

The Open Master Hearing Aid (openMHA)

4.12.0

Plugin Developers' Manual



HörTech

Kompetenzzentrum für
Hörgeräte-Systemtechnik

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1 Overview

The HörTech Open Master Hearing Aid (openMHA), is a development and evaluation software platform that is able to execute hearing aid signal processing in real-time on standard computing hardware with a low delay between sound input and output.

1.1 Structure

The openMHA can be split into four major components :

- **The openMHA command line application (MHA)** (p. 32)
- Signal processing plugins
- Audio input-output (IO) plugins (see `io_file_t` (p. 568), `MHAIOJack` (p. 111), `io_parser_t` (p. 580), `io_tcp_parser_t` (p. 590))
- **The openMHA toolbox library** (p. 33)

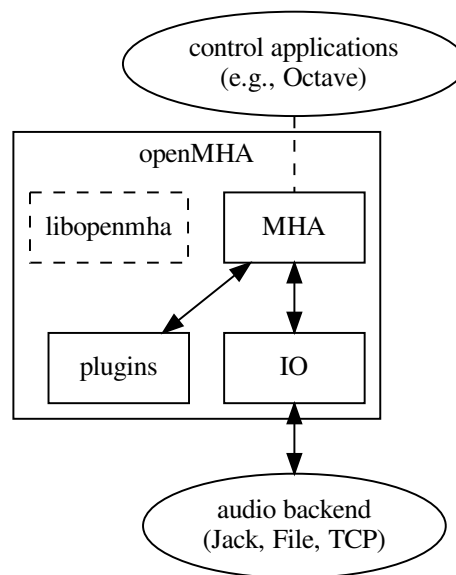


Figure 1 openMHA structure

The openMHA command line application (MHA) (p. 32) acts as a plugin host. It can load signal processing plugins as well as audio input-output (IO) plugins. Additionally, it provides the command line configuration interface and a TCP/IP based configuration interface. Several IO plugins exist: For real-time signal processing, commonly the openMHA **MHAIOJack** (p. 111) plugin (see plugins' manual) is used, which provides an interface to the Jack Audio Connection Kit (JACK). Other IO plugins provide audio file access or TCP/IP-based processing.

openMHA plugins provide the audio signal processing capabilities and audio signal handling. Typically, one openMHA plugin implements one specific algorithm. The complete virtual hearing aid signal processing can be achieved by a combination of several openMHA plugins.

1.2 Platform Services and Conventions

The openMHA platform offers some services and conventions to algorithms implemented in plugins, that make it especially well suited to develop hearing aid algorithms, while still supporting general-purpose signal processing.

1.2.1 Audio Signal Domains

As in most other plugin hosts, the audio signal in the openMHA is processed in audio chunks. However, plugins are not restricted to propagate audio signal as blocks of audio samples in the time domain another option is to propagate the audio signal in the short time Fourier transform (STFT) domain, i.e. as spectra of blocks of audio signal, so that not every plugin has to perform its own STFT analysis and synthesis. Since STFT analysis and re-synthesis of acceptable audio quality always introduces an algorithmic delay, sharing STFT data is a necessity for a hearing aid signal processing platform, because the overall delay of the complete processing has to be as short as possible.

Similar to some other platforms, the openMHA allows also arbitrary data to be exchanged between plugins through a mechanism called **algorithm communication variables** (p. 24) or short "AC vars". This mechanism is commonly used to share data such as filter coefficients or filter states.

1.2.2 Real-Time Safe Complex Configuration Changes

Hearing aid algorithms in the openMHA can export configuration settings that may be changed by the user at run time.

To ensure real-time safe signal processing, the audio processing will normally be done in a signal processing thread with real-time priority, while user interaction with configuration parameters would be performed in a configuration thread with normal priority, so that the audio processing does not get interrupted by configuration tasks. Two types of problems may occur when the user is changing parameters in such a setup:

- The change of a simple parameter exposed to the user may cause an involved recalculation of internal runtime parameters that the algorithm actually uses in processing. The duration required to perform this recalculation may be a significant portion of (or take even longer than) the time available to process one block of audio signal. In hearing aid usage, it is not acceptable to halt audio processing for the duration that the recalculation may require.
- If the user needs to change multiple parameters to reach a desired configuration state of an algorithm from the original configuration state, then it may not be acceptable that processing is performed while some of the parameters have already been changed while others still retain their original values. It is also not acceptable to interrupt signal processing until all pending configuration changes have been performed.

The openMHA provides a mechanism in its toolbox library to enable real-time safe configuration changes in openMHA plugins:

Basically, existing runtime configurations are used in the processing thread until the work of creating an updated runtime configuration has been completed in the configuration thread.

In hearing aids, it is more acceptable to continue to use an outdated configuration for a few more milliseconds than blocking all processing.

The openMHA toolbox library provides an easy-to-use mechanism to integrate real-time safe runtime configuration updates into every plugin.

1.2.3 Plugins can Themselves Host Other Plugins

An openMHA plugin can itself act as a plugin host. This allows to combine analysis and re-synthesis methods in a single plugin. We call plugins that can themselves load other plugins "bridge plugins" in the openMHA.

When such a bridge plugin is then called by the openMHA to process one block of signal, it will first perform its analysis, then invoke (as a function call) the signal processing in the loaded plugin to process the block of signal in the analysis domain, wait to receive a processed block of signal in the analysis domain back from the loaded plugin when the signal processing function call to that plugin returns, then perform the re-synthesis transform, and finally return the block of processed signal in the original domain back to the caller of the bridge plugin.

1.2.4 Central Calibration

The purpose of hearing aid signal processing is to enhance the sound for hearing impaired listeners. Hearing impairment generally means that people suffering from it have increased hearing thresholds, i.e. soft sounds that are audible for normal hearing listeners may be imperceptible for hearing impaired listeners. To provide accurate signal enhancement for hearing impaired people, hearing aid signal processing algorithms have to be able to determine the absolute physical sound pressure level corresponding to a digital signal given to any openMHA plugin for processing. Inside the openMHA, we achieve this with the following convention: The single-precision floating point time-domain sound signal samples, that are processed inside the openMHA plugins in blocks of short durations, have the physical pressure unit Pascal ($1\text{Pa} = 1\text{N/m}^2$). With this convention in place, all plugins can determine the absolute physical sound pressure level from the sound samples that they process: E.g. plugins can compute the rms (root mean squared) sound pressure in Pascal of the current block by computing $\text{rms} = \sqrt{\sum_i x_i^2}$, where x_i refer to the samples of the audio signal in a single audio channel, and the corresponding free-field sound pressure level L in dB SPL FF as $L = 20 \log_{10}(\text{rms}/20\mu\text{Pa})$. ($20\mu\text{Pa}$ is the sound pressure at 0dB SPL FF).

A derived convention is employed in the spectral domain for STFT signals: The sum of the squared magnitudes of all spectral bins computes rms of the signal in the current STFT block: $\text{rms} = \sqrt{\sum_i |X_i|^2}$, the X_i refer to the complex values of the STFT spectral bins. The STFT bins of the negative frequencies are not stored, since they contain the complex conjugate values of the corresponding positive frequencies. When summing over all bins to compute the rms

as above, care must be taken to also account for the negative frequencies. Note that the bins corresponding to 0Hz and to the Nyquist frequency have no corresponding negative frequency bin. The sound pressure level in dB can be computed from the `rms` in the same way as in the time domain.

Due to the dependency of the calibration on the hardware used, it is the responsibility of the user of the openMHA to perform calibration measurements and adapt the openMHA settings to make sure that this calibration convention is met. We provide the plugin `transducers` which can be configured to perform the necessary signal adjustments.

2 Module Documentation

2.1 Concept of Variables and Data Exchange in the openMHA

Accessibility of configuration variables and data exchange between plugins (processing blocks) are an important issue in the openMHA.

Accessibility of configuration variables and data exchange between plugins (processing blocks) are an important issue in the openMHA.

In general, variable types in the openMHA are distinguished by their different access methods. The variable types in the openMHA are:

- **Configuration variables** : Read and write accesses are possible through the openMHA configuration language interface. Configuration variables are implemented as C++ classes with a public data member of the underlying C type. Configuration variables can be read and modified from "outside" using the configuration language. The plugin which provides the configuration variable can use the exposed data member directly. All accesses through the openMHA configuration language are checked for data type, valid range, and access restrictions.
- **Monitor variables** : Read access is possible through the openMHA configuration language. Write access is only possible from the C++ code. Internally, monitor variables have a similar C++ class interface as configuration variables.
- **AC variables (algorithm communication variables)** (p. 24): Any C or C++ data structure can be shared within an openMHA chain. Access management and name space is realised in openMHA chain plugin ('mhachain'). AC variables are not available to the openMHA configuration language interface, although a read-only converter plugin `acmon` is available.
- **Runtime configuration** : Algorithms usually derive more parameters (runtime configuration) from the openMHA configuration language variables. When a configuration variable changes through configuration language write access, then the runtime configuration has to be recomputed. Plugin developers are encouraged to encapsulate the runtime configuration in a C++ class, which recomputes the runtime configuration from configuration variables in the constructor. The openMHA supports lock-free and thread-safe replacement of the runtime configuration instance (see **example5.cpp** (p. 16) and references therein).

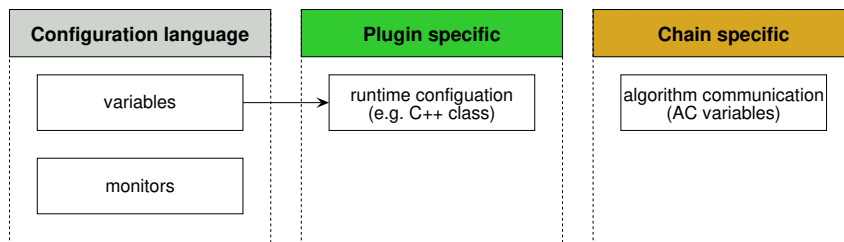


Figure 2 Variable types in the openMHA

Variables that describe physical facts to the MHA user should be given in SI units, e.g. meters for distances (not centimeters or inches), seconds for times (not milliseconds or minutes) etc for reasons of uniformity and simplicity of handling derived units.

The C++ data types are shown in the figure below. These variables can be accessed via the openMHA host application using the openMHA configuration language. For more details see the openMHA application manual.

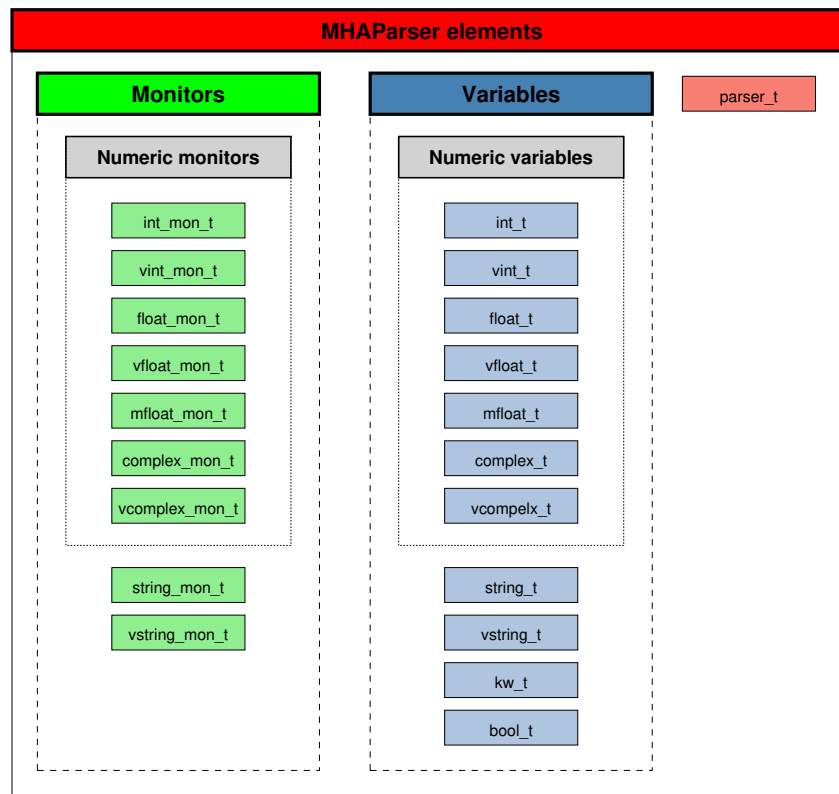


Figure 3 MHAParser elements

2.2 Writing openMHA Plugins. A step-by-step tutorial

A step-by-step tutorial on writing openMHA plugins.

A step-by-step tutorial on writing openMHA plugins.

Plugins are C++ code that is compiled and linked against the openMHA library. The compiler needs be instructed on how to find the openMHA headers and library and to link against the openMHA library. There are two possible options: One can compile openMHA and then create a copy of an example plugin directory and customize from there. See `COMPILATION.md` for more information on how to compile openMHA.

On Ubuntu it is also possible to install the `openmha-dev` package and include `config.mk` into the user's Makefile. Example 21 provides an example plugin and Makefile for this scenario.

openMHA contains a small number of example plugins as C++ source code. They are meant to help developers in understanding the concepts of openMHA plugin programming starting from the simplest example and increasing in complexity. This tutorial explains the basic parts of the example files.

2.2.1 example1.cpp

The example plugin file `example1.cpp` (p. 1495) demonstrates the easiest way to implement an openMHA Plugin. It attenuates the sound signal in the first channel by multiplying the sound samples with a factor. The plugin class `MHAPlugin::plugin_t` (p. 1097) exports several methods, but only two of them need a non-empty implementation: `prepare()` method is a pure virtual function and `process()` is called when signal processing starts.

```
#include "mha_plugin.hh"

class example1_t : public MHAPlugin::plugin_t<int> {
public:
    example1_t(algo_comm_t & ac,
               const std::string & chain_name,
               const std::string & algo_name)
        : MHAPlugin::plugin_t<int>("", ac)
    { /* Do nothing in constructor */ }

    void release(void)
    { /* Do nothing in release */ }
```

Every plugin implementation should include the '`mha_plugin.hh`' (p. 1565) header file. C++ helper classes for plugin development are declared in this header file, and most header files needed for plugin development are included by `mha_plugin.hh` (p. 1565).

The class `plugin1_t` inherits from the class `MHAPlugin::plugin_t` (p. 1097), which then inherits from `MHAParser::parser_t` (p. 1045) – the configuration language interface in the method "parse". Our plugin class therefore exports the working "parse" method inherited from `MHAParser::parser_t` (p. 1045), and the plugin is visible in the openMHA configuration tree.

The constructor has to accept 3 parameters of correct types. In this simple example, we do not make use of them.

The `release()` method is used to free resources after signal processing. In this simple example, we do not allocate resources, so there is no need to free them.

2.2.1.1 The prepare method

```
void prepare(mhaconfig_t & signal_info)
{
    if (signal_info.domain != MHA_WAVEFORM)
        throw MHA_Error(__FILE__, __LINE__,
                        "This plugin can only process waveform signals.");
    if (signal_info.channels < 1)
        throw MHA_Error(__FILE__, __LINE__,
                        "This plugin requires at least one input channel.");
}
```

Parameters

<i>signal_info</i>	Contains information about the input signal's parameters, see mhaconfig_t (p. 792).
--------------------	--

The `prepare()` method of the plugin is called before the signal processing starts, when the input signal parameters like domain, number of channels, frames per block, and sampling rate are known. The `prepare()` method can check these values and raise an exception if the plugin cannot cope with them, as is done here. The plugin can also change these values if the signal processing performed in the plugin results in an output signal with different parameters. This plugin does not change the signal's parameters, therefore they are not modified here.

2.2.1.2 The signal processing method

```
mha_wave_t * process(mha_wave_t * signal)
{
    unsigned int channel = 0; // channels and frames counting starts with 0
    float factor = 0.1f;
    unsigned int frame;

    // Scale channel number "channel" by "factor":
    for(frame = 0; frame < signal->num_frames; frame++) {
        // Waveform channels are stored interleaved.
        signal->buf[signal->num_channels * frame + channel] *= factor;
    }
    // Algorithms may process data in-place and return the input signal
    // structure as their output signal:
    return signal;
};
```

Parameters

<i>signal</i>	Pointer to the input signal structure mha_wave_t (p. 780).
---------------	---

Returns

Pointer to the output signal structure. The input signal structure may be reused if the signal has the same domain and dimensions.

The plugin works with time domain input signal (indicated by the data type **mha_wave_t** (p. 780))

of the process method's parameter). It scales the first channel by a factor of 0.1. The output signal reuses the structure that previously contained the input signal (in-place processing).

2.2.1.3 Connecting the C++ class with the C plugin interface

Plugins have to export C functions as their interface (to avoid C++ name-mangling issues and other incompatibilities when mixing plugins compiled with different C++ compilers).

```
MHAPLUGIN_CALLBACKS (example1, example1_t, wave, wave)
```

This macro takes care of accessing the C++ class from the C functions required as the plugin's interface. It implements the C functions and calls the corresponding C++ instance methods. Plugin classes should be derived from the template class **MHAPlugin::plugin_t** (p. 1097) to be compatible with the C interface wrapper.

This macro also catches C++ exceptions of type **MHA_Error** (p. 707), when raised in the methods of the plugin class, and reports the error using an error flag as the return value of the underlying C function. It is therefore important to note that only C++ exceptions of type **MHA_Error** (p. 707) may be raised by your plugin. If your code uses different Exception classes, you will have to catch them yourself before control leaves your plugin class, and maybe report the error by throwing an instance of **MHA_Error** (p. 707). This is important, because: (1) C++ exceptions cannot cross the plugin interface, which is in C, and (2) there is no error handling code for your exception classes in the openMHA framework anyways.

2.2.2 example2.cpp

This is another simple example of openMHA plugin written in C++. This plugin also scales one channel of the input signal, working in the time domain. The scale factor and which channel to scale (index number) are made accessible to the configuration language.

The algorithm is again implemented as a C++ class.

```
class example2_t : public MHAPlugin::plugin_t<int> {
    MHAParser::int_t scale_ch;
    MHAParser::float_t factor;
public:
    example2_t(algo_comm_t & ac,
               const std::string & chain_name,
               const std::string & algo_name);

    void prepare(mhaconfig_t & signal_info);

    void release(void);

    mha_wave_t * process(mha_wave_t * signal);
};
```

Parameters

<i>scale_ch</i>	– the channel number to be scaled
<i>factor</i>	– the scale factor of the scaling.

This class again inherits from the template class **MHAPugin::plugin_t** (p. 1097) for intergration with the openMHA configuration language. The two data members serve as externally visible configuration variables. All methods of this class have a non-empty implementation.

2.2.2.1 Constructor

```
example2_t::example2_t(algo_comm_t & ac,
                      const std::string & chain_name,
                      const std::string & algo_name)
: MHAPugin::plugin_t<int>("This plugin multiplies the sound signal"
                          " in one audio channel by a factor",ac),
  scale_ch("Index of audio channel to scale. Indices start from 0.",
           "0",
           "[0, [",
           factor("The scaling factor that is applied to the selected channel.",
                  "0.1",
                  "[0, [")
{
    insert_item("channel", &scale_ch);
    insert_item("factor", &factor);
}
```

The constructor invokes the superclass constructor with a string parameter. This string parameter serves as the help text that describes the functionality of the plugin. The constructor registers configuration variables with the openMHA configuration tree and sets their default values and permitted ranges. The minimum permitted value for both variables is zero, and there is no maximum limit (apart from the limitations of the underlying C data type). The configuration variables have to be registered with the parser node instance using the **MHAParser::parser←_t::insert_item** (p. 1047) method.

2.2.2.2 The prepare method

```
void example2_t::prepare(mhaconfig_t & signal_info)
{
    if (signal_info.domain != MHA_WAVEFORM)
        throw MHA_Error(__FILE__, __LINE__,
                        "This plugin can only process waveform signals.");
    // The user may have configured scale_ch before prepare is called.
    // Check that the configured channel is present in the input signal.
    if (signal_info.channels <= unsigned(scale_ch.data))
        throw MHA_Error(__FILE__, __LINE__,
                        "This plugin requires at least %d input channels.",
                        scale_ch.data + 1);
    // Adjust the range of the channel configuration variable so that it
    // cannot be set to an out-of-range value during processing.
    using MHAParser::StrCnv::val2str;
    scale_ch.set_range("[0, " + val2str(int(signal_info.channels)) + "[");
}
```

Parameters

<code>signal_info</code>	– contains information about the input signal's parameters, see <code>mhaconfig_t</code> (p. 792).
--------------------------	--

The user may have changed the configuration variables before preparing the openMHA plugin. A consequence of this is that it is not sufficient any more to check if the input signal has at least 1 audio channel.

Instead, this prepare method checks that the input signal has enough channels so that the current value of `scale_ch.data` is a valid channel index, i.e. $0 \leq \text{scale_ch.data} < \text{signal_info.channels}$. The prepare method does not have to check that $0 \leq \text{scale_ch.data}$, since this is guaranteed by the valid range setting of the configuration variable.

The prepare method then modifies the valid range of the `scale_ch` variable, it modifies the upper bound so that the user cannot set the variable to a channel index higher than the available channels. Setting the range is done using a string parameter. The prepare method concatenates a string of the form "[0,n[". `n` is the number of channels in the input signal, and is used here as an exclusive upper boundary. To convert the number of channels into a string, a helper function for string conversion from the openMHA Toolbox is used. This function is overloaded and works for several data types.

It is safe to assume that the value of configuration variables does not change while the prepare method executes, since openMHA preparation is triggered from a configuration language command, and the openMHA configuration language parser is busy and cannot accept other commands until all openMHA plugins are prepared (or one of them stops the process by raising an exception). As we will see later in this tutorial, the same assumption cannot be made for the process method.

2.2.2.3 The release method

```
void example2_t::release(void)
{
    scale_ch.set_range("0,[" );
}
```

The release method should undo the state changes that were performed by the prepare method. In this example, the prepare method has reduced the valid range of the `scale_ch`, so that only valid channels could be selected during signal processing.

The release method reverts this change by setting the valid range back to its original value, "[0,[".

2.2.2.4 The signal processing method

```
mha_wave_t * example2_t::process(mha_wave_t * signal)
{
    unsigned int frame;
    for(frame = 0; frame < signal->num_frames; frame++)
        value(signal, frame, scale_ch.data) *= factor.data;
    return signal;
}
```

The processing function uses the current values of the configuration variables to scale every frame in the selected audio channel.

Note that the value of each configuration variable can change while the processing method executes, since the process method usually executes in a different thread than the configuration interface.

For this simple plugin, this is not a problem, but for more advanced plugins, it has to be taken into consideration. The next section takes a closer look at the problem.

Consistency

Assume that one thread reads the value stored in a variable while another thread writes a new value to that variable concurrently. In this case, you may have a consistency problem. You would perhaps expect that the value retrieved from the variable either (a) the old value, or (b) the new value, but not (c) something else. Yet generally case (c) is a possibility.

Fortunately, for some data types on PC systems, case (c) cannot happen. These are 32bit wide data types with a 4-byte alignment. Therefore, the values in **MHAParser::int_t** (p. 1010) and **MHAParser::float_t** (p. 1004) are always consistent, but this is not the case for vectors, strings, or complex values. With these, you can get a mixture of the bit patterns of old and new values, or you can even cause a memory access violation in case a vector or string grows and has to be reallocated to a different memory address.

There is also a consistency problem if you take the combination of two "safe" datatypes. The openMHA provides a mechanism that can cope with these types of problems. This thread-safe runtime configuration update mechanism is introduced in example 5.

2.2.3 example3.cpp

This example introduces the openMHA Event mechanism. Plugins that provide configuration variable can receive a callback from the parser base class when a configuration variable is accessed through the configuration language interface.

The third example performs the same processing as before, but now only even channel indices are permitted when selecting the audio channel to scale. This restriction cannot be ensured by setting the range of the channel index configuration variable. Instead, the event mechanism of openMHA configuration variables is used. Configuration variables emit 4 different events, and your plugin can connect callback methods that are called when the events are triggered. These events are:

writeaccess

- triggered on write access to a configuration variable.

valuechanged

- triggered when write access to a configuration variable actually changes the value of this variable.

readaccess

- triggered after the value of the configuration variable has been read.

prereadaccess

- triggered before the value of a configuration variable is read, i.e. the value of the requested variable can be changed by the callback to implement computation on demand.

All of these callbacks are executed in the configuration thread. Therefore, the callback implementation does not have to be realtime-safe. No other updates of configuration language variables through the configuration language can happen in parallel, but your processing method can execute in parallel and may change values.

2.2.3.1 Data member declarations

```
class example3_t : public MHAPLugin::plugin_t<int> {
    MHAParser::int_t scale_ch;
    MHAParser::float_t factor;
    MHAParser::int_mon_t prepared;

    MHAEvents::patchbay_t<example3_t> patchbay;
```

This plugin exposes another configuration variable, "prepared", that keeps track of the prepared state of the plugin. This is a read-only (monitor) integer variable, i.e. its value can only be changed by your plugin's C++ code. When using the configuration language interface, the value of this variable can only be read, but not changed.

The patchbay member is an instance of a connector class that connects event sources with callbacks.

2.2.3.2 Method declarations

```

/* Callbacks triggered by Events */
void on_scale_ch_writeaccess();
void on_scale_ch_valuechanged();
void on_scale_ch_readaccess();
void on_prereadaccess();
public:
    example3_t(algo_comm_t & ac,
               const std::string & chain_name,
               const std::string & algo_name);

    void prepare(mhaconfig_t & signal_info);

    void release(void);

    mha_wave_t * process(mha_wave_t * signal);
};

```

This plugin exposes 4 callback methods that are triggered by events. Multiple events (from the same or different configuration variables) can be connected to the same callback method, if desired.

This example plugin uses the `valuechanged` event to check that the `scale_ch` configuration variable is only set to valid values.

The other callbacks only cause log messages to stdout, but the comments in the logging callbacks give a hint when listening on the events would be useful.

2.2.3.3 Example 3 constructor

```

example3_t::example3_t(algo_comm_t & ac,
                       const std::string & chain_name,
                       const std::string & algo_name)
: MHAPlugin::plugin_t<int>("This plugin multiplies the sound signal"
    " in one audio channel by a factor", ac),
  scale_ch("Index of audio channel to scale. Indices start from 0."
    " Only channels with even indices may be scaled.",
    "0",
    "[0, [",
    factor("The scaling factor that is applied to the selected channel.",
    "0.1",
    "[0, [",
    prepared("State of this plugin: 0 = unprepared, 1 = prepared")
{
    insert_item("channel", &scale_ch);
    insert_item("factor", &factor);
    prepared.data = 0;
    insert_item("prepared", &prepared);

    patchbay.connect(&scale_ch.writeaccess, this,
                     &example3_t::on_scale_ch_writeaccess);
    patchbay.connect(&scale_ch.valuechanged, this,
                     &example3_t::on_scale_ch_valuechanged);
    patchbay.connect(&scale_ch.readaccess, this,
                     &example3_t::on_scale_ch_readaccess);
    patchbay.connect(&scale_ch.prereadaccess, this,
                     &example3_t::on_prereadaccess);
    patchbay.connect(&factor.prereadaccess, this,
                     &example3_t::on_prereadaccess);
    patchbay.connect(&prepared.prereadaccess, this,
                     &example3_t::on_prereadaccess);
}

```

The constructor of monitor variables does not take a parameter for setting the initial value. The single parameter here is the help text describing the contents of the read-only variable. If the initial value should differ from 0, then the `.data` member of the configuration variable has to be set to the initial value in the plugin constructor's body explicitly, as is done here for demonstration although the initial value of this monitor variable is 0.

Events and callback methods are then connected using the `patchbay` member variable.

2.2.3.4 The prepare method

```
void example3_t::prepare(mhaconfig_t & signal_info)
{
    if (signal_info.domain != MHA_WAVEFORM)
        throw MHA_Error(__FILE__, __LINE__,
                        "This plugin can only process waveform signals.");
    // The user may have configured scale_ch before prepare is called.
    // Check that the configured channel is present in the input signal.
    if (signal_info.channels <= unsigned(scale_ch.data))
        throw MHA_Error(__FILE__, __LINE__,
                        "This plugin requires at least %d input channels.",
                        scale_ch.data + 1);

    // bookkeeping
    prepared.data = 1;
}
```

The prepare method checks whether the current setting of the `scale_ch` variable is possible with the input signal dimension. It does not adjust the range of the variable, since the range alone is not sufficient to ensure all future settings are also valid: The scale channel index has to be even.

2.2.3.5 The release method

```
void example3_t::release(void)
{
    prepared.data = 0;
}
```

The release method is needed for tracking the prepared state only in this example.

2.2.3.6 The signal processing method

```
mha_wave_t * example3_t::process(mha_wave_t * signal)
{
    unsigned int frame;
    for(frame = 0; frame < signal->num_frames; frame++)
        value(signal, frame, scale_ch.data) *= factor.data;
    return signal;
}
```

The signal processing member function is the same as in example 2.

2.2.3.7 The callback methods

```
void example3_t::on_scale_ch_writeaccess()
{
    printf("Write access: Attempt to set scale_ch=%d.\n", scale_ch.data);
    // Can be used to track any writeaccess to the configuration, even
    // if it does not change the value. E.g. setting the name of the
    // sound file in a string configuration variable can cause a sound
    // file player plugin to start playing the sound file from the
    // beginning.
}
void example3_t::on_scale_ch_valuechanged()
{
    if (scale_ch.data & 1)
        throw MHA_Error(__FILE__, __LINE__,
                        "Attempt to set scale_ch to non-even value %d",
                        scale_ch.data);
    // Can be used to recompute a runtime configuration only if some
    // configuration variable actually changed.
}
void example3_t::on_scale_ch_readaccess()
{
    printf("scale_ch has been read.\n");
    // A configuration variable used as an accumulator can be reset
    // after it has been read.
}
void example3_t::on_prereadaccess()
{
    printf("A configuration language variable is about to be read.\n");
    // Can be used to compute the value on demand.
}

MHAPLUGIN_CALLBACKS(example3, example3_t, wave, wave)
```

When the `writeaccess` or `valuechanged` callbacks throw an `MHAError` exception, then the change made to the value of the configuration variable is reverted.

If multiple event sources are connected to a single callback method, then it is not possible to determine which event has caused the callback to execute. Often, this information is not crucial, i.e. when the answer to a change of any variable in a set of variables is the same, e.g. the recomputation of a new runtime configuration that takes all variables of this set as input.

2.2.4 example4.cpp

This plugin is the same as example 3 except that it works on the spectral domain (STFT).

2.2.4.1 The Prepare method

```
void example4_t::prepare(mhaconfig_t & signal_info)
{
    if (signal_info.domain != MHA_SPECTRUM)
        throw MHA_Error(__FILE__, __LINE__,
                        "This plugin can only process spectrum signals.");
    // The user may have configured scale_ch before prepare is called.
    // Check that the configured channel is present in the input signal.
    if (signal_info.channels <= unsigned(scale_ch.data))
        throw MHA_Error(__FILE__, __LINE__,
                        "This plugin requires at least %d input channels.",
                        scale_ch.data + 1);

    // bookkeeping
    prepared.data = 1;
}
```

The prepare method now checks that the signal domain is `MHA_SPECTRUM`.

2.2.4.2 The signal processing method

```
mha_spec_t * example4_t::process(mha_spec_t * signal)
{
    unsigned int bin;
    // spectral signal is stored non-interleaved.
    mha_complex_t * channeldata =
        signal->buf + signal->num_frames * scale_ch.data;
    for(bin = 0; bin < signal->num_frames; bin++)
        channeldata[bin] *= factor.data;
    return signal;
}
```

The signal processing member function works on the spectral signal instead of the wave signal as before.

The **mha_spec_t** (p. 732) instance stores the complex (**mha_complex_t** (p. 688)) spectral signal for positive frequencies only (since the waveform signal is always real). The `num_frames` member of **mha_spec_t** (p. 732) actually denotes the number of STFT bins.

Please note that different from **mha_wave_t** (p. 780), a multichannel signal in **mha_spec_t** (p. 732) is stored non-interleaved in the signal buffer.

Some arithmetic operations are defined on struct **mha_complex_t** (p. 688) to facilitate efficient complex computations. The `*=` operator used here (defined for real and for complex arguments) is one of them.

2.2.4.3 Connecting the C++ class with the C plugin interface

```
MHAPLUGIN_CALLBACKS(example4, example4_t, spec, spec)
```

When connecting a class that performs spectral processing with the C interface, use `spec` instead of `wave` as the domain indicator.

2.2.5 example5.cpp

Many algorithms use complex operations to transform the user space variables into run time configurations. If this takes a noticeable time (e.g. more than 100-500 μ sec), the update of the runtime configuration can not take place in the real time processing thread. Furthermore, the parallel access to complex structures may cause unpredictable results if variables are read while only parts of them are written to memory (cf. section **Consistency** (p. 11)). To handle these situations, a special C++ template class **MHAPLugin::plugin_t** (p. 1097) was designed. This class helps keeping all access to the configuration language variables in the **configuration** thread rather than in the **processing** thread.

The runtime configuration class **example5_t** (p. 457) is the parameter of the template class **MHAPLugin::plugin_t** (p. 1097). Its constructor converts the user variables into a runtime configuration. Because the constructor executes in the configuration thread, there is no harm if the constructor takes a long time. All other member functions and data members of the runtime configurations are accessed only from the signal processing thread (real-time thread).

```
class example5_t {
public:
    example5_t(unsigned int,unsigned int,mha_real_t);
    mha_spec_t* process(mha_spec_t*);
private:
    unsigned int channel;
    mha_real_t scale;
};
```

The plugin interface class inherits from the plugin template class **MHAPlugin::plugin_t** (p. 1097), parameterised by the runtime configuration. Configuration changes (write access to the variables) will emit a write access event of the changed variables. These events can be connected to member functions of the interface class by the help of a **MHAEvents::patchbay_t** (p. 802) instance.

```
class plugin_interface_t : public MHAPlugin::plugin_t<example5_t> {
public:
    plugin_interface_t(const algo_comm_t&,const std::string&,const std::string&);
    mha_spec_t* process(mha_spec_t*);
    void prepare(mhaconfig_t&);
private:
    void update_cfg();
    /* integer variable of MHA-parser: */
    MHAParser::int_t scale_ch;
    /* float variable of MHA-parser: */
    MHAParser::float_t factor;
    /* patch bay for connecting configuration parser
       events with local member functions: */
    MHAEvents::patchbay_t<plugin_interface_t> patchbay;
};
```

The constructor of the runtime configuration analyses and validates the user variables. If the configuration is invalid, an exception of type **MHA_Error** (p. 707) is thrown. This will cause the openMHA configuration language command which caused the change to fail: The modified configuration language variable is then reset to its original value, and the error message will contain the message string of the **MHA_Error** (p. 707) exception.

```
example5_t::example5_t(unsigned int ichannel,
                      unsigned int numchannels,
                      mha_real_t iscale)
    : channel(ichannel),scale(iscale)
{
    if( channel >= numchannels )
        throw MHA_Error(__FILE__,__LINE__,
                        "Invalid channel number %u (only %u channels configured).",
                        channel,numchannels);
}
```

In this example, the run time configuration class **example5_t** (p. 457) has a signal processing member function. In this function, the selected channel is scaled by the given scaling factor.

```
mha_spec_t* example5_t::process(mha_spec_t* spec)
{
    /* Scale channel number "scale_ch" by "factor": */
    for(unsigned int fr = 0; fr < spec->num_frames; fr++){
        spec->buf[fr + channel * spec->num_frames].re *= scale;
        spec->buf[fr + channel * spec->num_frames].im *= scale;
    }
    return spec;
}
```

The constructor of the example plugin class is similar to the previous examples. A callback triggered on write access to the variables is registered using the **MHAEvents::patchbay_t** (p. 802) instance.

```
plugin_interface_t::plugin_interface_t(
    const algo_comm_t& iac,
    const std::string&, const std::string&)
: MHAPLugin::plugin_t<example5_t>("example plugin scaling a spectral signal", iac),
  /* initializing variable 'scale_ch' with MHAParser::int_t(char* name, .... ) */
  scale_ch("channel number to be scaled", "0", "[0, [",
  /* initializing variable 'factor' with MHAParser::float_t(char* name, .... ) */
  factor("scale factor", "1.0", "[0,2]")
{
    /* Register variables to the configuration parser: */
    insert_item("channel", &scale_ch);
    insert_item("factor", &factor);
    /*
     * On write access to the parser variables a notify callback of
     * this class will be called. That function will update the runtime
     * configuration.
     */
    patchbay.connect(&scale_ch.writeaccess, this, &plugin_interface_t::update_cfg);
    patchbay.connect(&factor.writeaccess, this, &plugin_interface_t::update_cfg);
}
```

The processing function can gather the latest valid runtime configuration by a call of `poll_config`. On success, the class member `cfg` points to this configuration. On error, if there is no usable runtime configuration instance, an exception is thrown. In this example, the `prepare` method ensures that there is a valid runtime configuration, so that in this example, no error can be raised at this point. The `prepare` method is always executed before the `process` method is called. The runtime configuration class in this example provides a signal processing method. The `process` method of the plugin interface calls the `process` method of this instance to perform the actual signal processing.

```
mha_spec_t* plugin_interface_t::process(mha_spec_t* spec)
{
    poll_config();
    return cfg->process(spec);
}
```

The `prepare` method ensures that a valid runtime configuration exists by creating a new runtime configuration from the current configuration language variables. If the configuration is invalid, then an exception of type **MHA_Error** (p. 707) is raised and the preparation of the openMHA fails with an error message.

```
void plugin_interface_t::prepare(mhaconfig_t& tfcfg)
{
    if( tfcfg.domain != MHA_SPECTRUM )
        throw MHA_Error(__FILE__, __LINE__,
            "Example5: Only spectral processing is supported.");
    /* remember the transform configuration (i.e. channel numbers): */
    tftype = tfcfg;
    /* make sure that a valid runtime configuration exists: */
    update_cfg();
}
```

The `update_cfg` member function is called when the value of a configuration language variable changes, or from the prepare method. It allocates a new runtime configuration and registers it for later access from the real time processing thread. The function **push_config** (p. 1095) stores the configuration in a FiFo queue of runtime configurations. Once they are inserted in the FiFo, the **MHAPlugin::plugin_t** (p. 1097) template is responsible for deleting runtime configuration instances stored in the FiFo. You don't need to keep track of the created instances, and you must not delete them yourself.

```
void plugin_interface_t::update_cfg()
{
    if( tftype.channels )
        push_config(new example5_t(scale_ch.data,tftype.channels,factor.data));
}
```

In the end of the example code file, the macro **MHAPLUGIN_CALLBACKS** (p. 1568) defines all ANSI-C interface functions and passes them to the corresponding C++ class member functions (partly defined by the **MHAPlugin::plugin_t** (p. 1097) template class). All exceptions of type **MHA_Error** (p. 707) are caught and transformed into an appropriate error code and error message.

```
MHAPLUGIN_CALLBACKS(example5,plugin_interface_t,spec,spec)
```

2.2.6 example6.cpp

This last example is the same as the previous one, but it additionally creates an 'Algorithm Communication Variable' (AC variable). It calculates the RMS level of a given channel and stores it into this variable. The variable can be accessed by any other algorithm in the same chain. To store the data onto disk, the 'acsave' plugin can be used. 'acmon' is a plugin which converts AC variables into parsable monitor variables.

In the constructor of the plugin class the variable `rmsdb` is registered under the name `example6_rmslev` as a one-dimensional AC variable of type float. For registration of other types, read access and other detailed informations please see **Communication between algorithms** (p. 24).

```
example6_t::example6_t(const algo_comm_t& iac,
                      const std::string&,const std::string&)
: MHAPlugin::plugin_t<cfg_t>("Example rms level meter plugin",iac),
  /* initialzing variable 'channel_no' with MHAParser::int_t(char* name, .... ) */
  channel_no("channel in which the RMS level is measured","0","[0,[")
{
    /* Register variables to the configuration parser: */
    insert_item("channel",&channel_no);
    /*
     * On write access to the parser variables a notify callback of
     * this class will be called. That funtion will update the runtime
     * configuration.
     */
    patchbay.connect(&channel_no.writeaccess,this,&example6_t::update_cfg);
    /*
     * Propagate the level variable to all algorithms in the
     * processing chain. If multiple instances of this algorithm are
     * required, than it is necessary to use different names for this
     * variable (i.e. prefixing the name with the algorithm name
     * passed to MHAInit).
     */
    ac.insert_var_float( ac.handle, "example6_rmslev", &rmsdb );
}
```


2.2.7 Debugging openMHA plugins

Suppose you would want to step through the code of your openMHA plugin with a debugger. This example details how to use the linux gdb debugger to inspect the `example6_t::prepare()` (p. 460) and `example6_t::process()` (p. 460) routines of `example6.cpp` (p. 19) example 6.

First, make sure that your plugin is compiled with the compiler option to include debugging symbols: Apply the `-ggdb` switch to all gcc, g++ invocations.

Once the plugin is compiled, with debugging symbols, create a test configuration. For example 6, assuming there is an audio file named `input.wav` in your working directory, you could create a configuration file named `'debugexample6.cfg'`, with the following content:

```
# debugexample6.cfg
fragsize = 64
srate = 44100
nchannels_in = 2
iolib = MHAIOFile

io.in = input.wav
io.out = output.wav
mhalib = example6
mha.channel = 1
cmd=start
```

Assuming all your binaries and shared-object libraries are in your `'bin'` directory (see README.md), you could start gdb using

```
$ export MHA_LIBRARY_PATH=$PWD/bin
$ gdb $MHA_LIBRARY_PATH/mha
```

Set breakpoints in `prepare` and `process` methods, and start execution. Note that specifying the breakpoint by symbol (`example6_t::prepare` (p. 460)) does not yet work, as the symbol lives in the openMHA plugin that has not yet been loaded. Specifying by line number works, however. Specifying the breakpoint by symbol also works once the plugin is loaded (i.e. when the debugger stops in the first break point). You can set the breakpoints like this (example shown here is run in gdb version 7.11.1):

```
(gdb) run ?read:debugexample6.cfg
Starting program: {openMHA_directory}/bin/mha ?read:debugexample6.cfg
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".
The Open Master Hearing Aid (openMHA) server
Copyright (c) 2005-2020 HoerTech gGmbH, D-26129 Oldenburg, Germany
```

```
This program comes with ABSOLUTELY NO WARRANTY; for details see file COPYING.
This is free software, and you are welcome to redistribute it
under the terms of the GNU AFFERO GENERAL PUBLIC LICENSE, Version 3;
for details see file COPYING.
```

```
Breakpoint 1, example6_t::prepare (this=0x6478b0, tfcfg=...)
  at example6.cpp:192
192         if( tfcfg.domain != MHA_WAVEFORM )
(gdb) b example6.cpp:162
Breakpoint 2 at 0x7ffff589744a: file example6.cpp, line 162.
(gdb) c
Continuing.
```

Where '{openMHA_directory}' is the directory where openMHA is located (which should also be your working directory in this case). Next stop is the `process()` method. You can now examine and change the variables, step through the program as needed (using, for example 'n' to step in the next line):

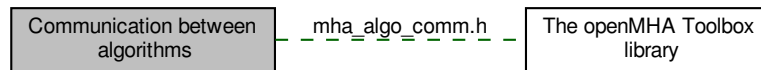
```
Breakpoint 2, example6_t::process (this=0x7ffff6a06c0d, wave=0x10a8b550)
    at example6.cpp:162
162     {
(gdb) n
163     poll_config();
(gdb)
```


2.3 The MHA Framework interface

2.4 Communication between algorithms

Algorithms within one chain can share variables for communication with other algorithms.

Collaboration diagram for Communication between algorithms:



Files

- file **mha_algo_comm.h**
Header file for Algorithm Communication.

Namespaces

- **MHA_AC**
Functions and classes for Algorithm Communication (AC) support.

Classes

- class **MHA_AC::spectrum_t**
*Insert a **MHASignal::spectrum_t** (p. 1197) class into the AC space.*
- class **MHA_AC::waveform_t**
*Insert a **MHASignal::waveform_t** (p. 1212) class into the AC space.*
- class **MHA_AC::int_t**
Insert a integer variable into the AC space.
- class **MHA_AC::float_t**
Insert a float point variable into the AC space.
- class **MHA_AC::double_t**
Insert a double precision floating point variable into the AC space.
- class **MHA_AC::ac2matrix_t**
Copy AC variable to a matrix.
- class **MHA_AC::acspace2matrix_t**
Copy all or a subset of all numeric AC variables into an array of matrixes.
- struct **algo_comm_t**
A reference handle for algorithm communication variables.
- struct **comm_var_t**
Algorithm communication variable structure.

Functions

- **mha_spec_t MHA_AC::get_var_spectrum** (**algo_comm_t** ac, const std::string &name)
Convert an AC variable into a spectrum.
- **mha_wave_t MHA_AC::get_var_waveform** (**algo_comm_t** ac, const std::string &name)
Convert an AC variable into a waveform.
- **int MHA_AC::get_var_int** (**algo_comm_t** ac, const std::string &name)
Return value of an integer scalar AC variable.
- **float MHA_AC::get_var_float** (**algo_comm_t** ac, const std::string &name)
Return value of an floating point scalar AC variable.
- **std::vector< float > MHA_AC::get_var_vfloat** (**algo_comm_t** ac, const std::string &name)
Return value of an floating point vector AC variable as standard vector of floats.

2.4.1 Detailed Description

Algorithms within one chain can share variables for communication with other algorithms.

This mechanism allows interaction between algorithms (i.e. separation of noise estimation and noise reduction algorithms, combination of dynamic compression and noise estimation). Through a set of simple C functions, algorithms can propagate variables of any type, even C++ classes, to other algorithms.

An algorithm communication handle (**algo_comm_t** (p. 271)) is passed at initialisation time to the constructor of each plugin class **constructor** (p. 1097). This handle contains a reference handle, **algo_comm_t::handle** (p. 272), and a number of function pointers, **algo_comm_t::insert_var** (p. 272) etc.. An algorithm communication variable is accessed through objects of type **comm_var_t** (p. 344).

For openMHA users, openMHA provides generic plugins to inspect and store AC variables of numeric types:

- plugin **acmon** mirrors AC variables of numeric types in readonly configuration variables (called monitors),
- plugin **acsave** stores AC variables into Matlab or text files. Plugin developers may also want to use these plugins to inspect any AC variables published by their own plugins during testing.

As a developer of openMHA plugin(s), please observe the following best practices in plugins using AC variables:

1. Plugins publishing AC variables:

- insert all variables during **prepare()**

- re-insert all variables during each process()
- memory used for storing AC variable values is allocated and owned by the publishing plugin and needs to remain valid until the next call to process() or release() of the same plugin.

2. Plugins consuming AC variable published by other plugins:

- poll required variables (and check validity) again during each process() before accessing their values.

2.4.2 Function Documentation

2.4.2.1 get_var_spectrum()

```
mha_spec_t MHA_AC::get_var_spectrum (
    algo_comm_t ac,
    const std::string & name )
```

Convert an AC variable into a spectrum.

This function reads an AC variable and tries to convert it into a valid spectrum. The Spectrum variable is granted to be valid only for one call of the processing function.

Parameters

<i>ac</i>	AC handle
<i>name</i>	Name of the variable

Returns

Spectrum structure

2.4.2.2 get_var_waveform()

```
mha_wave_t MHA_AC::get_var_waveform (
    algo_comm_t ac,
    const std::string & name )
```

Convert an AC variable into a waveform.

This function reads an AC variable and tries to convert it into a valid waveform. The waveform variable is granted to be valid only for one call of the processing function.

Parameters

<i>ac</i>	AC handle
<i>name</i>	Name of the variable

Returns

waveform structure

2.4.2.3 get_var_int()

```
int MHA_AC::get_var_int (
    algo_comm_t ac,
    const std::string & name )
```

Return value of an integer scalar AC variable.

Parameters

<i>ac</i>	AC handle
<i>name</i>	Name of the variable

Returns

Variable value

2.4.2.4 get_var_float()

```
float MHA_AC::get_var_float (
    algo_comm_t ac,
    const std::string & name )
```

Return value of an floating point scalar AC variable.

Parameters

<i>ac</i>	AC handle
<i>name</i>	Name of the variable

Returns

Variable value

2.4.2.5 get_var_vfloat()

```
std::vector< float > MHA_AC::get_var_vfloat (
    algo_comm_t ac,
    const std::string & name )
```

Return value of an floating point vector AC variable as standard vector of floats.

Parameters

<i>ac</i>	AC handle
<i>name</i>	Name of the variable

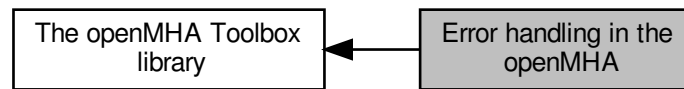
Returns

Variable value

2.5 Error handling in the openMHA

Errors are reported to the user via the **MHA_Error** (p. 707) exception.

Collaboration diagram for Error handling in the openMHA:



Classes

- class **MHA_Error**
Error reporting exception class.

Macros

- #define **MHA_ErrorMsg**(x) **MHA_Error**(__FILE__, __LINE__, "%s", x)
Throw an openMHA error with a text message.
- #define **MHA_assert**(x) if(! (x)) throw **MHA_Error**(__FILE__, __LINE__, "\"%s\" is false.", #x)
*Assertion macro, which throws an **MHA_Error** (p. 707).*
- #define **MHA_assert_equal**(a, b) if(a != b) throw **MHA_Error**(__FILE__, __LINE__, "\"%s == %s\" is false (%s = %g, %s = %g).", #a, #b, #a, (double)(a), #b, (double)(b))
*Equality assertion macro, which throws an **MHA_Error** (p. 707) with the values.*

Functions

- void **mha_debug** (const char *fmt,...) __attribute__((__format__(printf
Print an info message (stderr on Linux, OutputDebugString in Windows).

2.5.1 Detailed Description

Errors are reported to the user via the **MHA_Error** (p. 707) exception.

2.5.2 Macro Definition Documentation

2.5.2.1 MHA_ErrorMsg

```
#define MHA_ErrorMsg(  
    x )    MHA_Error(__FILE__, __LINE__, "%s", x)
```

Throw an openMHA error with a text message.

Parameters

<i>x</i>	Text message.
----------	---------------

2.5.2.2 MHA_assert

```
#define MHA_assert(
    x ) if(!(x)) throw MHA_Error(__FILE__, __LINE__, "\"%s\" is false.", #x)
```

Assertion macro, which throws an **MHA_Error** (p. 707).

Parameters

<i>x</i>	Boolean expression which should be true.
----------	--

2.5.2.3 MHA_assert_equal

```
#define MHA_assert_equal(
    a,
    b ) if( a != b ) throw MHA_Error(__FILE__, __LINE__, "\"%s == %s\" is
false (%s = %g, %s = %g).", #a, #b, #a, (double)(a), #b, (double)(b))
```

Equality assertion macro, which throws an **MHA_Error** (p. 707) with the values.

Parameters

<i>a</i>	Numeric expression which can be converted to double (for printing).
<i>b</i>	Numeric expression which should be equal to a

2.5.3 Function Documentation**2.5.3.1 mha_debug()**

```
void mha_debug (
    const char * fmt,
    ... )
```

Print an info message (stderr on Linux, OutputDebugString in Windows).

2.6 The openMHA configuration language

openMHA Plugins that should use the openMHA configuration language for their configuration have to be implemented in C++ and need to include **mha_parser.hh** (p. 1561).

openMHA Plugins that should use the openMHA configuration language for their configuration have to be implemented in C++ and need to include **mha_parser.hh** (p. 1561).

All required classes and functions for parser access are declared in the namespace **MHA↵Parser** (p. 123). The plugin class should be derived from the class **MHAParser::parser_↵t** (p. 1045) (or **MHAPLugin::plugin_t** (p. 1097)), which symbolises a sub-parser node in the openMHA script hierarchy. Variables of many types can be registered to the sub-parser node by calling the member function **insert_item** (p. 1047).

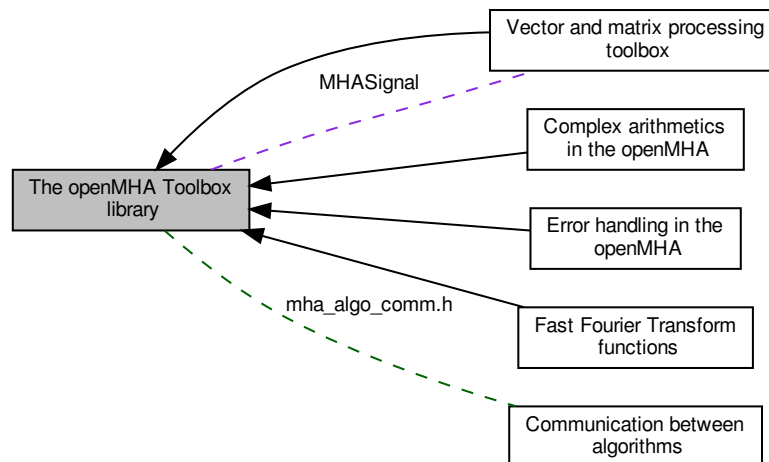
The openMHA Plugin template class **MHAPLugin::plugin_t** (p. 1097) together with the Plugin macro **MHAPLUGIN_CALLBACKS** (p. 1568) provide the callback mappings and correct inheritance. If your plugin is based on that template class, you simply have to use the **insert_item** command to give access to your variables, everything else is managed internally.

A complete list of all openMHA script items is given in the description of the **MHAParser** (p. 123) namespace.

2.7 The openMHA Toolbox library

The openMHA toolbox is a static C++ library which makes it more comfortable to develop openMHA plugins.

Collaboration diagram for The openMHA Toolbox library:



Modules

- **Error handling in the openMHA**

*Errors are reported to the user via the **MHA_Error** (p. 707) exception.*

- **Vector and matrix processing toolbox**

*The vector and matrix processing toolbox consists of a number of classes defined in the namespace **MHASignal** (p. 137), and many functions and operators for use with the structures **mha_wave_t** (p. 780) and **mha_spec_t** (p. 732).*

- **Complex arithmetics in the openMHA**

- **Fast Fourier Transform functions**

Files

- file **mha_algo_comm.h**

Header file for Algorithm Communication.

- file **mha_filter.hh**

Header file for IIR filter classes.

- file **mha_signal.hh**

Header file for audio signal handling and processing classes.

- file **mha_tablelookup.hh**

Header file for table lookup classes.

Namespaces

- **MHAOvFilter**
Namespace for overlapping FFT based filter bank classes and functions.
- **MHAFilter**
Namespace for IIR and FIR filter classes.
- **MHAParser**
Name space for the openMHA-Parser configuration language.
- **MHASignal**
Namespace for audio signal handling and processing classes.
- **MHATableLookup**
Namespace for table lookup classes.

2.7.1 Detailed Description

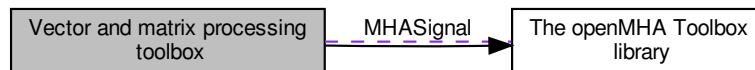
The openMHA toolbox is a static C++ library which makes it more comfortable to develop openMHA plugins.

It contains the openMHA script language classes.

2.8 Vector and matrix processing toolbox

The vector and matrix processing toolbox consists of a number of classes defined in the namespace **MHASignal** (p. 137), and many functions and operators for use with the structures **mha_wave_t** (p. 780) and **mha_spec_t** (p. 732).

Collaboration diagram for Vector and matrix processing toolbox:



Namespaces

- **MHASignal**
Namespace for audio signal handling and processing classes.
- **MHAWindow**
Collection of Window types.

Classes

- struct **mha_wave_t**
Waveform signal structure.
- struct **mha_spec_t**
Spectrum signal structure.
- struct **mha_audio_descriptor_t**
*Description of an audio fragment (planned as a replacement of **mhaconfig_t** (p. 792)).*
- struct **mha_audio_t**
*An audio fragment in the openMHA (planned as a replacement of **mha_wave_t** (p. 780) and **mha_spec_t** (p. 732)).*
- class **MHASignal::spectrum_t**
*a signal processing class for spectral data (based on **mha_spec_t** (p. 732))*
- class **MHASignal::waveform_t**
*signal processing class for waveform data (based on **mha_wave_t** (p. 780))*
- class **MHASignal::doublebuffer_t**
Double-buffering class.
- class **MHASignal::hilbert_t**
Hilbert transformation of a waveform segment.
- class **MHASignal::minphase_t**
Minimal phase function.
- class **MHASignal::uint_vector_t**

Vector of unsigned values, used for size and index description of n-dimensional matrixes.

- class **MHASignal::matrix_t**
n-dimensional matrix with real or complex floating point values.
- class **MHAParser::window_t**
MHA configuration interface for a window function generator.
- class **MHASignal::delay_wave_t**
Delayline containing wave fragments.
- class **MHASignal::async_rmslevel_t**
Class for asynchronous level metering.

Typedefs

- typedef float **mha_real_t**
openMHA type for real numbers

Functions

- **mha_wave_t range** (**mha_wave_t** s, unsigned int k0, unsigned int len)
Return a time interval from a waveform chunk.
- **mha_spec_t channels** (**mha_spec_t** s, unsigned int ch_start, unsigned int nch)
Return a channel interval from a spectrum.
- **mha_real_t MHASignal::bin2freq** (**mha_real_t** bin, unsigned fftlen, **mha_real_t** ←
t srate)
conversion from fft bin index to frequency
- **mha_real_t MHASignal::freq2bin** (**mha_real_t** freq, unsigned fftlen, **mha_real_t** ←
t srate)
conversion from frequency to fft bin index
- **mha_real_t MHASignal::smp2rad** (**mha_real_t** samples, unsigned bin, unsigned
fftlen)
conversion from delay in samples to phase shift
- **mha_real_t MHASignal::rad2smp** (**mha_real_t** phase_shift, unsigned bin, unsigned
fftlen)
conversion from phase shift to delay in samples
- template<class elem_type >
std::vector< elem_type > **MHASignal::dupvec** (std::vector< elem_type > vec, unsigned
n)
Duplicate last vector element to match desired size.
- template<class elem_type >
std::vector< elem_type > **MHASignal::dupvec_chk** (std::vector< elem_type > vec, un-
signed n)
Duplicate last vector element to match desired size, check for dimension.
- bool **equal_dim** (const **mha_wave_t** &a, const **mha_wave_t** &b)
Test for equal dimension of waveform structures.
- bool **equal_dim** (const **mha_wave_t** &a, const **mhaconfig_t** &b)
Test for match of waveform dimension with mhaconfig structure.

- **bool equal_dim** (const **mha_spec_t** &a, const **mha_spec_t** &b)
Test for equal dimension of spectrum structures.
- **bool equal_dim** (const **mha_spec_t** &a, const **mhaconfig_t** &b)
Test for match of spectrum dimension with mhaconfig structure.
- **bool equal_dim** (const **mha_wave_t** &a, const **mha_spec_t** &b)
Test for equal dimension of waveform/spectrum structures.
- **bool equal_dim** (const **mha_spec_t** &a, const **mha_wave_t** &b)
Test for equal dimension of waveform/spectrum structures.
- **void integrate** (**mha_wave_t** &s)
Numeric integration of a signal vector (real values)
- **void integrate** (**mha_spec_t** &s)
Numeric integration of a signal vector (complex values)
- **unsigned int size** (const **mha_wave_t** &s)
Return size of a waveform structure.
- **unsigned int size** (const **mha_spec_t** &s)
Return size of a spectrum structure.
- **unsigned int size** (const **mha_wave_t** *s)
Return size of a waveform structure.
- **unsigned int size** (const **mha_spec_t** *s)
Return size of a spectrum structure.
- **void clear** (**mha_wave_t** &s)
Set all values of waveform to zero.
- **void clear** (**mha_wave_t** *s)
Set all values of waveform to zero.
- **void clear** (**mha_spec_t** &s)
Set all values of spectrum to zero.
- **void clear** (**mha_spec_t** *s)
Set all values of spectrum to zero.
- **void assign** (**mha_wave_t** self, **mha_real_t** val)
Set all values of waveform 'self' to 'val'.
- **void assign** (**mha_wave_t** self, const **mha_wave_t** &val)
Set all values of waveform 'self' to 'val'.
- **void assign** (**mha_spec_t** self, const **mha_spec_t** &val)
Set all values of spectrum 'self' to 'val'.
- **void timeshift** (**mha_wave_t** &self, int shift)
Time shift of waveform chunk.
- **mha_real_t & value** (**mha_wave_t** *s, unsigned int fr, unsigned int ch)
Access an element of a waveform structure.
- **const mha_real_t & value** (const **mha_wave_t** *s, unsigned int fr, unsigned int ch)
Constant access to an element of a waveform structure.
- **mha_complex_t & value** (**mha_spec_t** *s, unsigned int fr, unsigned int ch)
Access to an element of a spectrum.
- **const mha_complex_t & value** (const **mha_spec_t** *s, unsigned int fr, unsigned int ch)
Constant access to an element of a spectrum.
- **mha_real_t & value** (**mha_wave_t** &s, unsigned int fr, unsigned int ch)

- Access to an element of a waveform structure.*

 - `const mha_real_t & value` (`const mha_wave_t &s`, unsigned int fr, unsigned int ch)

Constant access to an element of a waveform structure.
- `mha_complex_t & value` (`mha_spec_t &s`, unsigned int fr, unsigned int ch)

Access to an element of a spectrum.
- `const mha_complex_t & value` (`const mha_spec_t &s`, unsigned int fr, unsigned int ch)

Constant access to an element of a spectrum.
- `std::vector< float > std_vector_float` (`const mha_wave_t &`)

Converts a `mha_wave_t` (p. 780) structure into a `std::vector<float>` (interleaved order).
- `std::vector< std::vector< float > > std_vector_vector_float` (`const mha_wave_t &`)

Converts a `mha_wave_t` (p. 780) structure into a `std::vector< std::vector<float> >` (outer vector represents channels).
- `std::vector< std::vector< mha_complex_t > > std_vector_vector_complex` (`const mha_spec_t &`)

Converts a `mha_spec_t` (p. 732) structure into a `std::vector< std::vector<mha_complex_t> >` (outer vector represents channels).
- `mha_wave_t & operator+=` (`mha_wave_t &`, `const mha_real_t &`)

Addition operator.
- `mha_wave_t & operator+=` (`mha_wave_t &`, `const mha_wave_t &`)

Addition operator.
- `mha_wave_t & operator-=` (`mha_wave_t &`, `const mha_wave_t &`)

Subtraction operator.
- `mha_spec_t & operator-=` (`mha_spec_t &`, `const mha_spec_t &`)

Subtraction operator.
- `mha_wave_t & operator*=` (`mha_wave_t &`, `const mha_real_t &`)

Element-wise multiplication operator.
- `mha_wave_t & operator*=` (`mha_wave_t &`, `const mha_wave_t &`)

Element-wise multiplication operator.
- `mha_spec_t & operator*=` (`mha_spec_t &`, `const mha_real_t &`)

Element-wise multiplication operator.
- `mha_spec_t & operator*=` (`mha_spec_t &`, `const mha_wave_t &`)

Element-wise multiplication operator.
- `mha_spec_t & operator*=` (`mha_spec_t &`, `const mha_spec_t &`)

Element-wise multiplication operator.
- `mha_spec_t & operator/=` (`mha_spec_t &`, `const mha_spec_t &`)

Element-wise division operator.
- `mha_wave_t & operator/=` (`mha_wave_t &`, `const mha_wave_t &`)

Element-wise division operator.
- `mha_spec_t & operator+=` (`mha_spec_t &`, `const mha_spec_t &`)

Addition operator.
- `mha_spec_t & operator+=` (`mha_spec_t &`, `const mha_real_t &`)

Addition operator.
- `mha_wave_t & operator^=` (`mha_wave_t &self`, `const mha_real_t &arg`)

Exponent operator.

- void **MHASignal::copy_channel** (**mha_spec_t** &self, const **mha_spec_t** &src, unsigned sch, unsigned dch)
Copy one channel of a source signal.
- void **MHASignal::copy_channel** (**mha_wave_t** &self, const **mha_wave_t** &src, unsigned src_channel, unsigned dest_channel)
Copy one channel of a source signal.
- **mha_real_t MHASignal::rmslevel** (const **mha_spec_t** &s, unsigned int channel, unsigned int fftlen)
Return RMS level of a spectrum channel.
- **mha_real_t MHASignal::colored_intensity** (const **mha_spec_t** &s, unsigned int channel, unsigned int fftlen, **mha_real_t** *sqfreq_response=NULLptr)
Colored spectrum intensity.
- **mha_real_t MHASignal::maxabs** (const **mha_spec_t** &s, unsigned int channel)
Find maximal absolute value.
- **mha_real_t MHASignal::rmslevel** (const **mha_wave_t** &s, unsigned int channel)
Return RMS level of a waveform channel.
- **mha_real_t MHASignal::maxabs** (const **mha_wave_t** &s, unsigned int channel)
Find maximal absolute value.
- **mha_real_t MHASignal::maxabs** (const **mha_wave_t** &s)
Find maximal absolute value.
- **mha_real_t MHASignal::max** (const **mha_wave_t** &s)
Find maximal value.
- **mha_real_t MHASignal::min** (const **mha_wave_t** &s)
Find minimal value.
- **mha_real_t MHASignal::sumsqr_channel** (const **mha_wave_t** &s, unsigned int channel)
Calculate sum of squared values in one channel.
- **mha_real_t MHASignal::sumsqr_frame** (const **mha_wave_t** &s, unsigned int frame)
Calculate sum over all channels of squared values.
- void **conjugate** (**mha_spec_t** &self)
*Replace (!) the value of this **mha_spec_t** (p. 732) with its conjugate.*

2.8.1 Detailed Description

The vector and matrix processing toolbox consists of a number of classes defined in the namespace **MHASignal** (p. 137), and many functions and operators for use with the structures **mha_wave_t** (p. 780) and **mha_spec_t** (p. 732).

2.8.2 Typedef Documentation

2.8.2.1 mha_real_t

```
typedef float mha_real_t
```

openMHA type for real numbers

This type is expected to be allways the C-type 'float' (IEEE 754 single).

2.8.3 Function Documentation

2.8.3.1 range()

```
mha_wave_t range (
    mha_wave_t s,
    unsigned int k0,
    unsigned int len )
```

Return a time interval from a waveform chunk.

A waveform chunk containing a time intervall of a larger waveform chunk is returned. The number of channels remains constant. The data of the output waveform structure points to the data of the input structure, i.e., write access to the output waveform chunk modifies the corresponding entries in the input chunk.

Parameters

<i>s</i>	Waveform structure
<i>k0</i>	Index of first value in output
<i>len</i>	Number of frames in output

Returns

Waveform structure representing the sub-interval.

2.8.3.2 channels()

```
mha_spec_t channels (
    mha_spec_t s,
    unsigned int ch_start,
    unsigned int nch )
```

Return a channel interval from a spectrum.

Parameters

<i>s</i>	Input spectrum
<i>ch_start</i>	Index of first channel in output
<i>nch</i>	Number of channels in output

Returns

Spectrum structure representing the sub-interval.

2.8.3.3 bin2freq()

```
mha_real_t MHASignal::bin2freq (
    mha_real_t bin,
    unsigned fftlen,
    mha_real_t srate ) [inline]
```

conversion from fft bin index to frequency

Parameters

<i>bin</i>	index of fft bin, index 0 has dc
<i>fftlen</i>	FFT length
<i>srate</i>	sampling frequency / Hz

Returns

frequency of fft bin / Hz

2.8.3.4 freq2bin()

```
mha_real_t MHASignal::freq2bin (
    mha_real_t freq,
    unsigned fftlen,
    mha_real_t srate ) [inline]
```

conversion from frequency to fft bin index

Parameters

<i>freq</i>	frequency / Hz
<i>fftlen</i>	FFT length
<i>srate</i>	sampling frequency / Hz

Returns

0-based index of fft bin, generally has non-zero fractional part

2.8.3.5 smp2rad()

```
mha_real_t MHASignal::smp2rad (
    mha_real_t samples,
    unsigned bin,
    unsigned fftlen ) [inline]
```

conversion from delay in samples to phase shift

Compute phase shift that needs to be applied to fft spectrum to achieve the desired delay.

Parameters

<i>samples</i>	delay in samples. Positive delay: shift current signal to future.
<i>bin</i>	index of fft bin, index 0 has dc (index 0 and nyquist bin cannot be delayed)
<i>fftlen</i>	FFT length

Returns

The phase shift in radiant that needs to be applied to fft bin to achieve the desired delay. A positive delay requires a negative phase shift. If required phase shift is $>\pi$ or $<-\pi$, then the desired delay cannot be applied in the fft domain with given parameters. Required phase shifts close to π should not be used. If bin is 0 or nyquist, returns 0 phase shift.

2.8.3.6 rad2smp()

```
mha_real_t MHASignal::rad2smp (
    mha_real_t phase_shift,
    unsigned bin,
    unsigned fftlen ) [inline]
```

conversion from phase shift to delay in samples

Compute delay in samples that is achieved by a phase shift.

Parameters

<i>phase_shift</i>	phase shift in radiant
<i>bin</i>	index of fft bin, index 0 has dc (index 0 and nyquist bin cannot be delayed)
<i>fftlen</i>	FFT length

Returns

The delay in samples achieved by applying the phase shift. A negative phase shift causes a positive delay: shifts current signal to future.

2.8.3.7 dupvec()

```
template<class elem_type >
std::vector<elem_type> MHASignal::dupvec (
    std::vector< elem_type > vec,
    unsigned n )
```

Duplicate last vector element to match desired size.

Parameters

<i>vec</i>	Input vector.
<i>n</i>	Target number of elements.

Return values

<i>Resized</i>	vector.
----------------	---------

2.8.3.8 dupvec_chk()

```
template<class elem_type >
std::vector<elem_type> MHASignal::dupvec_chk (
    std::vector< elem_type > vec,
    unsigned n )
```

Duplicate last vector element to match desired size, check for dimension.

The input dimension can be either 1 or the target length.

Parameters

<i>vec</i>	Input vector.
<i>n</i>	Target number of elements.

Return values

<i>Resized</i>	vector.
----------------	---------

2.8.3.9 equal_dim() [1/6]

```
bool equal_dim (  
    const mha_wave_t & a,  
    const mha_wave_t & b ) [inline]
```

Test for equal dimension of waveform structures.

2.8.3.10 equal_dim() [2/6]

```
bool equal_dim (  
    const mha_wave_t & a,  
    const mhaconfig_t & b ) [inline]
```

Test for match of waveform dimension with mhaconfig structure.

2.8.3.11 equal_dim() [3/6]

```
bool equal_dim (  
    const mha_spec_t & a,  
    const mha_spec_t & b ) [inline]
```

Test for equal dimension of spectrum structures.

2.8.3.12 equal_dim() [4/6]

```
bool equal_dim (  
    const mha_spec_t & a,  
    const mhaconfig_t & b ) [inline]
```

Test for match of spectrum dimension with mhaconfig structure.

2.8.3.13 equal_dim() [5/6]

```
bool equal_dim (
    const  mha_wave_t & a,
    const  mha_spec_t & b ) [inline]
```

Test for equal dimension of waveform/spectrum structures.

Warning

Waveform structures **mha_wave_t** (p. 780) use interleaved data order, while spectrum structures **mha_spec_t** (p. 732) use non-interleaved.

2.8.3.14 equal_dim() [6/6]

```
bool equal_dim (
    const  mha_spec_t & a,
    const  mha_wave_t & b ) [inline]
```

Test for equal dimension of waveform/spectrum structures.

Warning

Waveform structures **mha_wave_t** (p. 780) use interleaved data order, while spectrum structures **mha_spec_t** (p. 732) use non-interleaved.

2.8.3.15 integrate() [1/2]

```
void integrate (
    mha_wave_t & s )
```

Numeric integration of a signal vector (real values)

Parameters

s	Input signal vector
----------	---------------------

2.8.3.16 integrate() [2/2]

```
void integrate (
    mha_spec_t & s )
```

Numeric integration of a signal vector (complex values)

Parameters

s	Input signal vector
----------	---------------------

2.8.3.17 size() [1/4]

```
unsigned int size (  
    const mha_wave_t & s ) [inline]
```

Return size of a waveform structure.

2.8.3.18 size() [2/4]

```
unsigned int size (  
    const mha_spec_t & s ) [inline]
```

Return size of a spectrum structure.

2.8.3.19 size() [3/4]

```
unsigned int size (  
    const mha_wave_t * s ) [inline]
```

Return size of a waveform structure.

2.8.3.20 size() [4/4]

```
unsigned int size (  
    const mha_spec_t * s ) [inline]
```

Return size of a spectrum structure.

2.8.3.21 clear() [1/4]

```
void clear (
    mha_wave_t & s ) [inline]
```

Set all values of waveform to zero.

2.8.3.22 clear() [2/4]

```
void clear (
    mha_wave_t * s ) [inline]
```

Set all values of waveform to zero.

2.8.3.23 clear() [3/4]

```
void clear (
    mha_spec_t & s ) [inline]
```

Set all values of spectrum to zero.

2.8.3.24 clear() [4/4]

```
void clear (
    mha_spec_t * s ) [inline]
```

Set all values of spectrum to zero.

2.8.3.25 assign() [1/3]

```
void assign (
    mha_wave_t self,
    mha_real_t val ) [inline]
```

Set all values of waveform 'self' to 'val'.

Parameters

<i>self</i>	Waveform to be modified.
<i>val</i>	Value to be assigned to all entries of waveform.

2.8.3.26 assign() [2/3]

```
void assign (
    mha_wave_t self,
    const mha_wave_t & val )
```

Set all values of waveform 'self' to 'val'.

Parameters

<i>self</i>	Waveform to be modified.
<i>val</i>	Source waveform structure.

2.8.3.27 assign() [3/3]

```
void assign (
    mha_spec_t self,
    const mha_spec_t & val )
```

Set all values of spectrum 'self' to 'val'.

Parameters

<i>self</i>	Spectrum to be modified.
<i>val</i>	Source spectrum.

2.8.3.28 timeshift()

```
void timeshift (
    mha_wave_t & self,
    int shift )
```

Time shift of waveform chunk.

Shifted areas are filled with zeros.

Parameters

<i>self</i>	Waveform chunk to be shifted
<i>shift</i>	Shift amount, positive values shift to later times

2.8.3.29 value() [1/8]

```
mha_real_t& value (  
    mha_wave_t * s,  
    unsigned int fr,  
    unsigned int ch ) [inline]
```

Access an element of a waveform structure.

Parameters

<i>s</i>	Waveform structure
<i>fr</i>	Frame number
<i>ch</i>	Channel number

Returns

Reference to element

2.8.3.30 value() [2/8]

```
const mha_real_t& value (  
    const mha_wave_t * s,  
    unsigned int fr,  
    unsigned int ch ) [inline]
```

Constant access to an element of a waveform structure.

Parameters

<i>s</i>	Waveform structure
<i>fr</i>	Frame number
<i>ch</i>	Channel number

Returns

Reference to element

2.8.3.31 value() [3/8]

```
mha_complex_t& value (
    mha_spec_t * s,
    unsigned int fr,
    unsigned int ch ) [inline]
```

Access to an element of a spectrum.

Parameters

<i>s</i>	Spectrum structure
<i>fr</i>	Bin number
<i>ch</i>	Channel number

Returns

Reference to element

2.8.3.32 value() [4/8]

```
const mha_complex_t& value (
    const mha_spec_t * s,
    unsigned int fr,
    unsigned int ch ) [inline]
```

Constant access to an element of a spectrum.

Parameters

<i>s</i>	Spectrum structure
<i>fr</i>	Bin number
<i>ch</i>	Channel number

Returns

Reference to element

2.8.3.33 value() [5/8]

```
mha_real_t& value (
    mha_wave_t & s,
```

```
    unsigned int fr,
    unsigned int ch ) [inline]
```

Access to an element of a waveform structure.

Parameters

<i>s</i>	Waveform structure
<i>fr</i>	Frame number
<i>ch</i>	Channel number

Returns

Reference to element

2.8.3.34 value() [6/8]

```
const mha_real_t& value (
    const mha_wave_t & s,
    unsigned int fr,
    unsigned int ch ) [inline]
```

Constant access to an element of a waveform structure.

Parameters

<i>s</i>	Waveform structure
<i>fr</i>	Frame number
<i>ch</i>	Channel number

Returns

Reference to element

2.8.3.35 value() [7/8]

```
mha_complex_t& value (
    mha_spec_t & s,
    unsigned int fr,
    unsigned int ch ) [inline]
```

Access to an element of a spectrum.

Parameters

<i>s</i>	Spectrum structure
<i>fr</i>	Bin number
<i>ch</i>	Channel number

Returns

Reference to element

2.8.3.36 value() [8/8]

```
const mha_complex_t& value (
    const mha_spec_t & s,
    unsigned int fr,
    unsigned int ch ) [inline]
```

Constant access to an element of a spectrum.

Parameters

<i>s</i>	Spectrum structure
<i>fr</i>	Bin number
<i>ch</i>	Channel number

Returns

Reference to element

2.8.3.37 std_vector_float()

```
std::vector<float> std_vector_float (
    const mha_wave_t & )
```

Converts a **mha_wave_t** (p. 780) structure into a `std::vector<float>` (interleaved order).

Warning

This function is not real-time safe. Do not use in signal processing thread.

2.8.3.38 `std_vector_vector_float()`

```
std::vector<std::vector<float> > std_vector_vector_float (
    const mha_wave_t & )
```

Converts a **mha_wave_t** (p. 780) structure into a `std::vector< std::vector<float> >` (outer vector represents channels).

Warning

This function is not real-time safe. Do not use in signal processing thread.

2.8.3.39 `std_vector_vector_complex()`

```
std::vector<std::vector< mha_complex_t> > std_vector_vector_complex (
    const mha_spec_t & )
```

Converts a **mha_spec_t** (p. 732) structure into a `std::vector< std::vector<mha_complex_t> >` (outer vector represents channels).

Warning

This function is not real-time safe. Do not use in signal processing thread.

2.8.3.40 `operator+=()` [1/4]

```
mha_wave_t& operator+= (
    mha_wave_t & ,
    const mha_real_t & )
```

Addition operator.

2.8.3.41 `operator+=()` [2/4]

```
mha_wave_t& operator+= (
    mha_wave_t & ,
    const mha_wave_t & )
```

Addition operator.

2.8.3.42 operator-=() [1/2]

```
mha_wave_t& operator-= (
    mha_wave_t & ,
    const mha_wave_t & )
```

Subtraction operator.

2.8.3.43 operator-=() [2/2]

```
mha_spec_t& operator-= (
    mha_spec_t & ,
    const mha_spec_t & )
```

Subtraction operator.

2.8.3.44 operator*=() [1/5]

```
mha_wave_t& operator*= (
    mha_wave_t & ,
    const mha_real_t & )
```

Element-wise multiplication operator.

2.8.3.45 operator*=() [2/5]

```
mha_wave_t& operator*= (
    mha_wave_t & ,
    const mha_wave_t & )
```

Element-wise multiplication operator.

2.8.3.46 operator*=() [3/5]

```
mha_spec_t& operator*= (
    mha_spec_t & ,
    const mha_real_t & )
```

Element-wise multiplication operator.

2.8.3.47 operator*=() [4/5]

```
mha_spec_t& operator*= (
    mha_spec_t & ,
    const mha_wave_t & )
```

Element-wise multiplication operator.

2.8.3.48 operator*=() [5/5]

```
mha_spec_t& operator*= (
    mha_spec_t & ,
    const mha_spec_t & )
```

Element-wise multiplication operator.

2.8.3.49 operator/=() [1/2]

```
mha_spec_t& operator/= (
    mha_spec_t & ,
    const mha_spec_t & )
```

Element-wise division operator.

2.8.3.50 operator/=() [2/2]

```
mha_wave_t& operator/= (
    mha_wave_t & ,
    const mha_wave_t & )
```

Element-wise division operator.

2.8.3.51 operator+=() [3/4]

```
mha_spec_t& operator+= (
    mha_spec_t & ,
    const mha_spec_t & )
```

Addition operator.

2.8.3.52 operator+=() [4/4]

```
mha_spec_t& operator+= (
    mha_spec_t & ,
    const mha_real_t & )
```

Addition operator.

2.8.3.53 operator^=()

```
mha_wave_t& operator^= (
    mha_wave_t & self,
    const mha_real_t & arg )
```

Exponent operator.

Warning

This overwrites the xor operator!

2.8.3.54 copy_channel() [1/2]

```
void MHASignal::copy_channel (
    mha_spec_t & self,
    const mha_spec_t & src,
    unsigned sch,
    unsigned dch )
```

Copy one channel of a source signal.

Parameters

<i>self</i>	Destination.
<i>src</i>	Source
<i>sch</i>	Source channel number
<i>dch</i>	Destination channel number

2.8.3.55 copy_channel() [2/2]

```
void MHASignal::copy_channel (
    mha_wave_t & self,
```

```
const mha_wave_t & src,
unsigned src_channel,
unsigned dest_channel )
```

Copy one channel of a source signal.

Parameters

<i>self</i>	Destination.
<i>src</i>	Source
<i>src_channel</i>	Source channel number
<i>dest_channel</i>	Destination channel number

2.8.3.56 rmslevel() [1/2]

```
mha_real_t MHASignal::rmslevel (
    const mha_spec_t & s,
    unsigned int channel,
    unsigned int fftlen )
```

Return RMS level of a spectrum channel.

Computes the RMS level of the signal in Pascal in the given channel.

Takes into account the the negative frequency bins that are not stored (**Central Calibration** (p. 3)).

Parameters

<i>s</i>	Input spectrum
<i>channel</i>	Channel number to be tested
<i>fftlen</i>	FFT length (to correctly count the level of the Nyquist bin)

Returns

RMS level in Pa

2.8.3.57 colored_intensity()

```
mha_real_t MHASignal::colored_intensity (
    const mha_spec_t & s,
    unsigned int channel,
```

```
unsigned int fftlen,
mha_real_t * sqfreq_response = nullptr )
```

Colored spectrum intensity.

computes the squared sum of the spectrum after filtering with the frequency response. Takes into account the negative frequency bins that are not stored (**Central Calibration** (p. 3)).

Parameters

<i>s</i>	Input spectrum
<i>channel</i>	Channel number to be tested
<i>fftlen</i>	FFT length (to correctly count the level of the Nyquist bin)
<i>sqfreq_response</i>	An array with one squared weighting factor for every fft bin. Array length must be equal to <i>s</i> ->num_frames. nullptr can be given for equal weighting of all frequencies.

Returns

sum of squares. Root of this is the colored level in Pa

2.8.3.58 maxabs() [1/3]

```
mha_real_t MHASignal::maxabs (
    const mha_spec_t & s,
    unsigned int channel )
```

Find maximal absolute value.

Parameters

<i>s</i>	Input signal
<i>channel</i>	Channel to be tested

Returns

maximum absolute value

2.8.3.59 rmslevel() [2/2]

```
mha_real_t MHASignal::rmslevel (
    const mha_wave_t & s,
    unsigned int channel )
```

Return RMS level of a waveform channel.

Parameters

<i>s</i>	Input waveform signal
<i>channel</i>	Channel number to be tested

Returns

RMS level in Pa

2.8.3.60 maxabs() [2/3]

```
mha_real_t MHASignal::maxabs (
    const mha_wave_t & s,
    unsigned int channel )
```

Find maximal absolute value.

Parameters

<i>s</i>	Input signal
<i>channel</i>	Channel to be tested

Returns

maximum absolute value

2.8.3.61 maxabs() [3/3]

```
mha_real_t MHASignal::maxabs (
    const mha_wave_t & s )
```

Find maximal absolute value.

Parameters

<i>s</i>	Input signal
----------	--------------

Returns

maximum absolute value

2.8.3.62 max()

```
mha_real_t MHASignal::max (
    const mha_wave_t & s )
```

Find maximal value.

Parameters

<i>s</i>	Input signal
----------	--------------

Returns

maximum absolute value

2.8.3.63 min()

```
mha_real_t MHASignal::min (
    const mha_wave_t & s )
```

Find minimal value.

Parameters

<i>s</i>	Input signal
----------	--------------

Returns

maximum absolute value

2.8.3.64 sumsqr_channel()

```
mha_real_t MHASignal::sumsqr_channel (
    const mha_wave_t & s,
    unsigned int channel )
```

Calculate sum of squared values in one channel.

Parameters

<i>s</i>	Input signal
<i>channel</i>	Channel

Returns

$$\sum x^2$$

2.8.3.65 sumsqr_frame()

```
mha_real_t MHASignal::sumsqr_frame (
    const mha_wave_t & s,
    unsigned int frame )
```

Calculate sum over all channels of squared values.

Parameters

<i>s</i>	Input signal
<i>frame</i>	Frame number

Returns

$$\sum x^2$$

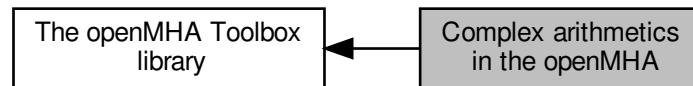
2.8.3.66 conjugate()

```
void conjugate (
    mha_spec_t & self ) [inline]
```

Replace (!) the value of this **mha_spec_t** (p. 732) with its conjugate.

2.9 Complex arithmetics in the openMHA

Collaboration diagram for Complex arithmetics in the openMHA:



Classes

- struct **mha_complex_t**
Type for complex floating point values.

Functions

- **mha_complex_t & set (mha_complex_t &self, mha_real_t real, mha_real_t imag=0)**
*Assign real and imaginary parts to a **mha_complex_t** (p. 688) variable.*
- **mha_complex_t mha_complex (mha_real_t real, mha_real_t imag=0)**
*Create a new **mha_complex_t** (p. 688) with specified real and imaginary parts.*
- **mha_complex_t & set (mha_complex_t &self, const std::complex< mha_real_t > & stdcomplex)**
*Assign a **mha_complex_t** (p. 688) variable from a **std::complex**.*
- **std::complex< mha_real_t > stdcomplex (const mha_complex_t &self)**
*Create a **std::complex** from **mha_complex_t** (p. 688).*
- **mha_complex_t & expi (mha_complex_t &self, mha_real_t angle)**
*replaces the value of the given **mha_complex_t** (p. 688) with $\exp(i*b)$.*
- **double angle (const mha_complex_t &self)**
Computes the angle of a complex number in the complex plane.
- **mha_complex_t & operator+= (mha_complex_t &self, const mha_complex_t &other)**
Addition of two complex numbers, overwriting the first.
- **mha_complex_t operator+ (const mha_complex_t &self, const mha_complex_t &other)**
Addition of two complex numbers, result is a temporary object.
- **mha_complex_t & operator+= (mha_complex_t &self, mha_real_t other_real)**
Addition of a complex and a real number, overwriting the complex.
- **mha_complex_t operator+ (const mha_complex_t &self, mha_real_t other_real)**
Addition of a complex and a real number, result is a temporary object.
- **mha_complex_t & operator-= (mha_complex_t &self, const mha_complex_t &other)**

Subtraction of two complex numbers, overwriting the first.

- **mha_complex_t operator-** (const **mha_complex_t** &self, const **mha_complex_t** &other)

Subtraction of two complex numbers, result is a temporary object.

- **mha_complex_t & operator-=** (**mha_complex_t** &self, **mha_real_t** other_real)

Subtraction of a complex and a real number, overwriting the complex.

- **mha_complex_t operator-** (const **mha_complex_t** &self, **mha_real_t** other_real)

Subtraction of a complex and a real number, result is a temporary object.

- **mha_complex_t & operator*=-** (**mha_complex_t** &self, const **mha_complex_t** &other)

Multiplication of two complex numbers, overwriting the first.

- **mha_complex_t operator*** (const **mha_complex_t** &self, const **mha_complex_t** &other)

Multiplication of two complex numbers, result is a temporary object.

- **mha_complex_t & operator*=** (**mha_complex_t** &self, **mha_real_t** other_real)

Multiplication of a complex and a real number, overwriting the complex.

- **mha_complex_t & expi** (**mha_complex_t** &self, **mha_real_t** angle, **mha_real_t** factor)

*replaces (!) the value of the given **mha_complex_t** (p. 688) with $a * \exp(i*b)$*

- **mha_complex_t operator*** (const **mha_complex_t** &self, **mha_real_t** other_real)

Multiplication of a complex and a real number, result is a temporary object.

- **mha_real_t abs2** (const **mha_complex_t** &self)

Compute the square of the absolute value of a complex value.

- **mha_real_t abs** (const **mha_complex_t** &self)

Compute the absolute value of a complex value.

- **mha_complex_t & operator/=** (**mha_complex_t** &self, **mha_real_t** other_real)

Division of a complex and a real number, overwriting the complex.

- **mha_complex_t operator/** (const **mha_complex_t** &self, **mha_real_t** other_real)

Division of a complex and a real number, result is a temporary object.

- **mha_complex_t & safe_div** (**mha_complex_t** &self, const **mha_complex_t** &other, **mha_real_t** eps, **mha_real_t** eps2)

Safe division of two complex numbers, overwriting the first.

- **mha_complex_t & operator/=** (**mha_complex_t** &self, const **mha_complex_t** &other)

Division of two complex numbers, overwriting the first.

- **mha_complex_t operator/** (const **mha_complex_t** &self, const **mha_complex_t** &other)

Division of two complex numbers, result is a temporary object.

- **mha_complex_t operator-** (const **mha_complex_t** &self)

Unary minus on a complex results in a negative temporary object.

- bool **operator==** (const **mha_complex_t** &x, const **mha_complex_t** &y)

Compare two complex numbers for equality.

- bool **operator!=** (const **mha_complex_t** &x, const **mha_complex_t** &y)

Compare two complex numbers for inequality.

- void **conjugate** (**mha_complex_t** &self)

*Replace (!) the value of this **mha_complex_t** (p. 688) with its conjugate.*

- **mha_complex_t _conjugate** (const **mha_complex_t** &self)

- Compute the conjugate of this complex value.*
- void **reciprocal** (**mha_complex_t** &self)
 - Replace the value of this complex with its reciprocal.*
- **mha_complex_t** **_reciprocal** (const **mha_complex_t** &self)
 - compute the reciprocal of this complex value.*
- void **normalize** (**mha_complex_t** &self)
 - Divide a complex by its absolute value, thereby normalizing it (projecting onto the unit circle).*
- void **normalize** (**mha_complex_t** &self, **mha_real_t** margin)
 - Divide a complex by its absolute value, thereby normalizing it (projecting onto the unit circle), with a safety margin.*
- bool **almost** (const **mha_complex_t** &self, const **mha_complex_t** &other, **mha_real_t** times_epsilon=1e2)
 - Compare two complex numbers for equality except for a small relative error.*
- bool **operator<** (const **mha_complex_t** &x, const **mha_complex_t** &y)
 - Compares the absolute values of two complex numbers.*

2.9.1 Detailed Description

2.9.2 Function Documentation

2.9.2.1 **set()** [1/2]

```
mha_complex_t& set (
    mha_complex_t & self,
    mha_real_t real,
    mha_real_t imag = 0 ) [inline]
```

Assign real and imaginary parts to a **mha_complex_t** (p. 688) variable.

Parameters

<i>self</i>	The mha_complex_t (p. 688) variable whose value is about to change.
<i>real</i>	The new real part.
<i>imag</i>	The new imaginary part.

Returns

A reference to the changed variable.

2.9.2.2 mha_complex()

```
mha_complex_t mha_complex (
    mha_real_t real,
    mha_real_t imag = 0 ) [inline]
```

Create a new **mha_complex_t** (p. 688) with specified real and imaginary parts.

Parameters

<i>real</i>	The real part.
<i>imag</i>	The imaginary part.

Returns

The new value.

2.9.2.3 set() [2/2]

```
mha_complex_t& set (
    mha_complex_t & self,
    const std::complex< mha_real_t > & stdcomplex ) [inline]
```

Assign a **mha_complex_t** (p. 688) variable from a `std::complex`.

Parameters

<i>self</i>	The mha_complex_t (p. 688) variable whose value is about to change.
<i>stdcomplex</i>	The new complex value.

Returns

A reference to the changed variable.

2.9.2.4 stdcomplex()

```
std::complex< mha_real_t> stdcomplex (
    const mha_complex_t & self ) [inline]
```

Create a `std::complex` from **mha_complex_t** (p. 688).

2.9.2.5 `expi()` [1/2]

```
mha_complex_t& expi (
    mha_complex_t & self,
    mha_real_t angle ) [inline]
```

replaces the value of the given **mha_complex_t** (p. 688) with $\exp(i*b)$.

Parameters

<i>self</i>	The mha_complex_t (p. 688) variable whose value is about to change.
<i>angle</i>	The angle in the complex plane [rad].

Returns

A reference to the changed variable.

2.9.2.6 `angle()`

```
double angle (
    const mha_complex_t & self ) [inline]
```

Computes the angle of a complex number in the complex plane.

Parameters

<i>self</i>	The complex number whose angle is needed.
-------------	---

Returns

The angle of a complex number in the complex plane.

2.9.2.7 `operator+=()` [1/2]

```
mha_complex_t& operator+= (
    mha_complex_t & self,
    const mha_complex_t & other ) [inline]
```

Addition of two complex numbers, overwriting the first.

2.9.2.8 operator+() [1/2]

```
mha_complex_t operator+ (
    const mha_complex_t & self,
    const mha_complex_t & other ) [inline]
```

Addition of two complex numbers, result is a temporary object.

2.9.2.9 operator+=() [2/2]

```
mha_complex_t& operator+= (
    mha_complex_t & self,
    mha_real_t other_real ) [inline]
```

Addition of a complex and a real number, overwriting the complex.

2.9.2.10 operator+() [2/2]

```
mha_complex_t operator+ (
    const mha_complex_t & self,
    mha_real_t other_real ) [inline]
```

Addition of a complex and a real number, result is a temporary object.

2.9.2.11 operator-=() [1/2]

```
mha_complex_t& operator-= (
    mha_complex_t & self,
    const mha_complex_t & other ) [inline]
```

Subtraction of two complex numbers, overwriting the first.

2.9.2.12 operator-() [1/3]

```
mha_complex_t operator- (
    const mha_complex_t & self,
    const mha_complex_t & other ) [inline]
```

Subtraction of two complex numbers, result is a temporary object.

2.9.2.13 operator-=() [2/2]

```
mha_complex_t& operator-= (
    mha_complex_t & self,
    mha_real_t other_real ) [inline]
```

Subtraction of a complex and a real number, overwriting the complex.

2.9.2.14 operator-() [2/3]

```
mha_complex_t operator- (
    const mha_complex_t & self,
    mha_real_t other_real ) [inline]
```

Subtraction of a complex and a real number, result is a temporary object.

2.9.2.15 operator*=() [1/2]

```
mha_complex_t& operator*= (
    mha_complex_t & self,
    const mha_complex_t & other ) [inline]
```

Multiplication of two complex numbers, overwriting the first.

2.9.2.16 operator*() [1/2]

```
mha_complex_t operator* (
    const mha_complex_t & self,
    const mha_complex_t & other ) [inline]
```

Multiplication of two complex numbers, result is a temporary object.

2.9.2.17 operator*=() [2/2]

```
mha_complex_t& operator*= (
    mha_complex_t & self,
    mha_real_t other_real ) [inline]
```

Multiplication of a complex and a real number, overwriting the complex.

2.9.2.18 expi() [2/2]

```
mha_complex_t& expi (
    mha_complex_t & self,
    mha_real_t angle,
    mha_real_t factor ) [inline]
```

replaces (!) the value of the given **mha_complex_t** (p. 688) with $a * \exp(i*b)$

Parameters

<i>self</i>	The mha_complex_t (p. 688) variable whose value is about to change.
<i>angle</i>	The imaginary exponent.
<i>factor</i>	The absolute value of the result.

Returns

A reference to the changed variable.

2.9.2.19 operator*() [2/2]

```
mha_complex_t operator* (  
    const mha_complex_t & self,  
    mha_real_t other_real ) [inline]
```

Multiplication of a complex and a real number, result is a temporary object.

2.9.2.20 abs2()

```
mha_real_t abs2 (  
    const mha_complex_t & self ) [inline]
```

Compute the square of the absolute value of a complex value.

Returns

The square of the absolute value of self.

2.9.2.21 abs()

```
mha_real_t abs (  
    const mha_complex_t & self ) [inline]
```

Compute the absolute value of a complex value.

Returns

The absolute value of self.

2.9.2.22 operator/=() [1/2]

```
mha_complex_t& operator/= (
    mha_complex_t & self,
    mha_real_t other_real ) [inline]
```

Division of a complex and a real number, overwriting the complex.

2.9.2.23 operator/() [1/2]

```
mha_complex_t operator/ (
    const mha_complex_t & self,
    mha_real_t other_real ) [inline]
```

Division of a complex and a real number, result is a temporary object.

2.9.2.24 safe_div()

```
mha_complex_t& safe_div (
    mha_complex_t & self,
    const mha_complex_t & other,
    mha_real_t eps,
    mha_real_t eps2 ) [inline]
```

Safe division of two complex numbers, overwriting the first.

If $\text{abs}(\text{divisor}) < \text{eps}$, then divisor is replaced by eps. $\text{eps2} = \text{eps} * \text{eps}$.

2.9.2.25 operator/=() [2/2]

```
mha_complex_t& operator/= (
    mha_complex_t & self,
    const mha_complex_t & other ) [inline]
```

Division of two complex numbers, overwriting the first.

2.9.2.26 operator/() [2/2]

```
mha_complex_t operator/ (
    const mha_complex_t & self,
    const mha_complex_t & other ) [inline]
```

Division of two complex numbers, result is a temporary object.

2.9.2.27 operator-() [3/3]

```
mha_complex_t operator- (
    const mha_complex_t & self ) [inline]
```

Unary minus on a complex results in a negative temporary object.

2.9.2.28 operator==()

```
bool operator== (
    const mha_complex_t & x,
    const mha_complex_t & y ) [inline]
```

Compare two complex numbers for equality.

2.9.2.29 operator!=()

```
bool operator!= (
    const mha_complex_t & x,
    const mha_complex_t & y ) [inline]
```

Compare two complex numbers for inequality.

2.9.2.30 conjugate()

```
void conjugate (
    mha_complex_t & self ) [inline]
```

Replace (!) the value of this **mha_complex_t** (p. [688](#)) with its conjugate.

2.9.2.31 _conjugate()

```
mha_complex_t _conjugate (
    const mha_complex_t & self ) [inline]
```

Compute the conjugate of this complex value.

Returns

A temporary object holding the conjugate value.

2.9.2.32 reciprocal()

```
void reciprocal (
    mha_complex_t & self ) [inline]
```

Replace the value of this complex with its reciprocal.

2.9.2.33 _reciprocal()

```
mha_complex_t _reciprocal (
    const mha_complex_t & self ) [inline]
```

compute the reciprocal of this complex value.

Returns

A temporary object holding the reciprocal value.

2.9.2.34 normalize() [1/2]

```
void normalize (
    mha_complex_t & self ) [inline]
```

Divide a complex by its absolute value, thereby normalizing it (projecting onto the unit circle).

2.9.2.35 normalize() [2/2]

```
void normalize (
    mha_complex_t & self,
    mha_real_t margin ) [inline]
```

Divide a complex by its absolute value, thereby normalizing it (projecting onto the unit circle), with a safety margin.

2.9.2.36 almost()

```
bool almost (
    const mha_complex_t & self,
    const mha_complex_t & other,
    mha_real_t times_epsilon = 1e2 ) [inline]
```

Compare two complex numbers for equality except for a small relative error.

Parameters

<i>self</i>	The first complex number.
<i>other</i>	The second complex number.
<i>times_epsilon</i>	Permitted relative error is this number multiplied with the machine accuracy for this Floating point format (std::numeric_limits<mha_real_t>::epsilon)

Returns

true if the relative difference is below $\text{times_epsilon} * \text{std::numeric_limits<mha_real_t>::epsilon}$

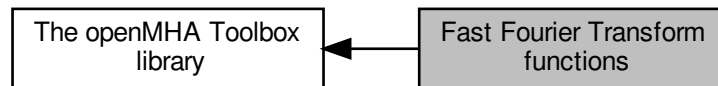
2.9.2.37 operator<()

```
bool operator< (  
    const mha_complex_t & x,  
    const mha_complex_t & y ) [inline]
```

Compares the absolute values of two complex numbers.

2.10 Fast Fourier Transform functions

Collaboration diagram for Fast Fourier Transform functions:



Typedefs

- `typedef void * mha_fft_t`
Handle for an FFT object.

Functions

- `mha_fft_t mha_fft_new` (unsigned int n)
Create a new FFT handle.
- `void mha_fft_free` (`mha_fft_t` h)
Destroy an FFT handle.
- `void mha_fft_wave2spec` (`mha_fft_t` h, const `mha_wave_t` *in, `mha_spec_t` *out)
Tranform waveform segment into spectrum.
- `void mha_fft_wave2spec` (`mha_fft_t` h, const `mha_wave_t` *in, `mha_spec_t` *out, bool swaps)
Tranform waveform segment into spectrum.
- `void mha_fft_spec2wave` (`mha_fft_t` h, const `mha_spec_t` *in, `mha_wave_t` *out)
Tranform spectrum into waveform segment.
- `void mha_fft_spec2wave` (`mha_fft_t` h, const `mha_spec_t` *in, `mha_wave_t` *out, unsigned int offset)
Tranform spectrum into waveform segment.
- `void mha_fft_forward` (`mha_fft_t` h, `mha_spec_t` *sIn, `mha_spec_t` *sOut)
Complex to complex FFT (forward).
- `void mha_fft_backward` (`mha_fft_t` h, `mha_spec_t` *sIn, `mha_spec_t` *sOut)
Complex to complex FFT (backward).
- `void mha_fft_forward_scale` (`mha_fft_t` h, `mha_spec_t` *sIn, `mha_spec_t` *sOut)
Complex to complex FFT (forward).
- `void mha_fft_backward_scale` (`mha_fft_t` h, `mha_spec_t` *sIn, `mha_spec_t` *sOut)
Complex to complex FFT (backward).
- `void mha_fft_wave2spec_scale` (`mha_fft_t` h, const `mha_wave_t` *in, `mha_spec_t` *out)
Tranform waveform segment into spectrum.
- `void mha_fft_spec2wave_scale` (`mha_fft_t` h, const `mha_spec_t` *in, `mha_wave_t` *out)
Tranform spectrum into waveform segment.

2.10.1 Detailed Description

2.10.2 Typedef Documentation

2.10.2.1 mha_fft_t

```
typedef void* mha_fft_t
```

Handle for an FFT object.

This FFT object is used by the functions `mha_fft_wave2spec` and `mha_fft_spec2wave`. The F↔FT back-end is the FFTW library. The back-end is completely hidden, including external header files or linking external libraries is not required.

2.10.3 Function Documentation

2.10.3.1 mha_fft_new()

```
mha_fft_t mha_fft_new (
    unsigned int n )
```

Create a new FFT handle.

Parameters

n	FFT length.
-----	-------------

Create a new FFT handle.

Parameters

n	FFT length
-----	------------

Return values

<i>FFT</i>	object
------------	--------

2.10.3.2 mha_fft_free()

```
void mha_fft_free (
    mha_fft_t h )
```

Destroy an FFT handle.

Parameters

<i>h</i>	Handle to be destroyed.
----------	-------------------------

Destroy an FFT handle.

Parameters

<i>h</i>	FFT object to be removed
----------	--------------------------

2.10.3.3 mha_fft_wave2spec() [1/2]

```
void mha_fft_wave2spec (
    mha_fft_t h,
    const mha_wave_t * in,
    mha_spec_t * out )
```

Tranform waveform segment into spectrum.

Parameters

<i>h</i>	FFT handle.
<i>in</i>	Input waveform segment.
<i>out</i>	Output spectrum.

Tranform waveform segment into spectrum.

Parameters

<i>h</i>	FFT object handle
<i>in</i>	pointer to input waveform signal
<i>out</i>	pointer to output spectrum signal (has to be allocated)

2.10.3.4 `mha_fft_wave2spec()` [2/2]

```
void mha_fft_wave2spec (
    mha_fft_t h,
    const mha_wave_t * in,
    mha_spec_t * out,
    bool swaps )
```

Tranform waveform segment into spectrum.

Like normal `wave2spec`, but swaps wave buffer halves before transforming if the `swaps` parameter is true.

Warning: These openMHA FFTs adopt a nonstandard scaling scheme in which the forward transform scales by $1/N$ and the backward does not scale. We would recommend using the `'_scale'` methods instead.

Parameters

<i>h</i>	FFT handle.
<i>in</i>	Input waveform segment.
<i>out</i>	Output spectrum.
<i>swaps</i>	Function swaps the first and second half of the waveform buffer before the FFT transform when this parameter is set to true.

2.10.3.5 `mha_fft_spec2wave()` [1/2]

```
void mha_fft_spec2wave (
    mha_fft_t h,
    const mha_spec_t * in,
    mha_wave_t * out )
```

Tranform spectrum into waveform segment.

Warning: These openMHA FFTs adopt a nonstandard scaling scheme in which the forward transform scales by $1/N$ and the backward does not scale. We would recommend using the `'_scale'` methods instead.

Parameters

<i>h</i>	FFT handle.
<i>in</i>	Input spectrum.
<i>out</i>	Output waveform segment.

Tranform spectrum into waveform segment.

Parameters

<i>h</i>	FFT object handle
<i>in</i>	pointer to input spectrum
<i>out</i>	pointer to output waveform signal (has to be allocated)

2.10.3.6 mha_fft_spec2wave() [2/2]

```
void mha_fft_spec2wave (
    mha_fft_t h,
    const mha_spec_t * in,
    mha_wave_t * out,
    unsigned int offset )
```

Tranform spectrum into waveform segment.

out may have fewer number of frames than needed for a complete iFFT. Only as many frames are written into out as fit, starting with offset offset of the complete iFFT.

Warning: These openMHA FFTs adopt a nonstandard scaling scheme in which the forward transform scales by 1/N and the backward does not scale. We would recommend using the '_scale' methods instead.

Parameters

<i>h</i>	FFT handle.
<i>in</i>	Input spectrum.
<i>out</i>	Output waveform segment.
<i>offset</i>	Offset into iFFT wave buffer

Tranform spectrum into waveform segment.

Only part of the iFFT is tranferred into the out buffer.

Out may have fewer number of freames than needed for a complete iFFT. Only as many frames are written into out as fit, starting with offset offset of the complete iFFT.

Parameters

<i>h</i>	FFT object handle
<i>in</i>	pointer to input spectrum
<i>out</i>	pointer to output waveform signal (has to be allocated)
<i>offset</i>	Offset into complete iFFT buffer.

2.10.3.7 mha_fft_forward()

```
void mha_fft_forward (
    mha_fft_t h,
    mha_spec_t * sIn,
    mha_spec_t * sOut )
```

Complex to complex FFT (forward).

sIn and sOut need to have nfft bins (please note that **mha_spec_t** (p. 732) typically has nfft/2+1 bins for half-complex representation).

Warning: These openMHA FFTs adopt a nonstandard scaling scheme in which the forward transform scales by 1/N and the backward does not scale. We would recommend using the '_scale' methods instead.

Parameters

<i>h</i>	FFT handle.
<i>sIn</i>	Input spectrum.
<i>sOut</i>	Output spectrum.

2.10.3.8 mha_fft_backward()

```
void mha_fft_backward (
    mha_fft_t h,
    mha_spec_t * sIn,
    mha_spec_t * sOut )
```

Complex to complex FFT (backward).

sIn and sOut need to have nfft bins (please note that **mha_spec_t** (p. 732) typically has nfft/2+1 bins for half-complex representation).

Warning: These openMHA FFTs adopt a nonstandard scaling scheme in which the forward transform scales by 1/N and the backward does not scale. We would recommend using the '_scale' methods instead.

Parameters

<i>h</i>	FFT handle.
<i>sIn</i>	Input spectrum.
<i>sOut</i>	Output spectrum.

2.10.3.9 mha_fft_forward_scale()

```
void mha_fft_forward_scale (
    mha_fft_t h,
    mha_spec_t * sIn,
    mha_spec_t * sOut )
```

Complex to complex FFT (forward).

sIn and sOut need to have nfft bins (please note that **mha_spec_t** (p. 732) typically has nfft/2+1 bins for half-complex representation).

The `_scale` methods use standard DFT scaling: There is no scaling in the forward transformation, and 1/N scaling for the backward.

Parameters

<i>h</i>	FFT handle.
<i>sIn</i>	Input spectrum.
<i>sOut</i>	Output spectrum.

2.10.3.10 mha_fft_backward_scale()

```
void mha_fft_backward_scale (
    mha_fft_t h,
    mha_spec_t * sIn,
    mha_spec_t * sOut )
```

Complex to complex FFT (backward).

sIn and sOut need to have nfft bins (please note that **mha_spec_t** (p. 732) typically has nfft/2+1 bins for half-complex representation).

The `_scale` methods use standard DFT scaling: There is no scaling in the forward transformation, and 1/N scaling for the backward.

Parameters

<i>h</i>	FFT handle.
<i>sIn</i>	Input spectrum.
<i>sOut</i>	Output spectrum.

2.10.3.11 mha_fft_wave2spec_scale()

```
void mha_fft_wave2spec_scale (
    mha_fft_t h,
    const mha_wave_t * in,
    mha_spec_t * out )
```

Tranform waveform segment into spectrum.

The `_scale` methods use standard DFT scaling: There is no scaling in the forward transformation, and 1/N scaling for the backward.

Parameters

<i>h</i>	FFT handle.
<i>in</i>	Input waveform segment.
<i>out</i>	Output spectrum.

2.10.3.12 mha_fft_spec2wave_scale()

```
void mha_fft_spec2wave_scale (
    mha_fft_t h,
    const mha_spec_t * in,
    mha_wave_t * out )
```

Tranform spectrum into waveform segment.

The `_scale` methods use standard DFT scaling: There is no scaling in the forward transformation, and 1/N scaling for the backward.

Parameters

<i>h</i>	FFT handle.
<i>in</i>	Input spectrum.
<i>out</i>	Output waveform segment.

3 Namespace Documentation

3.1 ac2lsl Namespace Reference

All types for the **ac2lsl** (p. 82) plugins live in this namespace.

Classes

- class **ac2lsl_t**
*Plugin class of **ac2lsl** (p. 82).*
- class **cfg_t**
*Runtime configuration class of the **ac2lsl** (p. 82) plugin.*
- class **save_var_base_t**
Interface for ac to lsl bridge variable.
- class **save_var_t**
Implementation for all ac to lsl bridges except complex types.
- class **save_var_t<mha_complex_t>**
*Template specialization of the **ac2lsl** (p. 82) bridge to take care of complex numbers.*
- struct **type_info**

Variables

- const std::map< int, **type_info** > **types**

3.1.1 Detailed Description

All types for the **ac2lsl** (p. 82) plugins live in this namespace.

3.1.2 Variable Documentation

3.1.2.1 types

```
const std::map<int, type_info> ac2lsl::types
```

3.2 ac_proc Namespace Reference

Classes

- class **interface_t**

3.3 acmon Namespace Reference

Namespace for displaying ac variables as parser monitors.

Classes

- class **ac_monitor_t**
A class for converting AC variables to Parser monitors of correct type.
- class **acmon_t**

3.3.1 Detailed Description

Namespace for displaying ac variables as parser monitors.

3.4 acsave Namespace Reference

Classes

- class **acsave_t**
- class **cfg_t**
- struct **mat4head_t**
- class **save_var_t**

3.5 addsndfile Namespace Reference

Classes

- class **addsndfile_if_t**
- class **level_adapt_t**
- class **resampled_soundfile_t**
Reads sound from file and resamples it if necessary and wanted.
- class **sndfile_t**
- class **waveform_proxy_t**
*Class helps to specify which instance of MHASignal_waveform_t parent instance is meant in **resampled_soundfile_t** (p. [248](#)).*

Typedefs

- typedef **MHAPLugin::config_t< level_adapt_t > level_adaptor**
- typedef **MHAPLugin::plugin_t< sndfile_t > wave_reader**

Enumerations

- enum **addsndfile_resampling_mode_t** { **DONT_RESAMPLE_PERMISSIVE**, **DONT_RESAMPLE_STRICT**, **DO_RESAMPLE** }

Specifies the resampling mode in `resampled_soundfile_t`.

Functions

- static unsigned **resampled_num_frames** (unsigned num_source_frames, float source_rate, float target_rate, **addsndfile_resampling_mode_t** resampling_mode)

3.5.1 Typedef Documentation

3.5.1.1 level_adaptor

```
typedef MHAPlugin::config_t< level_adapt_t> addsndfile::level_adaptor
```

3.5.1.2 wave_reader

```
typedef MHAPlugin::plugin_t< sndfile_t> addsndfile::wave_reader
```

3.5.2 Enumeration Type Documentation

3.5.2.1 addsndfile_resampling_mode_t

```
enum addsndfile::addsndfile_resampling_mode_t
```

Specifies the resampling mode in **resampled_soundfile_t** (p. [248](#)).

Enumerator

DONT_RESAMPLE_PERMISSIVE	
DONT_RESAMPLE_STRICT	Do not resample, if the sample rate of the MHA differs from the sample rate of the sound file, raise an error.
DO_RESAMPLE	Resample.

3.5.3 Function Documentation

3.5.3.1 resampled_num_frames()

```
static unsigned addsndfile::resampled_num_frames (
    unsigned num_source_frames,
    float source_rate,
    float target_rate,
    addsndfile_resampling_mode_t resampling_mode ) [static]
```

3.6 ADM Namespace Reference

Classes

- class **ADM**
Adaptive differential microphone, working for speech frequency range.
- class **Delay**
A delay-line class.
- class **Linearphase_FIR**
An efficient linear-phase fir filter implementation.

Functions

- static double **subsampledelay_coeff** (double samples, double f_design, double fs=1.0)
compute IIR coefficient for subsample delay

Variables

- const double **PI** = 3.14159265358979312
- const double **C** = 340
- const double **DELAY_FREQ** = 2000
- const double **START_BETA** = 0.5

3.6.1 Function Documentation

3.6.1.1 subsampledelay_coeff()

```
static double ADM::subsampledelay_coeff (
    double samples,
    double f_design,
    double fs = 1.0 ) [static]
```

compute IIR coefficient for subsample delay

Parameters

<i>samples</i>	Constraint: $0.0 \leq \text{samples} < 1.0$; Amount of sub-sample delay
<i>f_design</i>	design frequency (subsample delay is accurate for this frequency)
<i>fs</i>	sampling rate

Returns

IIR coefficient for subsample delay

3.6.2 Variable Documentation**3.6.2.1 PI**

```
const double ADM::PI = 3.14159265358979312
```

3.6.2.2 C

```
const double ADM::C = 340
```

3.6.2.3 DELAY_FREQ

```
const double ADM::DELAY_FREQ = 2000
```

3.6.2.4 START_BETA

```
const double ADM::START_BETA = 0.5
```

3.7 AuditoryProfile Namespace Reference

Namespace for classes and functions around the auditory profile (e.g., audiogram handling)

Classes

- class **fmap_t**
A class to store frequency dependent data (e.g., HTL and UCL).
- class **parser_t**
Class to make the auditory profile accessible through the parser interface.
- class **profile_t**
The Auditory Profile class.

3.7.1 Detailed Description

Namespace for classes and functions around the auditory profile (e.g., audiogram handling)

The auditory profile as defined by HearCom or BMBF Modellbasierte Hoergeraete is stored in the class **AuditoryProfile::profile_t** (p. 313). Until a complete definition is available, only the currently needed elements are implemented.

3.8 coherence Namespace Reference

Classes

- class **cohflt_if_t**
- class **cohflt_t**
- class **vars_t**

Functions

- void **getcipd** (**mha_complex_t** &c, **mha_real_t** &a, const **mha_complex_t** &xl, const **mha_complex_t** &xr)

3.8.1 Function Documentation

3.8.1.1 getcipd()

```
void coherence::getcipd (
    mha_complex_t & c,
    mha_real_t & a,
    const mha_complex_t & xl,
    const mha_complex_t & xr ) [inline]
```

3.9 cpuload Namespace Reference

Classes

- class **cpuload_cfg_t**
- class **cpuload_if_t**

3.10 dbasync_native Namespace Reference

Classes

- class **db_if_t**
- class **dbasync_t**
- class **delay_check_t**

Enumerations

- enum { **INVALID_THREAD_PRIORITY** = 999999999 }

Functions

- static void * **thread_start** (void *instance)
- static unsigned **gcd** (unsigned a, unsigned b)

3.10.1 Enumeration Type Documentation

3.10.1.1 anonymous enum

anonymous enum

Enumerator

INVALID_THREAD_PRIORITY	
-------------------------	--

3.10.2 Function Documentation

3.10.2.1 thread_start()

```
static void* dbasync_native::thread_start (  
    void * instance ) [static]
```

3.10.2.2 gcd()

```
static unsigned dbasync_native::gcd (  
    unsigned a,  
    unsigned b ) [inline], [static]
```

3.11 dc Namespace Reference

Classes

- class **dc_if_t**
- class **dc_t**
- class **dc_vars_t**
- class **dc_vars_validator_t**

3.12 dc_simple Namespace Reference

Classes

- class **dc_if_t**
- class **dc_t**
- class **dc_vars_t**
- class **dc_vars_validator_t**
- class **level_smoother_t**

Typedefs

- typedef **MHAPLugin::plugin_t< dc_t > DC**
- typedef **MHAPLugin::config_t< level_smoother_t > LEVEL**

Functions

- void **test_fail** (const std::vector< float > &v, unsigned int s, const std::string &name)
- std::vector< float > **force_resize** (const std::vector< float > &v, unsigned int s, const std::string &name)
- **mha_real_t not_zero** (**mha_real_t** x, const std::string &comment="")

3.12.1 Typedef Documentation

3.12.1.1 DC

```
typedef MHAPplugin::plugin_t< dc_t> dc_simple::DC
```

3.12.1.2 LEVEL

```
typedef MHAPplugin::config_t< level_smoother_t> dc_simple::LEVEL
```

3.12.2 Function Documentation

3.12.2.1 test_fail()

```
void dc_simple::test_fail (  
    const std::vector< float > & v,  
    unsigned int s,  
    const std::string & name )
```

3.12.2.2 force_resize()

```
std::vector<float> dc_simple::force_resize (  
    const std::vector< float > & v,  
    unsigned int s,  
    const std::string & name )
```

3.12.2.3 not_zero()

```
mha_real_t dc_simple::not_zero (  
    mha_real_t x,  
    const std::string & comment = "" )
```

3.13 delay Namespace Reference

Classes

- class **interface_t**

3.14 delaysum Namespace Reference

This namespace contains the delaysum plugin.

Classes

- class **delaysum_wave_if_t**
Interface class for the delaysum plugin.
- class **delaysum_wave_t**
Runtime configuration of the delaysum_wave plugin.

3.14.1 Detailed Description

This namespace contains the delaysum plugin.

3.15 delaysum_spec Namespace Reference

Classes

- class **delaysum_spec_if_t**
- class **delaysum_t**

3.16 DynComp Namespace Reference

dynamic compression related classes and functions

Classes

- class **dc_afterburn_rt_t**
Real-time class for after burn effect.
- class **dc_afterburn_t**
Afterburn class, to be defined as a member of compressors.
- class **dc_afterburn_vars_t**
*Variables for **dc_afterburn_t** (p. 429) class.*
- class **gaintable_t**
Gain table class.

Functions

- **mha_real_t interp1** (const std::vector< **mha_real_t** > &vX, const std::vector< **mha_real_t** > &vY, **mha_real_t** X)
One-dimensional linear interpolation.
- **mha_real_t interp2** (const std::vector< **mha_real_t** > &vX, const std::vector< **mha_real_t** > &vY, const std::vector< std::vector< **mha_real_t** > > &mZ, **mha_real_t** X, **mha_real_t** Y)
Linear interpolation in a two-dimensional field.

3.16.1 Detailed Description

dynamic compression related classes and functions

3.16.2 Function Documentation

3.16.2.1 interp1()

```
mha_real_t DynComp::interp1 (
    const std::vector< mha_real_t > & vX,
    const std::vector< mha_real_t > & vY,
    mha_real_t X )
```

One-dimensional linear interpolation.

Parameters

vX	Vector with input samples.
vY	Vector with values at input samples.
X	Input value to be interpolated.

Return values

<i>Interpolated</i>	value Y(X) at position X.
---------------------	---------------------------

3.16.2.2 interp2()

```
mha_real_t DynComp::interp2 (
    const std::vector< mha_real_t > & vX,
```

```

const std::vector< mha_real_t > & vY,
const std::vector< std::vector< mha_real_t > > & mZ,
    mha_real_t X,
    mha_real_t Y )

```

Linear interpolation in a two-dimensional field.

Parameters

<i>vX</i>	Vector with input samples, first dimension.
<i>vY</i>	Vector with input samples, second dimension.
<i>mZ</i>	Field with values at input samples.
<i>X</i>	First dimension of input value to be interpolated.
<i>Y</i>	Second dimension of input value to be interpolated.

Return values

<i>Interpolated</i>	value Z(X,Y) at position X,Y.
---------------------	-------------------------------

3.17 equalize Namespace Reference

Classes

- class **cfg_t**
- class **freqgains_t**

3.18 fader_wave Namespace Reference

Classes

- class **fader_wave_if_t**
- class **level_adapt_t**

Typedefs

- typedef **MHAPLugin::plugin_t< level_adapt_t > level_adaptor**

3.18.1 Typedef Documentation

3.18.1.1 level_adaptor

```
typedef MHAPugin::plugin_t< level_adapt_t> fader_wave::level_adaptor
```

3.19 fftbpow Namespace Reference

Namespace for the fftbpow plugin.

Classes

- class **fftfbpow_interface_t**
Interface class for fftbpow plugin.
- class **fftfbpow_t**
Run time configuration for the fftbpow plugin.

3.19.1 Detailed Description

Namespace for the fftbpow plugin.

3.20 fftfilter Namespace Reference

Classes

- class **fftfilter_t**
- class **interface_t**

Functions

- unsigned int **irs_length** (const **MHAParser::mfloat_t** &irs)
- unsigned int **irs_validator** (const **MHAParser::mfloat_t** &irs, const unsigned int &**channels**, const unsigned int &fragsize, const unsigned int &fftlens)

3.20.1 Function Documentation

3.20.1.1 irs_length()

```
unsigned int fftfilter::irs_length (
    const MHAParser::mfloat_t & irs )
```

Return the length of the longest vector in irs.

Parameters

<i>irs</i>	"Matrix" of floats parser variable
------------	------------------------------------

Returns

length of the longest vector in *irs*, or 1 if all vectors are empty

3.20.1.2 *irs_validator()*

```
unsigned int fftfilter::irs_validator (
    const  MHAParser::mfloat_t & irs,
    const unsigned int & channels,
    const unsigned int & fragsize,
    const unsigned int & fftllen )
```

Validity checks. Throws Error if parameters are invalid: Number of channels must be > 0, *fftl*len must be >= *fragsize*. The number of rows in *irs* has to match the number of channels, or has to be exactly 1. None of the row vectors may be empty. The longest supported impulse response is (*fftl*len - *fragsize* + 1). Impulse responses longer than (*fftl*len - *fragsize* + 1) would cause temporal aliasing.

Parameters

<i>irs</i>	The matrix containing the impulse responses (one response per channel, or the same response for every channels) as set by the parser.
<i>channels</i>	The number of prepared audio channels for this MHA plugin.
<i>fragsize</i>	The block size (samples per channel) for waveform audio data
<i>fftl</i> len	FFT length used for filtering.

Returns

the length of the longest impulse response vector in *irs*.

3.21 fftfilterbank Namespace Reference

Classes

- class **fftfb_interface_t**
- class **fftfb_plug_t**

3.22 fshift Namespace Reference

All types for the fshift plugin live in this namespace.

Classes

- class **fshift_config_t**
fshift runtime config class
- class **fshift_t**
fshift plugin interface class

Functions

- int **fft_find_bin** (**mha_real_t** frequency, unsigned fftlen, **mha_real_t** srate)
Finds bin number of FFT bin nearest to the given frequency.

3.22.1 Detailed Description

All types for the fshift plugin live in this namespace.

3.22.2 Function Documentation

3.22.2.1 fft_find_bin()

```
int fshift::fft_find_bin (
    mha_real_t frequency,
    unsigned fftlen,
    mha_real_t srate )
```

Finds bin number of FFT bin nearest to the given frequency.

Parameters

<i>frequency</i>	The frequency for which to look. Has to be in range [-srate/2,+srate/2]
<i>fftlen</i>	Length of the FFT.
<i>srate</i>	Sampling rate of the waveform from which the FFT originates.

Returns

Bin number of the FFT bin corresponding to frequency

3.23 fshift_hilbert Namespace Reference

All types for the hilbert frequency shifter live in this namespace.

Classes

- class **frequency_translator_t**
- class **hilbert_shifter_t**

3.23.1 Detailed Description

All types for the hilbert frequency shifter live in this namespace.

3.24 gain Namespace Reference

Classes

- class **gain_if_t**
- class **scaler_t**

3.25 gsc_adaptive_stage Namespace Reference

Classes

- class **gsc_adaptive_stage**
- class **gsc_adaptive_stage_if**
Plugin interface class.

Variables

- constexpr **mha_real_t DELT** =1e-12
Small constant to ensure no division by zero occurs.

3.25.1 Variable Documentation

3.25.1.1 DELT

```
constexpr mha_real_t gsc_adaptive_stage::DELT = 1e-12
```

Small constant to ensure no division by zero occurs.

3.26 gtfb_analyzer Namespace Reference

Classes

- struct **gtfb_analyzer_cfg_t**
Configuration for Gammatone Filterbank Analyzer.
- class **gtfb_analyzer_t**
Gammatone Filterbank Analyzer Plugin.

3.27 level_matching Namespace Reference

Classes

- class **channel_pair**
- class **level_matching_config_t**
- class **level_matching_t**

3.28 Isl2ac Namespace Reference

All types for the **Isl2ac** (p. 98) plugins live in this namespace.

Classes

- class **cfg_t**
*Runtime configuration class of the **Isl2ac** (p. 98) plugin.*
- class **Isl2ac_t**
*Plugin class of **Isl2ac** (p. 98).*
- class **save_var_t**
LSL to AC bridge variable.

Enumerations

- enum **underrun_behavior** { **underrun_behavior::Zero** = 0, **underrun_behavior::Copy**, **underrun_behavior::Abort** }

3.28.1 Detailed Description

All types for the **ls12ac** (p. 98) plugins live in this namespace.

3.28.2 Enumeration Type Documentation

3.28.2.1 underrun_behavior

```
enum ls12ac::underrun_behavior [strong]
```

Enumerator

Zero	
Copy	
Abort	

3.29 matrixmixer Namespace Reference

Classes

- class **cfg_t**
- class **matmix_t**

3.30 mconv Namespace Reference

Classes

- class **MConv**

3.31 MHA_AC Namespace Reference

Functions and classes for Algorithm Communication (AC) support.

Classes

- class **ac2matrix_helper_t**
- class **ac2matrix_t**
Copy AC variable to a matrix.
- class **acspace2matrix_t**
Copy all or a subset of all numeric AC variables into an array of matrixes.
- class **double_t**
Insert a double precision floating point variable into the AC space.
- class **float_t**
Insert a float point variable into the AC space.
- class **int_t**
Insert a integer variable into the AC space.
- class **spectrum_t**
*Insert a **MHASignal::spectrum_t** (p. 1197) class into the AC space.*
- class **stat_t**
- class **waveform_t**
*Insert a **MHASignal::waveform_t** (p. 1212) class into the AC space.*

Functions

- **mha_spec_t get_var_spectrum (algo_comm_t ac, const std::string &name)**
Convert an AC variable into a spectrum.
- **mha_wave_t get_var_waveform (algo_comm_t ac, const std::string &name)**
Convert an AC variable into a waveform.
- **int get_var_int (algo_comm_t ac, const std::string &name)**
Return value of an integer scalar AC variable.
- **float get_var_float (algo_comm_t ac, const std::string &name)**
Return value of an floating point scalar AC variable.
- **std::vector< float > get_var_vfloat (algo_comm_t ac, const std::string &name)**
Return value of an floating point vector AC variable as standard vector of floats.

3.31.1 Detailed Description

Functions and classes for Algorithm Communication (AC) support.

3.32 mha_error_helpers Namespace Reference

Functions

- unsigned **digits** (unsigned n)
Compute number of decimal digits required to represent an unsigned integer.
- unsigned **snprintf_required_length** (const char *formatstring,...)
snprintf_required_length Compute the number of bytes (excluding the terminating nul) required to store the result of an snprintf.

3.32.1 Function Documentation

3.32.1.1 digits()

```
unsigned mha_error_helpers::digits (
    unsigned n )
```

Compute number of decimal digits required to represent an unsigned integer.

Parameters

<i>n</i>	The unsigned integer that we want to know the number of required decimal digits for. return The number of decimal digits in <i>n</i> .
----------	---

3.32.1.2 snprintf_required_length()

```
unsigned mha_error_helpers::snprintf_required_length (
    const char * formatstring,
    ... )
```

snprintf_required_length Compute the number of bytes (excluding the terminating nul) required to store the result of an snprintf.

Parameters

<i>formatstring</i>	The format string with standard printf formatstring
---------------------	---

Returns

the number of bytes required by printf without the terminating nul

3.33 MHA_TCP Namespace Reference

A Namespace for TCP helper classes.

Classes

- class **Async_Notify**
Portable Multiplexable cross-thread notification.

- class **Client**
A portable class for a tcp client connections.
- class **Connection**
***Connection** (p. 741) handles Communication between client and server, is used on both sides.*
- class **Event_Watcher**
OS-independent event watcher, uses select on Unix and WaitForMultipleObjects on Windows.
- struct **OS_EVENT_TYPE**
- class **Server**
- class **sock_init_t**
- class **Sockaccept_Event**
- class **Sockread_Event**
Watch socket for incoming data.
- class **Sockwrite_Event**
- class **Thread**
A very simple class for portable threads.
- class **Timeout_Event**
- class **Timeout_Watcher**
OS-independent event watcher with internal fixed-end-time timeout.
- class **Wakeup_Event**
A base class for asynchronous wakeup events.

Typedefs

- typedef int **SOCKET**

Functions

- std::string **STRERROR** (int err)
Portable conversion from error number to error string.
- std::string **HSTRERROR** (int err)
Portable conversion from hostname error number to error string.
- int **N_ERRNO** ()
Portable access to last network error number.
- int **H_ERRNO** ()
Portable access to last hostname error number.
- int **G_ERRNO** ()
Portable access to last non-network error number.
- double **dtime** ()
Time access function for system's high resolution time, retrieve current time as double.
- double **dtime** (const struct timeval &tv)
Time access function for unix' high resolution time, converts struct timeval to double.
- struct timeval **stime** (double d)
Time access function for unix' high resolution time, converts time from double to struct timeval.

Variables

- class **MHA_TCP::sock_init_t** **sock_initializer**

3.33.1 Detailed Description

A Namespace for TCP helper classes.

3.33.2 Typedef Documentation

3.33.2.1 SOCKET

```
typedef int MHA_TCP::SOCKET
```

3.33.3 Function Documentation

3.33.3.1 STRERROR()

```
std::string MHA_TCP::STRERROR (
    int err )
```

Portable conversion from error number to error string.

3.33.3.2 HSTRERROR()

```
std::string MHA_TCP::HSTRERROR (
    int err )
```

Portable conversion from hostname error number to error string.

3.33.3.3 N_ERRNO()

```
int MHA_TCP::N_ERRNO ( )
```

Portable access to last network error number.

3.33.3.4 H_ERRNO()

```
int MHA_TCP::H_ERRNO ( )
```

Portable access to last hostname error number.

3.33.3.5 G_ERRNO()

```
int MHA_TCP::G_ERRNO ( )
```

Portable access to last non-network error number.

3.33.3.6 dtime() [1/2]

```
double MHA_TCP::dtime ( )
```

Time access function for system's high resolution time, retrieve current time as double.

3.33.3.7 dtime() [2/2]

```
double MHA_TCP::dtime (
    const struct timeval & tv )
```

Time access function for unix' high resolution time, converts struct timeval to double.

3.33.3.8 stime()

```
struct timeval MHA_TCP::stime (
    double d )
```

Time access function for unix' high resolution time, converts time from double to struct timeval.

3.33.4 Variable Documentation

3.33.4.1 sock_initializer

```
class MHA_TCP::sock_init_t MHA_TCP::sock_initializer
```

3.34 mha_tcp Namespace Reference

namespace for network communication classes of MHA

Classes

- class **buffered_socket_t**
An asio TCP socket with an associated streambuf buffer for receiving lines of text, as well as string buffers for sending responses.
- class **server_t**
Class for accepting TCP connections from clients.

3.34.1 Detailed Description

namespace for network communication classes of MHA

3.35 mhachain Namespace Reference

Classes

- class **chain_base_t**
- class **mhachain_t**
- class **plugs_t**

3.36 MHAEvents Namespace Reference

Collection of event handling classes.

Classes

- class **connector_base_t**
- class **connector_t**
- class **emitter_t**
Class for emitting openMHA events.
- class **patchbay_t**
Patchbay which connects any event emitter with any member function of the parameter class.

3.36.1 Detailed Description

Collection of event handling classes.

3.37 MHAFilter Namespace Reference

Namespace for IIR and FIR filter classes.

Classes

- class **adapt_filter_param_t**
- class **adapt_filter_state_t**
- class **adapt_filter_t**
Adaptive filter.
- class **blockprocessing_polyphase_resampling_t**
A class that does polyphase resampling and takes into account block processing.
- class **complex_bandpass_t**
Complex bandpass filter.
- class **diff_t**
Differentiator class (non-normalized)
- class **fftfilter_t**
FFT based FIR filter implementation.
- class **fftfilterbank_t**
FFT based FIR filterbank implementation.
- class **filter_t**
Generic IIR filter class.
- class **gammaflt_t**
Class for gammatone filter.
- class **iir_filter_state_t**
- class **iir_filter_t**
IIR filter class wrapper for integration into parser structure.
- class **iir_ord1_real_t**
First order recursive filter.
- class **o1_ar_filter_t**
First order attack-release lowpass filter.
- class **o1flt_lowpass_t**
First order low pass filter.
- class **o1flt_maxtrack_t**
First order maximum tracker.
- class **o1flt_mintrack_t**
First order minimum tracker.
- class **partitioned_convolution_t**
A filter class for partitioned convolution.

- class **polyphase_resampling_t**
A class that performs polyphase resampling.
- class **resampling_filter_t**
Hann shaped low pass filter for resampling.
- class **smoothspec_t**
Smooth spectral gains, create a windowed impulse response.
- class **thirdoctave_analyzer_t**
- struct **transfer_function_t**
a structure containing a source channel number, a target channel number, and an impulse response.
- struct **transfer_matrix_t**
A sparse matrix of transfer function partitionss.

Functions

- template<typename T , typename std::enable_if< std::is_floating_point< T >::value, T >::type * = nullptr>
void **make_friendly_number** (T &x)
- void **o1_lp_coeffs** (const **mha_real_t** tau, const **mha_real_t** fs, **mha_real_t** &c1, **mha_real_t** &c2)
Set first order filter coefficients from time constant and sampling rate.
- void **butter_stop_ord1** (double *A, double *B, double f1, double f2, double fs)
Setup a first order butterworth band stop filter.
- std::vector< float > **fir_lp** (float f_pass_, float f_stop_, float fs_, unsigned order_)
Setup a nth order fir low pass filter.
- **MHASignal::waveform_t** * **spec2fir** (const **mha_spec_t** *spec, const unsigned int fftlen, const **MHAWindow::base_t** &window, const bool minphase)
Create a windowed impulse response/FIR filter coefficients from a spectrum.
- unsigned **gcd** (unsigned a, unsigned b)
greatest common divisor
- double **sinc** (double x)
sin(x)/x function, coping with x=0.
- std::pair< unsigned, unsigned > **resampling_factors** (float source_sampling_rate, float target_sampling_rate, float factor=1.0f)
Computes rational resampling factor from two sampling rates.

3.37.1 Detailed Description

Namespace for IIR and FIR filter classes.

3.37.2 Function Documentation

3.37.2.1 make_friendly_number()

```
template<typename T , typename std::enable_if< std::is_floating_point< T >::value,
T >::type * = nullptr>
void MHAFilter::make_friendly_number (
    T & x ) [inline]
```

3.37.2.2 o1_lp_coeffs()

```
void MHAFilter::o1_lp_coeffs (
    const mha_real_t tau,
    const mha_real_t fs,
    mha_real_t & c1,
    mha_real_t & c2 )
```

Set first order filter coefficients from time constant and sampling rate.

Parameters

<i>tau</i>	Time constant
<i>fs</i>	Sampling rate

Return values

<i>c1</i>	Recursive filter coefficient
<i>c2</i>	Non-recursive filter coefficient

3.37.2.3 butter_stop_ord1()

```
void MHAFilter::butter_stop_ord1 (
    double * A,
    double * B,
    double f1,
    double f2,
    double fs )
```

Setup a first order butterworth band stop filter.

This function calculates the filter coefficients of a first order butterworth band stop filter.

Return values

<i>A</i>	recursive filter coefficients
<i>B</i>	non recursive filter coefficients

Parameters

<i>f1</i>	lower frequency
<i>f2</i>	upper frequency
<i>fs</i>	sample frequency

3.37.2.4 `fir_lp()`

```
std::vector< float > MHAFilter::fir_lp (
    float f_pass_,
    float f_stop_,
    float fs_,
    unsigned order_ )
```

Setup a nth order fir low pass filter.

This function calculates the filter coefficients of a nth order fir low pass filter filter. Frequency arguments above the nyquist frequency are accepted but the spectral response is truncated at the nyquist frequency

Returns

vector containing filter coefficients

Precondition

`f_pass_` must be smaller or equal to `f_stop_`.

Parameters

<i>f_{pass}</i>	Upper passband frequency
<i>f_{stop}</i>	Lower stopband frequency
<i>fs</i>	sample frequency

3.37.2.5 `spec2fir()`

```
MHASignal::waveform_t * MHAFilter::spec2fir (
    const mha_spec_t * spec,
    const unsigned int fftlen,
```

```
const MHAWindow::base_t & window,
const bool minphase )
```

Create a windowed impulse response/FIR filter coefficients from a spectrum.

Parameters

<i>spec</i>	Input spectrum
<i>fftl</i>	FFT length of spectrum
<i>window</i>	Window shape (with length, e.g. initialized with MHAWindow::hanning(54)).
<i>minphase</i>	Flag, true if original phase should be discarded and replaced by a minimal phase function.

3.37.2.6 gcd()

```
unsigned MHAFilter::gcd (
    unsigned a,
    unsigned b ) [inline]
```

greatest common divisor

3.37.2.7 sinc()

```
double MHAFilter::sinc (
    double x )
```

$\sin(x)/x$ function, coping with $x=0$.

This is the historical sinc function, not the normalized sinc function.

3.37.2.8 resampling_factors()

```
std::pair< unsigned, unsigned > MHAFilter::resampling_factors (
    float source_sampling_rate,
    float target_sampling_rate,
    float factor = 1.0f )
```

Computes rational resampling factor from two sampling rates.

The function will fail if either $\text{sampling_rate} * \text{factor}$ is not an integer

Parameters

<i>source_sampling_rate</i>	The original sampling rate
<i>target_sampling_rate</i>	The desired sampling rate
<i>factor</i>	A helper factor to use for non-integer sampling rates

Returns

a pair that contains first the upsampling factor and second the downsampling factor required for the specified resampling.

Exceptions

<i>MHA_Error</i> (p. 707)	if no rational resampling factor can be found.
---	--

3.38 MHAIOJack Namespace Reference

JACK IO.

Classes

- class **io_jack_t**
Main class for JACK IO.

3.38.1 Detailed Description

JACK IO.

3.39 MHAIOJackdb Namespace Reference

Classes

- class **io_jack_t**
Main class for JACK IO.

3.40 MHAIOPortAudio Namespace Reference

Classes

- class **device_info_t**
- class **io_portaudio_t**
Main class for Portaudio sound IO.

Functions

- static std::string **parserFriendlyName** (const std::string &in)

3.40.1 Function Documentation

3.40.1.1 parserFriendlyName()

```
static std::string MHAIOPortAudio::parserFriendlyName (
    const std::string & in ) [static]
```

3.41 MHAJack Namespace Reference

Classes and functions for openMHA and JACK interaction.

Classes

- class **client_avg_t**
Generic JACK client for averaging a system response across time.
- class **client_noncont_t**
Generic client for synchronous playback and recording of waveform fragments.
- class **client_t**
Generic asynchronous JACK client.
- class **port_t**
Class for one channel/port.

Functions

- void **io** (**mha_wave_t** *s_out, **mha_wave_t** *s_in, const std::string &name, const std::vector< std::string > &p_out, const std::vector< std::string > &p_in, float *srate=NULL, unsigned int *fragsize=NULL, bool use_jack_transport=false)
Functional form of generic client for synchronous playback and recording of waveform fragments.
- std::vector< unsigned int > **get_port_capture_latency** (const std::vector< std::string > &ports)
Return the JACK port latency of ports.
- std::vector< int > **get_port_capture_latency_int** (const std::vector< std::string > &ports)
Return the JACK port latency of ports.
- std::vector< unsigned int > **get_port_playback_latency** (const std::vector< std::string > &ports)
Return the JACK port latency of ports.
- std::vector< int > **get_port_playback_latency_int** (const std::vector< std::string > &ports)

3.41.1 Detailed Description

Classes and functions for openMHA and JACK interaction.

3.41.2 Function Documentation

3.41.2.1 io()

```
void MHAJack::io (
    mha_wave_t * s_out,
    mha_wave_t * s_in,
    const std::string & name,
    const std::vector< std::string > & p_out,
    const std::vector< std::string > & p_in,
    float * srate = NULL,
    unsigned int * fragsize = NULL,
    bool use_jack_transport = false )
```

Functional form of generic client for synchronous playback and recording of waveform fragments.

3.41.2.2 get_port_capture_latency()

```
std::vector< unsigned int > MHAJack::get_port_capture_latency (
    const std::vector< std::string > & ports )
```

Return the JACK port latency of ports.

Parameters

<i>ports</i>	Ports to be tested
--------------	--------------------

Returns

Latency vector (one entry for each port)

3.41.2.3 get_port_capture_latency_int()

```
std::vector< int > MHAJack::get_port_capture_latency_int (
    const std::vector< std::string > & ports )
```

Return the JACK port latency of ports.

Parameters

<i>ports</i>	Ports to be tested
--------------	--------------------

Returns

Latency vector (one entry for each port)

3.41.2.4 get_port_playback_latency()

```
std::vector< unsigned int > MHAJack::get_port_playback_latency (
    const std::vector< std::string > & ports )
```

Return the JACK port latency of ports.

Parameters

<i>ports</i>	Ports to be tested
--------------	--------------------

Returns

Latency vector (one entry for each port)

3.41.2.5 get_port_playback_latency_int()

```
std::vector< int > MHAJack::get_port_playback_latency_int (
    const std::vector< std::string > & ports )
```

3.42 MHAKernel Namespace Reference

Classes

- class **algo_comm_class_t**
- class **comm_var_map_t**

Functions

- **algo_comm_class_t * algo_comm_safe_cast** (void *)

3.42.1 Function Documentation

3.42.1.1 algo_comm_safe_cast()

```
MHAKernel::algo_comm_class_t * MHAKernel::algo_comm_safe_cast (
    void * h )
```

3.43 MHAMultiSrc Namespace Reference

Collection of classes for selecting audio chunks from multiple sources.

Classes

- class **base_t**
Base class for source selection.
- class **channel_t**
- class **channels_t**
- class **spectrum_t**
- class **waveform_t**

3.43.1 Detailed Description

Collection of classes for selecting audio chunks from multiple sources.

3.44 MHAOvfFilter Namespace Reference

Namespace for overlapping FFT based filter bank classes and functions.

Namespaces

- **barkscale**
- **FreqScaleFun**
Transform functions from linear scale in Hz to new frequency scales.
- **ShapeFun**
Shape functions for overlapping filters.

Classes

- class **band_descriptor_t**
- class **fftfb_ac_info_t**
- class **fftfb_t**
FFT based overlapping filter bank.
- class **fftfb_vars_t**
Set of configuration variables for FFT-based overlapping filters.
- class **fscale_bw_t**
- class **fscale_t**
- class **fspacing_t**
Class for frequency spacing, used by filterbank shape generator class.
- class **overlap_save_filterbank_analytic_t**
- class **overlap_save_filterbank_t**
*A time-domain minimal phase filter bank with frequency shapes from **MHAOvFilter::fftfb_t** (p. 947).*
- class **scale_var_t**

Typedefs

- typedef **mha_real_t()** **scale_fun_t(mha_real_t)**

3.44.1 Detailed Description

Namespace for overlapping FFT based filter bank classes and functions.

3.44.2 Typedef Documentation

3.44.2.1 scale_fun_t

```
typedef mha_real_t() MHAOvFilter::scale_fun_t( mha_real_t)
```

3.45 MHAOvFilter::barkscale Namespace Reference

Classes

- class **bark2hz_t**
- class **hz2bark_t**

Variables

- **mha_real_t** **vfreq** [**BARKSCALE_ENTRIES**]
- **mha_real_t** **vbark** [**BARKSCALE_ENTRIES**]

3.45.1 Variable Documentation

3.45.1.1 vfreq

mha_real_t MHAOvlFilter::barkscale::vfreq

3.45.1.2 vbark

mha_real_t MHAOvlFilter::barkscale::vbark

3.46 MHAOvlFilter::FreqScaleFun Namespace Reference

Transform functions from linear scale in Hz to new frequency scales.

Functions

- **mha_real_t** **hz2hz** (**mha_real_t** x)
Dummy scale transformation Hz to Hz.
- **mha_real_t** **hz2khz** (**mha_real_t** x)
- **mha_real_t** **hz2octave** (**mha_real_t** x)
- **mha_real_t** **hz2third_octave** (**mha_real_t** x)
- **mha_real_t** **hz2bark** (**mha_real_t** x)
Transformation to bark scale.
- **mha_real_t** **hz2bark_analytic** (**mha_real_t**)
- **mha_real_t** **hz2erb** (**mha_real_t**)
- **mha_real_t** **hz2erb_glasberg1990** (**mha_real_t**)
- **mha_real_t** **hz2log** (**mha_real_t** x)
Third octave frequency scale.
- **mha_real_t** **inv_scale** (**mha_real_t**, **mha_real_t**(*)(**mha_real_t**))

3.46.1 Detailed Description

Transform functions from linear scale in Hz to new frequency scales.

3.46.2 Function Documentation

3.46.2.1 hz2hz()

```
mha_real_t MHAOvIFilter::FreqScaleFun::hz2hz (
    mha_real_t x )
```

Dummy scale transformation Hz to Hz.

This function implements a dummy scale transformation (linear frequency scale).

Parameters

x	Input frequency in Hz
----------	-----------------------

Returns

Frequency in Hz

3.46.2.2 hz2khz()

```
mha_real_t MHAOvIFilter::FreqScaleFun::hz2khz (
    mha_real_t x )
```

3.46.2.3 hz2octave()

```
mha_real_t MHAOvIFilter::FreqScaleFun::hz2octave (
    mha_real_t x )
```

3.46.2.4 hz2third_octave()

```
mha_real_t MHAOvIFilter::FreqScaleFun::hz2third_octave (
    mha_real_t x )
```

3.46.2.5 hz2bark()

```
mha_real_t MHAOvIFilter::FreqScaleFun::hz2bark (
    mha_real_t x )
```

Transformation to bark scale.

This function implements a critical band rate (bark) scale.

Parameters

<i>x</i>	Input frequency in Hz
----------	-----------------------

Returns

Critical band rate in Bark

3.46.2.6 `hz2bark_analytic()`

```
mha_real_t MHAOvlFilter::FreqScaleFun::hz2bark_analytic (  
    mha_real_t x )
```

3.46.2.7 `hz2erb()`

```
mha_real_t MHAOvlFilter::FreqScaleFun::hz2erb (  
    mha_real_t x )
```

3.46.2.8 `hz2erb_glasberg1990()`

```
mha_real_t MHAOvlFilter::FreqScaleFun::hz2erb_glasberg1990 (  
    mha_real_t x )
```

3.46.2.9 `hz2log()`

```
mha_real_t MHAOvlFilter::FreqScaleFun::hz2log (  
    mha_real_t x )
```

Third octave frequency scale.

This function implements a third octave scale. Frequencies below 16 Hz are mapped to 16 Hz.

Parameters

<i>x</i>	Frequency in Hz
----------	-----------------

Returns

Third octaves relative to 1000 Hz

3.46.2.10 inv_scale()

```
mha_real_t MHAOvIFilter::FreqScaleFun::inv_scale (
    mha_real_t y,
    mha_real_t (*) ( mha_real_t ) fun )
```

3.47 MHAOvIFilter::ShapeFun Namespace Reference

Shape functions for overlapping filters.

Functions

- **mha_real_t** **rect** (**mha_real_t** x)
Filter shape function for rectangular filters.
- **mha_real_t** **linear** (**mha_real_t** x)
Filter shape function for sawtooth filters.
- **mha_real_t** **hann** (**mha_real_t** x)
Filter shape function for hanning shaped filters.
- **mha_real_t** **expflt** (**mha_real_t**)
- **mha_real_t** **gauss** (**mha_real_t**)

3.47.1 Detailed Description

Shape functions for overlapping filters.

3.47.2 Function Documentation

3.47.2.1 rect()

```
mha_real_t MHAOvIFilter::ShapeFun::rect (
    mha_real_t x )
```

Filter shape function for rectangular filters.

This function creates rectangular filter shapes. The edge is exactly half way between two center frequencies (on a given scale).

Parameters

x	Input value in the range $[-1,1]$.
-----	-------------------------------------

Returns

Weight function in the range $[0,1]$

3.47.2.2 linear()

```
mha_real_t MHAOvlFilter::ShapeFun::linear (  
    mha_real_t  $x$  )
```

Filter shape function for sawtooth filters.

This function creates sawtooth filter shapes. They rise linearly from 0 to 1 in the interval from the lower neighbor center frequency to the band center frequency and from 1 to 0 in the interval from the band center frequency to the upper neighbour band center frequency. Linear means linear on a given frequency scale.

Parameters

x	Input value in the range $[-1,1]$.
-----	-------------------------------------

Returns

Weight function in the range $[0,1]$

3.47.2.3 hann()

```
mha_real_t MHAOvlFilter::ShapeFun::hann (  
    mha_real_t  $x$  )
```

Filter shape function for hanning shaped filters.

This function creates hanning window shaped filters.

Parameters

x	Input value in the range $[-1,1]$.
-----	-------------------------------------

Returns

Weight function in the range [0,1]

3.47.2.4 expflt()

```
mha_real_t MHAOvlFilter::ShapeFun::expflt (
    mha_real_t x )
```

3.47.2.5 gauss()

```
mha_real_t MHAOvlFilter::ShapeFun::gauss (
    mha_real_t x )
```

3.48 MHAParser Namespace Reference

Name space for the openMHA-Parser configuration language.

Namespaces

- **StrCnv**
String converter namespace.

Classes

- class **base_t**
Base class for all parser items.
- class **bool_mon_t**
Monitor with string value.
- class **bool_t**
Variable with a boolean value ("yes"/"no")
- class **c_ifc_parser_t**
- class **commit_t**
Parser variable with event-emission functionality.
- class **complex_mon_t**
Monitor with complex value.
- class **complex_t**
Variable with complex value.
- class **entry_t**
- class **expression_t**

- class **float_mon_t**
Monitor with float value.
- class **float_t**
Variable with float value.
- class **int_mon_t**
Monitor variable with int value.
- class **int_t**
Variable with integer value.
- class **keyword_list_t**
Keyword list class.
- class **kw_t**
Variable with keyword list value.
- class **mcomplex_mon_t**
Matrix of complex numbers monitor.
- class **mcomplex_t**
Matrix variable with complex value.
- class **mfloat_mon_t**
Matrix of floats monitor.
- class **mfloat_t**
Matrix variable with float value.
- class **mhaconfig_mon_t**
- class **mhapluginloader_t**
Class to create a plugin loader in a parser, including the load logic.
- class **mint_mon_t**
Matrix of ints monitor.
- class **mint_t**
Matrix variable with int value.
- class **monitor_t**
Base class for monitors and variable nodes.
- class **parser_t**
Parser node class.
- class **range_var_t**
Base class for all variables with a numeric value range.
- class **string_mon_t**
Monitor with string value.
- class **string_t**
Variable with a string value.
- class **variable_t**
Base class for variable nodes.
- class **vcomplex_mon_t**
Monitor with vector of complex values.
- class **vcomplex_t**
Vector variable with complex value.
- class **vfloat_mon_t**
Vector of floats monitor.

- class **vfloat_t**
Vector variable with float value.
- class **vint_mon_t**
Vector of ints monitor.
- class **vint_t**
Variable with vector<int> value.
- class **vstring_mon_t**
Vector of monitors with string value.
- class **vstring_t**
Vector variable with string values.
- class **window_t**
MHA configuration interface for a window function generator.

Typedefs

- typedef std::string(base_t::* **opact_t**) (**expression_t** &)
- typedef std::string(base_t::* **query_t**) (const std::string &)
- typedef std::map< std::string, **opact_t** > **opact_map_t**
- typedef std::map< std::string, **query_t** > **query_map_t**
- typedef std::list< **entry_t** > **entry_map_t**
- typedef int(* **c_parse_cmd_t**) (void *, const char *, char *, unsigned int)
- typedef const char *(* **c_parse_err_t**) (void *, int)

Functions

- int **get_precision** ()
- std::string **commentate** (const std::string &s)
- void **trim** (std::string &s)
- std::string **cfg_dump** (**base_t** *, const std::string &)
- std::string **cfg_dump_short** (**base_t** *, const std::string &)
- std::string **all_dump** (**base_t** *, const std::string &)
- std::string **mon_dump** (**base_t** *, const std::string &)
- std::string **all_ids** (**base_t** *, const std::string &, const std::string &= "")
- void **strreplace** (std::string &, const std::string &, const std::string &)
string replace function
- void **envreplace** (std::string &s)

3.48.1 Detailed Description

Name space for the openMHA-Parser configuration language.

This namespace contains all classes which are needed for the implementation of the open↔MHA configuration language. For details on the script language itself please see section **The openMHA configuration language** (p. 32).

3.48.2 List of valid MHAParser items

- **Sub-parser:** `parser_t` (p. 1045)
- **Variables:**
 Numeric variables: `int_t` (p. 1010), `vint_t` (p. 1076), `float_t` (p. 1004), `vfloat_t` (p. 1071), `mfloat_t` (p. 1027)
 Other variables: `string_t` (p. 1059), `vstring_t` (p. 1081), `kw_t` (p. 1017), `bool_t` (p. 987)
- **Monitors:**
 Numeric monitors: `int_mon_t` (p. 1007), `vint_mon_t` (p. 1074), `float_mon_t` (p. 1002), `vfloat_mon_t` (p. 1068), `mfloat_mon_t` (p. 1025), `mcomplex_mon_t` (p. 1021)
 Other monitors: `bool_mon_t` (p. 985), `string_mon_t` (p. 1057), `vstring_mon_t` (p. 1079)

Members can be inserted into the configuration namespace by using `MHAParser::insert_item()` or the `insert_member()` (p. 1565) macro.

3.48.3 Typedef Documentation

3.48.3.1 `opact_t`

```
typedef std::string(base_t::* MHAParser::opact_t) ( expression_t &)
```

3.48.3.2 `query_t`

```
typedef std::string(base_t::* MHAParser::query_t) (const std::string &)
```

3.48.3.3 `opact_map_t`

```
typedef std::map<std::string, opact_t> MHAParser::opact_map_t
```

3.48.3.4 `query_map_t`

```
typedef std::map<std::string, query_t> MHAParser::query_map_t
```


3.48.3.5 entry_map_t

```
typedef std::list< entry_t> MHAParser::entry_map_t
```

3.48.3.6 c_parse_cmd_t

```
typedef int(* MHAParser::c_parse_cmd_t) (void *, const char *, char *, unsigned int)
```

3.48.3.7 c_parse_err_t

```
typedef const char*(* MHAParser::c_parse_err_t) (void *, int)
```

3.48.4 Function Documentation

3.48.4.1 get_precision()

```
int MHAParser::get_precision ( )
```

3.48.4.2 commentate()

```
std::string MHAParser::commentate (
    const std::string & s )
```

3.48.4.3 trim()

```
void MHAParser::trim (
    std::string & s )
```

3.48.4.4 cfg_dump()

```
std::string MHAParser::cfg_dump (
    base_t * p,
    const std::string & pref )
```

3.48.4.5 `cfg_dump_short()`

```
std::string MHAParser::cfg_dump_short (
    base_t * p,
    const std::string & pref )
```

3.48.4.6 `all_dump()`

```
std::string MHAParser::all_dump (
    base_t * p,
    const std::string & pref )
```

3.48.4.7 `mon_dump()`

```
std::string MHAParser::mon_dump (
    base_t * p,
    const std::string & pref )
```

3.48.4.8 `all_ids()`

```
std::string MHAParser::all_ids (
    base_t * p,
    const std::string & pref,
    const std::string & id = "" )
```

3.48.4.9 `strreplace()`

```
void MHAParser::strreplace (
    std::string & s,
    const std::string & arg,
    const std::string & rep )
```

string replace function

Parameters

<i>s</i>	target string
<i>arg</i>	search pattern
<i>rep</i>	replace pattern

3.48.4.10 envreplace()

```
void MHAParser::envreplace (
    std::string & s )
```

3.49 MHAParser::StrCnv Namespace Reference

String converter namespace.

Functions

- int **num_brackets** (const std::string &s)
count number of brackets
- int **bracket_balance** (const std::string &s)
- void **str2val** (const std::string &, bool &)
Convert from string.
- void **str2val** (const std::string &, float &)
Convert from string.
- void **str2val** (const std::string &, **mha_complex_t** &)
Convert from string.
- void **str2val** (const std::string &, int &)
Convert from string.
- void **str2val** (const std::string &, **keyword_list_t** &)
Convert from string.
- void **str2val** (const std::string &, std::string &)
Convert from string.
- template<class arg_t >
void **str2val** (const std::string &s, std::vector< arg_t > &val)
Converter for vector types.
- template<>
void **str2val**< **mha_real_t** > (const std::string &s, std::vector< **mha_real_t** > &v)
Converter for vector<mha_real_t> with Matlab-style expansion.
- template<class arg_t >
void **str2val** (const std::string &s, std::vector< std::vector< arg_t > > &val)
Converter for matrix types.
- std::string **val2str** (const bool &)
Convert to string.
- std::string **val2str** (const float &)
Convert to string.
- std::string **val2str** (const **mha_complex_t** &)
Convert to string.
- std::string **val2str** (const int &)

- Convert to string.*
- `std::string val2str (const keyword_list_t &)`
Convert to string.
- `std::string val2str (const std::string &)`
Convert to string.
- `std::string val2str (const std::vector< float > &)`
Convert to string.
- `std::string val2str (const std::vector< mha_complex_t > &)`
Convert to string.
- `std::string val2str (const std::vector< int > &)`
Convert to string.
- `std::string val2str (const std::vector< std::vector< int > > &)`
Convert to string.
- `std::string val2str (const std::vector< std::string > &)`
Convert to string.
- `std::string val2str (const std::vector< std::vector< float > > &)`
Convert to string.
- `std::string val2str (const std::vector< std::vector< mha_complex_t > > &)`
Convert to string.

3.49.1 Detailed Description

String converter namespace.

The functions defined in this namespace manage the conversions from C++ variables to strings and back. It was tried to keep a matlab compatible string format for vectors and vectors of vectors.

3.49.2 Function Documentation

3.49.2.1 num_brackets()

```
int MHAParser::StrCnv::num_brackets (
    const std::string & s )
```

count number of brackets

Return number of brackets according to layer depth (vector:2, matrix:4, etc)

Parameters

s	String
---	--------

Returns

Number of brackets, or -1 for empty string, or -2 for invalid brackets

3.49.2.2 bracket_balance()

```
int MHAParser::StrCnv::bracket_balance (
    const std::string & s )
```

3.49.2.3 str2val() [1/8]

```
void MHAParser::StrCnv::str2val (
    const std::string & s,
    bool & v )
```

Convert from string.

3.49.2.4 str2val() [2/8]

```
void MHAParser::StrCnv::str2val (
    const std::string & s,
    float & v )
```

Convert from string.

3.49.2.5 str2val() [3/8]

```
void MHAParser::StrCnv::str2val (
    const std::string & s,
    mha_complex_t & v )
```

Convert from string.

3.49.2.6 str2val() [4/8]

```
void MHAParser::StrCnv::str2val (
    const std::string & s,
    int & v )
```

Convert from string.

3.49.2.7 str2val() [5/8]

```
void MHAParser::StrCnv::str2val (
    const std::string & s,
    MHAParser::keyword_list_t & v )
```

Convert from string.

3.49.2.8 str2val() [6/8]

```
void MHAParser::StrCnv::str2val (
    const std::string & s,
    std::string & v )
```

Convert from string.

3.49.2.9 str2val() [7/8]

```
template<class arg_t >
void MHAParser::StrCnv::str2val (
    const std::string & s,
    std::vector< arg_t > & val )
```

Converter for vector types.

3.49.2.10 str2val<mha_real_t>()

```
template<>
void MHAParser::StrCnv::str2val< mha_real_t > (
    const std::string & s,
    std::vector< mha_real_t > & v )
```

Converter for vector<mha_real_t> with Matlab-style expansion.

3.49.2.11 str2val() [8/8]

```
template<class arg_t >
void MHAParser::StrCnv::str2val (
    const std::string & s,
    std::vector< std::vector< arg_t > > & val )
```

Converter for matrix types.

3.49.2.12 val2str() [1/13]

```
std::string MHAParser::StrCnv::val2str (
    const bool & v )
```

Convert to string.

3.49.2.13 val2str() [2/13]

```
std::string MHAParser::StrCnv::val2str (
    const float & v )
```

Convert to string.

3.49.2.14 val2str() [3/13]

```
std::string MHAParser::StrCnv::val2str (
    const mha_complex_t & v )
```

Convert to string.

3.49.2.15 val2str() [4/13]

```
std::string MHAParser::StrCnv::val2str (
    const int & v )
```

Convert to string.

3.49.2.16 val2str() [5/13]

```
std::string MHAParser::StrCnv::val2str (
    const keyword_list_t & v )
```

Convert to string.

3.49.2.17 val2str() [6/13]

```
std::string MHAParser::StrCnv::val2str (
    const std::string & v )
```

Convert to string.

3.49.2.18 val2str() [7/13]

```
std::string MHAParser::StrCnv::val2str (
    const std::vector< float > & v )
```

Convert to string.

3.49.2.19 val2str() [8/13]

```
std::string MHAParser::StrCnv::val2str (
    const std::vector< mha_complex_t > & v )
```

Convert to string.

3.49.2.20 val2str() [9/13]

```
std::string MHAParser::StrCnv::val2str (
    const std::vector< int > & v )
```

Convert to string.

3.49.2.21 val2str() [10/13]

```
std::string MHAParser::StrCnv::val2str (
    const std::vector< std::vector< int > > & v )
```

Convert to string.

3.49.2.22 val2str() [11/13]

```
std::string MHAParser::StrCnv::val2str (
    const std::vector< std::string > & v )
```

Convert to string.

3.49.2.23 val2str() [12/13]

```
std::string MHAParser::StrCnv::val2str (
    const std::vector< std::vector< float > > & v )
```

Convert to string.

3.49.2.24 val2str() [13/13]

```
std::string MHAParser::StrCnv::val2str (
    const std::vector< std::vector< mha_complex_t > > & v )
```

Convert to string.

3.50 MHAPLugin Namespace Reference

Namespace for openMHA plugin class templates and thread-safe runtime configurations.

Classes

- class **cfg_node_t**
A node class for storing MHA plugin runtime configurations as a singly linked list, where the nodes store besides the usual "next" and "data" pointers also a flag that indicates whether this node can be deleted.
- class **config_t**
Template class for thread safe configuration.
- class **plugin_t**
The template class for C++ openMHA plugins.

3.50.1 Detailed Description

Namespace for openMHA plugin class templates and thread-safe runtime configurations.

3.51 MHAPPlugin_Resampling Namespace Reference

Classes

- class **resampling_if_t**
- class **resampling_t**

3.52 MHAPPlugin_Split Namespace Reference

Classes

- class **domain_handler_t**
Handles domain-specific partial input and output signal.
- class **dummy_threads_t**
Dummy specification of a thread platform: This class implements everything in a single thread.
- class **posix_threads_t**
Posix threads specification of thread platform.
- class **split_t**
Implements split plugin.
- class **splitted_part_t**
*The **splitted_part_t** (p. 1129) instance manages the plugin that performs processing on the reduced set of channels.*
- class **thread_platform_t**
Basic interface for encapsulating thread creation, thread priority setting, and synchronization on any threading platform (i.e., pthreads or win32threads).
- class **uni_processor_t**
An interface to a class that sports a process method with no parameters and no return value.

Enumerations

- enum { **INVALID_THREAD_PRIORITY** = 999999999 }
Invalid thread priority.

3.52.1 Detailed Description

A namespace for the split plugin. Helps testability and documentation.

3.52.2 Enumeration Type Documentation

3.52.2.1 anonymous enum

anonymous enum

Invalid thread priority.

Enumerator

INVALID_THREAD_PRIORITY	
-------------------------	--

3.53 MHASignal Namespace Reference

Namespace for audio signal handling and processing classes.

Classes

- class **async_rmslevel_t**
Class for asynchronous level metering.
- class **delay_spec_t**
- class **delay_t**
Class to realize a simple delay of waveform streams.
- class **delay_wave_t**
Delayline containing wave fragments.
- class **doublebuffer_t**
Double-buffering class.
- class **fft_t**
- class **hilbert_fftw_t**
- class **hilbert_t**
Hilbert transformation of a waveform segment.
- class **loop_wavefragment_t**
Copy a fixed waveform fragment to a series of waveform fragments of other size.
- class **matrix_t**
n-dimensional matrix with real or complex floating point values.
- class **minphase_t**
Minimal phase function.
- class **quantizer_t**
Simple simulation of fixpoint quantization.
- class **ringbuffer_t**
A ringbuffer class for time domain audio signal, which makes no assumptions with respect to fragment size.
- class **schroeder_t**
Schroeder tone complex class.
- class **spectrum_t**
*a signal processing class for spectral data (based on **mha_spec_t** (p. 732))*
- class **stat_t**
- class **subsample_delay_t**
implements subsample delay in spectral domain.
- class **uint_vector_t**
Vector of unsigned values, used for size and index description of n-dimensional matrixes.
- class **waveform_t**
*signal processing class for waveform data (based on **mha_wave_t** (p. 780))*

Functions

- **void for_each (mha_wave_t *s, mha_real_t(*fun)(mha_real_t))**
*Apply a function to each element of a **mha_wave_t** (p. 780).*
- **mha_real_t lin2db (mha_real_t x, mha_real_t eps)**
Conversion from linear scale to dB (no SPL reference)
- **mha_real_t lin2db (mha_real_t x)**
Conversion from linear scale to dB (no SPL reference)
- **mha_real_t db2lin (mha_real_t x)**
Conversion from dB scale to linear (no SPL reference)
- **mha_real_t sq2db (mha_real_t x, mha_real_t eps=0.0f)**
conversion from squared values to dB (no SPL reference)
- **mha_real_t db2sq (mha_real_t x)**
conversion from dB to squared values (no SPL reference)
- **mha_real_t pa2dbspl (mha_real_t x, mha_real_t eps=0.0f)**
Conversion from linear Pascal scale to dB SPL.
- **mha_real_t dbspl2pa (mha_real_t x)**
Conversion from dB SPL to linear Pascal scale.
- **mha_real_t pa2dbspl (mha_real_t x, mha_real_t eps=0.0f)**
Conversion from squared Pascal scale to dB SPL.
- **mha_real_t dbspl2pa2 (mha_real_t x)**
conversion from dB SPL to squared Pascal scale
- **mha_real_t smp2sec (mha_real_t n, mha_real_t srate)**
conversion from samples to seconds
- **mha_real_t sec2smp (mha_real_t sec, mha_real_t srate)**
conversion from seconds to samples
- **mha_real_t bin2freq (mha_real_t bin, unsigned fftlen, mha_real_t srate)**
conversion from fft bin index to frequency
- **mha_real_t freq2bin (mha_real_t freq, unsigned fftlen, mha_real_t srate)**
conversion from frequency to fft bin index
- **mha_real_t smp2rad (mha_real_t samples, unsigned bin, unsigned fftlen)**
conversion from delay in samples to phase shift
- **mha_real_t rad2smp (mha_real_t phase_shift, unsigned bin, unsigned fftlen)**
conversion from phase shift to delay in samples
- **template<class elem_type >**
std::vector< elem_type > dupvec (std::vector< elem_type > vec, unsigned n)
Duplicate last vector element to match desired size.
- **template<class elem_type >**
std::vector< elem_type > dupvec_chk (std::vector< elem_type > vec, unsigned n)
Duplicate last vector element to match desired size, check for dimension.
- **void copy_channel (mha_spec_t &self, const mha_spec_t &src, unsigned sch, unsigned dch)**
Copy one channel of a source signal.
- **void copy_channel (mha_wave_t &self, const mha_wave_t &src, unsigned src_channel, unsigned dest_channel)**
Copy one channel of a source signal.

- **mha_real_t rmslevel** (const **mha_spec_t** &s, unsigned int channel, unsigned int fftlen)
Return RMS level of a spectrum channel.
- **mha_real_t colored_intensity** (const **mha_spec_t** &s, unsigned int channel, unsigned int fftlen, **mha_real_t** *sqfreq_response=NULLptr)
Colored spectrum intensity.
- **mha_real_t maxabs** (const **mha_spec_t** &s, unsigned int channel)
Find maximal absolute value.
- **mha_real_t rmslevel** (const **mha_wave_t** &s, unsigned int channel)
Return RMS level of a waveform channel.
- **mha_real_t maxabs** (const **mha_wave_t** &s, unsigned int channel)
Find maximal absolute value.
- **mha_real_t maxabs** (const **mha_wave_t** &s)
Find maximal absolute value.
- **mha_real_t max** (const **mha_wave_t** &s)
Find maximal value.
- **mha_real_t min** (const **mha_wave_t** &s)
Find minimal value.
- **mha_real_t sumsqr_channel** (const **mha_wave_t** &s, unsigned int channel)
Calculate sum of squared values in one channel.
- **mha_real_t sumsqr_frame** (const **mha_wave_t** &s, unsigned int frame)
Calculate sum over all channels of squared values.
- void **scale** (**mha_spec_t** *dest, const **mha_wave_t** *src)
- void **limit** (**mha_wave_t** &s, const **mha_real_t** &min, const **mha_real_t** &max)
Limit the signal in the waveform buffer to the range [min, max].
- template<class elem_type >
elem_type **kth_smallest** (elem_type array[], unsigned n, unsigned k)
Fast search for the kth smallest element of an array.
- template<class elem_type >
elem_type **median** (elem_type array[], unsigned n)
Fast median search.
- template<class elem_type >
elem_type **mean** (const std::vector< elem_type > &data, elem_type start_val)
Calculate average of elements in a vector.
- template<class elem_type >
std::vector< elem_type > **quantile** (std::vector< elem_type > data, const std::vector< elem_type > &p)
Calculate quantile of elements in a vector.
- void **saveas_mat4** (const **mha_spec_t** &data, const std::string &varname, FILE *fh)
Save a openMHA spectrum as a variable in a Matlab4 file.
- void **saveas_mat4** (const **mha_wave_t** &data, const std::string &varname, FILE *fh)
Save a openMHA waveform as a variable in a Matlab4 file.
- void **saveas_mat4** (const std::vector< **mha_real_t** > &data, const std::string &varname, FILE *fh)
Save a float vector as a variable in a Matlab4 file.
- void **copy_permuted** (**mha_wave_t** *dest, const **mha_wave_t** *src)
Copy contents of a waveform to a permuted waveform.

Variables

- unsigned long int **signal_counter** = 0
Signal counter to produce signal ID strings.

3.53.1 Detailed Description

Namespace for audio signal handling and processing classes.

3.53.2 Function Documentation

3.53.2.1 for_each()

```
void MHASignal::for_each (
    mha_wave_t * s,
    mha_real_t(*) ( mha_real_t) fun ) [inline]
```

Apply a function to each element of a **mha_wave_t** (p. 780).

Parameters

<i>s</i>	Pointer to a mha_wave_t (p. 780) structure
<i>fun</i>	Function to be applied (one argument)

3.53.2.2 lin2db() [1/2]

```
mha_real_t MHASignal::lin2db (
    mha_real_t x,
    mha_real_t eps ) [inline]
```

Conversion from linear scale to dB (no SPL reference)

Parameters

<i>x</i>	Linear input
<i>eps</i>	minimum linear value (if $x < \text{eps}$ → convert eps instead), $\text{eps} < 0$ not allowed

Returns

NaN if $x < 0$ (log not defined for negative)

Exceptions

<i>MHA_Error</i> (p. 707)	if $\text{eps} < 0$
----------------------------------	---------------------

3.53.2.3 lin2db() [2/2]

```
mha_real_t MHASignal::lin2db (
    mha_real_t x ) [inline]
```

Conversion from linear scale to dB (no SPL reference)

Parameters

x	Linear input.
----------	---------------

Returns

NaN if $x < 0$ (log not defined for negative)

3.53.2.4 db2lin()

```
mha_real_t MHASignal::db2lin (
    mha_real_t x ) [inline]
```

Conversion from dB scale to linear (no SPL reference)

Parameters

x	dB input.
----------	-----------

3.53.2.5 sq2db()

```
mha_real_t MHASignal::sq2db (
    mha_real_t x,
    mha_real_t eps = 0.0f ) [inline]
```

conversion from squared values to dB (no SPL reference)

Parameters

<i>x</i>	squared value input
<i>eps</i>	minimum squared value (if $x < \text{eps}$ → convert eps instead), $\text{eps} < 0$ not allowed

Returns

NaN if $x < 0$ (log not defined for negative)

Exceptions

<i>MHA_Error</i> (p. 707)	if $\text{eps} < 0$
---	---------------------

3.53.2.6 db2sq()

```
mha_real_t MHASignal::db2sq (  
    mha_real_t x ) [inline]
```

conversion from dB to squared values (no SPL reference)

Parameters

<i>x</i>	dB input
----------	----------

3.53.2.7 pa2dbspl()

```
mha_real_t MHASignal::pa2dbspl (  
    mha_real_t x,  
    mha_real_t eps = 0.0f ) [inline]
```

Conversion from linear Pascal scale to dB SPL.

Parameters

<i>x</i>	Linear input
<i>eps</i>	minimum pascal value (if $x < \text{eps}$ → convert eps instead), $\text{eps} < 0$ not allowed

Returns

NaN if $x < 0$ (log not defined for negative)

Exceptions

<i>MHA_Error</i> (p. 707)	if $\text{eps} < 0$
---	---------------------

3.53.2.8 dbspl2pa()

```
mha_real_t MHASignal::dbspl2pa (
    mha_real_t x ) [inline]
```

Conversion from dB SPL to linear Pascal scale.

Parameters

<i>x</i>	Linear input.
----------	---------------

3.53.2.9 pa22dbspl()

```
mha_real_t MHASignal::pa22dbspl (
    mha_real_t x,
    mha_real_t eps = 0.0f ) [inline]
```

Conversion from squared Pascal scale to dB SPL.

Parameters

<i>x</i>	squared pascal input
<i>eps</i>	minimum squared-pascal value (if $x < \text{eps}$ → convert eps instead), $\text{eps} < 0$ not allowed

Returns

NaN if $x < 0$ (log not defined for negative)

Exceptions

<i>MHA_Error</i> (p. 707)	if $\text{eps} < 0$
---	---------------------

3.53.2.10 dbspl2pa2()

```
mha_real_t MHASignal::dbspl2pa2 (
```

```
mha_real_t x ) [inline]
```

conversion from dB SPL to squared Pascal scale

Parameters

<i>x</i>	dB SPL input
----------	--------------

3.53.2.11 smp2sec()

```
mha_real_t MHASignal::smp2sec (
    mha_real_t n,
    mha_real_t srate ) [inline]
```

conversion from samples to seconds

Parameters

<i>n</i>	number of samples
<i>srate</i>	sampling rate / Hz

3.53.2.12 sec2smp()

```
mha_real_t MHASignal::sec2smp (
    mha_real_t sec,
    mha_real_t srate ) [inline]
```

conversion from seconds to samples

Parameters

<i>sec</i>	time in seconds
<i>srate</i>	sampling rate / Hz

Returns

number of samples, generally has non-zero fractional part

3.53.2.13 scale()

```
void MHASignal::scale (
    mha_spec_t * dest,
    const mha_wave_t * src )
```

3.53.2.14 limit()

```
void MHASignal::limit (
    mha_wave_t & s,
    const mha_real_t & min,
    const mha_real_t & max )
```

Limit the signal in the waveform buffer to the range [min, max].

Parameters

<i>s</i>	The signal to limit. The signal in this wave buffer is modified.
<i>min</i>	lower limit
<i>max</i>	upper limit

3.53.2.15 kth_smallest()

```
template<class elem_type >
elem_type MHASignal::kth_smallest (
    elem_type array[],
    unsigned n,
    unsigned k )
```

Fast search for the kth smallest element of an array.

The order of elements is altered, but not completely sorted. Using the algorithm from N. Wirth, published in "Algorithms + data structures = programs", Prentice-Hall, 1976

Parameters

<i>array</i>	Element array
--------------	---------------

Postcondition

The order of elements in the array is altered. array[k] then holds the result.

Parameters

n	number of elements in array
-----	-----------------------------

Precondition

$$n \geq 1$$

Parameters

k	The k 'th smallest element is returned: $k = 0$ returns the minimum, $k = (n-1)/2$ returns the median, $k=(n-1)$ returns the maximum
-----	--

Precondition

$$k < n$$

Returns

The k th smallest array element

3.53.2.16 median()

```
template<class elem_type >
elem_type MHASignal::median (
    elem_type array[],
    unsigned n ) [inline]
```

Fast median search.

The order of elements is altered, but not completely sorted.

Parameters

<i>array</i>	Element array
--------------	---------------

Postcondition

The order of elements in the array is altered. `array[(n-1)/2]` then holds the median.

Parameters

<i>n</i>	number of elements in array
----------	-----------------------------

Precondition

$n \geq 1$

Returns

The median of the array elements

3.53.2.17 mean()

```
template<class elem_type >
elem_type MHASignal::mean (
    const std::vector< elem_type > & data,
    elem_type start_val ) [inline]
```

Calculate average of elements in a vector.

Parameters

<i>data</i>	Input vector
<i>start_val</i>	Value for initialization of the return value before sum.

Returns

The average of the vector elements

3.53.2.18 quantile()

```
template<class elem_type >
std::vector<elem_type> MHASignal::quantile (
    std::vector< elem_type > data,
    const std::vector< elem_type > & p ) [inline]
```

Calculate quantile of elements in a vector.

Parameters

<i>data</i>	Input vector
<i>p</i>	Vector of probability values.

Returns

Vector of quantiles of input data, one entry for each probability value.

3.53.2.19 saveas_mat4() [1/3]

```
void MHASignal::saveas_mat4 (
    const mha_spec_t & data,
    const std::string & varname,
    FILE * fh )
```

Save a openMHA spectrum as a variable in a Matlab4 file.

Parameters

<i>data</i>	openMHA spectrum to be saved.
<i>varname</i>	Matlab variable name (Matlab4 limitations on maximal length are not checked).
<i>fh</i>	File handle to Matlab4 file.

3.53.2.20 saveas_mat4() [2/3]

```
void MHASignal::saveas_mat4 (
    const mha_wave_t & data,
    const std::string & varname,
    FILE * fh )
```

Save a openMHA waveform as a variable in a Matlab4 file.

Parameters

<i>data</i>	openMHA waveform to be saved.
<i>varname</i>	Matlab variable name (Matlab4 limitations on maximal length are not checked).
<i>fh</i>	File handle to Matlab4 file.

3.53.2.21 saveas_mat4() [3/3]

```
void MHASignal::saveas_mat4 (
    const std::vector< mha_real_t > & data,
    const std::string & varname,
    FILE * fh )
```

Save a float vector as a variable in a Matlab4 file.

Parameters

<i>data</i>	Float vector to be saved.
<i>varname</i>	Matlab variable name (Matlab4 limitations on maximal length are not checked).
<i>fh</i>	File handle to Matlab4 file.

3.53.2.22 copy_permuted()

```
void MHASignal::copy_permuted (
    mha_wave_t * dest,
    const mha_wave_t * src )
```

Copy contents of a waveform to a permuted waveform.

Parameters

<i>dest</i>	Destination waveform
<i>src</i>	Source waveform

The total size of *src* and *dest* must be the same, *num_frames* and *num_channels* must be exchanged in *dest*.

3.53.3 Variable Documentation**3.53.3.1 signal_counter**

```
unsigned long int MHASignal::signal_counter = 0
```

Signal counter to produce signal ID strings.

3.54 MHASndFile Namespace Reference

Classes

- class **sf_t**
- class **sf_wave_t**

3.55 MHATableLookup Namespace Reference

Namespace for table lookup classes.

Classes

- class **linear_table_t**
Class for interpolation with equidistant x values.
- class **table_t**
- class **xy_table_t**
Class for interpolation with non-equidistant x values.

3.55.1 Detailed Description

Namespace for table lookup classes.

3.56 MHAUtils Namespace Reference

Functions

- bool **is_multiple_of** (const unsigned big, const unsigned small)
- bool **is_power_of_two** (const unsigned n)
- bool **is_multiple_of_by_power_of_two** (const unsigned big, const unsigned small)
- std::string **strip** (const std::string &line)
- std::string **remove** (const std::string &str_, char c)
- bool **is_denormal** (**mha_real_t** x)
Get the normal-ness of a mha_real_t.
- bool **is_denormal** (const **mha_complex_t** &x)
Get the normal-ness of a complex number.
- bool **is_denormal** (const std::complex< **mha_real_t** > &x)
Get the normal-ness of a complex number.
- **mha_real_t** **spl2hl** (**mha_real_t** f)
Get the offset of between dB(SPL) and dB(HL) for a given frequency according to ISO 389-7↵:2005 (freefield); e.g.

3.56.1 Function Documentation

3.56.1.1 `is_multiple_of()`

```
bool MHAUtils::is_multiple_of (
    const unsigned big,
    const unsigned small ) [inline]
```

3.56.1.2 `is_power_of_two()`

```
bool MHAUtils::is_power_of_two (
    const unsigned n ) [inline]
```

3.56.1.3 `is_multiple_of_by_power_of_two()`

```
bool MHAUtils::is_multiple_of_by_power_of_two (
    const unsigned big,
    const unsigned small ) [inline]
```

3.56.1.4 `strip()`

```
std::string MHAUtils::strip (
    const std::string & line ) [inline]
```

3.56.1.5 `remove()`

```
std::string MHAUtils::remove (
    const std::string & str_,
    char c ) [inline]
```

3.56.1.6 `is_denormal()` [1/3]

```
bool MHAUtils::is_denormal (
    mha_real_t x ) [inline]
```

Get the normal-ness of a `mha_real_t`.

Returns true iff *x* is not equal to zero and the absolute value of *x* is smaller than the minimum positive normalized value of `mha_real_t`.

Parameters

x	A mha_real_t floating point number
---	------------------------------------

Returns

True if x is denormal, false otherwise

3.56.1.7 is_denormal() [2/3]

```
bool MHAUtils::is_denormal (
    const mha_complex_t & x ) [inline]
```

Get the normal-ness of a complex number.

Overload for **mha_complex_t** (p. 688). Returns true iff one or both of real and imaginary part are denormal

Parameters

x	[in] A mha_complex_t (p. 688) number
---	--------------------------------------

Returns

True if at least one component of x is denormal, false otherwise

3.56.1.8 is_denormal() [3/3]

```
bool MHAUtils::is_denormal (
    const std::complex< mha_real_t > & x ) [inline]
```

Get the normal-ness of a complex number.

Overload for std::complex Returns true iff one or both of real and imaginary part are denormal.

Parameters

x	[in] A mha_complex_t (p. 688) number
---	--------------------------------------

Returns

True if at least one component of x is denormal, false otherwise

3.56.1.9 spl2hl()

```
mha_real_t MHAUtils::spl2hl (
    mha_real_t f )
```

Get the offset of between dB(SPL) and dB(HL) for a given frequency according to ISO 389-7↵:2005 (freefield); e.g.

an intensity of 22.1 dB(SPL) at 125 Hz is equivalent to 0 dB(HL), so `spl2hl(125)=-22.1`. Interpolation between mesh points is linear. The correction values for frequencies above 16 kHz are extrapolated."

Parameters

in	f	The frequency in Hz for which the offset shall be returned
-----------	----------	--

Returns

The offset between dB(SPL) and dB(HL) at frequency f

Exceptions

MHA_Error (p. 707)	if $f < 0$
---------------------------	------------

3.57 MHAWindow Namespace Reference

Collection of Window types.

Classes

- class **bartlett_t**
Bartlett window.
- class **base_t**
Common base for window types.
- class **blackman_t**
Blackman window.
- class **fun_t**

Generic window based on a generator function.

- class **hamming_t**
Hamming window.
- class **hanning_t**
von-Hann window
- class **rect_t**
Rectangular window.
- class **user_t**
User defined window.

Functions

- float **rect** (float)
Rectangular window function.
- float **bartlett** (float)
Bartlett window function.
- float **hanning** (float)
Hanning window function.
- float **hamming** (float)
Hamming window function.
- float **blackman** (float)
Blackman window function.

3.57.1 Detailed Description

Collection of Window types.

3.57.2 Function Documentation

3.57.2.1 rect()

```
float MHAWindow::rect (  
    float x )
```

Rectangular window function.

3.57.2.2 bartlett()

```
float MHAWindow::bartlett (
    float x )
```

Bartlett window function.

3.57.2.3 hanning()

```
float MHAWindow::hanning (
    float x )
```

Hanning window function.

3.57.2.4 hamming()

```
float MHAWindow::hamming (
    float x )
```

Hamming window function.

3.57.2.5 blackman()

```
float MHAWindow::blackman (
    float x )
```

Blackman window function.

3.58 multibandcompressor Namespace Reference

Classes

- class **fftfb_plug_t**
- class **interface_t**
- class **plugin_signals_t**

3.59 noise_psd_estimator Namespace Reference

Classes

- class **noise_psd_estimator_if_t**
- class **noise_psd_estimator_t**

3.60 overlapadd Namespace Reference

Classes

- class **overlapadd_if_t**
- class **overlapadd_t**

3.61 plingploing Namespace Reference

All classes for the plingploing music generator live in this namespace.

Classes

- class **if_t**
Plugin class of the plingploing music generator.
- class **plingploing_t**
Run-time configuration of the plingploing music generator.

Functions

- double **drand** (double a, double b)

3.61.1 Detailed Description

All classes for the plingploing music generator live in this namespace.

3.61.2 Function Documentation

3.61.2.1 drand()

```
double plingploing::drand (  
    double a,  
    double b )
```

3.62 PluginLoader Namespace Reference

Classes

- class **config_file_splitter_t**
- class **fourway_processor_t**
This abstract class defines the interface for classes that implement all types of signal domain processing supported by the MHA: wave2wave, spec2spec, wave2spec, and spec2wave.
- class **mhapluginloader_t**

Functions

- const char * **mhastrdomain** (mha_domain_t)
- void **mhaconfig_compare** (const mhaconfig_t &req, const mhaconfig_t &avail, const std::string &pref="")
*Compare two **mhaconfig_t** (p. 792) structures, and report differences as an error.*

3.62.1 Function Documentation

3.62.1.1 mhastrdomain()

```
const char * PluginLoader::mhastrdomain (
    mha_domain_t d )
```

3.62.1.2 mhaconfig_compare()

```
void PluginLoader::mhaconfig_compare (
    const mhaconfig_t & req,
    const mhaconfig_t & avail,
    const std::string & pref = "" )
```

Compare two **mhaconfig_t** (p. 792) structures, and report differences as an error.

Parameters

<i>req</i>	Expected mhaconfig_t (p. 792) structure
<i>avail</i>	Available mhaconfig_t (p. 792) structure
<i>pref</i>	Prefix for error messages

3.63 rmslevel Namespace Reference

Classes

- class **mon_t**
- class **rmslevel_if_t**
Interface class of the rmslevel plugin.
- class **rmslevel_t**
Run-time configuration class of the rmslevel plugin.

Enumerations

- enum **UNIT** { **UNIT::SPL** =0, **UNIT::HL** =1 }

3.63.1 Enumeration Type Documentation

3.63.1.1 UNIT

```
enum rmslevel::UNIT [strong]
```

Enumerator

SPL	
HL	

3.64 rohBeam Namespace Reference

Classes

- struct **configOptions**
- class **rohBeam**
- class **rohConfig**

Functions

- double **j0** (double x)
Cylindrical bessel function of the first kind of order 0.

Variables

- constexpr float **CONST_C** = 343.0115f
- constexpr int **refL** = 0
- constexpr int **refR** = 3
- auto **scalarify** = [](auto t){return t(0);}

3.64.1 Function Documentation

3.64.1.1 j0()

```
double rohBeam::j0 (
    double x )
```

Cylindrical bessel function of the first kind of order 0.

Parameters

x	the argument of the function
----------	------------------------------

Returns

j0(x)

3.64.2 Variable Documentation

3.64.2.1 CONST_C

```
constexpr float rohBeam::CONST_C = 343.0115f
```

3.64.2.2 refL

```
constexpr int rohBeam::refL = 0
```

3.64.2.3 refR

```
constexpr int rohBeam::refR = 3
```

3.64.2.4 scalarify

```
auto rohBeam::scalarify = [](auto t){return t(0);}
```

3.65 route Namespace Reference

Classes

- class **interface_t**
- class **process_t**

3.66 shadowfilter_begin Namespace Reference

Classes

- class **cfg_t**
- class **shadowfilter_begin_t**

3.67 shadowfilter_end Namespace Reference

Classes

- class **cfg_t**
- class **shadowfilter_end_t**

3.68 smooth_cepstrum Namespace Reference

Classes

- class **smooth_cepstrum_if_t**
- class **smooth_cepstrum_t**
- class **smooth_params**

3.69 smoothgains_bridge Namespace Reference

Classes

- class **overlapadd_if_t**
- class **smoothspec_wrap_t**

3.70 testplugin Namespace Reference

Classes

- class **ac_parser_t**
- class **config_parser_t**
- class **if_t**
- class **signal_parser_t**

3.71 windnoise Namespace Reference

namespace for plugin windnoise which detects and cancels wind noise

Classes

- class **cfg_t**
Runtime config class for windnoise plugin.
- class **if_t**
interface class for windnoise plugin

3.71.1 Detailed Description

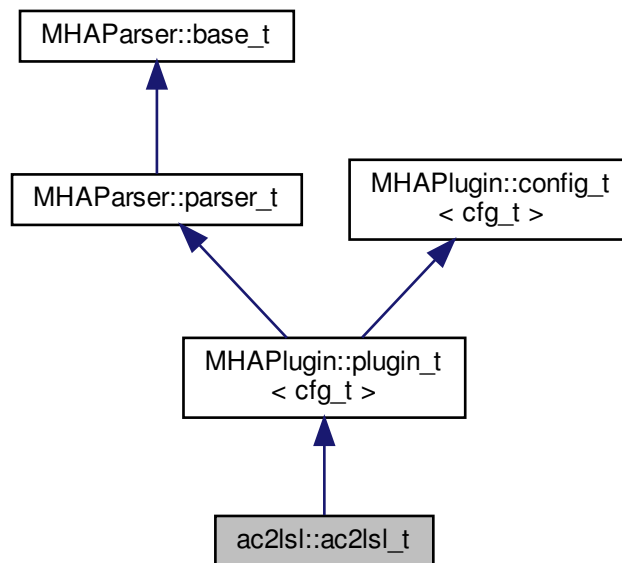
namespace for plugin windnoise which detects and cancels wind noise

4 Class Documentation

4.1 ac2lsl::ac2lsl_t Class Reference

Plugin class of **ac2lsl** (p. 82).

Inheritance diagram for ac2lsl::ac2lsl_t:



Public Member Functions

- **ac2lsl_t** (**algo_comm_t** iac, const char *chain, const char *algo)
- void **prepare** (**mhaconfig_t** &)
*Prepare constructs the vector of bridge variables and locks the configuration, then calls **update()** (p. 166).*
- **mha_wave_t** * **process** (**mha_wave_t** *s)
Processing fct for waveforms.
- **mha_spec_t** * **process** (**mha_spec_t** *s)
Processing fct for spectra.
- void **process** ()
Process function.
- void **release** ()
Release fct.

Private Member Functions

- `std::vector< std::string > get_all_names_from_ac_space (const algo_comm_t & ac)`
const
Retrieves all variable names from the AC space.
- `void update ()`
Construct new runtime configuration.

Private Attributes

- `MHAParser::vstring_t vars`
- `MHAParser::string_t source_id`
- `MHAParser::bool_t rt_strict`
- `MHAParser::bool_t activate`
- `MHAParser::int_t skip`
- `MHAEvents::patchbay_t< ac2lsl_t > patchbay`
- `bool is_first_run`

Additional Inherited Members

4.1.1 Detailed Description

Plugin class of **ac2lsl** (p. [82](#)).

4.1.2 Constructor & Destructor Documentation

4.1.2.1 ac2lsl_t()

```
ac2lsl::ac2lsl_t::ac2lsl_t (
    algo_comm_t iac,
    const char * chain,
    const char * algo )
```

4.1.3 Member Function Documentation

4.1.3.1 prepare()

```
void ac2lsl::ac2lsl_t::prepare (
    mhaconfig_t & cf ) [virtual]
```

Prepare constructs the vector of bridge variables and locks the configuration, then calls **update()** (p. 166).

Implements **MHAPlugin::plugin_t< cfg_t >** (p. 1099).

4.1.3.2 process() [1/3]

```
mha_wave_t* ac2lsl::ac2lsl_t::process (
    mha_wave_t * s ) [inline]
```

Processing fct for waveforms.

Calls **process(void)** (p. 165).

4.1.3.3 process() [2/3]

```
mha_spec_t* ac2lsl::ac2lsl_t::process (
    mha_spec_t * s ) [inline]
```

Processing fct for spectra.

Calls **process(void)** (p. 165).

4.1.3.4 process() [3/3]

```
void ac2lsl::ac2lsl_t::process (
    void )
```

Process function.

Checks once if the plugin is run in a real-time thread and throws if `rt_strict` is true, then forwards to **cfg_t::process()** (p. 169).

4.1.3.5 release()

```
void ac2lsl::ac2lsl_t::release (
    void ) [virtual]
```

Release fct.

Unlocks variable name list

Reimplemented from **MHAPlugin::plugin_t< cfg_t >** (p. 1100).

4.1.3.6 get_all_names_from_ac_space()

```
std::vector< std::string > ac2lsl::ac2lsl_t::get_all_names_from_ac_space (
    const algo_comm_t & ac ) const [private]
```

Retrieves all variable names from the AC space.

Parameters

<i>ac</i>	AC space
-----------	----------

Returns

Vector of variable names

4.1.3.7 update()

```
void ac2lsl::ac2lsl_t::update ( ) [private]
```

Construct new runtime configuration.

4.1.4 Member Data Documentation**4.1.4.1 vars**

```
MHAParser::vstring_t ac2lsl::ac2lsl_t::vars [private]
```

4.1.4.2 source_id

```
MHAParser::string_t ac2lsl::ac2lsl_t::source_id [private]
```

4.1.4.3 rt_strict

```
MHAParser::bool_t ac2lsl::ac2lsl_t::rt_strict [private]
```

4.1.4.4 activate

```
MHAParser::bool_t ac2lsl::ac2lsl_t::activate [private]
```


4.1.4.5 skip

```
MHAParser::int_t ac2lsl::ac2lsl_t::skip [private]
```

4.1.4.6 patchbay

```
MHAEvents::patchbay_t< ac2lsl_t> ac2lsl::ac2lsl_t::patchbay [private]
```

4.1.4.7 is_first_run

```
bool ac2lsl::ac2lsl_t::is_first_run [private]
```

The documentation for this class was generated from the following file:

- **ac2lsl.cpp**

4.2 ac2lsl::cfg_t Class Reference

Runtime configuration class of the **ac2lsl** (p. 82) plugin.

Public Member Functions

- **cfg_t** (const **algo_comm_t** &ac_, unsigned skip_, const std::string & **source_id**, const std::vector< std::string > &varnames_, double rate)
*C'tor of **ac2lsl** (p. 82) run time configuration.*
- void **process** ()

Private Member Functions

- void **create_or_replace_var** (const std::string &name, const **comm_var_t** &v)
- void **check_vars** ()
- void **update_varlist** ()

Private Attributes

- `std::map< std::string, std::unique_ptr< save_var_base_t > > varlist`
Maps variable name to unique ptr's of ac to lsl bridges.
- unsigned **skipcnt**
Counter of frames to skip.
- const unsigned **skip**
Number of frames to skip after each send.
- const double **srate**
Sampling rate of the stream.
- const `std::string` **source_id**
User configurable source id.
- const **algo_comm_t** & **ac**
Handle to the ac space.

4.2.1 Detailed Description

Runtime configuration class of the **ac2lsl** (p. 82) plugin.

4.2.2 Constructor & Destructor Documentation

4.2.2.1 `cfg_t()`

```
cfg_t::cfg_t (
    const algo_comm_t & ac_,
    unsigned skip_,
    const std::string & source_id,
    const std::vector< std::string > & varnames_,
    double rate )
```

C'tor of **ac2lsl** (p. 82) run time configuration.

Parameters

<code>ac_</code>	AC space, source of data to send over LSL
<code>skip_</code>	Number of frames to skip after each send
<code>source_↔ id_</code>	LSL identifier for this data stream
<code>varnames↔ _</code>	Names of AC variables to send over LSL
<code>rate</code>	Rate with wich chunks of data are sent to the LSL stream. Usually the rate with which process calls happen, but may be lower due to the subsampling caused by <code>skip_</code>

4.2.3 Member Function Documentation

4.2.3.1 create_or_replace_var()

```
void cfg_t::create_or_replace_var (
    const std::string & name,
    const comm_var_t & v ) [private]
```

4.2.3.2 check_vars()

```
void ac2lsl::cfg_t::check_vars ( ) [private]
```

4.2.3.3 update_varlist()

```
void cfg_t::update_varlist ( ) [private]
```

4.2.3.4 process()

```
void cfg_t::process (
    void )
```

4.2.4 Member Data Documentation

4.2.4.1 varlist

```
std::map<std::string, std::unique_ptr< save_var_base_t> > ac2lsl::cfg_t::varlist
[private]
```

Maps variable name to unique ptr's of ac to lsl bridges.

4.2.4.2 skipcnt

```
unsigned ac2lsl::cfg_t::skipcnt [private]
```

Counter of frames to skip.

4.2.4.3 skip

```
const unsigned ac2lsl::cfg_t::skip [private]
```

Number of frames to skip after each send.

4.2.4.4 srate

```
const double ac2lsl::cfg_t::srate [private]
```

Sampling rate of the stream.

4.2.4.5 source_id

```
const std::string ac2lsl::cfg_t::source_id [private]
```

User configurable source id.

4.2.4.6 ac

```
const algo_comm_t& ac2lsl::cfg_t::ac [private]
```

Handle to the ac space.

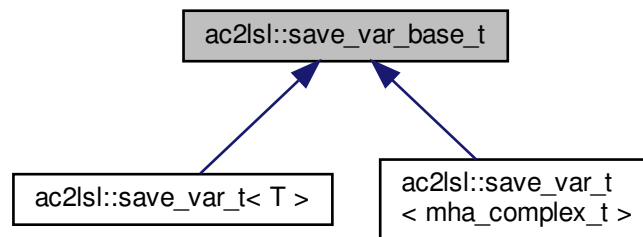
The documentation for this class was generated from the following file:

- **ac2lsl.cpp**

4.3 ac2lsl::save_var_base_t Class Reference

Interface for ac to lsl bridge variable.

Inheritance diagram for ac2lsl::save_var_base_t:



Public Member Functions

- virtual void **send_frame** ()=0
- virtual void * **get_buf_address** () const noexcept=0
- virtual void **set_buf_address** (void *data)=0
- virtual lsl::stream_info **info** () const noexcept=0
- virtual unsigned **data_type** () const noexcept=0
- virtual unsigned **num_entries** () const noexcept=0
- virtual **~save_var_base_t** ()=default

4.3.1 Detailed Description

Interface for ac to lsl bridge variable.

4.3.2 Constructor & Destructor Documentation

4.3.2.1 ~save_var_base_t()

```
virtual ac2lsl::save_var_base_t::~~save_var_base_t ( ) [virtual], [default]
```

4.3.3 Member Function Documentation

4.3.3.1 send_frame()

```
virtual void ac2lsl::save_var_base_t::send_frame ( ) [pure virtual]
```

Implemented in **ac2lsl::save_var_t< mha_complex_t >** (p. 180), and **ac2lsl::save_var_t< T >** (p. 176).

4.3.3.2 get_buf_address()

```
virtual void* ac2lsl::save_var_base_t::get_buf_address ( ) const [pure virtual],  
[noexcept]
```

Implemented in **ac2lsl::save_var_t< mha_complex_t >** (p. 179), and **ac2lsl::save_var_t< T >** (p. 175).

4.3.3.3 set_buf_address()

```
virtual void ac2lsl::save_var_base_t::set_buf_address (   
    void * data ) [pure virtual]
```

Implemented in **ac2lsl::save_var_t< mha_complex_t >** (p. 179), and **ac2lsl::save_var_t< T >** (p. 175).

4.3.3.4 info()

```
virtual lsl::stream_info ac2lsl::save_var_base_t::info ( ) const [pure virtual],  
[noexcept]
```

Implemented in **ac2lsl::save_var_t< mha_complex_t >** (p. 179), and **ac2lsl::save_var_t< T >** (p. 175).

4.3.3.5 data_type()

```
virtual unsigned ac2lsl::save_var_base_t::data_type ( ) const [pure virtual], [noexcept]
```

Implemented in **ac2lsl::save_var_t< mha_complex_t >** (p. 180), and **ac2lsl::save_var_t< T >** (p. 176).

4.3.3.6 num_entries()

```
virtual unsigned ac2lsl::save_var_base_t::num_entries ( ) const [pure virtual],
[noexcept]
```

Implemented in **ac2lsl::save_var_t< mha_complex_t >** (p. 180), and **ac2lsl::save_var_t< T >** (p. 176).

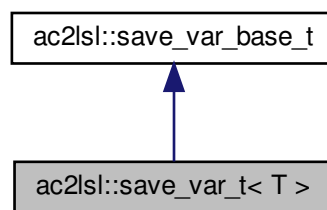
The documentation for this class was generated from the following file:

- **ac2lsl.cpp**

4.4 ac2lsl::save_var_t< T > Class Template Reference

Implementation for all ac to lsl bridges except complex types.

Inheritance diagram for ac2lsl::save_var_t< T >:



Public Member Functions

- **save_var_t** (const std::string &name_, const std::string &type_, unsigned num_entries_, const **mha_real_t** rate_, const lsl::channel_format_t format_, const std::string &source_id_, void *data_, const unsigned **data_type**_)
C'tor of generic ac to lsl bridge.
- virtual void * **get_buf_address** () const noexcept override
Get buffer address as void pointer.
- virtual void **set_buf_address** (void *data) override
Cast the input pointer to the appropriate type and set the buffer address.
- virtual lsl::stream_info **info** () const noexcept override
Get stream info object from stream outlet.
- virtual unsigned **num_entries** () const noexcept override
Get number of entries in the stream object.
- virtual unsigned **data_type** () const noexcept override
Get data type id according MHA convention.
- virtual ~**save_var_t** ()=default
- virtual void **send_frame** () override
Send a frame to lsl.

Private Attributes

- `lsl::stream_outlet` **stream**
LSL stream outlet.
- `T *` **buf**
Pointer to data buffer of the ac variable.
- `const unsigned` **data_type_**
Data type id according to MHA convention.

4.4.1 Detailed Description

```
template<typename T>
class ac2lsl::save_var_t< T >
```

Implementation for all ac to lsl bridges except complex types.

4.4.2 Constructor & Destructor Documentation

4.4.2.1 save_var_t()

```
template<typename T >
ac2lsl::save_var_t< T >:: save_var_t (
    const std::string & name_,
    const std::string & type_,
    unsigned num_entries_,
    const mha_real_t rate_,
    const lsl::channel_format_t format_,
    const std::string & source_id_,
    void * data_,
    const unsigned data_type_ ) [inline]
```

C'tor of generic ac to lsl bridge.

Parameters

<i>info</i>	LSL stream info object containing metadata
<i>data</i>	Pointer to data buffer of the ac variable
<i>data_type</i>	Type id of the stream, in mha convention. Should be set to one if not a vector.

4.4.2.2 ~save_var_t()

```
template<typename T >
virtual ac2lsl::save_var_t< T >::~save_var_t ( ) [virtual], [default]
```

4.4.3 Member Function Documentation

4.4.3.1 get_buf_address()

```
template<typename T >
virtual void* ac2lsl::save_var_t< T >::get_buf_address ( ) const [inline], [override],
[virtual], [noexcept]
```

Get buffer address as void pointer.

Returns

Adress of the data buffer

Implements `ac2lsl::save_var_base_t` (p. 172).

4.4.3.2 set_buf_address()

```
template<typename T >
virtual void ac2lsl::save_var_t< T >::set_buf_address (
    void * data ) [inline], [override], [virtual]
```

Cast the input pointer to the appropriate type and set the buffer address.

Parameters

<i>data</i>	New buffer address
-------------	--------------------

Implements `ac2lsl::save_var_base_t` (p. 172).

4.4.3.3 info()

```
template<typename T >
virtual lsl::stream_info ac2lsl::save_var_t< T >::info ( ) const [inline], [override],
[virtual], [noexcept]
```

Get stream info object from stream outlet.

Implements **ac2lsl::save_var_base_t** (p. 172).

4.4.3.4 num_entries()

```
template<typename T >
virtual unsigned ac2lsl::save_var_t< T >::num_entries ( ) const [inline], [override],
[virtual], [noexcept]
```

Get number of entries in the stream object.

Implements **ac2lsl::save_var_base_t** (p. 172).

4.4.3.5 data_type()

```
template<typename T >
virtual unsigned ac2lsl::save_var_t< T >::data_type ( ) const [inline], [override],
[virtual], [noexcept]
```

Get data type id according MHA convention.

Implements **ac2lsl::save_var_base_t** (p. 172).

4.4.3.6 send_frame()

```
template<typename T >
virtual void ac2lsl::save_var_t< T >::send_frame ( ) [inline], [override], [virtual]
```

Send a frame to lsl.

Implements **ac2lsl::save_var_base_t** (p. 172).

4.4.4 Member Data Documentation

4.4.4.1 stream

```
template<typename T >
lsl::stream_outlet ac2lsl::save_var_t< T >::stream [private]
```

LSL stream outlet.

Interface to lsl

4.4.4.2 buf

```
template<typename T >  
T* ac2lsl::save_var_t< T >::buf [private]
```

Pointer to data buffer of the ac variable.

4.4.4.3 data_type_

```
template<typename T >  
const unsigned ac2lsl::save_var_t< T >::data_type_ [private]
```

Data type id according to MHA convention.

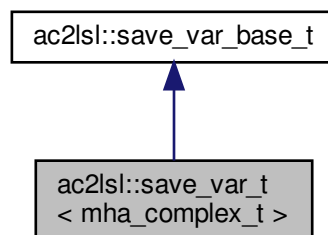
The documentation for this class was generated from the following file:

- **ac2lsl.cpp**

4.5 ac2lsl::save_var_t< mha_complex_t > Class Template Reference

Template specialization of the **ac2lsl** (p. [82](#)) bridge to take care of complex numbers.

Inheritance diagram for ac2lsl::save_var_t< mha_complex_t >:



Public Member Functions

- **save_var_t** (const std::string &name_, const std::string &type_, const unsigned num_↵
entries_, const **mha_real_t** rate_, const lsl::channel_format_t format_, const std::string
&source_id_, void *data_)

C'tor of specialization for complex types.

- virtual void * **get_buf_address** () const noexcept override
- virtual void **set_buf_address** (void *data) override
- virtual lsl::stream_info **info** () const noexcept override

Get buffer address as void pointer.

- virtual unsigned **num_entries** () const noexcept override

Get number of entries in the stream object.

- virtual unsigned **data_type** () const noexcept override

Cast the input pointer to the appropriate type and set the buffer address.

- virtual ~**save_var_t** ()=default
- virtual void **send_frame** () override

Send a frame of complex types.

Private Attributes

- lsl::stream_outlet **stream**

LSL stream outlet.

- **mha_complex_t** * **buf**

Pointer to data buffer of the ac variable.

4.5.1 Detailed Description

```
template<>
class ac2lsl::save_var_t< mha_complex_t >
```

Template specialization of the **ac2lsl** (p. 82) bridge to take care of complex numbers.

This specialization is needed because lsl does not support complex numbers. Order is [re(0), im(0), re(1), im(1),]

4.5.2 Constructor & Destructor Documentation

4.5.2.1 save_var_t()

```
ac2lsl::save_var_t< mha_complex_t >:: save_var_t (
    const std::string & name_,
    const std::string & type_,
    const unsigned num_entries_,
    const mha_real_t rate_,
    const lsl::channel_format_t format_,
    const std::string & source_id_,
    void * data_ ) [inline]
```

C'tor of specialization for complex types.

See generic c'tor for details.

4.5.2.2 ~save_var_t()

```
virtual ac2lsl::save_var_t< mha_complex_t >::~~ save_var_t ( ) [virtual], [default]
```

4.5.3 Member Function Documentation

4.5.3.1 get_buf_address()

```
virtual void* ac2lsl::save_var_t< mha_complex_t >::get_buf_address ( ) const [inline],
[override], [virtual], [noexcept]
```

Implements `ac2lsl::save_var_base_t` (p. 172).

4.5.3.2 set_buf_address()

```
virtual void ac2lsl::save_var_t< mha_complex_t >::set_buf_address (
    void * data ) [inline], [override], [virtual]
```

Implements `ac2lsl::save_var_base_t` (p. 172).

4.5.3.3 info()

```
virtual lsl::stream_info ac2lsl::save_var_t< mha_complex_t >::info ( ) const [inline],
[override], [virtual], [noexcept]
```

Get buffer address as void pointer.

Returns

Adress of the data buffer

Implements **ac2lsl::save_var_base_t** (p. 172).

4.5.3.4 num_entries()

```
virtual unsigned ac2lsl::save_var_t< mha_complex_t >::num_entries ( ) const [inline],
[override], [virtual], [noexcept]
```

Get number of entries in the stream object.

Implements **ac2lsl::save_var_base_t** (p. 172).

4.5.3.5 data_type()

```
virtual unsigned ac2lsl::save_var_t< mha_complex_t >::data_type ( ) const [inline],
[override], [virtual], [noexcept]
```

Cast the input pointer to the appropriate type and set the buffer address.

Parameters

<i>data</i>	New buffer address
-------------	--------------------

Implements **ac2lsl::save_var_base_t** (p. 172).

4.5.3.6 send_frame()

```
virtual void ac2lsl::save_var_t< mha_complex_t >::send_frame ( ) [inline], [override],
[virtual]
```

Send a frame of complex types.

Complex numbers are stored as alternating real and imaginary parts. An array of complex numbers in memory can be reinterpreted as a vector of real numbers that correspond to real and imaginary parts. LSL does not support complex types directly. Send one vector containing {buf[0].re,buf[0].im,buf[1].re,buf[1].im,...} instead.

Implements **ac2lsl::save_var_base_t** (p. 172).

4.5.4 Member Data Documentation

4.5.4.1 stream

```
lsl::stream_outlet ac2lsl::save_var_t< mha_complex_t >::stream [private]
```

LSL stream outlet.

Interface to lsl

4.5.4.2 buf

```
mha_complex_t* ac2lsl::save_var_t< mha_complex_t >::buf [private]
```

Pointer to data buffer of the ac variable.

The documentation for this class was generated from the following file:

- **ac2lsl.cpp**

4.6 ac2lsl::type_info Struct Reference

Public Attributes

- const std::string **name**
- const lsl::channel_format_t **format**

4.6.1 Member Data Documentation

4.6.1.1 name

```
const std::string ac2lsl::type_info::name
```

4.6.1.2 format

```
const lsl::channel_format_t ac2lsl::type_info::format
```

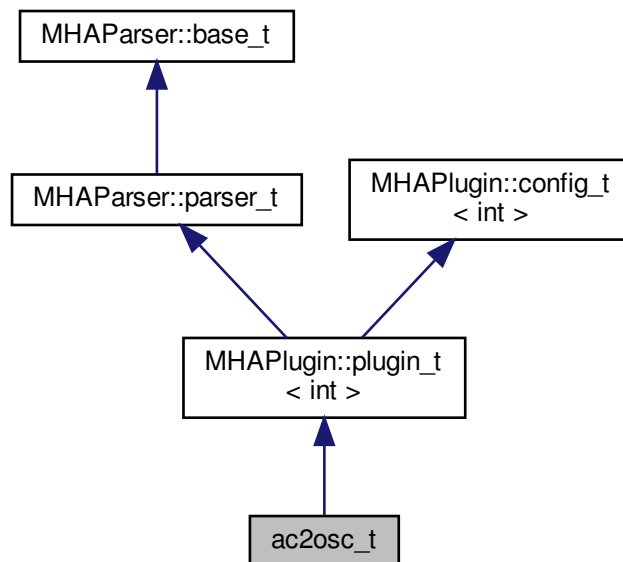
The documentation for this struct was generated from the following file:

- **ac2lsl.cpp**

4.7 ac2osc_t Class Reference

Plugin class of the ac2osc plugin.

Inheritance diagram for ac2osc_t:



Public Member Functions

- **ac2osc_t** (**algo_comm_t** iac, const char *chain, const char *algo)
C'tor of plugin class.
- void **prepare** (**mhaconfig_t** &)
- **mha_wave_t** * **process** (**mha_wave_t** *s)
Processing fct for waveforms.
- **mha_spec_t** * **process** (**mha_spec_t** *s)
Processing fct for spectra.
- void **process** ()
Process function.
- void **release** ()
Release frees osc related memory, does cleanup.

Private Member Functions

- void **send_osc_float** ()
- void **update_mode** ()
Start/Stop sending of messages.

Private Attributes

- **MHAParser::string_t host**
OSC server host name.
- **MHAParser::string_t port**
OSC server port.
- **MHAParser::int_t ttl**
Time-to-live of UDP packages.
- **MHAParser::vstring_t vars**
List of AC variables to be saved, empty for all.
- **MHAParser::kw_t mode**
Record mode.
- **MHAParser::int_t skip**
number of frames to skip after sending
- **MHAParser::bool_t rt_strict**
abort if used in real-time thread?
- **MHA_AC::acspace2matrix_t * acspace**
- **MHAEvents::patchbay_t< ac2osc_t > patchbay**
- bool **b_record**
- uint8_t * **rtmem**
- float **framerate**
- int **skipcnt**
- lo_address **lo_addr**
- bool **is_first_run**

Additional Inherited Members

4.7.1 Detailed Description

Plugin class of the ac2osc plugin.

4.7.2 Constructor & Destructor Documentation

4.7.2.1 `ac2osc_t()`

```
ac2osc_t::ac2osc_t (
    algo_comm_t iac,
    const char * chain,
    const char * algo )
```

C'tor of plugin class.

4.7.3 Member Function Documentation

4.7.3.1 `prepare()`

```
void ac2osc_t::prepare (
    mhaconfig_t & cf ) [virtual]
```

Implements **MHAPlugin::plugin_t< int >** (p. [1099](#)).

4.7.3.2 `process()` [1/3]

```
mha_wave_t* ac2osc_t::process (
    mha_wave_t * s ) [inline]
```

Processing fct for waveforms.

Calls **process(void)** (p. [184](#)).

4.7.3.3 `process()` [2/3]

```
mha_spec_t* ac2osc_t::process (
    mha_spec_t * s ) [inline]
```

Processing fct for spectra.

Calls **process(void)** (p. [184](#)).

4.7.3.4 `process()` [3/3]

```
void ac2osc_t::process (
    void )
```

Process function.

Checks once if the plugin is run in a real-time thread and throws if `rt_strict` is true, sends osc messages according to config.

4.7.3.5 release()

```
void ac2osc_t::release (
    void ) [virtual]
```

Release frees osc related memory, does cleanup.

Reimplemented from **MHAPLugin::plugin_t< int >** (p. 1100).

4.7.3.6 send_osc_float()

```
void ac2osc_t::send_osc_float ( ) [private]
```

4.7.3.7 update_mode()

```
void ac2osc_t::update_mode ( ) [private]
```

Start/Stop sending of messages.

4.7.4 Member Data Documentation

4.7.4.1 host

```
MHAParser::string_t ac2osc_t::host [private]
```

OSC server host name.

4.7.4.2 port

```
MHAParser::string_t ac2osc_t::port [private]
```

OSC server port.

4.7.4.3 ttl

```
MHAParser::int_t ac2osc_t::ttl [private]
```

Time-to-live of UDP packages.

4.7.4.4 vars

```
MHAParser::vstring_t ac2osc_t::vars [private]
```

List of AC variables to be saved, empty for all.

4.7.4.5 mode

```
MHAParser::kw_t ac2osc_t::mode [private]
```

Record mode.

4.7.4.6 skip

```
MHAParser::int_t ac2osc_t::skip [private]
```

number of frames to skip after sending

4.7.4.7 rt_strict

```
MHAParser::bool_t ac2osc_t::rt_strict [private]
```

abort if used in real-time thread?

4.7.4.8 acspace

```
MHA_AC::acspace2matrix_t* ac2osc_t::acspace [private]
```

4.7.4.9 patchbay

```
MHAEvents::patchbay_t< ac2osc_t> ac2osc_t::patchbay [private]
```

4.7.4.10 b_record

```
bool ac2osc_t::b_record [private]
```

4.7.4.11 rtmem

```
uint8_t* ac2osc_t::rtmem [private]
```

4.7.4.12 framerate

```
float ac2osc_t::framerate [private]
```

4.7.4.13 skipcnt

```
int ac2osc_t::skipcnt [private]
```

4.7.4.14 lo_addr

```
lo_address ac2osc_t::lo_addr [private]
```

4.7.4.15 is_first_run

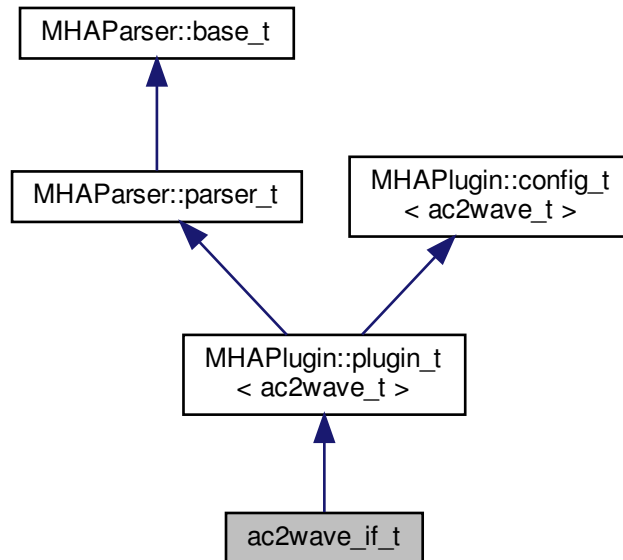
```
bool ac2osc_t::is_first_run [private]
```

The documentation for this class was generated from the following file:

- **ac2osc.cpp**

4.8 ac2wave_if_t Class Reference

Inheritance diagram for ac2wave_if_t:



Public Member Functions

- **ac2wave_if_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- **mha_wave_t * process** (**mha_spec_t** *)
- **mha_wave_t * process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()

Private Member Functions

- void **update** ()

Private Attributes

- **MHAParser::string_t** name
- **MHAParser::float_t** gain_in
- **MHAParser::float_t** gain_ac
- **MHAParser::int_t** delay_in
- **MHAParser::int_t** delay_ac
- **MHASignal::waveform_t** * zeros
- bool **prepared**
- **MHAEvents::patchbay_t** < **ac2wave_if_t** > patchbay

Additional Inherited Members

4.8.1 Constructor & Destructor Documentation

4.8.1.1 ac2wave_if_t()

```
ac2wave_if_t::ac2wave_if_t (
    const algo_comm_t & iac,
    const std::string & ith,
    const std::string & ial )
```

4.8.2 Member Function Documentation

4.8.2.1 process() [1/2]

```
mha_wave_t * ac2wave_if_t::process (
    mha_spec_t * )
```

4.8.2.2 process() [2/2]

```
mha_wave_t * ac2wave_if_t::process (
    mha_wave_t * s )
```

4.8.2.3 prepare()

```
void ac2wave_if_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t**< **ac2wave_t** > (p. [1099](#)).

4.8.2.4 release()

```
void ac2wave_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t**< **ac2wave_t** > (p. [1100](#)).

4.8.2.5 update()

```
void ac2wave_if_t::update ( ) [private]
```

4.8.3 Member Data Documentation

4.8.3.1 name

```
MHAParser::string_t ac2wave_if_t::name [private]
```

4.8.3.2 gain_in

```
MHAParser::float_t ac2wave_if_t::gain_in [private]
```

4.8.3.3 gain_ac

```
MHAParser::float_t ac2wave_if_t::gain_ac [private]
```

4.8.3.4 delay_in

```
MHAParser::int_t ac2wave_if_t::delay_in [private]
```

4.8.3.5 delay_ac

```
MHAParser::int_t ac2wave_if_t::delay_ac [private]
```

4.8.3.6 zeros

```
MHASignal::waveform_t* ac2wave_if_t::zeros [private]
```


4.8.3.7 prepared

```
bool ac2wave_if_t::prepared [private]
```

4.8.3.8 patchbay

```
MHAEvents::patchbay_t< ac2wave_if_t> ac2wave_if_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **ac2wave.cpp**

4.9 ac2wave_t Class Reference

Public Member Functions

- **ac2wave_t** (unsigned int frames_, unsigned int channels_, **algo_comm_t** ac_, std::string name_, float gain_in_, float gain_ac_, unsigned int delay_in_, unsigned int delay_ac_)
- **mha_wave_t * process (mha_wave_t *)**

Private Attributes

- unsigned int **frames**
- unsigned int **channels**
- **mha_wave_t w**
- **algo_comm_t ac**
- std::string **name**
- **MHASignal::delay_wave_t delay_in**
- **MHASignal::delay_wave_t delay_ac**
- **mha_real_t gain_in**
- **mha_real_t gain_ac**

4.9.1 Constructor & Destructor Documentation

4.9.1.1 ac2wave_t()

```
ac2wave_t::ac2wave_t (
    unsigned int frames_,
    unsigned int channels_,
    algo_comm_t ac_,
    std::string name_,
    float gain_in_,
    float gain_ac_,
    unsigned int delay_in_,
    unsigned int delay_ac_ )
```

4.9.2 Member Function Documentation

4.9.2.1 process()

```
mha_wave_t * ac2wave_t::process (
    mha_wave_t * s )
```

4.9.3 Member Data Documentation

4.9.3.1 frames

```
unsigned int ac2wave_t::frames [private]
```

4.9.3.2 channels

```
unsigned int ac2wave_t::channels [private]
```

4.9.3.3 w

```
mha_wave_t ac2wave_t::w [private]
```

4.9.3.4 ac

```
algo_comm_t ac2wave_t::ac [private]
```

4.9.3.5 name

```
std::string ac2wave_t::name [private]
```

4.9.3.6 delay_in

```
MHASignal::delay_wave_t ac2wave_t::delay_in [private]
```

4.9.3.7 delay_ac

```
MHASignal::delay_wave_t ac2wave_t::delay_ac [private]
```

4.9.3.8 gain_in

```
mha_real_t ac2wave_t::gain_in [private]
```

4.9.3.9 gain_ac

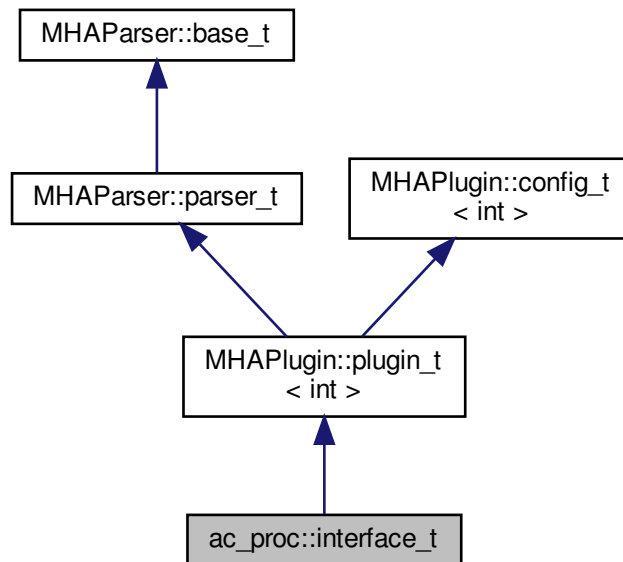
```
mha_real_t ac2wave_t::gain_ac [private]
```

The documentation for this class was generated from the following file:

- **ac2wave.cpp**

4.10 ac_proc::interface_t Class Reference

Inheritance diagram for ac_proc::interface_t:



Public Member Functions

- **interface_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()
- void **process** ()
- **mha_spec_t** * **process** (**mha_spec_t** *)
- **mha_wave_t** * **process** (**mha_wave_t** *)

Private Attributes

- std::string **algo**
- **MHAParser::mhapluginloader_t** **plug**
- **MHAParser::string_t** **input**
- **MHAParser::bool_t** **permute**
- **MHA_AC::waveform_t** * **s_out**
- **MHASignal::waveform_t** * **s_in_perm**
- bool **b_permute**
- **mha_wave_t** **s_in**

Additional Inherited Members

4.10.1 Constructor & Destructor Documentation

4.10.1.1 interface_t()

```
ac_proc::interface_t::interface_t (
    const algo_comm_t & ac_,
    const std::string & th,
    const std::string & al )
```

Default values are set and MHA configuration variables registered into the parser.

Parameters

<i>ac_</i>	algorithm communication handle
<i>th</i>	chain name
<i>al</i>	algorithm name

4.10.2 Member Function Documentation

4.10.2.1 prepare()

```
void ac_proc::interface_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPlugin::plugin_t< int >** (p. 1099).

4.10.2.2 release()

```
void ac_proc::interface_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< int >** (p. 1100).

4.10.2.3 process() [1/3]

```
void ac_proc::interface_t::process (  
    void )
```

4.10.2.4 process() [2/3]

```
mha_spec_t * ac_proc::interface_t::process (  
    mha_spec_t * s )
```

4.10.2.5 process() [3/3]

```
mha_wave_t * ac_proc::interface_t::process (  
    mha_wave_t * s )
```

4.10.3 Member Data Documentation

4.10.3.1 algo

```
std::string ac_proc::interface_t::algo [private]
```

4.10.3.2 plug

```
MHAParser::mhapuginloader_t ac_proc::interface_t::plug [private]
```

4.10.3.3 input

```
MHAParser::string_t ac_proc::interface_t::input [private]
```

4.10.3.4 permute

```
MHAParser::bool_t ac_proc::interface_t::permute [private]
```

4.10.3.5 s_out

```
MHA_AC::waveform_t* ac_proc::interface_t::s_out [private]
```

4.10.3.6 s_in_perm

```
MHASignal::waveform_t* ac_proc::interface_t::s_in_perm [private]
```

4.10.3.7 b_permute

```
bool ac_proc::interface_t::b_permute [private]
```

4.10.3.8 s_in

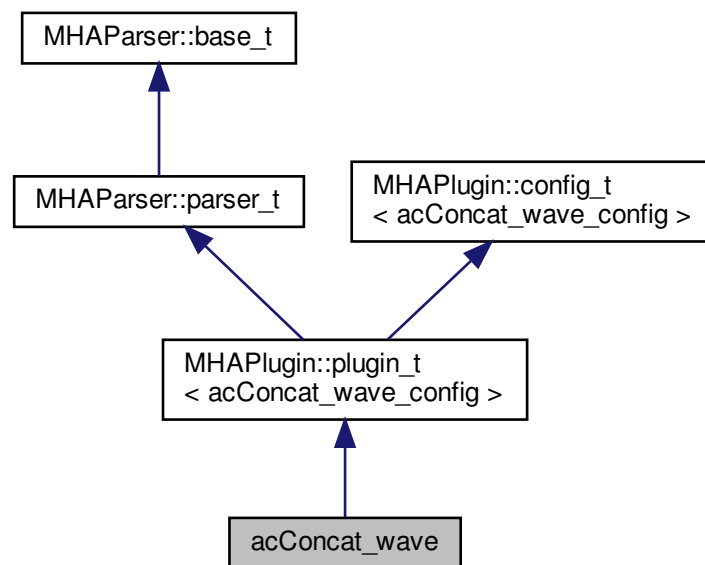
```
mha_wave_t ac_proc::interface_t::s_in [private]
```

The documentation for this class was generated from the following file:

- **ac_proc.cpp**

4.11 acConcat_wave Class Reference

Inheritance diagram for acConcat_wave:



Public Member Functions

- **acConcat_wave** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
Constructs our plugin.
- **~acConcat_wave** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)
Checks for the most recent configuration and defers processing to it.
- void **prepare** (**mhaconfig_t** &)
Plugin preparation.
- void **release** (void)

Public Attributes

- **MHAParser::int_t** num_AC
- **MHAParser::string_t** prefix_names_AC
- **MHAParser::vint_t** samples_AC
- **MHAParser::string_t** name_con_AC
- **MHAParser::int_t** numchannels

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t** < **acConcat_wave** > patchbay

Additional Inherited Members

4.11.1 Constructor & Destructor Documentation

4.11.1.1 acConcat_wave()

```
acConcat_wave::acConcat_wave (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Constructs our plugin.

4.11.1.2 ~acConcat_wave()

```
acConcat_wave::~~acConcat_wave ( )
```

4.11.2 Member Function Documentation

4.11.2.1 process()

```
mha_wave_t * acConcat_wave::process (
    mha_wave_t * signal )
```

Checks for the most recent configuration and defers processing to it.

4.11.2.2 prepare()

```
void acConcat_wave::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPlugin::plugin_t< acConcat_wave_config >** (p. [1099](#)).

4.11.2.3 release()

```
void acConcat_wave::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< acConcat_wave_config >** (p. [1100](#)).

4.11.2.4 update_cfg()

```
void acConcat_wave::update_cfg ( ) [private]
```

4.11.3 Member Data Documentation

4.11.3.1 num_AC

```
MHAParser::int_t acConcat_wave::num_AC
```

4.11.3.2 prefix_names_AC

```
MHAParser::string_t acConcat_wave::prefix_names_AC
```

4.11.3.3 samples_AC

```
MHAParser::vint_t acConcat_wave::samples_AC
```

4.11.3.4 name_con_AC

```
MHAParser::string_t acConcat_wave::name_con_AC
```

4.11.3.5 numchannels

```
MHAParser::int_t acConcat_wave::numchannels
```

4.11.3.6 patchbay

```
MHAEvents::patchbay_t< acConcat_wave> acConcat_wave::patchbay [private]
```

The documentation for this class was generated from the following files:

- **acConcat_wave.h**
- **acConcat_wave.cpp**

4.12 acConcat_wave_config Class Reference

Public Member Functions

- **acConcat_wave_config** (**algo_comm_t** & **ac**, const **mhaconfig_t** *in_cfg*, **acConcat_wave** * *_concat*)
- **~acConcat_wave_config** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)

Public Attributes

- **algo_comm_t** & **ac**
- **std::vector< std::string >** **strNames_AC**
- **std::vector< int >** **numSamples_AC**
- **mha_wave_t** **vGCC**
- **MHA_AC::waveform_t** * **vGCC_con**

4.12.1 Constructor & Destructor Documentation

4.12.1.1 acConcat_wave_config()

```
acConcat_wave_config::acConcat_wave_config (
    algo_comm_t & ac,
    const mhaconfig_t in_cfg,
    acConcat_wave * _concat )
```

4.12.1.2 ~acConcat_wave_config()

```
acConcat_wave_config::~acConcat_wave_config ( )
```

4.12.2 Member Function Documentation

4.12.2.1 process()

```
mha_wave_t * acConcat_wave_config::process (
    mha_wave_t * wave )
```

4.12.3 Member Data Documentation

4.12.3.1 ac

```
algo_comm_t& acConcat_wave_config::ac
```

4.12.3.2 strNames_AC

```
std::vector<std::string> acConcat_wave_config::strNames_AC
```

4.12.3.3 numSamples_AC

```
std::vector<int> acConcat_wave_config::numSamples_AC
```

4.12.3.4 vGCC

```
mha_wave_t acConcat_wave_config::vGCC
```

4.12.3.5 vGCC_con

```
MHA_AC::waveform_t* acConcat_wave_config::vGCC_con
```

The documentation for this class was generated from the following files:

- **acConcat_wave.h**
- **acConcat_wave.cpp**

4.13 acmon::ac_monitor_t Class Reference

A class for converting AC variables to Parser monitors of correct type.

Public Member Functions

- **ac_monitor_t** (**MHAParser::parser_t** &parent, const std::string &name_, **algo_←comm_t** ac, bool use_matrix)
Converts AC variable to parser monitor.
- void **getvar** (**algo_comm_t** ac)
Update values of monitor.

Public Attributes

- std::string **name**
name of AC variable and parser monitor
- std::string **dimstr**
columns x rows
- **MHAParser::vfloat_mon_t** **mon**
Monitor used for real vectors.
- **MHAParser::mfloat_mon_t** **mon_mat**
Monitor used for real matrices.
- **MHAParser::vcomplex_mon_t** **mon_complex**
monitor used for complex vectors
- **MHAParser::mcomplex_mon_t** **mon_mat_complex**
monitor used for complex matrices
- **MHAParser::parser_t** & **p_parser**
parent parser to insert monitor into

Private Attributes

- bool **use_mat**
if true, use matrix monitor, else use vector monitor

4.13.1 Detailed Description

A class for converting AC variables to Parser monitors of correct type.

4.13.2 Constructor & Destructor Documentation

4.13.2.1 ac_monitor_t()

```
acmon::ac_monitor_t::ac_monitor_t (
    MHAParser::parser_t & parent,
    const std::string & name_,
    algo_comm_t ac,
    bool use_matrix )
```

Converts AC variable to parser monitor.

Parameters

<i>parent</i>	The parser to insert a monitor into
<i>name_</i>	The name of the AC variable and the monitor variable
<i>ac</i>	Handle to algorithm communication space
<i>use_matrix</i>	Indicates if a matrix monitor type should be used.

4.13.3 Member Function Documentation**4.13.3.1 getvar()**

```
void acmon::ac_monitor_t::getvar (
    algo_comm_t ac )
```

Update values of monitor.

Parameters

<i>ac</i>	Handle to algorithm communication space
-----------	---

4.13.4 Member Data Documentation**4.13.4.1 name**

```
std::string acmon::ac_monitor_t::name
```

name of AC variable and parser monitor

4.13.4.2 dimstr

```
std::string acmon::ac_monitor_t::dimstr
```

columns x rows

4.13.4.3 mon

MHAParser::vfloat_mon_t acmon::ac_monitor_t::mon

Monitor used for real vectors.

4.13.4.4 mon_mat

MHAParser::mfloat_mon_t acmon::ac_monitor_t::mon_mat

Monitor used for real matrices.

4.13.4.5 mon_complex

MHAParser::vcomplex_mon_t acmon::ac_monitor_t::mon_complex

monitor used for complex vectors

4.13.4.6 mon_mat_complex

MHAParser::mcomplex_mon_t acmon::ac_monitor_t::mon_mat_complex

monitor used for complex matrices

4.13.4.7 p_parser

MHAParser::parser_t& acmon::ac_monitor_t::p_parser

parent parser to insert monitor into

4.13.4.8 use_mat

`bool acmon::ac_monitor_t::use_mat [private]`

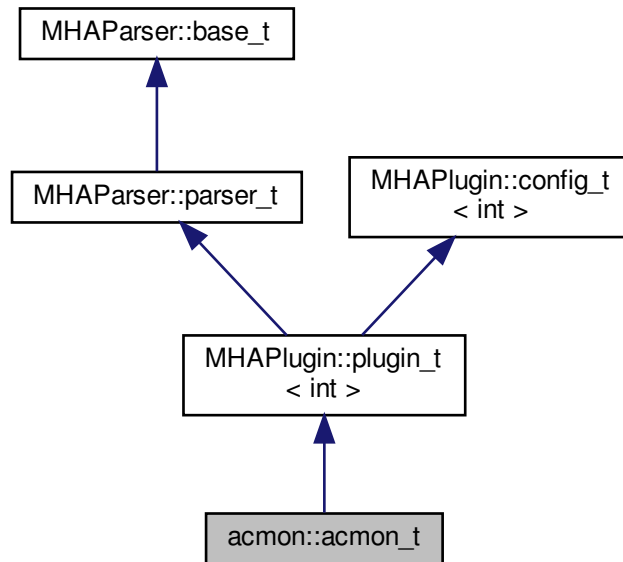
if true, use matrix monitor, else use vector monitor

The documentation for this class was generated from the following files:

- **ac_monitor_type.hh**
- **ac_monitor_type.cpp**

4.14 acmon::acmon_t Class Reference

Inheritance diagram for acmon::acmon_t:



Public Member Functions

- **acmon_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- **~acmon_t** ()
- void **prepare** (**mhaconfig_t** &)
- void **release** ()
- **mha_spec_t** * **process** (**mha_spec_t** *)
- **mha_wave_t** * **process** (**mha_wave_t** *)

Private Member Functions

- void **save_vars** ()
- void **update_recmode** ()

Private Attributes

- **algo_comm_t** **ac**
- **MHAParser::vstring_mon_t** **varlist**
- **MHAParser::vstring_mon_t** **dimensions**
- **MHAParser::kw_t** **dispmode**
- **MHAParser::kw_t** **recmode**
- **std::vector< ac_monitor_t * >** **vars**
- **MHAEvents::patchbay_t< acmon_t >** **patchbay**
- **std::string** **chain**
- **std::string** **algo**
- **bool** **b_cont**
- **bool** **b_snapshot**

Additional Inherited Members

4.14.1 Constructor & Destructor Documentation

4.14.1.1 acmon_t()

```
acmon::acmon_t::acmon_t (
    const algo_comm_t & iac,
    const std::string & ith,
    const std::string & ial )
```

4.14.1.2 ~acmon_t()

```
acmon::acmon_t::~~acmon_t (
    void )
```

4.14.2 Member Function Documentation

4.14.2.1 prepare()

```
void acmon::acmon_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t< int >** (p. 1099).

4.14.2.2 release()

```
void acmon::acmon_t::release (  
    void ) [inline], [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< int >** (p. [1100](#)).

4.14.2.3 process() [1/2]

```
mha_spec_t * acmon::acmon_t::process (  
    mha_spec_t * s )
```

4.14.2.4 process() [2/2]

```
mha_wave_t * acmon::acmon_t::process (  
    mha_wave_t * s )
```

4.14.2.5 save_vars()

```
void acmon::acmon_t::save_vars ( ) [private]
```

4.14.2.6 update_recmode()

```
void acmon::acmon_t::update_recmode ( ) [private]
```

4.14.3 Member Data Documentation

4.14.3.1 ac

```
algo_comm_t acmon::acmon_t::ac [private]
```

4.14.3.2 varlist

MHAParser::vstring_mon_t acmon::acmon_t::varlist [private]

4.14.3.3 dimensions

MHAParser::vstring_mon_t acmon::acmon_t::dimensions [private]

4.14.3.4 dispmode

MHAParser::kw_t acmon::acmon_t::dispmode [private]

4.14.3.5 recmode

MHAParser::kw_t acmon::acmon_t::recmode [private]

4.14.3.6 vars

std::vector< ac_monitor_t*> acmon::acmon_t::vars [private]

4.14.3.7 patchbay

MHAEvents::patchbay_t< acmon_t> acmon::acmon_t::patchbay [private]

4.14.3.8 chain

std::string acmon::acmon_t::chain [private]

4.14.3.9 algo

std::string acmon::acmon_t::algo [private]

4.14.3.10 b_cont

```
bool acmon::acmon_t::b_cont [private]
```

4.14.3.11 b_snapshot

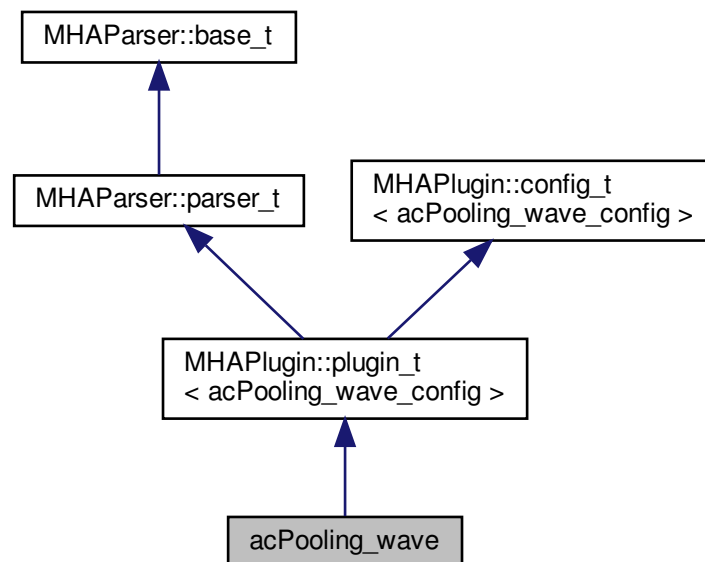
```
bool acmon::acmon_t::b_snapshot [private]
```

The documentation for this class was generated from the following file:

- **acmon.cpp**

4.15 acPooling_wave Class Reference

Inheritance diagram for acPooling_wave:



Public Member Functions

- **acPooling_wave** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
Constructs our plugin.
- **~acPooling_wave** ()
- **mha_wave_t * process** (**mha_wave_t ***)
Checks for the most recent configuration and defers processing to it.
- void **prepare** (**mhaconfig_t** &)
Plugin preparation.
- void **release** (void)

Public Attributes

- **MHAParser::int_t** numsamples
- **MHAParser::int_t** pooling_wndlen
- **MHAParser::kw_t** pooling_type
- **MHAParser::float_t** upper_threshold
- **MHAParser::float_t** lower_threshold
- **MHAParser::int_t** neighbourhood
- **MHAParser::float_t** alpha
- **MHAParser::string_t** p_name
- **MHAParser::string_t** p_biased_name
- **MHAParser::string_t** pool_name
- **MHAParser::string_t** max_pool_ind_name
- **MHAParser::string_t** like_ratio_name
- **MHAParser::vfloat_t** probb_bias

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t**< **acPooling_wave** > patchbay

Additional Inherited Members

4.15.1 Constructor & Destructor Documentation

4.15.1.1 acPooling_wave()

```
acPooling_wave::acPooling_wave (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Constructs our plugin.

4.15.1.2 ~acPooling_wave()

```
acPooling_wave::~~acPooling_wave ( )
```

4.15.2 Member Function Documentation

4.15.2.1 process()

```
mha_wave_t * acPooling_wave::process (
    mha_wave_t * signal )
```

Checks for the most recent configuration and defers processing to it.

4.15.2.2 prepare()

```
void acPooling_wave::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPlugin::plugin_t< acPooling_wave_config >** (p. [1099](#)).

4.15.2.3 release()

```
void acPooling_wave::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< acPooling_wave_config >** (p. [1100](#)).

4.15.2.4 update_cfg()

```
void acPooling_wave::update_cfg ( ) [private]
```

4.15.3 Member Data Documentation

4.15.3.1 numsamples

MHAParser::int_t acPooling_wave::numsamples

4.15.3.2 pooling_wndlen

MHAParser::int_t acPooling_wave::pooling_wndlen

4.15.3.3 pooling_type

MHAParser::kw_t acPooling_wave::pooling_type

4.15.3.4 upper_threshold

MHAParser::float_t acPooling_wave::upper_threshold

4.15.3.5 lower_threshold

MHAParser::float_t acPooling_wave::lower_threshold

4.15.3.6 neighbourhood

MHAParser::int_t acPooling_wave::neighbourhood

4.15.3.7 alpha

MHAParser::float_t acPooling_wave::alpha

4.15.3.8 p_name

MHAParser::string_t acPooling_wave::p_name

4.15.3.9 p_biased_name

```
MHAParser::string_t acPooling_wave::p_biased_name
```

4.15.3.10 pool_name

```
MHAParser::string_t acPooling_wave::pool_name
```

4.15.3.11 max_pool_ind_name

```
MHAParser::string_t acPooling_wave::max_pool_ind_name
```

4.15.3.12 like_ratio_name

```
MHAParser::string_t acPooling_wave::like_ratio_name
```

4.15.3.13 prob_bias

```
MHAParser::vfloat_t acPooling_wave::prob_bias
```

4.15.3.14 patchbay

```
MHAEvents::patchbay_t< acPooling_wave> acPooling_wave::patchbay [private]
```

The documentation for this class was generated from the following files:

- **acPooling_wave.h**
- **acPooling_wave.cpp**

4.16 acPooling_wave_config Class Reference

Public Member Functions

- **acPooling_wave_config** (**algo_comm_t** & **ac**, const **mhaconfig_t** in_cfg, **ac**↔**Pooling_wave** *_pooling)
- **~acPooling_wave_config** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **insert** ()

Public Attributes

- **algo_comm_t & ac**
- **std::string raw_p_name**
- **MHA_AC::waveform_t p**
- **MHA_AC::waveform_t p_biased**
- **MHA_AC::waveform_t p_max**
- **MHA_AC::waveform_t like_ratio**
- **mha_wave_t c**
- **unsigned int pooling_ind**
- **unsigned int pooling_option**
- **unsigned int pooling_size**
- **float up_thresh**
- **float low_thresh**
- **int neigh**
- **float alpha**
- **MHASignal::waveform_t pool**
- **MHASignal::waveform_t prob_bias_func**

4.16.1 Constructor & Destructor Documentation

4.16.1.1 acPooling_wave_config()

```
acPooling_wave_config::acPooling_wave_config (
    algo_comm_t & ac,
    const mhaconfig_t in_cfg,
    acPooling_wave * _pooling )
```

4.16.1.2 ~acPooling_wave_config()

```
acPooling_wave_config::~acPooling_wave_config ( )
```

4.16.2 Member Function Documentation

4.16.2.1 process()

```
mha_wave_t * acPooling_wave_config::process (
    mha_wave_t * wave )
```

4.16.2.2 insert()

```
void acPooling_wave_config::insert ( )
```

4.16.3 Member Data Documentation

4.16.3.1 ac

```
algo_comm_t& acPooling_wave_config::ac
```

4.16.3.2 raw_p_name

```
std::string acPooling_wave_config::raw_p_name
```

4.16.3.3 p

```
MHA_AC::waveform_t acPooling_wave_config::p
```

4.16.3.4 p_biased

```
MHA_AC::waveform_t acPooling_wave_config::p_biased
```

4.16.3.5 p_max

```
MHA_AC::waveform_t acPooling_wave_config::p_max
```

4.16.3.6 like_ratio

```
MHA_AC::waveform_t acPooling_wave_config::like_ratio
```

4.16.3.7 c

mha_wave_t acPooling_wave_config::c

4.16.3.8 pooling_ind

unsigned int acPooling_wave_config::pooling_ind

4.16.3.9 pooling_option

unsigned int acPooling_wave_config::pooling_option

4.16.3.10 pooling_size

unsigned int acPooling_wave_config::pooling_size

4.16.3.11 up_thresh

float acPooling_wave_config::up_thresh

4.16.3.12 low_thresh

float acPooling_wave_config::low_thresh

4.16.3.13 neigh

int acPooling_wave_config::neigh

4.16.3.14 alpha

float acPooling_wave_config::alpha

4.16.3.15 pool

MHASignal::waveform_t acPooling_wave_config::pool

4.16.3.16 prob_bias_func

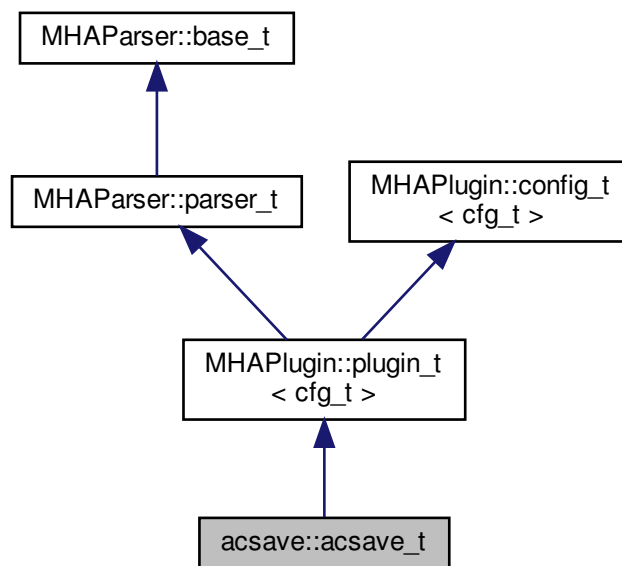
MHASignal::waveform_t acPooling_wave_config::prob_bias_func

The documentation for this class was generated from the following files:

- **acPooling_wave.h**
- **acPooling_wave.cpp**

4.17 acsave::acsave_t Class Reference

Inheritance diagram for acsave::acsave_t:



Public Member Functions

- **acsave_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()
- **mha_spec_t** * **process** (**mha_spec_t** *)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **event_start_recording** ()
- void **event_stop_and_flush** ()

Private Types

- typedef std::vector< **save_var_t** * > **varlist_t**

Private Member Functions

- void **process** ()

Private Attributes

- **MHAParser::bool_t** **bflush**
- **MHAParser::kw_t** **fileformat**
- **MHAParser::string_t** **fname**
- **MHAParser::float_t** **reclen**
- **MHAParser::vstring_t** **variables**
- **varlist_t** **varlist**
- std::string **chain**
- std::string **algo**
- bool **b_prepared**
- bool **b_flushed**
- **MHAEvents::patchbay_t**< **acsave_t** > **patchbay**

Additional Inherited Members**4.17.1 Member Typedef Documentation****4.17.1.1 varlist_t**

```
typedef std::vector< save_var_t*> acsave::acsave_t::varlist_t [private]
```

4.17.2 Constructor & Destructor Documentation**4.17.2.1 acsave_t()**

```
acsave::acsave_t::acsave_t (
    const algo_comm_t & iac,
    const std::string & ith,
    const std::string & ial )
```

4.17.3 Member Function Documentation

4.17.3.1 prepare()

```
void acsave::acsave_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPlugin::plugin_t< cfg_t >** (p. [1099](#)).

4.17.3.2 release()

```
void acsave::acsave_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< cfg_t >** (p. [1100](#)).

4.17.3.3 process() [1/3]

```
mha_spec_t * acsave::acsave_t::process (
    mha_spec_t * s )
```

4.17.3.4 process() [2/3]

```
mha_wave_t * acsave::acsave_t::process (
    mha_wave_t * s )
```

4.17.3.5 event_start_recording()

```
void acsave::acsave_t::event_start_recording ( )
```

4.17.3.6 event_stop_and_flush()

```
void acsave::acsave_t::event_stop_and_flush ( )
```

4.17.3.7 process() [3/3]

```
void acsave::acsave_t::process (  
    void ) [private]
```

4.17.4 Member Data Documentation

4.17.4.1 bflush

```
MHAParser::bool_t acsave::acsave_t::bflush [private]
```

4.17.4.2 fileformat

```
MHAParser::kw_t acsave::acsave_t::fileformat [private]
```

4.17.4.3 fname

```
MHAParser::string_t acsave::acsave_t::fname [private]
```

4.17.4.4 reclen

```
MHAParser::float_t acsave::acsave_t::reclen [private]
```

4.17.4.5 variables

```
MHAParser::vstring_t acsave::acsave_t::variables [private]
```

4.17.4.6 varlist

```
varlist_t acsave::acsave_t::varlist [private]
```

4.17.4.7 chain

```
std::string acsave::acsave_t::chain [private]
```

4.17.4.8 algo

```
std::string acsave::acsave_t::algo [private]
```

4.17.4.9 b_prepared

```
bool acsave::acsave_t::b_prepared [private]
```

4.17.4.10 b_flushed

```
bool acsave::acsave_t::b_flushed [private]
```

4.17.4.11 patchbay

```
MHAEvents::patchbay_t< acsave_t> acsave::acsave_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **acsave.cpp**

4.18 acsave::cfg_t Class Reference

Public Member Functions

- **cfg_t** (const **algo_comm_t** &iac, unsigned int imax_frames, std::vector< std::string > &var_names)
- **~cfg_t** ()
- void **store_frame** ()
- void **flush_data** (const std::string &, unsigned int)

Private Attributes

- **algo_comm_t** **ac**
- unsigned int **nvars**
- **save_var_t** ** **varlist**
- unsigned int **rec_frames**
- unsigned int **max_frames**

4.18.1 Constructor & Destructor Documentation

4.18.1.1 cfg_t()

```
cfg_t::cfg_t (
    const algo_comm_t & iac,
    unsigned int imax_frames,
    std::vector< std::string > & var_names )
```

4.18.1.2 ~cfg_t()

```
cfg_t::~~cfg_t ( )
```

4.18.2 Member Function Documentation

4.18.2.1 store_frame()

```
void cfg_t::store_frame ( )
```

This function is called in the processing thread.

4.18.2.2 flush_data()

```
void cfg_t::flush_data (
    const std::string & filename,
    unsigned int fmt )
```

This function is called in the configuration thread.

Parameters

<i>filename</i>	Output file name
<i>fmt</i>	Output file format

4.18.3 Member Data Documentation**4.18.3.1 ac**

algo_comm_t acsave::cfg_t::ac [private]

4.18.3.2 nvars

unsigned int acsave::cfg_t::nvars [private]

4.18.3.3 varlist

save_var_t** acsave::cfg_t::varlist [private]

4.18.3.4 rec_frames

unsigned int acsave::cfg_t::rec_frames [private]

4.18.3.5 max_frames

unsigned int acsave::cfg_t::max_frames [private]

The documentation for this class was generated from the following file:

- **acsave.cpp**

4.19 acsave::mat4head_t Struct Reference

Public Attributes

- `int32_t t`
- `int32_t rows`
- `int32_t cols`
- `int32_t imag`
- `int32_t namelen`

4.19.1 Member Data Documentation

4.19.1.1 t

`int32_t acsave::mat4head_t::t`

4.19.1.2 rows

`int32_t acsave::mat4head_t::rows`

4.19.1.3 cols

`int32_t acsave::mat4head_t::cols`

4.19.1.4 imag

`int32_t acsave::mat4head_t::imag`

4.19.1.5 namelen

`int32_t acsave::mat4head_t::namelen`

The documentation for this struct was generated from the following file:

- **acsave.cpp**

4.20 acsave::save_var_t Class Reference

Public Member Functions

- **save_var_t** (const std::string &, int, const **algo_comm_t** &)
- **~save_var_t** ()
- void **store_frame** ()
- void **save_txt** (FILE *, unsigned int)
- void **save_mat4** (FILE *, unsigned int)
- void **save_m** (FILE *, unsigned int)

Public Attributes

- double * **data**

Private Attributes

- std::string **name**
- unsigned int **nframes**
- unsigned int **ndim**
- unsigned int **maxframe**
- **algo_comm_t** **ac**
- unsigned int **framecnt**
- bool **b_complex**

4.20.1 Constructor & Destructor Documentation

4.20.1.1 save_var_t()

```
acsave::save_var_t::save_var_t (
    const std::string & nm,
    int n,
    const algo_comm_t & iac )
```

4.20.1.2 ~save_var_t()

```
acsave::save_var_t::~~save_var_t ( )
```

4.20.2 Member Function Documentation

4.20.2.1 store_frame()

```
void acsave::save_var_t::store_frame ( )
```

4.20.2.2 save_txt()

```
void acsave::save_var_t::save_txt (
    FILE * fh,
    unsigned int writeframes )
```

4.20.2.3 save_mat4()

```
void acsave::save_var_t::save_mat4 (
    FILE * fh,
    unsigned int writeframes )
```

4.20.2.4 save_m()

```
void acsave::save_var_t::save_m (
    FILE * fh,
    unsigned int writeframes )
```

4.20.3 Member Data Documentation

4.20.3.1 data

```
double* acsave::save_var_t::data
```

4.20.3.2 name

```
std::string acsave::save_var_t::name [private]
```

4.20.3.3 nframes

```
unsigned int acsave::save_var_t::nframes [private]
```

4.20.3.4 ndim

```
unsigned int acsave::save_var_t::ndim [private]
```

4.20.3.5 maxframe

```
unsigned int acsave::save_var_t::maxframe [private]
```

4.20.3.6 ac

```
algo_comm_t acsave::save_var_t::ac [private]
```

4.20.3.7 framecnt

```
unsigned int acsave::save_var_t::framecnt [private]
```

4.20.3.8 b_complex

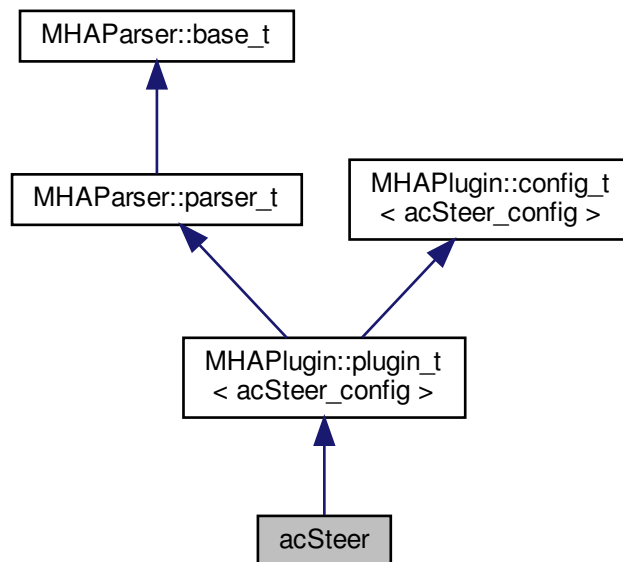
```
bool acsave::save_var_t::b_complex [private]
```

The documentation for this class was generated from the following file:

- **acsave.cpp**

4.21 acSteer Class Reference

Inheritance diagram for acSteer:



Public Member Functions

- **acSteer** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
Constructs our plugin.
- **~acSteer** ()
- **mha_spec_t** * **process** (**mha_spec_t** *)
This method is a NOOP.
- void **prepare** (**mhaconfig_t** &)
Plugin preparation.
- void **release** (void)

Public Attributes

- **MHAParser::string_t** **steerFile**
- **MHAParser::string_t** **acSteerName1**
- **MHAParser::string_t** **acSteerName2**
- **MHAParser::int_t** **nsteerchan**
- **MHAParser::int_t** **nrefmic**

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t**< **acSteer** > **patchbay**

Additional Inherited Members

4.21.1 Constructor & Destructor Documentation

4.21.1.1 **acSteer**()

```
acSteer::acSteer (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Constructs our plugin.

4.21.1.2 **~acSteer**()

```
acSteer::~~acSteer ( )
```

4.21.2 Member Function Documentation

4.21.2.1 **process**()

```
mha_spec_t * acSteer::process (
    mha_spec_t * signal )
```

This method is a NOOP.

4.21.2.2 **prepare**()

```
void acSteer::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPLugin::plugin_t< acSteer_config >** (p. 1099).

4.21.2.3 release()

```
void acSteer::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< acSteer_config >** (p. 1100).

4.21.2.4 update_cfg()

```
void acSteer::update_cfg ( ) [private]
```

4.21.3 Member Data Documentation

4.21.3.1 steerFile

```
MHAParser::string_t acSteer::steerFile
```

4.21.3.2 acSteerName1

```
MHAParser::string_t acSteer::acSteerName1
```

4.21.3.3 acSteerName2

```
MHAParser::string_t acSteer::acSteerName2
```

4.21.3.4 nsteerchan

```
MHAParser::int_t acSteer::nsteerchan
```

4.21.3.5 nrefmic

```
MHAParser::int_t acSteer::nrefmic
```

4.21.3.6 patchbay

```
MHAEvents::patchbay_t< acSteer> acSteer::patchbay [private]
```

The documentation for this class was generated from the following files:

- **acSteer.h**
- **acSteer.cpp**

4.22 acSteer_config Class Reference

Public Member Functions

- **acSteer_config** (**algo_comm_t** &ac, const **mhaconfig_t** in_cfg, **acSteer** * acSteer)
- **~acSteer_config** ()
- void **insert** ()

Public Attributes

- unsigned int **nchan**
- unsigned int **nfreq**
- unsigned int **nsteerchan**
- unsigned int **nrefmic**
- unsigned int **nangle**
- **MHA_AC::spectrum_t** specSteer1
- **MHA_AC::spectrum_t** specSteer2

4.22.1 Constructor & Destructor Documentation

4.22.1.1 acSteer_config()

```
acSteer_config::acSteer_config (
    algo_comm_t & ac,
    const mhaconfig_t in_cfg,
    acSteer * acSteer )
```

4.22.1.2 ~acSteer_config()

```
acSteer_config::~~acSteer_config ( )
```

4.22.2 Member Function Documentation

4.22.2.1 insert()

```
void acSteer_config::insert ( )
```

4.22.3 Member Data Documentation

4.22.3.1 nchan

```
unsigned int acSteer_config::nchan
```

4.22.3.2 nfreq

```
unsigned int acSteer_config::nfreq
```

4.22.3.3 nsteerchan

```
unsigned int acSteer_config::nsteerchan
```

4.22.3.4 nrefmic

```
unsigned int acSteer_config::nrefmic
```

4.22.3.5 nangle

```
unsigned int acSteer_config::nangle
```

4.22.3.6 specSteer1

```
MHA_AC::spectrum_t acSteer_config::specSteer1
```

4.22.3.7 specSteer2

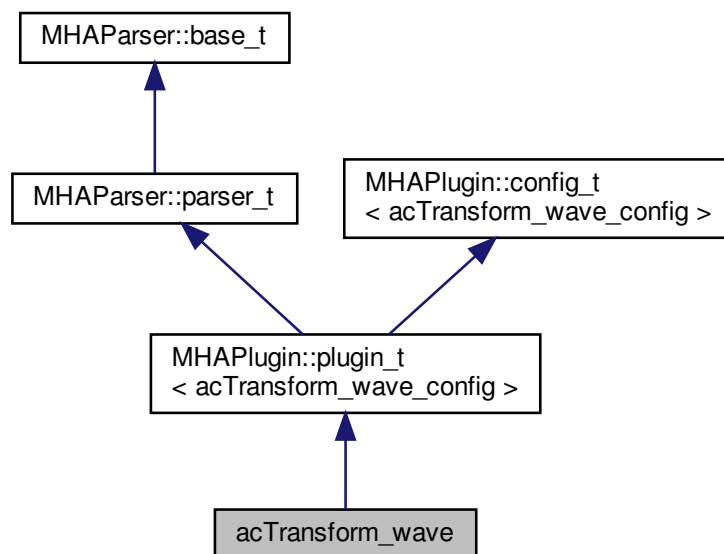
```
MHA_AC::spectrum_t acSteer_config::specSteer2
```

The documentation for this class was generated from the following files:

- **acSteer.h**
- **acSteer.cpp**

4.23 acTransform_wave Class Reference

Inheritance diagram for acTransform_wave:



Public Member Functions

- **acTransform_wave** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
Constructs our plugin.
- **~acTransform_wave** ()
- **mha_wave_t * process** (**mha_wave_t ***)
Checks for the most recent configuration and defers processing to it.
- void **prepare** (**mhaconfig_t** &)
Plugin preparation.
- void **release** (void)

Public Attributes

- **MHAParser::string_t ang_name**
- **MHAParser::string_t raw_p_name**
- **MHAParser::string_t raw_p_max_name**
- **MHAParser::string_t rotated_p_name**
- **MHAParser::string_t rotated_p_max_name**
- **MHAParser::int_t numsamples**
- **MHAParser::bool_t to_from**

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t< acTransform_wave > patchbay**

Additional Inherited Members

4.23.1 Constructor & Destructor Documentation

4.23.1.1 acTransform_wave()

```
acTransform_wave::acTransform_wave (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Constructs our plugin.

4.23.1.2 `~acTransform_wave()`

```
acTransform_wave::~~acTransform_wave ( )
```

4.23.2 Member Function Documentation

4.23.2.1 `process()`

```
mha_wave_t * acTransform_wave::process (
    mha_wave_t * signal )
```

Checks for the most recent configuration and defers processing to it.

4.23.2.2 `prepare()`

```
void acTransform_wave::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPlugin::plugin_t< acTransform_wave_config >** (p. [1099](#)).

4.23.2.3 `release()`

```
void acTransform_wave::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< acTransform_wave_config >** (p. [1100](#)).

4.23.2.4 update_cfg()

```
void acTransform_wave::update_cfg ( ) [private]
```

4.23.3 Member Data Documentation

4.23.3.1 ang_name

```
MHAParser::string_t acTransform_wave::ang_name
```

4.23.3.2 raw_p_name

```
MHAParser::string_t acTransform_wave::raw_p_name
```

4.23.3.3 raw_p_max_name

```
MHAParser::string_t acTransform_wave::raw_p_max_name
```

4.23.3.4 rotated_p_name

```
MHAParser::string_t acTransform_wave::rotated_p_name
```

4.23.3.5 rotated_p_max_name

```
MHAParser::string_t acTransform_wave::rotated_p_max_name
```

4.23.3.6 numsamples

```
MHAParser::int_t acTransform_wave::numsamples
```

4.23.3.7 to_from

```
MHAParser::bool_t acTransform_wave::to_from
```

4.23.3.8 patchbay

```
MHAEvents::patchbay_t< acTransform_wave> acTransform_wave::patchbay [private]
```

The documentation for this class was generated from the following files:

- **acTransform_wave.h**
- **acTransform_wave.cpp**

4.24 acTransform_wave_config Class Reference

Public Member Functions

- **acTransform_wave_config** (**algo_comm_t** & **ac**, const **mhaconfig_t** in_cfg, **ac**↔
Transform_wave *_transform)
- **~acTransform_wave_config** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)

Public Attributes

- **algo_comm_t** & **ac**
- std::string **ang_name**
- std::string **raw_p_name**
- std::string **raw_p_max_name**
- **MHA_AC::waveform_t** **rotated_p**
- **MHA_AC::int_t** **rotated_i**
- unsigned int **offset**
- unsigned int **resolution**
- unsigned int **to_from**

4.24.1 Constructor & Destructor Documentation

4.24.1.1 acTransform_wave_config()

```
acTransform_wave_config::acTransform_wave_config (
    algo_comm_t & ac,
    const mhaconfig_t in_cfg,
    acTransform_wave * _transform )
```

4.24.1.2 ~acTransform_wave_config()

```
acTransform_wave_config::~acTransform_wave_config ( )
```

4.24.2 Member Function Documentation

4.24.2.1 process()

```
mha_wave_t * acTransform_wave_config::process (
    mha_wave_t * wave )
```

4.24.3 Member Data Documentation

4.24.3.1 ac

```
algo_comm_t& acTransform_wave_config::ac
```

4.24.3.2 ang_name

```
std::string acTransform_wave_config::ang_name
```

4.24.3.3 raw_p_name

```
std::string acTransform_wave_config::raw_p_name
```

4.24.3.4 raw_p_max_name

`std::string acTransform_wave_config::raw_p_max_name`

4.24.3.5 rotated_p

`MHA_AC::waveform_t acTransform_wave_config::rotated_p`

4.24.3.6 rotated_i

`MHA_AC::int_t acTransform_wave_config::rotated_i`

4.24.3.7 offset

`unsigned int acTransform_wave_config::offset`

4.24.3.8 resolution

`unsigned int acTransform_wave_config::resolution`

4.24.3.9 to_from

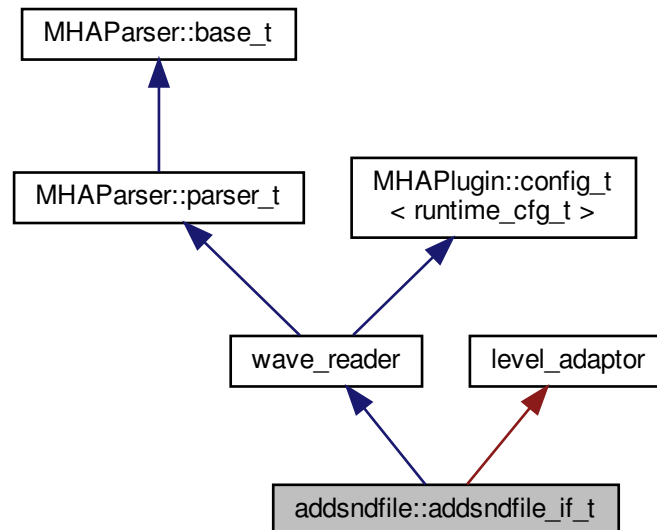
`unsigned int acTransform_wave_config::to_from`

The documentation for this class was generated from the following files:

- **acTransform_wave.h**
- **acTransform_wave.cpp**

4.25 addsndfile::addsndfile_if_t Class Reference

Inheritance diagram for addsndfile::addsndfile_if_t:



Public Member Functions

- **addsndfile_if_t** (**algo_comm_t**, const char *, const char *)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()

Private Member Functions

- void **update** ()
- void **change_mode** ()
- void **set_level** ()
- void **scan_dir** ()

Private Attributes

- **MHAParser::string_t** filename
- **MHAParser::string_t** path
- **MHAParser::bool_t** loop
- **MHAParser::float_t** level

- **MHAParser::kw_t** levelmode
- **MHAParser::kw_t** resamplingmode
- **MHAParser::vint_t** channels
- **MHAParser::kw_t** mode
- **MHAParser::float_t** ramplen
- **MHAParser::int_t** startpos
- **MHAParser::vint_mon_t** mapping
- **MHAParser::int_mon_t** numchannels
- **MHAParser::int_mon_t** mhachannels
- **MHAParser::int_mon_t** active
- **MHAParser::string_t** search_pattern
- **MHAParser::vstring_mon_t** search_result
- unsigned int **uint_mode**
- **MHAEvents::patchbay_t**< **addsndfile_if_t** > patchbay

Additional Inherited Members

4.25.1 Constructor & Destructor Documentation

4.25.1.1 addsndfile_if_t()

```
addsndfile::addsndfile_if_t::addsndfile_if_t (
    algo_comm_t iac,
    const char * ,
    const char * )
```

4.25.2 Member Function Documentation

4.25.2.1 process()

```
mha_wave_t * addsndfile::addsndfile_if_t::process (
    mha_wave_t * s )
```

4.25.2.2 prepare()

```
void addsndfile::addsndfile_if_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t**< **runtime_cfg_t** > (p. [1099](#)).

4.25.2.3 release()

```
void addsndfile::addsndfile_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t**< **runtime_cfg_t** > (p. [1100](#)).

4.25.2.4 update()

```
void addsndfile::addsndfile_if_t::update ( ) [private]
```

4.25.2.5 change_mode()

```
void addsndfile::addsndfile_if_t::change_mode ( ) [private]
```

4.25.2.6 set_level()

```
void addsndfile::addsndfile_if_t::set_level ( ) [private]
```

4.25.2.7 scan_dir()

```
void addsndfile::addsndfile_if_t::scan_dir ( ) [private]
```

4.25.3 Member Data Documentation

4.25.3.1 filename

```
MHAParser::string_t addsndfile::addsndfile_if_t::filename [private]
```

4.25.3.2 path

```
MHAParser::string_t addsndfile::addsndfile_if_t::path [private]
```

4.25.3.3 loop

MHAParser::bool_t addsndfile::addsndfile_if_t::loop [private]

4.25.3.4 level

MHAParser::float_t addsndfile::addsndfile_if_t::level [private]

4.25.3.5 levelmode

MHAParser::kw_t addsndfile::addsndfile_if_t::levelmode [private]

4.25.3.6 resamplingmode

MHAParser::kw_t addsndfile::addsndfile_if_t::resamplingmode [private]

4.25.3.7 channels

MHAParser::vint_t addsndfile::addsndfile_if_t::channels [private]

4.25.3.8 mode

MHAParser::kw_t addsndfile::addsndfile_if_t::mode [private]

4.25.3.9 ramplen

MHAParser::float_t addsndfile::addsndfile_if_t::ramplen [private]

4.25.3.10 startpos

MHAParser::int_t addsndfile::addsndfile_if_t::startpos [private]

4.25.3.11 mapping

MHAParser::vint_mon_t addsndfile::addsndfile_if_t::mapping [private]

4.25.3.12 numchannels

MHAParser::int_mon_t addsndfile::addsndfile_if_t::numchannels [private]

4.25.3.13 mhachannels

MHAParser::int_mon_t addsndfile::addsndfile_if_t::mhachannels [private]

4.25.3.14 active

MHAParser::int_mon_t addsndfile::addsndfile_if_t::active [private]

4.25.3.15 search_pattern

MHAParser::string_t addsndfile::addsndfile_if_t::search_pattern [private]

4.25.3.16 search_result

MHAParser::vstring_mon_t addsndfile::addsndfile_if_t::search_result [private]

4.25.3.17 uint_mode

unsigned int addsndfile::addsndfile_if_t::uint_mode [private]

4.25.3.18 patchbay

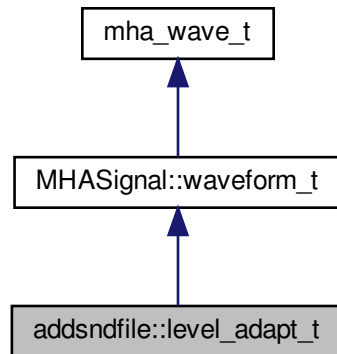
MHAEvents::patchbay_t< **addsndfile_if_t**> addsndfile::addsndfile_if_t::patchbay [private]

The documentation for this class was generated from the following file:

- **addsndfile.cpp**

4.26 addsndfile::level_adapt_t Class Reference

Inheritance diagram for addsndfile::level_adapt_t:



Public Member Functions

- **level_adapt_t** (**mhaconfig_t** cf, **mha_real_t** adapt_len, **mha_real_t** l_new_, **mha_real_t** l_old_)
- void **update_frame** ()
- **mha_real_t** **get_level** () const
- bool **can_update** () const

Private Attributes

- unsigned int **ilen**
- unsigned int **pos**
- **MHAWindow::fun_t** **wnd**
- **mha_real_t** **l_new**
- **mha_real_t** **l_old**

Additional Inherited Members

4.26.1 Constructor & Destructor Documentation

4.26.1.1 level_adapt_t()

```
addsndfile::level_adapt_t::level_adapt_t (
    mhaconfig_t cf,
    mha_real_t adapt_len,
    mha_real_t l_new_,
    mha_real_t l_old_ )
```

4.26.2 Member Function Documentation

4.26.2.1 update_frame()

```
void addsndfile::level_adapt_t::update_frame ( )
```

4.26.2.2 get_level()

```
mha_real_t addsndfile::level_adapt_t::get_level ( ) const [inline]
```

4.26.2.3 can_update()

```
bool addsndfile::level_adapt_t::can_update ( ) const [inline]
```

4.26.3 Member Data Documentation

4.26.3.1 ilen

```
unsigned int addsndfile::level_adapt_t::ilen [private]
```

4.26.3.2 pos

```
unsigned int addsndfile::level_adapt_t::pos [private]
```

4.26.3.3 wnd

```
MHAWindow::fun_t addsndfile::level_adapt_t::wnd [private]
```

4.26.3.4 l_new

```
mha_real_t addsndfile::level_adapt_t::l_new [private]
```

4.26.3.5 l_old

```
mha_real_t addsndfile::level_adapt_t::l_old [private]
```

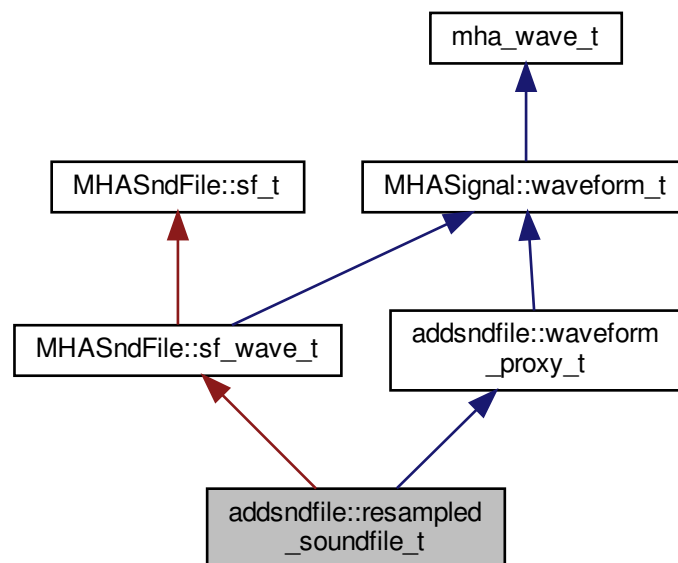
The documentation for this class was generated from the following file:

- **addsndfile.cpp**

4.27 addsndfile::resampled_soundfile_t Class Reference

Reads sound from file and resamples it if necessary and wanted.

Inheritance diagram for addsndfile::resampled_soundfile_t:



Public Member Functions

- **resampled_soundfile_t** (const std::string &name, float mha_sampling_rate, **addsndfile_↔
_resampling_mode_t** resampling_mode)
Reads sound from file and resamples if necessary and wanted.

Additional Inherited Members

4.27.1 Detailed Description

Reads sound from file and resamples it if necessary and wanted.

Sound data can then be used by addsndfile.

4.27.2 Constructor & Destructor Documentation

4.27.2.1 resampled_soundfile_t()

```
addsndfile::resampled_soundfile_t::resampled_soundfile_t (
    const std::string & name,
    float mha_sampling_rate,
    addsndfile_resampling_mode_t resampling_mode )
```

Reads sound from file and resamples if necessary and wanted.

If the sound file does not specify a sampling rate, then the sound data is always used without resampling.

Parameters

<i>name</i>	Sound file name
<i>mha_sampling_rate</i>	The sampling rate of the MHA signal processing at the point of the addsndfile plugin
<i>resampling_mode</i>	DONT_RESAMPLE_STRICT: Do not resample, just use the samples from the sound file at the current sample rate, even if the sample rate of the sound file differs. DONT_RESAMPLE_PERMISSIVE: Do not resample, if the sample rate of the MHA differs from the sample rate of the sound file, raise an error. DO_RESAMPLE: Resample.

Exceptions

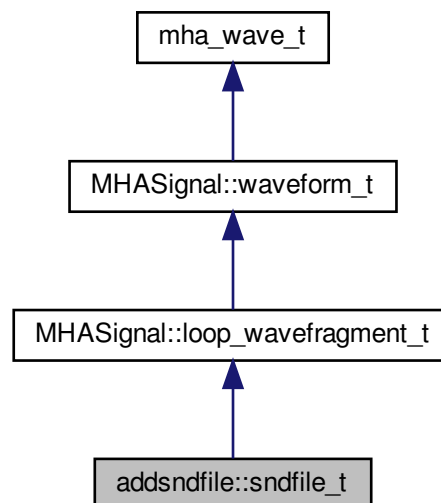
<i>MHA_Error</i> (p. 707)	If the sampling rate of the file does not match the sampling rate of the MHA and DONT_RESAMPLE_STRICT was requested. If resampling failed (e.g. due to non-rational quotient of MHA sampling rate and sound file sampling rate).
---	--

The documentation for this class was generated from the following file:

- **addsndfile.cpp**

4.28 addsndfile::sndfile_t Class Reference

Inheritance diagram for addsndfile::sndfile_t:



Public Member Functions

- **sndfile_t** (const std::string &name, bool loop, unsigned int level_mode, std::vector< int > channels_, unsigned int nchannels, std::vector< int > &mapping, int &numchannels, unsigned int startpos, float mha_sampling_rate, **addsndfile_resampling_mode_t** resampling_mode)

Additional Inherited Members

4.28.1 Constructor & Destructor Documentation

4.28.1.1 sndfile_t()

```

addsndfile::sndfile_t::sndfile_t (
    const std::string & name,
    bool loop,
    unsigned int level_mode,
    std::vector< int > channels_,
    unsigned int nchannels,
    std::vector< int > & mapping,
    int & numchannels,
    unsigned int startpos,
    float mha_sampling_rate,
    addsndfile_resampling_mode_t resampling_mode )

```

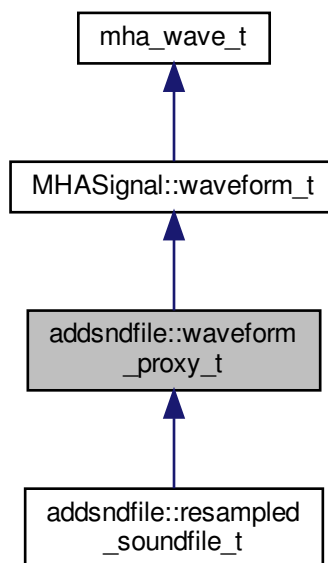
The documentation for this class was generated from the following file:

- **addsndfile.cpp**

4.29 addsndfile::waveform_proxy_t Class Reference

Class helps to specify which instance of MHASignal_waveform_t parent instance is meant in **resampled_soundfile_t** (p. 248).

Inheritance diagram for addsndfile::waveform_proxy_t:



Public Member Functions

- **waveform_proxy_t** (unsigned frames, unsigned **channels**)

Additional Inherited Members

4.29.1 Detailed Description

Class helps to specify which instance of MHASignal_waveform_t parent instance is meant in **resampled_soundfile_t** (p. 248).

4.29.2 Constructor & Destructor Documentation

4.29.2.1 waveform_proxy_t()

```
addsndfile::waveform_proxy_t::waveform_proxy_t (
    unsigned frames,
    unsigned channels ) [inline]
```

The documentation for this class was generated from the following file:

- **addsndfile.cpp**

4.30 ADM::ADM< F > Class Template Reference

Adaptive differential microphone, working for speech frequency range.

Public Member Functions

- **ADM** (F fs, F dist, unsigned lp_order, const F *lp_alphas, unsigned decomb_order, const F *decomb_alphas, F tau_beta=F(50e-3), F mu_beta=F(1e-4))
Create Adaptive Differential Microphone.
- F **process** (const F &front, const F &back, const F &external_beta=F(-1), bool update_beta=true)
ADM (p. 252) processes one frame.
- F **beta** () const

Private Attributes

- Delay< F > m_delay_front
- Delay< F > m_delay_back
- Linearphase_FIR< F > m_lp_bf
- Linearphase_FIR< F > m_lp_result
- Linearphase_FIR< F > m_decomb
- F m_beta
- F m_mu_beta
- F m_powerfilter_coeff
- F m_powerfilter_norm
- F m_powerfilter_state

4.30.1 Detailed Description

```
template<class F>
class ADM::ADM< F >
```

Adaptive differential microphone, working for speech frequency range.

4.30.2 Constructor & Destructor Documentation

4.30.2.1 ADM()

```
template<class F >
ADM::ADM< F >::ADM (
    F fs,
    F dist,
    unsigned lp_order,
    const F * lp_alphas,
    unsigned decomb_order,
    const F * decomb_alphas,
    F tau_beta = F(50e-3),
    F mu_beta = F(1e-4) )
```

Create Adaptive Differential Microphone.

Parameters

<i>fs</i>	Sampling rate / Hz
<i>dist</i>	Distance between physical microphones / m
<i>lp_order</i>	Filter order of FIR lowpass filter used for adaptation

Parameters

<i>lp_alphas</i>	Pointer to array of alpha coefficients for the lowpass filter used for adaptation. Since this class uses linear phase FIR filters only, only the first half ($\text{order}/2 + 1$) of the coefficients will be read (coefficients for linear-phase FIR filters are symmetric).
<i>decomb_order</i>	Filter order of FIR compensation filter (compensates for comb filter characteristic). $\text{decomb_order} \leq 1$ deactivates filter.
<i>decomb_alphas</i>	Pointer to array of alpha coefficients for the compensation filter used to compensate for the comb filter characteristic. Since this class uses linear phase FIR filters only, only the first half ($\text{order}/2 + 1$) of the coefficients will be read (coefficients for linear-phase FIR filters are symmetric).
<i>tau_beta</i>	Time constant of the lowpass filter used for averaging the power of the output signal
<i>mu_beta</i>	adaptation speed

4.30.3 Member Function Documentation**4.30.3.1 process()**

```
template<class F >
F  ADM::ADM< F >::process (
    const F & front,
    const F & back,
    const F & external_beta = F(-1),
    bool update_beta = true ) [inline]
```

ADM (p. 252) processes one frame.

Parameters

<i>front</i>	The current front input signal sample
<i>back</i>	The current rear input signal sample
<i>external_beta</i>	If ≥ 0 , this is used as the "beta" parameter for direction to filter out. Else, the beta parameter is adapted to filtered out a direction so that best reduction of signal intensity from the back hemisphere is achieved.
<i>update_beta</i>	Perform the beta adaptation step?

Returns

The computed output sample

4.30.3.2 beta()

```
template<class F >
F ADM::ADM< F >::beta ( ) const [inline]
```

4.30.4 Member Data Documentation

4.30.4.1 m_delay_front

```
template<class F >
Delay<F> ADM::ADM< F >::m_delay_front [private]
```

4.30.4.2 m_delay_back

```
template<class F >
Delay<F> ADM::ADM< F >::m_delay_back [private]
```

4.30.4.3 m_lp_bf

```
template<class F >
Linearphase_FIR<F> ADM::ADM< F >::m_lp_bf [private]
```

4.30.4.4 m_lp_result

```
template<class F >
Linearphase_FIR<F> ADM::ADM< F >::m_lp_result [private]
```

4.30.4.5 m_decomb

```
template<class F >
Linearphase_FIR<F> ADM::ADM< F >::m_decomb [private]
```

4.30.4.6 m_beta

```
template<class F >
F ADM::ADM< F >::m_beta [private]
```

4.30.4.7 m_mu_beta

```
template<class F >
F ADM::ADM< F >::m_mu_beta [private]
```

4.30.4.8 m_powerfilter_coeff

```
template<class F >
F ADM::ADM< F >::m_powerfilter_coeff [private]
```

4.30.4.9 m_powerfilter_norm

```
template<class F >
F ADM::ADM< F >::m_powerfilter_norm [private]
```

4.30.4.10 m_powerfilter_state

```
template<class F >
F ADM::ADM< F >::m_powerfilter_state [private]
```

The documentation for this class was generated from the following file:

- **adm.hh**

4.31 **ADM::Delay**< F > Class Template Reference

A delay-line class.

Public Member Functions

- **Delay** (F samples, F f_design, F fs)
Create a signal delay object.
- **~Delay** ()
- F **process** (const F &in_sample)
Apply delay to signal.

Private Attributes

- unsigned **m_fullsamples**
Integer part of delay.
- F **m_coeff**
coefficient for 1st order IIR lowpass filter which does the subsample delay
- F **m_norm**
normalization for the IIR subsample delay filter
- F * **m_state**
Ringbuffer: Delayline.
- unsigned **m_now_in**
current position for inserting new samples into m_state ringbuffer

4.31.1 Detailed Description

```
template<class F>
class ADM::Delay< F >
```

A delay-line class.

It can delay samples in a single audio channel. It stores samples while they are delayed until they have reached their target delay. It can also do subsample-delays for a limited frequency range below fs/4.

4.31.2 Constructor & Destructor Documentation

4.31.2.1 Delay()

```
template<class F >
ADM::Delay< F >:: Delay (
    F samples,
    F f_design,
    F fs )
```

Create a signal delay object.

Parameters

<i>samples</i>	number of samples to delay (may be non-integer)
<i>f_design</i>	design frequency (in Hz). Subsampledelay is exact for this frequency and approximate for different frequencies
<i>fs</i>	sampling frequency (in Hz).

4.31.2.2 ~Delay()

```
template<class F >
ADM::Delay< F >::~~ Delay ( )
```

4.31.3 Member Function Documentation**4.31.3.1 process()**

```
template<class F >
F ADM::Delay< F >::process (
    const F & in_sample ) [inline]
```

Apply delay to signal.

Whenever a new audio sample enters the delay line, a previous audio sample, now delayed, is returned by this method. Sub-sample-delays are implemented by applying a first-order recursive lowpass filter. This method needs to be called repeatedly, once for each incoming audio sample in correct order for a block of audio with multiple samples (oldest first, newest last).

Parameters

<i>in_sample</i>	The current input signal sample
------------------	---------------------------------

Returns

The output sample, which is one of the previously received input samples except for the sub-sample delay.

4.31.4 Member Data Documentation

4.31.4.1 m_fullsamples

```
template<class F >
unsigned ADM::Delay< F >::m_fullsamples [private]
```

Integer part of delay.

4.31.4.2 m_coeff

```
template<class F >
F ADM::Delay< F >::m_coeff [private]
```

coefficient for 1st order IIR lowpass filter which does the subsample delay

4.31.4.3 m_norm

```
template<class F >
F ADM::Delay< F >::m_norm [private]
```

normalization for the IIR subsample delay filter

4.31.4.4 m_state

```
template<class F >
F* ADM::Delay< F >::m_state [private]
```

Ringbuffer: Delayline.

4.31.4.5 m_now_in

```
template<class F >
unsigned ADM::Delay< F >::m_now_in [private]
```

current position for inserting new samples into m_state ringbuffer

The documentation for this class was generated from the following file:

- **adm.hh**

4.32 ADM::Linearphase_FIR< F > Class Template Reference

An efficient linear-phase fir filter implementation.

Public Member Functions

- **Linearphase_FIR** (unsigned order, const F *alphas)
Create linear-phase FIR filter.
- **~Linearphase_FIR** ()
- F **process** (const F &in_sample)
Filter one sample with this linear-phase FIR filter.

Private Attributes

- unsigned **m_order**
The filter order of this linear-phase FIR filter.
- F * **m_alphas**
FIR filter coefficients.
- F * **m_output**
Ringbuffer for building future output.
- unsigned **m_now**
current start of ringbuffer

4.32.1 Detailed Description

```
template<class F>
class ADM::Linearphase_FIR< F >
```

An efficient linear-phase fir filter implementation.

4.32.2 Constructor & Destructor Documentation

4.32.2.1 Linearphase_FIR()

```
template<class F >
ADM::Linearphase_FIR< F >:: Linearphase_FIR (
    unsigned order,
    const F * alphas )
```

Create linear-phase FIR filter.

Parameters

<i>order</i>	filter order of this FIR filter. restriction: must be even.
<i>alphas</i>	pointer to Array of alpha coefficients. Since this class is for linear phase FIR filters only, only (order / 2 + 1) coefficients will be read. (Coefficients for linear-phase FIR filters are symmetric.)

4.32.2.2 ~Linearphase_FIR()

```
template<class F >
ADM::Linearphase_FIR< F >::~~ Linearphase_FIR ( )
```

4.32.3 Member Function Documentation

4.32.3.1 process()

```
template<class F >
F ADM::Linearphase_FIR< F >::process (
    const F & in_sample ) [inline]
```

Filter one sample with this linear-phase FIR filter.

Parameters

<i>in_sample</i>	the current input sample
------------------	--------------------------

Returns

the computed output sample

4.32.4 Member Data Documentation

4.32.4.1 m_order

```
template<class F >
unsigned ADM::Linearphase_FIR< F >::m_order [private]
```

The filter order of this linear-phase FIR filter.

4.32.4.2 m_alphas

```
template<class F >
F* ADM::Linearphase_FIR< F >::m_alphas [private]
```

FIR filter coefficients.

Only $m_order / 2 + 1$ coefficients need to be stored since coefficients of linear-phase FIR filters are symmetric

4.32.4.3 m_output

```
template<class F >
F* ADM::Linearphase_FIR< F >::m_output [private]
```

Ringbuffer for building future output.

4.32.4.4 m_now

```
template<class F >
unsigned ADM::Linearphase_FIR< F >::m_now [private]
```

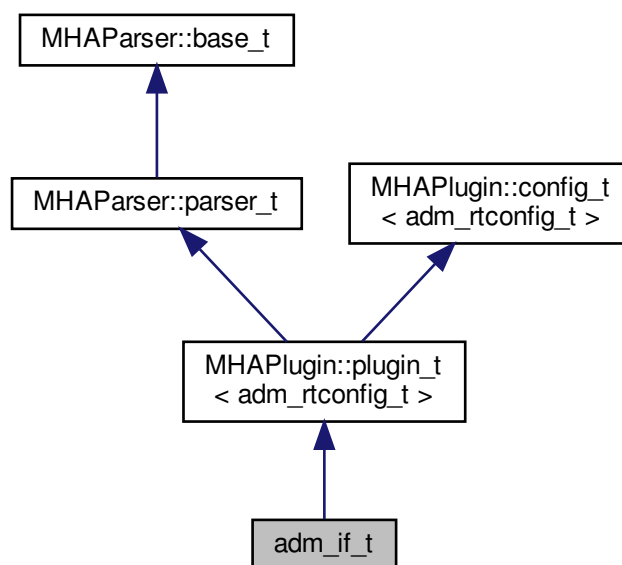
current start of ringbuffer

The documentation for this class was generated from the following file:

- **adm.hh**

4.33 adm_if_t Class Reference

Inheritance diagram for adm_if_t:



Public Member Functions

- **adm_if_t** (const **algo_comm_t** & **ac**, const std::string &thread_name, const std::string &algo_name)
- **mha_wave_t** * **process** (**mha_wave_t** *in)
- virtual void **prepare** (**mhaconfig_t** &)
- virtual void **release** ()

Private Member Functions

- void **update** ()
- bool **is_prepared** ()

Private Attributes

- **MHASignal::waveform_t** * **out**
- **MHAParser::vint_t** **front_channels**
- **MHAParser::vint_t** **rear_channels**
- **MHAParser::vfloat_t** **distances**
- **MHAParser::int_t** **lp_order**
- **MHAParser::int_t** **decomb_order**
- **MHAParser::int_t** **bypass**
- **MHAParser::float_t** **beta**
- **MHAParser::vfloat_t** **mu_beta**
- **MHAParser::vfloat_t** **tau_beta**
- **MHAParser::vfloat_mon_t** **coeff_lp**
- **MHAParser::vfloat_mon_t** **coeff_decomb**
- **MHAParser::int_t** **adaptation_ratio**
- unsigned **input_channels**
- int **framecnt**
- **mha_real_t** **srate**
- **MHAEvents::patchbay_t** < **adm_if_t** > **patchbay**

Additional Inherited Members

4.33.1 Constructor & Destructor Documentation

4.33.1.1 adm_if_t()

```
adm_if_t::adm_if_t (
    const algo_comm_t & ac,
    const std::string & thread_name,
    const std::string & algo_name )
```

4.33.2 Member Function Documentation

4.33.2.1 process()

```
mha_wave_t * adm_if_t::process (
    mha_wave_t * in )
```

4.33.2.2 prepare()

```
void adm_if_t::prepare (
    mhaconfig_t & cfg ) [virtual]
```

Implements **MHAPlugin::plugin_t**< **adm_rtconfig_t** > (p. [1099](#)).

4.33.2.3 release()

```
void adm_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPlugin::plugin_t**< **adm_rtconfig_t** > (p. [1100](#)).

4.33.2.4 update()

```
void adm_if_t::update ( ) [private]
```

4.33.2.5 is_prepared()

```
bool adm_if_t::is_prepared ( ) [inline], [private]
```

4.33.3 Member Data Documentation

4.33.3.1 out

MHASignal::waveform_t* adm_if_t::out [private]

4.33.3.2 front_channels

MHAParser::vint_t adm_if_t::front_channels [private]

4.33.3.3 rear_channels

MHAParser::vint_t adm_if_t::rear_channels [private]

4.33.3.4 distances

MHAParser::vfloat_t adm_if_t::distances [private]

4.33.3.5 lp_order

MHAParser::int_t adm_if_t::lp_order [private]

4.33.3.6 decomb_order

MHAParser::int_t adm_if_t::decomb_order [private]

4.33.3.7 bypass

MHAParser::int_t adm_if_t::bypass [private]

4.33.3.8 beta

MHAParser::float_t adm_if_t::beta [private]

4.33.3.9 mu_beta

MHAParser::vfloat_t adm_if_t::mu_beta [private]

4.33.3.10 tau_beta

MHAParser::vfloat_t adm_if_t::tau_beta [private]

4.33.3.11 coeff_lp

MHAParser::vfloat_mon_t adm_if_t::coeff_lp [private]

4.33.3.12 coeff_decomb

MHAParser::vfloat_mon_t adm_if_t::coeff_decomb [private]

4.33.3.13 adaptation_ratio

MHAParser::int_t adm_if_t::adaptation_ratio [private]

4.33.3.14 input_channels

unsigned adm_if_t::input_channels [private]

4.33.3.15 framecnt

int adm_if_t::framecnt [private]

4.33.3.16 srate

mha_real_t adm_if_t::srate [private]

4.33.3.17 patchbay

```
MHAEvents::patchbay_t< adm_if_t> adm_if_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **adm.cpp**

4.34 adm_rtconfig_t Class Reference

Public Types

- typedef **ADM::ADM**< mha_real_t > **adm_t**

Public Member Functions

- **adm_rtconfig_t** (unsigned nchannels_in, unsigned nchannels_out, int adaptation_ratio_, const std::vector< int > & **front_channels**, const std::vector< int > & **rear_channels**, const **mha_real_t** fs, const std::vector< **mha_real_t** > &distances, const int lp_order, const int decomb_order, const std::vector< **mha_real_t** > &tau_beta, const std::vector< **mha_real_t** > &mu_beta)

Construct new ADMs.

- virtual **~adm_rtconfig_t** ()
- size_t **num_adms** () const
- **adm_t** & **adm** (unsigned index)
Returns adm object number index.
- int **front_channel** (unsigned index) const
Returns index of front channel for adm number index.
- int **rear_channel** (unsigned index) const
Returns index of rear channel for adm number index.
- int **get_adaptation_ratio** () const

Private Member Functions

- void **check_index** (unsigned index) const
Index checking for all internal arrays.

Private Attributes

- `std::vector< int > front_channels`
Indices of channels containing the signals from the front microphones.
- `std::vector< int > rear_channels`
Indices of channels containing the signals from the rear microphones.
- `int adaptation_ratio`
Prescale.
- `MHASignal::waveform_t * lp_coeffs`
Lowpass filter coefficients.
- `std::vector< MHASignal::waveform_t * > decomb_coeffs`
Decomb-Filter coefficients.
- `std::vector< adm_t * > adms`
ADMs.

4.34.1 Member Typedef Documentation

4.34.1.1 adm_t

```
typedef ADM::ADM< mha_real_t> adm_rtconfig_t::adm_t
```

4.34.2 Constructor & Destructor Documentation

4.34.2.1 adm_rtconfig_t()

```
adm_rtconfig_t::adm_rtconfig_t (
    unsigned nchannels_in,
    unsigned nchannels_out,
    int adaptation_ratio_,
    const std::vector< int > & front_channels,
    const std::vector< int > & rear_channels,
    const mha_real_t fs,
    const std::vector< mha_real_t > & distances,
    const int lp_order,
    const int decomb_order,
    const std::vector< mha_real_t > & tau_beta,
    const std::vector< mha_real_t > & mu_beta )
```

Construct new ADMs.

Used when configuration changes.

Parameters

<i>nchannels_in</i>	Number of input channels
<i>nchannels_out</i>	Number of output channels
<i>adaptation_ratio_↔</i>	Update beta every adaptation_ratio frames
<i>front_channels</i>	Parser's front_channels setting
<i>rear_channels</i>	Parser's front_channels setting
<i>fs</i>	Sampling rate / Hz
<i>distances</i>	Distances between microphones / m
<i>lp_order</i>	Filter order of FIR lowpass filter for adaptation
<i>decomb_order</i>	Filter order of FIR compensation filter (compensates for comb filter characteristic)
<i>tau_beta</i>	Time constants of the lowpass filter used for averaging the power of the output signal used for adaptation
<i>mu_beta</i>	Adaptation step sizes

4.34.2.2 ~adm_rtconfig_t()

```
adm_rtconfig_t::~adm_rtconfig_t ( ) [virtual]
```

4.34.3 Member Function Documentation

4.34.3.1 check_index()

```
void adm_rtconfig_t::check_index (
    unsigned index ) const [inline], [private]
```

Index checking for all internal arrays.

Exceptions

MHA_Error (p. 707)	if index out of range.
---------------------------	------------------------

4.34.3.2 num_adms()

```
size_t adm_rtconfig_t::num_adms ( ) const [inline]
```

4.34.3.3 adm()

```
adm_t& adm_rtconfig_t::adm (
    unsigned index ) [inline]
```

Returns adm object number index.

4.34.3.4 front_channel()

```
int adm_rtconfig_t::front_channel (
    unsigned index ) const [inline]
```

Returns index of front channel for adm number index.

4.34.3.5 rear_channel()

```
int adm_rtconfig_t::rear_channel (
    unsigned index ) const [inline]
```

Returns index of rear channel for adm number index.

4.34.3.6 get_adaptation_ratio()

```
int adm_rtconfig_t::get_adaptation_ratio ( ) const [inline]
```

4.34.4 Member Data Documentation

4.34.4.1 front_channels

```
std::vector<int> adm_rtconfig_t::front_channels [private]
```

Indices of channels containing the signals from the front microphones.

4.34.4.2 rear_channels

```
std::vector<int> adm_rtconfig_t::rear_channels [private]
```

Indices of channels containing the signals from the rear microphones.

4.34.4.3 adaptation_ratio

```
int adm_rtconfig_t::adaptation_ratio [private]
```

Prescale.

4.34.4.4 lp_coeffs

```
MHASignal::waveform_t* adm_rtconfig_t::lp_coeffs [private]
```

Lowpass filter coefficients.

4.34.4.5 decomb_coeffs

```
std::vector< MHASignal::waveform_t*> adm_rtconfig_t::decomb_coeffs [private]
```

Decomb-Filter coefficients.

4.34.4.6 adms

```
std::vector< adm_t *> adm_rtconfig_t::adms [private]
```

ADMs.

The documentation for this class was generated from the following file:

- **adm.cpp**

4.35 algo_comm_t Struct Reference

A reference handle for algorithm communication variables.

Public Attributes

- void * **handle**
AC variable control handle.
- int(* **insert_var**)(void *, const char *, **comm_var_t**)
Register an AC variable.
- int(* **insert_var_int**)(void *, const char *, int *)
Register an int as an AC variable.
- int(* **insert_var_float**)(void *, const char *, float *)
Register a float as an AC variable.
- int(* **remove_var**)(void *, const char *)
Remove an AC variable.
- int(* **remove_ref**)(void *, void *)
Remove all AC variable which refer to address.
- int(* **is_var**)(void *, const char *)
Test if an AC variable exists.
- int(* **get_var**)(void *, const char *, **comm_var_t** *)
Get the variable handle of an AC variable.
- int(* **get_var_int**)(void *, const char *, int *)
Get the value of an int AC variable.
- int(* **get_var_float**)(void *, const char *, float *)
Get the value of a float AC variable.
- int(* **get_entries**)(void *, char *, unsigned int)
Return a space separated list of all variable names.
- const char *(* **get_error**)(int)
Convert AC error codes into human readable error messages.

4.35.1 Detailed Description

A reference handle for algorithm communication variables.

This structure contains a coontrol handle and a set of function pointers for sharing variables within one processing chain. See also section **Communication between algorithms** (p. 24).

4.35.2 Member Data Documentation

4.35.2.1 handle

`algo_comm_t::handle`

AC variable control handle.

4.35.2.2 insert_var

```
algo_comm_t::insert_var
```

Register an AC variable.

This function can register a variable to be shared within one chain. If a variable of this name exists it will be overwritten.

Parameters

<i>h</i>	AC handle
<i>n</i>	name of variable. May not be empty. Must not contain space character. The name is copied, therefore it is allowed that the char array pointed to gets invalid after return.
<i>v</i>	variable handle of type comm_var_t (p. 344)

Returns

Error code or zero on success

4.35.2.3 insert_var_int

```
algo_comm_t::insert_var_int
```

Register an int as an AC variable.

This function can register an int variable to be shared with other algorithms. It behaves similar to `ac.insert_var`.

Parameters

<i>h</i>	AC handle
<i>n</i>	name of variable
<i>v</i>	pointer on the variable

Returns

Error code or zero on success

4.35.2.4 insert_var_float

```
algo_comm_t::insert_var_float
```

Register a float as an AC variable.

This function can register a float variable to be shared with other algorithms. It behaves similar to `ac.insert_var`.

Parameters

<i>h</i>	AC handle
<i>n</i>	name of variable
<i>v</i>	pointer on the variable

Returns

Error code or zero on success

4.35.2.5 `remove_var`

```
algo_comm_t::remove_var
```

Remove an AC variable.

Remove (unregister) an AC variable. After calling this function, the variable is not available to `ac.is_var` or `ac.get_var`. The data pointer is not affected.

Parameters

<i>h</i>	AC handle
<i>n</i>	name of variable to be removed

Returns

Error code or zero on success

4.35.2.6 `remove_ref`

```
algo_comm_t::remove_ref
```

Remove all AC variable which refer to address.

This function removes all AC variables whos data field points to the given address.

Parameters

<i>h</i>	AC handle
<i>p</i>	address which should not be referred to any more

Returns

Error code or zero on success

4.35.2.7 is_var

```
algo_comm_t::is_var
```

Test if an AC variable exists.

This function tests if an AC variable of a given name exists. Use `ac.get_var` to get information about the variables type and dimension.

Parameters

<i>h</i>	AC handle
<i>n</i>	name of variable

Returns

1 if the variable exists, 0 otherwise

4.35.2.8 get_var

```
algo_comm_t::get_var
```

Get the variable handle of an AC variable.

This function returns the variable handle **comm_var_t** (p. 344) of a variable of the given name. If no variable of that name exists, an error code is returned.

Parameters

<i>h</i>	AC handle
<i>n</i>	name of variable
<i>v</i>	pointer to a AC variable object

Returns

Error code or zero on success

4.35.2.9 get_var_int

```
algo_comm_t::get_var_int
```

Get the value of an int AC variable.

This function returns the value of an int AC variable of the given name. If no variable exists, the variable type is mismatching or more than one entry is registered, a corresponding error code is returned. This is a special version of `ac.get_var`.

Parameters

<i>h</i>	AC handle
<i>n</i>	name of variable
<i>v</i>	pointer on an int variable to store the result

Returns

Error code or zero on success

4.35.2.10 get_var_float

```
algo_comm_t::get_var_float
```

Get the value of a float AC variable.

This function returns the value of a float AC variable of the given name. If no variable exists, the variable type is mismatching or more than one entry is registered, a corresponding error code is returned. This is a special version of `ac.get_var`.

Parameters

<i>h</i>	AC handle
<i>n</i>	name of variable
<i>v</i>	pointer on a float variable to store the result

Returns

Error code or zero on success

4.35.2.11 get_entries

```
algo_comm_t::get_entries
```

Return a space separated list of all variable names.

This function returns the names of all registered variables, separated by a single space.

Parameters

<i>h</i>	AC handle
----------	-----------

Return values

<i>ret</i>	Character buffer for return value
------------	-----------------------------------

Parameters

<i>len</i>	length of character buffer
------------	----------------------------

Returns

Error code or zero on success. -1: invalid ac handle. -3: not enough room in character buffer to store all variable names.

4.35.2.12 get_error

```
algo_comm_t::get_error
```

Convert AC error codes into human readable error messages.

Parameters

<i>e</i>	Error code
----------	------------

Returns

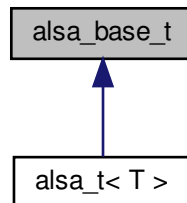
Error message

The documentation for this struct was generated from the following files:

- **mha.hh**
- **mha_algo_comm.cpp**

4.36 **alsa_base_t** Class Reference

Inheritance diagram for **alsa_base_t**:



Public Member Functions

- **alsa_base_t** ()
- virtual **~alsa_base_t** ()=default
- virtual void **start** ()=0
start puts alsa device in usable state
- virtual void **stop** ()=0
stop informs alsa device that we do not need any more samples / will not provide any more samples
- virtual bool **read** (**mha_wave_t** **)=0
*read audio samples from the device into an internal **mha_wave_t** (p. 780) buffer, then update the pointer given as parameter to point to the internal structure.*
- virtual bool **write** (**mha_wave_t** *)=0
write audio samples from the given waveform buffer to the sound device.

Public Attributes

- **snd_pcm_t** * **pcm**
The underlying alsa handle to this sound card.

4.36.1 Constructor & Destructor Documentation

4.36.1.1 `alsa_base_t()`

```
alsa_base_t::alsa_base_t ( ) [inline]
```

4.36.1.2 `~alsa_base_t()`

```
virtual alsa_base_t::~~alsa_base_t ( ) [virtual], [default]
```

4.36.2 Member Function Documentation

4.36.2.1 `start()`

```
virtual void alsa_base_t::start ( ) [pure virtual]
```

`start` puts `alsa` device in usable state

Implemented in `alsa_t< T >` (p. 284).

4.36.2.2 `stop()`

```
virtual void alsa_base_t::stop ( ) [pure virtual]
```

`stop` informs `alsa` device that we do not need any more samples / will not provide any more samples

Implemented in `alsa_t< T >` (p. 284).

4.36.2.3 `read()`

```
virtual bool alsa_base_t::read (
    mha_wave_t ** ) [pure virtual]
```

`read` audio samples from the device into an internal `mha_wave_t` (p. 780) buffer, then update the pointer given as parameter to point to the internal structure.

Converts sound samples from the integer data type provided by the sound card to floating-point values needed by the MHA in the range [-1.0,1.0]

Implemented in `alsa_t< T >` (p. 285).

4.36.2.4 write()

```
virtual bool alsa_base_t::write (
    mha_wave_t * ) [pure virtual]
```

write audio samples from the given waveform buffer to the sound device.

converts the floating point values coming from the MHA to the integer samples required by the sound card.

Implemented in **alsa_t< T >** (p. 285).

4.36.3 Member Data Documentation

4.36.3.1 pcm

```
snd_pcm_t* alsa_base_t::pcm
```

The underlying alsa handle to this sound card.

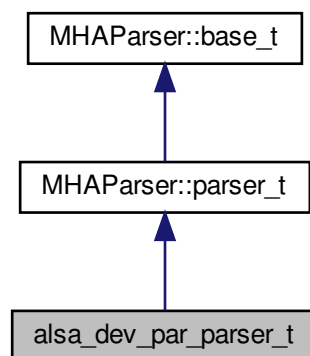
The documentation for this class was generated from the following file:

- **MHAIOalsa.cpp**

4.37 alsa_dev_par_parser_t Class Reference

Parser variables corresponding to one alsa device.

Inheritance diagram for alsa_dev_par_parser_t:



Public Member Functions

- **`alsa_dev_par_parser_t`** (`snd_pcm_stream_t` **`stream_dir`**)
Constructor inserts the parser variables into this sub-parser.

Public Attributes

- **`MHAParser::string_t`** **`device`**
Name of the device in the alsa world, like "hw:0.0", "default", etc.
- **`MHAParser::int_t`** **`nperiods`**
Number of buffers of fragsize to hold in the alsa buffer.
- `snd_pcm_stream_t` **`stream_dir`**
Remember the direction (capture/playback) of this device.

Additional Inherited Members

4.37.1 Detailed Description

Parser variables corresponding to one alsa device.

ALSA separates audio capture and audio playback into two different devices that have to be opened separately. This class encapsulates the parser variables that pertain to one such direction.

4.37.2 Constructor & Destructor Documentation

4.37.2.1 `alsa_dev_par_parser_t()`

```
alsa_dev_par_parser_t::alsa_dev_par_parser_t (
    snd_pcm_stream_t stream_dir )
```

Constructor inserts the parser variables into this sub-parser.

Parameters

<code>stream_dir</code>	capture or playback
-------------------------	---------------------

4.37.3 Member Data Documentation

4.37.3.1 device

```
MHAParser::string_t alsa_dev_par_parser_t::device
```

Name of the device in the alsa world, like "hw:0.0", "default", etc.

4.37.3.2 nperiods

```
MHAParser::int_t alsa_dev_par_parser_t::nperiods
```

Number of buffers of fragsize to hold in the alsa buffer.

Usually 2, the minimum possible.

4.37.3.3 stream_dir

```
snd_pcm_stream_t alsa_dev_par_parser_t::stream_dir
```

Remember the direction (capture/playback) of this device.

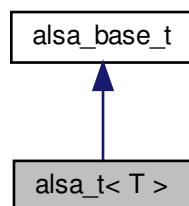
The documentation for this class was generated from the following file:

- **MHAIOalsa.cpp**

4.38 **alsa_t< T >** Class Template Reference

Our representation of one alsa device.

Inheritance diagram for **alsa_t< T >**:



Public Member Functions

- **alsa_t** (const **alsa_dev_par_parser_t** &par, unsigned int rate, unsigned int **fragsize**, unsigned int **channels**)
Constructor receives the parameters for this device.
- **~alsa_t** ()
Destructor closes the sound device.
- void **start** () override
start puts alsa device in usable state
- void **stop** () override
stop informs alsa device that we do not need any more samples / will not provide any more samples
- bool **read** (**mha_wave_t** **) override
*read audio samples from the device into an internal **mha_wave_t** (p. 780) buffer, then update the pointer given as parameter to point to the internal structure.*
- bool **write** (**mha_wave_t** *) override
write audio samples from the given waveform buffer to the sound device.

Private Attributes

- unsigned int **channels**
- unsigned int **fragsize**
- T * **buffer**
- std::vector< **mha_real_t** > **frame_data**
- **MHASignal::waveform_t** **wave**
internal buffer to store sound samples coming from the sound card.
- const **mha_real_t** **gain**
- const **mha_real_t** **invgain**
- const **mha_real_t** **val_min**
- const **mha_real_t** **val_max**
- snd_pcm_format_t **pcm_format**

Additional Inherited Members

4.38.1 Detailed Description

```
template<typename T>
class alsa_t< T >
```

Our representation of one alsa device.

We can start and stop the device, and depending on the direction, read or write samples.

4.38.2 Constructor & Destructor Documentation

4.38.2.1 `alsa_t()`

```
template<typename T >
alsa_t< T >:: alsa_t (
    const alsa_dev_par_parser_t & par,
    unsigned int rate,
    unsigned int fragsize,
    unsigned int channels )
```

Constructor receives the parameters for this device.

It opens the sound device using the alsa library and selects the given parameters, but does not yet start the sound device to perform real I/O.

Parameters

<i>par</i>	our parser variable aggregator (containing direction, device name, and number of periods to place in alsa buffer)
<i>rate</i>	sampling rate in Hz
<i>fragsize</i>	samples per block per channel
<i>channels</i>	number of audio channels to open

4.38.2.2 `~alsa_t()`

```
template<typename T >
alsa_t< T >::~ ~alsa_t ( )
```

Destructor closes the sound device.

4.38.3 Member Function Documentation

4.38.3.1 `start()`

```
template<typename T >
void alsa_t< T >::start ( ) [override], [virtual]
```

`start` puts alsa device in usable state

Implements **alsa_base_t** (p. 279).

4.38.3.2 stop()

```
template<typename T >
void alsa_t< T >::stop ( ) [override], [virtual]
```

stop informs alsa device that we do not need any more samples / will not provide any more samples

Implements **alsa_base_t** (p. [279](#)).

4.38.3.3 read()

```
template<typename T >
bool alsa_t< T >::read (
    mha_wave_t ** s ) [override], [virtual]
```

read audio samples from the device into an internal **mha_wave_t** (p. [780](#)) buffer, then update the pointer given as parameter to point to the internal structure.

Converts sound samples from the integer data type provided by the sound card to floating-point values needed by the MHA in the range [-1.0,1.0]

Implements **alsa_base_t** (p. [279](#)).

4.38.3.4 write()

```
template<typename T >
bool alsa_t< T >::write (
    mha_wave_t * s ) [override], [virtual]
```

write audio samples from the given waveform buffer to the sound device.

converts the floating point values coming from the MHA to the integer samples required by the sound card.

Implements **alsa_base_t** (p. [279](#)).

4.38.4 Member Data Documentation

4.38.4.1 channels

```
template<typename T >
unsigned int alsa_t< T >::channels [private]
```

4.38.4.2 fragsize

```
template<typename T >
unsigned int alsa_t< T >::fragsize [private]
```

4.38.4.3 buffer

```
template<typename T >
T* alsa_t< T >::buffer [private]
```

4.38.4.4 frame_data

```
template<typename T >
std::vector< mha_real_t> alsa_t< T >::frame_data [private]
```

4.38.4.5 wave

```
template<typename T >
MHASignal::waveform_t alsa_t< T >::wave [private]
```

internal buffer to store sound samples coming from the sound card.

4.38.4.6 gain

```
template<typename T >
const mha_real_t alsa_t< T >::gain [private]
```


4.38.4.7 invgain

```
template<typename T >
const mha_real_t alsat_t< T >::invgain [private]
```

4.38.4.8 val_min

```
template<typename T >
const mha_real_t alsat_t< T >::val_min [private]
```

4.38.4.9 val_max

```
template<typename T >
const mha_real_t alsat_t< T >::val_max [private]
```

4.38.4.10 pcm_format

```
template<typename T >
snd_pcm_format_t alsat_t< T >::pcm_format [private]
```

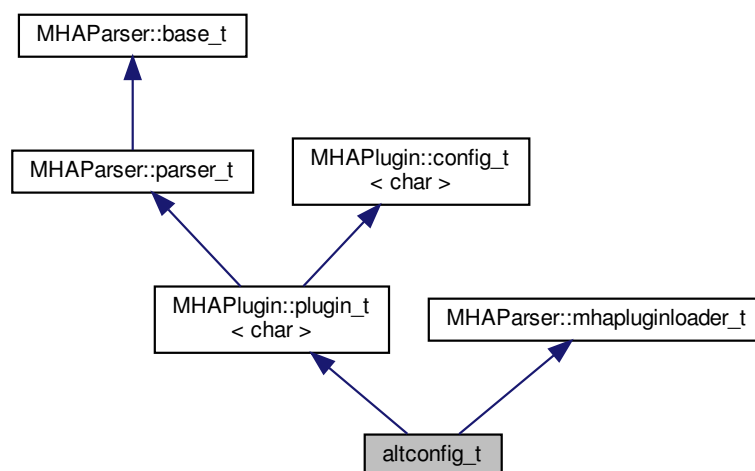
The documentation for this class was generated from the following file:

- **MHAIOalsa.cpp**

4.39 altconfig_t Class Reference

Single class implementing plugin altconfig.

Inheritance diagram for altconfig_t:



Public Member Functions

- **altconfig_t** (**algo_comm_t** iac, const char *chain, const char *algo)
Constructor initializes an instance of the altconfig plugin.
- void **prepare** (**mhaconfig_t** &cf)
Invoked by MHA when this plugin should prepare for signal processing.
- void **release** ()
Invoked by MHA when this plugin should call its release function.

Private Member Functions

- void **on_set_algos** ()
Callback executed when the configuration variable "algos" is written to at run time.
- void **on_set_select** ()
Callback executed when the configuration variable "select" is successfully written to at run time.
- void **event_select_all** ()
Callback executed when the configuration variable "selectall" is written to at run time.
- std::map< std::string, **MHAParser::string_t** > **save_state** ()
Save the old state of the user-defined sub-parsers for eventual restoration later.
- void **restore_state** (std::map< std::string, **MHAParser::string_t** > &state, std::map< std::string, **MHAParser::string_t** > &failed_state)
Restore the old parser state from a saved state.

Private Attributes

- **MHAParser::vstring_t** **parser_algos**
- **MHAParser::kw_t** **select_plug**
- **MHAParser::bool_t** **selectall**
- std::map< std::string, **MHAParser::string_t** > **configs**
Storage for alternative configuration commands.
- **MHAEvents::patchbay_t**< **altconfig_t** > **patchbay**
Configuration event broker.

Additional Inherited Members

4.39.1 Detailed Description

Single class implementing plugin altconfig.

altconfig loads another plugin and can send configuration commands to that plugin. altconfig does not need a separate runtime configuration class, template parameter char is used as a placeholder. Uses parser variable names "algos" and "select" even though the alternatives that can be selected in this plugin are not algorithms or plugins but configuration commands in order to be interface-compatible with plugin altplugins. mhacontrol has a UI area that automatically fills with the alternatives found in either altplugins or altconfig if the complete MHA loads exactly one plugin with this interface.

4.39.2 Constructor & Destructor Documentation

4.39.2.1 altconfig_t()

```
altconfig_t::altconfig_t (
    algo_comm_t iac,
    const char * chain,
    const char * algo )
```

Constructor initializes an instance of the altconfig plugin.

Parameters

<i>iac</i>	Algorithm communication variable space, not used by this plugin except to initialize base class.
<i>algo</i>	Configured name of this plugin.

4.39.3 Member Function Documentation

4.39.3.1 prepare()

```
void altconfig_t::prepare (
    mhaconfig_t & cf ) [inline], [virtual]
```

Invoked by MHA when this plugin should prepare for signal processing.

altconfig delegates to the loaded plugin and does not need to do more work to prepare.

Parameters

<i>cf</i>	signal dimensions, forwarded to loaded plugin which may change the signal dimensions.
-----------	---

Implements **MHAPlugin::plugin_t< char >** (p. 1099).

4.39.3.2 release()

```
void altconfig_t::release (
    void ) [inline], [virtual]
```

Invoked by MHA when this plugin should call its release function.

altconfig delegates to the loaded plugin.

Reimplemented from **MHAParser::plugin_t< char >** (p. 1100).

4.39.3.3 on_set_algos()

```
void altconfig_t::on_set_algos ( ) [private]
```

Callback executed when the configuration variable "algos" is written to at run time.

Adds the configuration variables that store the alternative configuration commands based on the new names and sets the allowed values of configuration variable "select"

4.39.3.4 on_set_select()

```
void altconfig_t::on_set_select ( ) [private]
```

Callback executed when the configuration variable "select" is successfully written to at run time.

Causes the execution of the stored command for the selected condition in the context of the loaded plugin.

4.39.3.5 event_select_all()

```
void altconfig_t::event_select_all ( ) [private]
```

Callback executed when the configuration variable "selectall" is written to at run time.

When set to yes, iterates once through all stored configurations in the order they appear in configuration variable algos.

4.39.3.6 save_state()

```
std::map< std::string, MHAParser::string_t > altconfig_t::save_state ( ) [private]
```

Save the old state of the user-defined sub-parsers for eventual restoration later.

operator= does not suffice to store/restore the old state because we need to re-insert the string_t's that were removed, but a copy of the string_t keeps a pointer to its parent and complains if we try to insert_item it again. So we just copy the relevant data into a new string_t.

Parameters

<i>old_state</i>	old parser state
------------------	------------------

Returns

Copy of the old state

4.39.3.7 restore_state()

```
void altconfig_t::restore_state (
    std::map< std::string, MHAParser::string_t > & state,
    std::map< std::string, MHAParser::string_t > & failed_state ) [private]
```

Restore the old parser state from a saved state.

Parameters

<i>state</i>	old parser state
--------------	------------------

4.39.4 Member Data Documentation

4.39.4.1 parser_algos

```
MHAParser::vstring_t altconfig_t::parser_algos [private]
```

4.39.4.2 select_plug

```
MHAParser::kw_t altconfig_t::select_plug [private]
```

4.39.4.3 selectall

```
MHAParser::bool_t altconfig_t::selectall [private]
```

4.39.4.4 configs

```
std::map<std::string, MHAParser::string_t> altconfig_t::configs [private]
```

Storage for alternative configuration commands.

New entries are registered with the plugin's parser when parser_algos is updated.

4.39.4.5 patchbay

```
MHAEvents::patchbay_t < altconfig_t > altconfig_t::patchbay [private]
```

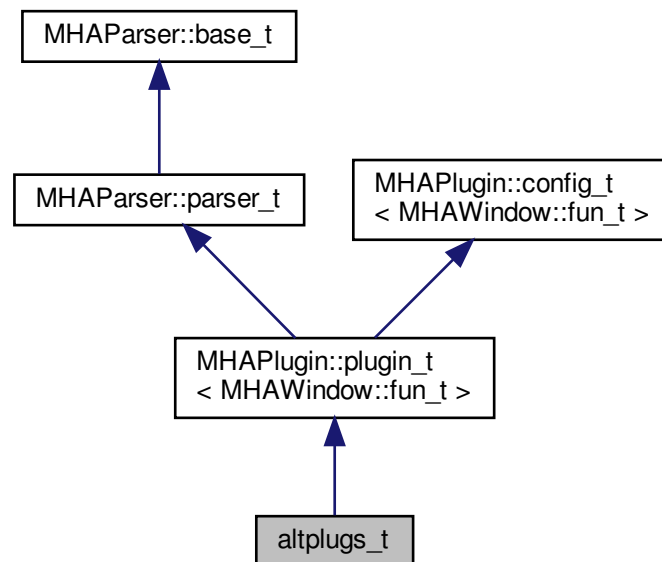
Configuration event broker.

The documentation for this class was generated from the following files:

- **altconfig.hh**
- **altconfig.cpp**

4.40 altplugins_t Class Reference

Inheritance diagram for altplugins_t:



Public Member Functions

- **altplugins_t** (**algo_comm_t** iac, const char *chain, const char *algo)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()
- void **process** (**mha_wave_t** *, **mha_wave_t** **)
- void **process** (**mha_spec_t** *, **mha_wave_t** **)
- void **process** (**mha_wave_t** *, **mha_spec_t** **)
- void **process** (**mha_spec_t** *, **mha_spec_t** **)
- virtual std::string **parse** (const std::string &arg)
- virtual void **parse** (const char *a1, char *a2, unsigned int a3)

Private Member Functions

- void **event_set_plugs** ()
- void **event_add_plug** ()
- void **event_delete_plug** ()
- void **event_select_plug** ()
- void **update_selector_list** ()
- void **update_ramplen** ()
- void **proc_ramp** (mha_wave_t *s)

Private Attributes

- **MHAParser::bool_t** use_own_ac
- **MHAParser::vstring_t** parser_plugs
- **MHAParser::string_t** add_plug
- **MHAParser::string_t** delete_plug
- **MHAParser::float_t** ramplen
- **MHAParser::kw_t** select_plug
- **MHAParser::parser_t** current
- **MHAParser::vstring_mon_t** nondefault_labels
- **std::vector< mhaplug_cfg_t * >** plugs
- **mhaplug_cfg_t *** selected_plug
- **MHAEvents::patchbay_t< altplugins_t >** patchbay
- **MHASignal::waveform_t *** fallback_wave
- **MHASignal::spectrum_t *** fallback_spec
- **mhaconfig_t** cfin
- **mhaconfig_t** cfout
- **bool** prepared
- **bool** added_via_plugs
- **unsigned int** ramp_counter
- **unsigned int** ramp_len

Additional Inherited Members

4.40.1 Constructor & Destructor Documentation

4.40.1.1 altplugins_t()

```
altplugins_t::altplugins_t (
    algo_comm_t iac,
    const char * chain,
    const char * algo )
```

4.40.2 Member Function Documentation

4.40.2.1 prepare()

```
void altplugins_t::prepare (
    mhaconfig_t & cf ) [virtual]
```

Implements **MHAPLugin::plugin_t**< **MHAWindow::fun_t** > (p. [1099](#)).

4.40.2.2 release()

```
void altplugins_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t**< **MHAWindow::fun_t** > (p. [1100](#)).

4.40.2.3 process() [1/4]

```
void altplugins_t::process (
    mha_wave_t * sIn,
    mha_wave_t ** sOut )
```

4.40.2.4 process() [2/4]

```
void altplugins_t::process (
    mha_spec_t * sIn,
    mha_wave_t ** sOut )
```

4.40.2.5 process() [3/4]

```
void altplugins_t::process (
    mha_wave_t * sIn,
    mha_spec_t ** sOut )
```


4.40.2.6 process() [4/4]

```
void altplugins_t::process (
    mha_spec_t * sIn,
    mha_spec_t ** sOut )
```

4.40.2.7 parse() [1/2]

```
std::string altplugins_t::parse (
    const std::string & arg ) [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [974](#)).

4.40.2.8 parse() [2/2]

```
virtual void altplugins_t::parse (
    const char * a1,
    char * a2,
    unsigned int a3 ) [inline], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [975](#)).

4.40.2.9 event_set_plugs()

```
void altplugins_t::event_set_plugs ( ) [private]
```

4.40.2.10 event_add_plug()

```
void altplugins_t::event_add_plug ( ) [private]
```

4.40.2.11 event_delete_plug()

```
void altplugins_t::event_delete_plug ( ) [private]
```

4.40.2.12 event_select_plug()

```
void altplugins_t::event_select_plug ( ) [private]
```

4.40.2.13 update_selector_list()

```
void altplugins_t::update_selector_list ( ) [private]
```

4.40.2.14 update_ramplen()

```
void altplugins_t::update_ramplen ( ) [private]
```

4.40.2.15 proc_ramp()

```
void altplugins_t::proc_ramp (
    mha_wave_t * s ) [private]
```

4.40.3 Member Data Documentation**4.40.3.1 use_own_ac**

```
MHAParser::bool_t altplugins_t::use_own_ac [private]
```

4.40.3.2 parser_plugs

```
MHAParser::vstring_t altplugins_t::parser_plugs [private]
```

4.40.3.3 add_plug

```
MHAParser::string_t altplugins_t::add_plug [private]
```

4.40.3.4 delete_plug

MHAParser::string_t altplugins_t::delete_plug [private]

4.40.3.5 ramplen

MHAParser::float_t altplugins_t::ramplen [private]

4.40.3.6 select_plug

MHAParser::kw_t altplugins_t::select_plug [private]

4.40.3.7 current

MHAParser::parser_t altplugins_t::current [private]

4.40.3.8 nondefault_labels

MHAParser::vstring_mon_t altplugins_t::nondefault_labels [private]

4.40.3.9 plugs

std::vector< mhaplug_cfg_t*> altplugins_t::plugs [private]

4.40.3.10 selected_plug

mhaplug_cfg_t* altplugins_t::selected_plug [private]

4.40.3.11 patchbay

MHAEvents::patchbay_t< altplugins_t> altplugins_t::patchbay [private]

4.40.3.12 fallback_wave

MHASignal::waveform_t* altplugins_t::fallback_wave [private]

4.40.3.13 fallback_spec

MHASignal::spectrum_t* altplugins_t::fallback_spec [private]

4.40.3.14 cfin

mhaconfig_t altplugins_t::cfin [private]

4.40.3.15 cfout

mhaconfig_t altplugins_t::cfout [private]

4.40.3.16 prepared

bool altplugins_t::prepared [private]

4.40.3.17 added_via_plugs

bool altplugins_t::added_via_plugs [private]

4.40.3.18 ramp_counter

unsigned int altplugins_t::ramp_counter [private]

4.40.3.19 ramp_len

unsigned int altplugins_t::ramp_len [private]

The documentation for this class was generated from the following file:

- **altplugins.cpp**

4.41 analysepath_t Class Reference

Public Member Functions

- **analysepath_t** (unsigned int nchannels_in, unsigned int outer_fragsize, unsigned int inner_fragsize, int **priority**, **MHAProc_wave2wave_t** inner_proc_wave2wave, **MHAProc_wave2spec_t** inner_proc_wave2spec, void *ilibdata, **algo_comm_t** outer_ac, const **MHA_AC::acspace2matrix_t** &acspace_template, **mha_domain_t** inner_out_domain, unsigned int fifo_len_blocks)
- virtual **~analysepath_t** ()
- void **rt_process** (**mha_wave_t** *)
- virtual int **svc** ()

Private Attributes

- **MHAProc_wave2wave_t** inner_process_wave2wave
- **MHAProc_wave2spec_t** inner_process_wave2spec
- **MHASignal::waveform_t** inner_input
- void * **libdata**
- **mha_fifo_t** < **mha_real_t** > **wave_fifo**
- **mha_fifo_t** < **MHA_AC::acspace2matrix_t** > **ac_fifo**
- **MHA_AC::acspace2matrix_t** inner_ac_copy
- **MHA_AC::acspace2matrix_t** outer_ac_copy
- **algo_comm_t** outer_ac
- **mha_domain_t** inner_out_domain
- **MHA_Error** inner_error
- bool **has_inner_error**
- bool **flag_terminate_inner_thread**
- int **input_to_process**
- **pthread_mutex_t** **ProcessMutex**
- **pthread_attr_t** **attr**
- struct sched_param **priority**
- int **scheduler**
- **pthread_t** **thread**
- **pthread_cond_t** **cond_to_process**

4.41.1 Constructor & Destructor Documentation

4.41.1.1 analysepath_t()

```
analysepath_t::analysepath_t (
    unsigned int nchannels_in,
    unsigned int outer_fragsize,
    unsigned int inner_fragsize,
    int priority,
    MHAProc_wave2wave_t inner_proc_wave2wave,
    MHAProc_wave2spec_t inner_proc_wave2spec,
    void * ilibdata,
    algo_comm_t outer_ac,
    const MHA_AC::acspace2matrix_t & acspace_template,
    mha_domain_t inner_out_domain,
    unsigned int fifo_len_blocks )
```

4.41.1.2 ~analysepath_t()

```
analysepath_t::~~analysepath_t ( ) [virtual]
```

4.41.2 Member Function Documentation

4.41.2.1 rt_process()

```
void analysepath_t::rt_process (
    mha_wave_t * outer_input )
```

4.41.2.2 svc()

```
int analysepath_t::svc ( ) [virtual]
```

4.41.3 Member Data Documentation

4.41.3.1 inner_process_wave2wave

```
MHAProc_wave2wave_t analysepath_t::inner_process_wave2wave [private]
```

4.41.3.2 inner_process_wave2spec

```
MHAProc_wave2spec_t analysepath_t::inner_process_wave2spec [private]
```

4.41.3.3 inner_input

```
MHASignal::waveform_t analysepath_t::inner_input [private]
```

4.41.3.4 libdata

```
void* analysepath_t::libdata [private]
```

4.41.3.5 wave_fifo

```
mha_fifo_t< mha_real_t> analysepath_t::wave_fifo [private]
```

4.41.3.6 ac_fifo

```
mha_fifo_t< MHA_AC::acspace2matrix_t> analysepath_t::ac_fifo [private]
```

4.41.3.7 inner_ac_copy

```
MHA_AC::acspace2matrix_t analysepath_t::inner_ac_copy [private]
```

4.41.3.8 outer_ac_copy

```
MHA_AC::acspace2matrix_t analysepath_t::outer_ac_copy [private]
```

4.41.3.9 outer_ac

```
algo_comm_t analysepath_t::outer_ac [private]
```

4.41.3.10 inner_out_domain

mha_domain_t analysepath_t::inner_out_domain [private]

4.41.3.11 inner_error

MHA_Error analysepath_t::inner_error [private]

4.41.3.12 has_inner_error

bool analysepath_t::has_inner_error [private]

4.41.3.13 flag_terminate_inner_thread

bool analysepath_t::flag_terminate_inner_thread [private]

4.41.3.14 input_to_process

int analysepath_t::input_to_process [private]

4.41.3.15 ProcessMutex

pthread_mutex_t analysepath_t::ProcessMutex [private]

4.41.3.16 attr

pthread_attr_t analysepath_t::attr [private]

4.41.3.17 priority

struct sched_param analysepath_t::priority [private]

4.41.3.18 scheduler

```
int analysepath_t::scheduler [private]
```

4.41.3.19 thread

```
pthread_t analysepath_t::thread [private]
```

4.41.3.20 cond_to_process

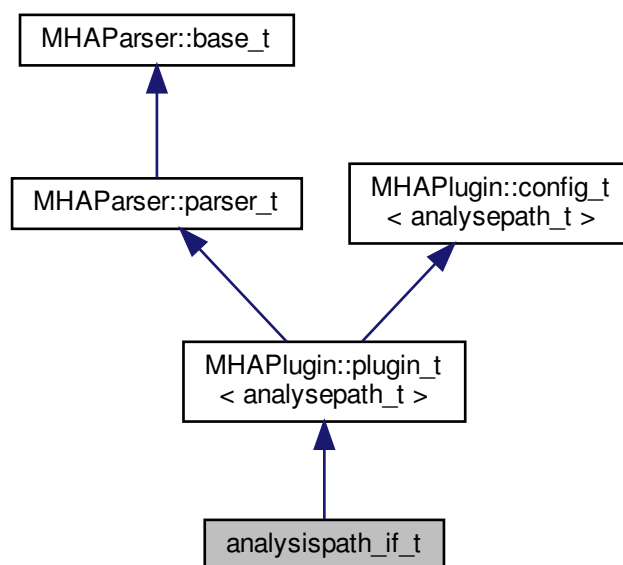
```
pthread_cond_t analysepath_t::cond_to_process [private]
```

The documentation for this class was generated from the following file:

- **analysispath.cpp**

4.42 analysispath_if_t Class Reference

Inheritance diagram for analysispath_if_t:



Public Member Functions

- **analysispath_if_t (algo_comm_t, std::string, std::string)**
- **mha_wave_t * process (mha_wave_t *)**
- **void prepare (mhaconfig_t &)**
- **void release ()**
- **~analysispath_if_t ()**

Private Member Functions

- **void loadlib ()**

Private Attributes

- **MHAEvents::patchbay_t< analysispath_if_t > patchbay**
- **MHAParser::string_t libname**
- **MHAParser::int_t fragsize**
- **MHAParser::int_t fifolen**
- **MHAParser::int_t priority**
- **MHAParser::vstring_t vars**
- **plug_t * plug**
- **std::string chain**
- **std::string algo**
- **MHA_AC::acspace2matrix_t * acspace_template**

Additional Inherited Members

4.42.1 Constructor & Destructor Documentation

4.42.1.1 analysispath_if_t()

```
analysispath_if_t::analysispath_if_t (
    algo_comm_t iac,
    std::string th,
    std::string al )
```

4.42.1.2 ~analysispath_if_t()

```
analysispath_if_t::~~analysispath_if_t ( )
```

4.42.2 Member Function Documentation

4.42.2.1 process()

```
mha_wave_t * analysispath_if_t::process (
    mha_wave_t * s )
```

4.42.2.2 prepare()

```
void analysispath_if_t::prepare (
    mhaconfig_t & conf ) [virtual]
```

Implements **MHAPlugin::plugin_t< analysepath_t >** (p. [1099](#)).

4.42.2.3 release()

```
void analysispath_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< analysepath_t >** (p. [1100](#)).

4.42.2.4 loadlib()

```
void analysispath_if_t::loadlib ( ) [private]
```

4.42.3 Member Data Documentation

4.42.3.1 patchbay

```
MHAEvents::patchbay_t< analysispath_if_t > analysispath_if_t::patchbay [private]
```

4.42.3.2 libname

MHAParser::string_t analysispath_if_t::libname [private]

4.42.3.3 fragsize

MHAParser::int_t analysispath_if_t::fragsize [private]

4.42.3.4 fifolen

MHAParser::int_t analysispath_if_t::fifolen [private]

4.42.3.5 priority

MHAParser::int_t analysispath_if_t::priority [private]

4.42.3.6 vars

MHAParser::vstring_t analysispath_if_t::vars [private]

4.42.3.7 plug

plug_t* analysispath_if_t::plug [private]

4.42.3.8 chain

std::string analysispath_if_t::chain [private]

4.42.3.9 algo

std::string analysispath_if_t::algo [private]

4.42.3.10 acspace_template

```
MHA_AC::acspace2matrix_t* analysispath_if_t::acspace_template [private]
```

The documentation for this class was generated from the following file:

- **analysispath.cpp**

4.43 AuditoryProfile::fmap_t Class Reference

A class to store frequency dependent data (e.g., HTL and UCL).

Inherits `map< mha_real_t, mha_real_t >`.

Public Member Functions

- `std::vector< mha_real_t > get_frequencies () const`
Return configured frequencies.
- `std::vector< mha_real_t > get_values () const`
Return stored values corresponding to the frequencies.
- `bool isempty () const`

4.43.1 Detailed Description

A class to store frequency dependent data (e.g., HTL and UCL).

4.43.2 Member Function Documentation

4.43.2.1 get_frequencies()

```
std::vector< mha_real_t > AuditoryProfile::fmap_t::get_frequencies ( ) const
```

Return configured frequencies.

4.43.2.2 get_values()

```
std::vector< mha_real_t > AuditoryProfile::fmap_t::get_values ( ) const
```

Return stored values corresponding to the frequencies.

4.43.2.3 isempty()

```
bool AuditoryProfile::fmap_t::isempty ( ) const [inline]
```

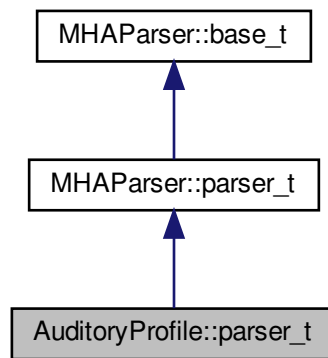
The documentation for this class was generated from the following files:

- **auditory_profile.h**
- **auditory_profile.cpp**

4.44 AuditoryProfile::parser_t Class Reference

Class to make the auditory profile accessible through the parser interface.

Inheritance diagram for AuditoryProfile::parser_t:



Classes

- class **ear_t**
- class **fmap_t**

Public Member Functions

- **parser_t ()**
- **AuditoryProfile::profile_t get_current_profile ()**

Private Attributes

- **AuditoryProfile::parser_t::ear_t L**
- **AuditoryProfile::parser_t::ear_t R**

Additional Inherited Members

4.44.1 Detailed Description

Class to make the auditory profile accessible through the parser interface.

4.44.2 Constructor & Destructor Documentation

4.44.2.1 parser_t()

```
AuditoryProfile::parser_t::parser_t ( )
```

4.44.3 Member Function Documentation

4.44.3.1 get_current_profile()

```
AuditoryProfile::profile_t AuditoryProfile::parser_t::get_current_profile ( )
```

4.44.4 Member Data Documentation

4.44.4.1 L

```
AuditoryProfile::parser_t::ear_t AuditoryProfile::parser_t::L [private]
```

4.44.4.2 R

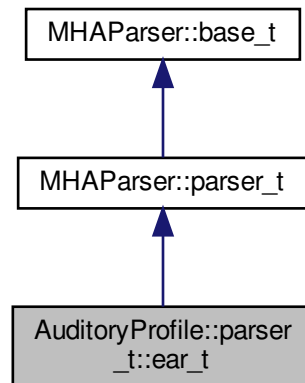
```
AuditoryProfile::parser_t::ear_t AuditoryProfile::parser_t::R [private]
```

The documentation for this class was generated from the following files:

- **auditory_profile.h**
- **auditory_profile.cpp**

4.45 AuditoryProfile::parser_t::ear_t Class Reference

Inheritance diagram for AuditoryProfile::parser_t::ear_t:



Public Member Functions

- **ear_t ()**
- **AuditoryProfile::profile_t::ear_t get_ear () const**

Private Attributes

- **AuditoryProfile::parser_t::fmap_t HTL**
- **AuditoryProfile::parser_t::fmap_t UCL**

Additional Inherited Members

4.45.1 Constructor & Destructor Documentation

4.45.1.1 ear_t()

`AuditoryProfile::parser_t::ear_t::ear_t ()`

4.45.2 Member Function Documentation

4.45.2.1 get_ear()

```
AuditoryProfile::profile_t::ear_t AuditoryProfile::parser_t::ear_t::get_ear ( )  
const
```

4.45.3 Member Data Documentation

4.45.3.1 HTL

```
AuditoryProfile::parser_t::fmap_t AuditoryProfile::parser_t::ear_t::HTL [private]
```

4.45.3.2 UCL

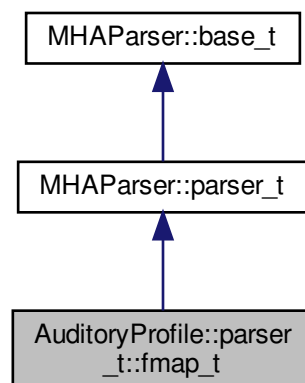
```
AuditoryProfile::parser_t::fmap_t AuditoryProfile::parser_t::ear_t::UCL [private]
```

The documentation for this class was generated from the following files:

- `auditory_profile.h`
- `auditory_profile.cpp`

4.46 AuditoryProfile::parser_t::fmap_t Class Reference

Inheritance diagram for AuditoryProfile::parser_t::fmap_t:



Public Member Functions

- **fmap_t** (const std::string &name, const std::string & **help**)
- **AuditoryProfile::fmap_t get_fmap** () const

Private Member Functions

- void **validate** ()

Private Attributes

- **MHAEvents::patchbay_t**< **AuditoryProfile::parser_t::fmap_t** > **patchbay**
- **MHAParser::vfloat_t** **f**
- **MHAParser::vfloat_t** **value**
- std::string **name_**

Additional Inherited Members

4.46.1 Constructor & Destructor Documentation

4.46.1.1 fmap_t()

```
AuditoryProfile::parser_t::fmap_t::fmap_t (
    const std::string & name,
    const std::string & help )
```

4.46.2 Member Function Documentation

4.46.2.1 get_fmap()

```
AuditoryProfile::fmap_t AuditoryProfile::parser_t::fmap_t::get_fmap ( ) const
```

4.46.2.2 validate()

```
void AuditoryProfile::parser_t::fmap_t::validate ( ) [private]
```

4.46.3 Member Data Documentation

4.46.3.1 patchbay

MHAEvents::patchbay_t < **AuditoryProfile::parser_t::fmap_t** > AuditoryProfile::parser↔
_t::fmap_t::patchbay [private]

4.46.3.2 f

MHAParser::vfloat_t AuditoryProfile::parser_t::fmap_t::f [private]

4.46.3.3 value

MHAParser::vfloat_t AuditoryProfile::parser_t::fmap_t::value [private]

4.46.3.4 name_

std::string AuditoryProfile::parser_t::fmap_t::name_ [private]

The documentation for this class was generated from the following files:

- **auditory_profile.h**
- **auditory_profile.cpp**

4.47 AuditoryProfile::profile_t Class Reference

The Auditory Profile class.

Classes

- class **ear_t**
Class for ear-dependent parameters, e.g., audiograms or unilateral loudness scaling.

Public Member Functions

- **AuditoryProfile::profile_t::ear_t get_ear** (unsigned int channel) const
Return ear information of channel number.

Public Attributes

- **AuditoryProfile::profile_t::ear_t L**
Left ear data.
- **AuditoryProfile::profile_t::ear_t R**
Right ear data.

4.47.1 Detailed Description

The Auditory Profile class.

See definition of auditory profile

Currently only the audiogram data is stored.

4.47.2 Member Function Documentation

4.47.2.1 get_ear()

```
AuditoryProfile::profile_t::ear_t AuditoryProfile::profile_t::get_ear (
    unsigned int channel ) const [inline]
```

Return ear information of channel number.

4.47.3 Member Data Documentation

4.47.3.1 L

```
AuditoryProfile::profile_t::ear_t AuditoryProfile::profile_t::L
```

Left ear data.

4.47.3.2 R

AuditoryProfile::profile_t::ear_t AuditoryProfile::profile_t::R

Right ear data.

The documentation for this class was generated from the following file:

- **auditory_profile.h**

4.48 AuditoryProfile::profile_t::ear_t Class Reference

Class for ear-dependent parameters, e.g., audiograms or unilateral loudness scaling.

Public Member Functions

- void **convert_empty2normal** ()

Public Attributes

- **AuditoryProfile::fmap_t** HTL
- **AuditoryProfile::fmap_t** UCL

4.48.1 Detailed Description

Class for ear-dependent parameters, e.g., audiograms or unilateral loudness scaling.

4.48.2 Member Function Documentation

4.48.2.1 convert_empty2normal()

```
void AuditoryProfile::profile_t::ear_t::convert_empty2normal ( )
```

4.48.3 Member Data Documentation

4.48.3.1 HTL

AuditoryProfile::fmap_t AuditoryProfile::profile_t::ear_t::HTL

4.48.3.2 UCL

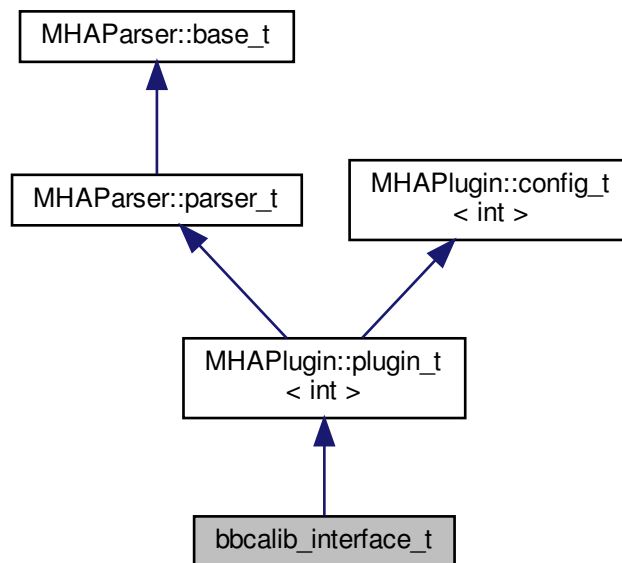
AuditoryProfile::fmap_t AuditoryProfile::profile_t::ear_t::UCL

The documentation for this class was generated from the following files:

- **auditory_profile.h**
- **auditory_profile.cpp**

4.49 bbcalib_interface_t Class Reference

Inheritance diagram for bbcalib_interface_t:



Public Member Functions

- **bbcalib_interface_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- **~bbcalib_interface_t** ()
- **mha_wave_t * process** (**mha_wave_t ***)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()

Private Attributes

- **calibrator_t** **calib_in**
- **calibrator_t** **calib_out**
- **MHAParser::mhappluginloader_t** **plugloader**

Additional Inherited Members

4.49.1 Constructor & Destructor Documentation

4.49.1.1 bbcalib_interface_t()

```
bbcalib_interface_t::bbcalib_interface_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.49.1.2 ~bbcalib_interface_t()

```
bbcalib_interface_t::~~bbcalib_interface_t ( )
```

4.49.2 Member Function Documentation

4.49.2.1 process()

```
mha_wave_t * bbcalib_interface_t::process (
    mha_wave_t * s )
```

4.49.2.2 prepare()

```
void bbcalib_interface_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPlugin::plugin_t**< **int** > (p. [1099](#)).

4.49.2.3 release()

```
void bbcalib_interface_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< int >** (p. 1100).

4.49.3 Member Data Documentation

4.49.3.1 calib_in

```
calibrator_t bbcalib_interface_t::calib_in [private]
```

4.49.3.2 calib_out

```
calibrator_t bbcalib_interface_t::calib_out [private]
```

4.49.3.3 plugloader

```
MHAParser::mhapluginloader_t bbcalib_interface_t::plugloader [private]
```

The documentation for this class was generated from the following file:

- **transducers.cpp**

4.50 calibrator_runtime_layer_t Class Reference

Public Member Functions

- **calibrator_runtime_layer_t** (bool is_input, const **mhaconfig_t** &tf, **calibrator_↔variables_t** &vars)
- **mha_real_t process** (**mha_wave_t** **)

Static Private Member Functions

- static unsigned int **firfirlen** (const std::vector< std::vector< float > > &)
- static unsigned int **firfir2fftlen** (unsigned int, const std::vector< std::vector< float > > &)

Private Attributes

- **MHAFilter::fftfirfilter_t** fir
- **MHASignal::quantizer_t** quant
- **MHASignal::waveform_t** gain
- **softclipper_t** softclip
- bool **b_is_input**
- bool **b_use_fir**
- bool **b_use_clipping**
- **MHASignal::loop_wavefragment_t** speechnoise
- **MHASignal::loop_wavefragment_t::playback_mode_t** pmode

4.50.1 Constructor & Destructor Documentation

4.50.1.1 calibrator_runtime_layer_t()

```
calibrator_runtime_layer_t::calibrator_runtime_layer_t (  
    bool is_input,  
    const mhaconfig_t & tf,  
    calibrator_variables_t & vars )
```

4.50.2 Member Function Documentation

4.50.2.1 process()

```
mha_real_t calibrator_runtime_layer_t::process (  
    mha_wave_t ** s )
```

4.50.2.2 firfirlen()

```
unsigned int calibrator_runtime_layer_t::firfirlen (  
    const std::vector< std::vector< float > > & fir ) [static], [private]
```

4.50.2.3 firfir2fftlent()

```
unsigned int calibrator_runtime_layer_t::firfir2fftlent (  
    unsigned int fragsize,  
    const std::vector< std::vector< float > > & fir ) [static], [private]
```

4.50.3 Member Data Documentation

4.50.3.1 fir

MHAFilter::fftfilter_t calibrator_runtime_layer_t::fir [private]

4.50.3.2 quant

MHASignal::quantizer_t calibrator_runtime_layer_t::quant [private]

4.50.3.3 gain

MHASignal::waveform_t calibrator_runtime_layer_t::gain [private]

4.50.3.4 softclip

softclipper_t calibrator_runtime_layer_t::softclip [private]

4.50.3.5 b_is_input

bool calibrator_runtime_layer_t::b_is_input [private]

4.50.3.6 b_use_fir

bool calibrator_runtime_layer_t::b_use_fir [private]

4.50.3.7 b_use_clipping

bool calibrator_runtime_layer_t::b_use_clipping [private]

4.50.3.8 speechnoise

```
MHASignal::loop_wavefragment_t calibrator_runtime_layer_t::speechnoise [private]
```

4.50.3.9 pmode

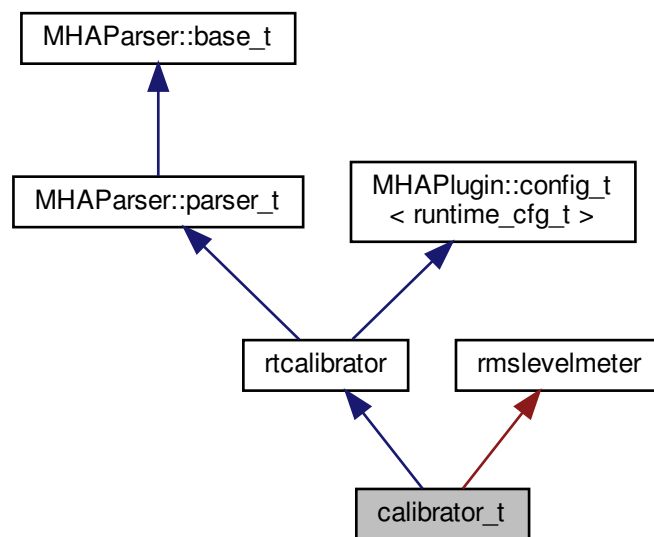
```
MHASignal::loop_wavefragment_t::playback_mode_t calibrator_runtime_layer_t::pmode  
[private]
```

The documentation for this class was generated from the following file:

- **transducers.cpp**

4.51 calibrator_t Class Reference

Inheritance diagram for calibrator_t:



Public Member Functions

- **calibrator_t** (**algo_comm_t**, bool is_input)
- void **prepare** (**mhaconfig_t** &tf)
- void **release** ()
- **mha_wave_t** * **process** (**mha_wave_t** *s)

Private Member Functions

- void **update** ()
- void **update_tau_level** ()
- void **read_levels** ()

Private Attributes

- bool **b_is_input**
- **MHAEvents::patchbay_t**< **calibrator_t** > **patchbay**
- **calibrator_variables_t** **vars**
- bool **prepared**

Additional Inherited Members

4.51.1 Constructor & Destructor Documentation

4.51.1.1 **calibrator_t**()

```
calibrator_t::calibrator_t (
    algo_comm_t iac,
    bool is_input )
```

4.51.2 Member Function Documentation

4.51.2.1 **prepare**()

```
void calibrator_t::prepare (
    mhaconfig_t & tf ) [inline], [virtual]
```

Implements **MHAPugin::plugin_t**< **runtime_cfg_t** > (p. [1099](#)).

4.51.2.2 **release**()

```
void calibrator_t::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPugin::plugin_t**< **runtime_cfg_t** > (p. [1100](#)).

4.51.2.3 process()

```
mha_wave_t * calibrator_t::process (
    mha_wave_t * s )
```

4.51.2.4 update()

```
void calibrator_t::update ( ) [private]
```

4.51.2.5 update_tau_level()

```
void calibrator_t::update_tau_level ( ) [private]
```

4.51.2.6 read_levels()

```
void calibrator_t::read_levels ( ) [private]
```

4.51.3 Member Data Documentation

4.51.3.1 b_is_input

```
bool calibrator_t::b_is_input [private]
```

4.51.3.2 patchbay

```
MHAEvents::patchbay_t< calibrator_t> calibrator_t::patchbay [private]
```

4.51.3.3 vars

```
calibrator_variables_t calibrator_t::vars [private]
```

4.51.3.4 prepared

```
bool calibrator_t::prepared [private]
```

The documentation for this class was generated from the following file:

- **transducers.cpp**

4.52 calibrator_variables_t Class Reference

Public Member Functions

- **calibrator_variables_t** (bool is_input, **MHAParser::parser_t** &parent)

Public Attributes

- **MHAParser::vfloat_t** peaklevel
- **MHAParser::mfloat_t** fir
- **MHAParser::int_t** nbits
- **MHAParser::float_t** tau_level
- **MHAParser::kw_t** spnoise_mode
- **MHAParser::vint_t** spnoise_channels
- **MHAParser::float_t** spnoise_level
- **MHAParser::vfloat_mon_t** rmslevel
- **MHAParser::parser_t** spnoise_parser
- **MHAParser::float_mon_t** srate
- **MHAParser::int_mon_t** fragsize
- **MHAParser::int_mon_t** num_channels
- **MHAParser::parser_t** config_parser
- **softclipper_variables_t** softclip
- **MHAParser::bool_t** do_clipping

4.52.1 Constructor & Destructor Documentation

4.52.1.1 calibrator_variables_t()

```
calibrator_variables_t::calibrator_variables_t (
    bool is_input,
    MHAParser::parser_t & parent )
```

4.52.2 Member Data Documentation

4.52.2.1 peaklevel

MHAParser::vfloat_t calibrator_variables_t::peaklevel

4.52.2.2 fir

MHAParser::mfloat_t calibrator_variables_t::fir

4.52.2.3 nbits

MHAParser::int_t calibrator_variables_t::nbits

4.52.2.4 tau_level

MHAParser::float_t calibrator_variables_t::tau_level

4.52.2.5 spnoise_mode

MHAParser::kw_t calibrator_variables_t::spnoise_mode

4.52.2.6 spnoise_channels

MHAParser::vint_t calibrator_variables_t::spnoise_channels

4.52.2.7 spnoise_level

MHAParser::float_t calibrator_variables_t::spnoise_level

4.52.2.8 rmslevel

MHAParser::vfloat_mon_t calibrator_variables_t::rmslevel

4.52.2.9 spnoise_parser

MHAParser::parser_t calibrator_variables_t::spnoise_parser

4.52.2.10 srate

MHAParser::float_mon_t calibrator_variables_t::srate

4.52.2.11 fragsize

MHAParser::int_mon_t calibrator_variables_t::fragsize

4.52.2.12 num_channels

MHAParser::int_mon_t calibrator_variables_t::num_channels

4.52.2.13 config_parser

MHAParser::parser_t calibrator_variables_t::config_parser

4.52.2.14 softclip

softclipper_variables_t calibrator_variables_t::softclip

4.52.2.15 do_clipping

MHAParser::bool_t calibrator_variables_t::do_clipping

The documentation for this class was generated from the following file:

- **transducers.cpp**

4.53 `cfg_t` Class Reference

Public Member Functions

- `cfg_t` (unsigned int, unsigned int)
- `cfg_t` (`mhaconfig_t` chcfg, `mha_real_t` newlev, bool replace, `mha_real_t` len, int seed)
- void `process` (`mha_wave_t` *)
- void `process` (`mha_spec_t` *)
- `cfg_t` (`mha_real_t` tau_attack, `mha_real_t` tau_decay, unsigned int nch, `mha_real_t` start_limit, `mha_real_t` slope_db, `mha_real_t` fs)

Public Attributes

- unsigned int `channel`
- `mha_real_t` `start_lin`
- `mha_real_t` `alpha`
- `MHAFilter::o1flt_lowpass_t` `attack`
- `MHAFilter::o1flt_maxtrack_t` `decay`

Private Attributes

- `mha_real_t` `gain_wave_`
- `mha_real_t` `gain_spec_`
- bool `replace_`
- bool `use_frozen_`
- `MHASignal::waveform_t` `frozen_noise_`
- unsigned int `pos`
- `std::default_random_engine` `rng`
- `std::uniform_real_distribution< mha_real_t >` `rand_dist`

4.53.1 Constructor & Destructor Documentation

4.53.1.1 `cfg_t()` [1/3]

```

cfg_t::cfg_t (
    unsigned int ichannel,
    unsigned int numchannels )

```

4.53.1.2 `cfg_t()` [2/3]

```
cfg_t::cfg_t (
    mhaconfig_t chcfg,
    mha_real_t newlev,
    bool replace,
    mha_real_t len,
    int seed )
```

4.53.1.3 `cfg_t()` [3/3]

```
cfg_t::cfg_t (
    mha_real_t tau_attack,
    mha_real_t tau_decay,
    unsigned int nch,
    mha_real_t start_limit,
    mha_real_t slope_db,
    mha_real_t fs )
```

4.53.2 Member Function Documentation

4.53.2.1 `process()` [1/2]

```
void cfg_t::process (
    mha_wave_t * s ) [inline]
```

4.53.2.2 `process()` [2/2]

```
void cfg_t::process (
    mha_spec_t * s ) [inline]
```

4.53.3 Member Data Documentation

4.53.3.1 `channel`

```
unsigned int cfg_t::channel
```

4.53.3.2 `gain_wave_`

```
mha_real_t cfg_t::gain_wave_ [private]
```

4.53.3.3 `gain_spec_`

```
mha_real_t cfg_t::gain_spec_ [private]
```

4.53.3.4 `replace_`

```
bool cfg_t::replace_ [private]
```

4.53.3.5 `use_frozen_`

```
bool cfg_t::use_frozen_ [private]
```

4.53.3.6 `frozen_noise_`

```
MHASignal::waveform_t cfg_t::frozen_noise_ [private]
```

4.53.3.7 `pos`

```
unsigned int cfg_t::pos [private]
```

4.53.3.8 `rng`

```
std::default_random_engine cfg_t::rng [private]
```

4.53.3.9 `rand_dist`

```
std::uniform_real_distribution< mha_real_t> cfg_t::rand_dist [private]
```

4.53.3.10 start_lin

```
mha_real_t cfg_t::start_lin
```

4.53.3.11 alpha

```
mha_real_t cfg_t::alpha
```

4.53.3.12 attack

```
MHAFilter::olflt_lowpass_t cfg_t::attack
```

4.53.3.13 decay

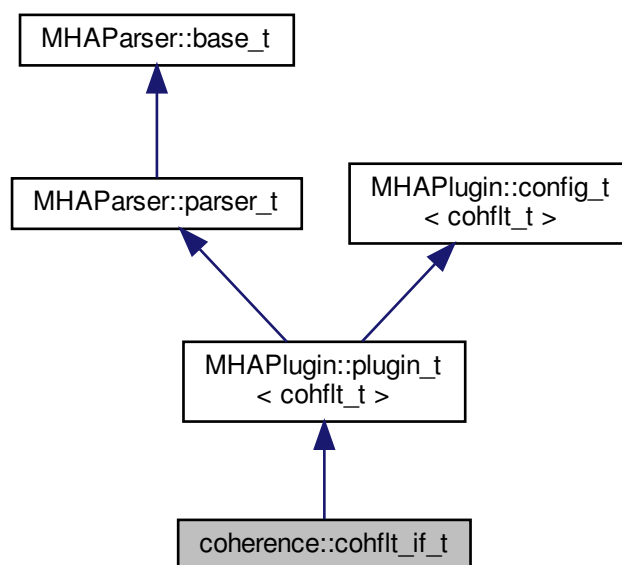
```
MHAFilter::olflt_maxtrack_t cfg_t::decay
```

The documentation for this class was generated from the following files:

- **example6.cpp**
- **noise.cpp**
- **softclip.cpp**

4.54 coherence::cohflt_if_t Class Reference

Inheritance diagram for coherence::cohflt_if_t:



Public Member Functions

- **cohflt_if_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()
- **mha_spec_t** * **process** (**mha_spec_t** *)

Private Member Functions

- void **update** ()

Private Attributes

- **MHAEvents::patchbay_t**< **cohflt_if_t** > **patchbay**
- **vars_t** **vars**
- const std::string **algo**

Additional Inherited Members

4.54.1 Constructor & Destructor Documentation

4.54.1.1 cohflt_if_t()

```
coherence::cohflt_if_t::cohflt_if_t (
    const algo_comm_t & ac,
    const std::string & th,
    const std::string & al )
```

4.54.2 Member Function Documentation

4.54.2.1 prepare()

```
void coherence::cohflt_if_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPlugin::plugin_t**< **cohflt_t** > (p. [1099](#)).

4.54.2.2 release()

```
void coherence::cohflt_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< cohflt_t >** (p. 1100).

4.54.2.3 process()

```
mha_spec_t * coherence::cohflt_if_t::process (
    mha_spec_t * s )
```

4.54.2.4 update()

```
void coherence::cohflt_if_t::update ( ) [private]
```

4.54.3 Member Data Documentation

4.54.3.1 patchbay

```
MHAEvents::patchbay_t< cohflt_if_t> coherence::cohflt_if_t::patchbay [private]
```

4.54.3.2 vars

```
vars_t coherence::cohflt_if_t::vars [private]
```

4.54.3.3 algo

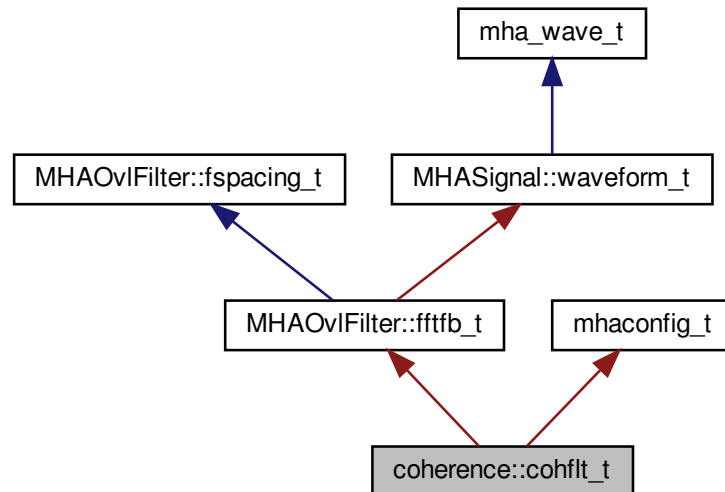
```
const std::string coherence::cohflt_if_t::algo [private]
```

The documentation for this class was generated from the following file:

- **coherence.cpp**

4.55 coherence::cohflt_t Class Reference

Inheritance diagram for coherence::cohflt_t:



Public Member Functions

- **cohflt_t** (**vars_t** &v, const **mhaconfig_t** &icf, **algo_comm_t** iac, const std::string &name)
- **mha_spec_t** * **process** (**mha_spec_t** *)
- void **insert** ()

Private Attributes

- unsigned int **nbands**
- bool **avg_ipd**
- **mha_complex_t** **cg**
- float **g**
- float **c_scale**
- float **c_min**
- **MHASignal::waveform_t** **alpha**
- float **limit**
- **MHAFilter::o1flt_lowpass_t** **lp1r**
- **MHAFilter::o1flt_lowpass_t** **lp1i**
- **MHA_AC::spectrum_t** **coh_c**
- **MHA_AC::waveform_t** **coh_rlp**
- **MHASignal::waveform_t** **gain**

- **MHASignal::delay_wave_t gain_delay**
- **MHASignal::spectrum_t s_out**
- **bool blInvert**
- **MHAFilter::o1flt_lowpass_t lp1ltg**
- **bool b_ltg**
- **std::vector< float > staticgain**

Additional Inherited Members

4.55.1 Constructor & Destructor Documentation

4.55.1.1 cohflt_t()

```
coherence::cohflt_t::cohflt_t (
    vars_t & v,
    const mhaconfig_t & icf,
    algo_comm_t iac,
    const std::string & name )
```

4.55.2 Member Function Documentation

4.55.2.1 process()

```
mha_spec_t * coherence::cohflt_t::process (
    mha_spec_t * s )
```

4.55.2.2 insert()

```
void coherence::cohflt_t::insert ( )
```

4.55.3 Member Data Documentation

4.55.3.1 nbands

unsigned int coherence::cohflt_t::nbands [private]

4.55.3.2 avg_ipd

bool coherence::cohflt_t::avg_ipd [private]

4.55.3.3 cg

mha_complex_t coherence::cohflt_t::cg [private]

4.55.3.4 g

float coherence::cohflt_t::g [private]

4.55.3.5 c_scale

float coherence::cohflt_t::c_scale [private]

4.55.3.6 c_min

float coherence::cohflt_t::c_min [private]

4.55.3.7 alpha

MHASignal::waveform_t coherence::cohflt_t::alpha [private]

4.55.3.8 limit

float coherence::cohflt_t::limit [private]

4.55.3.9 lp1r

MHAFilter::olflt_lowpass_t coherence::cohflt_t::lp1r [private]

4.55.3.10 lp1i

MHAFilter::olflt_lowpass_t coherence::cohflt_t::lp1i [private]

4.55.3.11 coh_c

MHA_AC::spectrum_t coherence::cohflt_t::coh_c [private]

4.55.3.12 coh_rlp

MHA_AC::waveform_t coherence::cohflt_t::coh_rlp [private]

4.55.3.13 gain

MHASignal::waveform_t coherence::cohflt_t::gain [private]

4.55.3.14 gain_delay

MHASignal::delay_wave_t coherence::cohflt_t::gain_delay [private]

4.55.3.15 s_out

MHASignal::spectrum_t coherence::cohflt_t::s_out [private]

4.55.3.16 blnvert

bool coherence::cohflt_t::bInvert [private]

4.55.3.17 lp1ltg

```
MHAFilter::olflt_lowpass_t coherence::cohflt_t::lp1ltg [private]
```

4.55.3.18 b_ltg

```
bool coherence::cohflt_t::b_ltg [private]
```

4.55.3.19 staticgain

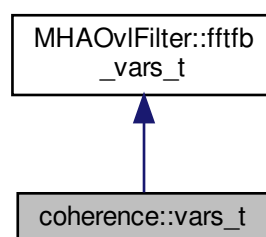
```
std::vector<float> coherence::cohflt_t::staticgain [private]
```

The documentation for this class was generated from the following file:

- **coherence.cpp**

4.56 coherence::vars_t Class Reference

Inheritance diagram for coherence::vars_t:



Public Member Functions

- **vars_t (MHAParser::parser_t *)**

Public Attributes

- **MHAParser::kw_t tau_unit**
- **MHAParser::vfloat_t tau**
- **MHAParser::vfloat_t alpha**
- **MHAParser::float_t limit**
- **MHAParser::vfloat_t mapping**
- **MHAParser::kw_t average**
- **MHAParser::bool_t invert**
- **MHAParser::bool_t ltgcomp**
- **MHAParser::vfloat_t ltgtau**
- **MHAParser::vfloat_t staticgain**
- **MHAParser::int_t delay**

4.56.1 Constructor & Destructor Documentation

4.56.1.1 vars_t()

```
coherence::vars_t::vars_t (
    MHAParser::parser_t * p )
```

4.56.2 Member Data Documentation

4.56.2.1 tau_unit

```
MHAParser::kw_t coherence::vars_t::tau_unit
```

4.56.2.2 tau

```
MHAParser::vfloat_t coherence::vars_t::tau
```

4.56.2.3 alpha

```
MHAParser::vfloat_t coherence::vars_t::alpha
```

4.56.2.4 limit

MHAParser::float_t coherence::vars_t::limit

4.56.2.5 mapping

MHAParser::vfloat_t coherence::vars_t::mapping

4.56.2.6 average

MHAParser::kw_t coherence::vars_t::average

4.56.2.7 invert

MHAParser::bool_t coherence::vars_t::invert

4.56.2.8 ltgcomp

MHAParser::bool_t coherence::vars_t::ltgcomp

4.56.2.9 ltgtau

MHAParser::vfloat_t coherence::vars_t::ltgtau

4.56.2.10 staticgain

MHAParser::vfloat_t coherence::vars_t::staticgain

4.56.2.11 delay

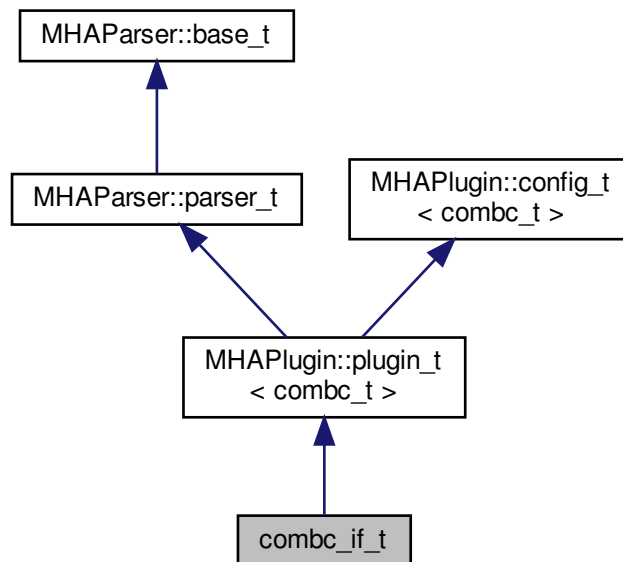
MHAParser::int_t coherence::vars_t::delay

The documentation for this class was generated from the following file:

- **coherence.cpp**

4.57 combc_if_t Class Reference

Inheritance diagram for combc_if_t:



Public Member Functions

- **combc_if_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- void **prepare** (**mhaconfig_t** &)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- **mha_spec_t** * **process** (**mha_spec_t** *)

Private Attributes

- **MHAParser::int_t** outchannels
- **MHAParser::bool_t** interleaved
- **MHAParser::string_t** channel_gain_name
- **MHAParser::string_t** element_gain_name

Additional Inherited Members

4.57.1 Constructor & Destructor Documentation

4.57.1.1 **combc_if_t()**

```
combc_if_t::combc_if_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.57.2 Member Function Documentation

4.57.2.1 **prepare()**

```
void combc_if_t::prepare (
    mhaconfig_t & chcfg ) [virtual]
```

Implements **MHAParser::plugin_t**< **combc_t** > (p. [1099](#)).

4.57.2.2 **process()** [1/2]

```
mha_wave_t * combc_if_t::process (
    mha_wave_t * s )
```

4.57.2.3 **process()** [2/2]

```
mha_spec_t * combc_if_t::process (
    mha_spec_t * s )
```

4.57.3 Member Data Documentation

4.57.3.1 **outchannels**

```
MHAParser::int_t combc_if_t::outchannels [private]
```

4.57.3.2 interleaved

```
MHAParser::bool_t combc_if_t::interleaved [private]
```

4.57.3.3 channel_gain_name

```
MHAParser::string_t combc_if_t::channel_gain_name [private]
```

4.57.3.4 element_gain_name

```
MHAParser::string_t combc_if_t::element_gain_name [private]
```

The documentation for this class was generated from the following file:

- **combinechannels.cpp**

4.58 combc_t Class Reference

Public Member Functions

- **combc_t** (**algo_comm_t** ac, **mhaconfig_t** cfg_input, **mhaconfig_t** cfg_output, std::vector< float > channel_gains, const std::string &element_gain_name, bool interleaved)
- **mha_wave_t * process** (**mha_wave_t** *s)
- **mha_spec_t * process** (**mha_spec_t** *s)

Private Attributes

- **algo_comm_t** ac_
- bool interleaved_
- unsigned int nbands
- **MHASignal::waveform_t** w_out
- **MHASignal::spectrum_t** s_out
- std::vector< **mha_real_t** > channel_gains_
- std::string element_gain_name_

4.58.1 Constructor & Destructor Documentation

4.58.1.1 **combc_t()**

```
combc_t::combc_t (
    algo_comm_t ac,
    mhaconfig_t cfg_input,
    mhaconfig_t cfg_output,
    std::vector< float > channel_gains,
    const std::string & element_gain_name,
    bool interleaved )
```

4.58.2 Member Function Documentation

4.58.2.1 **process()** [1/2]

```
mha_wave_t * combc_t::process (
    mha_wave_t * s )
```

4.58.2.2 **process()** [2/2]

```
mha_spec_t * combc_t::process (
    mha_spec_t * s )
```

4.58.3 Member Data Documentation

4.58.3.1 **ac_**

```
algo_comm_t combc_t::ac_ [private]
```

4.58.3.2 **interleaved_**

```
bool combc_t::interleaved_ [private]
```

4.58.3.3 nbands

```
unsigned int combc_t::nbands [private]
```

4.58.3.4 w_out

```
MHASignal::waveform_t combc_t::w_out [private]
```

4.58.3.5 s_out

```
MHASignal::spectrum_t combc_t::s_out [private]
```

4.58.3.6 channel_gains_

```
std::vector< mha_real_t> combc_t::channel_gains_ [private]
```

4.58.3.7 element_gain_name_

```
std::string combc_t::element_gain_name_ [private]
```

The documentation for this class was generated from the following file:

- **combinechannels.cpp**

4.59 comm_var_t Struct Reference

Algorithm communication variable structure.

Public Attributes

- unsigned int **data_type**
Type of data.
- unsigned int **num_entries**
Number of entries.
- unsigned int **stride**
length of one row (C interpretation) or of one column (Fortran interpretation)
- void * **data**
Pointer to variable data.

4.59.1 Detailed Description

Algorithm communication variable structure.

Algorithm communication variables (AC variables) are objects of this type. The member data is a pointer to the variable 'data'. This pointer has to be valid for the lifetime of this AC variable. The member 'data_type' can be one of the predefined types or any user defined type. The member 'num_entries' describes the number of elements of this base type stored at the pointer address.

An AC variable can be registered with the `\ref algo_comm_t::insert_var "insert_var"` function.

4.59.2 Member Data Documentation

4.59.2.1 data_type

`comm_var_t::data_type`

Type of data.

This can be one of the predefined types

- MHA_AC_CHAR
- MHA_AC_INT
- MHA_AC_MHAREAL
- MHA_AC_FLOAT
- MHA_AC_DOUBLE
- MHA_AC_MHACOMPLEX
- MHA_AC_VEC_FLOAT or any user defined type with a value greater than
- MHA_AC_USER

4.59.2.2 num_entries

`comm_var_t::num_entries`

Number of entries.

4.59.2.3 stride

`comm_var_t::stride`

length of one row (C interpretation) or of one column (Fortran interpretation)

4.59.2.4 data

`comm_var_t::data`

Pointer to variable data.

The documentation for this struct was generated from the following files:

- **mha.hh**
- **mha_algo_comm.cpp**

4.60 cpuload::cpuload_cfg_t Class Reference

Public Member Functions

- **cpuload_cfg_t** (**mha_real_t** factor_, **size_t** table_size_, **bool** use_sine_)
Ctor of the runtime configuration class.
- void **process** (unsigned fac_)
Process callback. Does not actually change signal.

Private Member Functions

- void **calc_sine** ()
- void **write_to_table** ()

Private Attributes

- float **phase** =0
Phase of the sine.
- volatile float **result** =0
Result of sin(phase). Volatile to prevent compiler from optimizing away the calculation.
- bool **use_sine** =false
Use sine or do table operation.
- float **factor** =0
cpu load factor. Values > 1 increase cpu load, values < 1 decrease it
- **std::vector< float >** **table**
Table with arbitrary values to operate on. Unused if use_sine=true.

4.60.1 Constructor & Destructor Documentation

4.60.1.1 cpuload_cfg_t()

```
cpuload::cpuload_cfg_t::cpuload_cfg_t (
    mha_real_t factor_,
    size_t table_size_,
    bool use_sine_ )
```

Ctor of the runtime configuration class.

Parameters

<i>factor_</i>	cpu load factor. Values > 1 increase cpu load, values < 1 decrease it
<i>table_↔ size_</i>	
<i>use_sine_↔ _</i>	

4.60.2 Member Function Documentation

4.60.2.1 process()

```
void cpuload::cpuload_cfg_t::process (
    unsigned fac_ )
```

Process callback. Does not actually change signal.

4.60.2.2 calc_sine()

```
void cpuload::cpuload_cfg_t::calc_sine ( ) [private]
```

4.60.2.3 write_to_table()

```
void cpuload::cpuload_cfg_t::write_to_table ( ) [private]
```

4.60.3 Member Data Documentation

4.60.3.1 phase

```
float cpuload::cpuload_cfg_t::phase =0 [private]
```

Phase of the sine.

4.60.3.2 result

```
volatile float cpuload::cpuload_cfg_t::result =0 [private]
```

Result of sin(phase). Volatile to prevent compiler from optimizing away the calculation.

4.60.3.3 use_sine

```
bool cpuload::cpuload_cfg_t::use_sine =false [private]
```

Use sine or do table operation.

4.60.3.4 factor

```
float cpuload::cpuload_cfg_t::factor =0 [private]
```

cpu load factor. Values > 1 increase cpu load, values < 1 decrease it

4.60.3.5 table

```
std::vector<float> cpuload::cpuload_cfg_t::table [private]
```

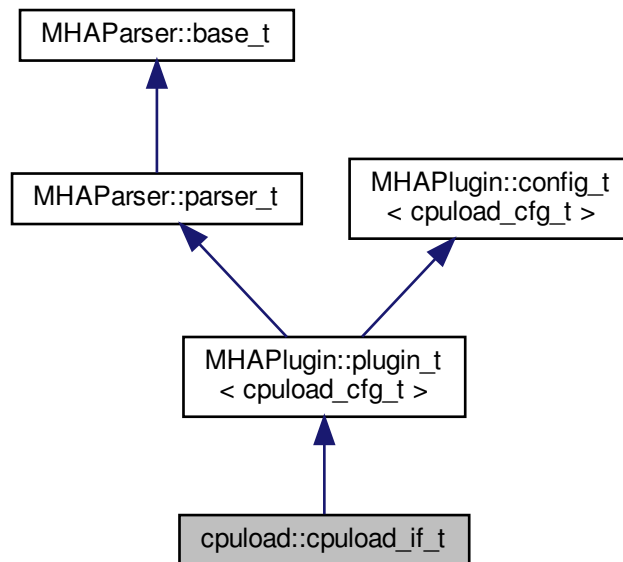
Table with arbitrary values to operate on. Unused if use_sine=true.

The documentation for this class was generated from the following file:

- **cpuload.cpp**

4.61 cpuload::cpuload_if_t Class Reference

Inheritance diagram for cpuload::cpuload_if_t:



Public Member Functions

- **cpuload_if_t** (**algo_comm_t**, const char *, const char *)
- **mha_spec_t** * **process** (**mha_spec_t** *)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)

Private Member Functions

- void **update** ()

Private Attributes

- **MHAParser::float_t** **factor**
- **MHAParser::int_t** **table_size**
- **MHAParser::bool_t** **use_sine**
- **MHAEvents::patchbay_t** < **cpuload_if_t** > **patchbay**

Additional Inherited Members

4.61.1 Constructor & Destructor Documentation

4.61.1.1 cpuload_if_t()

```
cpuload::cpuload_if_t::cpuload_if_t (
    algo_comm_t iac,
    const char * ,
    const char * )
```

4.61.2 Member Function Documentation

4.61.2.1 process() [1/2]

```
mha_spec_t * cpuload::cpuload_if_t::process (
    mha_spec_t * s )
```

4.61.2.2 process() [2/2]

```
mha_wave_t * cpuload::cpuload_if_t::process (
    mha_wave_t * s )
```

4.61.2.3 prepare()

```
void cpuload::cpuload_if_t::prepare (
    mhaconfig_t & cf ) [virtual]
```

Implements **MHAPlugin::plugin_t< cpuload_cfg_t >** (p. [1099](#)).

4.61.2.4 update()

```
void cpuload::cpuload_if_t::update ( ) [private]
```


4.61.3 Member Data Documentation

4.61.3.1 factor

MHAParser::float_t cpuload::cpuload_if_t::factor [private]

4.61.3.2 table_size

MHAParser::int_t cpuload::cpuload_if_t::table_size [private]

4.61.3.3 use_sine

MHAParser::bool_t cpuload::cpuload_if_t::use_sine [private]

4.61.3.4 patchbay

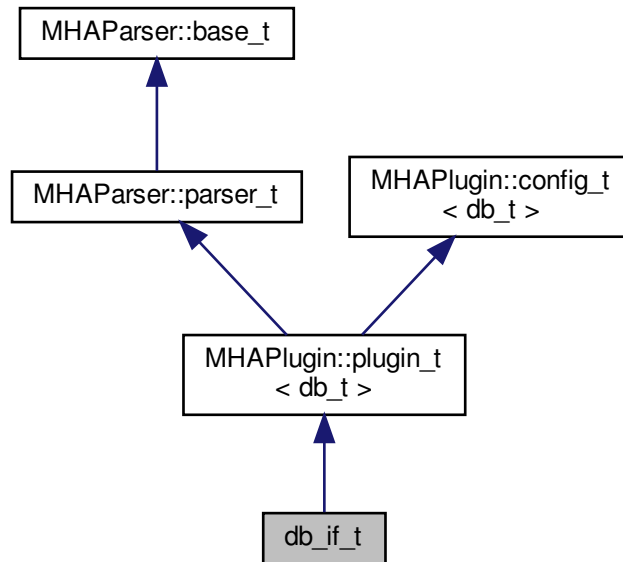
MHAEvents::patchbay_t< **cpuload_if_t**> cpuload::cpuload_if_t::patchbay [private]

The documentation for this class was generated from the following file:

- **cpuload.cpp**

4.62 db_if_t Class Reference

Inheritance diagram for db_if_t:



Public Member Functions

- **db_if_t** (**algo_comm_t**, std::string, std::string)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()
- ~**db_if_t** ()

Private Attributes

- **MHAEvents::patchbay_t** < **db_if_t** > **patchbay**
- **MHAParser::int_t** **fragsize**
- **MHAParser::mhapluginloader_t** **plugloader**
- std::string **chain**
- std::string **algo**
- bool **bypass**

Additional Inherited Members

4.62.1 Constructor & Destructor Documentation

4.62.1.1 db_if_t()

```
db_if_t::db_if_t (
    algo_comm_t iac,
    std::string th,
    std::string al )
```

4.62.1.2 ~db_if_t()

```
db_if_t::~~db_if_t ( )
```

4.62.2 Member Function Documentation

4.62.2.1 process()

```
mha_wave_t * db_if_t::process (
    mha_wave_t * s )
```

4.62.2.2 prepare()

```
void db_if_t::prepare (
    mhaconfig_t & conf ) [virtual]
```

Implements **MHAPLugin::plugin_t< db_t >** (p. [1099](#)).

4.62.2.3 release()

```
void db_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< db_t >** (p. [1100](#)).

4.62.3 Member Data Documentation

4.62.3.1 patchbay

```
MHAEvents::patchbay_t < db_if_t > db_if_t::patchbay [private]
```

4.62.3.2 fragsize

```
MHAParser::int_t db_if_t::fragsize [private]
```

4.62.3.3 plugloader

```
MHAParser::mhapluginloader_t db_if_t::plugloader [private]
```

4.62.3.4 chain

```
std::string db_if_t::chain [private]
```

4.62.3.5 algo

```
std::string db_if_t::algo [private]
```

4.62.3.6 bypass

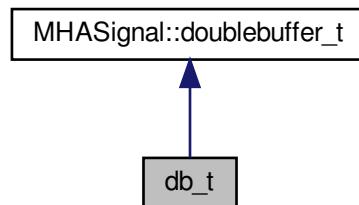
```
bool db_if_t::bypass [private]
```

The documentation for this class was generated from the following file:

- **db.cpp**

4.63 db_t Class Reference

Inheritance diagram for db_t:



Public Member Functions

- **db_t** (unsigned int *outer_fragsize*, unsigned int *inner_fragsize*, unsigned int *nch_in*, unsigned int *nch_out*, **MHAParser::mhapluginloader_t** &plug)
- **mha_wave_t** * **inner_process** (**mha_wave_t** *)

Private Attributes

- **MHAParser::mhapluginloader_t** & **plugloader**

Additional Inherited Members

4.63.1 Constructor & Destructor Documentation

4.63.1.1 db_t()

```
db_t::db_t (
    unsigned int outer_fragsize,
    unsigned int inner_fragsize,
    unsigned int nch_in,
    unsigned int nch_out,
    MHAParser::mhapluginloader_t & plug )
```

4.63.2 Member Function Documentation

4.63.2.1 inner_process()

```
mha_wave_t * db_t::inner_process (
    mha_wave_t * s ) [virtual]
```

Implements **MHASignal::doublebuffer_t** (p. 1157).

4.63.3 Member Data Documentation

4.63.3.1 plugloader

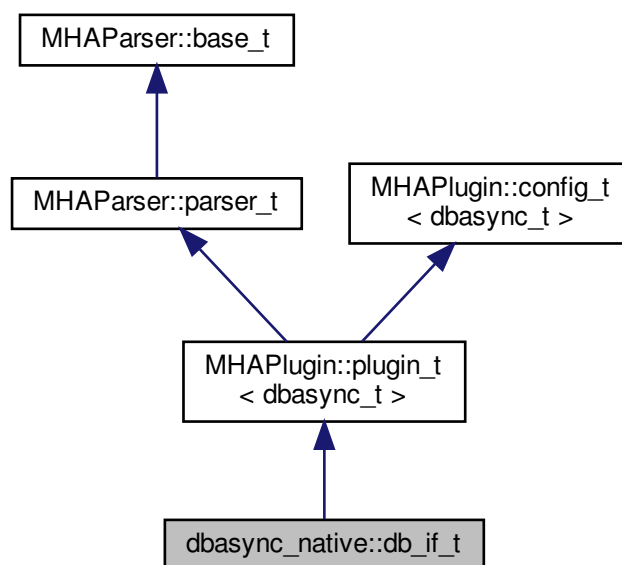
```
MHAParser::mhapluginloader_t& db_t::plugloader [private]
```

The documentation for this class was generated from the following file:

- **db.cpp**

4.64 dbasync_native::db_if_t Class Reference

Inheritance diagram for dbasync_native::db_if_t:



Public Member Functions

- **db_if_t** (**algo_comm_t**, const std::string &, const std::string &)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()
- ~**db_if_t** ()=default

Private Attributes

- **MHAKernel::algo_comm_class_t** **sub_ac**
- **MHAParser::mhapluginloader_t** **plugloader**
- **MHAParser::int_t** **fragsize**
- **MHAParser::int_t** **delay**
- **MHAParser::kw_t** **worker_thread_scheduler**
Scheduler used for worker thread.
- **MHAParser::int_t** **worker_thread_priority**
Priority of worker thread.
- **MHAParser::string_mon_t** **framework_thread_scheduler**
Scheduler of the signal processing thread.
- **MHAParser::int_mon_t** **framework_thread_priority**
Priority of signal processing thread.
- std::string **chain**
- std::string **algo**

Additional Inherited Members

4.64.1 Constructor & Destructor Documentation

4.64.1.1 db_if_t()

```
db_if_t::db_if_t (
    algo_comm_t iac,
    const std::string & th,
    const std::string & al )
```

4.64.1.2 ~db_if_t()

```
dbasync_native::db_if_t::~~db_if_t ( ) [default]
```

4.64.2 Member Function Documentation

4.64.2.1 process()

```
mha_wave_t * db_if_t::process (  
    mha_wave_t * s )
```

4.64.2.2 prepare()

```
void db_if_t::prepare (  
    mhaconfig_t & conf ) [virtual]
```

Implements **MHAPLugin::plugin_t< dbasync_t >** (p. [1099](#)).

4.64.2.3 release()

```
void db_if_t::release (  
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< dbasync_t >** (p. [1100](#)).

4.64.3 Member Data Documentation

4.64.3.1 sub_ac

```
MHAKernel::algo_comm_class_t dbasync_native::db_if_t::sub_ac [private]
```

4.64.3.2 plugloader

```
MHAParser::mhapluginloader_t dbasync_native::db_if_t::plugloader [private]
```


4.64.3.3 fragsize

MHAParser::int_t dbasync_native::db_if_t::fragsize [private]

4.64.3.4 delay

MHAParser::int_t dbasync_native::db_if_t::delay [private]

4.64.3.5 worker_thread_scheduler

MHAParser::kw_t dbasync_native::db_if_t::worker_thread_scheduler [private]

Scheduler used for worker thread.

4.64.3.6 worker_thread_priority

MHAParser::int_t dbasync_native::db_if_t::worker_thread_priority [private]

Priority of worker thread.

4.64.3.7 framework_thread_scheduler

MHAParser::string_mon_t dbasync_native::db_if_t::framework_thread_scheduler [private]

Scheduler of the signal processing thread.

4.64.3.8 framework_thread_priority

MHAParser::int_mon_t dbasync_native::db_if_t::framework_thread_priority [private]

Priority of signal processing thread.

4.64.3.9 chain

std::string dbasync_native::db_if_t::chain [private]

4.64.3.10 algo

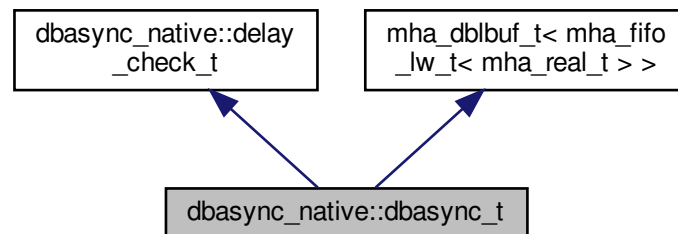
```
std::string dbasync_native::db_if_t::algo [private]
```

The documentation for this class was generated from the following file:

- **dbasync.cpp**

4.65 dbasync_native::dbasync_t Class Reference

Inheritance diagram for dbasync_native::dbasync_t:



Public Member Functions

- **dbasync_t** (unsigned int nchannels_in, unsigned int nchannels_out, unsigned int outer↔_fragsize, unsigned int inner_fragsize, int **delay**, const std::string &thread_scheduler, int thread_priority, **MHAParser::mhapluginloader_t** &plug)
- **~dbasync_t** ()
- **mha_wave_t** * **outer_process** (**mha_wave_t** *)
- int **svc** ()

Private Attributes

- **MHAParser::mhapluginloader_t** & **plugloader**
- **MHASignal::waveform_t** **inner_input**
- **MHASignal::waveform_t** **outer_output**
- pthread_attr_t **attr**
- struct sched_param **priority**
- int **scheduler**
- pthread_t **thread**

Additional Inherited Members

4.65.1 Constructor & Destructor Documentation

4.65.1.1 dbasync_t()

```
dbasync_native::dbasync_t::dbasync_t (
    unsigned int nchannels_in,
    unsigned int nchannels_out,
    unsigned int outer_fragsize,
    unsigned int inner_fragsize,
    int delay,
    const std::string & thread_scheduler,
    int thread_priority,
    MHAParser::mhappluginloader_t & plug )
```

4.65.1.2 ~dbasync_t()

```
dbasync_native::dbasync_t::~~dbasync_t ( )
```

4.65.2 Member Function Documentation

4.65.2.1 outer_process()

```
mha_wave_t * dbasync_native::dbasync_t::outer_process (
    mha_wave_t * outer_input )
```

4.65.2.2 svc()

```
int dbasync_native::dbasync_t::svc ( )
```

4.65.3 Member Data Documentation

4.65.3.1 plugloader

```
MHAParser::mhapluginloader_t& dbasync_native::dbasync_t::plugloader [private]
```

4.65.3.2 inner_input

```
MHASignal::waveform_t dbasync_native::dbasync_t::inner_input [private]
```

4.65.3.3 outer_output

```
MHASignal::waveform_t dbasync_native::dbasync_t::outer_output [private]
```

4.65.3.4 attr

```
pthread_attr_t dbasync_native::dbasync_t::attr [private]
```

4.65.3.5 priority

```
struct sched_param dbasync_native::dbasync_t::priority [private]
```

4.65.3.6 scheduler

```
int dbasync_native::dbasync_t::scheduler [private]
```

4.65.3.7 thread

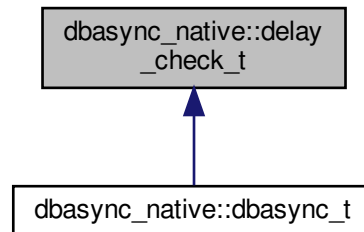
```
pthread_t dbasync_native::dbasync_t::thread [private]
```

The documentation for this class was generated from the following file:

- **dbasync.cpp**

4.66 dbasync_native::delay_check_t Class Reference

Inheritance diagram for dbasync_native::delay_check_t:



Protected Member Functions

- **delay_check_t** (int delay, unsigned inner_fragsize, unsigned outer_fragsize)

4.66.1 Constructor & Destructor Documentation

4.66.1.1 delay_check_t()

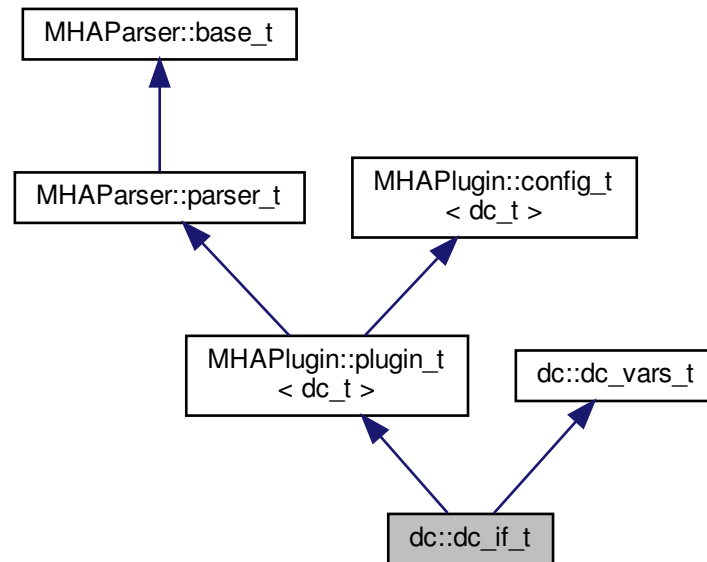
```
dbasync_native::delay_check_t::delay_check_t (  
    int delay,  
    unsigned inner_fragsize,  
    unsigned outer_fragsize ) [protected]
```

The documentation for this class was generated from the following file:

- **dbasync.cpp**

4.67 dc::dc_if_t Class Reference

Inheritance diagram for dc::dc_if_t:



Public Member Functions

- **dc_if_t** (const **algo_comm_t** &ac_, const std::string &th_, const std::string &al_)
- void **prepare** (**mhaconfig_t** &tf)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- **mha_spec_t** * **process** (**mha_spec_t** *)

Private Member Functions

- void **update_monitors** ()
Called from within the processing routines: updates the monitor variables.
- void **update** ()
Called by MHA configuration change event mechanism: creates new runtime configuration.

Private Attributes

- std::string **algo**
- **MHAEvents::patchbay_t** < **dc_if_t** > **patchbay**

Additional Inherited Members

4.67.1 Constructor & Destructor Documentation

4.67.1.1 dc_if_t()

```
dc_if_t::dc_if_t (
    const algo_comm_t & ac_,
    const std::string & th_,
    const std::string & al_ )
```

4.67.2 Member Function Documentation

4.67.2.1 prepare()

```
void dc_if_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t**< **dc_t** > (p. 1099).

4.67.2.2 process() [1/2]

```
mha_wave_t * dc_if_t::process (
    mha_wave_t * s_in )
```

4.67.2.3 process() [2/2]

```
mha_spec_t * dc_if_t::process (
    mha_spec_t * s_in )
```

4.67.2.4 update_monitors()

```
void dc_if_t::update_monitors ( ) [private]
```

Called from within the processing routines: updates the monitor variables.

4.67.2.5 update()

```
void dc_if_t::update ( ) [private]
```

Called by MHA configuration change event mechanism: creates new runtime configuration.

4.67.3 Member Data Documentation

4.67.3.1 algo

```
std::string dc::dc_if_t::algo [private]
```

4.67.3.2 patchbay

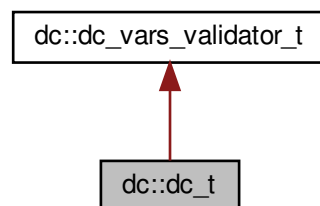
```
MHAEvents::patchbay_t< dc_if_t> dc::dc_if_t::patchbay [private]
```

The documentation for this class was generated from the following files:

- **dc.hh**
- **dc.cpp**

4.68 dc::dc_t Class Reference

Inheritance diagram for dc::dc_t:



Public Member Functions

- **dc_t** (**dc_vars_t** vars, **mha_real_t** filter_rate, unsigned int nch_, **algo_comm_t** ac, **mha_domain_t** domain, unsigned int **fftl**, const std::string &algo, const std::vector< **mha_real_t** > &rmslevel_state={}, const std::vector< **mha_real_t** > &attack_state={}, const std::vector< **mha_real_t** > &decay_state={})
- **mha_wave_t** * **process** (**mha_wave_t** *)
- **mha_spec_t** * **process** (**mha_spec_t** *)
- void **explicit_insert** ()
- unsigned **get_nbands** () const
Number of frequency bands accessor.
- unsigned **get_nch** () const
Total number of channels accessor.
- const **MHASignal::waveform_t** & **get_level_in_db** () const
- const **MHASignal::waveform_t** & **get_level_in_db_adjusted** () const
- std::vector< **mha_real_t** > **get_rmslevel_filter_state** () const
- std::vector< **mha_real_t** > **get_attack_filter_state** () const
- std::vector< **mha_real_t** > **get_decay_filter_state** () const

Private Attributes

- std::vector< **MHATableLookup::linear_table_t** > **gt**
- std::vector< **mha_real_t** > **offset**
- **MHAFilter::o1flt_lowpass_t** **rmslevel**
- **MHAFilter::o1flt_lowpass_t** **attack**
- **MHAFilter::o1flt_maxtrack_t** **decay**
- bool **bypass**
- bool **log_interp**
- unsigned int **naudiochannels**
- unsigned int **nbands**
- unsigned int **nch**
- **MHA_AC::waveform_t** **level_in_db**
- **MHA_AC::waveform_t** **level_in_db_adjusted**
- unsigned int **fftl**

Additional Inherited Members

4.68.1 Constructor & Destructor Documentation

4.68.1.1 dc_t()

```
dc_t::dc_t (
    dc_vars_t vars,
    mha_real_t filter_rate,
    unsigned int nch_,
    algo_comm_t ac,
    mha_domain_t domain,
    unsigned int fftlen,
    const std::string & algo,
    const std::vector< mha_real_t > & rmslevel_state = {},
    const std::vector< mha_real_t > & attack_state = {},
    const std::vector< mha_real_t > & decay_state = {} )
```

4.68.2 Member Function Documentation

4.68.2.1 process() [1/2]

```
mha_wave_t * dc_t::process (
    mha_wave_t * s )
```

4.68.2.2 process() [2/2]

```
mha_spec_t * dc_t::process (
    mha_spec_t * s )
```

4.68.2.3 explicit_insert()

```
void dc_t::explicit_insert ( )
```

4.68.2.4 get_nbands()

```
unsigned dc::dc_t::get_nbands ( ) const [inline]
```

Number of frequency bands accessor.

4.68.2.5 get_nch()

```
unsigned dc::dc_t::get_nch ( ) const [inline]
```

Total number of channels accessor.

4.68.2.6 get_level_in_db()

```
const MHASignal::waveform_t& dc::dc_t::get_level_in_db ( ) const [inline]
```

4.68.2.7 get_level_in_db_adjusted()

```
const MHASignal::waveform_t& dc::dc_t::get_level_in_db_adjusted ( ) const [inline]
```

4.68.2.8 get_rmslevel_filter_state()

```
std::vector< mha_real_t> dc::dc_t::get_rmslevel_filter_state ( ) const [inline]
```

4.68.2.9 get_attack_filter_state()

```
std::vector< mha_real_t> dc::dc_t::get_attack_filter_state ( ) const [inline]
```

4.68.2.10 get_decay_filter_state()

```
std::vector< mha_real_t> dc::dc_t::get_decay_filter_state ( ) const [inline]
```

4.68.3 Member Data Documentation

4.68.3.1 gt

```
std::vector< MHATableLookup::linear_table_t> dc::dc_t::gt [private]
```

4.68.3.2 offset

```
std::vector< mha_real_t> dc::dc_t::offset [private]
```

4.68.3.3 rmslevel

```
MHAFilter::olflt_lowpass_t dc::dc_t::rmslevel [private]
```

4.68.3.4 attack

```
MHAFilter::olflt_lowpass_t dc::dc_t::attack [private]
```

4.68.3.5 decay

```
MHAFilter::olflt_maxtrack_t dc::dc_t::decay [private]
```

4.68.3.6 bypass

```
bool dc::dc_t::bypass [private]
```

4.68.3.7 log_interp

```
bool dc::dc_t::log_interp [private]
```

4.68.3.8 naudiochannels

```
unsigned int dc::dc_t::naudiochannels [private]
```

4.68.3.9 nbands

```
unsigned int dc::dc_t::nbands [private]
```

4.68.3.10 nch

```
unsigned int dc::dc_t::nch [private]
```

4.68.3.11 level_in_db

```
MHA_AC::waveform_t dc::dc_t::level_in_db [private]
```

4.68.3.12 level_in_db_adjusted

```
MHA_AC::waveform_t dc::dc_t::level_in_db_adjusted [private]
```

4.68.3.13 fftlen

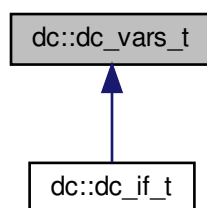
```
unsigned int dc::dc_t::fftlen [private]
```

The documentation for this class was generated from the following files:

- **dc.hh**
- **dc.cpp**

4.69 dc::dc_vars_t Class Reference

Inheritance diagram for dc::dc_vars_t:



Public Member Functions

- **dc_vars_t (MHAParser::parser_t &)**

Public Attributes

- **MHAParser::mfloat_t gtdata**
- **MHAParser::vfloat_t gtmin**
- **MHAParser::vfloat_t gtstep**
- **MHAParser::vfloat_t taurmslevel**
- **MHAParser::vfloat_t tauattack**
- **MHAParser::vfloat_t taudecay**
- **MHAParser::vfloat_t offset**
- **MHAParser::string_t filterbank**
- **std::string cf_name**
- **std::string ef_name**
- **std::string bw_name**
- **MHAParser::string_t cname**
- **MHAParser::bool_t bypass**
- **MHAParser::bool_t log_interp**
- **MHAParser::string_t clientid**
- **MHAParser::string_t gainrule**
- **MHAParser::string_t preset**
- **MHAParser::int_mon_t modified**
- **MHAParser::vfloat_mon_t input_level**
- **MHAParser::vfloat_mon_t filtered_level**
- **MHAParser::vfloat_mon_t center_frequencies**
- **MHAParser::vfloat_mon_t edge_frequencies**
- **MHAParser::vfloat_mon_t band_weights**

4.69.1 Constructor & Destructor Documentation

4.69.1.1 dc_vars_t()

```
dc_vars_t::dc_vars_t (
    MHAParser::parser_t & p ) [explicit]
```

4.69.2 Member Data Documentation

4.69.2.1 gtdata

MHAParser::mfloat_t dc::dc_vars_t::gtdata

4.69.2.2 gtmin

MHAParser::vfloat_t dc::dc_vars_t::gtmin

4.69.2.3 gtstep

MHAParser::vfloat_t dc::dc_vars_t::gtstep

4.69.2.4 taurmslevel

MHAParser::vfloat_t dc::dc_vars_t::taurmslevel

4.69.2.5 tauattack

MHAParser::vfloat_t dc::dc_vars_t::tauattack

4.69.2.6 taudecay

MHAParser::vfloat_t dc::dc_vars_t::taudecay

4.69.2.7 offset

MHAParser::vfloat_t dc::dc_vars_t::offset

4.69.2.8 filterbank

MHAParser::string_t dc::dc_vars_t::filterbank

4.69.2.9 cf_name

`std::string dc::dc_vars_t::cf_name`

4.69.2.10 ef_name

`std::string dc::dc_vars_t::ef_name`

4.69.2.11 bw_name

`std::string dc::dc_vars_t::bw_name`

4.69.2.12 chname

`MHAParser::string_t dc::dc_vars_t::chname`

4.69.2.13 bypass

`MHAParser::bool_t dc::dc_vars_t::bypass`

4.69.2.14 log_interp

`MHAParser::bool_t dc::dc_vars_t::log_interp`

4.69.2.15 clientid

`MHAParser::string_t dc::dc_vars_t::clientid`

4.69.2.16 gainrule

`MHAParser::string_t dc::dc_vars_t::gainrule`

4.69.2.17 preset

MHAParser::string_t dc::dc_vars_t::preset

4.69.2.18 modified

MHAParser::int_mon_t dc::dc_vars_t::modified

4.69.2.19 input_level

MHAParser::vfloat_mon_t dc::dc_vars_t::input_level

4.69.2.20 filtered_level

MHAParser::vfloat_mon_t dc::dc_vars_t::filtered_level

4.69.2.21 center_frequencies

MHAParser::vfloat_mon_t dc::dc_vars_t::center_frequencies

4.69.2.22 edge_frequencies

MHAParser::vfloat_mon_t dc::dc_vars_t::edge_frequencies

4.69.2.23 band_weights

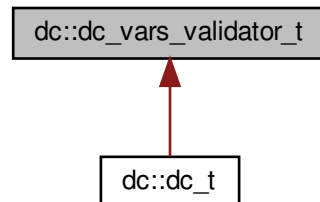
MHAParser::vfloat_mon_t dc::dc_vars_t::band_weights

The documentation for this class was generated from the following files:

- **dc.hh**
- **dc.cpp**

4.70 dc::dc_vars_validator_t Class Reference

Inheritance diagram for dc::dc_vars_validator_t:



Public Member Functions

- **dc_vars_validator_t** (**dc_vars_t** &v, unsigned int s, **mha_domain_t** domain)

4.70.1 Constructor & Destructor Documentation

4.70.1.1 dc_vars_validator_t()

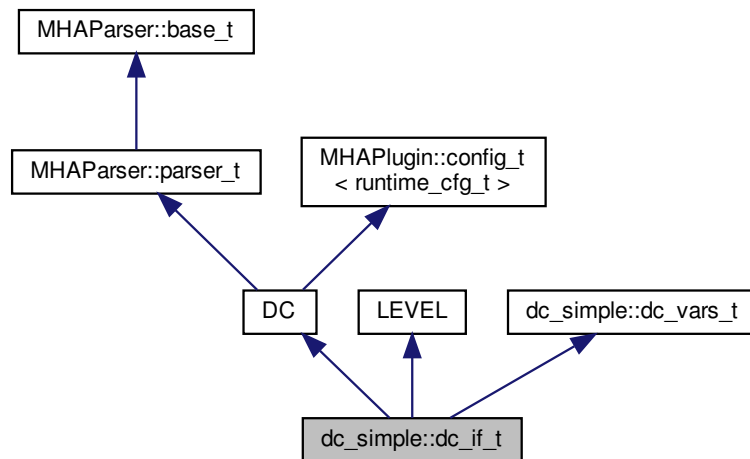
```
dc_vars_validator_t::dc_vars_validator_t (
    dc_vars_t & v,
    unsigned int s,
    mha_domain_t domain )
```

The documentation for this class was generated from the following files:

- **dc.hh**
- **dc.cpp**

4.71 dc_simple::dc_if_t Class Reference

Inheritance diagram for dc_simple::dc_if_t:



Public Member Functions

- **dc_if_t** (const **algo_comm_t** &ac_, const std::string &th_, const std::string &al_)
- void **prepare** (**mhaconfig_t** &tf)
- void **release** ()
- **mha_spec_t** * **process** (**mha_spec_t** *)
- **mha_wave_t** * **process** (**mha_wave_t** *)

Private Member Functions

- void **update_dc** ()
- void **update_level** ()
- void **has_been_modified** ()
- void **read_modified** ()
- void **update_level_mon** ()
- void **update_gain_mon** ()

Private Attributes

- **MHAParser::string_t** clientid
- **MHAParser::string_t** gainrule
- **MHAParser::string_t** preset
- **MHAParser::int_mon_t** modified
- **MHAParser::vfloat_mon_t** mon_l
- **MHAParser::vfloat_mon_t** mon_g
- **MHAParser::string_t** filterbank
- **MHAParser::vfloat_mon_t** center_frequencies
- **MHAParser::vfloat_mon_t** edge_frequencies
- **MHAEvents::patchbay_t**< **dc_if_t** > patchbay
- **bool** prepared

Additional Inherited Members

4.71.1 Constructor & Destructor Documentation

4.71.1.1 dc_if_t()

```
dc_simple::dc_if_t::dc_if_t (
    const algo_comm_t & ac_,
    const std::string & th_,
    const std::string & al_ )
```

4.71.2 Member Function Documentation

4.71.2.1 prepare()

```
void dc_simple::dc_if_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t**< **runtime_cfg_t** > (p. [1099](#)).

4.71.2.2 release()

```
void dc_simple::dc_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t**< **runtime_cfg_t** > (p. [1100](#)).

4.71.2.3 process() [1/2]

```
mha_spec_t * dc_simple::dc_if_t::process (
    mha_spec_t * s )
```

4.71.2.4 process() [2/2]

```
mha_wave_t * dc_simple::dc_if_t::process (
    mha_wave_t * s )
```

4.71.2.5 update_dc()

```
void dc_simple::dc_if_t::update_dc ( ) [private]
```

4.71.2.6 update_level()

```
void dc_simple::dc_if_t::update_level ( ) [private]
```

4.71.2.7 has_been_modified()

```
void dc_simple::dc_if_t::has_been_modified ( ) [inline], [private]
```

4.71.2.8 read_modified()

```
void dc_simple::dc_if_t::read_modified ( ) [inline], [private]
```

4.71.2.9 update_level_mon()

```
void dc_simple::dc_if_t::update_level_mon ( ) [private]
```

4.71.2.10 update_gain_mon()

```
void dc_simple::dc_if_t::update_gain_mon ( ) [private]
```

4.71.3 Member Data Documentation

4.71.3.1 clientid

MHAParser::string_t dc_simple::dc_if_t::clientid [private]

4.71.3.2 gainrule

MHAParser::string_t dc_simple::dc_if_t::gainrule [private]

4.71.3.3 preset

MHAParser::string_t dc_simple::dc_if_t::preset [private]

4.71.3.4 modified

MHAParser::int_mon_t dc_simple::dc_if_t::modified [private]

4.71.3.5 mon_l

MHAParser::vfloat_mon_t dc_simple::dc_if_t::mon_l [private]

4.71.3.6 mon_g

MHAParser::vfloat_mon_t dc_simple::dc_if_t::mon_g [private]

4.71.3.7 filterbank

MHAParser::string_t dc_simple::dc_if_t::filterbank [private]

4.71.3.8 center_frequencies

```
MHAParser::vfloat_mon_t dc_simple::dc_if_t::center_frequencies [private]
```

4.71.3.9 edge_frequencies

```
MHAParser::vfloat_mon_t dc_simple::dc_if_t::edge_frequencies [private]
```

4.71.3.10 patchbay

```
MHAEvents::patchbay_t< dc_if_t> dc_simple::dc_if_t::patchbay [private]
```

4.71.3.11 prepared

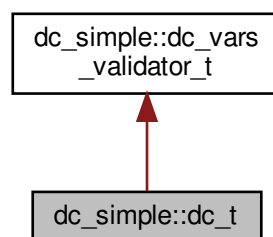
```
bool dc_simple::dc_if_t::prepared [private]
```

The documentation for this class was generated from the following file:

- **dc_simple.cpp**

4.72 dc_simple::dc_t Class Reference

Inheritance diagram for dc_simple::dc_t:



Classes

- class **line_t**

Public Member Functions

- **dc_t** (const **dc_vars_t** &vars, **mha_real_t** filter_rate, unsigned int nch, unsigned int fftlen)
- **mha_spec_t** * **process** (**mha_spec_t** *, **mha_wave_t** *level_db)
- **mha_wave_t** * **process** (**mha_wave_t** *, **mha_wave_t** *level_db)

Public Attributes

- std::vector< float > **mon_l**
- std::vector< float > **mon_g**

Private Attributes

- std::vector< **mha_real_t** > **expansion_threshold**
- std::vector< **mha_real_t** > **limiter_threshold**
- std::vector< **line_t** > **compression**
- std::vector< **line_t** > **expansion**
- std::vector< **line_t** > **limiter**
- std::vector< **mha_real_t** > **maxgain**
- unsigned int **nbands**

Additional Inherited Members

4.72.1 Constructor & Destructor Documentation

4.72.1.1 dc_t()

```
dc_simple::dc_t::dc_t (
    const dc_vars_t & vars,
    mha_real_t filter_rate,
    unsigned int nch,
    unsigned int fftlen )
```

4.72.2 Member Function Documentation

4.72.2.1 process() [1/2]

```
mha_spec_t * dc_simple::dc_t::process (
    mha_spec_t * s,
    mha_wave_t * level_db )
```

4.72.2.2 process() [2/2]

```
mha_wave_t * dc_simple::dc_t::process (
    mha_wave_t * s,
    mha_wave_t * level_db )
```

4.72.3 Member Data Documentation

4.72.3.1 expansion_threshold

```
std::vector< mha_real_t> dc_simple::dc_t::expansion_threshold [private]
```

4.72.3.2 limiter_threshold

```
std::vector< mha_real_t> dc_simple::dc_t::limiter_threshold [private]
```

4.72.3.3 compression

```
std::vector< line_t> dc_simple::dc_t::compression [private]
```

4.72.3.4 expansion

```
std::vector< line_t> dc_simple::dc_t::expansion [private]
```

4.72.3.5 limiter

```
std::vector< line_t> dc_simple::dc_t::limiter [private]
```

4.72.3.6 maxgain

```
std::vector< mha_real_t> dc_simple::dc_t::maxgain [private]
```

4.72.3.7 nbands

```
unsigned int dc_simple::dc_t::nbands [private]
```

4.72.3.8 mon_l

```
std::vector<float> dc_simple::dc_t::mon_l
```

4.72.3.9 mon_g

```
std::vector<float> dc_simple::dc_t::mon_g
```

The documentation for this class was generated from the following file:

- **dc_simple.cpp**

4.73 dc_simple::dc_t::line_t Class Reference

Public Member Functions

- **line_t (mha_real_t x1, mha_real_t y1, mha_real_t x2, mha_real_t y2)**
- **line_t (mha_real_t x1, mha_real_t y1, mha_real_t slope)**
- **mha_real_t operator() (mha_real_t x)**

Private Attributes

- **mha_real_t m**
- **mha_real_t y0**

4.73.1 Constructor & Destructor Documentation

4.73.1.1 line_t() [1/2]

```
dc_simple::dc_t::line_t::line_t (
    mha_real_t x1,
    mha_real_t y1,
    mha_real_t x2,
    mha_real_t y2 )
```

4.73.1.2 line_t() [2/2]

```
dc_simple::dc_t::line_t::line_t (
    mha_real_t x1,
    mha_real_t y1,
    mha_real_t slope )
```

4.73.2 Member Function Documentation

4.73.2.1 operator()

```
mha_real_t dc_simple::dc_t::line_t::operator() (
    mha_real_t x ) [inline]
```

4.73.3 Member Data Documentation

4.73.3.1 m

```
mha_real_t dc_simple::dc_t::line_t::m [private]
```

4.73.3.2 y0

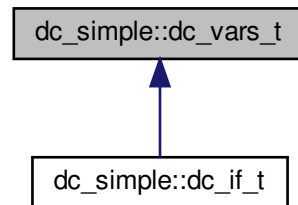
```
mha_real_t dc_simple::dc_t::line_t::y0 [private]
```

The documentation for this class was generated from the following file:

- **dc_simple.cpp**

4.74 dc_simple::dc_vars_t Class Reference

Inheritance diagram for dc_simple::dc_vars_t:



Public Member Functions

- `dc_vars_t (MHAParser::parser_t &)`

Public Attributes

- `MHAParser::vfloat_t g50`
- `MHAParser::vfloat_t g80`
- `MHAParser::vfloat_t maxgain`
- `MHAParser::vfloat_t expansion_threshold`
- `MHAParser::vfloat_t expansion_slope`
- `MHAParser::vfloat_t limiter_threshold`
- `MHAParser::vfloat_t tauattack`
- `MHAParser::vfloat_t taudecay`
- `MHAParser::bool_t bypass`

4.74.1 Constructor & Destructor Documentation

4.74.1.1 dc_vars_t()

```

dc_simple::dc_vars_t::dc_vars_t (
    MHAParser::parser_t & p )
  
```

4.74.2 Member Data Documentation

4.74.2.1 g50

MHAParser::vfloat_t dc_simple::dc_vars_t::g50

4.74.2.2 g80

MHAParser::vfloat_t dc_simple::dc_vars_t::g80

4.74.2.3 maxgain

MHAParser::vfloat_t dc_simple::dc_vars_t::maxgain

4.74.2.4 expansion_threshold

MHAParser::vfloat_t dc_simple::dc_vars_t::expansion_threshold

4.74.2.5 expansion_slope

MHAParser::vfloat_t dc_simple::dc_vars_t::expansion_slope

4.74.2.6 limiter_threshold

MHAParser::vfloat_t dc_simple::dc_vars_t::limiter_threshold

4.74.2.7 tauattack

MHAParser::vfloat_t dc_simple::dc_vars_t::tauattack

4.74.2.8 taudecay

```
MHAParser::vfloat_t dc_simple::dc_vars_t::taudecay
```

4.74.2.9 bypass

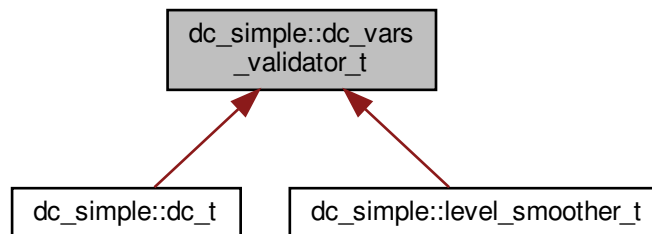
```
MHAParser::bool_t dc_simple::dc_vars_t::bypass
```

The documentation for this class was generated from the following file:

- **dc_simple.cpp**

4.75 dc_simple::dc_vars_validator_t Class Reference

Inheritance diagram for dc_simple::dc_vars_validator_t:



Public Member Functions

- **dc_vars_validator_t** (const **dc_vars_t** &v, unsigned int s)

4.75.1 Constructor & Destructor Documentation

4.75.1.1 dc_vars_validator_t()

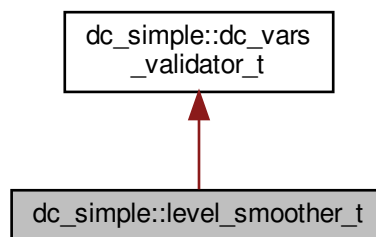
```
dc_simple::dc_vars_validator_t::dc_vars_validator_t (
    const dc_vars_t & v,
    unsigned int s )
```

The documentation for this class was generated from the following file:

- **dc_simple.cpp**

4.76 dc_simple::level_smoother_t Class Reference

Inheritance diagram for dc_simple::level_smoother_t:



Public Member Functions

- **level_smoother_t** (const **dc_vars_t** &vars, **mha_real_t** filter_rate, **mhaconfig_t** buscfg)
- **mha_wave_t** * **process** (**mha_spec_t** *)
- **mha_wave_t** * **process** (**mha_wave_t** *)

Private Attributes

- **MHAFilter::o1flt_lowpass_t** attack
- **MHAFilter::o1flt_maxtrack_t** decay
- unsigned int **nbands**
- unsigned int **ftflen**
- **MHASignal::waveform_t** level_wave
- **MHASignal::waveform_t** level_spec

Additional Inherited Members

4.76.1 Constructor & Destructor Documentation

4.76.1.1 level_smoother_t()

```
dc_simple::level_smoother_t::level_smoother_t (
    const   dc_vars_t & vars,
    mha_real_t filter_rate,
    mhaconfig_t buscfg )
```

4.76.2 Member Function Documentation

4.76.2.1 process() [1/2]

```
mha_wave_t * dc_simple::level_smoother_t::process (
    mha_spec_t * s )
```

4.76.2.2 process() [2/2]

```
mha_wave_t * dc_simple::level_smoother_t::process (
    mha_wave_t * s )
```

4.76.3 Member Data Documentation

4.76.3.1 attack

```
MHAFilter::olflt_lowpass_t dc_simple::level_smoother_t::attack [private]
```

4.76.3.2 decay

```
MHAFilter::olflt_maxtrack_t dc_simple::level_smoother_t::decay [private]
```


4.76.3.3 nbands

```
unsigned int dc_simple::level_smoother_t::nbands [private]
```

4.76.3.4 fftlen

```
unsigned int dc_simple::level_smoother_t::fftlen [private]
```

4.76.3.5 level_wave

```
MHASignal::waveform_t dc_simple::level_smoother_t::level_wave [private]
```

4.76.3.6 level_spec

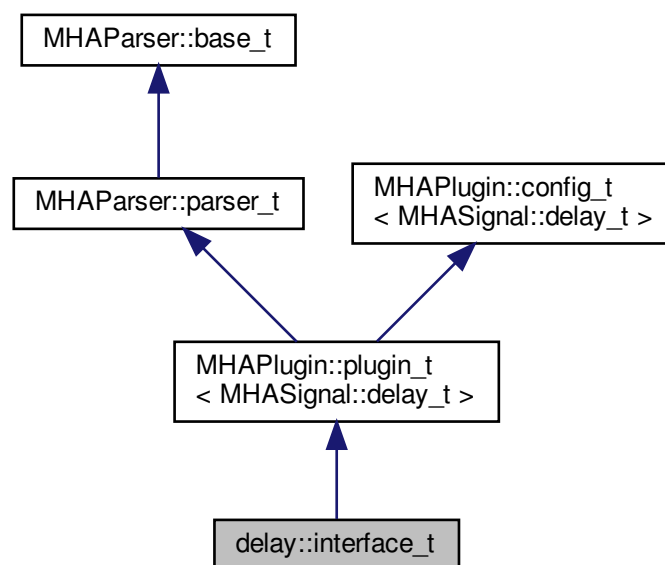
```
MHASignal::waveform_t dc_simple::level_smoother_t::level_spec [private]
```

The documentation for this class was generated from the following file:

- **dc_simple.cpp**

4.77 delay::interface_t Class Reference

Inheritance diagram for delay::interface_t:



Public Member Functions

- **interface_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- void **prepare** (**mhaconfig_t** &)
- **mha_wave_t** * **process** (**mha_wave_t** *)

Private Member Functions

- void **update** ()

Private Attributes

- **MHAParser::vint_t** **delays**
- **MHAEvents::patchbay_t** < **interface_t** > **patchbay**

Additional Inherited Members

4.77.1 Constructor & Destructor Documentation

4.77.1.1 interface_t()

```
delay::interface_t::interface_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.77.2 Member Function Documentation

4.77.2.1 prepare()

```
void delay::interface_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t** < **MHASignal::delay_t** > (p. [1099](#)).

4.77.2.2 process()

```
mha_wave_t * delay::interface_t::process (
    mha_wave_t * s )
```

4.77.2.3 update()

```
void delay::interface_t::update ( ) [private]
```

4.77.3 Member Data Documentation

4.77.3.1 delays

```
MHAParser::vint_t delay::interface_t::delays [private]
```

4.77.3.2 patchbay

```
MHAEvents::patchbay_t< interface_t> delay::interface_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **delay.cpp**

4.78 delaysum::delaysum_wave_if_t Class Reference

Interface class for the delaysum plugin.

Additional Inherited Members

4.78.1 Detailed Description

Interface class for the delaysum plugin.

This plugin allows to delay and sum multiple input channels using individual delays and weights. After each channel gets delayed it is multiplied with the given weight and then added to the single outout channel.

4.78.2 Constructor & Destructor Documentation

4.78.2.1 delaysum_wave_if_t()

```
delaysum::delaysum_wave_if_t::delaysum_wave_if_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.78.3 Member Function Documentation

4.78.3.1 process()

```
mha_wave_t * delaysum::delaysum_wave_if_t::process (
    mha_wave_t * wave )
```

4.78.3.2 prepare()

```
void delaysum::delaysum_wave_if_t::prepare (
    mhaconfig_t & tfcfg ) [virtual]
```

Implements **MHAPlugin::plugin_t**< **delaysum_wave_t** > (p. [1099](#)).

4.78.3.3 release()

```
void delaysum::delaysum_wave_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< delaysum_wave_t >** (p. 1100).

4.78.3.4 update_cfg()

```
void delaysum::delaysum_wave_if_t::update_cfg ( ) [private]
```

4.78.4 Member Data Documentation

4.78.4.1 weights

```
MHAParser::vfloat_t delaysum::delaysum_wave_if_t::weights [private]
```

Linear weights to be multiplied with the audio signal, one factor for each channel.

Order is [chan0, chan1, ...]

4.78.4.2 delay

```
MHAParser::vint_t delaysum::delaysum_wave_if_t::delay [private]
```

vector of channel-specific delays, in samples.

4.78.4.3 patchbay

```
MHAEvents::patchbay_t< delaysum_wave_if_t> delaysum::delaysum_wave_if_t::patchbay
[private]
```

The patchbay to react to config changes.

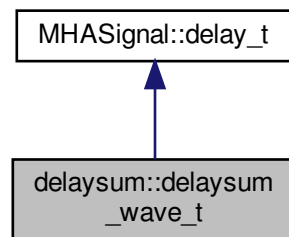
The documentation for this class was generated from the following file:

- **delaysum_wave.cpp**

4.79 delaysum::delaysum_wave_t Class Reference

Runtime configuration of the delaysum_wave plugin.

Inheritance diagram for delaysum::delaysum_wave_t:



Public Member Functions

- **delaysum_wave_t** (unsigned int nch, unsigned int fragsize, const std::vector< **mha_real_t** > &weights_, const std::vector< int > &delays_)
Constructor of the runtime configuration.
- **mha_wave_t * process** (**mha_wave_t ***)

Private Attributes

- std::vector< **mha_real_t** > **weights**
Relative weights for each channel. Order is [chan0, chan1, ...].
- **MHASignal::waveform_t out**
Output waveform.

4.79.1 Detailed Description

Runtime configuration of the delaysum_wave plugin.

Inherits from the already present delay_t class. The constructor initializes and validates the runtime configuration and forwards the delay vector to the delay_t class. The process function first calls delay_t::process and then multiplies every output channel with its weight and adds them into the output channel.

4.79.2 Constructor & Destructor Documentation

4.79.2.1 delaysum_wave_t()

```
delaysum::delaysum_wave_t::delaysum_wave_t (
    unsigned int nch,
    unsigned int fragsize,
    const std::vector< mha_real_t > & weights_,
    const std::vector< int > & delays_ )
```

Constructor of the runtime configuration.

Parameters

<i>nch</i>	Number of input channels.
<i>fragsize</i>	Size of one input fragment in frames.
<i>weights</i> ↔ —	Vector of weights for each channel.
<i>delays</i> ↔ —	Vector of delays, one entry per channel.

4.79.3 Member Function Documentation

4.79.3.1 process()

```
mha_wave_t * delaysum::delaysum_wave_t::process (
    mha_wave_t * signal )
```

4.79.4 Member Data Documentation

4.79.4.1 weights

```
std::vector< mha_real_t> delaysum::delaysum_wave_t::weights [private]
```

Relative weights for each channel. Order is [chan0, chan1, ...].

4.79.4.2 out

MHASignal::waveform_t delaysum::delaysum_wave_t::out [private]

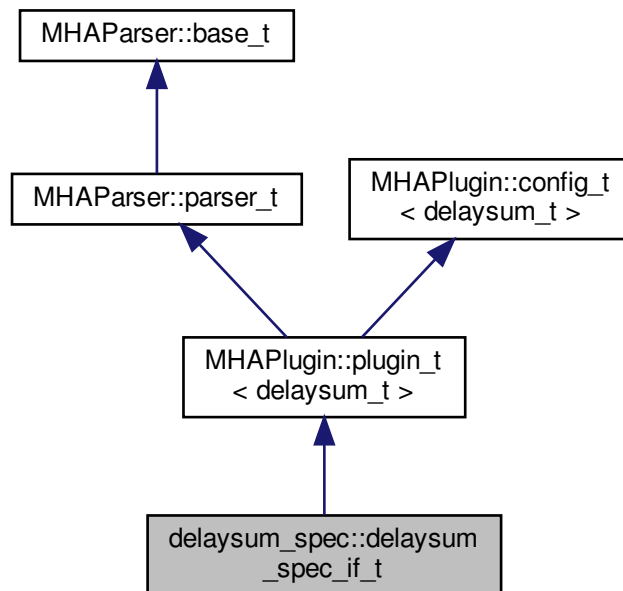
Output waveform.

The documentation for this class was generated from the following file:

- **delaysum_wave.cpp**

4.80 delaysum_spec::delaysum_spec_if_t Class Reference

Inheritance diagram for delaysum_spec::delaysum_spec_if_t:



Public Member Functions

- **delaysum_spec_if_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- **mha_spec_t * process** (**mha_spec_t** *)
- void **prepare** (**mhaconfig_t** &)

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAParser::vfloat_t** groupdelay
- **MHAParser::vfloat_t** gain
- **MHAEvents::patchbay_t** < **delaysum_spec_if_t** > patchbay

Additional Inherited Members

4.80.1 Constructor & Destructor Documentation

4.80.1.1 delaysum_spec_if_t()

```
delaysum_spec::delaysum_spec_if_t::delaysum_spec_if_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.80.2 Member Function Documentation

4.80.2.1 process()

```
mha_spec_t * delaysum_spec::delaysum_spec_if_t::process (
    mha_spec_t * spec )
```

4.80.2.2 prepare()

```
void delaysum_spec::delaysum_spec_if_t::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Implements **MHAPlugin::plugin_t** < **delaysum_t** > (p. 1099).

4.80.2.3 update_cfg()

```
void delaysum_spec::delaysum_spec_if_t::update_cfg ( ) [private]
```

4.80.3 Member Data Documentation

4.80.3.1 groupdelay

MHAParser::vfloat_t delaysum_spec::delaysum_spec_if_t::groupdelay [private]

4.80.3.2 gain

MHAParser::vfloat_t delaysum_spec::delaysum_spec_if_t::gain [private]

4.80.3.3 patchbay

MHAEvents::patchbay_t< **delaysum_spec_if_t**> delaysum_spec::delaysum_spec_if_t↔
::patchbay [private]

The documentation for this class was generated from the following file:

- **delaysum_spec.cpp**

4.81 delaysum_spec::delaysum_t Class Reference

Public Member Functions

- **delaysum_t** (std::vector< float > groupdelay, std::vector< float > gain, unsigned int n↔ Channels, unsigned int nFFT, float fs)
- **mha_spec_t * process (mha_spec_t *)**

Private Attributes

- **MHASignal::spectrum_t** scale
- **MHASignal::spectrum_t** output

4.81.1 Constructor & Destructor Documentation

4.81.1.1 `delaysum_t()`

```
delaysum_spec::delaysum_t::delaysum_t (
    std::vector< float > groupdelay,
    std::vector< float > gain,
    unsigned int nChannels,
    unsigned int nFFT,
    float fs )
```

4.81.2 Member Function Documentation

4.81.2.1 `process()`

```
mha_spec_t * delaysum_spec::delaysum_t::process (
    mha_spec_t * spec )
```

4.81.3 Member Data Documentation

4.81.3.1 `scale`

```
MHASignal::spectrum_t delaysum_spec::delaysum_t::scale [private]
```

4.81.3.2 `output`

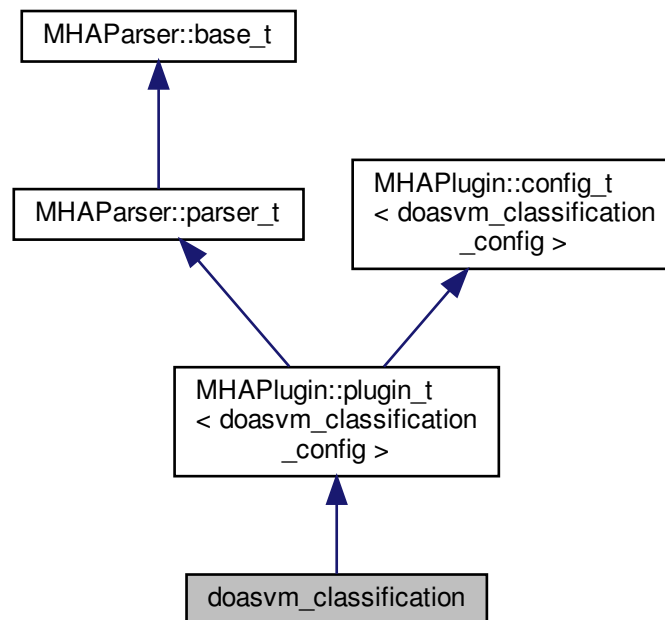
```
MHASignal::spectrum_t delaysum_spec::delaysum_t::output [private]
```

The documentation for this class was generated from the following file:

- `delaysum_spec.cpp`

4.82 doasvm_classification Class Reference

Inheritance diagram for doasvm_classification:



Public Member Functions

- **doasvm_classification** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
Constructs our plugin.
- **~doasvm_classification** ()
- **mha_wave_t * process** (**mha_wave_t ***)
Checks for the most recent configuration and defers processing to it.
- void **prepare** (**mhaconfig_t** &)
Plugin preparation.
- void **release** (void)

Public Attributes

- **MHAParser::vfloat_t** angles
- **MHAParser::mfloat_t** w
- **MHAParser::vfloat_t** b
- **MHAParser::vfloat_t** x
- **MHAParser::vfloat_t** y
- **MHAParser::string_t** p_name
- **MHAParser::string_t** max_p_ind_name
- **MHAParser::string_t** vGCC_name

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t** < **doasvm_classification** > **patchbay**

Additional Inherited Members

4.82.1 Constructor & Destructor Documentation

4.82.1.1 doasvm_classification()

```
doasvm_classification::doasvm_classification (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Constructs our plugin.

4.82.1.2 ~doasvm_classification()

```
doasvm_classification::~doasvm_classification ( )
```

4.82.2 Member Function Documentation

4.82.2.1 process()

```
mha_wave_t * doasvm_classification::process (
    mha_wave_t * signal )
```

Checks for the most recent configuration and defers processing to it.

4.82.2.2 prepare()

```
void doasvm_classification::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPLugin::plugin_t< doasvm_classification_config >** (p. [1099](#)).

4.82.2.3 release()

```
void doasvm_classification::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< doasvm_classification_config >** (p. [1100](#)).

4.82.2.4 update_cfg()

```
void doasvm_classification::update_cfg ( ) [private]
```

4.82.3 Member Data Documentation

4.82.3.1 angles

```
MHAParser::vfloat_t doasvm_classification::angles
```

4.82.3.2 w

```
MHAParser::mfloat_t doasvm_classification::w
```

4.82.3.3 b

```
MHAParser::vfloat_t doasvm_classification::b
```

4.82.3.4 x

```
MHAParser::vfloat_t doasvm_classification::x
```

4.82.3.5 y

```
MHAParser::vfloat_t doasvm_classification::y
```

4.82.3.6 p_name

```
MHAParser::string_t doasvm_classification::p_name
```

4.82.3.7 max_p_ind_name

```
MHAParser::string_t doasvm_classification::max_p_ind_name
```

4.82.3.8 vGCC_name

```
MHAParser::string_t doasvm_classification::vGCC_name
```

4.82.3.9 patchbay

```
MHAEvents::patchbay_t< doasvm_classification> doasvm_classification::patchbay [private]
```

The documentation for this class was generated from the following files:

- **doasvm_classification.h**
- **doasvm_classification.cpp**

4.83 doasvm_classification_config Class Reference

Public Member Functions

- **doasvm_classification_config** (**algo_comm_t** & **ac**, const **mhaconfig_t** **in_cfg**, **doasvm_classification** *_doasvm)
- **~doasvm_classification_config** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)

Public Attributes

- **algo_comm_t & ac**
- **doasvm_classification * doasvm**
- **MHA_AC::waveform_t p**
- **MHA_AC::int_t p_max**
- **mha_wave_t c**

4.83.1 Constructor & Destructor Documentation

4.83.1.1 doasvm_classification_config()

```
doasvm_classification_config::doasvm_classification_config (
    algo_comm_t & ac,
    const mhaconfig_t in_cfg,
    doasvm_classification * _doasvm )
```

4.83.1.2 ~doasvm_classification_config()

```
doasvm_classification_config::~doasvm_classification_config ( )
```

4.83.2 Member Function Documentation

4.83.2.1 process()

```
mha_wave_t * doasvm_classification_config::process (
    mha_wave_t * wave )
```

4.83.3 Member Data Documentation

4.83.3.1 ac

```
algo_comm_t& doasvm_classification_config::ac
```

4.83.3.2 doasvm

`doasvm_classification*` doasvm_classification_config::doasvm

4.83.3.3 p

`MHA_AC::waveform_t` doasvm_classification_config::p

4.83.3.4 p_max

`MHA_AC::int_t` doasvm_classification_config::p_max

4.83.3.5 c

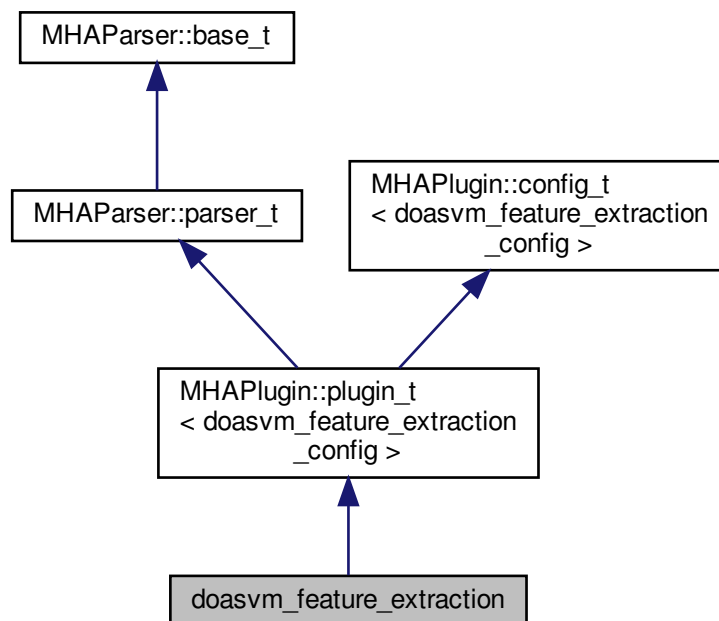
`mha_wave_t` doasvm_classification_config::c

The documentation for this class was generated from the following files:

- `doasvm_classification.h`
- `doasvm_classification.cpp`

4.84 doasvm_feature_extraction Class Reference

Inheritance diagram for doasvm_feature_extraction:



Public Member Functions

- **doasvm_feature_extraction** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
Constructs our plugin.
- **~doasvm_feature_extraction** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)
Checks for the most recent configuration and defers processing to it.
- void **prepare** (**mhaconfig_t** &)
Plugin preparation.
- void **release** (void)

Public Attributes

- **MHAParser::int_t** **fftl**
- **MHAParser::int_t** **max_lag**
- **MHAParser::int_t** **nupsample**
- **MHAParser::string_t** **vGCC_name**

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t** < **doasvm_feature_extraction** > **patchbay**

Additional Inherited Members

4.84.1 Constructor & Destructor Documentation

4.84.1.1 doasvm_feature_extraction()

```
doasvm_feature_extraction::doasvm_feature_extraction (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Constructs our plugin.

4.84.1.2 ~doasvm_feature_extraction()

```
doasvm_feature_extraction::~~doasvm_feature_extraction ( )
```

4.84.2 Member Function Documentation

4.84.2.1 process()

```
mha_wave_t * doasvm_feature_extraction::process (
    mha_wave_t * signal )
```

Checks for the most recent configuration and defers processing to it.

4.84.2.2 prepare()

```
void doasvm_feature_extraction::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate.
--------------------	--

Implements **MHAPlugin::plugin_t< doasvm_feature_extraction_config >** (p. [1099](#)).

4.84.2.3 release()

```
void doasvm_feature_extraction::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< doasvm_feature_extraction_config >** (p. [1100](#)).

4.84.2.4 update_cfg()

```
void doasvm_feature_extraction::update_cfg ( ) [private]
```

4.84.3 Member Data Documentation

4.84.3.1 fftlen

```
MHAParser::int_t doasvm_feature_extraction::fftlen
```

4.84.3.2 max_lag

```
MHAParser::int_t doasvm_feature_extraction::max_lag
```

4.84.3.3 nupsample

```
MHAParser::int_t doasvm_feature_extraction::nupsample
```

4.84.3.4 vGCC_name

```
MHAParser::string_t doasvm_feature_extraction::vGCC_name
```

4.84.3.5 patchbay

```
MHAEvents::patchbay_t< doasvm_feature_extraction> doasvm_feature_extraction::patchbay  
[private]
```

The documentation for this class was generated from the following files:

- **doasvm_feature_extraction.h**
- **doasvm_feature_extraction.cpp**

4.85 doasvm_feature_extraction_config Class Reference

Public Member Functions

- **doasvm_feature_extraction_config** (**algo_comm_t** &ac, const **mhaconfig_t** in_cfg, **doasvm_feature_extraction** * _doagcc)
- **~doasvm_feature_extraction_config** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)

Public Attributes

- **doasvm_feature_extraction** * **doagcc**
- unsigned int **wndlen**
- unsigned int **fftl**
- unsigned int **G_length**
- unsigned int **GCC_start**
- unsigned int **GCC_end**
- **MHA_AC::waveform_t** **vGCC_ac**
- **mha_fft_t** **fft**
- **mha_fft_t** **ifft**
- double **hifftwin_sum**
- **MHASignal::waveform_t** **proc_wave**
- **MHASignal::waveform_t** **hwin**
- **MHASignal::waveform_t** **hifftwin**
- **MHASignal::waveform_t** **vGCC**
- **MHASignal::spectrum_t** **in_spec**
- **MHASignal::spectrum_t** **G**

4.85.1 Constructor & Destructor Documentation

4.85.1.1 doasvm_feature_extraction_config()

```
doasvm_feature_extraction_config::doasvm_feature_extraction_config (
    algo_comm_t & ac,
    const mhaconfig_t in_cfg,
    doasvm_feature_extraction * _doagcc )
```

4.85.1.2 ~doasvm_feature_extraction_config()

```
doasvm_feature_extraction_config::~doasvm_feature_extraction_config ( )
```

4.85.2 Member Function Documentation

4.85.2.1 process()

```
mha_wave_t * doasvm_feature_extraction_config::process (
    mha_wave_t * wave )
```

4.85.3 Member Data Documentation

4.85.3.1 doagcc

```
doasvm_feature_extraction* doasvm_feature_extraction_config::doagcc
```

4.85.3.2 wndlen

```
unsigned int doasvm_feature_extraction_config::wndlen
```

4.85.3.3 fftlen

```
unsigned int doasvm_feature_extraction_config::fftlen
```

4.85.3.4 G_length

```
unsigned int doasvm_feature_extraction_config::G_length
```

4.85.3.5 GCC_start

```
unsigned int doasvm_feature_extraction_config::GCC_start
```

4.85.3.6 GCC_end

`unsigned int doasvm_feature_extraction_config::GCC_end`

4.85.3.7 vGCC_ac

`MHA_AC::waveform_t doasvm_feature_extraction_config::vGCC_ac`

4.85.3.8 fft

`mha_fft_t doasvm_feature_extraction_config::fft`

4.85.3.9 ifft

`mha_fft_t doasvm_feature_extraction_config::ifft`

4.85.3.10 hifftwin_sum

`double doasvm_feature_extraction_config::hifftwin_sum`

4.85.3.11 proc_wave

`MHASignal::waveform_t doasvm_feature_extraction_config::proc_wave`

4.85.3.12 hwin

`MHASignal::waveform_t doasvm_feature_extraction_config::hwin`

4.85.3.13 hifftwin

`MHASignal::waveform_t doasvm_feature_extraction_config::hifftwin`

4.85.3.14 vGCC

MHASignal::waveform_t doasvm_feature_extraction_config::vGCC

4.85.3.15 in_spec

MHASignal::spectrum_t doasvm_feature_extraction_config::in_spec

4.85.3.16 G

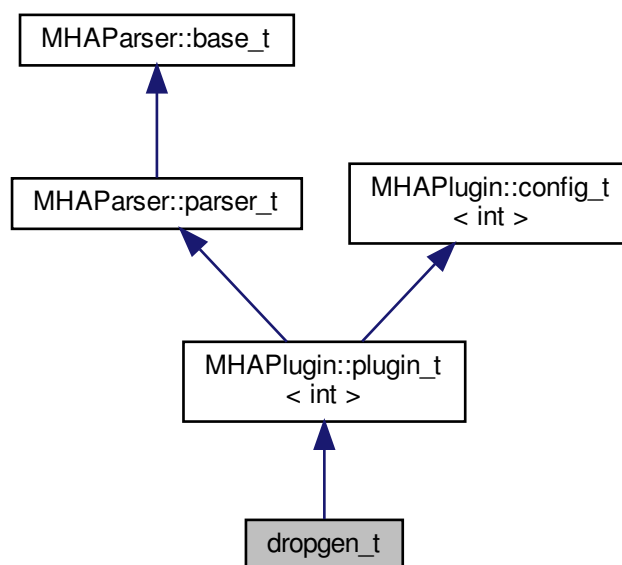
MHASignal::spectrum_t doasvm_feature_extraction_config::G

The documentation for this class was generated from the following files:

- doasvm_feature_extraction.h
- doasvm_feature_extraction.cpp

4.86 dropgen_t Class Reference

Inheritance diagram for dropgen_t:



Public Member Functions

- **dropgen_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- **mha_spec_t** * **process** (**mha_spec_t** *)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()

Public Attributes

- **MHAParser::float_t** **min_sleep_time**
- **MHAParser::float_t** **max_sleep_time**
- **MHAParser::float_t** **chance**
- **MHAEvents::patchbay_t** < **dropgen_t** > **patchbay**
- std::random_device **r**
- std::mt19937 **random_engine**
- std::uniform_real_distribution **dis**

Additional Inherited Members

4.86.1 Constructor & Destructor Documentation

4.86.1.1 dropgen_t()

```
dropgen_t::dropgen_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.86.2 Member Function Documentation

4.86.2.1 process() [1/2]

```
mha_wave_t * dropgen_t::process (
    mha_wave_t * s )
```

4.86.2.2 process() [2/2]

```
mha_spec_t * dropgen_t::process (
    mha_spec_t * s )
```

4.86.2.3 prepare()

```
void dropgen_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t< int >** (p. [1099](#)).

4.86.2.4 release()

```
void dropgen_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< int >** (p. [1100](#)).

4.86.3 Member Data Documentation

4.86.3.1 min_sleep_time

```
MHAParser::float_t dropgen_t::min_sleep_time
```

4.86.3.2 max_sleep_time

```
MHAParser::float_t dropgen_t::max_sleep_time
```

4.86.3.3 chance

```
MHAParser::float_t dropgen_t::chance
```

4.86.3.4 patchbay

```
MHAEvents::patchbay_t< dropgen_t> dropgen_t::patchbay
```

4.86.3.5 r

```
std::random_device dropgen_t::r
```

4.86.3.6 random_engine

```
std::mt19937 dropgen_t::random_engine
```

4.86.3.7 dis

```
std::uniform_real_distribution dropgen_t::dis
```

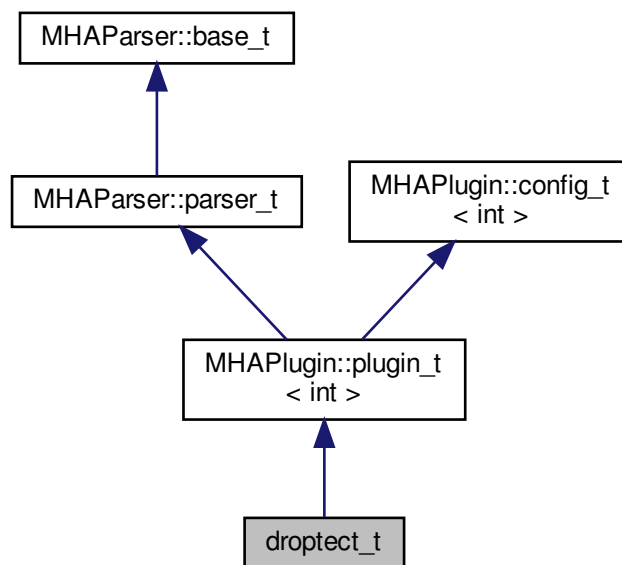
The documentation for this class was generated from the following file:

- **dropgen.cpp**

4.87 droptect_t Class Reference

Detect dropouts in a signal with a constant spectrum.

Inheritance diagram for droptect_t:



Public Member Functions

- **droptect_t** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
This constructor initializes the configuration language variables and inserts them into the MHA configuration tree.
- void **prepare** (**mhaconfig_t** &signal_info)
Allocates and initializes storage for this algorithm.
- void **release** (void)
Deallocates storage.
- **mha_spec_t** * **process** (**mha_spec_t** *signal)
Compares current spectrum against history.

Private Attributes

- **MHAParser::vint_mon_t** dropouts
- **MHAParser::vint_mon_t** consecutive_dropouts
- **MHAParser::int_mon_t** blocks
- **MHAParser::bool_t** reset
- **MHAParser::float_t** threshold
- **MHASignal::waveform_t** * current_powspec
- **MHASignal::waveform_t** * filtered_powspec
- **MHAParser::float_t** tau
- std::vector< bool > **filter_activated**
- float **period**
The period of the process callback (duration of fragsize in seconds)
- **MHAParser::mfloat_mon_t** filtered_powspec_mon
User access to filtered spectrum.
- **MHAParser::vfloat_mon_t** level_mon
User access to broadband levels.

Additional Inherited Members

4.87.1 Detailed Description

Detect dropouts in a signal with a constant spectrum.

4.87.2 Constructor & Destructor Documentation

4.87.2.1 droptect_t()

```
droptect_t::droptect_t (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

This constructor initializes the configuration language variables and inserts them into the MHA configuration tree.

4.87.3 Member Function Documentation

4.87.3.1 prepare()

```
void droptect_t::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Allocates and initializes storage for this algorithm.

Parameters

<i>signal_info</i>	contains fft length, number of channels, fft length and hop size.
--------------------	---

Implements **MHAPlugin::plugin_t< int >** (p. [1099](#)).

4.87.3.2 release()

```
void droptect_t::release (
    void ) [virtual]
```

Deallocates storage.

Reimplemented from **MHAPlugin::plugin_t< int >** (p. [1100](#)).

4.87.3.3 process()

```
mha_spec_t * droptect_t::process (
    mha_spec_t * signal )
```

Compares current spectrum against history.

If spectral power has changed or is below threshold, this is interpreted as dropout occurrence.

4.87.4 Member Data Documentation

4.87.4.1 dropouts

MHAParser::vint_mon_t droptect_t::dropouts [private]

4.87.4.2 consecutive_dropouts

MHAParser::vint_mon_t droptect_t::consecutive_dropouts [private]

4.87.4.3 blocks

MHAParser::int_mon_t droptect_t::blocks [private]

4.87.4.4 reset

MHAParser::bool_t droptect_t::reset [private]

4.87.4.5 threshold

MHAParser::float_t droptect_t::threshold [private]

4.87.4.6 current_powspec

MHASignal::waveform_t* droptect_t::current_powspec [private]

4.87.4.7 filtered_powspec

MHASignal::waveform_t* droptect_t::filtered_powspec [private]

4.87.4.8 tau

```
MHAParser::float_t droptect_t::tau [private]
```

4.87.4.9 filter_activated

```
std::vector<bool> droptect_t::filter_activated [private]
```

4.87.4.10 period

```
float droptect_t::period [private]
```

The period of the process callback (duration of fragsize in seconds)

4.87.4.11 filtered_powspec_mon

```
MHAParser::mfloat_mon_t droptect_t::filtered_powspec_mon [private]
```

User access to filtered spectrum.

4.87.4.12 level_mon

```
MHAParser::vfloat_mon_t droptect_t::level_mon [private]
```

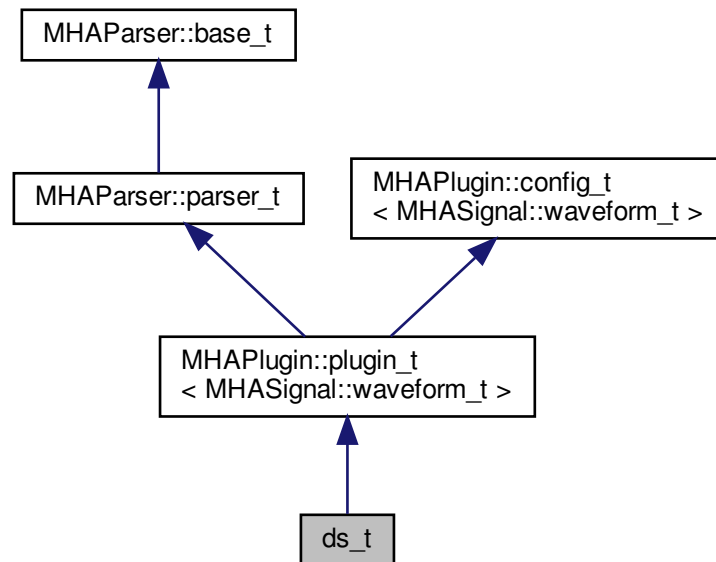
User access to broadband levels.

The documentation for this class was generated from the following file:

- **droptect.cpp**

4.88 ds_t Class Reference

Inheritance diagram for ds_t:



Public Member Functions

- **ds_t** (algo_comm_t, std::string, std::string)
- mha_wave_t * **process** (mha_wave_t *)
- void **prepare** (mhaconfig_t &)
- void **release** ()

Private Attributes

- **MHAParser::int_t** ratio
- **MHAFilter::iir_filter_t** antialias

Additional Inherited Members

4.88.1 Constructor & Destructor Documentation

4.88.1.1 ds_t()

```
ds_t::ds_t (
    algo_comm_t iac,
    std::string ,
    std::string )
```

4.88.2 Member Function Documentation

4.88.2.1 process()

```
mha_wave_t * ds_t::process (
    mha_wave_t * s )
```

4.88.2.2 prepare()

```
void ds_t::prepare (
    mhaconfig_t & cf ) [virtual]
```

Implements **MHAPLugin::plugin_t< MHASignal::waveform_t >** (p. [1099](#)).

4.88.2.3 release()

```
void ds_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< MHASignal::waveform_t >** (p. [1100](#)).

4.88.3 Member Data Documentation

4.88.3.1 ratio

```
MHAParser::int_t ds_t::ratio [private]
```

4.88.3.2 antialias

```
MHAFilter::iir_filter_t ds_t::antialias [private]
```

The documentation for this class was generated from the following file:

- **downsample.cpp**

4.89 dynamiclib_t Class Reference

Public Member Functions

- **dynamiclib_t** (const std::string &)
- void * **resolve** (const std::string &)
- void * **resolve_checked** (const std::string &)
- **~dynamiclib_t** ()
- const std::string & **getmodulename** () const
- const std::string & **getname** () const

Private Attributes

- std::string **fullname**
- std::string **modulename**
- **mha_libhandle_t** **h**

4.89.1 Constructor & Destructor Documentation

4.89.1.1 dynamiclib_t()

```
dynamiclib_t::dynamiclib_t (
    const std::string & n )
```

4.89.1.2 ~dynamiclib_t()

```
dynamiclib_t::~dynamiclib_t ( )
```

4.89.2 Member Function Documentation

4.89.2.1 resolve()

```
void * dynamiclib_t::resolve (
    const std::string & n )
```

4.89.2.2 resolve_checked()

```
void * dynamiclib_t::resolve_checked (
    const std::string & n )
```

4.89.2.3 getmodulename()

```
const std::string& dynamiclib_t::getmodulename ( ) const [inline]
```

4.89.2.4 getname()

```
const std::string& dynamiclib_t::getname ( ) const [inline]
```

4.89.3 Member Data Documentation

4.89.3.1 fullname

```
std::string dynamiclib_t::fullname [private]
```

4.89.3.2 modulename

```
std::string dynamiclib_t::modulename [private]
```

4.89.3.3 h

```
mha_libhandle_t dynamiclib_t::h [private]
```

The documentation for this class was generated from the following files:

- **mha_os.h**
- **mha_os.cpp**

4.90 DynComp::dc_afterburn_rt_t Class Reference

Real-time class for after burn effect.

Public Member Functions

- **dc_afterburn_rt_t** (const std::vector< float > &cf, unsigned int **channels**, float srate, const **dc_afterburn_vars_t** &vars)
- void **burn** (float &Gin, float Lin, unsigned int band, unsigned int channel)
gain modifier method (afterburn).

Private Attributes

- std::vector< float > **drain_inv**
- std::vector< float > **conflux**
- std::vector< float > **maxgain**
- std::vector< float > **mpo_inv**
- std::vector< **MHAFilter::o1flt_lowpass_t** > **lp**

4.90.1 Detailed Description

Real-time class for after burn effect.

The constructor processes the parameters and creates pre-processed variables for efficient realtime processing.

4.90.2 Constructor & Destructor Documentation

4.90.2.1 dc_afterburn_rt_t()

```
DynComp::dc_afterburn_rt_t::dc_afterburn_rt_t (
    const std::vector< float > & cf,
    unsigned int channels,
    float srate,
    const dc_afterburn_vars_t & vars )
```

4.90.3 Member Function Documentation

4.90.3.1 burn()

```
void DynComp::dc_afterburn_rt_t::burn (
    float & Gin,
    float Lin,
    unsigned int band,
    unsigned int channel ) [inline]
```

gain modifier method (afterburn).

Parameters

<i>Gin</i>	Linear gain.
<i>Lin</i>	Input level (Pascal).
<i>band</i>	Filter band number.
<i>channel</i>	Channel number.

Output level for MPO is estimated by $Gin * Lin$.

4.90.4 Member Data Documentation**4.90.4.1 drain_inv**

```
std::vector<float> DynComp::dc_afterburn_rt_t::drain_inv [private]
```

4.90.4.2 conflux

```
std::vector<float> DynComp::dc_afterburn_rt_t::conflux [private]
```

4.90.4.3 maxgain

```
std::vector<float> DynComp::dc_afterburn_rt_t::maxgain [private]
```

4.90.4.4 mpo_inv

```
std::vector<float> DynComp::dc_afterburn_rt_t::mpo_inv [private]
```

4.90.4.5 lp

```
std::vector< MHAFilter::olflt_lowpass_t> DynComp::dc_afterburn_rt_t::lp [private]
```

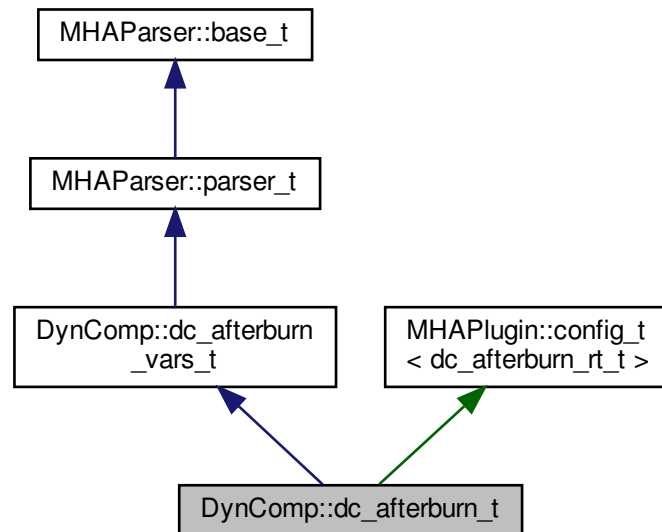
The documentation for this class was generated from the following files:

- **dc_afterburn.h**
- **dc_afterburn.cpp**

4.91 DynComp::dc_afterburn_t Class Reference

Afterburn class, to be defined as a member of compressors.

Inheritance diagram for DynComp::dc_afterburn_t:



Public Member Functions

- **dc_afterburn_t** ()
- void **set_fb_pars** (const std::vector< float > &cf, unsigned int **channels**, float srate)
- void **unset_fb_pars** ()
- void **update_burner** ()
- void **burn** (float &Gin, float Lin, unsigned int band, unsigned int channel)

Private Member Functions

- void **update** ()

Private Attributes

- **MHAEvents::patchbay_t**< **dc_afterburn_t** > **patchbay**
- std::vector< float > **_cf**
- unsigned int **_channels**
- float **_srate**
- bool **commit_pending**
- bool **fb_pars_configured**

Additional Inherited Members

4.91.1 Detailed Description

Afterburn class, to be defined as a member of compressors.

4.91.2 Constructor & Destructor Documentation

4.91.2.1 `dc_afterburn_t()`

```
DynComp::dc_afterburn_t::dc_afterburn_t ( )
```

4.91.3 Member Function Documentation

4.91.3.1 `set_fb_pars()`

```
void DynComp::dc_afterburn_t::set_fb_pars (
    const std::vector< float > & cf,
    unsigned int channels,
    float srate )
```

4.91.3.2 `unset_fb_pars()`

```
void DynComp::dc_afterburn_t::unset_fb_pars ( )
```

4.91.3.3 `update_burner()`

```
void DynComp::dc_afterburn_t::update_burner ( ) [inline]
```


4.91.3.4 burn()

```
void DynComp::dc_afterburn_t::burn (
    float & Gin,
    float Lin,
    unsigned int band,
    unsigned int channel ) [inline]
```

4.91.3.5 update()

```
void DynComp::dc_afterburn_t::update ( ) [private]
```

4.91.4 Member Data Documentation

4.91.4.1 patchbay

```
MHAEvents::patchbay_t< dc_afterburn_t> DynComp::dc_afterburn_t::patchbay [private]
```

4.91.4.2 _cf

```
std::vector<float> DynComp::dc_afterburn_t::_cf [private]
```

4.91.4.3 _channels

```
unsigned int DynComp::dc_afterburn_t::_channels [private]
```

4.91.4.4 _srate

```
float DynComp::dc_afterburn_t::_srate [private]
```

4.91.4.5 commit_pending

```
bool DynComp::dc_afterburn_t::commit_pending [private]
```

4.91.4.6 fb_pars_configured

```
bool DynComp::dc_afterburn_t::fb_pars_configured [private]
```

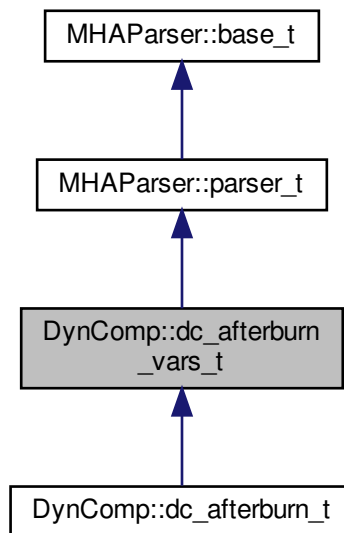
The documentation for this class was generated from the following files:

- **dc_afterburn.h**
- **dc_afterburn.cpp**

4.92 DynComp::dc_afterburn_vars_t Class Reference

Variables for **dc_afterburn_t** (p. 429) class.

Inheritance diagram for DynComp::dc_afterburn_vars_t:



Public Member Functions

- **dc_afterburn_vars_t ()**

Public Attributes

- **MHAParser::vfloat_t f**
- **MHAParser::vfloat_t drain**
- **MHAParser::vfloat_t conflux**
- **MHAParser::vfloat_t maxgain**
- **MHAParser::vfloat_t mpo**
- **MHAParser::float_t taugain**
- **MHAParser::kw_t commit**
- **MHAParser::bool_t bypass**

Additional Inherited Members

4.92.1 Detailed Description

Variables for **dc_afterburn_t** (p. 429) class.

4.92.2 Constructor & Destructor Documentation

4.92.2.1 dc_afterburn_vars_t()

```
DynComp::dc_afterburn_vars_t::dc_afterburn_vars_t ( )
```

4.92.3 Member Data Documentation

4.92.3.1 f

```
MHAParser::vfloat_t DynComp::dc_afterburn_vars_t::f
```

4.92.3.2 drain

```
MHAParser::vfloat_t DynComp::dc_afterburn_vars_t::drain
```

4.92.3.3 conflux

```
MHAParser::vfloat_t DynComp::dc_afterburn_vars_t::conflux
```

4.92.3.4 maxgain

```
MHAParser::vfloat_t DynComp::dc_afterburn_vars_t::maxgain
```

4.92.3.5 mpo

MHAParser::vfloat_t DynComp::dc_afterburn_vars_t::mpo

4.92.3.6 taugain

MHAParser::float_t DynComp::dc_afterburn_vars_t::taugain

4.92.3.7 commit

MHAParser::kw_t DynComp::dc_afterburn_vars_t::commit

4.92.3.8 bypass

MHAParser::bool_t DynComp::dc_afterburn_vars_t::bypass

The documentation for this class was generated from the following files:

- **dc_afterburn.h**
- **dc_afterburn.cpp**

4.93 DynComp::gaintable_t Class Reference

Gain table class.

Public Member Functions

- **gaintable_t** (const std::vector< **mha_real_t** > &Lin, const std::vector< **mha_real_t** > &FCenter, unsigned int **channels**)
Constructor.
- **~gaintable_t** ()
- void **update** (std::vector< std::vector< std::vector< **mha_real_t** > > > newGain)
Update gains from an external table.
- **mha_real_t** **get_gain** (**mha_real_t** Lin, **mha_real_t** Fin, unsigned int channel)
Read Gain from gain table.
- **mha_real_t** **get_gain** (**mha_real_t** Lin, unsigned int band, unsigned int channel)
Read Gain from gain table.
- void **get_gain** (const **mha_wave_t** &Lin, **mha_wave_t** &Gain)
Read Gains from gain table.
- unsigned int **nbands** () const
Return number of frequency bands.
- unsigned int **nchannels** () const
Return number of audio channels.
- std::vector< std::vector< **mha_real_t** > > **get_iofun** () const
Return current input-output function.
- std::vector< **mha_real_t** > **get_vL** () const
- std::vector< **mha_real_t** > **get_vF** () const

Private Attributes

- unsigned int **num_L**
- unsigned int **num_F**
- unsigned int **num_channels**
- std::vector< **mha_real_t** > **vL**
- std::vector< **mha_real_t** > **vF**
- std::vector< **mha_real_t** > **vFlog**
- std::vector< std::vector< std::vector< **mha_real_t** > > > **data**

4.93.1 Detailed Description

Gain table class.

This gain table is intended to efficient table lookup, i.e, interpolation of levels, and optional interpolation of frequencies. Sample input levels and sample frequencies are given in the constructor. The gain entries can be updated with the **update()** (p. 436) member function via a gain prescription rule from an auditory profile.

4.93.2 Constructor & Destructor Documentation

4.93.2.1 gaintable_t()

```
gaintable_t::gaintable_t (
    const std::vector< mha_real_t > & LInput,
    const std::vector< mha_real_t > & FCenter,
    unsigned int channels )
```

Constructor.

Parameters

<i>LInput</i>	Input level samples, in equivalent LTASS_combined dB SPL.
<i>FCenter</i>	Frequency samples in Hz (e.g., center frequencies of filterbank).
<i>channels</i>	Number of audio channels (typically 2).

4.93.2.2 ~gaintable_t()

```
gaintable_t::~gaintable_t ( )
```

4.93.3 Member Function Documentation

4.93.3.1 update()

```
void gaintable_t::update (
    std::vector< std::vector< std::vector< mha_real_t > > > newGain )
```

Update gains from an external table.

Parameters

<i>newGain</i>	New gain table entries.
----------------	-------------------------

Dimension change is not allowed. The number of entries are checked.

4.93.3.2 get_gain() [1/3]

```
mha_real_t gaintable_t::get_gain (
    mha_real_t Lin,
    mha_real_t Fin,
    unsigned int channel )
```

Read Gain from gain table.

Parameters

<i>Lin</i>	Input level
<i>Fin</i>	Input frequency (no match required)
<i>channel</i>	Audio channel

4.93.3.3 get_gain() [2/3]

```
mha_real_t gaintable_t::get_gain (
    mha_real_t Lin,
    unsigned int band,
    unsigned int channel )
```

Read Gain from gain table.

Parameters

<i>Lin</i>	Input level
<i>band</i>	Input frequency band
<i>channel</i>	Audio channel

4.93.3.4 get_gain() [3/3]

```
void gaintable_t::get_gain (
    const mha_wave_t & Lin,
    mha_wave_t & Gain )
```

Read Gains from gain table.

Parameters

<i>Lin</i>	Input levels.
<i>Gain</i>	Output gain.

The number of channels in Lin and Gain must match the number of bands times number of channels in the gaintable.

4.93.3.5 nbands()

```
unsigned int DynComp::gaintable_t::nbands ( ) const [inline]
```

Return number of frequency bands.

4.93.3.6 nchannels()

```
unsigned int DynComp::gaintable_t::nchannels ( ) const [inline]
```

Return number of audio channels.

4.93.3.7 get_iofun()

```
std::vector< std::vector< mha_real_t > > gaintable_t::get_iofun ( ) const
```

Return current input-output function.

4.93.3.8 get_vL()

```
std::vector< mha_real_t> DynComp::gaintable_t::get_vL ( ) const [inline]
```

4.93.3.9 get_vF()

```
std::vector< mha_real_t> DynComp::gaintable_t::get_vF ( ) const [inline]
```

4.93.4 Member Data Documentation

4.93.4.1 num_L

```
unsigned int DynComp::gaintable_t::num_L [private]
```

4.93.4.2 num_F

```
unsigned int DynComp::gaintable_t::num_F [private]
```

4.93.4.3 num_channels

```
unsigned int DynComp::gaintable_t::num_channels [private]
```

4.93.4.4 vL

```
std::vector< mha_real_t> DynComp::gaintable_t::vL [private]
```

4.93.4.5 vF

```
std::vector< mha_real_t> DynComp::gaintable_t::vF [private]
```

4.93.4.6 vFlog

```
std::vector< mha_real_t> DynComp::gaintable_t::vFlog [private]
```


4.93.4.7 data

```
std::vector<std::vector<std::vector< mha_real_t> > > DynComp::gaintable_t::data
[private]
```

The documentation for this class was generated from the following files:

- **gaintable.h**
- **gaintable.cpp**

4.94 equalize::cfg_t Class Reference

Public Member Functions

- **cfg_t** (int infft, int inchannels, std::vector< std::vector< float > > ifgains)
- **cfg_t** (const **cfg_t** &)=delete
- **cfg_t** & **operator=** (const **cfg_t** &)=delete
- **~cfg_t** ()

Public Attributes

- int **num_bins**
- int **nchannels**
- **mha_real_t** * **fftgains**

4.94.1 Constructor & Destructor Documentation

4.94.1.1 **cfg_t()** [1/2]

```
cfg_t::cfg_t (
    int infft,
    int inchannels,
    std::vector< std::vector< float > > ifgains )
```

4.94.1.2 **cfg_t()** [2/2]

```
equalize::cfg_t::cfg_t (
    const cfg_t & ) [delete]
```

4.94.1.3 ~cfg_t()

```
cfg_t::~~cfg_t ( )
```

4.94.2 Member Function Documentation

4.94.2.1 operator=()

```
cfg_t& equalize::cfg_t::operator= (
    const  cfg_t & ) [delete]
```

4.94.3 Member Data Documentation

4.94.3.1 num_bins

```
int equalize::cfg_t::num_bins
```

4.94.3.2 nchannels

```
int equalize::cfg_t::nchannels
```

4.94.3.3 fftgains

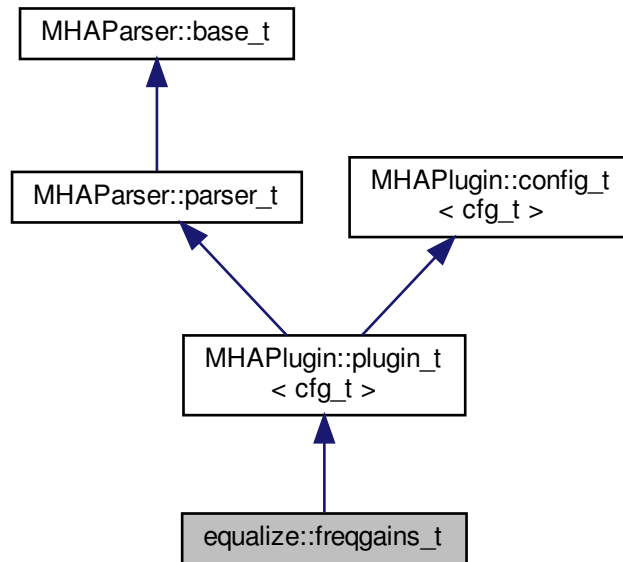
```
mha_real_t* equalize::cfg_t::fftgains
```

The documentation for this class was generated from the following file:

- **equalize.cpp**

4.95 equalize::freqgains_t Class Reference

Inheritance diagram for equalize::freqgains_t:



Public Member Functions

- **freqgains_t** (const **algo_comm_t** &iac, const std::string &, const std::string &)
- **mha_spec_t** * **process** (**mha_spec_t** *)
- void **prepare** (**mhaconfig_t** &)

Private Member Functions

- void **update_gains** ()
- void **update_id** ()

Private Attributes

- **MHAParser::mfloat_t** **fftgains**
- **MHAParser::string_t** **id**
- **MHAEvents::patchbay_t** < **freqgains_t** > **patchbay**

Additional Inherited Members

4.95.1 Constructor & Destructor Documentation

4.95.1.1 freqgains_t()

```
equalize::freqgains_t::freqgains_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.95.2 Member Function Documentation

4.95.2.1 process()

```
mha_spec_t * equalize::freqgains_t::process (
    mha_spec_t * s )
```

4.95.2.2 prepare()

```
void equalize::freqgains_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPlugin::plugin_t< cfg_t >** (p. [1099](#)).

4.95.2.3 update_gains()

```
void equalize::freqgains_t::update_gains (
    void ) [private]
```

4.95.2.4 update_id()

```
void equalize::freqgains_t::update_id (
    void ) [private]
```

4.95.3 Member Data Documentation

4.95.3.1 fftgains

```
MHAParser::mfloat_t equalize::freqgains_t::ftgains [private]
```

4.95.3.2 id

```
MHAParser::string_t equalize::freqgains_t::id [private]
```

4.95.3.3 patchbay

```
MHAEvents::patchbay_t< freqgains_t> equalize::freqgains_t::patchbay [private]
```

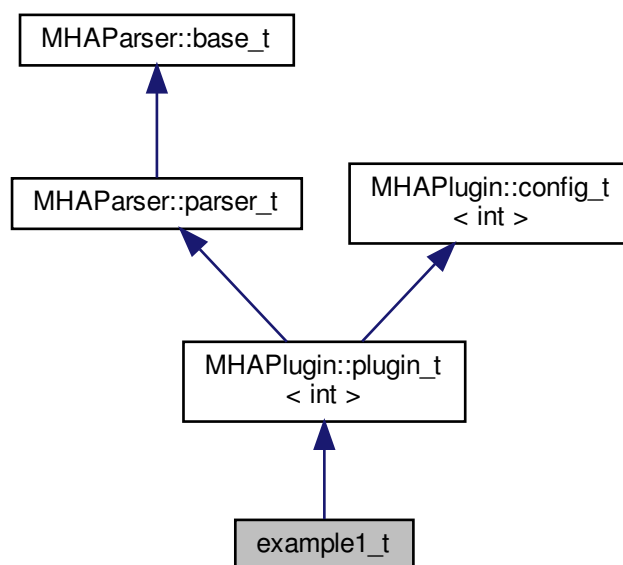
The documentation for this class was generated from the following file:

- **equalize.cpp**

4.96 example1_t Class Reference

This C++ class implements the simplest example plugin for the step-by-step tutorial.

Inheritance diagram for example1_t:



Public Member Functions

- **example1_t** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
Do-nothing constructor.
- void **release** (void)
Release may be empty.
- void **prepare** (**mhaconfig_t** &signal_info)
Plugin preparation.
- **mha_wave_t** * **process** (**mha_wave_t** *signal)
Signal processing performed by the plugin.

Additional Inherited Members

4.96.1 Detailed Description

This C++ class implements the simplest example plugin for the step-by-step tutorial.

It inherits from **MHAPLugin::plugin_t** (p. [1097](#)) for correct integration in the configuration language interface.

4.96.2 Constructor & Destructor Documentation

4.96.2.1 example1_t()

```
example1_t::example1_t (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name ) [inline]
```

Do-nothing constructor.

The constructor has to take these three arguments, but it does not have to use them. However, the base class has to be initialized.

4.96.3 Member Function Documentation

4.96.3.1 release()

```
void example1_t::release (
    void ) [inline], [virtual]
```

Release may be empty.

Reimplemented from **MHAPlugin::plugin_t< int >** (p. 1100).

4.96.3.2 prepare()

```
void example1_t::prepare (
    mhaconfig_t & signal_info ) [inline], [virtual]
```

Plugin preparation.

This plugin checks that the input signal has the waveform domain and contains at least one channel

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate.
--------------------	--

Implements **MHAPlugin::plugin_t< int >** (p. 1099).

4.96.3.3 process()

```
mha_wave_t* example1_t::process (
    mha_wave_t * signal ) [inline]
```

Signal processing performed by the plugin.

This plugin multiplies the signal in the first audio channel by a factor 0.1.

Parameters

<i>signal</i>	Pointer to the input signal structure.
---------------	--

Returns

Returns a pointer to the input signal structure, with a the signal modified by this plugin.
(In-place processing)

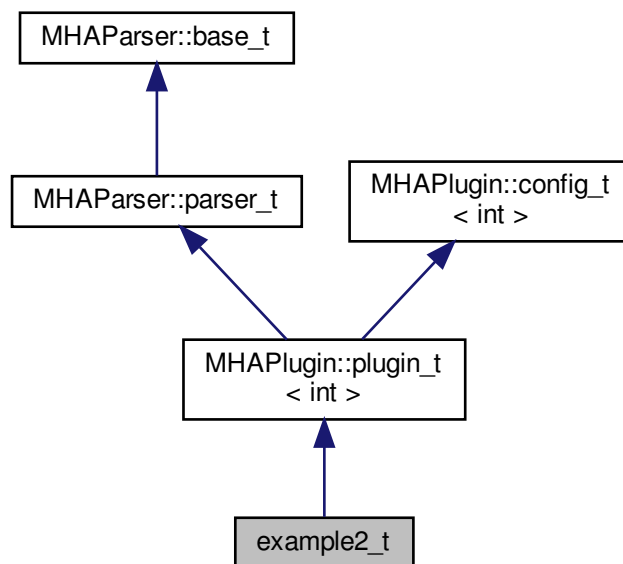
The documentation for this class was generated from the following file:

- **example1.cpp**

4.97 example2_t Class Reference

This C++ class implements the second example plugin for the step-by-step tutorial.

Inheritance diagram for example2_t:



Public Member Functions

- **example2_t** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
This constructor initializes the configuration language variables and inserts them into the openMHA configuration tree.
- void **prepare** (**mhaconfig_t** &signal_info)
Plugin preparation.
- void **release** (void)
Undo restrictions posed in prepare.
- **mha_wave_t** * **process** (**mha_wave_t** *signal)
Signal processing performed by the plugin.

Private Attributes

- **MHAParser::int_t scale_ch**
Index of audio channel to scale.
- **MHAParser::float_t factor**
The scaling factor applied to the selected channel.

Additional Inherited Members

4.97.1 Detailed Description

This C++ class implements the second example plugin for the step-by-step tutorial.

It extends the first example by using configuration language variables to influence the processing.

4.97.2 Constructor & Destructor Documentation

4.97.2.1 example2_t()

```
example2_t::example2_t (  
    algo_comm_t & ac,  
    const std::string & chain_name,  
    const std::string & algo_name )
```

This constructor initializes the configuration language variables and inserts them into the openMHA configuration tree.

4.97.3 Member Function Documentation

4.97.3.1 prepare()

```
void example2_t::prepare (  
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

This plugin checks that the input signal has the waveform domain and contains enough channels.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPlugin::plugin_t< int >** (p. 1099).

4.97.3.2 release()

```
void example2_t::release (
    void ) [virtual]
```

Undo restrictions posed in prepare.

Reimplemented from **MHAPlugin::plugin_t< int >** (p. 1100).

4.97.3.3 process()

```
mha_wave_t * example2_t::process (
    mha_wave_t * signal )
```

Signal processing performed by the plugin.

This plugin multiplies the signal in the selected audio channel by the configured factor.

Parameters

<i>signal</i>	Pointer to the input signal structure.
---------------	--

Returns

Returns a pointer to the input signal structure, with a the signal modified by this plugin.
(In-place processing)

4.97.4 Member Data Documentation**4.97.4.1 scale_ch**

```
MHAParser::int_t example2_t::scale_ch [private]
```

Index of audio channel to scale.

4.97.4.2 factor

```
MHAParser::float_t example2_t::factor [private]
```

The scaling factor applied to the selected channel.

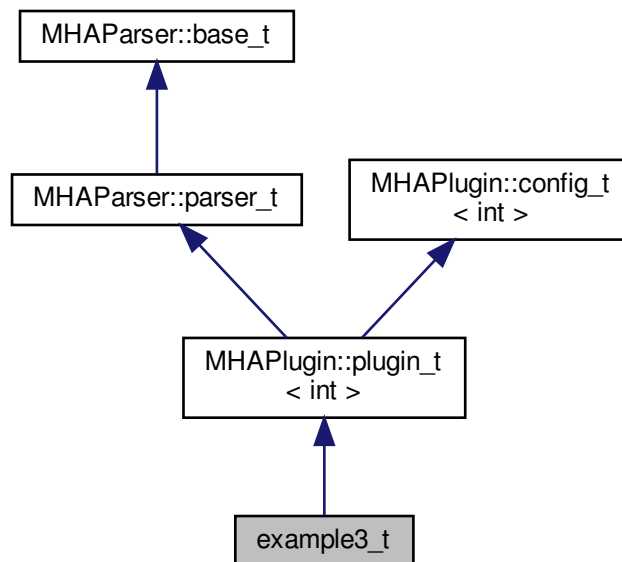
The documentation for this class was generated from the following file:

- **example2.cpp**

4.98 example3_t Class Reference

A Plugin class using the openMHA Event mechanism.

Inheritance diagram for example3_t:



Public Member Functions

- **example3_t** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
This constructor initializes the configuration language variables and inserts them into the openMHA configuration tree.
- void **prepare** (**mhaconfig_t** &signal_info)
Plugin preparation.
- void **release** (void)
Bookkeeping only.
- **mha_wave_t** * **process** (**mha_wave_t** *signal)
Signal processing performed by the plugin.

Private Member Functions

- void **on_scale_ch_writeaccess** ()
- void **on_scale_ch_valuechanged** ()
- void **on_scale_ch_readaccess** ()
- void **on_prereadaccess** ()

Private Attributes

- **MHAParser::int_t scale_ch**
Index of audio channel to scale.
- **MHAParser::float_t factor**
The scaling factor applied to the selected channel.
- **MHAParser::int_mon_t prepared**
Keep Track of the prepare/release calls.
- **MHAEvents::patchbay_t< example3_t > patchbay**
The Event connector.

Additional Inherited Members

4.98.1 Detailed Description

A Plugin class using the openMHA Event mechanism.

This is the third example plugin for the step-by-step tutorial.

4.98.2 Constructor & Destructor Documentation

4.98.2.1 example3_t()

```
example3_t::example3_t (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

This constructor initializes the configuration language variables and inserts them into the openMHA configuration tree.

It connects the openMHA Events triggered by these configuration variables to the respective callbacks.

4.98.3 Member Function Documentation

4.98.3.1 on_scale_ch_writeaccess()

```
void example3_t::on_scale_ch_writeaccess ( ) [private]
```

4.98.3.2 on_scale_ch_valuechanged()

```
void example3_t::on_scale_ch_valuechanged ( ) [private]
```

4.98.3.3 on_scale_ch_readaccess()

```
void example3_t::on_scale_ch_readaccess ( ) [private]
```

4.98.3.4 on_prereadaccess()

```
void example3_t::on_prereadaccess ( ) [private]
```

4.98.3.5 prepare()

```
void example3_t::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

This plugin checks that the input signal has the waveform domain and contains enough channels.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPLugin::plugin_t**< **int** > (p. 1099).

4.98.3.6 release()

```
void example3_t::release (
    void ) [virtual]
```

Bookkeeping only.

Reimplemented from **MHAPLugin::plugin_t< int >** (p. 1100).

4.98.3.7 process()

```
mha_wave_t * example3_t::process (
    mha_wave_t * signal )
```

Signal processing performed by the plugin.

This plugin multiplies the signal in the selected audio channel by the configured factor.

Parameters

<i>signal</i>	Pointer to the input signal structure.
---------------	--

Returns

Returns a pointer to the input signal structure, with a the signal modified by this plugin.
(In-place processing)

4.98.4 Member Data Documentation

4.98.4.1 scale_ch

```
MHAParser::int_t example3_t::scale_ch [private]
```

Index of audio channel to scale.

4.98.4.2 factor

```
MHAParser::float_t example3_t::factor [private]
```

The scaling factor applied to the selected channel.

4.98.4.3 prepared

```
MHAParser::int_mon_t example3_t::prepared [private]
```

Keep Track of the prepare/release calls.

4.98.4.4 patchbay

```
MHAEvents::patchbay_t< example3_t> example3_t::patchbay [private]
```

The Event connector.

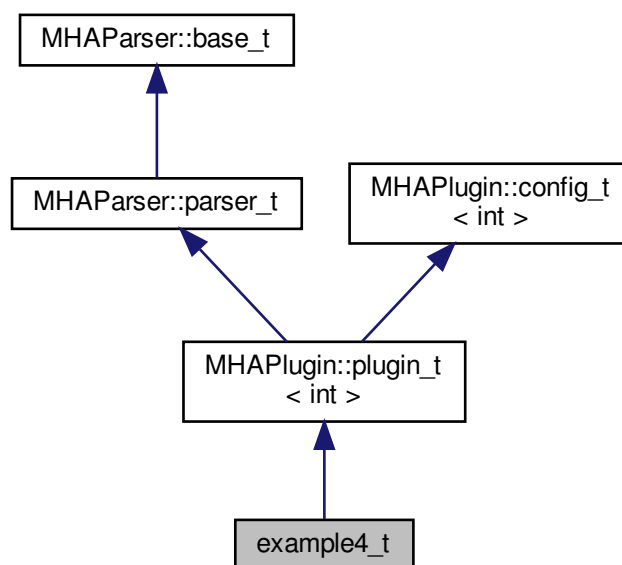
The documentation for this class was generated from the following file:

- **example3.cpp**

4.99 example4_t Class Reference

A Plugin class using the spectral signal.

Inheritance diagram for example4_t:



Public Member Functions

- **example4_t** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
This constructor initializes the configuration language variables and inserts them into the openMHA configuration tree.
- void **prepare** (**mhaconfig_t** &signal_info)
Plugin preparation.
- void **release** (void)
Bookkeeping only.
- **mha_spec_t** * **process** (**mha_spec_t** *signal)
Signal processing performed by the plugin.

Private Member Functions

- void **on_scale_ch_writeaccess** ()
- void **on_scale_ch_valuechanged** ()
- void **on_scale_ch_readaccess** ()
- void **on_prereadaccess** ()

Private Attributes

- **MHAParser::int_t scale_ch**
Index of audio channel to scale.
- **MHAParser::float_t factor**
The scaling factor applied to the selected channel.
- **MHAParser::int_mon_t prepared**
Keep Track of the prepare/release calls.
- **MHAEvents::patchbay_t< example4_t > patchbay**
The Event connector.

Additional Inherited Members

4.99.1 Detailed Description

A Plugin class using the spectral signal.

This is the fourth example plugin for the step-by-step tutorial.

4.99.2 Constructor & Destructor Documentation

4.99.2.1 example4_t()

```
example4_t::example4_t (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

This constructor initializes the configuration language variables and inserts them into the openMHA configuration tree.

It connects the openMHA Events triggered by these configuration variables to the respective callbacks.

4.99.3 Member Function Documentation

4.99.3.1 on_scale_ch_writeaccess()

```
void example4_t::on_scale_ch_writeaccess ( ) [private]
```

4.99.3.2 on_scale_ch_valuechanged()

```
void example4_t::on_scale_ch_valuechanged ( ) [private]
```

4.99.3.3 on_scale_ch_readaccess()

```
void example4_t::on_scale_ch_readaccess ( ) [private]
```

4.99.3.4 on_prereadaccess()

```
void example4_t::on_prereadaccess ( ) [private]
```

4.99.3.5 prepare()

```
void example4_t::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

This plugin checks that the input signal has the spectral domain and contains enough channels.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPLugin::plugin_t< int >** (p. 1099).

4.99.3.6 release()

```
void example4_t::release (
    void ) [virtual]
```

Bookkeeping only.

Reimplemented from **MHAPLugin::plugin_t< int >** (p. 1100).

4.99.3.7 process()

```
mha_spec_t * example4_t::process (
    mha_spec_t * signal )
```

Signal processing performed by the plugin.

This plugin multiplies the spectral signal in the selected audio channel by the configured factor.

Parameters

<i>signal</i>	Pointer to the input signal structure.
---------------	--

Returns

Returns a pointer to the input signal structure, with a the signal modified by this plugin.
(In-place processing)

4.99.4 Member Data Documentation**4.99.4.1 scale_ch**

```
MHAParser::int_t example4_t::scale_ch [private]
```

Index of audio channel to scale.

4.99.4.2 factor

```
MHAParser::float_t example4_t::factor [private]
```

The scaling factor applied to the selected channel.

4.99.4.3 prepared

```
MHAParser::int_mon_t example4_t::prepared [private]
```

Keep Track of the prepare/release calls.

4.99.4.4 patchbay

```
MHAEvents::patchbay_t< example4_t> example4_t::patchbay [private]
```

The Event connector.

The documentation for this class was generated from the following file:

- **example4.cpp**

4.100 example5_t Class Reference

Public Member Functions

- **example5_t** (unsigned int, unsigned int, **mha_real_t**)
- **mha_spec_t** * **process** (**mha_spec_t** *)

Private Attributes

- unsigned int **channel**
- **mha_real_t** **scale**

4.100.1 Constructor & Destructor Documentation

4.100.1.1 `example5_t()`

```
example5_t::example5_t (
    unsigned int ichannel,
    unsigned int numchannels,
    mha_real_t iscale )
```

4.100.2 Member Function Documentation

4.100.2.1 `process()`

```
mha_spec_t * example5_t::process (
    mha_spec_t * spec )
```

4.100.3 Member Data Documentation

4.100.3.1 `channel`

```
unsigned int example5_t::channel [private]
```

4.100.3.2 `scale`

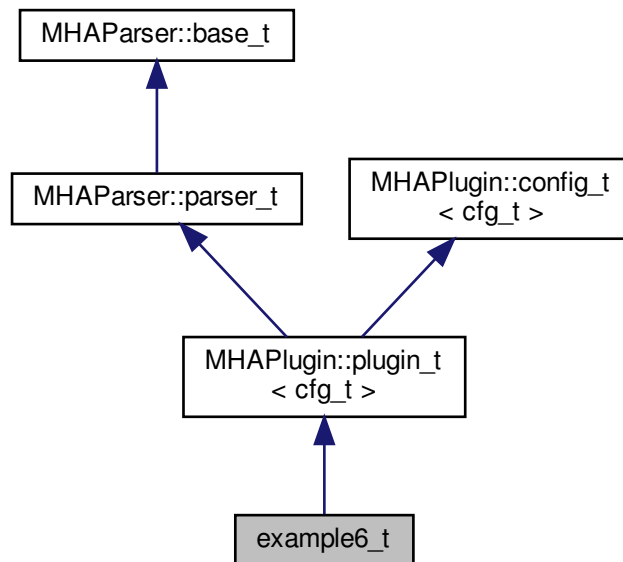
```
mha_real_t example5_t::scale [private]
```

The documentation for this class was generated from the following file:

- **example5.cpp**

4.101 example6_t Class Reference

Inheritance diagram for example6_t:



Public Member Functions

- **example6_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAParser::int_t** **channel_no**
- float **rmsdb**
- **MHAEvents::patchbay_t** < **example6_t** > **patchbay**

Additional Inherited Members

4.101.1 Constructor & Destructor Documentation

4.101.1.1 `example6_t()`

```
example6_t::example6_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.101.2 Member Function Documentation

4.101.2.1 `process()`

```
mha_wave_t * example6_t::process (
    mha_wave_t * wave )
```

4.101.2.2 `prepare()`

```
void example6_t::prepare (
    mhaconfig_t & tfcfg ) [virtual]
```

Implements **MHAPlugin::plugin_t< cfg_t >** (p. [1099](#)).

4.101.2.3 `update_cfg()`

```
void example6_t::update_cfg ( ) [private]
```

4.101.3 Member Data Documentation

4.101.3.1 channel_no

```
MHAParser::int_t example6_t::channel_no [private]
```

4.101.3.2 rmsdb

```
float example6_t::rmsdb [private]
```

4.101.3.3 patchbay

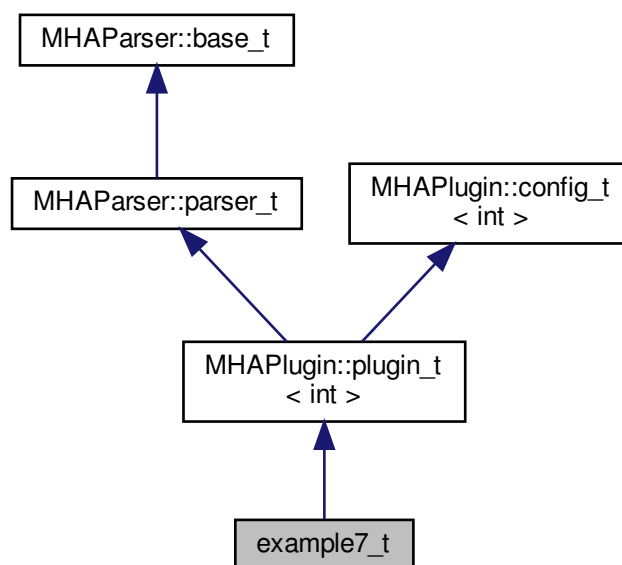
```
MHAEvents::patchbay_t< example6_t> example6_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **example6.cpp**

4.102 example7_t Class Reference

Inheritance diagram for example7_t:



Public Member Functions

- **example7_t** (**algo_comm_t** &, const std::string &, const std::string &)
- void **release** (void)
- void **prepare** (**mhaconfig_t** &)
- **mha_wave_t** * **process** (**mha_wave_t** *)

Additional Inherited Members

4.102.1 Constructor & Destructor Documentation

4.102.1.1 example7_t()

```
example7_t::example7_t (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

4.102.2 Member Function Documentation

4.102.2.1 release()

```
void example7_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPlugin::plugin_t**< int > (p. [1100](#)).

4.102.2.2 prepare()

```
void example7_t::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Implements **MHAPlugin::plugin_t**< int > (p. [1099](#)).

4.102.2.3 process()

```
mha_wave_t * example7_t::process (
    mha_wave_t * signal )
```

The documentation for this class was generated from the following files:

- **example7.hh**
- **example7.cpp**

4.103 expression_t Class Reference

Class for separating a string into a left hand value and a right hand value.

4.103.1 Detailed Description

Class for separating a string into a left hand value and a right hand value.

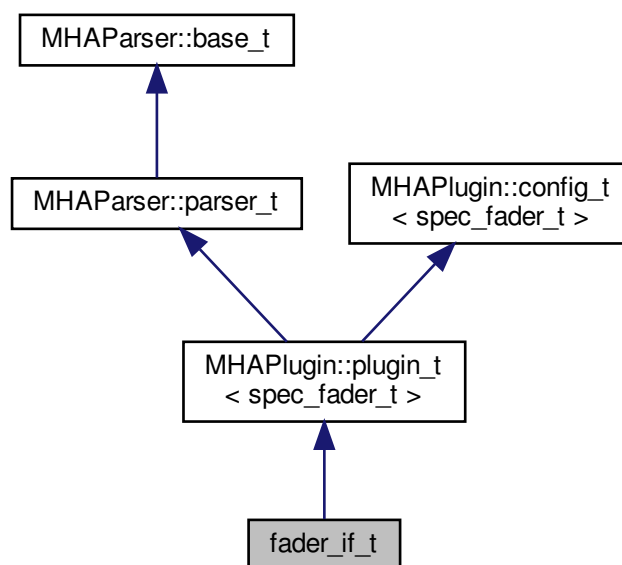
A list of valid operators can be provided. After construction, the class members lval, rval and op contain the appropriate contents.

The documentation for this class was generated from the following file:

- **mha_parser.cpp**

4.104 fader_if_t Class Reference

Inheritance diagram for fader_if_t:



Public Member Functions

- **fader_if_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- **mha_spec_t** * **process** (**mha_spec_t** *)
- void **prepare** (**mhaconfig_t** &)

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t**< **fader_if_t** > **patchbay**
- **MHAParser::float_t** **tau**
- **MHAParser::vfloat_t** **newgains**
- **mha_real_t** * **actgains**

Additional Inherited Members

4.104.1 Constructor & Destructor Documentation

4.104.1.1 fader_if_t()

```
fader_if_t::fader_if_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.104.2 Member Function Documentation

4.104.2.1 process()

```
mha_spec_t * fader_if_t::process (
    mha_spec_t * s )
```

4.104.2.2 prepare()

```
void fader_if_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPlugin::plugin_t**< **spec_fader_t** > (p. [1099](#)).

4.104.2.3 update_cfg()

```
void fader_if_t::update_cfg (
    void ) [private]
```

4.104.3 Member Data Documentation

4.104.3.1 patchbay

```
MHAEvents::patchbay_t< fader_if_t> fader_if_t::patchbay [private]
```

4.104.3.2 tau

```
MHAParser::float_t fader_if_t::tau [private]
```

4.104.3.3 newgains

```
MHAParser::vfloat_t fader_if_t::newgains [private]
```

4.104.3.4 actgains

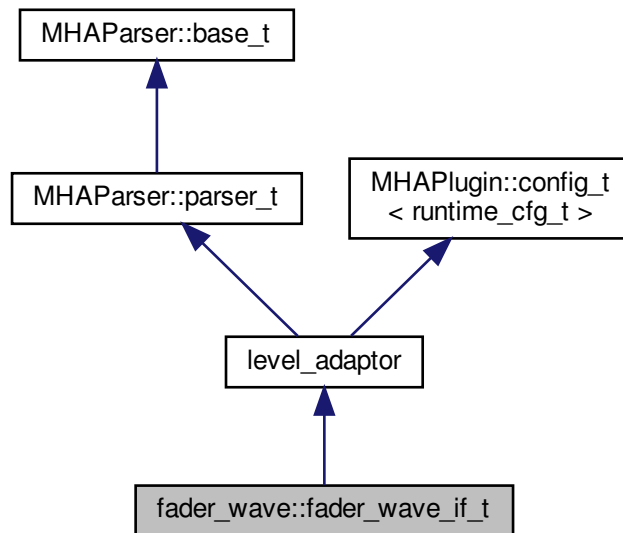
```
mha_real_t* fader_if_t::actgains [private]
```

The documentation for this class was generated from the following file:

- **fader_spec.cpp**

4.105 fader_wave::fader_wave_if_t Class Reference

Inheritance diagram for fader_wave::fader_wave_if_t:



Public Member Functions

- **fader_wave_if_t** (**algo_comm_t**, const char *, const char *)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()

Private Member Functions

- void **set_level** ()

Private Attributes

- **MHAParser::vfloat_t** **gain**
- **MHAParser::float_t** **ramplen**
- **MHAEvents::patchbay_t** < **fader_wave_if_t** > **patchbay**
- bool **prepared**

Additional Inherited Members

4.105.1 Constructor & Destructor Documentation

4.105.1.1 fader_wave_if_t()

```
fader_wave::fader_wave_if_t::fader_wave_if_t (
    algo_comm_t iac,
    const char * ,
    const char * )
```

4.105.2 Member Function Documentation

4.105.2.1 process()

```
mha_wave_t * fader_wave::fader_wave_if_t::process (
    mha_wave_t * s )
```

4.105.2.2 prepare()

```
void fader_wave::fader_wave_if_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t< runtime_cfg_t >** (p. [1099](#)).

4.105.2.3 release()

```
void fader_wave::fader_wave_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< runtime_cfg_t >** (p. [1100](#)).

4.105.2.4 set_level()

```
void fader_wave::fader_wave_if_t::set_level ( ) [private]
```

4.105.3 Member Data Documentation

4.105.3.1 gain

```
MHAParser::vfloat_t fader_wave::fader_wave_if_t::gain [private]
```

4.105.3.2 ramplen

```
MHAParser::float_t fader_wave::fader_wave_if_t::ramplen [private]
```

4.105.3.3 patchbay

```
MHAEvents::patchbay_t< fader_wave_if_t> fader_wave::fader_wave_if_t::patchbay [private]
```

4.105.3.4 prepared

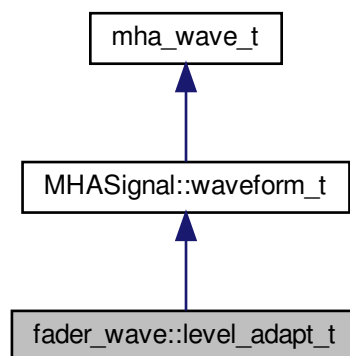
```
bool fader_wave::fader_wave_if_t::prepared [private]
```

The documentation for this class was generated from the following file:

- **fader_wave.cpp**

4.106 fader_wave::level_adapt_t Class Reference

Inheritance diagram for fader_wave::level_adapt_t:



Public Member Functions

- **level_adapt_t** (**mhaconfig_t** cf, **mha_real_t** adapt_len, std::vector< float > l_new_, std::vector< float > l_old_)
- void **update_frame** ()
- std::vector< float > **get_level** () const
- bool **can_update** () const

Private Attributes

- unsigned int **ilen**
- unsigned int **pos**
- **MHAWindow::fun_t** wnd
- std::vector< float > **l_new**
- std::vector< float > **l_old**

Additional Inherited Members

4.106.1 Constructor & Destructor Documentation

4.106.1.1 level_adapt_t()

```
fader_wave::level_adapt_t::level_adapt_t (
    mhaconfig_t cf,
    mha_real_t adapt_len,
    std::vector< float > l_new_,
    std::vector< float > l_old_ )
```

4.106.2 Member Function Documentation

4.106.2.1 update_frame()

```
void fader_wave::level_adapt_t::update_frame ( )
```

4.106.2.2 get_level()

```
std::vector<float> fader_wave::level_adapt_t::get_level ( ) const [inline]
```

4.106.2.3 can_update()

```
bool fader_wave::level_adapt_t::can_update ( ) const [inline]
```

4.106.3 Member Data Documentation

4.106.3.1 ilen

```
unsigned int fader_wave::level_adapt_t::ilen [private]
```

4.106.3.2 pos

```
unsigned int fader_wave::level_adapt_t::pos [private]
```

4.106.3.3 wnd

```
MHAWindow::fun_t fader_wave::level_adapt_t::wnd [private]
```

4.106.3.4 l_new

```
std::vector<float> fader_wave::level_adapt_t::l_new [private]
```

4.106.3.5 l_old

```
std::vector<float> fader_wave::level_adapt_t::l_old [private]
```

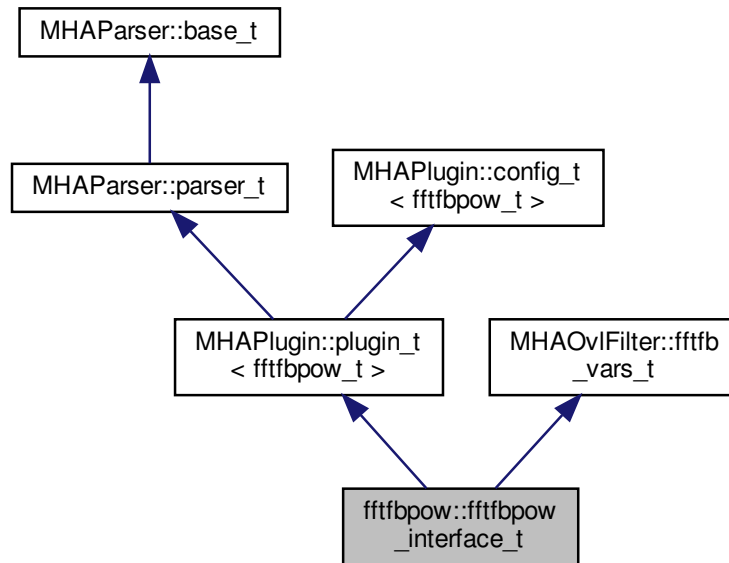
The documentation for this class was generated from the following file:

- **fader_wave.cpp**

4.107 fftfbpow::fftfbpow_interface_t Class Reference

Interface class for fftfbpow plugin.

Inheritance diagram for fftfbpow::fftfbpow_interface_t:



Public Member Functions

- **fftfbpow_interface_t** (const **algo_comm_t** & **ac**, const std::string &, const std::string & algo_name)
Constructor with standard MHA constructor parameters.
- void **prepare** (**mhaconfig_t** &tf)
Standard MHA plugin prepare function.
- **mha_spec_t** * **process** (**mha_spec_t** *s)
Standard MHA plugin process fct.

Private Member Functions

- void **update_cfg** ()
Constructs new runtime configuration in thread-safe manner.

Private Attributes

- `std::string name`
Configured name of this plugin instance.
- `MHAEvents::patchbay_t < fftfbpow_interface_t > patchbay`
Patchbay to connect to MHA configuration interface.

Additional Inherited Members

4.107.1 Detailed Description

Interface class for fftfbpow plugin.

4.107.2 Constructor & Destructor Documentation

4.107.2.1 fftfbpow_interface_t()

```
fftfbpow::fftfbpow_interface_t::fftfbpow_interface_t (
    const algo_comm_t & ac,
    const std::string & ,
    const std::string & algo_name )
```

Constructor with standard MHA constructor parameters.

Parameters

<i>ac</i>	Handle to algorithm communication variable space
<i>algo_name</i>	Configured name of this plugin instance

4.107.3 Member Function Documentation

4.107.3.1 prepare()

```
void fftfbpow::fftfbpow_interface_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Standard MHA plugin prepare function.

Ensures that the input is in the frequency domain, calls **update_cfg()** (p. 473) and inserts fbpow into the AC space.

Parameters

<i>tf</i>	Incoming mha configuration structure, contains information about input signal
-----------	---

Implements **MHAPlugin::plugin_t**< **fftfbpow_t** > (p. 1099).

4.107.3.2 process()

```
mha_spec_t * fftfbpow::fftfbpow_interface_t::process (
    mha_spec_t * s )
```

Standard MHA plugin process fct.

Polls new config and calls **process()** (p. 473) of the runtime configuration.

Parameters

<i>s</i>	Input spectrum
----------	----------------

Returns

Unchanged input spectrum

4.107.3.3 update_cfg()

```
void fftfbpow::fftfbpow_interface_t::update_cfg (
    void ) [private]
```

Constructs new runtime configuration in thread-safe manner.

4.107.4 Member Data Documentation

4.107.4.1 name

```
std::string fftfbpow::fftfbpow_interface_t::name [private]
```

Configured name of this plugin instance.

4.107.4.2 patchbay

```
MHAEvents::patchbay_t< fftfbpow_interface_t> fftfbpow::fftfbpow_interface_t::patchbay  
[private]
```

Patchbay to connect to MHA configuration interface.

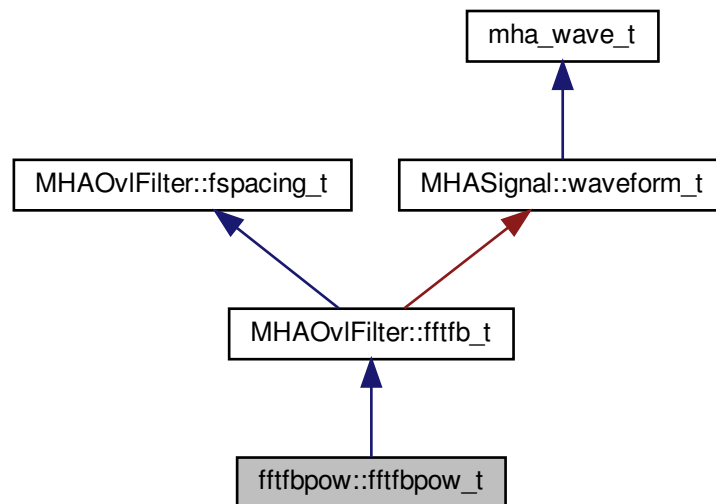
The documentation for this class was generated from the following file:

- **fftfbpow.cpp**

4.108 fftfbpow::fftfbpow_t Class Reference

Run time configuration for the fftfbpow plugin.

Inheritance diagram for fftfbpow::fftfbpow_t:



Public Member Functions

- **fftfbpow_t** (**MHAOvfFilter::fftfb_vars_t** &vars, unsigned int nch, unsigned int nfft, **mha_real_t** fs, **algo_comm_t** ac, std::string name)
Constructor of the run time configuration.

Public Attributes

- **MHA_AC::waveform_t fbpow**

AC variable containing the estimated power in each frequency band.

Additional Inherited Members

4.108.1 Detailed Description

Run time configuration for the fftfbpow plugin.

4.108.2 Constructor & Destructor Documentation

4.108.2.1 fftfbpow_t()

```
fftfbpow::fftfbpow_t::fftfbpow_t (
    MHAOvlFilter::fftfb_vars_t & vars,
    unsigned int nch,
    unsigned int nfft,
    mha_real_t fs,
    algo_comm_t ac,
    std::string name )
```

Constructor of the run time configuration.

Parameters

<i>vars</i>	Set of configuration variables for FFT-based overlapping filters
<i>nch</i>	Number of audio input channels
<i>nfft</i>	Length of FFT
<i>fs</i>	Sampling rate
<i>ac</i>	AC space
<i>name</i>	Configured name of plugin interface, used as prefix for AC variable names

4.108.3 Member Data Documentation

4.108.3.1 fbpow

MHA_AC::waveform_t fftfbpow::fftfbpow_t::fbpow

AC variable containing the estimated power in each frequency band.

The documentation for this class was generated from the following file:

- **fftfbpow.cpp**

4.109 fftfilter::fftfilter_t Class Reference

Public Member Functions

- **fftfilter_t** (const **MHAParser::mfloat_t** &irs, const unsigned int & **fragsize**, const unsigned int & **channels**, const unsigned int & **fftlent**)
Initialization of new run-time configuration from channel-specific impulse responses.
- **mha_wave_t** * **process** (**mha_wave_t** *)

Private Attributes

- unsigned int **irslen**
Length of the longest impulse response applied.
- unsigned int **fragsize**
The block size (samples per channel) for waveform audio data.
- unsigned int **fftlent**
FFT length used for filtering.
- unsigned int **channels**
Number of prepared audio channels processed by this MHA plugin.
- **MHAFilter::fftfilter_t** **fftfilt**
The filter object.

4.109.1 Detailed Description

Run-time configuration class for the fftfilter MHA plugin.

4.109.2 Constructor & Destructor Documentation

4.109.2.1 fftfilter_t()

```
fftfilter::fftfilter_t::fftfilter_t (
    const MHAParser::mfloat_t & irs,
    const unsigned int & fragsize_,
    const unsigned int & channels_,
    const unsigned int & fftlent_ )
```

Initialization of new run-time configuration from channel-specific impulse responses.

Parameters

<i>irs</i>	The matrix containing the impulse responses (one response per channel, or the same response for every channels) as set by the parser.
<i>fragsize</i> ↔ —	The block size (samples per channel) for waveform audio data
<i>channels</i> ↔ —	The number of prepared audio channels for this MHA plugin.
<i>fftlen_</i>	FFT length used for filtering

4.109.3 Member Function Documentation

4.109.3.1 process()

```
mha_wave_t * fftfilter::fftfiler_t::process (
    mha_wave_t * s )
```

Let fftfiler object handle the filtering

4.109.4 Member Data Documentation

4.109.4.1 irslen

```
unsigned int fftfilter::fftfiler_t::irslen [private]
```

Length of the longest impulse response applied.

4.109.4.2 fragsize

```
unsigned int fftfilter::fftfiler_t::fragsize [private]
```

The block size (samples per channel) for waveform audio data.

4.109.4.3 fftlen

```
unsigned int fftfilter::fftfilter_t::fftlen [private]
```

FFT length used for filtering.

4.109.4.4 channels

```
unsigned int fftfilter::fftfilter_t::channels [private]
```

Number of prepared audio channels processed by this MHA plugin.

4.109.4.5 fftfilt

```
MHAFilter::fftfilter_t fftfilter::fftfilter_t::fftfilt [private]
```

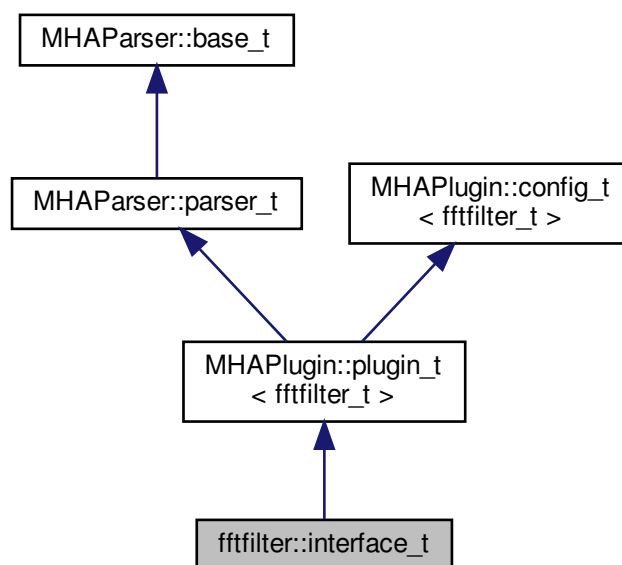
The filter object.

The documentation for this class was generated from the following file:

- **fftfilter.cpp**

4.110 fftfilter::interface_t Class Reference

Inheritance diagram for `fftfilter::interface_t`:



Public Member Functions

- `interface_t` (const `algo_comm_t` &, const `std::string` &, const `std::string` &)
- `mha_wave_t` * `process` (`mha_wave_t` *)
- void `prepare` (`mhaconfig_t` &)

Private Member Functions

- void `update` ()

Private Attributes

- `MHAParser::mfloat_t` `irs`
- `MHAParser::int_t` `fftl`
- `MHAParser::int_mon_t` `fftl_mon`
- `MHAEvents::patchbay_t` < `interface_t` > `patchbay`

Additional Inherited Members

4.110.1 Detailed Description

Implements the MHA plugin interface for `FFTFilter`

4.110.2 Constructor & Destructor Documentation

4.110.2.1 `interface_t()`

```
fftfilter::interface_t::interface_t (  
    const algo_comm_t & iac,  
    const std::string & ,  
    const std::string & )
```

4.110.3 Member Function Documentation

4.110.3.1 process()

```
mha_wave_t * fftfilter::interface_t::process (
    mha_wave_t * s )
```

4.110.3.2 prepare()

```
void fftfilter::interface_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAParser::plugin_t< fftfilter_t >** (p. 1099).

4.110.3.3 update()

```
void fftfilter::interface_t::update ( ) [private]
```

4.110.4 Member Data Documentation

4.110.4.1 irs

```
MHAParser::mfloat_t fftfilter::interface_t::irs [private]
```

4.110.4.2 fftlen

```
MHAParser::int_t fftfilter::interface_t::fftlen [private]
```

4.110.4.3 fftlen_final

```
MHAParser::int_mon_t fftfilter::interface_t::fftlen_final [private]
```

4.110.4.4 patchbay

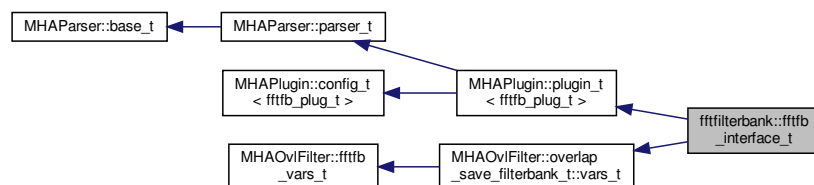
```
MHAEvents::patchbay_t< interface_t> fftfilter::interface_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **fftfilter.cpp**

4.111 fftfilterbank::fftfb_interface_t Class Reference

Inheritance diagram for fftfilterbank::fftfb_interface_t:



Public Member Functions

- **fftfb_interface_t** (const **algo_comm_t** & **ac**, const std::string &th, const std::string &al)
Default values are set and MHA configuration variables registered into the parser.
- void **prepare** (**mhaconfig_t** &)
Prepare all variables for processing.
- void **release** ()
- **mha_spec_t** * **process** (**mha_spec_t** *)
- **mha_wave_t** * **process** (**mha_wave_t** *)

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAParser::bool_t** **return_imag**
- **MHAEvents::patchbay_t**< **fftfb_interface_t** > **patchbay**
- **MHA_AC::int_t** **nchannels**
- std::string **algo**
- bool **prepared**
- unsigned int **nbands**

Additional Inherited Members

4.111.1 Constructor & Destructor Documentation

4.111.1.1 fftfb_interface_t()

```
fftfilterbank::fftfb_interface_t::fftfb_interface_t (
    const algo_comm_t & ac,
    const std::string & th,
    const std::string & al )
```

Default values are set and MHA configuration variables registered into the parser.

Parameters

<i>ac</i>	algorithm communication handle
<i>th</i>	chain name
<i>al</i>	algorithm name

4.111.2 Member Function Documentation

4.111.2.1 prepare()

```
void fftfilterbank::fftfb_interface_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Prepare all variables for processing.

In this function, all variables are initialised and the filter shapes for each band are calculated. The filter shapes $W(f)$ are defined as

$$W(f) = W(T(S(f))) = W(x), \quad x = T(S(f)) = T(\hat{f}),$$

$W(x)$ being a symmetric window function in the interval $[-1, 1]$ and $S(f)$ the transformation from the linear scale to the given frequency scale (see functions in FreqScaleFun). The function $T(\hat{f})$ transforms the frequency range between the center frequencies $[\hat{f}_{k-1}, \hat{f}_k]$ and $[\hat{f}_k, \hat{f}_{k+1}]$ into the interval $[-1, 0]$ and $[0, 1]$, respectively. This function is realised by the function `linscale()`.

Parameters

<i>tf</i>	Channel configuration
-----------	-----------------------

Implements **MHAPLugin::plugin_t**< **fftfb_plug_t** > (p. 1099).

4.111.2.2 release()

```
void fftfilterbank::fftfb_interface_t::release (  
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t**< **fftfb_plug_t** > (p. 1100).

4.111.2.3 process() [1/2]

```
mha_spec_t * fftfilterbank::fftfb_interface_t::process (  
    mha_spec_t * s )
```

4.111.2.4 process() [2/2]

```
mha_wave_t * fftfilterbank::fftfb_interface_t::process (  
    mha_wave_t * s )
```

4.111.2.5 update_cfg()

```
void fftfilterbank::fftfb_interface_t::update_cfg (  
    void ) [private]
```

4.111.3 Member Data Documentation

4.111.3.1 return_imag

```
MHAParser::bool_t fftfilterbank::fftfb_interface_t::return_imag [private]
```

4.111.3.2 patchbay

```
MHAEvents::patchbay_t < fftfb_interface_t > fftfilterbank::fftfb_interface_t::patchbay  
[private]
```

4.111.3.3 nchannels

```
MHA_AC::int_t fftfilterbank::fftfb_interface_t::nchannels [private]
```

4.111.3.4 algo

```
std::string fftfilterbank::fftfb_interface_t::algo [private]
```

4.111.3.5 prepared

```
bool fftfilterbank::fftfb_interface_t::prepared [private]
```

4.111.3.6 nbands

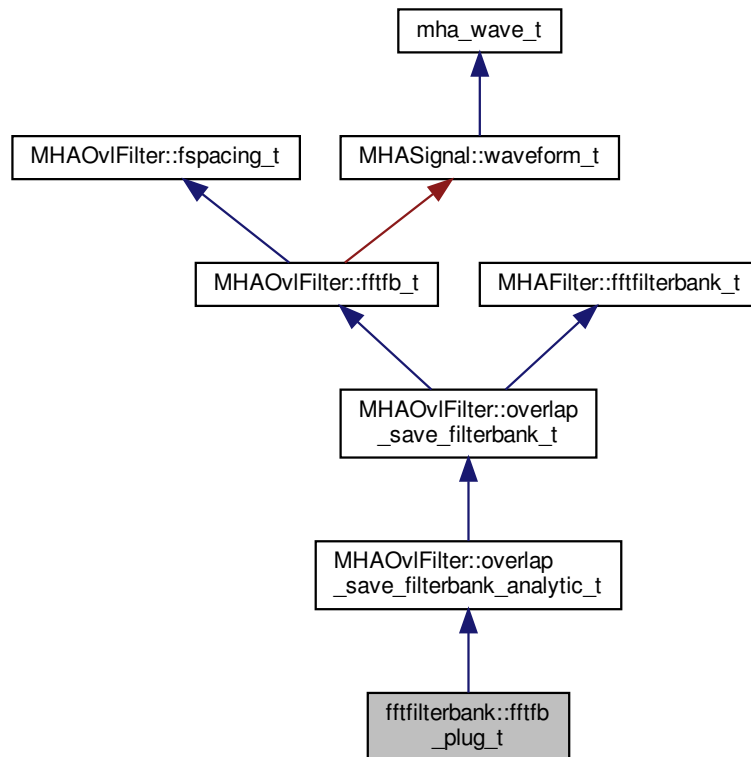
```
unsigned int fftfilterbank::fftfb_interface_t::nbands [private]
```

The documentation for this class was generated from the following file:

- **fftfilterbank.cpp**

4.112 fftfilterbank::fftfb_plug_t Class Reference

Inheritance diagram for fftfilterbank::fftfb_plug_t:



Public Member Functions

- **fftfb_plug_t** (**MHAOvfFilter::overlap_save_filterbank_t::vars_t** &, **mhaconfig_↔**
t chcfg, **algo_comm_t** ac, std::string alg, bool return_imag)
- **mha_spec_t** * **process** (**mha_spec_t** *)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **insert** ()

Private Attributes

- **MHAOvfFilter::fftfb_ac_info_t** fb_acinfo
- **MHASignal::spectrum_t** s_out
- **MHA_AC::waveform_t** imag
- bool **return_imag_**

Additional Inherited Members

4.112.1 Constructor & Destructor Documentation

4.112.1.1 `fftfb_plug_t()`

```
fftfilterbank::fftfb_plug_t::fftfb_plug_t (
    MHAOvlFilter::overlap_save_filterbank_t::vars_t & vars,
    mhaconfig_t chcfg,
    algo_comm_t ac,
    std::string alg,
    bool return_imag )
```

4.112.2 Member Function Documentation

4.112.2.1 `process()` [1/2]

```
mha_spec_t * fftfilterbank::fftfb_plug_t::process (
    mha_spec_t * s )
```

4.112.2.2 `process()` [2/2]

```
mha_wave_t * fftfilterbank::fftfb_plug_t::process (
    mha_wave_t * s )
```

4.112.2.3 `insert()`

```
void fftfilterbank::fftfb_plug_t::insert ( )
```

4.112.3 Member Data Documentation

4.112.3.1 fb_acinfo

MHAOvlFilter::fftfb_ac_info_t fftfilterbank::fftfb_plug_t::fb_acinfo [private]

4.112.3.2 s_out

MHASignal::spectrum_t fftfilterbank::fftfb_plug_t::s_out [private]

4.112.3.3 imag

MHA_AC::waveform_t fftfilterbank::fftfb_plug_t::imag [private]

4.112.3.4 return_imag_

bool fftfilterbank::fftfb_plug_t::return_imag_ [private]

The documentation for this class was generated from the following file:

- **fftfilterbank.cpp**

4.113 fshift::fshift_config_t Class Reference

fshift runtime config class

Public Member Functions

- **fshift_config_t** (**fshift_t** const *const plug)
C'tor of the fshift plugin runtime configuration class.
- **~fshift_config_t** ()=default
- **mha_spec_t** * **process** (**mha_spec_t** *)

Private Attributes

- const unsigned int **kmin**
FFT bin corresponding to fmin.
- const unsigned **kmax**
FFT bin corresponding to fmax.
- const int **df**
Frequency shift expressed in FFT bins.
- const **mha_complex_t** **delta_phi**
Phase advance per fft frame.
- **mha_complex_t** **delta_phi_total**
Sum of all phase advances.

4.113.1 Detailed Description

fshift runtime config class

4.113.2 Constructor & Destructor Documentation

4.113.2.1 fshift_config_t()

```
fshift::fshift_config_t::fshift_config_t (
    fshift_t const *const plug ) [explicit]
```

C'tor of the fshift plugin runtime configuration class.

Parameters

<i>plug</i>	ptr to the plugin interface class. Configuration information is given this way to keep the argument list small.
-------------	---

4.113.2.2 ~fshift_config_t()

```
fshift::fshift_config_t::~~fshift_config_t ( ) [default]
```

4.113.3 Member Function Documentation

4.113.3.1 process()

```
mha_spec_t * fshift::fshift_config_t::process (
    mha_spec_t * in )
```

4.113.4 Member Data Documentation

4.113.4.1 kmin

```
const unsigned int fshift::fshift_config_t::kmin [private]
```

FFT bin corresponding to fmin.

4.113.4.2 kmax

```
const unsigned fshift::fshift_config_t::kmax [private]
```

FFT bin corresponding to fmax.

4.113.4.3 df

```
const int fshift::fshift_config_t::df [private]
```

Frequency shift expressed in FFT bins.

4.113.4.4 delta_phi

```
const mha_complex_t fshift::fshift_config_t::delta_phi [private]
```

Phase advance per fft frame.

4.113.4.5 delta_phi_total

```
mha_complex_t fshift::fshift_config_t::delta_phi_total [private]
```

Sum of all phase advances.

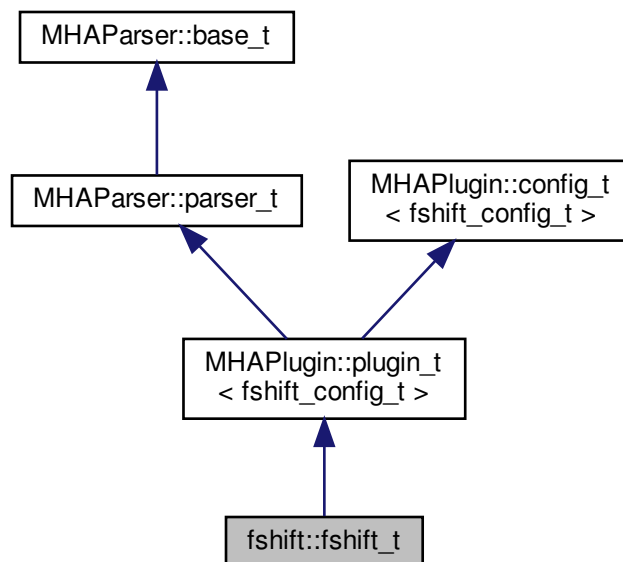
The documentation for this class was generated from the following files:

- **fshift.hh**
- **fshift.cpp**

4.114 fshift::fshift_t Class Reference

fshift plugin interface class

Inheritance diagram for fshift::fshift_t:



Public Member Functions

- **fshift_t** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
 - Constructs our plugin.*
- **~fshift_t** ()
- **mha_spec_t** * **process** (**mha_spec_t** *)
 - Checks for the most recent configuration and defers processing to it.*
- void **prepare** (**mhaconfig_t** &)
 - Plugin preparation.*
- void **release** (void)
- **mha_real_t** **fmin** () const
- **mha_real_t** **fmax** () const
- **mha_real_t** **df** () const

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t< fshift_t > patchbay**
patch bay for connecting configuration parser events with local member functions:
- **MHAParser::float_t m_fmin**
- **MHAParser::float_t m_fmax**
upper boundary for frequency shifter
- **MHAParser::float_t m_df**
Shift frequency in Hz.

Additional Inherited Members

4.114.1 Detailed Description

fshift plugin interface class

4.114.2 Constructor & Destructor Documentation

4.114.2.1 fshift_t()

```
fshift::fshift_t::fshift_t (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Constructs our plugin.

4.114.2.2 ~fshift_t()

```
fshift::fshift_t::~~fshift_t ( )
```

4.114.3 Member Function Documentation

4.114.3.1 process()

```
mha_spec_t * fshift::fshift_t::process (
    mha_spec_t * signal )
```

Checks for the most recent configuration and defers processing to it.

4.114.3.2 prepare()

```
void fshift::fshift_t::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate.
--------------------	--

Implements **MHAPlugin::plugin_t< fshift_config_t >** (p. [1099](#)).

4.114.3.3 release()

```
void fshift::fshift_t::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< fshift_config_t >** (p. [1100](#)).

4.114.3.4 fmin()

```
mha_real_t fshift::fshift_t::fmin ( ) const [inline]
```

4.114.3.5 fmax()

```
mha_real_t fshift::fshift_t::fmax ( ) const [inline]
```

4.114.3.6 df()

```
mha_real_t fshift::fshift_t::df ( ) const [inline]
```

4.114.3.7 update_cfg()

```
void fshift::fshift_t::update_cfg (
    void ) [private]
```

4.114.4 Member Data Documentation

4.114.4.1 patchbay

```
MHAEvents::patchbay_t< fshift_t> fshift::fshift_t::patchbay [private]
```

patch bay for connecting configuration parser events with local member functions:

4.114.4.2 m_fmin

```
MHAParser::float_t fshift::fshift_t::m_fmin [private]
```

4.114.4.3 m_fmax

```
MHAParser::float_t fshift::fshift_t::m_fmax [private]
```

upper boundary for frequency shifter

4.114.4.4 m_df

```
MHAParser::float_t fshift::fshift_t::m_df [private]
```

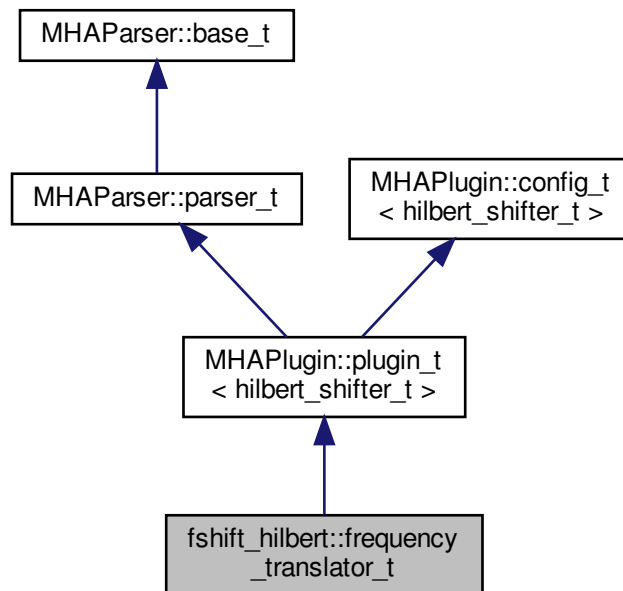
Shift frequency in Hz.

The documentation for this class was generated from the following files:

- **fshift.hh**
- **fshift.cpp**

4.115 fshift_hilbert::frequency_translator_t Class Reference

Inheritance diagram for fshift_hilbert::frequency_translator_t:



Public Member Functions

- **frequency_translator_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- **mha_spec_t** * **process** (**mha_spec_t** *)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()

Private Member Functions

- void **update** ()

Private Attributes

- **MHAEvents::patchbay_t** < **frequency_translator_t** > **patchbay**
- **MHAParser::vfloat_t** **df**
Vector containing the shift frequencies in Hz.
- **MHAParser::float_t** **fmin**
Lower boundary for frequency shifter.

- **MHAParser::float_t fmax**
Upper boundary for frequency shifter.
- **MHAParser::int_t irslen**
Maximum length of cut off filter response.
- **MHAParser::kw_t phasemode**
Mode of gain smoothing.

Additional Inherited Members

4.115.1 Constructor & Destructor Documentation

4.115.1.1 frequency_translator_t()

```
fshift_hilbert::frequency_translator_t::frequency_translator_t (
    const  algo_comm_t & iac,
    const std::string & ith,
    const std::string & ial )
```

4.115.2 Member Function Documentation

4.115.2.1 process()

```
mha_spec_t * fshift_hilbert::frequency_translator_t::process (
    mha_spec_t * s )
```

4.115.2.2 prepare()

```
void fshift_hilbert::frequency_translator_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t< hilbert_shifter_t >** (p. 1099).

4.115.2.3 release()

```
void fshift_hilbert::frequency_translator_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< hilbert_shifter_t >** (p. 1100).

4.115.2.4 update()

```
void fshift_hilbert::frequency_translator_t::update ( ) [private]
```

4.115.3 Member Data Documentation

4.115.3.1 patchbay

```
MHAEvents::patchbay_t< frequency_translator_t> fshift_hilbert::frequency_translator↔
_t::patchbay [private]
```

4.115.3.2 df

```
MHAParser::vfloat_t fshift_hilbert::frequency_translator_t::df [private]
```

Vector containing the shift frequencies in Hz.

4.115.3.3 fmin

```
MHAParser::float_t fshift_hilbert::frequency_translator_t::fmin [private]
```

Lower boundary for frequency shifter.

4.115.3.4 fmax

```
MHAParser::float_t fshift_hilbert::frequency_translator_t::fmax [private]
```

Upper boundary for frequency shifter.

4.115.3.5 irslen

```
MHAParser::int_t fshift_hilbert::frequency_translator_t::irslen [private]
```

Maximum length of cut off filter response.

4.115.3.6 phasemode

```
MHAParser::kw_t fshift_hilbert::frequency_translator_t::phasemode [private]
```

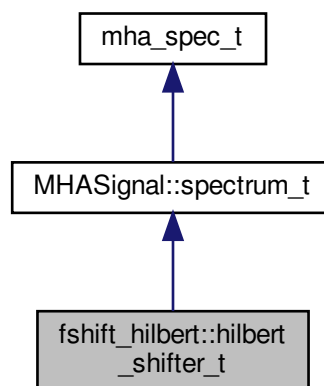
Mode of gain smoothing.

The documentation for this class was generated from the following file:

- **fshift_hilbert.cpp**

4.116 fshift_hilbert::hilbert_shifter_t Class Reference

Inheritance diagram for fshift_hilbert::hilbert_shifter_t:



Public Member Functions

- **hilbert_shifter_t** (unsigned int fftlen, unsigned int **channels**, **mha_real_t** srates, unsigned int **kmin**, unsigned int **kmax**, std::vector< **mha_real_t** > dphi, unsigned int **frameshift**, unsigned int maxirslen, unsigned int phasemode)
- **~hilbert_shifter_t** ()
- void **process** (**mha_spec_t** *)

Private Attributes

- **MHASignal::spectrum_t fullspec**
Part of the spectrum to be frequency shifted.
- **MHASignal::spectrum_t analytic**
*Analytic signal, defined as $a(t)=x(t)+i*H(x(t))$*
- **MHASignal::waveform_t shifted**
The frequency shifted signal in the time domain.
- **MHASignal::spectrum_t mixw_shift**
Helper variable containing the coefficients used to split the spectrum.
- **MHASignal::spectrum_t mixw_ref**
Helper variable containing the coefficients used to split the spectrum.
- **fftw_plan plan_spec2analytic**
FFT plan for the transformation of fullspec into the time domain.
- **mha_fft_t mhafft**
MHA wrapper object for fftw.
- **MHASignal::waveform_t df**
Vector holding one delta f value for every channel.
- unsigned int **kmin**
FFT frame that corresponds to f_{min} .
- unsigned int **kmax**
FFT frame that corresponds to f_{max} .
- unsigned int **frameshift**
Total phase advance within one fragment.
- std::vector< **mha_complex_t** > **delta_phi**
Phase advance per frame.
- std::vector< **mha_complex_t** > **delta_phi_total**
Sum of all phase advances.

Additional Inherited Members

4.116.1 Constructor & Destructor Documentation

4.116.1.1 hilbert_shifter_t()

```
fshift_hilbert::hilbert_shifter_t::hilbert_shifter_t (
    unsigned int fftlen,
    unsigned int channels,
    mha_real_t srates,
    unsigned int kmin,
    unsigned int kmax,
    std::vector< mha_real_t > dphi,
    unsigned int frameshift,
    unsigned int maxirslen,
    unsigned int phasemode )
```

4.116.1.2 ~hilbert_shifter_t()

```
fshift_hilbert::hilbert_shifter_t::~~hilbert_shifter_t ( )
```

4.116.2 Member Function Documentation

4.116.2.1 process()

```
void fshift_hilbert::hilbert_shifter_t::process (
    mha_spec_t * s )
```

4.116.3 Member Data Documentation

4.116.3.1 fullspec

```
MHASignal::spectrum_t fshift_hilbert::hilbert_shifter_t::fullspec [private]
```

Part of the spectrum to be frequency shifted.

4.116.3.2 analytic

```
MHASignal::spectrum_t fshift_hilbert::hilbert_shifter_t::analytic [private]
```

Analytic signal, defined as $a(t)=x(t)+i*H(x(t))$

4.116.3.3 shifted

```
MHASignal::waveform_t fshift_hilbert::hilbert_shifter_t::shifted [private]
```

The frequency shifted signal in the time domain.

4.116.3.4 mixw_shift

```
MHASignal::spectrum_t fshift_hilbert::hilbert_shifter_t::mixw_shift [private]
```

Helper variable containing the coefficients used to split the spectrum.

Contains 1 for every fft bin to be frequency shifted, 0 for all others

4.116.3.5 mixw_ref

```
MHASignal::spectrum_t fshift_hilbert::hilbert_shifter_t::mixw_ref [private]
```

Helper variable containing the coefficients used to split the spectrum.

Contains 0 for every fft bin to be frequency shifted, 1 for all others

4.116.3.6 plan_spec2analytic

```
fftw_plan fshift_hilbert::hilbert_shifter_t::plan_spec2analytic [private]
```

FFT plan for the transformation of fullspec into the time domain.

4.116.3.7 mhafft

```
mha_fft_t fshift_hilbert::hilbert_shifter_t::mhafft [private]
```

MHA wrapper object for fftw.

4.116.3.8 df

```
MHASignal::waveform_t fshift_hilbert::hilbert_shifter_t::df [private]
```

Vector holding one delta f value for every channel.

4.116.3.9 kmin

```
unsigned int fshift_hilbert::hilbert_shifter_t::kmin [private]
```

FFT frame that corresponds to f_min.

4.116.3.10 kmax

```
unsigned int fshift_hilbert::hilbert_shifter_t::kmax [private]
```

FFT frame that corresponds to f_max.

4.116.3.11 frameshift

```
unsigned int fshift_hilbert::hilbert_shifter_t::frameshift [private]
```

Total phase advance within one fragment.

4.116.3.12 delta_phi

```
std::vector< mha_complex_t> fshift_hilbert::hilbert_shifter_t::delta_phi [private]
```

Phase advance per frame.

4.116.3.13 delta_phi_total

```
std::vector< mha_complex_t> fshift_hilbert::hilbert_shifter_t::delta_phi_total [private]
```

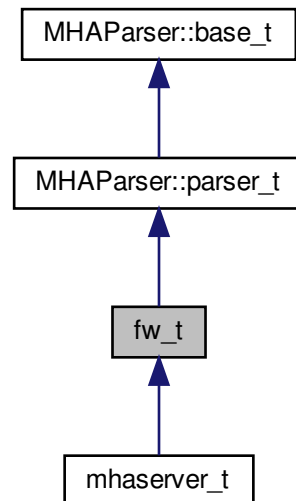
Sum of all phase advances.

The documentation for this class was generated from the following file:

- **fshift_hilbert.cpp**

4.117 fw_t Class Reference

Inheritance diagram for fw_t:



Public Member Functions

- `fw_t()`
- `~fw_t()`
- `bool exit_request() const`

Protected Attributes

- `int proc_error`
- `int io_error`

Private Types

- `enum state_t {
 fw_unprepared, fw_stopped, fw_starting, fw_running,
 fw_stopping, fw_exiting }`

Private Member Functions

- void **prepare** ()
preparation for processing
- void **start** ()
start of processing
- void **stop** ()
stop/pause of processing
- void **release** ()
release of IO device
- void **quit** ()
controlled quit
- void **stopped** (int, int)
- void **started** ()
- int **process** (mha_wave_t *, mha_wave_t **)
- void **exec_fw_command** ()
- void **load_proc_lib** ()
- void **load_io_lib** ()
- void **fw_sleep_cmd** ()
- void **fw_until_cmd** ()
- void **get_input_signal_dimension** ()
- void **async_read** ()
- void **async_poll_msg** ()
- void **get_parserstate** ()

Static Private Member Functions

- static void **stopped** (void *h, int proc_err, int io_err)
- static void **started** (void *h)
- static int **process** (void *h, mha_wave_t *sIn, mha_wave_t **sOut)

Private Attributes

- fw_vars_t prepare_vars
- MHAParser::int_mon_t nchannels_out
- MHAParser::string_t proc_name
- MHAParser::string_t io_name
- MHAParser::bool_t exit_on_stop
- MHAParser::int_t fw_sleep
- MHAParser::string_t fw_until
- MHAParser::kw_t fw_cmd
- MHAParser::string_mon_t parserstate
- MHAParser::string_t errorlog
- MHAParser::string_t fatallog
- MHAParser::vstring_t plugins

- **MHAParser::vstring_t plugin_paths**
- **MHAParser::bool_t dump_mha**
- **MHAParser::string_t inst_name**
A variable for naming MHA instances.
- **MHAKernel::algo_comm_class_t ac**
- **PluginLoader::mhapluginloader_t * proc_lib**
- **io_lib_t * io_lib**
- **mhaconfig_t cfin**
- **mhaconfig_t cfout**
- **state_t state**
- **bool b_exit_request**
- **MHAParser::string_mon_t proc_error_string**
- **MHAEvents::patchbay_t< fw_t > patchbay**

Additional Inherited Members

4.117.1 Member Enumeration Documentation

4.117.1.1 state_t

```
enum fw_t::state_t [private]
```

Enumerator

fw_unprepared	
fw_stopped	
fw_starting	
fw_running	
fw_stopping	
fw_exiting	

4.117.2 Constructor & Destructor Documentation

4.117.2.1 fw_t()

```
fw_t::fw_t ( )
```

4.117.2.2 ~fw_t()

```
fw_t::~~fw_t ( )
```

4.117.3 Member Function Documentation

4.117.3.1 exit_request()

```
bool fw_t::exit_request ( ) const [inline]
```

4.117.3.2 prepare()

```
void fw_t::prepare (
    void ) [private]
```

preparation for processing

4.117.3.3 start()

```
void fw_t::start ( ) [private]
```

start of processing

4.117.3.4 stop()

```
void fw_t::stop ( ) [private]
```

stop/pause of processing

4.117.3.5 release()

```
void fw_t::release ( ) [private]
```

release of IO device

4.117.3.6 quit()

```
void fw_t::quit ( ) [private]
```

controlled quit

4.117.3.7 stopped() [1/2]

```
static void fw_t::stopped (
    void * h,
    int proc_err,
    int io_err ) [inline], [static], [private]
```

4.117.3.8 started() [1/2]

```
static void fw_t::started (
    void * h ) [inline], [static], [private]
```

4.117.3.9 process() [1/2]

```
static int fw_t::process (
    void * h,
    mha_wave_t * sIn,
    mha_wave_t ** sOut ) [inline], [static], [private]
```

4.117.3.10 stopped() [2/2]

```
void fw_t::stopped (
    int proc_err,
    int io_err ) [private]
```

4.117.3.11 started() [2/2]

```
void fw_t::started ( ) [private]
```

4.117.3.12 process() [2/2]

```
int fw_t::process (
    mha_wave_t * s_in,
    mha_wave_t ** s_out ) [private]
```

4.117.3.13 exec_fw_command()

```
void fw_t::exec_fw_command ( ) [private]
```

4.117.3.14 load_proc_lib()

```
void fw_t::load_proc_lib ( ) [private]
```

4.117.3.15 load_io_lib()

```
void fw_t::load_io_lib ( ) [private]
```

4.117.3.16 fw_sleep_cmd()

```
void fw_t::fw_sleep_cmd ( ) [private]
```

4.117.3.17 fw_until_cmd()

```
void fw_t::fw_until_cmd ( ) [private]
```

4.117.3.18 get_input_signal_dimension()

```
void fw_t::get_input_signal_dimension ( ) [private]
```

4.117.3.19 `async_read()`

```
void fw_t::async_read ( )    [inline], [private]
```

4.117.3.20 `async_poll_msg()`

```
void fw_t::async_poll_msg ( )    [private]
```

4.117.3.21 `get_parserstate()`

```
void fw_t::get_parserstate ( )    [private]
```

4.117.4 Member Data Documentation**4.117.4.1 `prepare_vars`**

```
fw_vars_t fw_t::prepare_vars    [private]
```

4.117.4.2 `nchannels_out`

```
MHAParser::int_mon_t fw_t::nchannels_out    [private]
```

4.117.4.3 `proc_name`

```
MHAParser::string_t fw_t::proc_name    [private]
```

4.117.4.4 `io_name`

```
MHAParser::string_t fw_t::io_name    [private]
```

4.117.4.5 exit_on_stop

MHAParser::bool_t fw_t::exit_on_stop [private]

4.117.4.6 fw_sleep

MHAParser::int_t fw_t::fw_sleep [private]

4.117.4.7 fw_until

MHAParser::string_t fw_t::fw_until [private]

4.117.4.8 fw_cmd

MHAParser::kw_t fw_t::fw_cmd [private]

4.117.4.9 parserstate

MHAParser::string_mon_t fw_t::parserstate [private]

4.117.4.10 errorlog

MHAParser::string_t fw_t::errorlog [private]

4.117.4.11 fatallog

MHAParser::string_t fw_t::fatallog [private]

4.117.4.12 plugins

MHAParser::vstring_t fw_t::plugins [private]

4.117.4.13 plugin_paths

MHAParser::vstring_t fw_t::plugin_paths [private]

4.117.4.14 dump_mha

MHAParser::bool_t fw_t::dump_mha [private]

4.117.4.15 inst_name

MHAParser::string_t fw_t::inst_name [private]

A variable for naming MHA instances.

4.117.4.16 ac

MHAKernel::algo_comm_class_t fw_t::ac [private]

4.117.4.17 proc_lib

PluginLoader::mhapluginloader_t* fw_t::proc_lib [private]

4.117.4.18 io_lib

io_lib_t* fw_t::io_lib [private]

4.117.4.19 cfin

mhaconfig_t fw_t::cfin [private]

4.117.4.20 cfout

```
mhaconfig_t fw_t::cfout [private]
```

4.117.4.21 state

```
state_t fw_t::state [private]
```

4.117.4.22 b_exit_request

```
bool fw_t::b_exit_request [private]
```

4.117.4.23 proc_error

```
int fw_t::proc_error [protected]
```

4.117.4.24 io_error

```
int fw_t::io_error [protected]
```

4.117.4.25 proc_error_string

```
MHAParser::string_mon_t fw_t::proc_error_string [private]
```

4.117.4.26 patchbay

```
MHAEvents::patchbay_t< fw_t> fw_t::patchbay [private]
```

The documentation for this class was generated from the following files:

- **mhafw_lib.h**
- **mhafw_lib.cpp**

4.118 fw_vars_t Class Reference

Public Member Functions

- **fw_vars_t (MHAParser::parser_t &)**
- void **lock_srate_fragsize ()**
- void **lock_channels ()**
- void **unlock_srate_fragsize ()**
- void **unlock_channels ()**

Public Attributes

- **MHAParser::int_t pinchannels**
- **MHAParser::int_t pfragmentsize**
- **MHAParser::float_t psrate**

4.118.1 Constructor & Destructor Documentation

4.118.1.1 fw_vars_t()

```
fw_vars_t::fw_vars_t (
    MHAParser::parser_t & p ) [explicit]
```

4.118.2 Member Function Documentation

4.118.2.1 lock_srate_fragsize()

```
void fw_vars_t::lock_srate_fragsize ( )
```

4.118.2.2 lock_channels()

```
void fw_vars_t::lock_channels ( )
```

4.118.2.3 unlock_srate_fragsize()

```
void fw_vars_t::unlock_srate_fragsize ( )
```

4.118.2.4 unlock_channels()

```
void fw_vars_t::unlock_channels ( )
```

4.118.3 Member Data Documentation

4.118.3.1 pinchannels

```
MHAParser::int_t fw_vars_t::pinchannels
```

4.118.3.2 pfragmentsize

```
MHAParser::int_t fw_vars_t::pfragmentsize
```

4.118.3.3 psrate

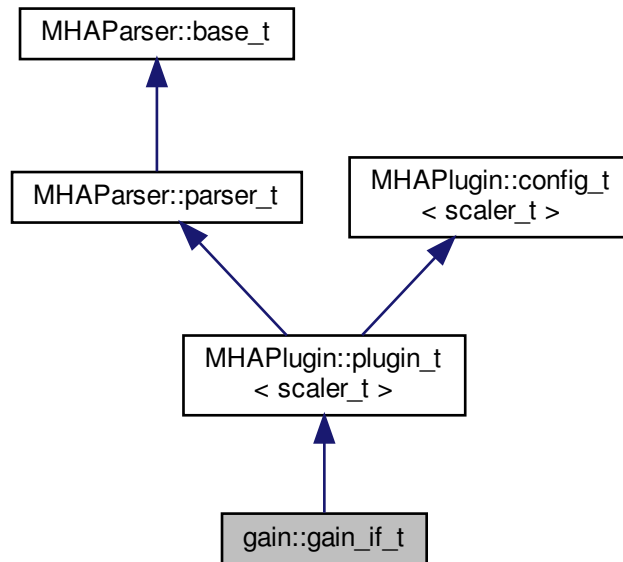
```
MHAParser::float_t fw_vars_t::psrate
```

The documentation for this class was generated from the following files:

- **mhafw_lib.h**
- **mhafw_lib.cpp**

4.119 gain::gain_if_t Class Reference

Inheritance diagram for gain::gain_if_t:



Public Member Functions

- **gain_if_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- **mha_spec_t** * **process** (**mha_spec_t** *)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()

Private Member Functions

- void **update_gain** ()
- void **update_minmax** ()

Private Attributes

- **MHAEvents::patchbay_t** < **gain_if_t** > **patchbay**
- **MHAParser::vfloat_t** **gains**
- **MHAParser::float_t** **vmin**
- **MHAParser::float_t** **vmax**

Additional Inherited Members

4.119.1 Constructor & Destructor Documentation

4.119.1.1 gain_if_t()

```
gain::gain_if_t::gain_if_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.119.2 Member Function Documentation

4.119.2.1 process() [1/2]

```
mha_wave_t * gain::gain_if_t::process (
    mha_wave_t * s )
```

4.119.2.2 process() [2/2]

```
mha_spec_t * gain::gain_if_t::process (
    mha_spec_t * s )
```

4.119.2.3 prepare()

```
void gain::gain_if_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t< scaler_t >** (p. 1099).

4.119.2.4 release()

```
void gain::gain_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< scaler_t >** (p. 1100).

4.119.2.5 update_gain()

```
void gain::gain_if_t::update_gain ( ) [private]
```

4.119.2.6 update_minmax()

```
void gain::gain_if_t::update_minmax ( ) [private]
```

4.119.3 Member Data Documentation

4.119.3.1 patchbay

```
MHAEvents::patchbay_t< gain_if_t> gain::gain_if_t::patchbay [private]
```

4.119.3.2 gains

```
MHAParser::vfloat_t gain::gain_if_t::gains [private]
```

4.119.3.3 vmin

```
MHAParser::float_t gain::gain_if_t::vmin [private]
```

4.119.3.4 vmax

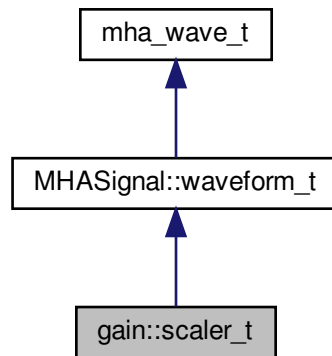
```
MHAParser::float_t gain::gain_if_t::vmax [private]
```

The documentation for this class was generated from the following file:

- **gain.cpp**

4.120 gain::scaler_t Class Reference

Inheritance diagram for gain::scaler_t:



Public Member Functions

- **scaler_t** (const unsigned int & **channels**, const **MHAParser::vfloat_t** &gains)

Additional Inherited Members

4.120.1 Constructor & Destructor Documentation

4.120.1.1 scaler_t()

```
gain::scaler_t::scaler_t (  
    const unsigned int & channels,  
    const MHAParser::vfloat_t & gains )
```

The documentation for this class was generated from the following file:

- **gain.cpp**

4.121 gsc_adaptive_stage::gsc_adaptive_stage Class Reference

Public Member Functions

- **gsc_adaptive_stage** (**algo_comm_t** & **ac**, const **mhaconfig_t**, int **lenOldSamps**, bool **doCircularComp**, float **mu**, float **alp**, bool **useVAD**, const std::string &**vadName_**)
Ctor of the rt processing class.
- **~gsc_adaptive_stage** ()=default
- **mha_wave_t** * **process** (**mha_wave_t** ***wavin**)
Processing callback.

Private Member Functions

- void **insert** ()
Re-insert all AC variables into the AC space.

Private Attributes

- **algo_comm_t** **ac**
Handle to AC space.
- unsigned int **lenOldSamps**
Number of old samples to buffer.
- unsigned int **lenNewSamps**
Number of new samples.
- unsigned int **bufSize**
Total buffer size.
- float **frac_old**
Fraction of new samples to total buffer size.
- **mha_fft_t** **mha_fft**
FFT handle.
- unsigned int **nfreq**
Number of frequency bins.
- unsigned int **nchan**
Number of channels in input signal.
- unsigned int **desired_chan**
Channel index containing the desired response.
- bool **doCircularComp**
Whether to compensate for circular convolution.
- float **mu**
Linear coefficient for gradient.
- float **alp**
Autoregressive coefficient for estimating PSD.
- bool **useVAD**

Whether to use VAD.

- **std::string vadName**
Name of VAD AC variable.
- **MHA_AC::waveform_t x**
Buffered input signal.
- **MHA_AC::spectrum_t X**
FFT of the buffered input signal.
- **MHA_AC::spectrum_t W**
Time-varying filter.
- **MHA_AC::spectrum_t Y**
Filter output, frequency domain.
- **MHA_AC::waveform_t y**
Filter output, time domain.
- **MHA_AC::waveform_t d**
Desired response.
- **MHA_AC::waveform_t e**
Error signal, time domain.
- **MHA_AC::spectrum_t E**
Error signal, frequency domain.
- **MHA_AC::spectrum_t E2**
Error spectrum multiplied by input spectrum: $E2=X \cdot E$.
- **MHA_AC::waveform_t grad**
Gradient.
- **MHA_AC::spectrum_t Grad**
FT of the gradient.
- **MHA_AC::waveform_t e_out**
Error signal.
- **MHA_AC::waveform_t P**
Signal power estimate.
- **MHA_AC::waveform_t Psum**
Signal power estimate, summed over all channels.

4.121.1 Constructor & Destructor Documentation

4.121.1.1 gsc_adaptive_stage()

```
gsc_adaptive_stage::gsc_adaptive_stage::gsc_adaptive_stage (
    algo_comm_t & ac,
    const mhaconfig_t in_cfg,
    int lenOldSamps,
    bool doCircularComp,
    float mu,
```

```
float alp,  
bool useVAD,  
const std::string & vadName_ )
```

Ctor of the rt processing class.

Parameters

<i>ac</i>	Handle to AC space
<i>in_cfg</i>	Input signal configuration
<i>lenOldSamps</i>	How many old samples to buffer
<i>doCircularComp</i>	Compensate for circular convolution?
<i>mu</i>	Scalar coefficient for gradient
<i>alp</i>	Autoregressive coefficient for estimating PSD
<i>useVAD</i>	Use voice activity detection?
<i>vadName_</i>	Name of the VAD AC variable

4.121.1.2 ~gsc_adaptive_stage()

```
gsc_adaptive_stage::gsc_adaptive_stage::~~gsc_adaptive_stage ( ) [default]
```

4.121.2 Member Function Documentation

4.121.2.1 process()

```
mha_wave_t * gsc_adaptive_stage::gsc_adaptive_stage::process (
    mha_wave_t * wavin )
```

Processing callback.

Parameters

<i>wavin</i>	input signal
--------------	--------------

Returns

Returns a pointer to the output signal

4.121.2.2 insert()

```
void gsc_adaptive_stage::gsc_adaptive_stage::insert ( ) [private]
```

Re-insert all AC variables into the AC space.

4.121.3 Member Data Documentation

4.121.3.1 ac

```
algo_comm_t gsc_adaptive_stage::gsc_adaptive_stage::ac [private]
```

Handle to AC space.

4.121.3.2 lenOldSamps

```
unsigned int gsc_adaptive_stage::gsc_adaptive_stage::lenOldSamps [private]
```

Number of old samples to buffer.

4.121.3.3 lenNewSamps

```
unsigned int gsc_adaptive_stage::gsc_adaptive_stage::lenNewSamps [private]
```

Number of new samples.

4.121.3.4 bufSize

```
unsigned int gsc_adaptive_stage::gsc_adaptive_stage::bufSize [private]
```

Total buffer size.

Must be lenOldSamps+lenNewSamps

4.121.3.5 frac_old

```
float gsc_adaptive_stage::gsc_adaptive_stage::frac_old [private]
```

Fraction of new samples to total buffer size.

4.121.3.6 mha_fft

`mha_fft_t gsc_adaptive_stage::gsc_adaptive_stage::mha_fft [private]`

FFT handle.

4.121.3.7 nfreq

`unsigned int gsc_adaptive_stage::gsc_adaptive_stage::nfreq [private]`

Number of frequency bins.

4.121.3.8 nchan

`unsigned int gsc_adaptive_stage::gsc_adaptive_stage::nchan [private]`

Number of channels in input signal.

4.121.3.9 desired_chan

`unsigned int gsc_adaptive_stage::gsc_adaptive_stage::desired_chan [private]`

Channel index containing the desired response.

Always last channel by convention

4.121.3.10 doCircularComp

`bool gsc_adaptive_stage::gsc_adaptive_stage::doCircularComp [private]`

Whether to compensate for circular convolution.

4.121.3.11 mu

`float gsc_adaptive_stage::gsc_adaptive_stage::mu [private]`

Linear coefficient for gradient.

4.121.3.12 alp

```
float gsc_adaptive_stage::gsc_adaptive_stage::alp [private]
```

Autoregressive coefficient for estimating PSD.

4.121.3.13 useVAD

```
bool gsc_adaptive_stage::gsc_adaptive_stage::useVAD [private]
```

Whether to use VAD.

4.121.3.14 vadName

```
std::string gsc_adaptive_stage::gsc_adaptive_stage::vadName [private]
```

Name of VAD AC variable.

4.121.3.15 x

```
MHA_AC::waveform_t gsc_adaptive_stage::gsc_adaptive_stage::x [private]
```

Buffered input signal.

4.121.3.16 X

```
MHA_AC::spectrum_t gsc_adaptive_stage::gsc_adaptive_stage::X [private]
```

FFT of the buffered input signal.

4.121.3.17 W

```
MHA_AC::spectrum_t gsc_adaptive_stage::gsc_adaptive_stage::W [private]
```

Time-varying filter.

4.121.3.18 Y

MHA_AC::spectrum_t gsc_adaptive_stage::gsc_adaptive_stage::Y [private]

Filter output, frequency domain.

4.121.3.19 y

MHA_AC::waveform_t gsc_adaptive_stage::gsc_adaptive_stage::y [private]

Filter output, time domain.

4.121.3.20 d

MHA_AC::waveform_t gsc_adaptive_stage::gsc_adaptive_stage::d [private]

Desired response.

4.121.3.21 e

MHA_AC::waveform_t gsc_adaptive_stage::gsc_adaptive_stage::e [private]

Error signal, time domain.

4.121.3.22 E

MHA_AC::spectrum_t gsc_adaptive_stage::gsc_adaptive_stage::E [private]

Error signal, frequency domain.

4.121.3.23 E2

MHA_AC::spectrum_t gsc_adaptive_stage::gsc_adaptive_stage::E2 [private]

Error spectrum multiplied by input spectrum: $E2 = X * E$.

4.121.3.24 grad

MHA_AC::waveform_t gsc_adaptive_stage::gsc_adaptive_stage::grad [private]

Gradient.

4.121.3.25 Grad

MHA_AC::spectrum_t gsc_adaptive_stage::gsc_adaptive_stage::Grad [private]

FT of the gradient.

4.121.3.26 e_out

MHA_AC::waveform_t gsc_adaptive_stage::gsc_adaptive_stage::e_out [private]

Error signal.

4.121.3.27 P

MHA_AC::waveform_t gsc_adaptive_stage::gsc_adaptive_stage::P [private]

Signal power estimate.

4.121.3.28 Psum

MHA_AC::waveform_t gsc_adaptive_stage::gsc_adaptive_stage::Psum [private]

Signal power estimate, summed over all channels.

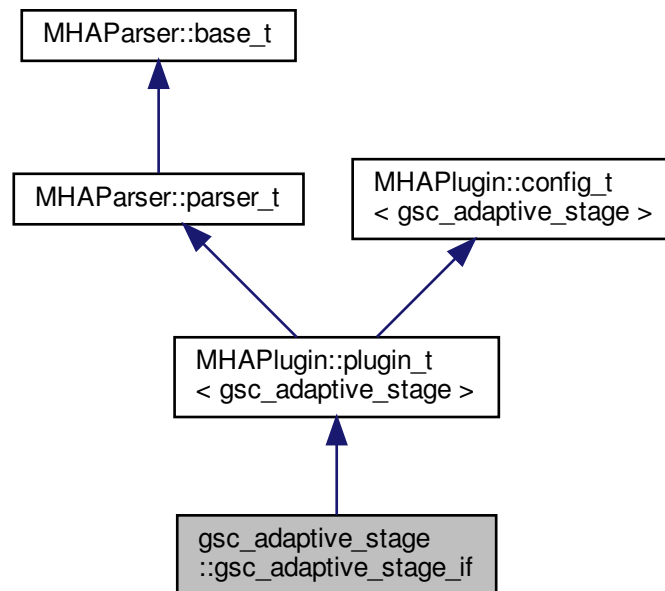
The documentation for this class was generated from the following files:

- **gsc_adaptive_stage.hh**
- **gsc_adaptive_stage.cpp**

4.122 gsc_adaptive_stage::gsc_adaptive_stage_if Class Reference

Plugin interface class.

Inheritance diagram for gsc_adaptive_stage::gsc_adaptive_stage_if:



Public Member Functions

- **gsc_adaptive_stage_if** (**algo_comm_t** & **ac**, const std::string &, const std::string &)
Constructs the interface to the adaptive filter plugin.
- **~gsc_adaptive_stage_if** ()=default
- **mha_wave_t** * **process** (**mha_wave_t** *)
This plugin implements noise reduction using spectral subtraction: By nonnegative subtraction from the output magnitude of the estimated noise magnitude spectrum.
- void **prepare** (**mhaconfig_t** &)
Plugin preparation.
- void **release** (void)

Private Member Functions

- void **update_cfg** ()
Update the rt config.
- void **on_model_param_valuechanged** ()

Private Attributes

- **MHAEvents::patchbay_t< gsc_adaptive_stage_if > patchbay**
- **MHAParser::int_t lenOldSamps**
How many old samples should be buffered per filter block.
- **MHAParser::bool_t doCircularComp**
Whether to compensate for circular convolution.
- **MHAParser::float_t mu**
Linear coefficient for gradient used in filter adaption.
- **MHAParser::float_t alp**
Autoregressive coefficient for PSD estimation.
- **MHAParser::bool_t useVAD**
Whether to use VAD for conditional filter adaption.
- **MHAParser::string_t vadName**
Name of VAD AC variable.

Additional Inherited Members

4.122.1 Detailed Description

Plugin interface class.

4.122.2 Constructor & Destructor Documentation

4.122.2.1 gsc_adaptive_stage_if()

```
gsc_adaptive_stage::gsc_adaptive_stage_if::gsc_adaptive_stage_if (
    algo_comm_t & ac,
    const std::string & ,
    const std::string & )
```

Constructs the interface to the adaptive filter plugin.

Parameters

<i>ac</i>	Handle to the ac space
-----------	------------------------

4.122.2.2 ~gsc_adaptive_stage_if()

```
gsc_adaptive_stage::gsc_adaptive_stage_if::~gsc_adaptive_stage_if ( ) [default]
```

4.122.3 Member Function Documentation

4.122.3.1 process()

```
mha_wave_t * gsc_adaptive_stage::gsc_adaptive_stage_if::process (
    mha_wave_t * signal )
```

This plugin implements noise reduction using spectral subtraction: By nonnegative subtraction from the output magnitude of the estimated noise magnitude spectrum.

Parameters

<i>signal</i>	Pointer to the input signal structure.
---------------	--

Returns

Returns a pointer to the input signal structure, with a the signal modified by this plugin.

4.122.3.2 prepare()

```
void gsc_adaptive_stage::gsc_adaptive_stage_if::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

This plugin checks that the input signal has the spectral domain and contains at least one channel

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPlugin::plugin_t< gsc_adaptive_stage >** (p. [1099](#)).

4.122.3.3 release()

```
void gsc_adaptive_stage::gsc_adaptive_stage_if::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< gsc_adaptive_stage >** (p. [1100](#)).

4.122.3.4 update_cfg()

```
void gsc_adaptive_stage::gsc_adaptive_stage_if::update_cfg (
    void ) [private]
```

Update the rt config.

4.122.3.5 on_model_param_valuechanged()

```
void gsc_adaptive_stage::gsc_adaptive_stage_if::on_model_param_valuechanged ( )
[private]
```

4.122.4 Member Data Documentation

4.122.4.1 patchbay

```
MHAEvents::patchbay_t< gsc_adaptive_stage_if> gsc_adaptive_stage::gsc_adaptive_↔
stage_if::patchbay [private]
```

4.122.4.2 lenOldSamps

```
MHAParser::int_t gsc_adaptive_stage::gsc_adaptive_stage_if::lenOldSamps [private]
```

How many old samples should be buffered per filter block.

4.122.4.3 doCircularComp

```
MHAParser::bool_t gsc_adaptive_stage::gsc_adaptive_stage_if::doCircularComp [private]
```

Whether to compensate for circular convolution.

4.122.4.4 mu

```
MHAParser::float_t gsc_adaptive_stage::gsc_adaptive_stage_if::mu [private]
```

Linear coefficient for gradient used in filter adaption.

4.122.4.5 alp

MHAParser::float_t gsc_adaptive_stage::gsc_adaptive_stage_if::alp [private]

Autoregressive coefficient for PSD estimation.

4.122.4.6 useVAD

MHAParser::bool_t gsc_adaptive_stage::gsc_adaptive_stage_if::useVAD [private]

Whether to use VAD for conditional filter adaption.

4.122.4.7 vadName

MHAParser::string_t gsc_adaptive_stage::gsc_adaptive_stage_if::vadName [private]

Name of VAD AC variable.

Ignored if useVAD=no

The documentation for this class was generated from the following files:

- **gsc_adaptive_stage_if.hh**
- **gsc_adaptive_stage_if.cpp**

4.123 gtfb_analyzer::gtfb_analyzer_cfg_t Struct Reference

Configuration for Gammatone Filterbank Analyzer.

Public Member Functions

- unsigned **bands** () const
Each band is split into this number of bands.
- unsigned **channels** () const
The number of separate audio channels.
- unsigned **frames** () const
The number of frames in one chunk.
- **mha_complex_t** * **states** (unsigned channel, unsigned band)
Returns pointer to filter states for that band.
- **gtfb_analyzer_cfg_t** (unsigned ch, unsigned **frames**, unsigned ord, const std::vector<**mha_complex_t**> &_coeff, const std::vector<**mha_complex_t**> &_norm_phase)
Create a configuration for Gammatone Filterbank Analyzer.
- ~**gtfb_analyzer_cfg_t** ()
- **mha_complex_t** & **cvalue** (unsigned frame, unsigned channel, unsigned band)

Public Attributes

- unsigned **order**
The order of the gammatone filters.
- std::vector< **mha_complex_t** > **coeff**
The complex coefficients of the gammatone filter bands.
- std::vector< **mha_complex_t** > **norm_phase**
Combination of normalization and phase correction factor.
- **mha_wave_t** **s_out**
Storage for the (complex) output signal.
- std::vector< **mha_complex_t** > **state**
Storage for Filter state.

4.123.1 Detailed Description

Configuration for Gammatone Filterbank Analyzer.

4.123.2 Constructor & Destructor Documentation

4.123.2.1 gtfb_analyzer_cfg_t()

```
gtfb_analyzer::gtfb_analyzer_cfg_t::gtfb_analyzer_cfg_t (
    unsigned ch,
    unsigned frames,
    unsigned ord,
    const std::vector< mha_complex_t > & _coeff,
    const std::vector< mha_complex_t > & _norm_phase ) [inline]
```

Create a configuration for Gammatone Filterbank Analyzer.

Parameters

<i>ch</i>	Number of Audio channels.
<i>frames</i>	Number of Audio frames per chunk.
<i>ord</i>	The order of the gammatone filters.
<i>_coeff</i>	Complex gammatone filter coefficients.
<i>_norm_phase</i>	Normalization and phase correction factors.

4.123.2 ~gtfb_analyzer_cfg_t()

```
gtfb_analyzer::gtfb_analyzer_cfg_t::~~gtfb_analyzer_cfg_t ( ) [inline]
```

4.123.3 Member Function Documentation

4.123.3.1 bands()

```
unsigned gtfb_analyzer::gtfb_analyzer_cfg_t::bands ( ) const [inline]
```

Each band is split into this number of bands.

4.123.3.2 channels()

```
unsigned gtfb_analyzer::gtfb_analyzer_cfg_t::channels ( ) const [inline]
```

The number of separate audio channels.

4.123.3.3 frames()

```
unsigned gtfb_analyzer::gtfb_analyzer_cfg_t::frames ( ) const [inline]
```

The number of frames in one chunk.

4.123.3.4 states()

```
mha_complex_t* gtfb_analyzer::gtfb_analyzer_cfg_t::states (
    unsigned channel,
    unsigned band ) [inline]
```

Returns pointer to filter states for that band.

4.123.3.5 cvalue()

```
mha_complex_t& gtfb_analyzer::gtfb_analyzer_cfg_t::cvalue (
    unsigned frame,
    unsigned channel,
    unsigned band ) [inline]
```

4.123.4 Member Data Documentation

4.123.4.1 order

```
unsigned gtfb_analyzer::gtfb_analyzer_cfg_t::order
```

The order of the gammatone filters.

4.123.4.2 coeff

```
std::vector< mha_complex_t> gtfb_analyzer::gtfb_analyzer_cfg_t::coeff
```

The complex coefficients of the gammatone filter bands.

4.123.4.3 norm_phase

```
std::vector< mha_complex_t> gtfb_analyzer::gtfb_analyzer_cfg_t::norm_phase
```

Combination of normalization and phase correction factor.

4.123.4.4 s_out

```
mha_wave_t gtfb_analyzer::gtfb_analyzer_cfg_t::s_out
```

Storage for the (complex) output signal.

Each of the real input audio channels is split into frequency bands with complex time signal output. The split complex time signal is again stored in a **mha_wave_t** (p. 780) buffer. Each complex time signal is stored as adjacent real and imaginary channels. Complex output from one source channel is stored in adjacent complex output channels.

Example: If the input has 2 channels ch0 ch1, and **gtfb_analyzer** (p. 98) splits into 3 bands b0 b1 b2, then the order of output channels in s_out is: ch0_b0_real ch0_b0_imag ch0_b1_real ch0_b1_imag ch0_b2_real ch0_b2_imag ch1_b0_real ch1_b1_imag ch1_b1_real ch1_b1_↔
imag ch1_b2_real ch1_b2_imag

4.123.4.5 state

```
std::vector< mha_complex_t> gtfb_analyzer::gtfb_analyzer_cfg_t::state
```

Storage for Filter state.

Holds **channels()** (p. 533) * **bands()** (p. 533) * order complex filter states. Layout: $\text{state}[(\text{bands}() * \text{channel} + \text{band}) * \text{order} + \text{stage}]$

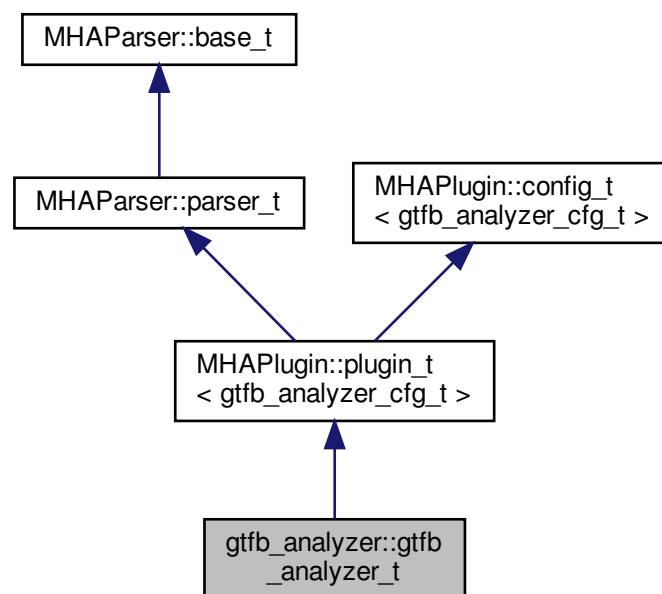
The documentation for this struct was generated from the following file:

- **gtfb_analyzer.cpp**

4.124 gtfb_analyzer::gtfb_analyzer_t Class Reference

Gammatone Filterbank Analyzer Plugin.

Inheritance diagram for gtfb_analyzer::gtfb_analyzer_t:



Public Member Functions

- **gtfb_analyzer_t** (const **algo_comm_t** &, const std::string &thread_name, const std::string &algo_name)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t** < **gtfb_analyzer_t** > **patchbay**
- bool **prepared**
- **MHAParser::int_t** **order**
- **MHAParser::vcomplex_t** **coeff**
- **MHAParser::vcomplex_t** **norm_phase**

Additional Inherited Members

4.124.1 Detailed Description

Gammatone Filterbank Analyzer Plugin.

4.124.2 Constructor & Destructor Documentation

4.124.2.1 **gtfb_analyzer_t**()

```
gtfb_analyzer::gtfb_analyzer_t::gtfb_analyzer_t (
    const algo_comm_t & iac,
    const std::string & thread_name,
    const std::string & algo_name )
```

4.124.3 Member Function Documentation

4.124.3.1 **process**()

```
mha_wave_t * gtfb_analyzer::gtfb_analyzer_t::process (
    mha_wave_t * s )
```

4.124.3.2 prepare()

```
void gtfb_analyzer::gtfb_analyzer_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t**< **gtfb_analyzer_cfg_t** > (p. 1099).

4.124.3.3 update_cfg()

```
void gtfb_analyzer::gtfb_analyzer_t::update_cfg (
    void ) [private]
```

4.124.4 Member Data Documentation

4.124.4.1 patchbay

```
MHAEvents::patchbay_t< gtfb_analyzer_t> gtfb_analyzer::gtfb_analyzer_t::patchbay
[private]
```

4.124.4.2 prepared

```
bool gtfb_analyzer::gtfb_analyzer_t::prepared [private]
```

4.124.4.3 order

```
MHAParser::int_t gtfb_analyzer::gtfb_analyzer_t::order [private]
```

4.124.4.4 coeff

```
MHAParser::vcomplex_t gtfb_analyzer::gtfb_analyzer_t::coeff [private]
```

4.124.4.5 norm_phase

```
MHAParser::vcomplex_t gtfb_analyzer::gtfb_analyzer_t::norm_phase [private]
```

The documentation for this class was generated from the following file:

- **gtfb_analyzer.cpp**

4.125 gtfb_simd_cfg_t Class Reference

Public Member Functions

- unsigned **get_bands** () const
Each band is split into this number of bands.
- unsigned **get_channels** () const
The number of separate audio channels.
- unsigned **get_frames** () const
The number of frames in one chunk.
- **gtfb_simd_cfg_t** (**gtfb_simd_cfg_t** &&)=delete
- **gtfb_simd_cfg_t** & **operator=** (**gtfb_simd_cfg_t** &&)=delete
- **gtfb_simd_cfg_t** (const **gtfb_simd_cfg_t** &)=delete
- **gtfb_simd_cfg_t** & **operator=** (const **gtfb_simd_cfg_t** &)=delete
- **gtfb_simd_cfg_t** (unsigned ch, unsigned frames, unsigned ord, const std::vector< **mha_complex_t** > &_coeff, const std::vector< **mha_complex_t** > &_norm_phase)
- ~**gtfb_simd_cfg_t** ()
- **mha_wave_t** * **process** (**mha_wave_t** *s_in)

Private Attributes

- unsigned **order**
The order of the gammatone filters.
- unsigned **bands**
Number of frequency bands per channel.
- unsigned **channels**
Number of input audio channels.
- unsigned **bandsXchannels**
Product of bands and channels.
- std::vector< **mha_complex_t** > **norm_phase**
Combination of normalization and phase correction factor.
- float * **rinputs**
input signal (1 sample) multiplied with norm_phase
- float * **iinputs**
- float * **rcoefficients**
The complex coefficients of the gammatone filter bands.

- float * **icoefficients**
- float * **rstates**
- float * **istates**
- float * **sout_buf**
output signal buffer, used by s_out.
- float * **large_array**
Large float array.
- **mha_wave_t s_out**

4.125.1 Detailed Description

Configuration for Gammatone Filterbank SIMD Analyzer.

4.125.2 Constructor & Destructor Documentation

4.125.2.1 gtfb_simd_cfg_t() [1/3]

```
gtfb_simd_cfg_t::gtfb_simd_cfg_t (
    gtfb_simd_cfg_t && ) [delete]
```

4.125.2.2 gtfb_simd_cfg_t() [2/3]

```
gtfb_simd_cfg_t::gtfb_simd_cfg_t (
    const gtfb_simd_cfg_t & ) [delete]
```

4.125.2.3 gtfb_simd_cfg_t() [3/3]

```
gtfb_simd_cfg_t::gtfb_simd_cfg_t (
    unsigned ch,
    unsigned frames,
    unsigned ord,
    const std::vector< mha_complex_t > & _coeff,
    const std::vector< mha_complex_t > & _norm_phase ) [inline]
```

Create a configuration for Gammatone Filterbank Analyzer.

Parameters

<i>ch</i>	Number of Audio channels.
<i>frames</i>	Number of Audio frames per chunk.
<i>ord</i>	The order of the gammatone filters.
<i>_coeff</i>	Complex gammatone filter coefficients.
<i>_norm_phase</i>	Normalization and phase correction factors.

4.125.2.4 ~gtfb_simd_cfg_t()

```
gtfb_simd_cfg_t::~gtfb_simd_cfg_t ( ) [inline]
```

4.125.3 Member Function Documentation**4.125.3.1 get_bands()**

```
unsigned gtfb_simd_cfg_t::get_bands ( ) const [inline]
```

Each band is split into this number of bands.

4.125.3.2 get_channels()

```
unsigned gtfb_simd_cfg_t::get_channels ( ) const [inline]
```

The number of separate audio channels.

4.125.3.3 get_frames()

```
unsigned gtfb_simd_cfg_t::get_frames ( ) const [inline]
```

The number of frames in one chunk.

4.125.3.4 operator=() [1/2]

```
gtfb_simd_cfg_t& gtfb_simd_cfg_t::operator= (
    gtfb_simd_cfg_t && ) [delete]
```

4.125.3.5 operator=() [2/2]

```
gtfb_simd_cfg_t& gtfb_simd_cfg_t::operator= (
    const gtfb_simd_cfg_t & ) [delete]
```

4.125.3.6 process()

```
mha_wave_t* gtfb_simd_cfg_t::process (
    mha_wave_t * s_in ) [inline]
```

4.125.4 Member Data Documentation

4.125.4.1 order

```
unsigned gtfb_simd_cfg_t::order [private]
```

The order of the gammatone filters.

4.125.4.2 bands

```
unsigned gtfb_simd_cfg_t::bands [private]
```

Number of frequency bands per channel.

4.125.4.3 channels

```
unsigned gtfb_simd_cfg_t::channels [private]
```

Number of input audio channels.

4.125.4.4 bandsXchannels

```
unsigned gtfb_simd_cfg_t::bandsXchannels [private]
```

Product of bands and channels.

4.125.4.5 norm_phase

```
std::vector< mha_complex_t> gtfb_simd_cfg_t::norm_phase [private]
```

Combination of normalization and phase correction factor.

4.125.4.6 rinputs

```
float* gtfb_simd_cfg_t::rinputs [private]
```

input signal (1 sample) multiplied with norm_phase

4.125.4.7 iinputs

```
float* gtfb_simd_cfg_t::iinputs [private]
```

4.125.4.8 rcoefficients

```
float* gtfb_simd_cfg_t::rcoefficients [private]
```

The complex coefficients of the gammatone filter bands.

4.125.4.9 icoefficients

```
float* gtfb_simd_cfg_t::icoefficients [private]
```


4.125.4.10 rstates

```
float* gtfb_simd_cfg_t::rstates [private]
```

Storage for Filter state. Holds **channels()** (p. 541) * **bands()** (p. 541) * order complex filter states. Layout: state[stage * bandsXchannels + **bands()** (p. 541)*channel+band]

4.125.4.11 istates

```
float* gtfb_simd_cfg_t::istates [private]
```

4.125.4.12 sout_buf

```
float* gtfb_simd_cfg_t::sout_buf [private]
```

output signal buffer, used by s_out.

Contains bandsXchannels * fragsize * 2 entries. all real parts come before all complex parts. Order is: channel 0 band 0 real, channel 0 band 1 real, ..., channel 1 band 0 real channel 1 band 1 real, ... channel 0 band 0 imag ... then next sample

4.125.4.13 large_array

```
float* gtfb_simd_cfg_t::large_array [private]
```

Large float array.

All previous pointers point into this array. Contains 3 unused entries to be able to adjust for alignment.

4.125.4.14 s_out

```
mha_wave_t gtfb_simd_cfg_t::s_out [private]
```

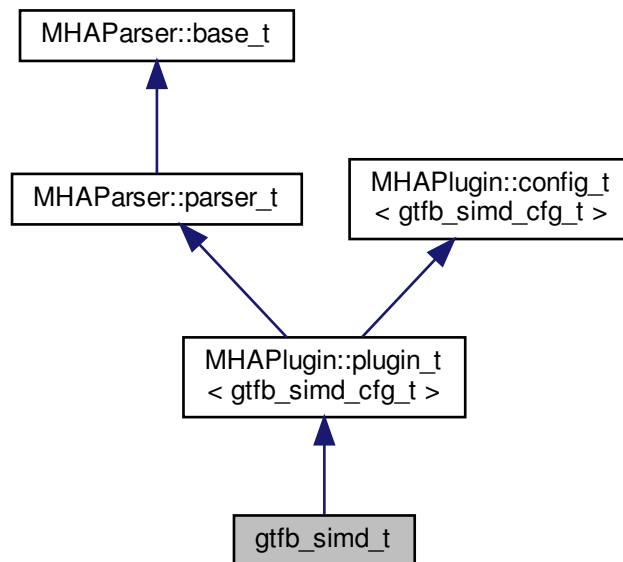
Storage for the (complex) output signal. Each of the real input audio channels is split into frequency bands with complex time signal output. The split complex time signal is again stored in a **mha_wave_t** (p. 780) buffer. Each complex time signal is stored as adjacent real and imaginary channels. Complex output from one source channel is stored in adjacent complex output channels.

The documentation for this class was generated from the following file:

- **gtfb_simd.cpp**

4.126 gtfb_simd_t Class Reference

Inheritance diagram for gtfb_simd_t:



Public Member Functions

- **gtfb_simd_t** (const **algo_comm_t** &, const std::string &thread_name, const std::string &algo_name)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t** < **gtfb_simd_t** > **patchbay**
- bool **prepared**
- **MHAParser::int_t** **order**
- **MHAParser::vcomplex_t** **coeff**
- **MHAParser::vcomplex_t** **norm_phase**

Additional Inherited Members

4.126.1 Constructor & Destructor Documentation

4.126.1.1 `gtfb_simd_t()`

```
gtfb_simd_t::gtfb_simd_t (
    const algo_comm_t & iac,
    const std::string & thread_name,
    const std::string & algo_name )
```

4.126.2 Member Function Documentation

4.126.2.1 `process()`

```
mha_wave_t * gtfb_simd_t::process (
    mha_wave_t * s )
```

4.126.2.2 `prepare()`

```
void gtfb_simd_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t**< **gtfb_simd_cfg_t** > (p. [1099](#)).

4.126.2.3 `update_cfg()`

```
void gtfb_simd_t::update_cfg (
    void ) [private]
```

4.126.3 Member Data Documentation

4.126.3.1 patchbay

```
MHAEvents::patchbay_t< gtfb_simd_t> gtfb_simd_t::patchbay [private]
```

4.126.3.2 prepared

```
bool gtfb_simd_t::prepared [private]
```

4.126.3.3 order

```
MHAParser::int_t gtfb_simd_t::order [private]
```

4.126.3.4 coeff

```
MHAParser::vcomplex_t gtfb_simd_t::coeff [private]
```

4.126.3.5 norm_phase

```
MHAParser::vcomplex_t gtfb_simd_t::norm_phase [private]
```

The documentation for this class was generated from the following file:

- **gtfb_simd.cpp**

4.127 gtfb_simple_rt_t Class Reference

Runtime configuration class of gtfb_simple_bridge plugin.

Public Member Functions

- **gtfb_simple_rt_t** (**algo_comm_t** ac, const std::string &name, **mhaconfig_t** &chcfg, std::vector< **mha_real_t** > cf, std::vector< **mha_real_t** > bw, unsigned int order, unsigned int pre_stages, unsigned int desired_delay, std::vector< **mha_real_t** > &vcltass, std::vector< **mha_real_t** > &resynthesis_gain, const std::string &element_gain_name)
- **mha_wave_t** * **pre_plugin** (**mha_wave_t** *s)
Filter real input signal s with the pre_stages filter orders in each gammatone filter band.
- **mha_wave_t** * **post_plugin** (**mha_wave_t** *s)
Post-filter the complex-valued filter-bank signal s after it has been processed by the loaded plugin.
- const **MHAFilter::gammaflt_t** & **get_gf** () const
Const-accessor to contained gammatone filterbank object.

Static Private Member Functions

- static std::vector< **mha_real_t** > **duplicate_vector** (const std::vector< **mha_real_t** > &src, unsigned int nchannels)
Helper function to repeat the elements in a vector.

Private Attributes

- unsigned int **_order**
Total number of gammatone filter orders.
- unsigned int **_pre_stages**
Number of filter orders applied before the loaded plugin is invoked.
- unsigned int **nbands**
Number of frequency bands to produce = number of gammatone filters.
- **MHA_AC::waveform_t** **imag**
Storage for the imaginary part of the filterbank signal.
- **MHA_AC::waveform_t** **accf**
AC variable to publish the center frequencies of the gammatone filters.
- **MHA_AC::waveform_t** **acbw**
AC variable to publish the bandwidths of the gammatone filters.
- **MHASignal::waveform_t** **input**
Real part of the filterbank signal.
- **MHASignal::waveform_t** **output**
Resynthesized broadband signal, used as the output signal of this plugin.
- **MHAFilter::gammaflt_t** **gf**
The gammatone filter bank implementation.
- **MHA_AC::waveform_t** **cLTASS**
AC variable to publish band-specific LTASS level correction values.
- **MHA_AC::waveform_t** **ac_resynthesis_gain**
AC variable to publish the configured per-frequency resynthesis gains.
- std::string **element_gain_name_**
Either an empty string, or the name of an AC variable from which element-wise linear factors are read.
- **algo_comm_t** **_ac**
Algorithm Communication Variable space.

4.127.1 Detailed Description

Runtime configuration class of gtfb_simple_bridge plugin.

4.127.2 Constructor & Destructor Documentation

4.127.2.1 gtfb_simple_rt_t()

```
gtfb_simple_rt_t::gtfb_simple_rt_t (
    algo_comm_t ac,
    const std::string & name,
    mhaconfig_t & chcfg,
    std::vector< mha_real_t > cf,
    std::vector< mha_real_t > bw,
    unsigned int order,
    unsigned int pre_stages,
    unsigned int desired_delay,
    std::vector< mha_real_t > & vcltass,
    std::vector< mha_real_t > & resynthesis_gain,
    const std::string & element_gain_name )
```

4.127.3 Member Function Documentation

4.127.3.1 pre_plugin()

```
mha_wave_t * gtfb_simple_rt_t::pre_plugin (
    mha_wave_t * s )
```

Filter real input signal *s* with the *pre_stages* filter orders in each gammatone filter band.

The real part of the complex output is returned in the return value of the method, the imaginary part is stored into the AC variable.

Parameters

<i>s</i>	real-valued, broad-band input signal
----------	--------------------------------------

Returns

real part of complex-valued output signal after *pre_stages* gammatone filter orders have been applied in each band. Order of output bands in real and imaginary output are: (channel0,band0), (channel0,band1), ..., (cannel1,band0), ...

4.127.3.2 post_plugin()

```
mha_wave_t * gtfb_simple_rt_t::post_plugin (
    mha_wave_t * s )
```

Post-filter the complex-valued filter-bank signal *s* after it has been processed by the loaded plugin.

The remaining gammatone filter orders are applied to restrict the loaded plugin's output signal to the respective bands. After

Parameters

<i>s</i>	complex-valued, filter-bank signal. This signal is produced by letting the loaded plugin process the output signal of the <code>pre_plugin</code> method.
----------	---

Returns

real part of complex-valued output signal after `pre_stages` gammatone filter orders have been applied in each band. Order of output bands in real and imaginary output are: (channel0,band0), (channel0,band1), ..., (channel1,band0), ...

4.127.3.3 get_gf()

```
const MHAFilter::gammaflt_t& gtfb_simple_rt_t::get_gf ( ) const [inline]
```

Const-accessor to contained gammatone filterbank object.

4.127.3.4 duplicate_vector()

```
std::vector< mha_real_t > gtfb_simple_rt_t::duplicate_vector (
    const std::vector< mha_real_t > & src,
    unsigned int nchannels ) [static], [private]
```

Helper function to repeat the elements in a vector.

Parameters

<i>src</i>	vector to repeat
<i>nchannels</i>	number of times to repeat input vector

Returns

a vector that returns `nchannels` repetitions of input vector.

4.127.4 Member Data Documentation

4.127.4.1 `_order`

```
unsigned int gtfb_simple_rt_t::_order [private]
```

Total number of gammatone filter orders.

4.127.4.2 `_pre_stages`

```
unsigned int gtfb_simple_rt_t::_pre_stages [private]
```

Number of filter orders applied before the loaded plugin is invoked.

4.127.4.3 `nbands`

```
unsigned int gtfb_simple_rt_t::nbands [private]
```

Number of frequency bands to produce = number of gammatone filters.

4.127.4.4 `imag`

```
MHA_AC::waveform_t gtfb_simple_rt_t::imag [private]
```

Storage for the imaginary part of the filterbank signal.

It is used as the imaginary input signal for the loaded plugin. Furthermore, it is expected that the loaded plugin processes the imaginary part of the data in place.

4.127.4.5 `accf`

```
MHA_AC::waveform_t gtfb_simple_rt_t::accf [private]
```

AC variable to publish the center frequencies of the gammatone filters.

4.127.4.6 `acbw`

```
MHA_AC::waveform_t gtfb_simple_rt_t::acbw [private]
```

AC variable to publish the bandwidths of the gammatone filters.

4.127.4.7 input

```
MHASignal::waveform_t gtfb_simple_rt_t::input [private]
```

Real part of the filterbank signal.

It is used as the real input signal to the loaded plugin.

4.127.4.8 output

```
MHASignal::waveform_t gtfb_simple_rt_t::output [private]
```

Resynthesized broadband signal, used as the output signal of this plugin.

4.127.4.9 gf

```
MHAFilter::gammaflt_t gtfb_simple_rt_t::gf [private]
```

The gammatone filter bank implementation.

4.127.4.10 cLTASS

```
MHA_AC::waveform_t gtfb_simple_rt_t::cLTASS [private]
```

AC variable to publish band-specific LTASS level correction values.

4.127.4.11 ac_resynthesis_gain

```
MHA_AC::waveform_t gtfb_simple_rt_t::ac_resynthesis_gain [private]
```

AC variable to publish the configured per-frequency resynthesis gains.

4.127.4.12 element_gain_name_

```
std::string gtfb_simple_rt_t::element_gain_name_ [private]
```

Either an empty string, or the name of an AC variable from which element-wise linear factors are read.

4.127.4.13 `_ac`

```
algo_comm_t gtfb_simple_rt_t::_ac [private]
```

Algorithm Communication Variable space.

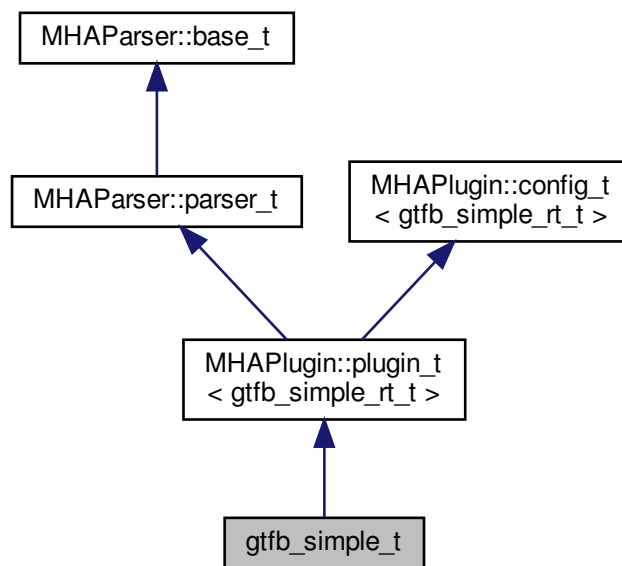
The documentation for this class was generated from the following file:

- **gtfb_simple_bridge.cpp**

4.128 `gtfb_simple_t` Class Reference

Interface class of `gtfb_simple_bridge` plugin.

Inheritance diagram for `gtfb_simple_t`:



Public Member Functions

- **gtfb_simple_t** (**algo_comm_t** ac, const std::string &chain, const std::string &algo)
Constructor.
- void **prepare** (**mhaconfig_t** &chcfg)
Prepare contained plugin for signal processing.
- void **release** ()
Releases contained plugin.

- **mha_wave_t * process (mha_wave_t *sIn)**
Process the input signal: Computes the filterbank with the pre-stages, calls the loaded plugin for processing of the filterbank signal, and resynthesizes the result to a modified broadband signal.
- **void setlock (bool b)**
Locks / unlocks all configuration variables before / after signal processing.

Private Attributes

- **MHAParser::mhapuginloader_t plug**
Handle to the loaded plugin.
- **MHAOvFilter::fscale_bw_t fscale**
Object determines the filterbank frequencies.
- **MHAParser::int_t order**
total order of gammatone filter
- **MHAParser::int_t prestages**
Number of gammatone filter order to process before the loaded plugin processes the filterbank signal.
- **MHAParser::int_t desired_delay**
Desired group delay in audio samples.
- **MHAParser::string_t element_gain_name**
Number of AC variable to take element-wise gain factors from for resynthesis.
- **MHAParser::vfloat_mon_t cLTASS**
Monitoring of LTASS correction values / dB.
- **MHAParser::vfloat_mon_t resynthesis_gain**
configured frequency-specific resynthesis gains
- **MHAParser::string_mon_t gf_internals**
For tests and debugging: a serialization of the gammatone filter internals.
- **std::string name_**
Configured algorithm name, used to name the AC variables.

Additional Inherited Members

4.128.1 Detailed Description

Interface class of gtfb_simple_bridge plugin.

4.128.2 Constructor & Destructor Documentation

4.128.2.1 gtfb_simple_t()

```
gtfb_simple_t::gtfb_simple_t (
    algo_comm_t ac,
    const std::string & chain,
    const std::string & algo )
```

Constructor.

Registers parser variables.

Parameters

<i>ac</i>	Algorithm Communication Variable space
<i>chain</i>	chain name
<i>algo</i>	configured name of this plugin instance

4.128.3 Member Function Documentation

4.128.3.1 prepare()

```
void gtfb_simple_t::prepare (
    mhaconfig_t & chcfg ) [virtual]
```

Prepare contained plugin for signal processing.

Allocates the runtime configuration instance. Locks all variables.

Implements **MHAPLugin::plugin_t< gtfb_simple_rt_t >** (p. [1099](#)).

4.128.3.2 release()

```
void gtfb_simple_t::release (
    void ) [virtual]
```

Releases contained plugin.

Unlocks all variables.

Reimplemented from **MHAPLugin::plugin_t< gtfb_simple_rt_t >** (p. [1100](#)).

4.128.3.3 process()

```
mha_wave_t * gtfb_simple_t::process (
    mha_wave_t * sIn )
```

Process the input signal: Computes the filterbank with the pre-stages, calls the loaded plugin for processing of the filterbank signal, and resynthesizes the result to a modified broadband signal.

4.128.3.4 setlock()

```
void gtfb_simple_t::setlock (
    bool b ) [inline]
```

Locks / unlocks all configuration variables before / after signal processing.

4.128.4 Member Data Documentation

4.128.4.1 plug

```
MHAParser::mhapluginloader_t gtfb_simple_t::plug [private]
```

Handle to the loaded plugin.

4.128.4.2 fscale

```
MHAOvlFilter::fscale_bw_t gtfb_simple_t::fscale [private]
```

Object determines the filterbank frequencies.

4.128.4.3 order

```
MHAParser::int_t gtfb_simple_t::order [private]
```

total order of gammatone filter

4.128.4.4 prestages

```
MHAParser::int_t gtfb_simple_t::prestages [private]
```

Number of gammatone filter order to process before the loaded plugin processes the filterbank signal.

4.128.4.5 desired_delay

```
MHAParser::int_t gtfb_simple_t::desired_delay [private]
```

Desired group delay in audio samples.

4.128.4.6 element_gain_name

```
MHAParser::string_t gtfb_simple_t::element_gain_name [private]
```

Number of AC variable to take element-wise gain factors from for resynthesis.

4.128.4.7 cLTASS

```
MHAParser::vfloat_mon_t gtfb_simple_t::cLTASS [private]
```

Monitoring of LTASS correction values / dB.

4.128.4.8 resynthesis_gain

```
MHAParser::vfloat_mon_t gtfb_simple_t::resynthesis_gain [private]
```

configured frequency-specific resynthesis gains

4.128.4.9 gf_internals

```
MHAParser::string_mon_t gtfb_simple_t::gf_internals [private]
```

For tests and debugging: a serialization of the gammatone filter internals.

4.128.4.10 name_

```
std::string gtfb_simple_t::name_ [private]
```

Configured algorithm name, used to name the AC variables.

The documentation for this class was generated from the following file:

- **gtfb_simple_bridge.cpp**

4.129 hanning_ramps_t Class Reference

Public Member Functions

- **hanning_ramps_t** (unsigned int, unsigned int)
- **~hanning_ramps_t** ()
- void **operator()** (**MHASignal::waveform_t** &)

Private Attributes

- unsigned int **len_a**
- unsigned int **len_b**
- **mha_real_t** * **ramp_a**
- **mha_real_t** * **ramp_b**

4.129.1 Constructor & Destructor Documentation

4.129.1.1 hanning_ramps_t()

```
hanning_ramps_t::hanning_ramps_t (  
    unsigned int la,  
    unsigned int lb )
```

4.129.1.2 ~hanning_ramps_t()

```
hanning_ramps_t::~hanning_ramps_t (  
    void )
```

4.129.2 Member Function Documentation

4.129.2.1 operator()

```
void hanning_ramps_t::operator() (
    MHASignal::waveform_t & b )
```

4.129.3 Member Data Documentation

4.129.3.1 len_a

```
unsigned int hanning_ramps_t::len_a [private]
```

4.129.3.2 len_b

```
unsigned int hanning_ramps_t::len_b [private]
```

4.129.3.3 ramp_a

```
mha_real_t* hanning_ramps_t::ramp_a [private]
```

4.129.3.4 ramp_b

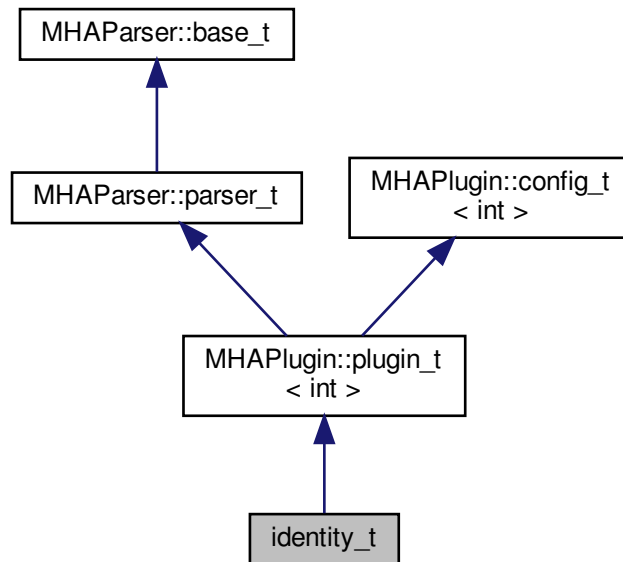
```
mha_real_t* hanning_ramps_t::ramp_b [private]
```

The documentation for this class was generated from the following file:

- **spec2wave.cpp**

4.130 identity_t Class Reference

Inheritance diagram for identity_t:



Public Member Functions

- **identity_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- **mha_spec_t** * **process** (**mha_spec_t** *)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()

Additional Inherited Members

4.130.1 Constructor & Destructor Documentation

4.130.1.1 identity_t()

```

identity_t::identity_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )

```

4.130.2 Member Function Documentation

4.130.2.1 process() [1/2]

```
mha_wave_t * identity_t::process (  
    mha_wave_t * s )
```

4.130.2.2 process() [2/2]

```
mha_spec_t * identity_t::process (  
    mha_spec_t * s )
```

4.130.2.3 prepare()

```
void identity_t::prepare (  
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t< int >** (p. [1099](#)).

4.130.2.4 release()

```
void identity_t::release (  
    void ) [virtual]
```

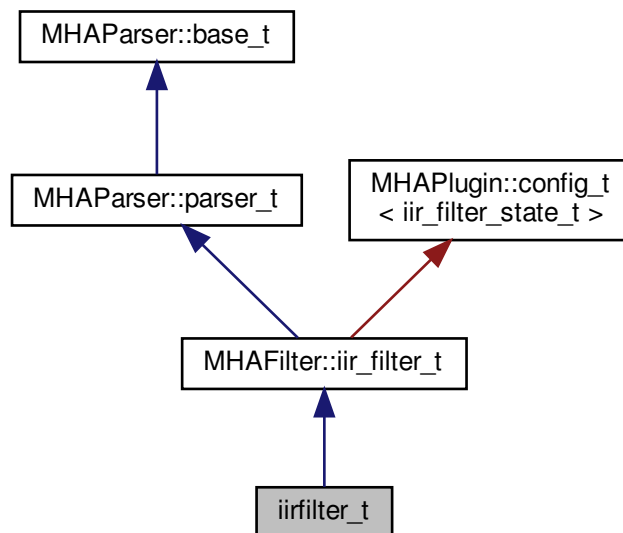
Reimplemented from **MHAPLugin::plugin_t< int >** (p. [1100](#)).

The documentation for this class was generated from the following file:

- **identity.cpp**

4.131 iirfilter_t Class Reference

Inheritance diagram for iirfilter_t:



Public Member Functions

- **iirfilter_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- void **prepare_** (**mhaconfig_t** &)
- void **release_** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)

Additional Inherited Members

4.131.1 Constructor & Destructor Documentation

4.131.1.1 iirfilter_t()

```

iirfilter_t::iirfilter_t (
    const algo_comm_t & ac,
    const std::string & th,
    const std::string & al )

```

4.131.2 Member Function Documentation

4.131.2.1 prepare_()

```
void iirfilter_t::prepare_ (
    mhaconfig_t & tf )
```

4.131.2.2 release_()

```
void iirfilter_t::release_ ( ) [inline]
```

4.131.2.3 process()

```
mha_wave_t * iirfilter_t::process (
    mha_wave_t * s )
```

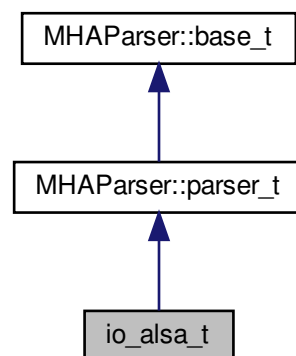
The documentation for this class was generated from the following file:

- **iirfilter.cpp**

4.132 io_alsa_t Class Reference

MHA IO interface class for ALSA IO.

Inheritance diagram for io_alsa_t:



Public Member Functions

- **io_alsa_t** (unsigned int fragsize, float samplerate, **IOProcessEvent_t** **proc_event**, void * **proc_handle**, **IOStartedEvent_t** **start_event**, void * **start_handle**, **IOStoppedEvent_t** **stop_event**, void * **stop_handle**)

Constructor, receives the callback handles to interact with the MHA framework.

- template<typename T = void>

void **prepare** (int, int)

Called after the framework has prepared the processing plugins and the number of input and output channels are fixed.

- void **release** ()

MHA framework leaves prepared state.

- void **start** ()

MHA framework calls this function when signal processing should start.

- void **stop** ()

MHA framework calls this function when signal processing should stop.

- template<>

void **prepare** (int nch_in, int nch_out)

Static Public Member Functions

- static void * **thread_start** (void *h)

MHAIOAlsa uses a separate thread that calls the alsa read and write functions to read and write audio samples, these functions are blocking until samples can be read or written.

Private Member Functions

- void **process** ()

Private Attributes

- bool **b_process**
- unsigned int **fw_fragsize**
- unsigned int **fw_samplerate**
- **IOProcessEvent_t** **proc_event**
- void * **proc_handle**
- **IOStartedEvent_t** **start_event**
- void * **start_handle**
- **IOStoppedEvent_t** **stop_event**
- void * **stop_handle**
- **alsa_base_t** * **dev_in**
- **alsa_base_t** * **dev_out**
- pthread_t **proc_thread**
- **alsa_dev_par_parser_t** **p_in**
- **alsa_dev_par_parser_t** **p_out**
- **MHAParser::bool_t** **pcmlink**
- **MHAParser::int_t** **priority**
- **MHAParser::kw_t** **format**
- **MHAParser::int_mon_t** **alsa_start_counter**
- **MHAEvents::patchbay_t**< **io_alsa_t** > **patchbay**

Additional Inherited Members

4.132.1 Detailed Description

MHA IO interface class for ALSA IO.

4.132.2 Constructor & Destructor Documentation

4.132.2.1 `io_alsa_t()`

```
io_alsa_t::io_alsa_t (
    unsigned int fragsize,
    float samplerate,
    IOProcessEvent_t proc_event,
    void * proc_handle,
    IOStartedEvent_t start_event,
    void * start_handle,
    IOStoppedEvent_t stop_event,
    void * stop_handle )
```

Constructor, receives the callback handles to interact with the MHA framework.

4.132.3 Member Function Documentation

4.132.3.1 `prepare()` [1/2]

```
template<typename T >
void io_alsa_t::prepare (
    int nch_in,
    int nch_out )
```

Called after the framework has prepared the processing plugins and the number of input and output channels are fixed.

open pcm streams

4.132.3.2 `release()`

```
void io_alsa_t::release (
    void )
```

MHA framework leaves prepared state.

4.132.3.3 start()

```
void io_alsa_t::start ( )
```

MHA framework calls this function when signal processing should start.

4.132.3.4 stop()

```
void io_alsa_t::stop ( )
```

MHA framework calls this function when signal processing should stop.

4.132.3.5 thread_start()

```
void * io_alsa_t::thread_start (
    void * h ) [static]
```

MHAIOAlsa uses a separate thread that calls the alsa read and write functions to read and write audio samples, these functions are blocking until samples can be read or written.

This is the start function of that thread.

4.132.3.6 process()

```
void io_alsa_t::process (
    void ) [private]
```

4.132.3.7 prepare() [2/2]

```
template<>
void io_alsa_t::prepare (
    int nch_in,
    int nch_out )
```

4.132.4 Member Data Documentation

4.132.4.1 b_process

```
bool io_alsa_t::b_process [private]
```

4.132.4.2 fw_fragsize

```
unsigned int io_alsa_t::fw_fragsize [private]
```

4.132.4.3 fw_samplerate

```
unsigned int io_alsa_t::fw_samplerate [private]
```

4.132.4.4 proc_event

```
IOProcessEvent_t io_alsa_t::proc_event [private]
```

4.132.4.5 proc_handle

```
void* io_alsa_t::proc_handle [private]
```

4.132.4.6 start_event

```
IOStartedEvent_t io_alsa_t::start_event [private]
```

4.132.4.7 start_handle

```
void* io_alsa_t::start_handle [private]
```

4.132.4.8 stop_event

```
IOStoppedEvent_t io_alsa_t::stop_event [private]
```


4.132.4.9 stop_handle

```
void* io_alsa_t::stop_handle [private]
```

4.132.4.10 dev_in

```
alsa_base_t* io_alsa_t::dev_in [private]
```

4.132.4.11 dev_out

```
alsa_base_t* io_alsa_t::dev_out [private]
```

4.132.4.12 proc_thread

```
pthread_t io_alsa_t::proc_thread [private]
```

4.132.4.13 p_in

```
alsa_dev_par_parser_t io_alsa_t::p_in [private]
```

4.132.4.14 p_out

```
alsa_dev_par_parser_t io_alsa_t::p_out [private]
```

4.132.4.15 pcmlink

```
MHAParser::bool_t io_alsa_t::pcmlink [private]
```

4.132.4.16 priority

```
MHAParser::int_t io_alsa_t::priority [private]
```

4.132.4.17 format

```
MHAParser::kw_t io_alsa_t::format [private]
```

4.132.4.18 alsa_start_counter

```
MHAParser::int_mon_t io_alsa_t::alsa_start_counter [private]
```

4.132.4.19 patchbay

```
MHAEvents::patchbay_t< io_alsa_t> io_alsa_t::patchbay [private]
```

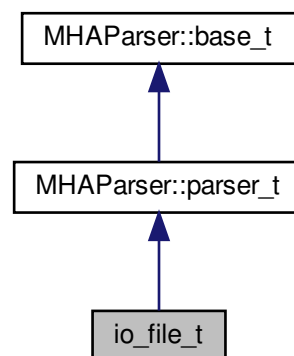
The documentation for this class was generated from the following file:

- **MHAIOalsa.cpp**

4.133 io_file_t Class Reference

File IO.

Inheritance diagram for io_file_t:



Public Member Functions

- **io_file_t** (int **fragsize**, float **samplerate**, **IOProcessEvent_t** **proc_event**, void * **proc_handle**, **IOStartedEvent_t** **start_event**, void * **start_handle**, **IOStoppedEvent_t** **stop_event**, void * **stop_handle**)
- **~io_file_t** ()
- void **prepare** (int, int)
Allocate buffers, activate FILE client and install internal ports.
- void **start** ()
- void **stop** ()
- void **release** ()
Remove FILE client and deallocate internal ports and buffers.

Private Member Functions

- void **stopped** (int, int)
- void **setlock** (bool locked)
lock or unlock all parser variables.

Private Attributes

- int **fragsize**
- float **samplerate**
- int **nchannels_in**
- int **nchannels_file_in**
- int **nchannels_out**
- **IOProcessEvent_t** **proc_event**
- void * **proc_handle**
- **IOStartedEvent_t** **start_event**
- void * **start_handle**
- **IOStoppedEvent_t** **stop_event**
- void * **stop_handle**
- **MHAParser::string_t** **filename_input**
- **MHAParser::string_t** **filename_output**
- **MHAParser::kw_t** **output_sample_format**
- **MHAParser::int_t** **startsample**
- **MHAParser::int_t** **length**
- **MHAParser::bool_t** **strict_channel_match**
- **MHAParser::bool_t** **strict_srate_match**
- **MHASignal::waveform_t** * **s_in**
- **MHASignal::waveform_t** * **s_file_in**
- **mha_wave_t** * **s_out**
- bool **b_prepared**
- **SNDFILE** * **sf_in**
- **SNDFILE** * **sf_out**
- **SF_INFO** **sfinf_in**
- **SF_INFO** **sfinf_out**
- **sf_count_t** **total_read**

Additional Inherited Members

4.133.1 Detailed Description

File IO.

4.133.2 Constructor & Destructor Documentation

4.133.2.1 `io_file_t()`

```
io_file_t::io_file_t (
    int fragsize,
    float samplerate,
    IOProcessEvent_t proc_event,
    void * proc_handle,
    IOStartedEvent_t start_event,
    void * start_handle,
    IOStoppedEvent_t stop_event,
    void * stop_handle )
```

4.133.2.2 `~io_file_t()`

```
io_file_t::~~io_file_t ( )
```

4.133.3 Member Function Documentation

4.133.3.1 `prepare()`

```
void io_file_t::prepare (
    int nch_in,
    int nch_out )
```

Allocate buffers, activate FILE client and install internal ports.

4.133.3.2 start()

```
void io_file_t::start ( )
```

4.133.3.3 stop()

```
void io_file_t::stop ( )
```

4.133.3.4 release()

```
void io_file_t::release (
    void )
```

Remove FILE client and deallocate internal ports and buffers.

4.133.3.5 stopped()

```
void io_file_t::stopped (
    int proc_err,
    int io_err ) [private]
```

4.133.3.6 setlock()

```
void io_file_t::setlock (
    bool locked ) [private]
```

lock or unlock all parser variables.

Used in prepare/release.

Parameters

<i>locked</i>	When true, locks. When false, unlocks.
---------------	--

4.133.4 Member Data Documentation

4.133.4.1 fragsize

```
int io_file_t::fragsize [private]
```

4.133.4.2 samplerate

```
float io_file_t::samplerate [private]
```

4.133.4.3 nchannels_in

```
int io_file_t::nchannels_in [private]
```

4.133.4.4 nchannels_file_in

```
int io_file_t::nchannels_file_in [private]
```

4.133.4.5 nchannels_out

```
int io_file_t::nchannels_out [private]
```

4.133.4.6 proc_event

```
IOProcessEvent_t io_file_t::proc_event [private]
```

4.133.4.7 proc_handle

```
void* io_file_t::proc_handle [private]
```

4.133.4.8 start_event

```
IOStartedEvent_t io_file_t::start_event [private]
```

4.133.4.9 start_handle

```
void* io_file_t::start_handle [private]
```

4.133.4.10 stop_event

```
IOStoppedEvent_t io_file_t::stop_event [private]
```

4.133.4.11 stop_handle

```
void* io_file_t::stop_handle [private]
```

4.133.4.12 filename_input

```
MHAParser::string_t io_file_t::filename_input [private]
```

4.133.4.13 filename_output

```
MHAParser::string_t io_file_t::filename_output [private]
```

4.133.4.14 output_sample_format

```
MHAParser::kw_t io_file_t::output_sample_format [private]
```

4.133.4.15 startsample

```
MHAParser::int_t io_file_t::startsample [private]
```

4.133.4.16 length

```
MHAParser::int_t io_file_t::length [private]
```

4.133.4.17 strict_channel_match

MHAParser::bool_t io_file_t::strict_channel_match [private]

4.133.4.18 strict_srate_match

MHAParser::bool_t io_file_t::strict_srate_match [private]

4.133.4.19 s_in

MHASignal::waveform_t* io_file_t::s_in [private]

4.133.4.20 s_file_in

MHASignal::waveform_t* io_file_t::s_file_in [private]

4.133.4.21 s_out

mha_wave_t* io_file_t::s_out [private]

4.133.4.22 b_prepared

bool io_file_t::b_prepared [private]

4.133.4.23 sf_in

SNDFILE* io_file_t::sf_in [private]

4.133.4.24 sf_out

SNDFILE* io_file_t::sf_out [private]

4.133.4.25 sfinf_in

```
SF_INFO io_file_t::sfinf_in [private]
```

4.133.4.26 sfinf_out

```
SF_INFO io_file_t::sfinf_out [private]
```

4.133.4.27 total_read

```
sf_count_t io_file_t::total_read [private]
```

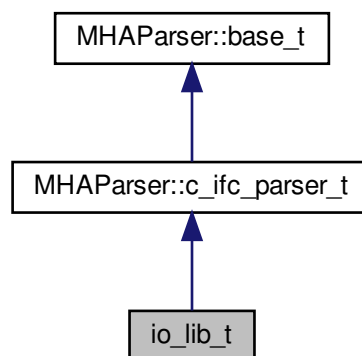
The documentation for this class was generated from the following file:

- **MHAIOFile.cpp**

4.134 io_lib_t Class Reference

Class for loading MHA sound IO module.

Inheritance diagram for io_lib_t:



Public Member Functions

- **io_lib_t** (int fragsize, float samplerate, **IOProcessEvent_t** proc_event, void *proc_handle, **IOStartedEvent_t** start_event, void *start_handle, **IOStoppedEvent_t** stop_event, void *stop_handle, std::string libname)
load and initialize MHA sound io module.
- **~io_lib_t** ()
Deinitialize and unload this MHA sound io module.
- void **prepare** (unsigned int inch, unsigned int outch)
Prepare the sound io module.
- void **start** ()
Tell the sound io module to start sound processing.
- void **stop** ()
- void **release** ()
- std::string **lib_str_error** (int err)

Protected Member Functions

- void **test_error** ()

Protected Attributes

- int **lib_err**
- **dynamiclib_t** **lib_handle**
- void * **lib_data**
- **IOInit_t** **IOInit_cb**
- **IOPrepare_t** **IOPrepare_cb**
- **IOStart_t** **IOStart_cb**
- **IOStop_t** **IOStop_cb**
- **IORelease_t** **IORelease_cb**
- **IOSetVar_t** **IOSetVar_cb**
- **IOStrError_t** **IOStrError_cb**
- **IODestroy_t** **IODestroy_cb**

Additional Inherited Members

4.134.1 Detailed Description

Class for loading MHA sound IO module.

4.134.2 Constructor & Destructor Documentation

4.134.2.1 io_lib_t()

```
io_lib_t::io_lib_t (
    int fragsize,
    float samplerate,
    IOProcessEvent_t proc_event,
    void * proc_handle,
    IOStartedEvent_t start_event,
    void * start_handle,
    IOStoppedEvent_t stop_event,
    void * stop_handle,
    std::string libname )
```

load and initialize MHA sound io module.

4.134.2.2 ~io_lib_t()

```
io_lib_t::~io_lib_t ( )
```

Deinitialize and unload this MHA sound io module.

4.134.3 Member Function Documentation

4.134.3.1 prepare()

```
void io_lib_t::prepare (
    unsigned int inch,
    unsigned int outch )
```

Prepare the sound io module.

After preparation, the sound io module may start the sound processing at any time (external trigger). When the sound processing is started, the sound io module will call the start_event callback.

Parameters

<i>inch</i>	number of input channels
<i>outch</i>	number of output channels

4.134.3.2 start()

```
void io_lib_t::start ( )
```

Tell the sound io module to start sound processing.

Some io modules need this, for others that wait for external events this method might do nothing.

4.134.3.3 stop()

```
void io_lib_t::stop ( )
```

4.134.3.4 release()

```
void io_lib_t::release ( )
```

4.134.3.5 lib_str_error()

```
std::string io_lib_t::lib_str_error (
    int err )
```

4.134.3.6 test_error()

```
void io_lib_t::test_error ( ) [protected]
```

4.134.4 Member Data Documentation

4.134.4.1 lib_err

```
int io_lib_t::lib_err [protected]
```

4.134.4.2 lib_handle

```
dynamiclib_t io_lib_t::lib_handle [protected]
```

4.134.4.3 lib_data

`void* io_lib_t::lib_data [protected]`

4.134.4.4 IOInit_cb

`IOInit_t io_lib_t::IOInit_cb [protected]`

4.134.4.5 IOPrepare_cb

`IOPrepare_t io_lib_t::IOPrepare_cb [protected]`

4.134.4.6 IOStart_cb

`IOStart_t io_lib_t::IOStart_cb [protected]`

4.134.4.7 IOSTop_cb

`IOStop_t io_lib_t::IOStop_cb [protected]`

4.134.4.8 IORelease_cb

`IORelease_t io_lib_t::IORelease_cb [protected]`

4.134.4.9 IOSetVar_cb

`IOSetVar_t io_lib_t::IOSetVar_cb [protected]`

4.134.4.10 IOStrError_cb

`IOStrError_t io_lib_t::IOStrError_cb [protected]`

4.134.4.11 IODestroy_cb

`IODestroy_t io_lib_t::IODestroy_cb [protected]`

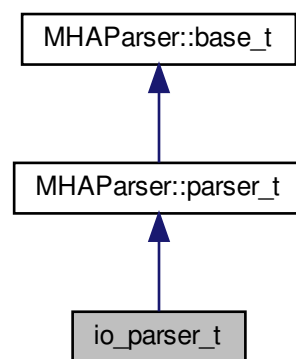
The documentation for this class was generated from the following files:

- **mhafw_lib.h**
- **mhafw_lib.cpp**

4.135 io_parser_t Class Reference

Main class for Parser IO.

Inheritance diagram for io_parser_t:



Public Member Functions

- **io_parser_t** (unsigned int **fragsize**, **IOProcessEvent_t** **proc_event**, void * **proc_handle**, **IOStartedEvent_t** **start_event**, void * **start_handle**, **IOStoppedEvent_t** **stop_event**, void * **stop_handle**)
- **~io_parser_t** ()
- void **prepare** (int, int)
Allocate buffers, activate JACK client and install internal ports.
- void **start** ()
- void **stop** ()
- void **release** ()
Remove JACK client and deallocate internal ports and buffers.

Private Member Functions

- void **stopped** (int, int)
- void **started** ()
- void **process_frame** ()

Private Attributes

- unsigned int **fragsize**
- unsigned int **nchannels_in**
- unsigned int **nchannels_out**
- **IOProcessEvent_t** **proc_event**
- void * **proc_handle**
- **IOStartedEvent_t** **start_event**
- void * **start_handle**
- **IOStoppedEvent_t** **stop_event**
- void * **stop_handle**
- **MHAParser::mfloat_t** **input**
- **MHAParser::mfloat_mon_t** **output**
- **MHASignal::waveform_t** * **s_in**
- **mha_wave_t** * **s_out**
- bool **b_fw_started**
- bool **b_stopped**
- bool **b_prepared**
- bool **b_starting**
- **MHAEvents::patchbay_t** < **io_parser_t** > **patchbay**

Additional Inherited Members**4.135.1 Detailed Description**

Main class for Parser IO.

4.135.2 Constructor & Destructor Documentation**4.135.2.1 io_parser_t()**

```
io_parser_t::io_parser_t (
    unsigned int fragsize,
    IOProcessEvent_t proc_event,
    void * proc_handle,
    IOStartedEvent_t start_event,
    void * start_handle,
    IOStoppedEvent_t stop_event,
    void * stop_handle )
```

4.135.2.2 ~io_parser_t()

```
io_parser_t::~io_parser_t ( )
```

4.135.3 Member Function Documentation

4.135.3.1 prepare()

```
void io_parser_t::prepare (
    int nch_in,
    int nch_out )
```

Allocate buffers, activate JACK client and install internal ports.

4.135.3.2 start()

```
void io_parser_t::start ( )
```

4.135.3.3 stop()

```
void io_parser_t::stop ( )
```

4.135.3.4 release()

```
void io_parser_t::release (
    void )
```

Remove JACK client and deallocate internal ports and buffers.

4.135.3.5 stopped()

```
void io_parser_t::stopped (
    int proc_err,
    int io_err ) [private]
```


4.135.3.6 started()

```
void io_parser_t::started ( ) [private]
```

4.135.3.7 process_frame()

```
void io_parser_t::process_frame ( ) [private]
```

4.135.4 Member Data Documentation**4.135.4.1 fragsize**

```
unsigned int io_parser_t::fragsize [private]
```

4.135.4.2 nchannels_in

```
unsigned int io_parser_t::nchannels_in [private]
```

4.135.4.3 nchannels_out

```
unsigned int io_parser_t::nchannels_out [private]
```

4.135.4.4 proc_event

```
IOProcessEvent_t io_parser_t::proc_event [private]
```

4.135.4.5 proc_handle

```
void* io_parser_t::proc_handle [private]
```

4.135.4.6 start_event

IOStartedEvent_t io_parser_t::start_event [private]

4.135.4.7 start_handle

void* io_parser_t::start_handle [private]

4.135.4.8 stop_event

IOStoppedEvent_t io_parser_t::stop_event [private]

4.135.4.9 stop_handle

void* io_parser_t::stop_handle [private]

4.135.4.10 input

MHAParser::mfloat_t io_parser_t::input [private]

4.135.4.11 output

MHAParser::mfloat_mon_t io_parser_t::output [private]

4.135.4.12 s_in

MHASignal::waveform_t* io_parser_t::s_in [private]

4.135.4.13 s_out

mha_wave_t* io_parser_t::s_out [private]

4.135.4.14 b_fw_started

```
bool io_parser_t::b_fw_started [private]
```

4.135.4.15 b_stopped

```
bool io_parser_t::b_stopped [private]
```

4.135.4.16 b_prepared

```
bool io_parser_t::b_prepared [private]
```

4.135.4.17 b_starting

```
bool io_parser_t::b_starting [private]
```

4.135.4.18 patchbay

```
MHAEvents::patchbay_t< io_parser_t> io_parser_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **MHAIOParser.cpp**

4.136 io_tcp_fwcb_t Class Reference

TCP sound-io library's interface to the framework callbacks.

Public Member Functions

- **io_tcp_fwcb_t** (**IOProcessEvent_t** **proc_event**, void * **proc_handle**, **IOStartedEvent_t** **start_event**, void * **start_handle**, **IOStoppedEvent_t** **stop_event**, void * **stop_handle**)
Constructor stores framework handles and initializes error numbers to 0.
- virtual **~io_tcp_fwcb_t** ()
Do-nothing destructor.
- virtual void **start** ()
Call the framework's start callback.
- virtual int **process** (**mha_wave_t** *sIn, **mha_wave_t** *&sOut)
Call the frameworks processing callback.
- virtual void **set_errnos** (int **proc_err**, int **io_err**)
Save error numbers to use during.
- virtual void **stop** ()
Call the frameworks stop callback.

Private Attributes

- **IOProcessEvent_t proc_event**
Pointer to signal processing callback function.
- **IOStartedEvent_t start_event**
Pointer to start notification callback function.
- **IOStoppedEvent_t stop_event**
Pointer to stop notification callback function.
- **void * proc_handle**
Handles belonging to framework.
- **void * start_handle**
- **void * stop_handle**
- **int proc_err**
Errors from the processing callback and from the TCP IO itself are stored here before closing Network handles.
- **int io_err**

4.136.1 Detailed Description

TCP sound-io library's interface to the framework callbacks.

4.136.2 Constructor & Destructor Documentation

4.136.2.1 io_tcp_fwcb_t()

```
io_tcp_fwcb_t::io_tcp_fwcb_t (
    IOProcessEvent_t proc_event,
    void * proc_handle,
    IOStartedEvent_t start_event,
    void * start_handle,
    IOStoppedEvent_t stop_event,
    void * stop_handle )
```

Constructor stores framework handles and initializes error numbers to 0.

4.136.2.2 ~io_tcp_fwcb_t()

```
virtual io_tcp_fwcb_t::~io_tcp_fwcb_t ( ) [inline], [virtual]
```

Do-nothing destructor.

4.136.3 Member Function Documentation

4.136.3.1 start()

```
void io_tcp_fwcb_t::start ( ) [virtual]
```

Call the framework's start callback.

4.136.3.2 process()

```
int io_tcp_fwcb_t::process (
    mha_wave_t * sIn,
    mha_wave_t *& sOut ) [virtual]
```

Call the frameworks processing callback.

Parameters

<i>sIn</i>	The input sound data just received from TCP.
<i>sOut</i>	A pointer to output sound data. Will point to the output sound data storage when the callback finishes.

Returns

Status, an error number from the signal processing callback. If this is != 0, then the connection should be closed.

4.136.3.3 set_errnos()

```
void io_tcp_fwcb_t::set_errnos (
    int proc_err,
    int io_err ) [virtual]
```

Save error numbers to use during.

See also

stop (p. [588](#))

Parameters

<i>proc_err</i>	The error number from the
-----------------	---------------------------

See also

process (p. 587) callback.

Parameters

<i>io_err</i>	The error number from the io library itself.
---------------	--

4.136.3.4 stop()

```
void io_tcp_fwcb_t::stop ( ) [virtual]
```

Call the frameworks stop callback.

Uses the error numbers set previously with

See also

set_errnos (p. 587).

4.136.4 Member Data Documentation**4.136.4.1 proc_event**

```
IOProcessEvent_t io_tcp_fwcb_t::proc_event [private]
```

Pointer to signal processing callback function.

4.136.4.2 start_event

```
IOStartedEvent_t io_tcp_fwcb_t::start_event [private]
```

Pointer to start notification callback function.

Called when a new TCP connection is established or the user issues the start command while there is a connection.

4.136.4.3 stop_event

```
IOStoppedEvent_t io_tcp_fwcb_t::stop_event [private]
```

Pointer to stop notification callback function.

Called when the connection is closed.

4.136.4.4 proc_handle

```
void* io_tcp_fwcb_t::proc_handle [private]
```

Handles belonging to framework.

4.136.4.5 start_handle

```
void * io_tcp_fwcb_t::start_handle [private]
```

4.136.4.6 stop_handle

```
void * io_tcp_fwcb_t::stop_handle [private]
```

4.136.4.7 proc_err

```
int io_tcp_fwcb_t::proc_err [private]
```

Errors from the processing callback and from the TCP IO itself are stored here before closing Network handles.

MHAIOTCP is notified by the server when the connection has been taken down, and calls

See also

stop (p. 588) from that callback. Within **stop** (p. 588), these error numbers are read again and transmitted to the framework.

4.136.4.8 io_err

```
int io_tcp_fwcb_t::io_err [private]
```

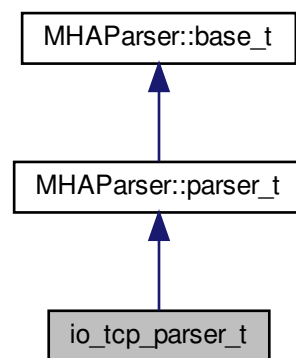
The documentation for this class was generated from the following file:

- **MHAIOTCP.cpp**

4.137 io_tcp_parser_t Class Reference

The parser interface of the IOTCP library.

Inheritance diagram for io_tcp_parser_t:



Public Member Functions

- virtual const std::string & **get_local_address** () const
Read parser variable local_address, this is the address of the network interface that should listen for incoming connections.
- virtual unsigned short **get_local_port** () const
Read parser variable local_port, this is the TCP port that should be used for incoming connections.
- virtual void **set_local_port** (unsigned short port)
Set parser variable local_port.
- virtual bool **get_server_port_open** () const
Return the status of the server port as it is known to the parser.
- virtual void **set_server_port_open** (bool open)
Inform the parser of the current status of the server socket.
- virtual bool **get_connected** () const

Return the parser's knowledge concerning whether there currently exists an established sound data TCP connection or not.

- virtual void **set_connected** (bool **connected**)
Inform the parser about the existence of a sound data connection.
- virtual void **set_new_peer** (unsigned short port, const std::string &host)
Set parser monitor variables peer_port and peer_address, and calls set_connected(true).
- **io_tcp_parser_t** ()
Constructor initializes parser variables.
- virtual **~io_tcp_parser_t** ()
Do-nothing destructor.
- virtual void **debug** (const std::string &message)

Private Attributes

- **MHAParser::string_t local_address**
Lets the user set the local network interface to listen on.
- **MHAParser::int_t local_port**
Lets the user choose the local tcp port to listen on.
- **MHAParser::int_mon_t server_port_open**
Indicates whether the TCP server socket is currently open.
- **MHAParser::int_mon_t connected**
Indicator if there currently is a sound data connection over TCP.
- **MHAParser::string_mon_t peer_address**
Display the ip address of the currently connected sound data client.
- **MHAParser::int_mon_t peer_port**
Display the tcp port used by the current sound data client.
- **MHAParser::string_t debug_filename**
filename to write debugging info to (if non-empty)
- FILE * **debug_file**
file handle to write debugging info to

Additional Inherited Members

4.137.1 Detailed Description

The parser interface of the IOTCP library.

4.137.2 Constructor & Destructor Documentation

4.137.2.1 io_tcp_parser_t()

```
io_tcp_parser_t::io_tcp_parser_t ( )
```

Constructor initializes parser variables.

4.137.2.2 ~io_tcp_parser_t()

```
virtual io_tcp_parser_t::~io_tcp_parser_t ( ) [inline], [virtual]
```

Do-nothing destructor.

4.137.3 Member Function Documentation

4.137.3.1 get_local_address()

```
virtual const std::string& io_tcp_parser_t::get_local_address ( ) const [inline],  
[virtual]
```

Read parser variable `local_address`, this is the address of the network interface that should listen for incoming connections.

Returns

A string containing the address of the local interface as it was set by the user.

4.137.3.2 get_local_port()

```
unsigned short io_tcp_parser_t::get_local_port ( ) const [virtual]
```

Read parser variable `local_port`, this is the TCP port that should be used for incoming connections.

Returns

The local tcp port to listen on as it was chosen by the user. The port number is between `MIN_TCP_PORT` and `MAX_TCP_PORT`.

4.137.3.3 set_local_port()

```
void io_tcp_parser_t::set_local_port (  
    unsigned short port ) [virtual]
```

Set parser variable `local_port`.

This is needed when it was set to 0 before: In this case, the OS chooses a free port for the TCP server socket, and the port that it chose has to be published to the user via the parser interface.

Parameters

<i>port</i>	The TCP port number that is currently used. In the range [MIN_TCP_PORT, MAX_TCP_PORT], excluding 0.
-------------	---

Precondition

get_local_port() (p. 592) currently returns 0.

4.137.3.4 get_server_port_open()

```
bool io_tcp_parser_t::get_server_port_open ( ) const [virtual]
```

Return the status of the server port as it is known to the parser.

Returns

false after initialization, or the value most recently set via

See also

set_server_port_open (p. 593).

4.137.3.5 set_server_port_open()

```
void io_tcp_parser_t::set_server_port_open (
    bool open ) [virtual]
```

Inform the parser of the current status of the server socket.

Parameters

<i>open</i>	Indicates whether the server socket has just been opened or closed.
-------------	---

Precondition

open may only have the value true if **get_server_port_open()** (p. 593) currently returns false.

Postcondition**See also**

get_server_port_open (p. 593) returns the **value** (p. 52) of open.

4.137.3.6 get_connected()

```
bool io_tcp_parser_t::get_connected ( ) const [virtual]
```

Return the parser's knowledge concerning whether there currently exists an established sound data TCP connection or not.

Returns

false after initialization, or the value most recently set via

See also

set_connected (p. 594).

4.137.3.7 set_connected()

```
void io_tcp_parser_t::set_connected (
    bool connected ) [virtual]
```

Inform the parser about the existence of a sound data connection.

Parameters

<i>connected</i>	Indicates whether there currently is a connection or not.
------------------	---

Precondition

connected must not have the same value that is currently returned by

See also

get_connected (p. 594).

Postcondition

See also

get_connected (p. 594) returns the **value** (p. 52) of open.

4.137.3.8 set_new_peer()

```
void io_tcp_parser_t::set_new_peer (
    unsigned short port,
    const std::string & host ) [virtual]
```

Set parser monitor variables peer_port and peer_address, and calls set_connected(true).

This method should be called when a new connection is established.

Parameters

<i>port</i>	The TCP port number used by the peer.
<i>host</i>	The Internet host where the peer is located.

Precondition

See also

get_connected (p. 594) currently returns false.

Postcondition

See also

get_connected (p. 594) returns true.

4.137.3.9 debug()

```
virtual void io_tcp_parser_t::debug (
    const std::string & message ) [inline], [virtual]
```

4.137.4 Member Data Documentation

4.137.4.1 local_address

```
MHAParser::string_t io_tcp_parser_t::local_address [private]
```

Lets the user set the local network interface to listen on.

4.137.4.2 local_port

```
MHAParser::int_t io_tcp_parser_t::local_port [private]
```

Lets the user choose the local tcp port to listen on.

4.137.4.3 server_port_open

```
MHAParser::int_mon_t io_tcp_parser_t::server_port_open [private]
```

Indicates wether the TCP server socket is currently open.

4.137.4.4 connected

```
MHAParser::int_mon_t io_tcp_parser_t::connected [private]
```

Indicator if there currently is a sound data connection over TCP.

4.137.4.5 peer_address

```
MHAParser::string_mon_t io_tcp_parser_t::peer_address [private]
```

Display the ip address of the currently connected sound data client.

4.137.4.6 peer_port

```
MHAParser::int_mon_t io_tcp_parser_t::peer_port [private]
```

Display the tcp port used by the current sound data client.

4.137.4.7 debug_filename

```
MHAParser::string_t io_tcp_parser_t::debug_filename [private]
```

filename to write debugging info to (if non-empty)

4.137.4.8 debug_file

```
FILE* io_tcp_parser_t::debug_file [private]
```

file handle to write debugging info to

The documentation for this class was generated from the following file:

- **MHAIOTCP.cpp**

4.138 io_tcp_sound_t Class Reference

Sound data handling of io tcp library.

Classes

- union **float_union**

This union helps in conversion of floats from host byte order to network byte order and back again.

Public Member Functions

- **io_tcp_sound_t** (int **fragsize**, float **samplerate**)
Initialize sound data handling.
- virtual **~io_tcp_sound_t** ()
Do-nothing destructor.
- virtual void **prepare** (int **num_inchannels**, int **num_outchannels**)
Called during prepare, sets number of audio channels and allocates sound data storage.
- virtual void **release** ()
Called during release.
- virtual int **chunkbytes_in** () const
Number of bytes that constitute one input sound chunk.
- virtual std::string **header** () const
Create the tcp sound header lines.
- virtual **mha_wave_t** * **ntoh** (const std::string &data)
*Copy data received from tcp into **mha_wave_t** (p. 780) structure.*
- virtual std::string **hton** (const **mha_wave_t** *s_out)
Copy sound data from the output sound structure to a string.

Static Private Member Functions

- static void **check_sound_data_type** ()
*Check if **mha_real_t** is a usable 32-bit floating point type.*

Private Attributes

- int **fragsize**
Number of sound samples in each channel expected and returned from processing callback.
- float **samplerate**
Sampling rate.
- int **num_inchannels**
Number of input channels.
- int **num_outchannels**
- **MHASignal::waveform_t** * **s_in**
Storage for input signal.

4.138.1 Detailed Description

Sound data handling of io tcp library.

4.138.2 Constructor & Destructor Documentation

4.138.2.1 io_tcp_sound_t()

```
io_tcp_sound_t::io_tcp_sound_t (
    int fragsize,
    float samplerate )
```

Initialize sound data handling.

Checks sound data type by calling

See also

check_sound_data_type (p. [599](#)).

Parameters

<i>fragsize</i>	Number of sound samples in each channel expected and returned from processing callback.
<i>samplerate</i>	Number of samples per second in each channel.

4.138.2.2 ~io_tcp_sound_t()

```
virtual io_tcp_sound_t::~io_tcp_sound_t ( ) [inline], [virtual]
```

Do-nothing destructor.

4.138.3 Member Function Documentation

4.138.3.1 check_sound_data_type()

```
void io_tcp_sound_t::check_sound_data_type ( ) [static], [private]
```

Check if mha_real_t is a usable 32-bit floating point type.

Exceptions

MHA_Error (p. 707)	if mha_real_t is not compatible to 32-bit float.
--	--

4.138.3.2 prepare()

```
void io_tcp_sound_t::prepare (
    int num_inchannels,
    int num_outchannels ) [virtual]
```

Called during prepare, sets number of audio channels and allocates sound data storage.

Parameters

<i>num_inchannels</i>	Number of input audio channels.
<i>num_outchannels</i>	Number of output audio channels.

4.138.3.3 release()

```
void io_tcp_sound_t::release (
    void ) [virtual]
```

Called during release.

Deletes sound data storage.

4.138.3.4 chunkbytes_in()

```
int io_tcp_sound_t::chunkbytes_in ( ) const [virtual]
```

Number of bytes that constitute one input sound chunk.

Returns

Number of bytes to read from TCP connection before invoking signal processing.

4.138.3.5 header()

```
std::string io_tcp_sound_t::header ( ) const [virtual]
```

Create the tcp sound header lines.

4.138.3.6 ntohs()

```
mha_wave_t * io_tcp_sound_t::ntoh (
    const std::string & data ) [virtual]
```

Copy data received from tcp into **mha_wave_t** (p. [780](#)) structure.

Doing network-to-host byte order swapping in the process.

Parameters

<i>data</i>	One chunk (
-------------	-------------

See also

chunkbytes_in (p. 600)) of sound data to process.

Returns

Pointer to the sound data storage.

4.138.3.7 hton()

```
std::string io_tcp_sound_t::hton (
    const mha_wave_t * s_out ) [virtual]
```

Copy sound data from the output sound structure to a string.

Doing host-to-network byte order swapping while at it.

Parameters

<i>s_out</i>	Pointer to the storage of the sound to put out.
--------------	---

Returns

The sound data in network byte order.

4.138.4 Member Data Documentation

4.138.4.1 fragsize

```
int io_tcp_sound_t::fragsize [private]
```

Number of sound samples in each channel expected and returned from processing callback.

4.138.4.2 samplerate

```
float io_tcp_sound_t::samplerate [private]
```

Sampling rate.

Number of samples per second in each channel.

4.138.4.3 num_inchannels

```
int io_tcp_sound_t::num_inchannels [private]
```

Number of input channels.

Number of channels expected from and returned by signal processing callback.

4.138.4.4 num_outchannels

```
int io_tcp_sound_t::num_outchannels [private]
```

4.138.4.5 s_in

```
MHASignal::waveform_t* io_tcp_sound_t::s_in [private]
```

Storage for input signal.

The documentation for this class was generated from the following file:

- **MHAIOTCP.cpp**

4.139 io_tcp_sound_t::float_union Union Reference

This union helps in conversion of floats from host byte order to network byte order and back again.

Public Attributes

- float **f**
- unsigned int **i**
- char **c** [4]

4.139.1 Detailed Description

This union helps in conversion of floats from host byte order to network byte order and back again.

4.139.2 Member Data Documentation

4.139.2.1 f

```
float io_tcp_sound_t::float_union::f
```

4.139.2.2 i

```
unsigned int io_tcp_sound_t::float_union::i
```

4.139.2.3 c

```
char io_tcp_sound_t::float_union::c[4]
```

The documentation for this union was generated from the following file:

- **MHAIOTCP.cpp**

4.140 io_tcp_t Class Reference

The tcp sound io library.

Public Member Functions

- **io_tcp_t** (int fragsize, float samplerate, **IOProcessEvent_t** proc_event, void *proc_↔
handle, **IOStartedEvent_t** start_event, void *start_handle, **IOStoppedEvent_t** stop_↔
event, void *stop_handle)
- void **prepare** (int num_inchannels, int num_outchannels)
Allocate server socket and start thread waiting for sound data exchange.
- void **start** ()
Call frameworks start callback if there is a sound data connection at the moment.
- void **stop** ()
Close the current connection if there is one.
- void **release** ()
Close the current connection and close the server socket.
- virtual void **accept_loop** ()
IO thread executes this method.
- virtual void **connection_loop** (**MHA_TCP::Connection** *c)
IO thread executes this method for each connection.
- virtual void **parse** (const char *cmd, char *retval, unsigned int len)
Parser interface.
- virtual ~**io_tcp_t** ()

Private Attributes

- **io_tcp_parser_t** parser
- **io_tcp_sound_t** sound
- **io_tcp_fwcb_t** fwcb
- **MHA_TCP::Server** * server
- **MHA_TCP::Thread** * thread
- **MHA_TCP::Async_Notify** notify_start
- **MHA_TCP::Async_Notify** notify_stop
- **MHA_TCP::Async_Notify** notify_release

4.140.1 Detailed Description

The tcp sound io library.

4.140.2 Constructor & Destructor Documentation

4.140.2.1 io_tcp_t()

```
io_tcp_t::io_tcp_t (
    int fragsize,
    float samplerate,
    IOProcessEvent_t proc_event,
    void * proc_handle,
    IOStartedEvent_t start_event,
    void * start_handle,
    IOStoppedEvent_t stop_event,
    void * stop_handle )
```

4.140.2.2 ~io_tcp_t()

```
virtual io_tcp_t::~io_tcp_t ( ) [inline], [virtual]
```

4.140.3 Member Function Documentation

4.140.3.1 prepare()

```
void io_tcp_t::prepare (
    int num_inchannels,
    int num_outchannels )
```

Allocate server socket and start thread waiting for sound data exchange.

prepare opens the tcp server socket and starts the io thread that listens for audio data on the tcp socket after doing some sanity checks

4.140.3.2 start()

```
void io_tcp_t::start ( )
```

Call frameworks start callback if there is a sound data connection at the moment.

4.140.3.3 stop()

```
void io_tcp_t::stop ( )
```

Close the current connection if there is one.

stop IO thread

4.140.3.4 release()

```
void io_tcp_t::release (
    void )
```

Close the current connection and close the server socket.

Stop IO thread and close server socket.

4.140.3.5 accept_loop()

```
void io_tcp_t::accept_loop ( ) [virtual]
```

IO thread executes this method.

4.140.3.6 connection_loop()

```
void io_tcp_t::connection_loop (
    MHA_TCP::Connection * c ) [virtual]
```

IO thread executes this method for each connection.

Parameters

<i>c</i>	pointer to connection. connection_loop deletes connection before exiting.
-----------------	---

4.140.3.7 parse()

```
virtual void io_tcp_t::parse (
    const char * cmd,
    char * retval,
    unsigned int len ) [inline], [virtual]
```

Parser interface.

4.140.4 Member Data Documentation**4.140.4.1 parser**

```
io_tcp_parser_t io_tcp_t::parser [private]
```


4.140.4.2 sound

```
io_tcp_sound_t io_tcp_t::sound [private]
```

4.140.4.3 fwcb

```
io_tcp_fwcb_t io_tcp_t::fwcb [private]
```

4.140.4.4 server

```
MHA_TCP::Server* io_tcp_t::server [private]
```

4.140.4.5 thread

```
MHA_TCP::Thread* io_tcp_t::thread [private]
```

4.140.4.6 notify_start

```
MHA_TCP::Async_Notify io_tcp_t::notify_start [private]
```

4.140.4.7 notify_stop

```
MHA_TCP::Async_Notify io_tcp_t::notify_stop [private]
```

4.140.4.8 notify_release

```
MHA_TCP::Async_Notify io_tcp_t::notify_release [private]
```

The documentation for this class was generated from the following file:

- **MHAIOTCP.cpp**

4.141 latex_doc_t Class Reference

Class to access the information stored in the plugin source code's MHAPLUGIN_DOCUMENTATION macro.

Public Member Functions

- **latex_doc_t** (const std::string & **plugname**, const std::string & **plugin_macro**)
Constructor loads the plugin into this process.
- std::string **get_latex_doc** ()
This method accesses the compiled-in contents of the MHAPLUGIN_DOCUMENTATION macro and the exported interface functions of the loaded plugin to produce latex documentation for the plugin.
- std::string **get_main_category** () const
- std::vector< std::string > **get_categories** () const

Private Member Functions

- std::string **strdom** (mha_domain_t d) const
- std::string **get_ac** (MHAKernel::algo_comm_class_t & **ac**, std::string txt) const
- std::string **parsername** (std::string s) const
- std::string **get_parser_var** (MHAParser::base_t *p, std::string name) const
- std::string **get_parser_tab** (MHAParser::base_t *p, const std::string &prefix, const std::string &latex_macro) const

Private Attributes

- const std::string **plugname**
- const std::string **latex_plugname**
- MHAKernel::algo_comm_class_t **ac**
- PluginLoader::mhapluginloader_t **loader**
- const std::string **plugin_macro**

4.141.1 Detailed Description

Class to access the information stored in the plugin source code's MHAPLUGIN_DOCUMENTATION macro.

4.141.2 Constructor & Destructor Documentation

4.141.2.1 latex_doc_t()

```
latex_doc_t::latex_doc_t (
    const std::string & plugname,
    const std::string & plugin_macro )
```

Constructor loads the plugin into this process.

Parameters

<i>plugname</i>	Name of the MHA plugin to process
<i>plugin_macro</i>	name of the LaTeX section macro that documents a single plugin (e.g. "section", "subsection", "subsubsection", ...)

4.141.3 Member Function Documentation**4.141.3.1 get_latex_doc()**

```
std::string latex_doc_t::get_latex_doc ( )
```

This method accesses the compiled-in contents of the MHAPLUGIN_DOCUMENTATION macro and the exported interface functions of the loaded plugin to produce latex documentation for the plugin.

It tentatively prepares the plugin for processing and checks the AC variables registered by the plugin.

Returns

the complete latex documentation for this plugin

4.141.3.2 get_main_category()

```
std::string latex_doc_t::get_main_category ( ) const
```

Returns

the first word of the categories string in the MHAPLUGIN_DOCUMENTATION macro

4.141.3.3 get_categories()

```
std::vector< std::string > latex_doc_t::get_categories ( ) const
```

Returns

a vector of all words in the categories string in the MHAPLUGIN_DOCUMENTATION macro

4.141.3.4 strdom()

```
std::string latex_doc_t::strdom (
    mha_domain_t d ) const [private]
```

4.141.3.5 get_ac()

```
std::string latex_doc_t::get_ac (
    MHAKernel::algo_comm_class_t & ac,
    std::string txt ) const [private]
```

4.141.3.6 parsername()

```
std::string latex_doc_t::parsername (
    std::string s ) const [private]
```

4.141.3.7 get_parser_var()

```
std::string latex_doc_t::get_parser_var (
    MHAParser::base_t * p,
    std::string name ) const [private]
```

4.141.3.8 get_parser_tab()

```
std::string latex_doc_t::get_parser_tab (
    MHAParser::base_t * p,
    const std::string & prefix,
    const std::string & latex_macro ) const [private]
```

4.141.4 Member Data Documentation

4.141.4.1 plugname

```
const std::string latex_doc_t::plugname [private]
```

4.141.4.2 latex_plugname

```
const std::string latex_doc_t::latex_plugname [private]
```

4.141.4.3 ac

```
MHAKernel::algo_comm_class_t latex_doc_t::ac [private]
```

4.141.4.4 loader

```
PluginLoader::mhapluginloader_t latex_doc_t::loader [private]
```

4.141.4.5 plugin_macro

```
const std::string latex_doc_t::plugin_macro [private]
```

The documentation for this class was generated from the following file:

- **generatemhaplugindoc.cpp**

4.142 level_matching::channel_pair Class Reference

Public Member Functions

- **channel_pair** (const std::pair< int, int > &idx_, **mha_real_t** filter_rate_, **mha_real_t** mismatch_time_constant_)
Channel pair ctor.
- **channel_pair** (int idx1_, int idx2_, **mha_real_t** filter_rate_, **mha_real_t** mismatch_time_constant_)
Channel pair ctor.
- **mha_real_t update_mismatch** (const **mha_wave_t** &signal_)
Calculates the filtered rms level mismatch.
- **mha_real_t update_mismatch** (const **mha_spec_t** &signal_, unsigned fftlen_)
Calculates the filtered rms level mismatch.
- **mha_real_t get_mismatch** () const
Get last filter result.
- const std::pair< int, int > & **get_idx** () const

Private Attributes

- `std::pair< int, int > idx`
Indices of channels.
- `MHAFilter::o1flt_lowpass_t mismatch`
Low-pass filtered level mismatch.

4.142.1 Constructor & Destructor Documentation

4.142.1.1 `channel_pair()` [1/2]

```
level_matching::channel_pair::channel_pair (
    const std::pair< int, int > & idx_,
    mha_real_t filter_rate_,
    mha_real_t mismatch_time_constant_ )
```

Channel pair ctor.

Parameters

<code>idx_</code>	Pair of channel indices
<code>filter_rate_</code>	Filter rate of low pass filter
<code>mismatch_time_↔ constant_</code>	Time constant of low pass filter

4.142.1.2 `channel_pair()` [2/2]

```
level_matching::channel_pair::channel_pair (
    int idx1_,
    int idx2_,
    mha_real_t filter_rate_,
    mha_real_t mismatch_time_constant_ )
```

Channel pair ctor.

Parameters

<code>idx1</code>	First channel index. Used as reference
<code>idx2</code>	Second channel index
<code>filter_rate_</code>	Filter rate of low pass filter
<code>mismatch_time_↔ constant_</code>	Time constant of low pass filter

4.142.2 Member Function Documentation

4.142.2.1 update_mismatch() [1/2]

```
mha_real_t level_matching::channel_pair::update_mismatch (
    const mha_wave_t & signal_ )
```

Calculates the filtered rms level mismatch.

Parameters

<i>signal</i>	Input signal
---------------	--------------

Returns

Low-pass filtered mismatch ratio

4.142.2.2 update_mismatch() [2/2]

```
mha_real_t level_matching::channel_pair::update_mismatch (
    const mha_spec_t & signal_,
    unsigned fftlen_ )
```

Calculates the filtered rms level mismatch.

Parameters

<i>signal</i>	Input signal
---------------	--------------

Returns

Low-pass filtered mismatch ratio

4.142.2.3 get_mismatch()

```
mha_real_t level_matching::channel_pair::get_mismatch ( ) const
```

Get last filter result.

Returns

Last filter result

4.142.2.4 get_idx()

```
const std::pair<int,int>& level_matching::channel_pair::get_idx ( ) const [inline]
```

4.142.3 Member Data Documentation

4.142.3.1 idx

```
std::pair<int,int> level_matching::channel_pair::idx [private]
```

Indices of channels.

4.142.3.2 mismatch

```
MHAFilter::olflt_lowpass_t level_matching::channel_pair::mismatch [private]
```

Low-pass filtered level mismatch.

The documentation for this class was generated from the following files:

- **level_matching.hh**
- **level_matching.cpp**

4.143 level_matching::level_matching_config_t Class Reference

Public Member Functions

- **level_matching_config_t** (const **mhaconfig_t** &cfg_, const std::vector< std::vector< int >> &pairs_, **mha_real_t** signal_lp_fpass_, **mha_real_t** signal_fstop_, unsigned signal_lp_order_, **mha_real_t** level_tau_, **mha_real_t** range_)
RT-config c'tor.
- **~level_matching_config_t** ()=default
- **mha_wave_t** * **process** (**mha_wave_t** *)
- **mha_spec_t** * **process** (**mha_spec_t** *)

Private Attributes

- **MHASignal::waveform_t tmp**
Temporary storage for input signal to use waveform_t helper functions.
- `std::vector< channel_pair > pairings`
Channel pairings.
- **MHAFilter::iir_filter_state_t lp**
Nth-order low pass filter used to exclude high frequencies from level matching.
- **mha_real_t range**
Maximum matching range. Maximum adjustment done.
- unsigned **ftflen**
ftflen in spectral domain

4.143.1 Constructor & Destructor Documentation

4.143.1.1 `level_matching_config_t()`

```
level_matching::level_matching_config_t::level_matching_config_t (
    const mhaconfig_t & cfg_,
    const std::vector< std::vector< int >> & pairs_,
    mha_real_t signal_lp_fpass_,
    mha_real_t signal_lp_fstop_,
    unsigned signal_lp_order_,
    mha_real_t level_tau_,
    mha_real_t range_ )
```

RT-config c'tor.

Parameters

<code>cfg_</code>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
-------------------	---

Precondition

Size of param pairs must be two

Parameters

<code>pairs_</code>	Matrix containing the channel indices of the microphone pairs. Two entries per row.
<code>signal_tau</code>	Time constant of the signal low pass filter in seconds.
<code>level_tau</code>	Time constant of the level mismatch averaging filter in seconds.

4.143.1.2 ~level_matching_config_t()

level_matching::level_matching_config_t::~~level_matching_config_t () [default]

4.143.2 Member Function Documentation

4.143.2.1 process() [1/2]

```
mha_wave_t * level_matching::level_matching_config_t::process (
    mha_wave_t * s )
```

4.143.2.2 process() [2/2]

```
mha_spec_t * level_matching::level_matching_config_t::process (
    mha_spec_t * s )
```

4.143.3 Member Data Documentation

4.143.3.1 tmp

```
MHASignal::waveform_t level_matching::level_matching_config_t::tmp [private]
```

Temporary storage for input signal to use waveform_t helper functions.

4.143.3.2 pairings

```
std::vector< channel_pair> level_matching::level_matching_config_t::pairings [private]
```

Channel pairings.

4.143.3.3 lp

MHAFilter::iir_filter_state_t level_matching::level_matching_config_t::lp [private]

Nth-order low pass filter used to exclude high frequencies from level matching.

4.143.3.4 range

mha_real_t level_matching::level_matching_config_t::range [private]

Maximum matching range. Maximum adjustment done.

4.143.3.5 fftlen

unsigned level_matching::level_matching_config_t::fftlen [private]

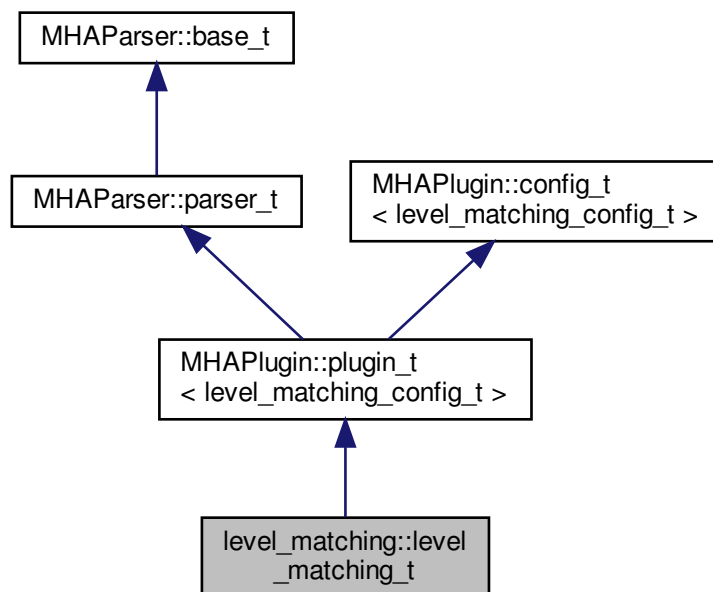
fftlen in spectral domain

The documentation for this class was generated from the following files:

- **level_matching.hh**
- **level_matching.cpp**

4.144 level_matching::level_matching_t Class Reference

Inheritance diagram for level_matching::level_matching_t:



Public Member Functions

- **level_matching_t** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string &algo_name)
Plugin interface ctor.
- **~level_matching_t** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)
Processing callback.
- **mha_spec_t** * **process** (**mha_spec_t** *)
Processing callback.
- void **prepare** (**mhaconfig_t** &)
Plugin preparation callback.
- void **release** (void)

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAParser::mint_t channels** ={"channels","[[0 1]]"}
- **MHAParser::float_t range** ={"Maximum matching range in dB","4","[0,["}
- **MHAParser::float_t lp_signal_fpass** ={"Upper edge of the lp pass band for the signal in Hz","4000","[0,["}
- **MHAParser::float_t lp_signal_fstop** ={"Stop band lower edge frequency for the signal in Hz","8000","[0,["}
- **MHAParser::float_t lp_signal_order** ={"Signal lp order","24","[1,["}
- **MHAParser::float_t lp_level_tau** ={"Low pass time constant for the mismatch in s","1","[0,["}
- **MHAEvents::patchbay_t** < **level_matching_t** > **patchbay**

Additional Inherited Members

4.144.1 Constructor & Destructor Documentation

4.144.1.1 level_matching_t()

```
level_matching::level_matching_t::level_matching_t (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Plugin interface ctor.

Parameters

<i>ac</i>	
-----------	--

4.144.1.2 ~level_matching_t()

```
level_matching::level_matching_t::~~level_matching_t ( )
```

4.144.2 Member Function Documentation

4.144.2.1 process() [1/2]

```
mha_wave_t * level_matching::level_matching_t::process (
    mha_wave_t * signal_ )
```

Processing callback.

Parameters

<i>signal</i>	Input signal
---------------	--------------

4.144.2.2 process() [2/2]

```
mha_spec_t * level_matching::level_matching_t::process (
    mha_spec_t * signal_ )
```

Processing callback.

Parameters

<i>signal</i>	Input signal
---------------	--------------

4.144.2.3 prepare()

```
void level_matching::level_matching_t::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation callback.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPLugin::plugin_t< level_matching_config_t >** (p. [1099](#)).

4.144.2.4 release()

```
void level_matching::level_matching_t::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< level_matching_config_t >** (p. [1100](#)).

4.144.2.5 update_cfg()

```
void level_matching::level_matching_t::update_cfg (
    void ) [private]
```

4.144.3 Member Data Documentation

4.144.3.1 channels

```
MHAParser::mint_t level_matching::level_matching_t::channels ={"channels", "[[0
1]]"} [private]
```

4.144.3.2 range

```
MHAParser::float_t level_matching::level_matching_t::range ={"Maximum matching
range in dB", "4", "[0,["} [private]
```

4.144.3.3 lp_signal_fpass

MHAParser::float_t level_matching::level_matching_t::lp_signal_fpass = {"Upper edge of the lp pass band for the signal in Hz", "4000", "[0,["} [private]

4.144.3.4 lp_signal_fstop

MHAParser::float_t level_matching::level_matching_t::lp_signal_fstop = {"Stop band lower edge frequency for the signal in Hz", "8000", "[0,["} [private]

4.144.3.5 lp_signal_order

MHAParser::float_t level_matching::level_matching_t::lp_signal_order = {"Signal lp order", "24", "[1,["} [private]

4.144.3.6 lp_level_tau

MHAParser::float_t level_matching::level_matching_t::lp_level_tau = {"Low pass time constant for the mismatch in s", "1", "[0,["} [private]

4.144.3.7 patchbay

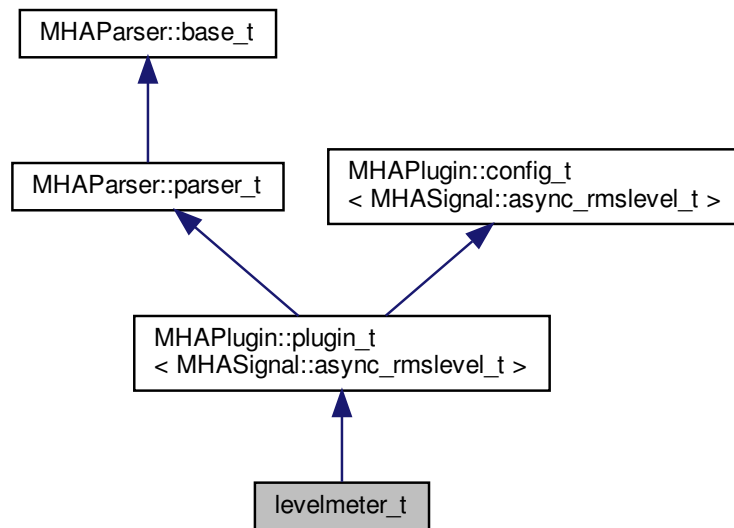
MHAEvents::patchbay_t < level_matching_t > level_matching::level_matching_t::patchbay [private]

The documentation for this class was generated from the following files:

- level_matching.hh
- level_matching.cpp

4.145 levelmeter_t Class Reference

Inheritance diagram for levelmeter_t:



Public Member Functions

- **levelmeter_t** (const **algo_comm_t** &, const std::string &, const std::string)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)

Private Member Functions

- void **update_tau** ()
- void **query_rms** ()
- void **query_peak** ()

Private Attributes

- **MHAParser::float_t** **tau**
- **MHAParser::kw_t** **mode**
- **MHAParser::vfloat_mon_t** **rms**
- **MHAParser::vfloat_mon_t** **peak**
- **MHAEvents::patchbay_t** < **levelmeter_t** > **patchbay**

Additional Inherited Members

4.145.1 Constructor & Destructor Documentation

4.145.1.1 levelmeter_t()

```
levelmeter_t::levelmeter_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string )
```

4.145.2 Member Function Documentation

4.145.2.1 process()

```
mha_wave_t * levelmeter_t::process (
    mha_wave_t * s )
```

4.145.2.2 prepare()

```
void levelmeter_t::prepare (
    mhaconfig_t & cf ) [virtual]
```

Implements **MHAPLugin::plugin_t**< **MHASignal::async_rmslevel_t** > (p. [1099](#)).

4.145.2.3 update_tau()

```
void levelmeter_t::update_tau ( ) [private]
```

4.145.2.4 query_rms()

```
void levelmeter_t::query_rms ( ) [private]
```

4.145.2.5 query_peak()

```
void levelmeter_t::query_peak ( ) [private]
```

4.145.3 Member Data Documentation

4.145.3.1 tau

```
MHAParser::float_t levelmeter_t::tau [private]
```

4.145.3.2 mode

```
MHAParser::kw_t levelmeter_t::mode [private]
```

4.145.3.3 rms

```
MHAParser::vfloat_mon_t levelmeter_t::rms [private]
```

4.145.3.4 peak

```
MHAParser::vfloat_mon_t levelmeter_t::peak [private]
```

4.145.3.5 patchbay

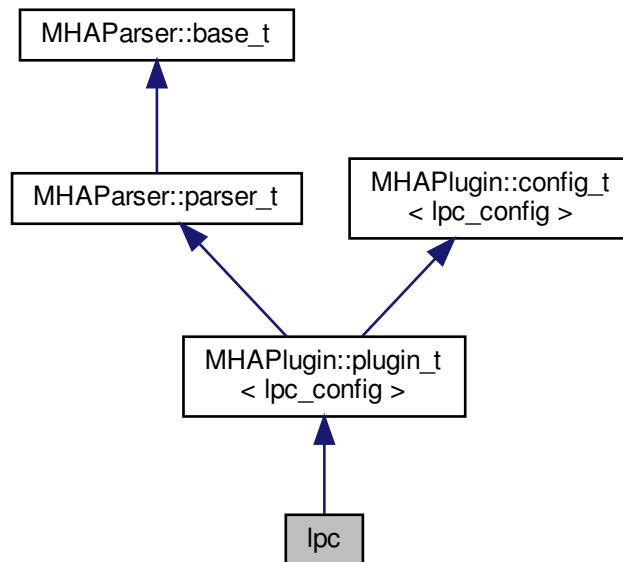
```
MHAEvents::patchbay_t< levelmeter_t> levelmeter_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **levelmeter.cpp**

4.146 lpc Class Reference

Inheritance diagram for lpc:



Public Member Functions

- **lpc** (**algo_comm_t** & **ac**, const std::string &chain_name, const std::string & **algo_name**)
Constructs our plugin.
- **~lpc** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)
Checks for the most recent configuration and defers processing to it.
- void **prepare** (**mhaconfig_t** &)
Plugin preparation.
- void **release** (void)

Private Member Functions

- void **update_cfg** ()

Private Attributes

- `std::string algo_name`
- `MHAParser::int_t lpc_order`
- `MHAParser::int_t lpc_buffer_size`
- `MHAParser::bool_t shift`
- `MHAParser::int_t comp_each_iter`
- `MHAParser::bool_t norm`
- `MHAEvents::patchbay_t< lpc > patchbay`

Additional Inherited Members

4.146.1 Constructor & Destructor Documentation

4.146.1.1 `lpc()`

```
lpc::lpc (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Constructs our plugin.

4.146.1.2 `~lpc()`

```
lpc::~~lpc ( )
```

4.146.2 Member Function Documentation

4.146.2.1 `process()`

```
mha_wave_t * lpc::process (
    mha_wave_t * signal )
```

Checks for the most recent configuration and defers processing to it.

4.146.2.2 `prepare()`

```
void lpc::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPLugin::plugin_t< lpc_config >** (p. [1099](#)).

4.146.2.3 release()

```
void lpc::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< lpc_config >** (p. [1100](#)).

4.146.2.4 update_cfg()

```
void lpc::update_cfg (
    void ) [private]
```

4.146.3 Member Data Documentation

4.146.3.1 algo_name

```
std::string lpc::algo_name [private]
```

4.146.3.2 lpc_order

```
MHAParser::int_t lpc::lpc_order [private]
```

4.146.3.3 lpc_buffer_size

```
MHAParser::int_t lpc::lpc_buffer_size [private]
```

4.146.3.4 shift

```
MHAParser::bool_t lpc::shift [private]
```

4.146.3.5 comp_each_iter

```
MHAParser::int_t lpc::comp_each_iter [private]
```

4.146.3.6 norm

```
MHAParser::bool_t lpc::norm [private]
```

4.146.3.7 patchbay

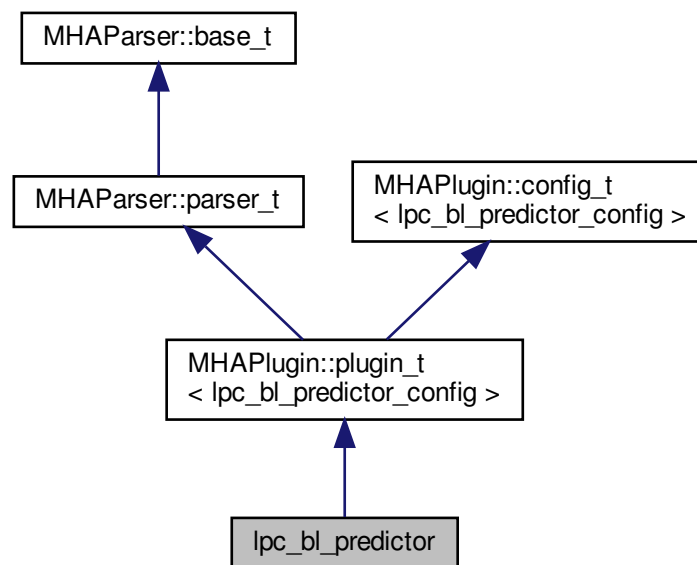
```
MHAEvents::patchbay_t< lpc> lpc::patchbay [private]
```

The documentation for this class was generated from the following files:

- **lpc.h**
- **lpc.cpp**

4.147 lpc_bl_predictor Class Reference

Inheritance diagram for lpc_bl_predictor:



Public Member Functions

- `lpc_bl_predictor (algo_comm_t & ac, const std::string &chain_name, const std::string &algo_name)`
Constructs our plugin.
- `~lpc_bl_predictor ()`
- `mha_wave_t * process (mha_wave_t *)`
Checks for the most recent configuration and defers processing to it.
- `void prepare (mhaconfig_t &)`
Plugin preparation.
- `void release (void)`

Public Attributes

- `MHAParser::int_t lpc_order`
- `MHAParser::string_t name_kappa`
- `MHAParser::string_t name_lpc_f`
- `MHAParser::string_t name_lpc_b`
- `MHAParser::string_t name_f`
- `MHAParser::string_t name_b`

Private Member Functions

- `void update_cfg ()`

Private Attributes

- `MHAEvents::patchbay_t< lpc_bl_predictor > patchbay`

Additional Inherited Members

4.147.1 Constructor & Destructor Documentation

4.147.1.1 `lpc_bl_predictor()`

```
lpc_bl_predictor::lpc_bl_predictor (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Constructs our plugin.

4.147.1.2 ~lpc_bl_predictor()

```
lpc_bl_predictor::~~lpc_bl_predictor ( )
```

4.147.2 Member Function Documentation

4.147.2.1 process()

```
mha_wave_t * lpc_bl_predictor::process (
    mha_wave_t * signal )
```

Checks for the most recent configuration and defers processing to it.

4.147.2.2 prepare()

```
void lpc_bl_predictor::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPlugin::plugin_t< lpc_bl_predictor_config >** (p. [1099](#)).

4.147.2.3 release()

```
void lpc_bl_predictor::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPlugin::plugin_t< lpc_bl_predictor_config >** (p. [1100](#)).

4.147.2.4 `update_cfg()`

```
void lpc_bl_predictor::update_cfg (  
    void ) [private]
```

4.147.3 Member Data Documentation

4.147.3.1 `lpc_order`

```
MHAParser::int_t lpc_bl_predictor::lpc_order
```

4.147.3.2 `name_kappa`

```
MHAParser::string_t lpc_bl_predictor::name_kappa
```

4.147.3.3 `name_lpc_f`

```
MHAParser::string_t lpc_bl_predictor::name_lpc_f
```

4.147.3.4 `name_lpc_b`

```
MHAParser::string_t lpc_bl_predictor::name_lpc_b
```

4.147.3.5 `name_f`

```
MHAParser::string_t lpc_bl_predictor::name_f
```

4.147.3.6 `name_b`

```
MHAParser::string_t lpc_bl_predictor::name_b
```

4.147.3.7 patchbay

```
MHAEvents::patchbay_t< lpc_bl_predictor> lpc_bl_predictor::patchbay [private]
```

The documentation for this class was generated from the following files:

- **lpc_bl_predictor.h**
- **lpc_bl_predictor.cpp**

4.148 lpc_bl_predictor_config Class Reference

Public Member Functions

- **lpc_bl_predictor_config** (**algo_comm_t** &iac, const **mhaconfig_t** in_cfg, **lpc_bl_predictor** *_lpc)
- **~lpc_bl_predictor_config** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)

Private Attributes

- **algo_comm_t** ac
- **MHA_AC::waveform_t** f_est
- **MHA_AC::waveform_t** b_est
- **MHASignal::waveform_t** forward
- **MHASignal::waveform_t** backward
- int **lpc_order**
- std::string **name_km**
- std::string **name_f**
- std::string **name_b**
- **mha_wave_t** km
- **mha_wave_t** s_f
- **mha_wave_t** s_b

4.148.1 Constructor & Destructor Documentation

4.148.1.1 lpc_bl_predictor_config()

```
lpc_bl_predictor_config::lpc_bl_predictor_config (
    algo_comm_t & iac,
    const mhaconfig_t in_cfg,
    lpc_bl_predictor * _lpc )
```

4.148.1.2 `~lpc_bl_predictor_config()`

```
lpc_bl_predictor_config::~lpc_bl_predictor_config ( )
```

4.148.2 Member Function Documentation

4.148.2.1 `process()`

```
mha_wave_t * lpc_bl_predictor_config::process (
    mha_wave_t * wave )
```

4.148.3 Member Data Documentation

4.148.3.1 `ac`

```
algo_comm_t lpc_bl_predictor_config::ac [private]
```

4.148.3.2 `f_est`

```
MHA_AC::waveform_t lpc_bl_predictor_config::f_est [private]
```

4.148.3.3 `b_est`

```
MHA_AC::waveform_t lpc_bl_predictor_config::b_est [private]
```

4.148.3.4 `forward`

```
MHASignal::waveform_t lpc_bl_predictor_config::forward [private]
```

4.148.3.5 backward

MHASignal::waveform_t lpc_bl_predictor_config::backward [private]

4.148.3.6 lpc_order

int lpc_bl_predictor_config::lpc_order [private]

4.148.3.7 name_km

std::string lpc_bl_predictor_config::name_km [private]

4.148.3.8 name_f

std::string lpc_bl_predictor_config::name_f [private]

4.148.3.9 name_b

std::string lpc_bl_predictor_config::name_b [private]

4.148.3.10 km

mha_wave_t lpc_bl_predictor_config::km [private]

4.148.3.11 s_f

mha_wave_t lpc_bl_predictor_config::s_f [private]

4.148.3.12 `s_b`

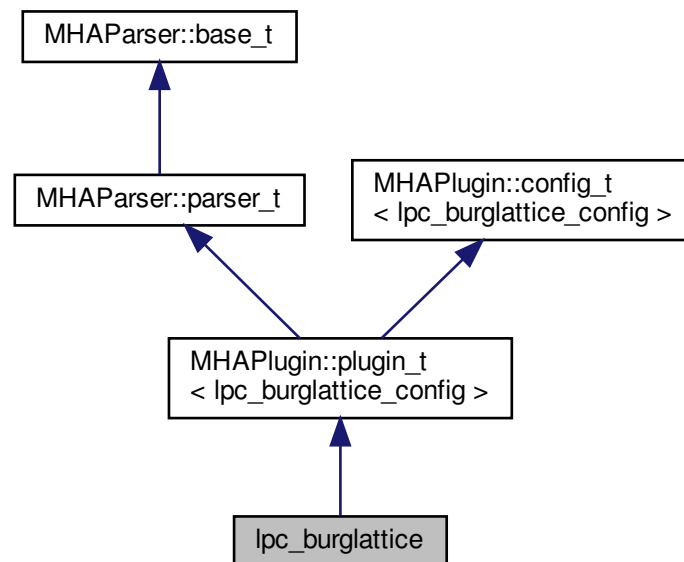
```
mha_wave_t lpc_bl_predictor_config::s_b [private]
```

The documentation for this class was generated from the following files:

- `lpc_bl_predictor.h`
- `lpc_bl_predictor.cpp`

4.149 `lpc_burglattice` Class Reference

Inheritance diagram for `lpc_burglattice`:



Public Member Functions

- **`lpc_burglattice`** (**`algo_comm_t`** & **`ac`**, const std::string &chain_name, const std::string &algo_name)
Constructs our plugin.
- **`~lpc_burglattice`** ()
- **`mha_wave_t * process`** (**`mha_wave_t *`**)
Checks for the most recent configuration and defers processing to it.
- void **`prepare`** (**`mhaconfig_t`** &)
Plugin preparation.
- void **`release`** (void)

Public Attributes

- **MHAParser::int_t lpc_order**
- **MHAParser::string_t name_kappa**
- **MHAParser::string_t name_f**
- **MHAParser::string_t name_b**
- **MHAParser::float_t lambda**

Private Member Functions

- void **update_cfg** ()

Private Attributes

- **MHAEvents::patchbay_t< lpc_burglattice > patchbay**

Additional Inherited Members

4.149.1 Constructor & Destructor Documentation

4.149.1.1 lpc_burglattice()

```
lpc_burglattice::lpc_burglattice (
    algo_comm_t & ac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Constructs our plugin.

4.149.1.2 ~lpc_burglattice()

```
lpc_burglattice::~lpc_burglattice ( )
```

4.149.2 Member Function Documentation

4.149.2.1 process()

```
mha_wave_t * lpc_burglattice::process (
    mha_wave_t * signal )
```

Checks for the most recent configuration and defers processing to it.

4.149.2.2 prepare()

```
void lpc_burglattice::prepare (
    mhaconfig_t & signal_info ) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

Parameters

<i>signal_info</i>	Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate).
--------------------	---

Implements **MHAPLugin::plugin_t< lpc_burglattice_config >** (p. [1099](#)).

4.149.2.3 release()

```
void lpc_burglattice::release (
    void ) [inline], [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< lpc_burglattice_config >** (p. [1100](#)).

4.149.2.4 update_cfg()

```
void lpc_burglattice::update_cfg (
    void ) [private]
```

4.149.3 Member Data Documentation

4.149.3.1 lpc_order

MHAParser::int_t lpc_burglattice::lpc_order

4.149.3.2 name_kappa

MHAParser::string_t lpc_burglattice::name_kappa

4.149.3.3 name_f

MHAParser::string_t lpc_burglattice::name_f

4.149.3.4 name_b

MHAParser::string_t lpc_burglattice::name_b

4.149.3.5 lambda

MHAParser::float_t lpc_burglattice::lambda

4.149.3.6 patchbay

MHAEvents::patchbay_t< **lpc_burglattice**> lpc_burglattice::patchbay [private]

The documentation for this class was generated from the following files:

- **lpc_burg-lattice.h**
- **lpc_burg-lattice.cpp**

4.150 lpc_burglattice_config Class Reference

Public Member Functions

- **lpc_burglattice_config** (**algo_comm_t** &iac, const **mhaconfig_t** in_cfg, **lpc_burglattice** *_lpc)
- **~lpc_burglattice_config** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)

Private Attributes

- `algo_comm_t ac`
- `MHASignal::waveform_t forward`
- `MHASignal::waveform_t backward`
- `MHASignal::waveform_t kappa`
- `MHA_AC::waveform_t kappa_block`
- `MHASignal::waveform_t dm`
- `MHASignal::waveform_t nm`
- `mha_real_t lambda`
- `int lpc_order`
- `std::string name_f`
- `std::string name_b`
- `mha_wave_t s_f`
- `mha_wave_t s_b`

4.150.1 Constructor & Destructor Documentation

4.150.1.1 `lpc_burglattice_config()`

```
lpc_burglattice_config::lpc_burglattice_config (
    algo_comm_t & iac,
    const mhaconfig_t in_cfg,
    lpc_burglattice * _lpc )
```

4.150.1.2 `~lpc_burglattice_config()`

```
lpc_burglattice_config::~lpc_burglattice_config ( )
```

4.150.2 Member Function Documentation

4.150.2.1 `process()`

```
mha_wave_t * lpc_burglattice_config::process (
    mha_wave_t * wave )
```

4.150.3 Member Data Documentation

4.150.3.1 ac

`algo_comm_t lpc_burglattice_config::ac [private]`

4.150.3.2 forward

`MHASignal::waveform_t lpc_burglattice_config::forward [private]`

4.150.3.3 backward

`MHASignal::waveform_t lpc_burglattice_config::backward [private]`

4.150.3.4 kappa

`MHASignal::waveform_t lpc_burglattice_config::kappa [private]`

4.150.3.5 kappa_block

`MHA_AC::waveform_t lpc_burglattice_config::kappa_block [private]`

4.150.3.6 dm

`MHASignal::waveform_t lpc_burglattice_config::dm [private]`

4.150.3.7 nm

`MHASignal::waveform_t lpc_burglattice_config::nm [private]`

4.150.3.8 `lambda`

```
mha_real_t lpc_burglattice_config::lambda [private]
```

4.150.3.9 `lpc_order`

```
int lpc_burglattice_config::lpc_order [private]
```

4.150.3.10 `name_f`

```
std::string lpc_burglattice_config::name_f [private]
```

4.150.3.11 `name_b`

```
std::string lpc_burglattice_config::name_b [private]
```

4.150.3.12 `s_f`

```
mha_wave_t lpc_burglattice_config::s_f [private]
```

4.150.3.13 `s_b`

```
mha_wave_t lpc_burglattice_config::s_b [private]
```

The documentation for this class was generated from the following files:

- `lpc_burg-lattice.h`
- `lpc_burg-lattice.cpp`

4.151 `lpc_config` Class Reference

Public Member Functions

- `lpc_config` (`algo_comm_t` &ac, const `mhaconfig_t` in_cfg, std::string &algo_name, unsigned int _order, unsigned int _lpc_buffer_size, bool _shift, unsigned int _comp_↔ each_iter, bool _norm)
- `~lpc_config` ()
- `mha_wave_t` * `process` (`mha_wave_t` *)
- void `insert` ()

Private Attributes

- bool **norm**
- bool **shift**
- unsigned int **comp_each_iter**
- unsigned int **order**
- unsigned int **lpc_buffer_size**
- unsigned int **N**
- unsigned int **comp_iter**
- **mha_wave_t** **sample**
- std::vector< **mha_real_t** > **R**
- std::vector< **mha_real_t** > **A**
- **MHASignal::ringbuffer_t** **inwave**
- **MHA_AC::waveform_t** **lpc_out**
- **MHA_AC::waveform_t** **corr_out**

4.151.1 Constructor & Destructor Documentation

4.151.1.1 lpc_config()

```
lpc_config::lpc_config (
    algo_comm_t & ac,
    const mhaconfig_t in_cfg,
    std::string & algo_name,
    unsigned int _order,
    unsigned int _lpc_buffer_size,
    bool _shift,
    unsigned int _comp_each_iter,
    bool _norm )
```

4.151.1.2 ~lpc_config()

```
lpc_config::~~lpc_config ( )
```

4.151.2 Member Function Documentation

4.151.2.1 process()

```
mha_wave_t * lpc_config::process (
    mha_wave_t * wave )
```

4.151.2.2 insert()

```
void lpc_config::insert ( )
```

4.151.3 Member Data Documentation

4.151.3.1 norm

```
bool lpc_config::norm [private]
```

4.151.3.2 shift

```
bool lpc_config::shift [private]
```

4.151.3.3 comp_each_iter

```
unsigned int lpc_config::comp_each_iter [private]
```

4.151.3.4 order

```
unsigned int lpc_config::order [private]
```

4.151.3.5 lpc_buffer_size

```
unsigned int lpc_config::lpc_buffer_size [private]
```

4.151.3.6 N

```
unsigned int lpc_config::N [private]
```

4.151.3.7 comp_iter

```
unsigned int lpc_config::comp_iter [private]
```

4.151.3.8 sample

```
mha_wave_t lpc_config::sample [private]
```

4.151.3.9 R

```
std::vector< mha_real_t> lpc_config::R [private]
```

4.151.3.10 A

```
std::vector< mha_real_t> lpc_config::A [private]
```

4.151.3.11 inwave

```
MHASignal::ringbuffer_t lpc_config::inwave [private]
```

4.151.3.12 lpc_out

```
MHA_AC::waveform_t lpc_config::lpc_out [private]
```

4.151.3.13 corr_out

```
MHA_AC::waveform_t lpc_config::corr_out [private]
```

The documentation for this class was generated from the following files:

- **lpc.h**
- **lpc.cpp**

4.152 Isl2ac::cfg_t Class Reference

Runtime configuration class of the **Isl2ac** (p. 98) plugin.

Public Member Functions

- **cfg_t** (const **algo_comm_t** &ac_, **underrun_behavior** underrun_, const std::vector< std::string > &streamnames_)
*C'tor of **Isl2ac** (p. 98) run time configuration.*
- void **process** ()

Private Attributes

- std::map< std::string, std::unique_ptr< **save_var_t** > > **varlist**
Maps variable name to unique ptr's of Isl to ac bridges.

4.152.1 Detailed Description

Runtime configuration class of the **Isl2ac** (p. 98) plugin.

4.152.2 Constructor & Destructor Documentation

4.152.2.1 cfg_t()

```
cfg_t::cfg_t (
    const algo_comm_t & ac_,
    underrun_behavior underrun_,
    const std::vector< std::string > & streamnames_ )
```

C'tor of **Isl2ac** (p. 98) run time configuration.

Parameters

<i>ac_</i>	AC space, data from LSL will be inserted as AC variables
<i>streamnames_</i>	Names of LSL streams to be subscribed to

4.152.3 Member Function Documentation**4.152.3.1 process()**

```
void cfg_t::process (
    void )
```

4.152.4 Member Data Documentation**4.152.4.1 varlist**

```
std::map<std::string, std::unique_ptr< save_var_t> > lsl2ac::cfg_t::varlist [private]
```

Maps variable name to unique ptr's of lsl to ac bridges.

The documentation for this class was generated from the following file:

- **lsl2ac.cpp**

4.153 lsl2ac::lsl2ac_t Class Reference

Plugin class of **lsl2ac** (p. [98](#)).

Private Attributes

- **MHAParser::vstring_t streams**
- **MHAParser::bool_t activate**
- **MHAParser::kw_t underrun_behavior**
- **MHAEvents::patchbay_t< lsl2ac_t > patchbay**
- **MHAParser::vstring_mon_t available_streams**

Monitor variable containing all available streams.

Additional Inherited Members

4.153.1 Detailed Description

Plugin class of **lsl2ac** (p. 98).

4.153.2 Constructor & Destructor Documentation

4.153.2.1 lsl2ac_t()

```
lsl2ac::lsl2ac_t::lsl2ac_t (
    algo_comm_t iac,
    const char * chain,
    const char * algo )
```

4.153.3 Member Function Documentation

4.153.3.1 prepare()

```
void lsl2ac::lsl2ac_t::prepare (
    mhaconfig_t & cf ) [virtual]
```

Prepare constructs the vector of bridge variables and locks the configuration, then calls **update()** (p. 649).

Implements **MHAPlugin::plugin_t< cfg_t >** (p. 1099).

4.153.3.2 process() [1/3]

```
mha_wave_t* lsl2ac::lsl2ac_t::process (
    mha_wave_t * s ) [inline]
```

Processing fct for waveforms.

Calls **process(void)** (p. 649).

4.153.3.3 process() [2/3]

```
mha_spec_t* lsl2ac::lsl2ac_t::process (
    mha_spec_t * s ) [inline]
```

Processing fct for spectra.

Calls **process(void)** (p. 649).

4.153.3.4 process() [3/3]

```
void lsl2ac::lsl2ac_t::process (
    void )
```

Process function.

4.153.3.5 release()

```
void lsl2ac::lsl2ac_t::release (
    void ) [virtual]
```

Release fct.

Unlocks variable name list

Reimplemented from **MHAPLugin::plugin_t< cfg_t >** (p. 1100).

4.153.3.6 get_all_stream_names()

```
void lsl2ac::lsl2ac_t::get_all_stream_names ( ) [private]
```

Retrieves all stream names from LSL and fills them into available_streams.

4.153.3.7 update()

```
void lsl2ac::lsl2ac_t::update ( ) [private]
```

Construct new runtime configuration.

4.153.4 Member Data Documentation

4.153.4.1 streams

```
MHAParser::vstring_t lsl2ac::lsl2ac_t::streams [private]
```

4.153.4.2 activate

```
MHAParser::bool_t lsl2ac::lsl2ac_t::activate [private]
```

4.153.4.3 underrun_behavior

```
MHAParser::kw_t lsl2ac::lsl2ac_t::underrun_behavior [private]
```

4.153.4.4 patchbay

```
MHAEvents::patchbay_t< lsl2ac_t> lsl2ac::lsl2ac_t::patchbay [private]
```

4.153.4.5 available_streams

```
MHAParser::vstring_mon_t lsl2ac::lsl2ac_t::available_streams [private]
```

Monitor variable containing all available streams.

The documentation for this class was generated from the following file:

- **lsl2ac.cpp**

4.154 Isl2ac::save_var_t Class Reference

LSL to AC bridge variable.

Public Member Functions

- **save_var_t** (const std::string &name_, const Isl::stream_info &info_, const **algo_↔comm_t** &ac_, **underrun_behavior** ub_)
C'tor of Isl to ac bridge.
- Isl::stream_info **info** ()
Get stream info object from stream inlet.
- unsigned **num_entries** ()
Get number of entries in the stream object.
- ~**save_var_t** ()=default
- void **receive_frame** ()
Receive a sample from Isl and copy to AC space.

Private Member Functions

- void **impl_receive_frame_zero** ()
- void **impl_receive_frame_copy** ()
- void **impl_receive_frame_abort** ()

Private Attributes

- Isl::stream_inlet **stream**
LSL stream outlet.
- std::unique_ptr< **mha_real_t**[]> **buf**
Pointer to data buffer of the ac variable.
- const **algo_comm_t** & **ac**
Handle to AC space.
- **comm_var_t** **cv**
AC variable.
- bool **skip** =false
Should the variable be skipped in future process calls? Only true when error occurred.
- **underrun_behavior** **ub**
Behavior on stream underrun.
- const std::string **name**
Name of stream.

4.154.1 Detailed Description

LSL to AC bridge variable.

4.154.2 Constructor & Destructor Documentation

4.154.2.1 save_var_t()

```
lsl2ac::save_var_t::save_var_t (
    const std::string & name_,
    const lsl::stream_info & info_,
    const algo_comm_t & ac_,
    underrun_behavior ub_ ) [inline]
```

C'tor of lsl to ac bridge.

Parameters

<i>name_</i>	Name of LSL stream to be received
<i>info_</i>	LSL stream info object containing metadata
<i>ac_</i>	Handle to ac space
<i>ub_</i>	Underrun behavior. 0=Zero out, 1=Copy, 2=Abort

4.154.2.2 ~save_var_t()

```
lsl2ac::save_var_t::~~save_var_t ( ) [default]
```

4.154.3 Member Function Documentation

4.154.3.1 info()

```
lsl::stream_info lsl2ac::save_var_t::info ( ) [inline]
```

Get stream info object from stream inlet.

4.154.3.2 num_entries()

```
unsigned lsl2ac::save_var_t::num_entries ( ) [inline]
```

Get number of entries in the stream object.

4.154.3.3 receive_frame()

```
void lsl2ac::save_var_t::receive_frame ( ) [inline]
```

Receive a sample from lsl and copy to AC space.

Handling of underrun is configuration-dependent

4.154.3.4 impl_receive_frame_zero()

```
void lsl2ac::save_var_t::impl_receive_frame_zero ( ) [inline], [private]
```

4.154.3.5 impl_receive_frame_copy()

```
void lsl2ac::save_var_t::impl_receive_frame_copy ( ) [inline], [private]
```

4.154.3.6 impl_receive_frame_abort()

```
void lsl2ac::save_var_t::impl_receive_frame_abort ( ) [inline], [private]
```

4.154.4 Member Data Documentation

4.154.4.1 stream

```
lsl::stream_inlet lsl2ac::save_var_t::stream [private]
```

LSL stream outlet.

Interface to lsl

4.154.4.2 buf

```
std::unique_ptr< mha_real_t[ ]> lsl2ac::save_var_t::buf [private]
```

Pointer to data buffer of the ac variable.

4.154.4.3 ac

```
const algo_comm_t& lsl2ac::save_var_t::ac [private]
```

Handle to AC space.

4.154.4.4 cv

```
comm_var_t lsl2ac::save_var_t::cv [private]
```

AC variable.

4.154.4.5 skip

```
bool lsl2ac::save_var_t::skip =false [private]
```

Should the variable be skipped in future process calls? Only true when error occurred.

4.154.4.6 ub

```
underrun_behavior lsl2ac::save_var_t::ub [private]
```

Behavior on stream underrun.

4.154.4.7 name

```
const std::string lsl2ac::save_var_t::name [private]
```

Name of stream.

Must be saved separately because the stream info might be unrecoverable in error cases

The documentation for this class was generated from the following file:

- **lsl2ac.cpp**

4.155 matrixmixer::cfg_t Class Reference

Public Member Functions

- **cfg_t** (std::vector< std::vector< float > > imixer, unsigned int ci, unsigned int co, unsigned int fragsize, unsigned int nfft)
- **mha_wave_t * process (mha_wave_t *)**
- **mha_spec_t * process (mha_spec_t *)**

Private Attributes

- **MHASignal::waveform_t m**
- **MHASignal::waveform_t wout**
- **MHASignal::spectrum_t sout**

4.155.1 Constructor & Destructor Documentation

4.155.1.1 cfg_t()

```
cfg_t::cfg_t (
    std::vector< std::vector< float > > imixer,
    unsigned int ci,
    unsigned int co,
    unsigned int fragsize,
    unsigned int nfft )
```

4.155.2 Member Function Documentation

4.155.2.1 process() [1/2]

```
mha_wave_t * cfg_t::process (
    mha_wave_t * s )
```

4.155.2.2 process() [2/2]

```
mha_spec_t * cfg_t::process (
    mha_spec_t * s )
```

4.155.3 Member Data Documentation

4.155.3.1 m

MHASignal::waveform_t matrixmixer::cfg_t::m [private]

4.155.3.2 wout

MHASignal::waveform_t matrixmixer::cfg_t::wout [private]

4.155.3.3 sout

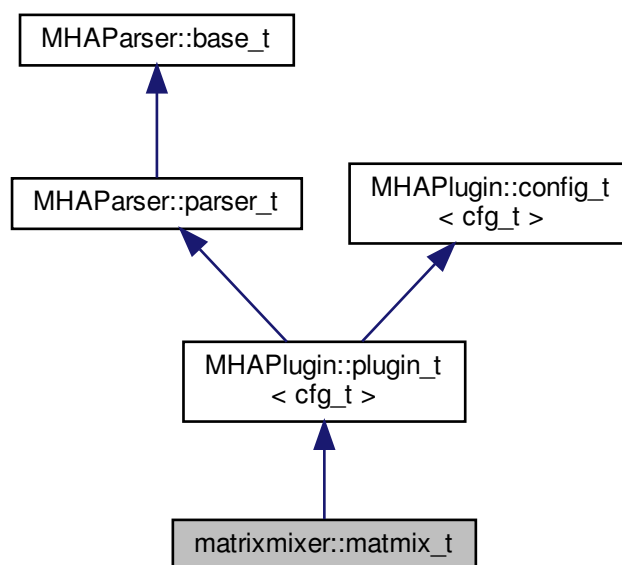
MHASignal::spectrum_t matrixmixer::cfg_t::sout [private]

The documentation for this class was generated from the following file:

- **matrixmixer.cpp**

4.156 matrixmixer::matmix_t Class Reference

Inheritance diagram for matrixmixer::matmix_t:



Public Member Functions

- **matmix_t** (const **algo_comm_t** &, const std::string &, const std::string &)
- void **prepare** (**mhaconfig_t** &)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- **mha_spec_t** * **process** (**mha_spec_t** *)

Private Member Functions

- void **update_m** ()

Private Attributes

- **MHAEvents::patchbay_t**< **matmix_t** > **patchbay**
- **MHAParser::mfloat_t** **mixer**
- unsigned int **ci**
- unsigned int **co**

Additional Inherited Members

4.156.1 Constructor & Destructor Documentation

4.156.1.1 matmix_t()

```
matrixmixer::matmix_t::matmix_t (
    const algo_comm_t & iac,
    const std::string & ,
    const std::string & )
```

4.156.2 Member Function Documentation

4.156.2.1 prepare()

```
void matrixmixer::matmix_t::prepare (
    mhaconfig_t & tf ) [virtual]
```

Implements **MHAPLugin::plugin_t**< **cfg_t** > (p. [1099](#)).

4.156.2.2 process() [1/2]

```
mha_wave_t * matrixmixer::matmix_t::process (  
    mha_wave_t * s )
```

4.156.2.3 process() [2/2]

```
mha_spec_t * matrixmixer::matmix_t::process (  
    mha_spec_t * s )
```

4.156.2.4 update_m()

```
void matrixmixer::matmix_t::update_m (  
    void ) [private]
```

4.156.3 Member Data Documentation

4.156.3.1 patchbay

```
MHAEvents::patchbay_t< matmix_t> matrixmixer::matmix_t::patchbay [private]
```

4.156.3.2 mixer

```
MHAParser::mfloat_t matrixmixer::matmix_t::mixer [private]
```

4.156.3.3 ci

```
unsigned int matrixmixer::matmix_t::ci [private]
```

4.156.3.4 co

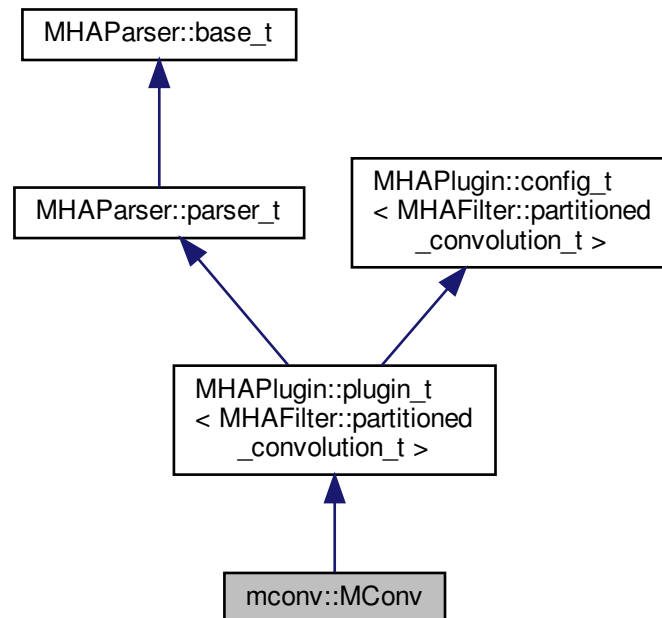
```
unsigned int matrixmixer::matmix_t::co [private]
```

The documentation for this class was generated from the following file:

- **matrixmixer.cpp**

4.157 mconv::MConv Class Reference

Inheritance diagram for mconv::MConv:



Public Member Functions

- **MConv** (const **algo_comm_t** &iac, const std::string &chainname, const std::string &algoname)
Plugin constructor.
- void **prepare** (**mhaconfig_t** &mhaconfig)
Prepare this plugin for processing.
- void **release** ()
- **mha_wave_t** * **process** (**mha_wave_t** *)

Private Member Functions

- void **update** ()
*Update is needed only once, since this plugin allows only change of irs after **prepare()** (p. 661).*
- void **update_irs** ()
*This function updates the irs without allowing a change of its size after **prepare()** (p. 661).*

Private Attributes

- **MHAParser::int_t nchannels_out**
Number of output channels to produce.
- **MHAParser::vint_t inch**
Vector of input channel indices.
- **MHAParser::vint_t outch**
Vector of output channel indices.
- **MHAParser::mfloat_t irs**
Impulse responses, one per row.
- unsigned int **nchannels_in**
Number of input channels, set during prepare.
- unsigned int **fragsize**
Fragsize, set during prepare, is used as the partition length in the partitioned convolution.
- **MHAEvents::patchbay_t< MConv > patchbay**

Additional Inherited Members

4.157.1 Detailed Description

class implements plugin for partitioned convolution. A matrix of impulse responses, filtering n input channels to m output channels, is supported.

4.157.2 Constructor & Destructor Documentation

4.157.2.1 MConv()

```
mconv::MConv::MConv (
    const algo_comm_t & iac,
    const std::string & chainname,
    const std::string & algoname )
```

Plugin constructor.

Parameters

<i>iac</i>	handle and function pointers for algorithm communication
<i>chainname</i>	Name of processing chain
<i>algoname</i>	The name by which the chain refers to this algorithm

4.157.3 Member Function Documentation

4.157.3.1 prepare()

```
void mconv::MConv::prepare (
    mhaconfig_t & mhaconfig ) [virtual]
```

Prepare this plugin for processing.

Parameters

<i>mhaconfig</i>	Configuration for this plugin (Input/Output parameter) Sample rate, fragment size, number of channels are detailed here.
------------------	--

Implements **MHAPlugin::plugin_t**< **MHAFilter::partitioned_convolution_t** > (p. 1099).

4.157.3.2 release()

```
void mconv::MConv::release (
    void ) [virtual]
```

Reimplemented from **MHAPlugin::plugin_t**< **MHAFilter::partitioned_convolution_t** > (p. 1100).

4.157.3.3 process()

```
mha_wave_t * mconv::MConv::process (
    mha_wave_t * s_in )
```

4.157.3.4 update()

```
void mconv::MConv::update ( ) [private]
```

Update is needed only once, since this plugin allows only change of irs after **prepare()** (p. 661).

4.157.3.5 update_irs()

```
void mconv::MConv::update_irs ( ) [private]
```

This function updates the irs without allowing a change of its size after **prepare()** (p. 661).

4.157.4 Member Data Documentation

4.157.4.1 nchannels_out

```
MHAParser::int_t mconv::MConv::nchannels_out [private]
```

Number of output channels to produce.

4.157.4.2 inch

```
MHAParser::vint_t mconv::MConv::inch [private]
```

Vector of input channel indices.

Each element in this vector identifies the input channel to which to apply the corresponding impulse response in irs.

4.157.4.3 outch

```
MHAParser::vint_t mconv::MConv::outch [private]
```

Vector of output channel indices.

Each element in this vector identifies the output channel to which the result of filtering with the corresponding impulse response in irs is mixed.

4.157.4.4 irs

```
MHAParser::mfloat_t mconv::MConv::irs [private]
```

Impulse responses, one per row.

For each row, the corresponding element of inch identifies the source channel, and the corresponding element of outch identifies the target channel.

4.157.4.5 nchannels_in

```
unsigned int mconv::MConv::nchannels_in [private]
```

Number of input channels, set during prepare.

4.157.4.6 fragsize

```
unsigned int mconv::MConv::fragsize [private]
```

Fragsize, set during prepare, is used as the partition length in the partitioned convolution.

4.157.4.7 patchbay

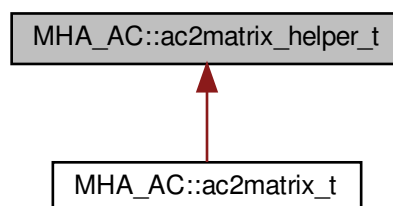
```
MHAEvents::patchbay_t< MConv> mconv::MConv::patchbay [private]
```

The documentation for this class was generated from the following file:

- **mconv.cpp**

4.158 MHA_AC::ac2matrix_helper_t Class Reference

Inheritance diagram for MHA_AC::ac2matrix_helper_t:



Public Member Functions

- **ac2matrix_helper_t** (**algo_comm_t**, const std::string &)
- void **getvar** ()

Public Attributes

- **algo_comm_t** **ac**
- `std::string` **name**
- `std::string` **username**
- **MHASignal::uint_vector_t** **size**
- `bool` **is_complex**

Protected Attributes

- **comm_var_t** **acvar**

4.158.1 Constructor & Destructor Documentation

4.158.1.1 `ac2matrix_helper_t()`

```
MHA_AC::ac2matrix_helper_t::ac2matrix_helper_t (
    algo_comm_t iac,
    const std::string & iname )
```

4.158.2 Member Function Documentation

4.158.2.1 `getvar()`

```
void MHA_AC::ac2matrix_helper_t::getvar ( )
```

4.158.3 Member Data Documentation

4.158.3.1 **ac**

```
algo_comm_t MHA_AC::ac2matrix_helper_t::ac
```

4.158.3.2 name

```
std::string MHA_AC::ac2matrix_helper_t::name
```

4.158.3.3 username

```
std::string MHA_AC::ac2matrix_helper_t::username
```

4.158.3.4 size

```
MHASignal::uint_vector_t MHA_AC::ac2matrix_helper_t::size
```

4.158.3.5 is_complex

```
bool MHA_AC::ac2matrix_helper_t::is_complex
```

4.158.3.6 acvar

```
comm_var_t MHA_AC::ac2matrix_helper_t::acvar [protected]
```

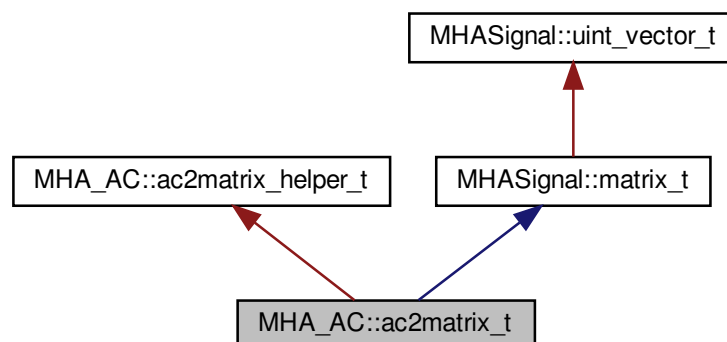
The documentation for this class was generated from the following files:

- mha_algo_comm.h
- mha_algo_comm.cpp

4.159 MHA_AC::ac2matrix_t Class Reference

Copy AC variable to a matrix.

Inheritance diagram for MHA_AC::ac2matrix_t:



Public Member Functions

- **ac2matrix_t** (**algo_comm_t** **ac**, const std::string & **name**)
Constructor.
- void **update** ()
Update contents of the matrix from the AC space.
- const std::string & **getname** () const
Return name of AC variable/matrix.
- const std::string & **getusername** () const
Return user specified name of AC variable/matrix.
- void **insert** (**algo_comm_t** **ac**)
Insert matrix into an AC space (other than source AC space)

Additional Inherited Members

4.159.1 Detailed Description

Copy AC variable to a matrix.

This class constructs a matrix of same size as an AC variable and can copy the AC variable to itself. The **update()** (p. 666) function is real-time safe.

4.159.2 Constructor & Destructor Documentation

4.159.2.1 ac2matrix_t()

```
MHA_AC::ac2matrix_t::ac2matrix_t (
    algo_comm_t ac,
    const std::string & name )
```

Constructor.

Parameters

<i>ac</i>	AC handle
<i>name</i>	Name of AC variable to be copied

4.159.3 Member Function Documentation

4.159.3.1 update()

```
void MHA_AC::ac2matrix_t::update ( )
```

Update contents of the matrix from the AC space.

This function is real-time safe. The copy operation performance is of the order of the number of elements in the matrix.

4.159.3.2 getname()

```
const std::string& MHA_AC::ac2matrix_t::getname ( ) const [inline]
```

Return name of AC variable/matrix.

4.159.3.3 getusername()

```
const std::string& MHA_AC::ac2matrix_t::getusername ( ) const [inline]
```

Return user specified name of AC variable/matrix.

4.159.3.4 insert()

```
void MHA_AC::ac2matrix_t::insert (
    algo_comm_t ac )
```

Insert matrix into an AC space (other than source AC space)

Parameters

<i>ac</i>	AC space handle to insert data
-----------	--------------------------------

Note

The AC variable data buffer points to the data of the matrix. Modifications of the AC variable directly modify the data of the matrix; after deletion of the matrix, the data buffer is invalid.

The documentation for this class was generated from the following files:

- **mha_algo_comm.h**
- **mha_algo_comm.cpp**

4.160 MHA_AC::acspace2matrix_t Class Reference

Copy all or a subset of all numeric AC variables into an array of matrixes.

Public Member Functions

- **acspace2matrix_t** (**algo_comm_t** ac, const std::vector< std::string > &names)
Constructor.
- **acspace2matrix_t** (const **MHA_AC::acspace2matrix_t** &src)
Constructor with initialization from an instance.
- **~acspace2matrix_t** ()
- **MHA_AC::acspace2matrix_t & operator=** (const **MHA_AC::acspace2matrix_t** &src)
Copy all contents (deep copy).
- **MHA_AC::ac2matrix_t & operator[]** (unsigned int k)
Access operator.
- const **MHA_AC::ac2matrix_t & operator[]** (unsigned int k) const
Constant access operator.
- void **update** ()
Update function.
- unsigned int **size** () const
Number of matrixes in AC space.
- unsigned int **frame** () const
Actual frame number.
- void **insert** (**algo_comm_t** ac)
Insert AC space copy into an AC space (other than source AC space)

Private Attributes

- unsigned int **len**
- **MHA_AC::ac2matrix_t** data**
- unsigned int **frameno**

4.160.1 Detailed Description

Copy all or a subset of all numeric AC variables into an array of matrixes.

4.160.2 Constructor & Destructor Documentation

4.160.2.1 acspace2matrix_t() [1/2]

```
MHA_AC::acspace2matrix_t::acspace2matrix_t (
    algo_comm_t ac,
    const std::vector< std::string > & names )
```

Constructor.

Scan all given AC variables and allocate corresponding matrixes.

Parameters

<i>ac</i>	AC handle.
<i>names</i>	Names of AC variables, or empty for all.

4.160.2.2 acspace2matrix_t() [2/2]

```
MHA_AC::acspace2matrix_t::acspace2matrix_t (
    const MHA_AC::acspace2matrix_t & src )
```

Constructor with initialization from an instance.

Parameters

<i>src</i>	Instance to be copied.
------------	------------------------

4.160.2.3 ~acspace2matrix_t()

```
MHA_AC::acspace2matrix_t::~~acspace2matrix_t ( )
```

4.160.3 Member Function Documentation

4.160.3.1 operator=()

```
MHA_AC::acspace2matrix_t & MHA_AC::acspace2matrix_t::operator= (
    const MHA_AC::acspace2matrix_t & src )
```

Copy all contents (deep copy).

Parameters

<i>src</i>	Array of matrixes to be copied.
------------	---------------------------------

4.160.3.2 operator[]() [1/2]

```
MHA_AC::ac2matrix_t& MHA_AC::acspace2matrix_t::operator[] (
```

```
unsigned int k ) [inline]
```

Access operator.

Parameters

<i>k</i>	index into array; should not exceed size() (p. 670)-1.
----------	---

Return values

<i>Reference</i>	to matrix.
------------------	------------

4.160.3.3 operator[]() [2/2]

```
const MHA_AC::ac2matrix_t& MHA_AC::acspace2matrix_t::operator[] (
    unsigned int k ) const [inline]
```

Constant access operator.

Parameters

<i>k</i>	index into array; should not exceed size() (p. 670)-1.
----------	---

Return values

<i>Constant</i>	reference to matrix.
-----------------	----------------------

4.160.3.4 update()

```
void MHA_AC::acspace2matrix_t::update ( ) [inline]
```

Update function.

This function updates all matrixes from their corresponding AC variables. It can be called from the MHA Framework prepare function or in the processing callback.

4.160.3.5 size()

```
unsigned int MHA_AC::acspace2matrix_t::size ( ) const [inline]
```

Number of matrixes in AC space.

4.160.3.6 frame()

```
unsigned int MHA_AC::acspace2matrix_t::frame ( ) const [inline]
```

Actual frame number.

4.160.3.7 insert()

```
void MHA_AC::acspace2matrix_t::insert (
    algo_comm_t ac )
```

Insert AC space copy into an AC space (other than source AC space)

Parameters

<i>ac</i>	AC space handle to insert data
-----------	--------------------------------

4.160.4 Member Data Documentation

4.160.4.1 len

```
unsigned int MHA_AC::acspace2matrix_t::len [private]
```

4.160.4.2 data

```
MHA_AC::ac2matrix_t** MHA_AC::acspace2matrix_t::data [private]
```

4.160.4.3 frameno

```
unsigned int MHA_AC::acspace2matrix_t::frameno [private]
```

The documentation for this class was generated from the following files:

- mha_algo_comm.h
- mha_algo_comm.cpp

4.161 MHA_AC::double_t Class Reference

Insert a double precision floating point variable into the AC space.

Public Member Functions

- **double_t** (**algo_comm_t**, std::string, double=0)
- **~double_t** ()

Public Attributes

- double **data**
Floating point value variable.

Private Attributes

- **algo_comm_t ac**

4.161.1 Detailed Description

Insert a double precision floating point variable into the AC space.

The variable is automatically removed on destruction.

4.161.2 Constructor & Destructor Documentation

4.161.2.1 double_t()

```
MHA_AC::double_t::double_t (
    algo_comm_t iac,
    std::string n,
    double v = 0 )
```

4.161.2.2 ~double_t()

```
MHA_AC::double_t::~~double_t ( )
```

4.161.3 Member Data Documentation

4.161.3.1 data

```
double MHA_AC::double_t::data
```

Floating point value variable.

4.161.3.2 ac

```
algo_comm_t MHA_AC::double_t::ac [private]
```

The documentation for this class was generated from the following files:

- **mha_algo_comm.h**
- **mha_algo_comm.cpp**

4.162 MHA_AC::float_t Class Reference

Insert a float point variable into the AC space.

Public Member Functions

- **float_t (algo_comm_t, std::string, float=0)**
Constructor.
- **~float_t ()**

Public Attributes

- float **data**
Floating point value variable.

Private Attributes

- **algo_comm_t ac**

4.162.1 Detailed Description

Insert a float point variable into the AC space.

The variable is automatically removed on destruction.

4.162.2 Constructor & Destructor Documentation

4.162.2.1 float_t()

```
MHA_AC::float_t::float_t (
    algo_comm_t iac,
    std::string n,
    float v = 0 )
```

Constructor.

4.162.2.2 ~float_t()

```
MHA_AC::float_t::~~float_t ( )
```

4.162.3 Member Data Documentation

4.162.3.1 data

```
float MHA_AC::float_t::data
```

Floating point value variable.

4.162.3.2 ac

```
algo_comm_t MHA_AC::float_t::ac [private]
```

The documentation for this class was generated from the following files:

- mha_algo_comm.h
- mha_algo_comm.cpp

4.163 MHA_AC::int_t Class Reference

Insert a integer variable into the AC space.

Public Member Functions

- **int_t** (**algo_comm_t**, std::string, int=0)
- **~int_t** ()

Public Attributes

- int **data**
Integer value variable.

Private Attributes

- **algo_comm_t** **ac**

4.163.1 Detailed Description

Insert a integer variable into the AC space.

The variable is automatically removed on destruction.

4.163.2 Constructor & Destructor Documentation

4.163.2.1 int_t()

```
MHA_AC::int_t::int_t (
    algo_comm_t iac,
    std::string n,
    int v = 0 )
```

4.163.2.2 ~int_t()

```
MHA_AC::int_t::~~int_t ( )
```

4.163.3 Member Data Documentation

4.163.3.1 data

```
int MHA_AC::int_t::data
```

Integer value variable.

4.163.3.2 ac

```
algo_comm_t MHA_AC::int_t::ac [private]
```

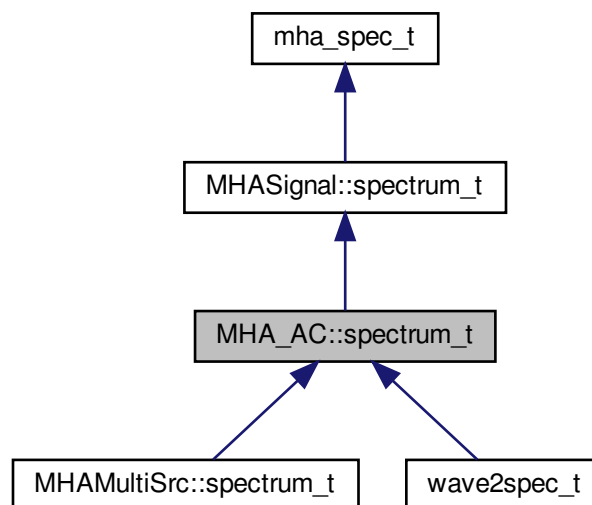
The documentation for this class was generated from the following files:

- **mha_algo_comm.h**
- **mha_algo_comm.cpp**

4.164 MHA_AC::spectrum_t Class Reference

Insert a **MHASignal::spectrum_t** (p. 1197) class into the AC space.

Inheritance diagram for MHA_AC::spectrum_t:



Public Member Functions

- **spectrum_t**(**algo_comm_t** **ac**, std::string **name**, unsigned int **bins**, unsigned int **channels**, bool **insert_now**)
Create the AC variable.
- **~spectrum_t**()
- void **insert**()
Insert AC variable into AC space.

Protected Attributes

- **algo_comm_t** **ac**
- std::string **name**

Additional Inherited Members

4.164.1 Detailed Description

Insert a **MHASignal::spectrum_t** (p. 1197) class into the AC space.

The variable is automatically removed on destruction.

4.164.2 Constructor & Destructor Documentation

4.164.2.1 spectrum_t()

```
MHA_AC::spectrum_t::spectrum_t (
    algo_comm_t ac,
    std::string name,
    unsigned int bins,
    unsigned int channels,
    bool insert_now )
```

Create the AC variable.

Parameters

<i>ac</i>	AC handle
<i>name</i>	Name of variable in AC space
<i>bins</i>	Number of FFT bins in the waveform_t (p. 680) class
<i>channels</i>	Number of audio channels in the waveform_t (p. 680) class
<i>insert_now</i>	Insert implicitly in the constructor (true) or explicitly in the insert() (p. 678) function (false)

4.164.2.2 ~spectrum_t()

```
MHA_AC::spectrum_t::~~spectrum_t (
    void ) [virtual]
```

Reimplemented from **MHASignal::spectrum_t** (p. [1199](#)).

4.164.3 Member Function Documentation

4.164.3.1 insert()

```
void MHA_AC::spectrum_t::insert ( )
```

Insert AC variable into AC space.

4.164.4 Member Data Documentation

4.164.4.1 ac

```
algo_comm_t MHA_AC::spectrum_t::ac [protected]
```

4.164.4.2 name

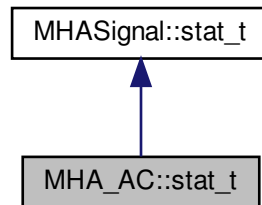
```
std::string MHA_AC::spectrum_t::name [protected]
```

The documentation for this class was generated from the following files:

- **mha_algo_comm.h**
- **mha_algo_comm.cpp**

4.165 MHA_AC::stat_t Class Reference

Inheritance diagram for MHA_AC::stat_t:



Public Member Functions

- **stat_t** (**algo_comm_t** ac, const std::string &name, const unsigned int &frames, const unsigned int &**channels**, bool insert_now)
- void **update** ()
- void **insert** ()

Private Attributes

- **MHA_AC::waveform_t** mean
- **MHA_AC::waveform_t** std

4.165.1 Constructor & Destructor Documentation

4.165.1.1 stat_t()

```
MHA_AC::stat_t::stat_t (  
    algo_comm_t ac,  
    const std::string & name,  
    const unsigned int & frames,  
    const unsigned int & channels,  
    bool insert_now )
```

4.165.2 Member Function Documentation

4.165.2.1 update()

```
void MHA_AC::stat_t::update ( )
```

4.165.2.2 insert()

```
void MHA_AC::stat_t::insert ( )
```

4.165.3 Member Data Documentation

4.165.3.1 mean

```
MHA_AC::waveform_t MHA_AC::stat_t::mean [private]
```

4.165.3.2 std

```
MHA_AC::waveform_t MHA_AC::stat_t::std [private]
```

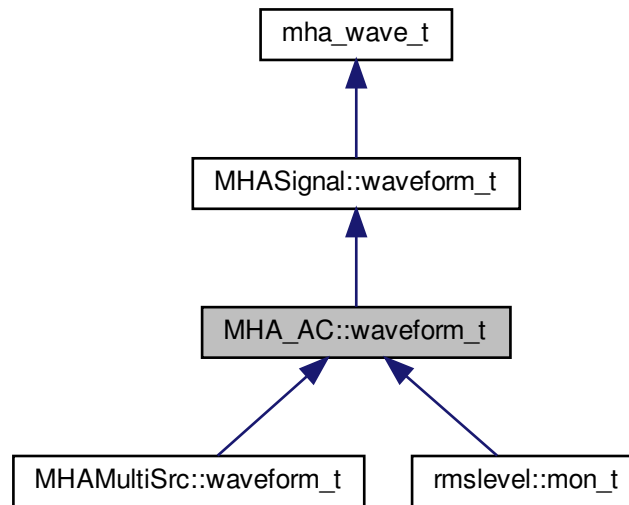
The documentation for this class was generated from the following files:

- **mha_algo_comm.h**
- **mha_algo_comm.cpp**

4.166 MHA_AC::waveform_t Class Reference

Insert a **MHASignal::waveform_t** (p. [1212](#)) class into the AC space.

Inheritance diagram for MHA_AC::waveform_t:



Public Member Functions

- **waveform_t** (**algo_comm_t** **ac**, std::string **name**, unsigned int frames, unsigned int **channels**, bool insert_now)
Create the AC variable.
- **~waveform_t** ()
- void **insert** ()
Insert AC variable into AC space.

Protected Attributes

- **algo_comm_t** **ac**
- std::string **name**

Additional Inherited Members

4.166.1 Detailed Description

Insert a **MHASignal::waveform_t** (p. 1212) class into the AC space.

The variable is automatically removed on destruction.

4.166.2 Constructor & Destructor Documentation

4.166.2.1 waveform_t()

```
MHA_AC::waveform_t::waveform_t (
    algo_comm_t ac,
    std::string name,
    unsigned int frames,
    unsigned int channels,
    bool insert_now )
```

Create the AC variable.

Parameters

<i>ac</i>	AC handle
<i>name</i>	Name of variable in AC space
<i>frames</i>	Number of frames in the waveform_t (p. 680) class
<i>channels</i>	Number of audio channels in the waveform_t (p. 680) class
<i>insert_now</i>	Insert implicitly in the constructor (true) or explicitly in the insert() (p. 682) function (false)

4.166.2.2 ~waveform_t()

```
MHA_AC::waveform_t::~~waveform_t (
    void ) [virtual]
```

Reimplemented from **MHASignal::waveform_t** (p. 1215).

4.166.3 Member Function Documentation

4.166.3.1 insert()

```
void MHA_AC::waveform_t::insert ( )
```

Insert AC variable into AC space.

4.166.4 Member Data Documentation

4.166.4.1 ac

`algo_comm_t MHA_AC::waveform_t::ac` [protected]

4.166.4.2 name

`std::string MHA_AC::waveform_t::name` [protected]

The documentation for this class was generated from the following files:

- `mha_algo_comm.h`
- `mha_algo_comm.cpp`

4.167 mha_audio_descriptor_t Struct Reference

Description of an audio fragment (planned as a replacement of `mhaconfig_t` (p. 792)).

Public Attributes

- unsigned int **n_samples**
Number of samples.
- unsigned int **n_channels**
Number of audio channels.
- unsigned int **n_freqs**
Number of frequency bands.
- unsigned int **is_complex**
Flag about sample type.
- **mha_real_t dt**
Time distance between samples (only equidistant samples allowed)
- **mha_real_t * cf**
Center frequencies of frequency bands.
- **mha_real_t * chdir**
Hint on source direction of channel, values below zero is left, values above zero is right, zero means unknown.

4.167.1 Detailed Description

Description of an audio fragment (planned as a replacement of **mhaconfig_t** (p. 792)).

4.167.2 Member Data Documentation

4.167.2.1 n_samples

```
unsigned int mha_audio_descriptor_t::n_samples
```

Number of samples.

4.167.2.2 n_channels

```
unsigned int mha_audio_descriptor_t::n_channels
```

Number of audio channels.

4.167.2.3 n_freqs

```
unsigned int mha_audio_descriptor_t::n_freqs
```

Number of frequency bands.

4.167.2.4 is_complex

```
unsigned int mha_audio_descriptor_t::is_complex
```

Flag about sample type.

4.167.2.5 dt

```
mha_real_t mha_audio_descriptor_t::dt
```

Time distance between samples (only equidistant samples allowed)

4.167.2.6 cf

mha_real_t* mha_audio_descriptor_t::cf

Center frequencies of frequency bands.

4.167.2.7 chdir

mha_real_t* mha_audio_descriptor_t::chdir

Hint on source direction of channel, values below zero is left, values above zero is right, zero means unknown.

The documentation for this struct was generated from the following file:

- **mha.hh**

4.168 mha_audio_t Struct Reference

An audio fragment in the openMHA (planned as a replacement of **mha_wave_t** (p. 780) and **mha_spec_t** (p. 732)).

Public Attributes

- **mha_audio_descriptor_t descriptor**
Dimension and description of the data.
- **mha_real_t* rdata**
*Data pointer if flag **mha_audio_descriptor_t::is_complex** (p. 684) is unset.*
- **mha_complex_t* cdata**
*Data pointer if flag **mha_audio_descriptor_t::is_complex** (p. 684) is set.*

4.168.1 Detailed Description

An audio fragment in the openMHA (planned as a replacement of **mha_wave_t** (p. 780) and **mha_spec_t** (p. 732)).

The data alignment is $(t_0, c_0, f_0), (t_0, c_0, f_1), \dots, (t_0, c_0, f_{freqs}), (t_0, c_1, f_0), \dots$. This allows a direct cast of the current **mha_wave_t** (p. 780) and **mha_spec_t** (p. 732) data pointers into corresponding **mha_audio_t** (p. 685) objects.

4.168.2 Member Data Documentation

4.168.2.1 descriptor

`mha_audio_descriptor_t mha_audio_t::descriptor`

Dimension and description of the data.

4.168.2.2 rdata

`mha_real_t* mha_audio_t::rdata`

Data pointer if flag `mha_audio_descriptor_t::is_complex` (p. 684) is unset.

4.168.2.3 cdata

`mha_complex_t* mha_audio_t::cdata`

Data pointer if flag `mha_audio_descriptor_t::is_complex` (p. 684) is set.

The documentation for this struct was generated from the following file:

- **mha.hh**

4.169 mha_channel_info_t Struct Reference

Channel information structure.

Public Attributes

- int **id**
channel id
- char **idstr** [32]
channel id
- unsigned int **side**
side (left/right)
- **mha_direction_t** **dir**
source direction
- **mha_real_t** **peaklevel**
Peak level corresponds to this SPL (dB) level.

4.169.1 Detailed Description

Channel information structure.

4.169.2 Member Data Documentation

4.169.2.1 id

```
int mha_channel_info_t::id
```

channel id

4.169.2.2 idstr

```
char mha_channel_info_t::idstr[32]
```

channel id

4.169.2.3 side

```
unsigned int mha_channel_info_t::side
```

side (left/right)

4.169.2.4 dir

```
mha_direction_t mha_channel_info_t::dir
```

source direction

4.169.2.5 peaklevel

```
mha_real_t mha_channel_info_t::peaklevel
```

Peak level corresponds to this SPL (dB) level.

The documentation for this struct was generated from the following file:

- **mha.hh**

4.170 mha_complex_t Struct Reference

Type for complex floating point values.

Public Attributes

- **mha_real_t re**
Real part.
- **mha_real_t im**
Imaginary part.

4.170.1 Detailed Description

Type for complex floating point values.

4.170.2 Member Data Documentation

4.170.2.1 re

mha_real_t mha_complex_t::re

Real part.

4.170.2.2 im

mha_real_t mha_complex_t::im

Imaginary part.

The documentation for this struct was generated from the following file:

- **mha.hh**

4.171 mha_complex_test_array_t Struct Reference

Several places in MHA rely on the fact that you can cast an array of **mha_complex_t** (p. [688](#)) `c[]` to an array of `mha_real_t r[]` with `r[0] == c[0].re` `r[1] == c[0].im` `r[2] == c[1].re` ...

Public Attributes

- **mha_complex_t c [2]**

4.171.1 Detailed Description

Several places in MHA rely on the fact that you can cast an array of **mha_complex_t** (p. 688) `c[]` to an array of `mha_real_t r[]` with `r[0] == c[0].re` `r[1] == c[0].im` `r[2] == c[1].re` ...

Check these expectations in static asserts.

4.171.2 Member Data Documentation

4.171.2.1 c

```
mha_complex_t mha_complex_test_array_t::c[2]
```

The documentation for this struct was generated from the following file:

- **mha.hh**

4.172 mha_dblbuf_t< FIFO > Class Template Reference

The doublebuffer adapts blocksizes between an outer process, which provides input data and takes output data, and an inner process, which processes the input signal and generates output data using a different block size than the outer process.

Public Types

- `typedef FIFO::value_type` **value_type**

The datatype exchanged by the FIFO and this doublebuffer.

Public Member Functions

- virtual unsigned **get_inner_size** () const
- virtual unsigned **get_outer_size** () const
- virtual unsigned **get_delay** () const
- virtual unsigned **get_fifo_size** () const
- virtual unsigned **get_input_channels** () const
- virtual unsigned **get_output_channels** () const
- virtual unsigned **get_input_fifo_fill_count** () const
- virtual unsigned **get_output_fifo_fill_count** () const
- virtual unsigned **get_input_fifo_space** () const
- virtual unsigned **get_output_fifo_space** () const
- virtual **MHA_Error** * **get_inner_error** () const
- virtual void **provoke_inner_error** (const **MHA_Error** &)
- virtual void **provoke_outer_error** (const **MHA_Error** &)
- **mha_dbuf_t** (unsigned **outer_size**, unsigned **inner_size**, unsigned **delay**, unsigned **input_channels**, unsigned **output_channels**, const **value_type** &delay_data)
Constructor creates FIFOs with specified delay.
- virtual **~mha_dbuf_t** ()
- virtual void **process** (const **value_type** *input_signal, **value_type** *output_signal, unsigned count)
The outer process has to call this method to propagate the input signal to the inner process, and receives back the output signal.
- virtual void **input** (**value_type** *input_signal)
The inner process has to call this method to receive its input signal.
- virtual void **output** (const **value_type** *output_signal)
The outer process has to call this method to deliver its output signal.

Private Attributes

- unsigned **outer_size**
The block size used by the outer process.
- unsigned **inner_size**
The block size used by the inner process.
- unsigned **delay**
The delay introduced by bidirectional buffer size adaptation.
- unsigned **fifo_size**
The size of each of the FIFOs.
- unsigned **input_channels**
The number of input channels.
- unsigned **output_channels**
The number of output channels.
- FIFO **input_fifo**
The FIFO for transporting the input signal from the outer process to the inner process.
- FIFO **output_fifo**
The FIFO for transporting the output signal from the inner process to the outer process.

- **MHA_Error * inner_error**
Owned copy of exception to be thrown in inner thread.
- **MHA_Error * outer_error**
Owned copy of exception to be thrown in outer thread.

4.172.1 Detailed Description

```
template<class FIFO>
class mha_dblbuf_t< FIFO >
```

The doublebuffer adapts block sizes between an outer process, which provides input data and takes output data, and an inner process, which processes the input signal and generates output data using a different block size than the outer process.

This class introduces the channels concept. Input and output may have different channel counts.

4.172.2 Member Typedef Documentation

4.172.2.1 value_type

```
template<class FIFO>
typedef FIFO::value_type mha_dblbuf_t< FIFO >:: value_type
```

The datatype exchanged by the FIFO and this doublebuffer.

4.172.3 Constructor & Destructor Documentation

4.172.3.1 mha_dblbuf_t()

```
template<class FIFO >
mha_dblbuf_t< FIFO >:: mha_dblbuf_t (
    unsigned outer_size,
    unsigned inner_size,
    unsigned delay,
    unsigned input_channels,
    unsigned output_channels,
    const value_type & delay_data )
```

Constructor creates FIFOs with specified delay.

Warning

The doublebuffer may block or raise an exception if the delay is too small. To avoid this, the delay should be

$$\text{delay} \geq (\text{inner_size} - \text{gcd}(\text{inner_size}, \text{outer_size}))$$

Parameters

<i>outer_size</i>	The block size used by the outer process.
<i>inner_size</i>	The block size used by the inner process.
<i>delay</i>	The total delay
<i>input_channels</i>	Number of input channels
<i>output_channels</i>	Number of output channels
<i>delay_data</i>	The delay consists of copies of this value.

4.172.3.2 ~mha_dblbuf_t()

```
template<class FIFO >
mha_dblbuf_t< FIFO >::~~ mha_dblbuf_t ( ) [virtual]
```

4.172.4 Member Function Documentation

4.172.4.1 get_inner_size()

```
template<class FIFO>
virtual unsigned mha_dblbuf_t< FIFO >::get_inner_size ( ) const [inline], [virtual]
```

4.172.4.2 get_outer_size()

```
template<class FIFO>
virtual unsigned mha_dblbuf_t< FIFO >::get_outer_size ( ) const [inline], [virtual]
```

4.172.4.3 get_delay()

```
template<class FIFO>
virtual unsigned mha_dblbuf_t< FIFO >::get_delay ( ) const [inline], [virtual]
```

4.172.4.4 get_fifo_size()

```
template<class FIFO>
virtual unsigned mha_dblbuf_t< FIFO >::get_fifo_size ( ) const [inline], [virtual]
```

4.172.4.5 get_input_channels()

```
template<class FIFO>
virtual unsigned mha_dblbuf_t< FIFO >::get_input_channels ( ) const [inline],
[virtual]
```

4.172.4.6 get_output_channels()

```
template<class FIFO>
virtual unsigned mha_dblbuf_t< FIFO >::get_output_channels ( ) const [inline],
[virtual]
```

4.172.4.7 get_input_fifo_fill_count()

```
template<class FIFO>
virtual unsigned mha_dblbuf_t< FIFO >::get_input_fifo_fill_count ( ) const [inline],
[virtual]
```

4.172.4.8 get_output_fifo_fill_count()

```
template<class FIFO>
virtual unsigned mha_dblbuf_t< FIFO >::get_output_fifo_fill_count ( ) const [inline],
[virtual]
```

4.172.4.9 get_input_fifo_space()

```
template<class FIFO>
virtual unsigned mha_dblbuf_t< FIFO >::get_input_fifo_space ( ) const [inline],
[virtual]
```

4.172.4.10 get_output_fifo_space()

```
template<class FIFO>
virtual unsigned mha_dblbuf_t< FIFO >::get_output_fifo_space ( ) const [inline],
[virtual]
```

4.172.4.11 get_inner_error()

```
template<class FIFO>
virtual MHA_Error* mha_dblbuf_t< FIFO >::get_inner_error ( ) const [inline],
[virtual]
```

4.172.4.12 provoke_inner_error()

```
template<class FIFO >
void mha_dblbuf_t< FIFO >::provoke_inner_error (
    const MHA_Error & error ) [virtual]
```

4.172.4.13 provoke_outer_error()

```
template<class FIFO >
void mha_dblbuf_t< FIFO >::provoke_outer_error (
    const MHA_Error & error ) [virtual]
```

4.172.4.14 process()

```
template<class FIFO >
void mha_dblbuf_t< FIFO >::process (
    const value_type * input_signal,
    value_type * output_signal,
    unsigned count ) [virtual]
```

The outer process has to call this method to propagate the input signal to the inner process, and receives back the output signal.

Parameters

<i>input_signal</i>	Pointer to the input signal array.
<i>output_signal</i>	Pointer to the output signal array.
<i>count</i>	The number of data instances provided and expected, lower or equal to inner_size given to constructor.

Exceptions

MHA_Error (p. 707)	When count is > outer_size as given to constructor or the underlying fifo implementation detects an error.
---------------------------	--

4.172.4.15 input()

```
template<class FIFO >
void mha_dbdbuf_t< FIFO >::input (
    value_type * input_signal ) [virtual]
```

The inner process has to call this method to receive its input signal.

Parameters

<i>input_signal</i>	Array where the doublebuffer can store the signal.
---------------------	--

Exceptions

<i>MHA_Error</i> (p. 707)	When the underlying fifo implementation detects an error.
---	---

4.172.4.16 output()

```
template<class FIFO >
void mha_dbdbuf_t< FIFO >::output (
    const value_type * output_signal ) [virtual]
```

The outer process has to call this method to deliver its output signal.

Parameters

<i>output_signal</i>	Array from which doublebuffer reads outputsignal.
----------------------	---

Exceptions

<i>MHA_Error</i> (p. 707)	When the underlying fifo implementation detects an error.
---	---

4.172.5 Member Data Documentation

4.172.5.1 outer_size

```
template<class FIFO>
unsigned mha_dbdbuf_t< FIFO >::outer_size [private]
```

The block size used by the outer process.

4.172.5.2 inner_size

```
template<class FIFO>
unsigned mha_dblbuf_t< FIFO >::inner_size [private]
```

The block size used by the inner process.

4.172.5.3 delay

```
template<class FIFO>
unsigned mha_dblbuf_t< FIFO >::delay [private]
```

The delay introduced by bidirectional buffer size adaptation.

4.172.5.4 fifo_size

```
template<class FIFO>
unsigned mha_dblbuf_t< FIFO >::fifo_size [private]
```

The size of each of the FIFOs.

4.172.5.5 input_channels

```
template<class FIFO>
unsigned mha_dblbuf_t< FIFO >::input_channels [private]
```

The number of input channels.

4.172.5.6 output_channels

```
template<class FIFO>
unsigned mha_dblbuf_t< FIFO >::output_channels [private]
```

The number of output channels.

4.172.5.7 input_fifo

```
template<class FIFO>
FIFO mha_dblbuf_t< FIFO >::input_fifo [private]
```

The FIFO for transporting the input signal from the outer process to the inner process.

4.172.5.8 output_fifo

```
template<class FIFO>
FIFO mha_dblbuf_t< FIFO >::output_fifo [private]
```

The FIFO for transporting the output signal from the inner process to the outer process.

4.172.5.9 inner_error

```
template<class FIFO>
MHA_Error* mha_dblbuf_t< FIFO >::inner_error [private]
```

Owned copy of exception to be thrown in inner thread.

4.172.5.10 outer_error

```
template<class FIFO>
MHA_Error* mha_dblbuf_t< FIFO >::outer_error [private]
```

Owned copy of exception to be thrown in outer thread.

The documentation for this class was generated from the following files:

- mha_fifo.h
- mha_fifo.cpp

4.173 mha_direction_t Struct Reference

Channel source direction structure.

Public Attributes

- **mha_real_t azimuth**
azimuth in radians
- **mha_real_t elevation**
elevation in radians
- **mha_real_t distance**
distance in meters

4.173.1 Detailed Description

Channel source direction structure.

4.173.2 Member Data Documentation

4.173.2.1 azimuth

`mha_real_t mha_direction_t::azimuth`

azimuth in radians

4.173.2.2 elevation

`mha_real_t mha_direction_t::elevation`

elevation in radians

4.173.2.3 distance

`mha_real_t mha_direction_t::distance`

distance in meters

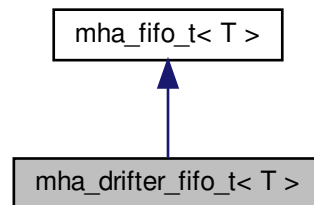
The documentation for this struct was generated from the following file:

- **mha.hh**

4.174 mha_drifter_fifo_t< T > Class Template Reference

A FIFO class for blocksize adaptation without Synchronization.

Inheritance diagram for mha_drifter_fifo_t< T >:



Public Member Functions

- virtual void **write** (const T *data, unsigned count)
write data to fifo
- virtual void **read** (T *buf, unsigned count)
Read data from fifo.
- virtual unsigned **get_fill_count** () const
Return fill_count, adding mha_drifter_fifo_t<T>::startup_zeros (p. 706) to the number of samples actually in the fifo's buffer.
- virtual unsigned **get_available_space** () const
Return available space, subtracting number of mha_drifter_fifo_t<T>::startup_zeros (p. 706) from the available_space actually present in the fifo's buffer.
- virtual unsigned **get_des_fill_count** () const
The desired fill count of this fifo.
- virtual unsigned **get_min_fill_count** () const
The minimum fill count of this fifo.
- virtual void **stop** ()
Called by mha_drifter_fifo_t<T>::read (p. 702) or mha_drifter_fifo_t<T>::write (p. 701) when their xrun in succession counter exceeds its limit.
- virtual void **starting** ()
Called by mha_drifter_fifo_t<T>::read (p. 702) or mha_drifter_fifo_t<T>::write (p. 701) when the respective flag (mha_drifter_fifo_t<T>::reader_started (p. 704) or mha_drifter_fifo_t<T>::writer_started (p. 704)) is about to be toggled from false to true.
- **mha_drifter_fifo_t** (unsigned min_fill_count, unsigned **desired_fill_count**, unsigned **max_fill_count**)
Create drifter FIFO.
- **mha_drifter_fifo_t** (unsigned min_fill_count, unsigned **desired_fill_count**, unsigned **max_fill_count**, const T &t)
Create drifter FIFO where all (initially unused) copies of T are initialized as copies of t.

Private Attributes

- const unsigned **minimum_fill_count**
The minimum fill count of this fifo.
- const unsigned **desired_fill_count**
The desired fill count of the fifo.
- bool **writer_started**
Flag set to true when write is called the first time.
- bool **reader_started**
Flag set to true when read is called for the first time.
- unsigned **writer_xruns_total**
The number of xruns seen by the writer since object instantiation.
- unsigned **reader_xruns_total**
The number of xruns seen by the reader since object instantiation.
- unsigned **writer_xruns_since_start**
The number of xruns seen by the writer since the last start of processing.
- unsigned **reader_xruns_since_start**
The number of xruns seen by the reader since the last start of processing.
- unsigned **writer_xruns_in_succession**
The number of xruns seen by the writer in succession.
- unsigned **reader_xruns_in_succession**
The number of xruns seen by the reader in succession.
- unsigned **maximum_writer_xruns_in_succession_before_stop**
A limit to the number of xruns seen in succession during write before the data transmission through the FIFO is stopped.
- unsigned **maximum_reader_xruns_in_succession_before_stop**
A limit to the number of xruns seen in succession during read before the data transmission through the FIFO is stopped.
- **mha_fifo_t< T >::value_type null_data**
The value used in place of missing data.
- unsigned **startup_zeros**
*When processing starts, that is when both **mha_drifter_fifo_t<T>::reader_started** (p. 704) and **mha_drifter_fifo_t<T>::writer_started** (p. 704) are true, then first **mha_drifter_fifo_t<T>::desired_fill_count** (p. 704) instances of **mha_drifter_fifo_t<T>::null_data** (p. 706) are delivered to the reader.*

Additional Inherited Members

4.174.1 Detailed Description

```
template<class T>
class mha_drifter_fifo_t< T >
```

A FIFO class for blocksize adaptation without Synchronization.

Features: delay concept (desired, minimum and maximum delay), drifting support by throwing away data or inserting zeroes.

4.174.2 Constructor & Destructor Documentation

4.174.2.1 mha_drifter_fifo_t() [1/2]

```
template<class T >
mha_drifter_fifo_t< T >:: mha_drifter_fifo_t (
    unsigned min_fill_count,
    unsigned desired_fill_count,
    unsigned max_fill_count )
```

Create drifter FIFO.

4.174.2.2 mha_drifter_fifo_t() [2/2]

```
template<class T >
mha_drifter_fifo_t< T >:: mha_drifter_fifo_t (
    unsigned min_fill_count,
    unsigned desired_fill_count,
    unsigned max_fill_count,
    const T & t )
```

Create drifter FIFO where all (initially unused) copies of T are initialized as copies of t.

4.174.3 Member Function Documentation

4.174.3.1 write()

```
template<class T >
void mha_drifter_fifo_t< T >::write (
    const T * data,
    unsigned count ) [virtual]
```

write data to fifo

Sets **writer_started** (p. 704) to true.

When processing has started, i.e. both **reader_started** (p. 704) and **writer_started** (p. 704) are true, write specified ammount of data to the fifo. If there is not enough space available, then the exceeding data is lost and the writer xrun counters are increased.

Processing is stopped when **writer_xruns_in_succession** (p. 705) exceeds **maximum_writer_xruns_in_succession_before_stop** (p. 706).

Parameters

<i>data</i>	Pointer to source data.
<i>count</i>	Number of instances to copy

Reimplemented from **mha_fifo_t**< T > (p. 718).

4.174.3.2 read()

```
template<class T >
void mha_drifter_fifo_t< T >::read (
    T * buf,
    unsigned count ) [virtual]
```

Read data from fifo.

Sets **reader_started** (p. 704) to true.

When processing has started, i.e. both **reader_started** (p. 704) and **writer_started** (p. 704) are true, then read specified ammount of data from the fifo. As long as **startup_zeros** (p. 706) is > 0, **null_data** (p. 706) is delivered to the reader and **startup_zeros** (p. 706) is diminished. Only when **startup_zeros** (p. 706) has reached 0, data is actually read from the fifo's buffer.

If the read would cause the fifo's fill count to drop below **minimum_fill_count** (p. 704), then only so much data are read that **minimum_fill_count** (p. 704) entries remain in the fifo, the missing data is replaced with **null_data** (p. 706), and the reader xrun counters are increased.

Processing is stopped when **reader_xruns_in_succession** (p. 706) exceeds **maximum_reader_xruns_in_succession_before_stop** (p. 706).

Parameters

<i>buf</i>	Pointer to the target buffer
<i>count</i>	Number of instances to copy

Reimplemented from **mha_fifo_t**< T > (p. 719).

4.174.3.3 get_fill_count()

```
template<class T >
unsigned mha_drifter_fifo_t< T >::get_fill_count ( ) const [virtual]
```

Return fill_count, adding **mha_drifter_fifo_t**<T>::**startup_zeros** (p. 706) to the number of samples actually in the fifo's buffer.

Reimplemented from **mha_fifo_t< T >** (p. 719).

4.174.3.4 get_available_space()

```
template<class T >
unsigned mha_drifter_fifo_t< T >::get_available_space ( ) const [virtual]
```

Return available space, subtracting number of **mha_drifter_fifo_t<T>::startup_zeros** (p. 706) from the available_space actually present in the fifo's buffer.

TODO: uncertain if this is a good idea.

Reimplemented from **mha_fifo_t< T >** (p. 719).

4.174.3.5 get_des_fill_count()

```
template<class T >
virtual unsigned mha_drifter_fifo_t< T >::get_des_fill_count ( ) const [inline],
[virtual]
```

The desired fill count of this fifo.

4.174.3.6 get_min_fill_count()

```
template<class T >
virtual unsigned mha_drifter_fifo_t< T >::get_min_fill_count ( ) const [inline],
[virtual]
```

The minimum fill count of this fifo.

4.174.3.7 stop()

```
template<class T >
void mha_drifter_fifo_t< T >::stop ( ) [virtual]
```

Called by **mha_drifter_fifo_t<T>::read** (p. 702) or **mha_drifter_fifo_t<T>::write** (p. 701) when their xrun in succession counter exceeds its limit.

Called by **read** (p. 702) or **write** (p. 701) when their xrun in succession counter exceeds its limit.

May also be called explicitly.

4.174.3.8 starting()

```
template<class T >
void mha_drifter_fifo_t< T >::starting ( ) [virtual]
```

Called by **mha_drifter_fifo_t<T>::read** (p. 702) or **mha_drifter_fifo_t<T>::write** (p. 701) when the respective flag (**mha_drifter_fifo_t<T>::reader_started** (p. 704) or **mha_drifter_fifo_t<T>::writer_started** (p. 704)) is about to be toggled from false to true.

The fifo's buffer is emptied, this method resets **startup_zeros** (p. 706) to **desired_fill_count** (p. 704), and it also resets **reader_xruns_since_start** (p. 705) and **writer_xruns_since_start** (p. 705) to 0.

4.174.4 Member Data Documentation

4.174.4.1 minimum_fill_count

```
template<class T >
const unsigned mha_drifter_fifo_t< T >::minimum_fill_count [private]
```

The minimum fill count of this fifo.

4.174.4.2 desired_fill_count

```
template<class T >
const unsigned mha_drifter_fifo_t< T >::desired_fill_count [private]
```

The desired fill count of the fifo.

The fifo is initialized with this ammount of data when data transmission starts.

4.174.4.3 writer_started

```
template<class T >
bool mha_drifter_fifo_t< T >::writer_started [private]
```

Flag set to true when write is called the first time.

4.174.4.4 reader_started

```
template<class T >
bool mha_drifter_fifo_t< T >::reader_started [private]
```

Flag set to true when read is called for the first time.

4.174.4.5 writer_xruns_total

```
template<class T >
unsigned mha_drifter_fifo_t< T >::writer_xruns_total [private]
```

The number of xruns seen by the writer since object instantiation.

4.174.4.6 reader_xruns_total

```
template<class T >
unsigned mha_drifter_fifo_t< T >::reader_xruns_total [private]
```

The number of xruns seen by the reader since object instantiation.

4.174.4.7 writer_xruns_since_start

```
template<class T >
unsigned mha_drifter_fifo_t< T >::writer_xruns_since_start [private]
```

The number of xruns seen by the writer since the last start of processing.

4.174.4.8 reader_xruns_since_start

```
template<class T >
unsigned mha_drifter_fifo_t< T >::reader_xruns_since_start [private]
```

The number of xruns seen by the reader since the last start of processing.

4.174.4.9 writer_xruns_in_succession

```
template<class T >
unsigned mha_drifter_fifo_t< T >::writer_xruns_in_succession [private]
```

The number of xruns seen by the writer in succession.

Reset to 0 every time a write succeeds without xrun.

4.174.4.10 reader_xruns_in_succession

```
template<class T >
unsigned mha_drifter_fifo_t< T >::reader_xruns_in_succession [private]
```

The number of xruns seen by the reader in succession.

Reset to 0 every time a read succeeds without xrun.

4.174.4.11 maximum_writer_xruns_in_succession_before_stop

```
template<class T >
unsigned mha_drifter_fifo_t< T >::maximum_writer_xruns_in_succession_before_stop
[private]
```

A limit to the number of xruns seen in succession during write before the data transmission through the FIFO is stopped.

4.174.4.12 maximum_reader_xruns_in_succession_before_stop

```
template<class T >
unsigned mha_drifter_fifo_t< T >::maximum_reader_xruns_in_succession_before_stop
[private]
```

A limit to the number of xruns seen in succession during read before the data transmission through the FIFO is stopped.

4.174.4.13 null_data

```
template<class T >
mha_fifo_t<T>:: value_type mha_drifter_fifo_t< T >::null_data [private]
```

The value used in place of missing data.

4.174.4.14 startup_zeros

```
template<class T >
unsigned mha_drifter_fifo_t< T >::startup_zeros [private]
```

When processing starts, that is when both **mha_drifter_fifo_t<T>::reader_started** (p. 704) and **mha_drifter_fifo_t<T>::writer_started** (p. 704) are true, then first **mha_drifter_fifo_t<T>::desired_fill_count** (p. 704) instances of **mha_drifter_fifo_t<T>::null_data** (p. 706) are delivered to the reader.

These **null_data** (p. 706) instances are not transmitted through the fifo because filling the fifo with enough **null_data** (p. 706) might not be realtime safe and this filling has to be initiated by **starting** (p. 703) or **stop** (p. 703) (this implementation: **starting** (p. 703)) which are be called with realtime constraints.

The documentation for this class was generated from the following file:

- **mha_fifo.h**

4.175 MHA_Error Class Reference

Error reporting exception class.

Inherits exception.

Public Member Functions

- **MHA_Error** (const char *file, int line, const char *fmt,...) __attribute__((__format__(printf, 3, 4)))
*Create an instance of a **MHA_Error** (p. 707).*
- **MHA_Error** (const **MHA_Error** &)
- **MHA_Error** & **operator=** (const **MHA_Error** &)
- **~MHA_Error** () throw ()
- const char * **get_msg** () const
Return the error message without source position.
- const char * **get_longmsg** () const
Return the error message with source position.
- const char * **what** () const throw ()
overwrite std::exception::what()

Private Attributes

- char * **msg**
- char * **longmsg**

4.175.1 Detailed Description

Error reporting exception class.

This class is used for error handling in the openMHA. It is used by the openMHA kernel and by the openMHA toolbox library. Please note that exceptions should not be used accross ANSI-C interfaces. It is necessary to catch exceptions within the library.

The **MHA_Error** (p. 707) class holds source file name, line number and an error message.

4.175.2 Constructor & Destructor Documentation

4.175.2.1 MHA_Error() [1/2]

```
MHA_Error::MHA_Error (
    const char * s_file,
    int l,
    const char * fmt,
    ... )
```

Create an instance of a **MHA_Error** (p. 707).

Parameters

<i>s_file</i>	source file name (FILE)
<i>l</i>	source line (LINE)
<i>fmt</i>	format string for error message (as in printf)

4.175.2.2 MHA_Error() [2/2]

```
MHA_Error::MHA_Error (
    const MHA_Error & p )
```

4.175.2.3 ~MHA_Error()

```
MHA_Error::~~MHA_Error ( ) throw ( )
```

4.175.3 Member Function Documentation

4.175.3.1 operator=()

```
MHA_Error & MHA_Error::operator= (
    const MHA_Error & p )
```

4.175.3.2 get_msg()

```
const char* MHA_Error::get_msg ( ) const [inline]
```

Return the error message without source position.

4.175.3.3 get_longmsg()

```
const char* MHA_Error::get_longmsg ( ) const [inline]
```

Return the error message with source position.

4.175.3.4 what()

```
const char* MHA_Error::what ( ) const throw ( ) [inline]
```

overwrite std::exception::what()

4.175.4 Member Data Documentation

4.175.4.1 msg

```
char* MHA_Error::msg [private]
```

4.175.4.2 longmsg

```
char* MHA_Error::longmsg [private]
```

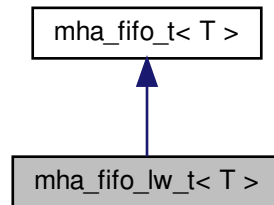
The documentation for this class was generated from the following files:

- **mha_error.hh**
- **mha_error.cpp**

4.176 mha_fifo_lw_t< T > Class Template Reference

This FIFO uses locks to synchronize access.

Inheritance diagram for mha_fifo_lw_t< T >:



Public Member Functions

- virtual void **write** (const T *data, unsigned count)
write specified ammount of data to the fifo.
- virtual void **read** (T *buf, unsigned count)
read data from fifo.
- **mha_fifo_lw_t** (unsigned **max_fill_count**)
Create FIFO with fixed buffer size.
- virtual **~mha_fifo_lw_t** ()
release synchronization object
- virtual void **set_error** (unsigned index, **MHA_Error** * **error**)
Process waiting for more data or space should bail out, throwing this error.

Private Attributes

- **mha_fifo_thread_platform_t** * **sync**
platform specific thread synchronization
- **MHA_Error** * **error** [2]
If waiting for synchronization should be aborted then exception to be thrown by reader process (index 0) or writer process (index 1) has to be placed here.

Additional Inherited Members

4.176.1 Detailed Description

```
template<class T>
class mha_fifo_lw_t< T >
```

This FIFO uses locks to synchronize access.

Reading and writing can block until the operation can be executed.

4.176.2 Constructor & Destructor Documentation

4.176.2.1 mha_fifo_lw_t()

```
template<class T >
mha_fifo_lw_t< T >:: mha_fifo_lw_t (
    unsigned max_fill_count ) [explicit]
```

Create FIFO with fixed buffer size.

4.176.2.2 ~mha_fifo_lw_t()

```
template<class T >
mha_fifo_lw_t< T >::~~ mha_fifo_lw_t ( ) [virtual]
```

release synchronization object

4.176.3 Member Function Documentation

4.176.3.1 write()

```
template<class T>
void mha_fifo_lw_t< T >::write (
    const T * data,
    unsigned count ) [virtual]
```

write specified ammount of data to the fifo.

If there is not enough space, then wait for more space.

Parameters

<i>data</i>	Pointer to source data.
<i>count</i>	Number of instances to copy.

Exceptions

<i>MHA_Error</i> (p. 707)	when detecting a deadlock situation.
---	--------------------------------------

Reimplemented from `mha_fifo_t< T >` (p. 718).

4.176.3.2 `read()`

```
template<class T>
void mha_fifo_lw_t< T >::read (
    T * buf,
    unsigned count ) [virtual]
```

read data from fifo.

If there is not enough data, then wait for more data.

Parameters

<i>buf</i>	Pointer to the target buffer.
<i>count</i>	Number of instances to copy.

Exceptions

MHA_Error (p. 707)	when detecting a deadlock situation.
---------------------------	--------------------------------------

Reimplemented from `mha_fifo_t< T >` (p. 719).

4.176.3.3 `set_error()`

```
template<class T >
void mha_fifo_lw_t< T >::set_error (
    unsigned index,
    MHA_Error * error ) [virtual]
```

Process waiting for more data or space should bail out, throwing this error.

Parameters

<i>index</i>	Use 0 for terminating reader, 1 for terminating writer.
<i>error</i>	MHA_Error (p. 707) to be thrown

4.176.4 Member Data Documentation

4.176.4.1 sync

```
template<class T>
mha_fifo_thread_platform_t* mha_fifo_lw_t< T >::sync [private]
```

platform specific thread synchronization

4.176.4.2 error

```
template<class T>
MHA_Error* mha_fifo_lw_t< T >::error[2] [private]
```

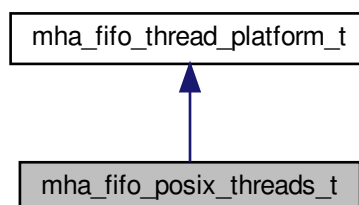
If waiting for synchronization should be aborted then exception to be thrown by reader process (index 0) or writer process (index 1) has to be placed here.

The documentation for this class was generated from the following files:

- **mha_fifo.h**
- **mha_fifo.cpp**

4.177 mha_fifo_posix_threads_t Class Reference

Inheritance diagram for mha_fifo_posix_threads_t:



Public Member Functions

- **mha_fifo_posix_threads_t ()**
- virtual void **acquire_mutex ()**
- virtual void **release_mutex ()**
- virtual void **wait_for_decrease ()**
- virtual void **wait_for_increase ()**
- virtual void **increment ()**
- virtual void **decrement ()**
- virtual **~mha_fifo_posix_threads_t ()**

Private Attributes

- `pthread_mutex_t` **mutex**
- `pthread_cond_t` **decrease_condition**
- `pthread_cond_t` **increase_condition**

4.177.1 Constructor & Destructor Documentation

4.177.1.1 `mha_fifo_posix_threads_t()`

```
mha_fifo_posix_threads_t::mha_fifo_posix_threads_t ( ) [inline]
```

4.177.1.2 `~mha_fifo_posix_threads_t()`

```
virtual mha_fifo_posix_threads_t::~~mha_fifo_posix_threads_t ( ) [inline], [virtual]
```

4.177.2 Member Function Documentation

4.177.2.1 `acquire_mutex()`

```
virtual void mha_fifo_posix_threads_t::acquire_mutex ( ) [inline], [virtual]
```

Implements `mha_fifo_thread_platform_t` (p. [724](#)).

4.177.2.2 `release_mutex()`

```
virtual void mha_fifo_posix_threads_t::release_mutex ( ) [inline], [virtual]
```

Implements `mha_fifo_thread_platform_t` (p. [724](#)).

4.177.2.3 `wait_for_decrease()`

```
virtual void mha_fifo_posix_threads_t::wait_for_decrease ( ) [inline], [virtual]
```

Implements `mha_fifo_thread_platform_t` (p. [725](#)).

4.177.2.4 wait_for_increase()

```
virtual void mha_fifo_posix_threads_t::wait_for_increase ( ) [inline], [virtual]
```

Implements **mha_fifo_thread_platform_t** (p. [725](#)).

4.177.2.5 increment()

```
virtual void mha_fifo_posix_threads_t::increment ( ) [inline], [virtual]
```

Implements **mha_fifo_thread_platform_t** (p. [725](#)).

4.177.2.6 decrement()

```
virtual void mha_fifo_posix_threads_t::decrement ( ) [inline], [virtual]
```

Implements **mha_fifo_thread_platform_t** (p. [725](#)).

4.177.3 Member Data Documentation

4.177.3.1 mutex

```
pthread_mutex_t mha_fifo_posix_threads_t::mutex [private]
```

4.177.3.2 decrease_condition

```
pthread_cond_t mha_fifo_posix_threads_t::decrease_condition [private]
```

4.177.3.3 increase_condition

```
pthread_cond_t mha_fifo_posix_threads_t::increase_condition [private]
```

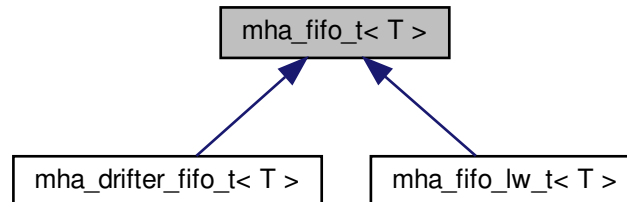
The documentation for this class was generated from the following file:

- **mha_fifo.h**

4.178 mha_fifo_t< T > Class Template Reference

A FIFO class for blocksize adaptation Synchronization: None.

Inheritance diagram for mha_fifo_t< T >:



Public Types

- typedef T **value_type**
The data type exchanged by this fifo.

Public Member Functions

- virtual void **write** (const T *data, unsigned count)
write specified ammount of data to the fifo.
- virtual void **read** (T * buf, unsigned count)
read data from fifo
- virtual unsigned **get_fill_count** () const
Read-only access to fill_count.
- virtual unsigned **get_available_space** () const
Read-only access to available_space.
- virtual unsigned **get_max_fill_count** () const
The capacity of this fifo.
- **mha_fifo_t** (unsigned **max_fill_count**)
Create FIFO with fixed buffer size.
- **mha_fifo_t** (unsigned **max_fill_count**, const T &t)
Create FIFO with fixed buffer size, where all (initially unused) copies of T are initialized as copies of t.
- **mha_fifo_t** (const **mha_fifo_t** &src)
Copy constructor.
- virtual ~**mha_fifo_t** ()
Destroy FIFO.
- **mha_fifo_t**< T > & **operator=** (const **mha_fifo_t**< T > &)
Assignment operator.

Protected Member Functions

- void **clear** ()
Empty the fifo at once.

Private Attributes

- const unsigned **max_fill_count**
The maximum fill count of this FIFO.
- T * **buf**
The memory allocated to store the data.
- T * **write_ptr**
points to location where to write next
- const T * **read_ptr**
points to location where to read next
- bool **buf_uses_placement_new**
wether buf was allocated using placement new or array new.

4.178.1 Detailed Description

```
template<class T>
class mha_fifo_t< T >
```

A FIFO class for blocksize adaptation Synchronization: None.

Use external synchronisation or synchronization in inheriting class.

4.178.2 Member Typedef Documentation

4.178.2.1 value_type

```
template<class T>
typedef T mha_fifo_t< T >:: value_type
```

The data type exchanged by this fifo.

4.178.3 Constructor & Destructor Documentation

4.178.3.1 mha_fifo_t() [1/3]

```
template<class T >
mha_fifo_t< T >:: mha_fifo_t (
    unsigned max_fill_count ) [explicit]
```

Create FIFO with fixed buffer size.

4.178.3.2 mha_fifo_t() [2/3]

```
template<class T>
mha_fifo_t< T >:: mha_fifo_t (
    unsigned max_fill_count,
    const T & t )
```

Create FIFO with fixed buffer size, where all (initially unused) copies of T are initialized as copies of t.

4.178.3.3 mha_fifo_t() [3/3]

```
template<class T>
mha_fifo_t< T >:: mha_fifo_t (
    const mha_fifo_t< T > & src )
```

Copy constructor.

4.178.3.4 ~mha_fifo_t()

```
template<class T >
mha_fifo_t< T >::~~ mha_fifo_t ( ) [virtual]
```

Destroy FIFO.

4.178.4 Member Function Documentation**4.178.4.1 write()**

```
template<class T>
void mha_fifo_t< T >::write (
    const T * data,
    unsigned count ) [virtual]
```

write specified ammount of data to the fifo.

Parameters

<i>data</i>	Pointer to source data.
<i>count</i>	Number of instances to copy

Exceptions

<i>MHA_Error</i> (p. 707)	when there is not enough space available.
----------------------------------	---

Reimplemented in **mha_fifo_lw_t< T >** (p. 711), **mha_fifo_lw_t< mha_real_t >** (p. 711), and **mha_drifter_fifo_t< T >** (p. 701).

4.178.4.2 read()

```
template<class T>
void mha_fifo_t< T >::read (
    T * buf,
    unsigned count ) [virtual]
```

read data from fifo

Parameters

<i>buf</i>	Pointer to the target buffer
<i>count</i>	Number of instances to copy

Exceptions

<i>MHA_Error</i> (p. 707)	when there is not enough data available.
----------------------------------	--

Reimplemented in **mha_fifo_lw_t< T >** (p. 712), **mha_fifo_lw_t< mha_real_t >** (p. 712), and **mha_drifter_fifo_t< T >** (p. 702).

4.178.4.3 get_fill_count()

```
template<class T >
unsigned mha_fifo_t< T >::get_fill_count ( ) const [virtual]
```

Read-only access to fill_count.

Reimplemented in **mha_drifter_fifo_t< T >** (p. 702).

4.178.4.4 `get_available_space()`

```
template<class T >
unsigned mha_fifo_t< T >::get_available_space ( ) const [virtual]
```

Read-only access to `available_space`.

Reimplemented in `mha_drifter_fifo_t< T >` (p. [703](#)).

4.178.4.5 `get_max_fill_count()`

```
template<class T>
virtual unsigned mha_fifo_t< T >::get_max_fill_count ( ) const [inline], [virtual]
```

The capacity of this fifo.

4.178.4.6 `operator=()`

```
template<class T>
mha_fifo_t< T > & mha_fifo_t< T >::operator= (
    const mha_fifo_t< T > & src )
```

Assignment operator.

4.178.4.7 `clear()`

```
template<class T>
void mha_fifo_t< T >::clear ( ) [inline], [protected]
```

Empty the fifo at once.

Should be called by the reader, or when the reader is inactive.

4.178.5 Member Data Documentation

4.178.5.1 max_fill_count

```
template<class T>
const unsigned mha_fifo_t< T >::max_fill_count [private]
```

The maximum fill count of this FIFO.

4.178.5.2 buf

```
template<class T>
T* mha_fifo_t< T >::buf [private]
```

The memory allocated to store the data.

max_fill_count + 1 locations are allocated: At least one location is always unused, because we have max_fill_count + 1 possible fillcounts [0:max_fill_count] that we need to distinguish.

4.178.5.3 write_ptr

```
template<class T>
T* mha_fifo_t< T >::write_ptr [private]
```

points to location where to write next

4.178.5.4 read_ptr

```
template<class T>
const T* mha_fifo_t< T >::read_ptr [private]
```

points to location where to read next

4.178.5.5 buf_uses_placement_new

```
template<class T>
bool mha_fifo_t< T >::buf_uses_placement_new [private]
```

wether buf was allocated using placement new or array new.

The documentation for this class was generated from the following file:

- mha_fifo.h

4.179 mha_fifo_thread_guard_t Class Reference

Simple Mutex Guard Class.

Public Member Functions

- **mha_fifo_thread_guard_t** (**mha_fifo_thread_platform_t** * **sync**)
- **~mha_fifo_thread_guard_t** ()

Private Attributes

- **mha_fifo_thread_platform_t** * **sync**

4.179.1 Detailed Description

Simple Mutex Guard Class.

4.179.2 Constructor & Destructor Documentation

4.179.2.1 mha_fifo_thread_guard_t()

```
mha_fifo_thread_guard_t::mha_fifo_thread_guard_t (
    mha_fifo_thread_platform_t * sync ) [inline]
```

4.179.2.2 ~mha_fifo_thread_guard_t()

```
mha_fifo_thread_guard_t::~~mha_fifo_thread_guard_t ( ) [inline]
```

4.179.3 Member Data Documentation

4.179.3.1 sync

```
mha_fifo_thread_platform_t* mha_fifo_thread_guard_t::sync [private]
```

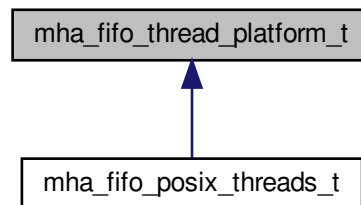
The documentation for this class was generated from the following file:

- **mha_fifo.h**

4.180 mha_fifo_thread_platform_t Class Reference

Abstract base class for synchronizing multithreaded (producer/consumer) fifo operations.

Inheritance diagram for mha_fifo_thread_platform_t:



Public Member Functions

- virtual void **acquire_mutex** ()=0
Calling thread waits until it acquires the lock.
- virtual void **release_mutex** ()=0
Calling thread releases the lock.
- virtual void **wait_for_decrease** ()=0
Calling producer thread must own the lock.
- virtual void **wait_for_increase** ()=0
Calling consumer thread must own the lock.
- virtual void **increment** ()=0
To be called by producer thread after producing.
- virtual void **decrement** ()=0
To be called by consumer thread after consuming.
- virtual **~mha_fifo_thread_platform_t** ()
Make destructor virtual.
- **mha_fifo_thread_platform_t** ()
Make default constructor accessible.

Private Member Functions

- **mha_fifo_thread_platform_t** (const **mha_fifo_thread_platform_t** &)
- **mha_fifo_thread_platform_t** & **operator=** (const **mha_fifo_thread_platform_t** &)

4.180.1 Detailed Description

Abstract base class for synchronizing multithreaded (producer/consumer) fifo operations.

Works only with single producer and single consumer.

4.180.2 Constructor & Destructor Documentation

4.180.2.1 `~mha_fifo_thread_platform_t()`

```
virtual mha_fifo_thread_platform_t::~~mha_fifo_thread_platform_t ( ) [inline], [virtual]
```

Make destructor virtual.

4.180.2.2 `mha_fifo_thread_platform_t()` [1/2]

```
mha_fifo_thread_platform_t::mha_fifo_thread_platform_t (  
    const mha_fifo_thread_platform_t & ) [private]
```

4.180.2.3 `mha_fifo_thread_platform_t()` [2/2]

```
mha_fifo_thread_platform_t::mha_fifo_thread_platform_t ( ) [inline]
```

Make default constructor accessible.

4.180.3 Member Function Documentation

4.180.3.1 `aquire_mutex()`

```
virtual void mha_fifo_thread_platform_t::aquire_mutex ( ) [pure virtual]
```

Calling thread waits until it aquires the lock.

Must not be called when the lock is already aquired.

Implemented in `mha_fifo_posix_threads_t` (p. [714](#)).

4.180.3.2 release_mutex()

```
virtual void mha_fifo_thread_platform_t::release_mutex ( ) [pure virtual]
```

Calling thread releases the lock.

May only be called when lock is owned.

Implemented in **mha_fifo_posix_threads_t** (p. [714](#)).

4.180.3.3 wait_for_decrease()

```
virtual void mha_fifo_thread_platform_t::wait_for_decrease ( ) [pure virtual]
```

Calling producer thread must own the lock.

Method releases lock, and waits for consumer thread to call decrease(). Then reacquires lock and returns

Implemented in **mha_fifo_posix_threads_t** (p. [714](#)).

4.180.3.4 wait_for_increase()

```
virtual void mha_fifo_thread_platform_t::wait_for_increase ( ) [pure virtual]
```

Calling consumer thread must own the lock.

Method releases lock, and waits for producer thread to call increase(). Then reacquires lock and returns

Implemented in **mha_fifo_posix_threads_t** (p. [714](#)).

4.180.3.5 increment()

```
virtual void mha_fifo_thread_platform_t::increment ( ) [pure virtual]
```

To be called by producer thread after producing.

Producer thread needs to own the lock to call this method.

Implemented in **mha_fifo_posix_threads_t** (p. [715](#)).

4.180.3.6 decrement()

```
virtual void mha_fifo_thread_platform_t::decrement ( ) [pure virtual]
```

To be called by consumer thread after consuming.

Consumer thread needs to own the lock to call this method.

Implemented in **mha_fifo_posix_threads_t** (p. [715](#)).

4.180.3.7 operator=()

```
mha_fifo_thread_platform_t& mha_fifo_thread_platform_t::operator= (
    const mha_fifo_thread_platform_t & ) [private]
```

The documentation for this class was generated from the following file:

- **mha_fifo.h**

4.181 mha_real_test_array_t Struct Reference

Public Attributes

- **mha_real_t r[4]**

4.181.1 Member Data Documentation

4.181.1.1 r

```
mha_real_t mha_real_test_array_t::r[4]
```

The documentation for this struct was generated from the following file:

- **mha.hh**

4.182 mha_rt_fifo_element_t< T > Class Template Reference

Object wrapper for **mha_rt_fifo_t** (p. [728](#)).

Public Member Functions

- **mha_rt_fifo_element_t** (T * **data**)
Constructor.
- **~mha_rt_fifo_element_t** ()

Public Attributes

- **mha_rt_fifo_element_t**< T > * **next**
Pointer to next fifo element. NULL for the last (newest) fifo element.
- bool **abandoned**
Indicates that this element will no longer be used and may be deleted.
- T * **data**
Pointer to user data.

4.182.1 Detailed Description

```
template<class T>
class mha_rt_fifo_element_t< T >
```

Object wrapper for **mha_rt_fifo_t** (p. 728).

4.182.2 Constructor & Destructor Documentation

4.182.2.1 mha_rt_fifo_element_t()

```
template<class T >
mha_rt_fifo_element_t< T >:: mha_rt_fifo_element_t (
    T * data ) [inline]
```

Constructor.

This element assumes ownership of user data.

Parameters

<i>data</i>	User data. Has to be allocated on the heap with standard operator new, because it will be deleted in this element's destructor.
-------------	---

4.182.2.2 ~mha_rt_fifo_element_t()

```
template<class T >
mha_rt_fifo_element_t< T >::~~ mha_rt_fifo_element_t ( ) [inline]
```

4.182.3 Member Data Documentation

4.182.3.1 next

```
template<class T >
mha_rt_fifo_element_t<T>* mha_rt_fifo_element_t< T >::next
```

Pointer to next fifo element. NULL for the last (newest) fifo element.

4.182.3.2 abandonned

```
template<class T >
bool mha_rt_fifo_element_t< T >::abandonned
```

Indicates that this element will no longer be used and may be deleted.

4.182.3.3 data

```
template<class T >
T* mha_rt_fifo_element_t< T >::data
```

Pointer to user data.

The documentation for this class was generated from the following file:

- mha_fifo.h

4.183 mha_rt_fifo_t< T > Class Template Reference

Template class for thread safe, half real time safe fifo without explicit locks.

Public Member Functions

- **mha_rt_fifo_t** ()
Construct empty fifo.
- **~mha_rt_fifo_t** ()
Destructor will delete all data currently in the fifo.
- **T * poll** ()
Retrieve the latest element in the Fifo.
- **T * poll_1** ()
Retrieve the next element in the Fifo, if there is one, and mark the previous element as abandoned.
- **void push** (T *data)
Add element to the Fifo.

Private Member Functions

- **void remove_abandoned** ()
Deletes abandoned elements.
- **void remove_all** ()
Deletes all elements.

Private Attributes

- **mha_rt_fifo_element_t< T > * root**
The first element in the fifo. Deleting elements starts here.
- **mha_rt_fifo_element_t< T > * current**
*The element most recently returned by **poll** (p. 730) or **poll_1** (p. 730).*

4.183.1 Detailed Description

```
template<class T>
class mha_rt_fifo_t< T >
```

Template class for thread safe, half real time safe fifo without explicit locks.

Reading from this fifo is realtime safe, writing to it is not. This fifo is designed for objects that were constructed on the heap. It assumes ownership of these objects and calls delete on them when they are no longer used. Objects remain inside the Fifo while being used by the reader.

A new fifo element is inserted by using **push** (p. 731). The push operation is not real time safe, it allocates and deallocates memory. The latest element is retrieved by calling **poll** (p. 730). This operation will skip fifo elements if more than one **push** (p. 731) has been occurred since the last poll. To avoid skipping, call the **poll_1** (p. 730) operation instead.

4.183.2 Constructor & Destructor Documentation

4.183.2.1 mha_rt_fifo_t()

```
template<class T >
mha_rt_fifo_t< T >:: mha_rt_fifo_t ( ) [inline]
```

Construct empty fifo.

4.183.2.2 ~mha_rt_fifo_t()

```
template<class T >
mha_rt_fifo_t< T >::~~ mha_rt_fifo_t ( ) [inline]
```

Destructor will delete all data currently in the fifo.

4.183.3 Member Function Documentation

4.183.3.1 poll()

```
template<class T >
T* mha_rt_fifo_t< T >::poll ( ) [inline]
```

Retrieve the latest element in the Fifo.

Will skip fifo elements if more than one element has been added since last poll invocation. Will return the same element as on last call if no elements have been added in the mean time. Marks former elements as abandoned.

Returns

The latest element in this Fifo. Returns NULL if the Fifo is empty.

4.183.3.2 poll_1()

```
template<class T >
T* mha_rt_fifo_t< T >::poll_1 ( ) [inline]
```

Retrieve the next element in the Fifo, if there is one, and mark the previous element as abandoned.

Else, if there is no newer element, returns the same element as on last **poll()** (p. 730) or **poll_1()** (p. 730) invocation.

Returns

The next element in this Fifo, if there is one, or the same as before. Returns NULL if the Fifo is empty.

4.183.3.3 push()

```
template<class T >
void mha_rt_fifo_t< T >::push (
    T * data ) [inline]
```

Add element to the Fifo.

Deletes abandoned elements in the fifo.

Parameters

<i>data</i>	The new user data to place at the end of the fifo. After this invocation, the fifo is the owner of this object and will delete it when it is no longer used. data must have been allocated on the heap with standard operator new.
-------------	--

4.183.3.4 remove_abandonned()

```
template<class T >
void mha_rt_fifo_t< T >::remove_abandonned ( ) [inline], [private]
```

Deletes abandoned elements.

4.183.3.5 remove_all()

```
template<class T >
void mha_rt_fifo_t< T >::remove_all ( ) [inline], [private]
```

Deletes all elements.

4.183.4 Member Data Documentation

4.183.4.1 root

```
template<class T >
mha_rt_fifo_element_t<T>* mha_rt_fifo_t< T >::root [private]
```

The first element in the fifo. Deleting elements starts here.

4.183.4.2 current

```
template<class T >
mha_rt_fifo_element_t<T>* mha_rt_fifo_t< T >::current [private]
```

The element most recently returned by **poll** (p. 730) or **poll_1** (p. 730).

Searching for new elements starts here.

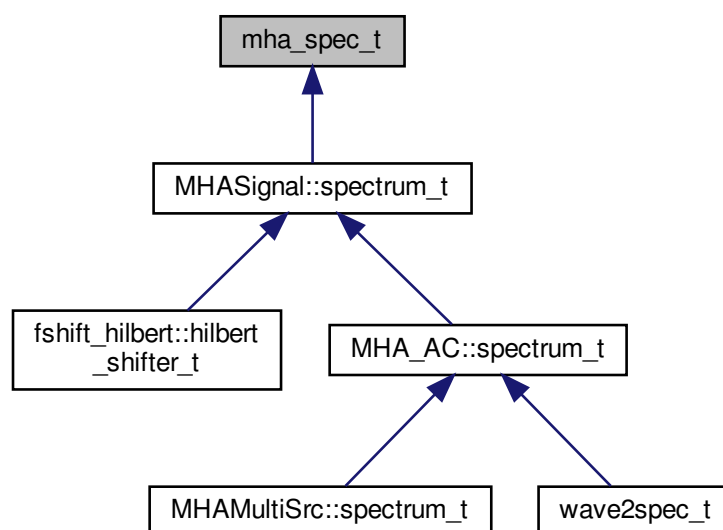
The documentation for this class was generated from the following file:

- **mha_fifo.h**

4.184 mha_spec_t Struct Reference

Spectrum signal structure.

Inheritance diagram for mha_spec_t:



Public Attributes

- **mha_complex_t * buf**
signal buffer
- unsigned int **num_channels**
number of channels
- unsigned int **num_frames**
number of frames in each channel
- **mha_channel_info_t * channel_info**
detailed channel description

4.184.1 Detailed Description

Spectrum signal structure.

This structure contains the short time fourier transform output of the windowed input signal. The member `num_frames` describes the number of frequency bins in each channel. For an even FFT length N , this is $N/2 + 1$. With odd FFT lengths, it is $(N + 1)/2$. The imaginary part of the first bin is zero. For even FFT lengths, also the imaginary part at the Nyquist frequency is zero.

buf[k].re	$Re(0)$	$Re(1)$	$Re(2)$	$Re(3)$	$Re(4)$...	$Re(n/2-1)$	$Re(n/2)$
buf[k].im		$Im(1)$	$Im(2)$	$Im(3)$	$Im(4)$...	$Im(n/2-1)$	
k	0	1	2	3	4		$n/2-1$	$n/2$

Figure 4 Data order of FFT spectrum.

Only the FFT bins for the positive frequencies, 0, and the Nyquist frequency are stored in this structure. The negative frequencies are not stored, because for a real-valued time signal they are the complex conjugates of the positive frequencies.

The negative frequencies still contribute to the signal's level. Refer to **Central Calibration** (p. 3) for a description of the scaling and how the level would be computed from the spectrum. It is recommended to use the library function **MHASignal::rmslevel** (p. 57) to compute the unweighted level correctly in Pascal, or **MHASignal::colored_intensity** (p. 57) to compute a possibly weighted intensity.

4.184.2 Member Data Documentation

4.184.2.1 buf

mha_complex_t* mha_spec_t::buf

signal buffer

4.184.2.2 num_channels

```
unsigned int mha_spec_t::num_channels
```

number of channels

4.184.2.3 num_frames

```
unsigned int mha_spec_t::num_frames
```

number of frames in each channel

4.184.2.4 channel_info

```
mha_channel_info_t* mha_spec_t::channel_info
```

detailed channel description

The documentation for this struct was generated from the following file:

- **mha.hh**

4.185 mha_stash_environment_variable_t Class Reference

This class changes the value of an environment variable when constructed and restores the original state of the environment variable when destroyed.

Public Member Functions

- **mha_stash_environment_variable_t** (const std::string & **variable_name**, const std::string &new_content)
- **~mha_stash_environment_variable_t** ()

Private Attributes

- const bool **existed_before**
Flag indicates if the environment variable existed before constructor.
- const std::string **variable_name**
Name of environment variable.
- const std::string **original_content**
Content of environment variable before constructor executed.

4.185.1 Detailed Description

This class changes the value of an environment variable when constructed and restores the original state of the environment variable when destroyed.

Can be used for testing functionality related to environment variables.

4.185.2 Constructor & Destructor Documentation

4.185.2.1 mha_stash_environment_variable_t()

```
mha_stash_environment_variable_t::mha_stash_environment_variable_t (
    const std::string & variable_name,
    const std::string & new_content ) [inline]
```

4.185.2.2 ~mha_stash_environment_variable_t()

```
mha_stash_environment_variable_t::~mha_stash_environment_variable_t ( ) [inline]
```

4.185.3 Member Data Documentation

4.185.3.1 existed_before

```
const bool mha_stash_environment_variable_t::existed_before [private]
```

Flag indicates if the environment variable existed before constructor.

4.185.3.2 variable_name

```
const std::string mha_stash_environment_variable_t::variable_name [private]
```

Name of environment variable.

4.185.3.3 original_content

```
const std::string mha_stash_environment_variable_t::original_content [private]
```

Content of environment variable before constructor executed.

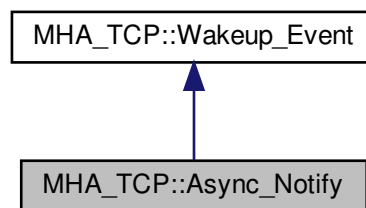
The documentation for this class was generated from the following file:

- **mha_os.h**

4.186 MHA_TCP::Async_Notify Class Reference

Portable Multiplexable cross-thread notification.

Inheritance diagram for MHA_TCP::Async_Notify:



Public Member Functions

- **Async_Notify ()**
- virtual void **reset ()**
- virtual void **set ()**
- virtual **~Async_Notify ()**

Private Attributes

- int **pipe [2]**

Additional Inherited Members

4.186.1 Detailed Description

Portable Multiplexable cross-thread notification.

4.186.2 Constructor & Destructor Documentation

4.186.2.1 Async_Notify()

```
Async_Notify::Async_Notify ( )
```

4.186.2.2 ~Async_Notify()

```
Async_Notify::~~Async_Notify ( ) [virtual]
```

4.186.3 Member Function Documentation

4.186.3.1 reset()

```
void Async_Notify::reset ( ) [virtual]
```

Reimplemented from **MHA_TCP::Wakeup_Event** (p. [778](#)).

4.186.3.2 set()

```
void Async_Notify::set ( ) [virtual]
```

4.186.4 Member Data Documentation

4.186.4.1 pipe

```
int MHA_TCP::Async_Notify::pipe[2] [private]
```

The documentation for this class was generated from the following files:

- **mha_tcp.hh**
- **mha_tcp.cpp**

4.187 mha_tcp::buffered_socket_t Class Reference

An asio TCP socket with an associated streambuf buffer for receiving lines of text, as well as string buffers for sending responses.

Inherits socket, and enable_shared_from_this< buffered_socket_t >.

Public Member Functions

- asio::streambuf & **get_buffer** ()
Access to associated streambuf.
- void **queue_write** (const std::string &message)
Send the given message through this connection to the client asynchronously.

Private Attributes

- asio::streambuf **streambuf**
associated streambuf object to collect received pieces into lines
- std::string **current_message**
The message that is currently sent back to the client.
- std::string **next_message**
A buffer for the next message(s) that must be sent back to the client after the sending of current_message has completed.

4.187.1 Detailed Description

An asio TCP socket with an associated streambuf buffer for receiving lines of text, as well as string buffers for sending responses.

Used for communicating with MHA TCP clients. The life time of the connection objects is managed with shared pointers registered together with callbacks in the asio event loop. This is a common idiom in asio. To support this, we inherit from enable_shared_from_this which is also common in code that uses asio.

4.187.2 Member Function Documentation

4.187.2.1 get_buffer()

```
asio::streambuf& mha_tcp::buffered_socket_t::get_buffer ( ) [inline]
```

Access to associated streambuf.

Needed to invoke `async_read`.

Returns

associated streambuf object by reference

4.187.2.2 queue_write()

```
void mha_tcp::buffered_socket_t::queue_write (
    const std::string & message )
```

Send the given message through this connection to the client asynchronously.

Parameters

<i>message</i>	The text to send. Method copies the message before returning.
----------------	---

4.187.3 Member Data Documentation

4.187.3.1 streambuf

```
asio::streambuf mha_tcp::buffered_socket_t::streambuf [private]
```

associated streambuf object to collect received pieces into lines

4.187.3.2 current_message

```
std::string mha_tcp::buffered_socket_t::current_message [private]
```

The message that is currently sent back to the client.

4.187.3.3 next_message

```
std::string mha_tcp::buffered_socket_t::next_message [private]
```

A buffer for the next message(s) that must be sent back to the client after the sending of current_message has completed.

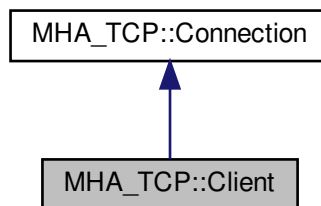
The documentation for this class was generated from the following files:

- **mha_tcp_server.hh**
- **mha_tcp_server.cpp**

4.188 MHA_TCP::Client Class Reference

A portable class for a tcp client connections.

Inheritance diagram for MHA_TCP::Client:



Public Member Functions

- **Client** (const std::string &host, unsigned short port)
Constructor connects to host, port via TCP.
- **Client** (const std::string &host, unsigned short port, **Timeout_Watcher** &timeout_↔
watcher)
Constructor connects to host, port via TCP, using a timeout.

Additional Inherited Members

4.188.1 Detailed Description

A portable class for a tcp client connections.

4.188.2 Constructor & Destructor Documentation

4.188.2.1 Client() [1/2]

```
Client::Client (
    const std::string & host,
    unsigned short port )
```

Constructor connects to host, port via TCP.

Parameters

<i>host</i>	The hostname of the TCP Server (p. 754).
<i>port</i>	The port or the TCP Server (p. 754).

4.188.2.2 Client() [2/2]

```
Client::Client (
    const std::string & host,
    unsigned short port,
    Timeout_Watcher & timeout_watcher )
```

Constructor connects to host, port via TCP, using a timeout.

Parameters

<i>host</i>	The hostname of the TCP Server (p. 754).
<i>port</i>	The port or the TCP Server (p. 754).
<i>timeout_watcher</i>	an Event watcher that implements a timeout.

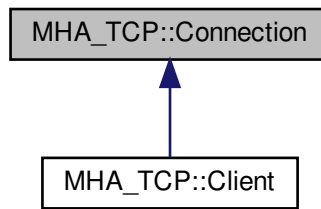
The documentation for this class was generated from the following files:

- **mha_tcp.hh**
- **mha_tcp.cpp**

4.189 MHA_TCP::Connection Class Reference

Connection (p. [741](#)) handles Communication between client and server, is used on both sides.

Inheritance diagram for MHA_TCP::Connection:



Public Member Functions

- **Sockread_Event * get_read_event ()**
- **Sockwrite_Event * get_write_event ()**
- std::string **get_peer_address ()**
Get peer's IP Address.
- unsigned short **get_peer_port ()**
Get peer's TCP port.
- **SOCKET get_fd () const**
Return the (protected) file descriptor of the connection.
- virtual **~Connection ()**
Destructor closes the underlying file descriptor.
- bool **eof ()**
Checks if the peer has closed the connection.
- bool **can_read_line** (char delim='\n')
Checks if a full line of text has arrived by now.
- bool **can_read_bytes** (unsigned howmany)
Checks if the specified ammount of data can be read.
- std::string **read_line** (char delim='\n')
Reads a single line of data from the socket.
- std::string **read_bytes** (unsigned howmany)
Reads the specified ammount of dat from the socket.
- void **try_write** (const std::string &data="")
Adds data to the internal "outgoing" buffer, and then tries to write as much data from that buffer to the socket as possible without blocking.
- void **write** (const std::string &data="")
Adds data to the internal "outgoing" buffer, and then writes that that buffer to the socket, regardless of blocking.
- bool **needs_write ()**
Checks if the internal "outgoing" buffer contains data.
- unsigned **buffered_incoming_bytes () const**
Returns the number of bytes in the internal "incoming" buffer.
- unsigned **buffered_outgoing_bytes () const**
Returns the number of bytes in the internal "outgoing" buffer.

Protected Member Functions

- **Connection (SOCKET _fd)**
Create a connection instance from a socket filedescriptor.

Protected Attributes

- **SOCKET fd**
The file descriptor of the TCP Socket.

Private Member Functions

- void **init_peer_data ()**
determine peer address and port
- bool **can_sysread ()**
Determine whether at least 1 byte can be read without blocking.
- bool **can_syswrite ()**
Determine whether at least 1 byte can be written without blocking.
- std::string **sysread** (unsigned bytes)
Call the system's read function and try to read bytes.
- std::string **syswrite** (const std::string &data)
Call the system's write function and try to write all characters in the string data.

Private Attributes

- std::string **outbuf**
- std::string **inbuf**
- **Sockread_Event * read_event**
- **Sockwrite_Event * write_event**
- bool **closed**
- struct sockaddr_in **peer_addr**

4.189.1 Detailed Description

Connection (p. 741) handles Communication between client and server, is used on both sides.

4.189.2 Constructor & Destructor Documentation

4.189.2.1 Connection()

```
MHA_TCP::Connection::Connection (
    SOCKET _fd ) [protected]
```

Create a connection instance from a socket filedescriptor.

Parameters

↔ _↔ <i>fd</i>	The file descriptor of the TCP Socket. This file descriptor is closed again in the destructor.
----------------------	--

Exceptions

<i>MHA_Error</i> (p. 707)	If the file descriptor is < 0.
---	--------------------------------

4.189.2.2 ~Connection()

`Connection::~~Connection () [virtual]`

Destructor closes the underlying file descriptor.

4.189.3 Member Function Documentation

4.189.3.1 init_peer_data()

`void MHA_TCP::Connection::init_peer_data () [private]`

determine peer address and port

4.189.3.2 can_sysread()

`bool Connection::can_sysread () [private]`

Determine whether at least 1 byte can be read without blocking.

4.189.3.3 can_syswrite()

`bool Connection::can_syswrite () [private]`

Determine whether at least 1 byte can be written without blocking.

4.189.3.4 sysread()

`std::string Connection::sysread (unsigned bytes) [private]`

Call the system's read function and try to read bytes.

This will block in a situation where `can_sysread` returns false.

Parameters

<i>bytes</i>	The desired number of characters.
--------------	-----------------------------------

Returns

The characters read from the socket. The result may have fewer characters than specified by *bytes*. If the result is an empty string, then the socket has been closed by the peer.

4.189.3.5 syswrite()

```
std::string Connection::syswrite (
    const std::string & data ) [private]
```

Call the system's write function and try to write all characters in the string *data*.

May write fewer characters, but will at least write one character.

Parameters

<i>data</i>	A string of characters to write to the socket.
-------------	--

Returns

The rest of the characters that have not yet been written.

4.189.3.6 get_read_event()

```
Sockread_Event * Connection::get_read_event ( )
```

4.189.3.7 get_write_event()

```
Sockwrite_Event * Connection::get_write_event ( )
```

4.189.3.8 get_peer_address()

```
std::string Connection::get_peer_address ( )
```

Get peer's IP Address.

4.189.3.9 get_peer_port()

```
unsigned short Connection::get_peer_port ( )
```

Get peer's TCP port.

4.189.3.10 get_fd()

```
SOCKET MHA_TCP::Connection::get_fd ( ) const [inline]
```

Return the (protected) file descriptor of the connection.

Will be required for SSL.

4.189.3.11 eof()

```
bool Connection::eof ( )
```

Checks if the peer has closed the connection.

As a side effect, this method fills the internal "incoming" buffer if it was empty and the socket is readable and not eof.

4.189.3.12 can_read_line()

```
bool Connection::can_read_line (
    char delim = '\n' )
```

Checks if a full line of text has arrived by now.

This method reads data from the socket into the internal "incoming" buffer if it can be done without blocking.

Parameters

<i>delim</i>	The line delimiter.
--------------	---------------------

Returns

true if at least one full line of text is present in the internal buffer after this method call, false otherwise.

4.189.3.13 can_read_bytes()

```
bool Connection::can_read_bytes (
    unsigned howmany )
```

Checks if the specified ammount of data can be read.

This method reads data from the socket into an internal "incoming" buffer if it can be done without blocking.

Parameters

<i>howmany</i>	The number of bytes that the caller wants to have checked.
----------------	--

Returns

true if at least the specified ammount of data is present in the internal buffer after this method call, false otherwise

4.189.3.14 read_line()

```
std::string Connection::read_line (
    char delim = '\n' )
```

Reads a single line of data from the socket.

Blocks if necessary.

Parameters

<i>delim</i>	The line delimiter.
--------------	---------------------

Returns

The string of characters in this line, including the trailing delimiter. The delimiter may be missing if the last line before EOF does not have a delimiter.

4.189.3.15 read_bytes()

```
std::string Connection::read_bytes (
    unsigned howmany )
```

Reads the specified ammount of dat from the socket.

Blocks if necessary.

Parameters

<i>howmany</i>	The number of bytes to read.
----------------	------------------------------

Returns

The string of characters read. The string may be shorter if EOF is encountered.

4.189.3.16 try_write()

```
void Connection::try_write (
    const std::string & data = "" )
```

Adds data to the internal "outgoing" buffer, and then tries to write as much data from that buffer to the socket as possible without blocking.

Parameters

<i>data</i>	data to send over the socket.
-------------	-------------------------------

4.189.3.17 write()

```
void Connection::write (
    const std::string & data = "" )
```

Adds data to the internal "outgoing" buffer, and then writes that that buffer to the socket, regardless of blocking.

Parameters

<i>data</i>	data to send over the socket.
-------------	-------------------------------

4.189.3.18 needs_write()

```
bool Connection::needs_write ( )
```

Checks if the internal "outgoing" buffer contains data.

4.189.3.19 buffered_incoming_bytes()

```
unsigned Connection::buffered_incoming_bytes ( ) const
```

Returns the number of bytes in the internal "incoming" buffer.

4.189.3.20 buffered_outgoing_bytes()

```
unsigned Connection::buffered_outgoing_bytes ( ) const
```

Returns the number of bytes in the internal "outgoing" buffer.

4.189.4 Member Data Documentation

4.189.4.1 outbuf

```
std::string MHA_TCP::Connection::outbuf [private]
```

4.189.4.2 inbuf

```
std::string MHA_TCP::Connection::inbuf [private]
```

4.189.4.3 read_event

```
SocketRead_Event* MHA_TCP::Connection::read_event [private]
```

4.189.4.4 write_event

```
Socketwrite_Event* MHA_TCP::Connection::write_event [private]
```

4.189.4.5 closed

```
bool MHA_TCP::Connection::closed [private]
```

4.189.4.6 peer_addr

```
struct sockaddr_in MHA_TCP::Connection::peer_addr [private]
```

4.189.4.7 fd

```
SOCKET MHA_TCP::Connection::fd [protected]
```

The file descriptor of the TCP Socket.

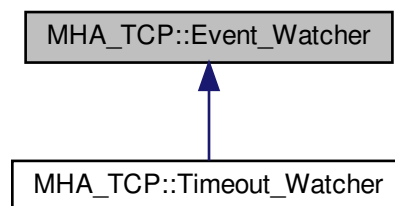
The documentation for this class was generated from the following files:

- **mha_tcp.hh**
- **mha_tcp.cpp**

4.190 MHA_TCP::Event_Watcher Class Reference

OS-independent event watcher, uses select on Unix and WaitForMultipleObjects on Windows.

Inheritance diagram for MHA_TCP::Event_Watcher:



Public Types

- typedef **std::set**< **Wakeup_Event** * > **Events**
- typedef **std::set**< **Wakeup_Event** * >:: iterator **iterator**

Public Member Functions

- void **observe** (**Wakeup_Event** *event)
Add an event to this observer.
- void **ignore** (**Wakeup_Event** *event)
Remove an event from this observer.
- **std::set**< **Wakeup_Event** * > **wait** ()
| Wait for some event to occur.
- virtual **~Event_Watcher** ()

Private Attributes

- **std::set**< **Wakeup_Event** * > **events**
The list of events to watch.

4.190.1 Detailed Description

OS-independent event watcher, uses select on Unix and WaitForMultipleObjects on Windows.

4.190.2 Member Typedef Documentation

4.190.2.1 Events

```
typedef std::set< Wakeup_Event*> MHA_TCP::Event_Watcher::Events
```

4.190.2.2 iterator

```
typedef std::set< Wakeup_Event*>:: iterator MHA_TCP::Event_Watcher::iterator
```

4.190.3 Constructor & Destructor Documentation

4.190.3.1 ~Event_Watcher()

```
Event_Watcher::~~Event_Watcher ( ) [virtual]
```

4.190.4 Member Function Documentation

4.190.4.1 observe()

```
void Event_Watcher::observe (
    Wakeup_Event * event )
```

Add an event to this observer.

4.190.4.2 ignore()

```
void Event_Watcher::ignore (
    Wakeup_Event * event )
```

Remove an event from this observer.

4.190.4.3 wait()

```
std::set< Wakeup_Event * > Event_Watcher::wait ( )
```

\ Wait for some event to occur.

Return all events that are ready

4.190.5 Member Data Documentation

4.190.5.1 events

```
std::set< Wakeup_Event*> MHA_TCP::Event_Watcher::events [private]
```

The list of events to watch.

The documentation for this class was generated from the following files:

- mha_tcp.hh
- mha_tcp.cpp

4.191 MHA_TCP::OS_EVENT_TYPE Struct Reference

Public Types

- enum { **R** =0, **W** =1, **X** =2, **T** }

Public Attributes

- enum MHA_TCP::OS_EVENT_TYPE:: { ... } **mode**
- union {
 int **fd**
 double **timeout**
};

4.191.1 Member Enumeration Documentation

4.191.1.1 anonymous enum

anonymous enum

Enumerator

R	
W	
X	
T	

4.191.2 Member Data Documentation

4.191.2.1 mode

```
enum { ... } MHA_TCP::OS_EVENT_TYPE::mode
```

4.191.2.2 fd

```
int MHA_TCP::OS_EVENT_TYPE::fd
```

4.191.2.3 timeout

```
double MHA_TCP::OS_EVENT_TYPE::timeout
```

4.191.2.4 "@5

```
union { ... }
```

The documentation for this struct was generated from the following file:

- **mha_tcp.hh**

4.192 MHA_TCP::Server Class Reference

Public Member Functions

- **Server** (unsigned short **port**=0, const std::string & **iface**="0.0.0.0")
Create a TCP server socket.
- **Server** (const std::string & **iface**, unsigned short **port**=0)
Create a TCP server socket.
- **~Server** ()
Close the TCP server socket.
- std::string **get_interface** () const
Get the name given in the constructor for the network interface.
- unsigned short **get_port** () const
Get the port that the TCP server socket currently listens to.
- **Sockaccept_Event** * **get_accept_event** ()
*Produces an event that can be observed by an **Event_Watcher** (p. 750).*
- **Connection** * **accept** ()
Accept an incoming connection.
- **Connection** * **try_accept** ()
Accept an incoming connection if it can be done without blocking.

Private Member Functions

- void **initialize** (const std::string & **iface**, unsigned short **port**)

Private Attributes

- sockaddr_in **sock_addr**
- **SOCKET** **serversocket**
- std::string **iface**
- unsigned short **port**
- **Sockaccept_Event** * **accept_event**

4.192.1 Constructor & Destructor Documentation

4.192.1.1 Server() [1/2]

```
Server::Server (
    unsigned short port = 0,
    const std::string & iface = "0.0.0.0" )
```

Create a TCP server socket.

Parameters

<i>port</i>	The TCP port to listen to.
<i>iface</i>	The network interface to bind to.

4.192.1.2 Server() [2/2]

```
Server::Server (
    const std::string & iface,
    unsigned short port = 0 )
```

Create a TCP server socket.

Parameters

<i>port</i>	The TCP port to listen to.
<i>iface</i>	The network interface to bind to.

4.192.1.3 ~Server()

```
Server::~Server ( )
```

Close the TCP server socket.

4.192.2 Member Function Documentation

4.192.2.1 initialize()

```
void Server::initialize (
    const std::string & iface,
    unsigned short port ) [private]
```

4.192.2.2 get_interface()

```
std::string Server::get_interface ( ) const
```

Get the name given in the constructor for the network interface.

4.192.2.3 get_port()

```
unsigned short Server::get_port ( ) const
```

Get the port that the TCP server socket currently listens to.

4.192.2.4 get_accept_event()

```
Sockaccept_Event * Server::get_accept_event ( )
```

Produces an event that can be observed by an **Event_Watcher** (p. [750](#)).

This event signals incoming connections that can be accepted.

4.192.2.5 accept()

```
Connection * Server::accept ( )
```

Accept an incoming connection.

blocks if necessary.

Returns

The new TCP connection. The connection has to be deleted by the caller.

4.192.2.6 try_accept()

```
Connection * Server::try_accept ( )
```

Accept an incoming connection if it can be done without blocking.

Returns

The new TCP connection or 0 if there is no immediate connection. The connection has to be deleted by the caller.

4.192.3 Member Data Documentation

4.192.3.1 sock_addr

```
sockaddr_in MHA_TCP::Server::sock_addr [private]
```

4.192.3.2 serversocket

```
SOCKET MHA_TCP::Server::serversocket [private]
```

4.192.3.3 iface

```
std::string MHA_TCP::Server::iface [private]
```

4.192.3.4 port

```
unsigned short MHA_TCP::Server::port [private]
```

4.192.3.5 accept_event

```
Sockaccept_Event* MHA_TCP::Server::accept_event [private]
```

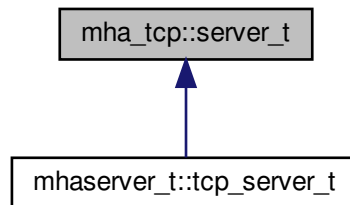
The documentation for this class was generated from the following files:

- mha_tcp.hh
- mha_tcp.cpp

4.193 mha_tcp::server_t Class Reference

Class for accepting TCP connections from clients.

Inheritance diagram for mha_tcp::server_t:



Public Member Functions

- **server_t** (const std::string &interface, uint16_t port)
Allocates a TCP server.
- uint16_t **get_port** () const
- asio::ip::tcp::endpoint **get_endpoint** () const
- asio::ip::address **get_address** () const
- size_t **get_num_accepted_connections** () const
- void **run** ()
Accepts connections on the TCP port and serves them.
- virtual bool **on_received_line** (std::shared_ptr< **buffered_socket_t** > c, const std::string &l)
This method is invoked when a line of text is received on one of the accepted connections.
- virtual void **shutdown** ()
*Shuts down the server: Close the acceptor (no new connections), shuts down the receiving direction of all accepted connections (no new commands, but responses can still be finished), registers a timer event that will cause event loop termination and return from the **run()** (p. 761) method 1 second in the future, giving us reasonably enough time for the pending responses to be sent out.*
- virtual ~**server_t** ()=default
Make destructor virtual.
- asio::io_context & **get_context** ()

Private Member Functions

- void **trigger_accept** ()
Triggers the acceptance of the next connection.
- void **post_trigger_read_line** (std::shared_ptr< **buffered_socket_t** > c)
Call trigger_read_line with a single detour through asio's event loop to avoid starving other connections when one connection floods us.
- void **trigger_read_line** (std::shared_ptr< **buffered_socket_t** > c)
Triggers the reading of the next line from a connection.
- void **add_connection** (std::shared_ptr< **buffered_socket_t** > connection)
Add new connection to the list of connections, retire stale pointers.

Private Attributes

- asio::io_context **io_context**
The io context used to run event loops.
- std::shared_ptr< asio::ip::tcp::acceptor > **acceptor**
The underlying asio object used to accept incoming TCP connections.
- bool **async_accept_has_been_triggered** = false
Set to true when async_acceptance is triggered in trigger_accept (Only one accept can be in process at any time).
- size_t **num_accepted_connections** = 0U
Number of accepted connections (not necessarily still existing)
- std::vector< std::weak_ptr< **buffered_socket_t** > > **connections**
Weak pointers to the existing connections.

4.193.1 Detailed Description

Class for accepting TCP connections from clients.

4.193.2 Constructor & Destructor Documentation

4.193.2.1 server_t()

```
mha_tcp::server_t::server_t (
    const std::string & interface,
    uint16_t port )
```

Allocates a TCP server.

Parameters

<i>interface</i>	Host name of the network interface to listen on. Can be "localhost" or "127.0.0.1" for localhost, "0.0.0.0" for any ipv4 interface, ...
<i>port</i>	TCP port to open for incoming connections. If port==0, then the operating system will select a free port.

Exceptions

<i>system_error</i>	if the name given in interface cannot be resolved
<i>system_error</i>	if we cannot bind to the requested interface

4.193.2.2 ~server_t()

```
virtual mha_tcp::server_t::~~server_t ( ) [virtual], [default]
```

Make destructor virtual.

4.193.3 Member Function Documentation**4.193.3.1 get_port()**

```
uint16_t mha_tcp::server_t::get_port ( ) const
```

Returns

The port number of the TCP port that has been opened. If the port specified in the constructor was 0, this will return the port that the operating system has selected.

4.193.3.2 get_endpoint()

```
asio::ip::tcp::endpoint mha_tcp::server_t::get_endpoint ( ) const
```

Returns

The local endpoint of the acceptor.

4.193.3.3 get_address()

```
asio::ip::address mha_tcp::server_t::get_address ( ) const
```

Returns

The ip adress that the server is bound to.

4.193.3.4 get_num_accepted_connections()

```
size_t mha_tcp::server_t::get_num_accepted_connections ( ) const
```

Returns

the number of TCP connections that ha ve been accepted

4.193.3.5 run()

```
void mha_tcp::server_t::run ( )
```

Accepts connections on the TCP port and serves them.

Triggers the acceptance of the next connection to start things off.

4.193.3.6 on_received_line()

```
bool mha_tcp::server_t::on_received_line (
    std::shared_ptr< buffered_socket_t > c,
    const std::string & l ) [virtual]
```

This method is invoked when a line of text is received on one of the accepted connections.

Override this method to process the communication with the client.

Parameters

<i>c</i>	the connection that has received this line
<i>l</i>	the line that has been received, without the line ending

Returns

client should return true when client wants to read another line of text, else false.

Reimplemented in **mhaserver_t::tcp_server_t** (p. 1144).

4.193.3.7 shutdown()

```
void mha_tcp::server_t::shutdown ( ) [virtual]
```

Shuts down the server: Close the acceptor (no new connections), shuts down the receiving direction of all accepted connections (no new commands, but responses can still be finished), registers a timer event that will cause event loop termination and return from the **run()** (p. 761) method 1 second in the future, giving us reasonably enough time for the pending responses to be sent out.

4.193.3.8 get_context()

```
asio::io_context & mha_tcp::server_t::get_context ( )
```

Returns

the asio io context used to run the event loop

4.193.3.9 trigger_accept()

```
void mha_tcp::server_t::trigger_accept ( ) [private]
```

Triggers the acceptance of the next connection.

Called from run to accept the first connection and from the accept handler to accept each next connection. Once a connection from a client is accepted, the accept handler will register it with the event loop for receiving a line of text.

4.193.3.10 post_trigger_read_line()

```
void mha_tcp::server_t::post_trigger_read_line (
    std::shared_ptr< buffered_socket_t > c ) [private]
```

Call trigger_read_line with a single detour through asio's event loop to avoid starving other connections when one connection floods us.

4.193.3.11 trigger_read_line()

```
void mha_tcp::server_t::trigger_read_line (
    std::shared_ptr< buffered_socket_t > c ) [private]
```

Triggers the reading of the next line from a connection.

Parameters

c	The connection where the incoming data is expected from.
----------	--

4.193.3.12 add_connection()

```
void mha_tcp::server_t::add_connection (
    std::shared_ptr< buffered_socket_t > connection ) [inline], [private]
```

Add new connection to the list of connections, retire stale pointers.

4.193.4 Member Data Documentation

4.193.4.1 io_context

```
asio::io_context mha_tcp::server_t::io_context [private]
```

The io context used to run event loops.

4.193.4.2 acceptor

```
std::shared_ptr<asio::ip::tcp::acceptor> mha_tcp::server_t::acceptor [private]
```

The underlying asio object used to accept incoming TCP connections.

4.193.4.3 async_accept_has_been_triggered

```
bool mha_tcp::server_t::async_accept_has_been_triggered = false [private]
```

Set to true when `async_acceptance` is triggered in `trigger_accept` (Only one accept can be in process at any time).

4.193.4.4 num_accepted_connections

```
size_t mha_tcp::server_t::num_accepted_connections = 0U [private]
```

Number of accepted connections (not necessarily still existing)

4.193.4.5 connections

```
std::vector<std::weak_ptr< buffered_socket_t> > mha_tcp::server_t::connections  
[private]
```

Weak pointers to the existing connections.

Needed to shutdown the active connections for incoming data when server shuts down.

The documentation for this class was generated from the following files:

- **mha_tcp_server.hh**
- **mha_tcp_server.cpp**

4.194 MHA_TCP::sock_init_t Class Reference

Public Member Functions

- **sock_init_t ()**

4.194.1 Constructor & Destructor Documentation

4.194.1.1 sock_init_t()

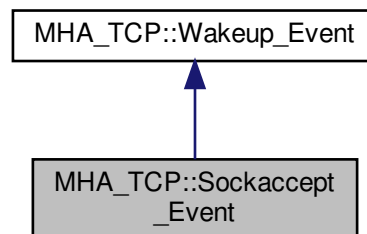
```
MHA_TCP::sock_init_t::sock_init_t ( ) [inline]
```

The documentation for this class was generated from the following file:

- **mha_tcp.cpp**

4.195 MHA_TCP::Sockaccept_Event Class Reference

Inheritance diagram for MHA_TCP::Sockaccept_Event:



Public Member Functions

- **Sockaccept_Event (SOCKET)**

Additional Inherited Members

4.195.1 Constructor & Destructor Documentation

4.195.1.1 Sockaccept_Event()

```
MHA_TCP::Sockaccept_Event::Sockaccept_Event (
    SOCKET s )
```

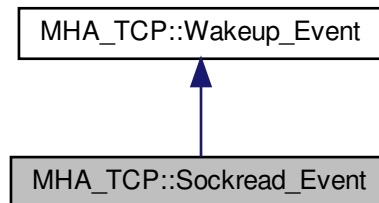
The documentation for this class was generated from the following files:

- **mha_tcp.hh**
- **mha_tcp.cpp**

4.196 MHA_TCP::Sockread_Event Class Reference

Watch socket for incoming data.

Inheritance diagram for MHA_TCP::Sockread_Event:



Public Member Functions

- **Sockread_Event (SOCKET s)**

Set socket to watch for.

Additional Inherited Members

4.196.1 Detailed Description

Watch socket for incoming data.

4.196.2 Constructor & Destructor Documentation

4.196.2.1 Sockread_Event()

```

MHA_TCP::Sockread_Event::Sockread_Event (
    SOCKET s )
  
```

Set socket to watch for.

Parameters

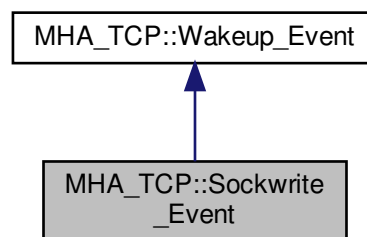
s	The socket to observe incoming data on.
----------	---

The documentation for this class was generated from the following files:

- **mha_tcp.hh**
- **mha_tcp.cpp**

4.197 MHA_TCP::Sockwrite_Event Class Reference

Inheritance diagram for MHA_TCP::Sockwrite_Event:



Public Member Functions

- **Sockwrite_Event (SOCKET s)**

Additional Inherited Members

4.197.1 Constructor & Destructor Documentation

4.197.1.1 Sockwrite_Event()

```
MHA_TCP::Sockwrite_Event::Sockwrite_Event (
    SOCKET s )
```

The documentation for this class was generated from the following files:

- **mha_tcp.hh**
- **mha_tcp.cpp**

4.198 MHA_TCP::Thread Class Reference

A very simple class for portable threads.

Public Types

- enum { **PREPARED**, **RUNNING**, **FINISHED** }
The current state of the thread.
- typedef void (*)(**thr_f**) (void *)
The thread function signature to use with this class.

Public Member Functions

- **Thread** (**thr_f** func, void * **arg**=0)
Constructor starts a new thread.
- virtual ~**Thread** ()
*The destructor should only be called when the **Thread** (p. 768) is finished.*
- virtual void **run** ()
*The internal method that delegated the new thread to the registered **Thread** (p. 768) function.*

Public Attributes

- **Async_Notify_thread_finish_event**
Event will be triggered when the thread exits.
- enum MHA_TCP::Thread:: { ... } **state**
The current state of the thread.
- **thr_f thread_func**
The thread function that the client has registered.
- void * **thread_arg**
The argument that the client wants to be handed through to the thread function.
- **MHA_Error * error**
*The **MHA_Error** (p. 707) that caused the thread to abort, if any.*

Protected Member Functions

- **Thread** ()
Default constructor may only be used by derived classes that want to start the thread themselves.

Protected Attributes

- void * **arg**
The argument for the client's thread function.
- void * **return_value**
The return value from the client's thread function is stored here When that function returns.

Private Attributes

- pthread_t **thread_handle**
The posix thread handle.
- pthread_attr_t **thread_attr**
The posix thread attribute structure.

4.198.1 Detailed Description

A very simple class for portable threads.

4.198.2 Member Typedef Documentation

4.198.2.1 thr_f

```
typedef void*(* MHA_TCP::Thread::thr_f) (void *)
```

The thread function signature to use with this class.

Derive from this class and call protected standard constructor to start threads differently.

4.198.3 Member Enumeration Documentation

4.198.3.1 anonymous enum

```
anonymous enum
```

The current state of the thread.

Enumerator

PREPARED	
RUNNING	
FINISHED	

4.198.4 Constructor & Destructor Documentation

4.198.4.1 Thread() [1/2]

```
MHA_TCP::Thread::Thread ( ) [protected]
```

Default constructor may only be used by derived classes that want to start the thread themselves.

4.198.4.2 Thread() [2/2]

```
Thread::Thread (
    Thread::thr_f func,
    void * arg = 0 )
```

Constructor starts a new thread.

Parameters

<i>func</i>	The function to be executed by the thread.
<i>arg</i>	The argument given to pass to the thread function.

4.198.4.3 ~Thread()

```
Thread::~Thread ( ) [virtual]
```

The destructor should only be called when the **Thread** (p. 768) is finished.

There is preliminary support for forceful thread cancellation in the destructor, but probably not very robust or portable..

4.198.5 Member Function Documentation

4.198.5.1 run()

```
void Thread::run ( ) [virtual]
```

The internal method that delegated the new thread to the registered **Thread** (p. 768) function.

4.198.6 Member Data Documentation

4.198.6.1 thread_handle

```
pthread_t MHA_TCP::Thread::thread_handle [private]
```

The posix thread handle.

4.198.6.2 thread_attr

```
pthread_attr_t MHA_TCP::Thread::thread_attr [private]
```

The posix thread attribute structure.

Required for starting a thread in detached state. Detachment is required to eliminate the need for joining this thread.

4.198.6.3 arg

```
void* MHA_TCP::Thread::arg [protected]
```

The argument for the client's thread function.

4.198.6.4 return_value

```
void* MHA_TCP::Thread::return_value [protected]
```

The return value from the client's thread function is stored here When that function returns.

4.198.6.5 thread_finish_event

Async_Notify MHA_TCP::Thread::thread_finish_event

Event will be triggered when the thread exits.

4.198.6.6 state

enum { ... } MHA_TCP::Thread::state

The current state of the thread.

4.198.6.7 thread_func

thr_f MHA_TCP::Thread::thread_func

The thread function that the client has registered.

4.198.6.8 thread_arg

void* MHA_TCP::Thread::thread_arg

The argument that the client wants to be handed through to the thread function.

4.198.6.9 error

MHA_Error* MHA_TCP::Thread::error

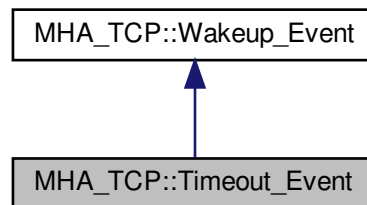
The **MHA_Error** (p. [707](#)) that caused the thread to abort, if any.

The documentation for this class was generated from the following files:

- mha_tcp.hh
- mha_tcp.cpp

4.199 MHA_TCP::Timeout_Event Class Reference

Inheritance diagram for MHA_TCP::Timeout_Event:



Public Member Functions

- **Timeout_Event** (double interval)
- virtual **OS_EVENT_TYPE** **get_os_event** ()

Private Attributes

- double **end_time**

Additional Inherited Members

4.199.1 Constructor & Destructor Documentation

4.199.1.1 Timeout_Event()

```
Timeout_Event::Timeout_Event (  
    double interval )
```

4.199.2 Member Function Documentation

4.199.2.1 `get_os_event()`

```
OS_EVENT_TYPE Timeout_Event::get_os_event ( ) [virtual]
```

Reimplemented from **MHA_TCP::Wakeup_Event** (p. [778](#)).

4.199.3 Member Data Documentation

4.199.3.1 `end_time`

```
double MHA_TCP::Timeout_Event::end_time [private]
```

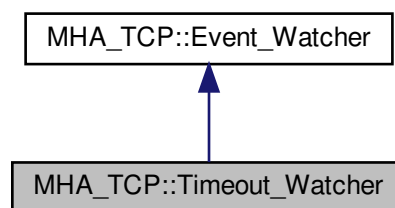
The documentation for this class was generated from the following files:

- **mha_tcp.hh**
- **mha_tcp.cpp**

4.200 MHA_TCP::Timeout_Watcher Class Reference

OS-independent event watcher with internal fixed-end-time timeout.

Inheritance diagram for MHA_TCP::Timeout_Watcher:



Public Member Functions

- **Timeout_Watcher** (double interval)
- virtual **~Timeout_Watcher** ()

Private Attributes

- **Timeout_Event** `timeout`

Additional Inherited Members

4.200.1 Detailed Description

OS-independent event watcher with internal fixed-end-time timeout.

4.200.2 Constructor & Destructor Documentation

4.200.2.1 Timeout_Watcher()

```
Timeout_Watcher::Timeout_Watcher (
    double interval ) [explicit]
```

4.200.2.2 ~Timeout_Watcher()

```
Timeout_Watcher::~~Timeout_Watcher ( ) [virtual]
```

4.200.3 Member Data Documentation

4.200.3.1 timeout

```
Timeout_Event MHA_TCP::Timeout_Watcher::timeout [private]
```

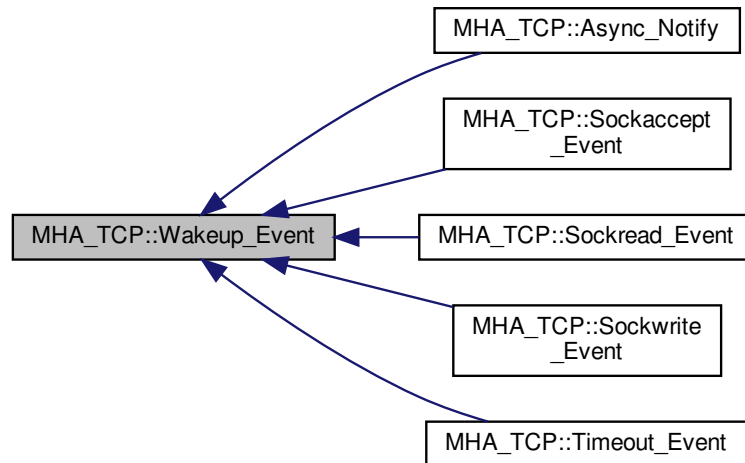
The documentation for this class was generated from the following files:

- **mha_tcp.hh**
- **mha_tcp.cpp**

4.201 MHA_TCP::Wakeup_Event Class Reference

A base class for asynchronous wakeup events.

Inheritance diagram for MHA_TCP::Wakeup_Event:



Public Member Functions

- **Wakeup_Event** ()
Event Constructor.
- virtual void **observed_by** (**Event_Watcher** *observer)
*Called by the **Event_Watcher** (p. 750) when this event is added to its list of observed events.*
- virtual void **ignored_by** (**Event_Watcher** *observer)
*Called by the **Event_Watcher** (p. 750) when this event is removed from its list of observed events.*
- virtual **~Wakeup_Event** ()
Destructor deregisters from observers.
- virtual **OS_EVENT_TYPE** **get_os_event** ()
Get necessary information for the Event Watcher.
- virtual void **reset** ()
For pure notification events, reset the "signalled" status.
- virtual bool **status** ()
Query whether the event is in signalled state now.

Protected Attributes

- **OS_EVENT_TYPE** **os_event**
- bool **os_event_valid**

Private Attributes

- **std::set< class Event_Watcher * > observers**

*A list of all **Event_Watcher** (p. 750) instances that this **Wakeup_Event** (p. 776) is observed by (stored here for proper deregistering).*

4.201.1 Detailed Description

A base class for asynchronous wakeup events.

4.201.2 Constructor & Destructor Documentation

4.201.2.1 Wakeup_Event()

```
Wakeup_Event::Wakeup_Event ( )
```

Event Constructor.

The new event has invalid state.

4.201.2.2 ~Wakeup_Event()

```
Wakeup_Event::~~Wakeup_Event ( ) [virtual]
```

Destructor deregisters from observers.

4.201.3 Member Function Documentation

4.201.3.1 observed_by()

```
void Wakeup_Event::observed_by (
    Event_Watcher * observer ) [virtual]
```

Called by the **Event_Watcher** (p. 750) when this event is added to its list of observed events.

4.201.3.2 ignored_by()

```
void Wakeup_Event::ignored_by (
    Event_Watcher * observer ) [virtual]
```

Called by the **Event_Watcher** (p. 750) when this event is removed from its list of observed events.

4.201.3.3 get_os_event()

```
OS_EVENT_TYPE Wakeup_Event::get_os_event ( ) [virtual]
```

Get necessary information for the Event Watcher.

Reimplemented in **MHA_TCP::Timeout_Event** (p. 773).

4.201.3.4 reset()

```
void Wakeup_Event::reset ( ) [virtual]
```

For pure notification events, reset the "signalled" status.

Reimplemented in **MHA_TCP::Async_Notify** (p. 737).

4.201.3.5 status()

```
bool Wakeup_Event::status ( ) [virtual]
```

Query whether the event is in signalled state now.

4.201.4 Member Data Documentation

4.201.4.1 observers

```
std::set<class Event_Watcher *> MHA_TCP::Wakeup_Event::observers [private]
```

A list of all **Event_Watcher** (p. 750) instances that this **Wakeup_Event** (p. 776) is observed by (stored here for proper deregistering).

4.201.4.2 os_event

```
OS_EVENT_TYPE MHA_TCP::Wakeup_Event::os_event [protected]
```

4.201.4.3 os_event_valid

```
bool MHA_TCP::Wakeup_Event::os_event_valid [protected]
```

The documentation for this class was generated from the following files:

- **mha_tcp.hh**
- **mha_tcp.cpp**

4.202 mha_tictoc_t Struct Reference

Public Attributes

- struct timeval **tv1**
- struct timeval **tv2**
- struct timezone **tz**
- float **t**

4.202.1 Member Data Documentation

4.202.1.1 tv1

```
struct timeval mha_tictoc_t::tv1
```

4.202.1.2 tv2

```
struct timeval mha_tictoc_t::tv2
```

4.202.1.3 tz

```
struct timezone mha_tictoc_t::tz
```


4.203.1 Detailed Description

Waveform signal structure.

This structure contains one fragment of a waveform signal. The member num_frames describes the number of audio samples in each audio channel.

In a calibrated openMHA, audio samples are stored in unit Pascal, see **Central Calibration** (p. 3).

The field channel_info must be an array of num_channels entries or NULL.

4.203.2 Member Data Documentation

4.203.2.1 buf

```
mha_real_t* mha_wave_t::buf
```

signal buffer

4.203.2.2 num_channels

```
unsigned int mha_wave_t::num_channels
```

number of channels

4.203.2.3 num_frames

```
unsigned int mha_wave_t::num_frames
```

number of frames in each channel

4.203.2.4 channel_info

```
mha_channel_info_t* mha_wave_t::channel_info
```

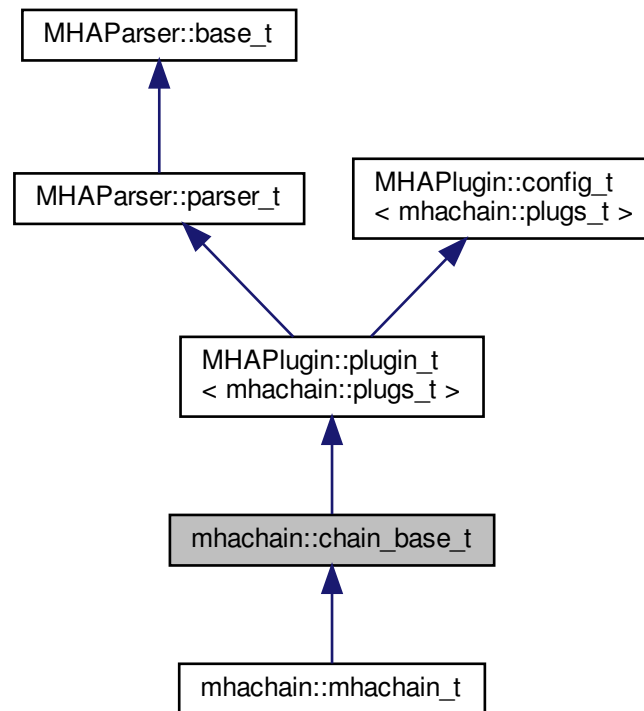
detailed channel description

The documentation for this struct was generated from the following file:

- **mha.hh**

4.204 mhachain::chain_base_t Class Reference

Inheritance diagram for mhachain::chain_base_t:



Public Member Functions

- **chain_base_t** (**algo_comm_t**, const std::string &, const std::string &)
- void **process** (**mha_wave_t** *, **mha_wave_t** **)
- void **process** (**mha_spec_t** *, **mha_wave_t** **)
- void **process** (**mha_wave_t** *, **mha_spec_t** **)
- void **process** (**mha_spec_t** *, **mha_spec_t** **)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()

Protected Attributes

- **MHAParser::bool_t** **bprofiling**
- **MHAParser::vstring_t** **algos**

Private Member Functions

- void **update** ()

Private Attributes

- std::vector< std::string > **old_algos**
- MHAEvents::patchbay_t< mhachain::chain_base_t > **patchbay**
- mhaconfig_t **cfin**
- mhaconfig_t **cfout**
- bool **b_prepared**
- std::string **chain**

Additional Inherited Members

4.204.1 Constructor & Destructor Documentation

4.204.1.1 chain_base_t()

```
mhachain::chain_base_t::chain_base_t (
    algo_comm_t iac,
    const std::string & ichain,
    const std::string & ialgo )
```

4.204.2 Member Function Documentation

4.204.2.1 process() [1/4]

```
void mhachain::chain_base_t::process (
    mha_wave_t * sin,
    mha_wave_t ** sout )
```

4.204.2.2 process() [2/4]

```
void mhachain::chain_base_t::process (
    mha_spec_t * sin,
    mha_wave_t ** sout )
```

4.204.2.3 process() [3/4]

```
void mhachain::chain_base_t::process (
    mha_wave_t * sin,
    mha_spec_t ** sout )
```

4.204.2.4 process() [4/4]

```
void mhachain::chain_base_t::process (
    mha_spec_t * sin,
    mha_spec_t ** sout )
```

4.204.2.5 prepare()

```
void mhachain::chain_base_t::prepare (
    mhaconfig_t & cf ) [virtual]
```

Implements **MHAPLugin::plugin_t**< **mhachain::plugs_t** > (p. [1099](#)).

4.204.2.6 release()

```
void mhachain::chain_base_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t**< **mhachain::plugs_t** > (p. [1100](#)).

4.204.2.7 update()

```
void mhachain::chain_base_t::update ( ) [private]
```

4.204.3 Member Data Documentation

4.204.3.1 bprofiling

```
MHAParser::bool_t mhachain::chain_base_t::bprofiling [protected]
```

4.204.3.2 algos

MHAParser::vstring_t mhachain::chain_base_t::algos [protected]

4.204.3.3 old_algos

std::vector<std::string> mhachain::chain_base_t::old_algos [private]

4.204.3.4 patchbay

MHAEvents::patchbay_t< mhachain::chain_base_t > mhachain::chain_base_t::patchbay [private]

4.204.3.5 cfin

mhaconfig_t mhachain::chain_base_t::cfin [private]

4.204.3.6 cfout

mhaconfig_t mhachain::chain_base_t::cfout [private]

4.204.3.7 b_prepared

bool mhachain::chain_base_t::b_prepared [private]

4.204.3.8 chain

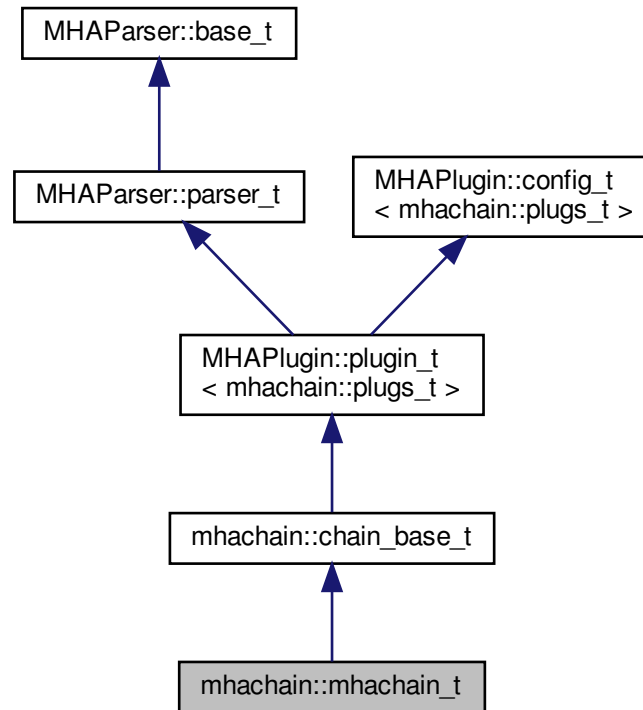
std::string mhachain::chain_base_t::chain [private]

The documentation for this class was generated from the following files:

- **mha_generic_chain.h**
- **mha_generic_chain.cpp**

4.205 mhachain::mhachain_t Class Reference

Inheritance diagram for mhachain::mhachain_t:



Public Member Functions

- **mhachain_t** (**algo_comm_t** iac, const std::string &ichain, const std::string &ialgo)

Additional Inherited Members

4.205.1 Constructor & Destructor Documentation

4.205.1.1 mhachain_t()

```

mhachain::mhachain_t::mhachain_t (
    algo_comm_t iac,
    const std::string & ichain,
    const std::string & ialgo )

```

The documentation for this class was generated from the following file:

- **mhachain.cpp**

4.206 mhachain::plugs_t Class Reference

Public Member Functions

- **plugs_t** (std::vector< std::string > **algos**, **mhaconfig_t** cfin, **mhaconfig_t** cfout, bool do_prepare, **MHAParser::parser_t** &p, **algo_comm_t** iac, std::string ichain, bool use_profiling)
- **~plugs_t** ()
- void **prepare** (**mhaconfig_t** &)
- void **release** ()
- void **process** (**mha_wave_t** *, **mha_spec_t** *, **mha_wave_t** **, **mha_spec_t** **)
- bool **prepared** () const

Private Member Functions

- void **alloc_plugs** (std::vector< std::string > **algos**)
- void **cleanup_plugs** ()
- void **update_proc_load** ()

Private Attributes

- bool **b_prepared**
- std::vector< **PluginLoader::mhapluginloader_t** *> **algos**
- **MHAParser::parser_t** & **parser**
- **algo_comm_t** **ac**
- std::string **chain**
- **MHAParser::parser_t** **profiling**
- **MHAParser::vstring_mon_t** **prof_algos**
- **MHAParser::vfloat_mon_t** **prof_init**
- **MHAParser::vfloat_mon_t** **prof_prepare**
- **MHAParser::vfloat_mon_t** **prof_release**
- **MHAParser::vfloat_mon_t** **prof_process**
- **MHAParser::float_mon_t** **prof_process_tt**
- **MHAParser::vfloat_mon_t** **prof_process_load**
- unsigned int **proc_cnt**
- **mhaconfig_t** **prof_cfg**
- **MHAEvents::connector_t**< **mhachain::plugs_t** > **prof_load_con**
- **MHAEvents::connector_t**< **mhachain::plugs_t** > **prof_tt_con**
- bool **b_use_profiling**
- **mha_platform_tictoc_t** **tictoc**

4.206.1 Constructor & Destructor Documentation

4.206.1.1 plugs_t()

```
mhachain::plugs_t::plugs_t (
    std::vector< std::string > algos,
    mhaconfig_t cfin,
    mhaconfig_t cfout,
    bool do_prepare,
    MHAParser::parser_t & p,
    algo_comm_t iac,
    std::string ichain,
    bool use_profiling )
```

4.206.1.2 ~plugs_t()

```
mhachain::plugs_t::~~plugs_t ( )
```

4.206.2 Member Function Documentation

4.206.2.1 prepare()

```
void mhachain::plugs_t::prepare (
    mhaconfig_t & tf )
```

4.206.2.2 release()

```
void mhachain::plugs_t::release (
    void )
```

4.206.2.3 process()

```
void mhachain::plugs_t::process (
    mha_wave_t * win,
    mha_spec_t * sin,
    mha_wave_t ** wout,
    mha_spec_t ** sout )
```

4.206.2.4 prepared()

```
bool mhachain::plugs_t::prepared ( ) const [inline]
```

4.206.2.5 alloc_plugs()

```
void mhachain::plugs_t::alloc_plugs (
    std::vector< std::string > algos ) [private]
```

4.206.2.6 cleanup_plugs()

```
void mhachain::plugs_t::cleanup_plugs ( ) [private]
```

4.206.2.7 update_proc_load()

```
void mhachain::plugs_t::update_proc_load ( ) [private]
```

4.206.3 Member Data Documentation

4.206.3.1 b_prepared

```
bool mhachain::plugs_t::b_prepared [private]
```

4.206.3.2 algos

```
std::vector< PluginLoader::mhapluginloader_t* > mhachain::plugs_t::algos [private]
```

4.206.3.3 parser

```
MHAParser::parser_t& mhachain::plugs_t::parser [private]
```

4.206.3.4 ac

`algo_comm_t mhachain::plugs_t::ac [private]`

4.206.3.5 chain

`std::string mhachain::plugs_t::chain [private]`

4.206.3.6 profiling

`MHAParser::parser_t mhachain::plugs_t::profiling [private]`

4.206.3.7 prof_algos

`MHAParser::vstring_mon_t mhachain::plugs_t::prof_algos [private]`

4.206.3.8 prof_init

`MHAParser::vfloat_mon_t mhachain::plugs_t::prof_init [private]`

4.206.3.9 prof_prepare

`MHAParser::vfloat_mon_t mhachain::plugs_t::prof_prepare [private]`

4.206.3.10 prof_release

`MHAParser::vfloat_mon_t mhachain::plugs_t::prof_release [private]`

4.206.3.11 prof_process

`MHAParser::vfloat_mon_t mhachain::plugs_t::prof_process [private]`

4.206.3.12 prof_process_tt

MHAParser::float_mon_t mhachain::plugs_t::prof_process_tt [private]

4.206.3.13 prof_process_load

MHAParser::vfloat_mon_t mhachain::plugs_t::prof_process_load [private]

4.206.3.14 proc_cnt

unsigned int mhachain::plugs_t::proc_cnt [private]

4.206.3.15 prof_cfg

mhaconfig_t mhachain::plugs_t::prof_cfg [private]

4.206.3.16 prof_load_con

MHAEvents::connector_t< **mhachain::plugs_t**> mhachain::plugs_t::prof_load_con [private]

4.206.3.17 prof_tt_con

MHAEvents::connector_t< **mhachain::plugs_t**> mhachain::plugs_t::prof_tt_con [private]

4.206.3.18 b_use_profiling

bool mhachain::plugs_t::b_use_profiling [private]

4.206.3.19 tictoc

```
mha_platform_tictoc_t mhachain::plugins_t::tictoc [private]
```

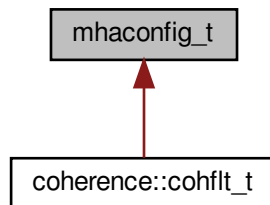
The documentation for this class was generated from the following files:

- **mha_generic_chain.h**
- **mha_generic_chain.cpp**

4.207 mhaconfig_t Struct Reference

MHA prepare configuration structure.

Inheritance diagram for mhaconfig_t:



Public Attributes

- unsigned int **channels**
Number of audio channels.
- unsigned int **domain**
Signal domain (MHA_WAVEFORM or MHA_SPECTRUM)
- unsigned int **fragsize**
Fragment size of waveform data.
- unsigned int **wndlen**
Window length of spectral data.
- unsigned int **ftflen**
FFT length of spectral data.
- **mha_real_t srate**
Sampling rate in Hz.

4.207.1 Detailed Description

MHA prepare configuration structure.

This structure contains information about channel number and domain for input and output signals of a openMHA Plugin. Each plugin can change any of these parameters, e.g. by resampling of the signal. The only limitation is that the callback frequency is fixed (except for the plugins `db` and `dbasync`).

4.207.2 Member Data Documentation

4.207.2.1 channels

```
unsigned int mhaconfig_t::channels
```

Number of audio channels.

4.207.2.2 domain

```
unsigned int mhaconfig_t::domain
```

Signal domain (MHA_WAVEFORM or MHA_SPECTRUM)

4.207.2.3 fragsize

```
unsigned int mhaconfig_t::fragsize
```

Fragment size of waveform data.

4.207.2.4 wndlen

```
unsigned int mhaconfig_t::wndlen
```

Window length of spectral data.

4.207.2.5 fftlen

```
unsigned int mhaconfig_t::fftlen
```

FFT length of spectral data.

4.207.2.6 srate

```
mha_real_t mhaconfig_t::srate
```

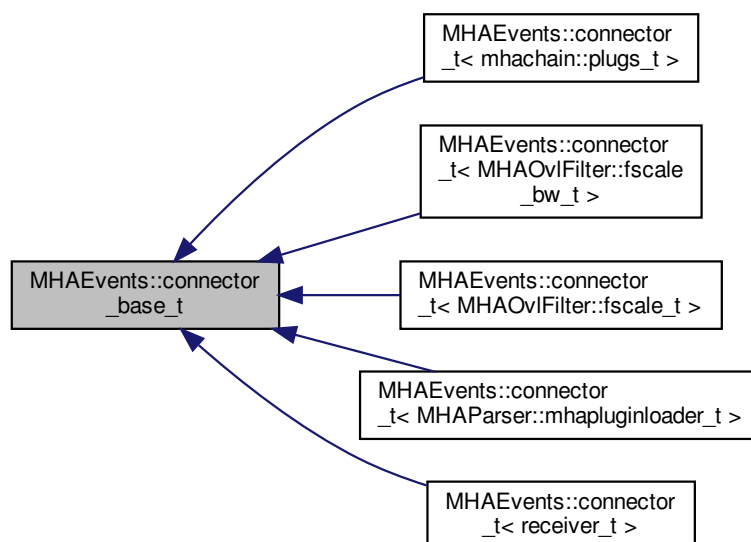
Sampling rate in Hz.

The documentation for this struct was generated from the following file:

- **mha.hh**

4.208 MHAEvents::connector_base_t Class Reference

Inheritance diagram for MHAEvents::connector_base_t:



Public Member Functions

- **connector_base_t** ()
- virtual **~connector_base_t** ()
- virtual void **emit_event** ()
- virtual void **emit_event** (const std::string &)
- virtual void **emit_event** (const std::string &, unsigned int, unsigned int)
- void **emitter_die** ()

Protected Attributes

- bool **emitter_is_alive**

4.208.1 Constructor & Destructor Documentation

4.208.1.1 connector_base_t()

MHAEvents::connector_base_t::connector_base_t ()

4.208.1.2 ~connector_base_t()

MHAEvents::connector_base_t::~~connector_base_t () [virtual]

4.208.2 Member Function Documentation

4.208.2.1 emit_event() [1/3]

void MHAEvents::connector_base_t::emit_event () [virtual]

Reimplemented in **MHAEvents::connector_t< receiver_t >** (p. 798), **MHAEvents::connector_t< MHAOvfFilter::fscale_bw_t >** (p. 798), **MHAEvents::connector_t< MHAPluginloader_t >** (p. 798), **MHAEvents::connector_t< mhachain::plugs_t >** (p. 798), and **MHAEvents::connector_t< MHAOvfFilter::fscale_t >** (p. 798).

4.208.2.2 emit_event() [2/3]

```
void MHAEvents::connector_base_t::emit_event (
    const std::string & ) [virtual]
```

Reimplemented in **MHAEvents::connector_t< receiver_t >** (p. 798), **MHAEvents::connector_t< MHAOvfFilter::fscale_bw_t >** (p. 798), **MHAEvents::connector_t< MHAParser::mhapluginloader_t >** (p. 798), **MHAEvents::connector_t< mhachain::plugs_t >** (p. 798), and **MHAEvents::connector_t< MHAOvfFilter::fscale_t >** (p. 798).

4.208.2.3 emit_event() [3/3]

```
void MHAEvents::connector_base_t::emit_event (
    const std::string & ,
    unsigned int ,
    unsigned int ) [virtual]
```

Reimplemented in **MHAEvents::connector_t< receiver_t >** (p. 799), **MHAEvents::connector_t< MHAOvfFilter::fscale_bw_t >** (p. 799), **MHAEvents::connector_t< MHAParser::mhapluginloader_t >** (p. 799), **MHAEvents::connector_t< mhachain::plugs_t >** (p. 799), and **MHAEvents::connector_t< MHAOvfFilter::fscale_t >** (p. 799).

4.208.2.4 emitter_die()

```
void MHAEvents::connector_base_t::emitter_die ( )
```

4.208.3 Member Data Documentation

4.208.3.1 emitter_is_alive

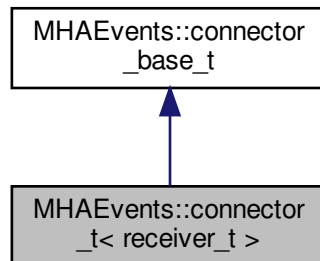
```
bool MHAEvents::connector_base_t::emitter_is_alive [protected]
```

The documentation for this class was generated from the following files:

- **mha_event_emitter.h**
- **mha_events.cpp**

4.209 MHAEvents::connector_t< receiver_t > Class Template Reference

Inheritance diagram for MHAEvents::connector_t< receiver_t >:



Public Member Functions

- **connector_t** (**emitter_t** *, receiver_t *, void(receiver_t::*)())
- **connector_t** (**emitter_t** *, receiver_t *, void(receiver_t::*)(const std::string &))
- **connector_t** (**emitter_t** *, receiver_t *, void(receiver_t::*)(const std::string &, unsigned int, unsigned int))
- ~**connector_t** ()

Private Member Functions

- void **emit_event** ()
- void **emit_event** (const std::string &)
- void **emit_event** (const std::string &, unsigned int, unsigned int)

Private Attributes

- **emitter_t** * **emitter**
- receiver_t * **receiver**
- void(receiver_t::* **eventhandler**)()
- void(receiver_t::* **eventhandler_s**)(const std::string &)
- void(receiver_t::* **eventhandler_suu**)(const std::string &, unsigned int, unsigned int)

Additional Inherited Members

4.209.1 Constructor & Destructor Documentation

4.209.1.1 connector_t() [1/3]

```
template<class receiver_t>
MHAEvents::connector_t< receiver_t >:: connector_t (
    emitter_t * e,
    receiver_t * r,
    void(receiver_t::*) () rfunc )
```

4.209.1.2 connector_t() [2/3]

```
template<class receiver_t>
MHAEvents::connector_t< receiver_t >:: connector_t (
    emitter_t * e,
    receiver_t * r,
    void(receiver_t::*) (const std::string &) rfunc )
```

4.209.1.3 connector_t() [3/3]

```
template<class receiver_t>
MHAEvents::connector_t< receiver_t >:: connector_t (
    emitter_t * e,
    receiver_t * r,
    void(receiver_t::*) (const std::string &, unsigned int, unsigned int)
    rfunc )
```

4.209.1.4 ~connector_t()

```
template<class receiver_t >
MHAEvents::connector_t< receiver_t >::~~ connector_t ( )
```

4.209.2 Member Function Documentation**4.209.2.1 emit_event()** [1/3]

```
template<class receiver_t >
void MHAEvents::connector_t< receiver_t >::emit_event ( ) [private], [virtual]
```

Reimplemented from **MHAEvents::connector_base_t** (p. [795](#)).

4.209.2.2 emit_event() [2/3]

```
template<class receiver_t >
void MHAEvents::connector_t< receiver_t >::emit_event (
    const std::string & arg ) [private], [virtual]
```

Reimplemented from **MHAEvents::connector_base_t** (p. [795](#)).

4.209.2.3 emit_event() [3/3]

```
template<class receiver_t >
void MHAEvents::connector_t< receiver_t >::emit_event (
    const std::string & arg,
    unsigned int arg2,
    unsigned int arg3 ) [private], [virtual]
```

Reimplemented from **MHAEvents::connector_base_t** (p. [796](#)).

4.209.3 Member Data Documentation

4.209.3.1 emitter

```
template<class receiver_t>
emitter_t* MHAEvents::connector_t< receiver_t >::emitter [private]
```

4.209.3.2 receiver

```
template<class receiver_t>
receiver_t* MHAEvents::connector_t< receiver_t >::receiver [private]
```

4.209.3.3 eventhandler

```
template<class receiver_t>
void(receiver_t::* MHAEvents::connector_t< receiver_t >::eventhandler) () [private]
```

4.209.3.4 eventhandler_s

```
template<class receiver_t>
void(receiver_t::* MHAEvents::connector_t< receiver_t >::eventhandler_s) (const
std::string &) [private]
```

4.209.3.5 eventhandler_suu

```
template<class receiver_t>
void(receiver_t::* MHAEvents::connector_t< receiver_t >::eventhandler_suu) (const
std::string &, unsigned int, unsigned int) [private]
```

The documentation for this class was generated from the following file:

- **mha_events.h**

4.210 MHAEvents::emitter_t Class Reference

Class for emitting openMHA events.

Public Member Functions

- **~emitter_t** ()
- void **operator()** ()
Emit an event without parameter.
- void **operator()** (const std::string &)
Emit an event with string parameter.
- void **operator()** (const std::string &, unsigned int, unsigned int)
Emit an event with string parameter and two unsigned int parameters.
- void **connect** (**connector_base_t** *)
- void **disconnect** (**connector_base_t** *)

Private Attributes

- std::list< **connector_base_t** * > **connections**

4.210.1 Detailed Description

Class for emitting openMHA events.

Use the template class **MHAEvents::patchbay_t** (p. [802](#)) for connecting to an emitter.

4.210.2 Constructor & Destructor Documentation

4.210.2.1 ~emitter_t()

```
MHAEvents::emitter_t::~~emitter_t ( )
```

4.210.3 Member Function Documentation

4.210.3.1 operator() [1/3]

```
void MHAEvents::emitter_t::operator() ( )
```

Emit an event without parameter.

4.210.3.2 operator() [2/3]

```
void MHAEvents::emitter_t::operator() (
    const std::string & arg )
```

Emit an event with string parameter.

4.210.3.3 operator() [3/3]

```
void MHAEvents::emitter_t::operator() (
    const std::string & arg,
    unsigned int arg2,
    unsigned int arg3 )
```

Emit an event with string parameter and two unsigned int parameters.

4.210.3.4 connect()

```
void MHAEvents::emitter_t::connect (
    connector_base_t * c )
```

4.210.3.5 disconnect()

```
void MHAEvents::emitter_t::disconnect (
    connector_base_t * c )
```

4.210.4 Member Data Documentation

4.210.4.1 connections

```
std::list< connector_base_t*> MHAEvents::emitter_t::connections [private]
```

The documentation for this class was generated from the following files:

- **mha_event_emitter.h**
- **mha_events.cpp**

4.211 MHAEvents::patchbay_t< receiver_t > Class Template Reference

Patchbay which connects any event emitter with any member function of the parameter class.

Public Member Functions

- **~patchbay_t ()**
- void **connect** (**emitter_t** *, receiver_t *, void(receiver_t::*)())
Connect a receiver member function void (receiver_t::)() with an event emitter.*
- void **connect** (**emitter_t** *, receiver_t *, void(receiver_t::*)(const std::string &))
Connect a receiver member function void (receiver_t::)(const std::string&) with an event emitter.*
- void **connect** (**emitter_t** *, receiver_t *, void(receiver_t::*)(const std::string &, unsigned int, unsigned int))

Private Attributes

- std::list< **connector_t**< receiver_t > * > **cons**

4.211.1 Detailed Description

```
template<class receiver_t>
class MHAEvents::patchbay_t< receiver_t >
```

Patchbay which connects any event emitter with any member function of the parameter class.

The connections created by the **connect()** (p. 803) function are hold until the destructor is called. To avoid access to invalid function pointers, it is required to destruct the patchbay before the receiver, usually by declaring the patchbay as a member of the receiver.

The receiver can be any class or structure; the event callback can be either a member function without arguments or with const std::string& argument.

4.211.2 Constructor & Destructor Documentation

4.211.2.1 ~patchbay_t()

```
template<class receiver_t >
MHAEvents::patchbay_t< receiver_t >::~~ patchbay_t ( )
```

4.211.3 Member Function Documentation

4.211.3.1 connect() [1/3]

```
template<class receiver_t>
void MHAEvents::patchbay_t< receiver_t >::connect (
    emitter_t * e,
    receiver_t * r,
    void(receiver_t::*)() rfun )
```

Connect a receiver member function void (receiver_t::*)() with an event emitter.

Create a connection.

The connection is removed when the patchbay is destructed.

Parameters

<i>e</i>	Pointer to an event emitter
<i>r</i>	Pointer to the receiver
<i>rfun</i>	Pointer to a member function of the receiver class

4.211.3.2 connect() [2/3]

```
template<class receiver_t>
void MHAEvents::patchbay_t< receiver_t >::connect (
    emitter_t * e,
    receiver_t * r,
    void(receiver_t::*)(const std::string &) rfun )
```

Connect a receiver member function void (receiver_t::*)(const std::string&) with an event emitter.

Create a connection.

The connection is removed when the patchbay is destructed.

Parameters

<i>e</i>	Pointer to an event emitter
<i>r</i>	Pointer to the receiver
<i>rfun</i>	Pointer to a member function of the receiver class

4.211.3.3 connect() [3/3]

```
template<class receiver_t>
void MHAEvents::patchbay_t< receiver_t >::connect (
    emitter_t * e,
    receiver_t * r,
    void(receiver_t::*)(const std::string &, unsigned int, unsigned int)
    rfun )
```

4.211.4 Member Data Documentation

4.211.4.1 cons

```
template<class receiver_t>
std::list< connector_t<receiver_t>*> MHAEvents::patchbay_t< receiver_t >::cons
[private]
```

The documentation for this class was generated from the following file:

- mha_events.h

4.212 MHAFilter::adapt_filter_param_t Class Reference

Public Member Functions

- **adapt_filter_param_t** (**mha_real_t** imu, bool ierr_in)

Public Attributes

- **mha_real_t** mu
- bool **err_in**

4.212.1 Constructor & Destructor Documentation

4.212.1.1 adapt_filter_param_t()

```
MHAFilter::adapt_filter_param_t::adapt_filter_param_t (  
    mha_real_t imu,  
    bool ierr_in )
```

4.212.2 Member Data Documentation

4.212.2.1 mu

```
mha_real_t MHAFilter::adapt_filter_param_t::mu
```

4.212.2.2 err_in

```
bool MHAFilter::adapt_filter_param_t::err_in
```

The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.213 MHAFilter::adapt_filter_state_t Class Reference

Public Member Functions

- **adapt_filter_state_t** (int **ntaps**, int **nchannels**)
- void **filter** (**mha_wave_t** y, **mha_wave_t** e, **mha_wave_t** x, **mha_wave_t** d, **mha_**↔
real_t mu, bool err_in)

Private Attributes

- int **ntaps**
- int **nchannels**
- **MHASignal::waveform_t** W
- **MHASignal::waveform_t** X
- **MHASignal::waveform_t** od
- **MHASignal::waveform_t** oy

4.213.1 Constructor & Destructor Documentation

4.213.1.1 adapt_filter_state_t()

```
MHAFilter::adapt_filter_state_t::adapt_filter_state_t (
    int ntaps,
    int nchannels )
```

4.213.2 Member Function Documentation

4.213.2.1 filter()

```
void MHAFilter::adapt_filter_state_t::filter (
    mha_wave_t y,
    mha_wave_t e,
    mha_wave_t x,
    mha_wave_t d,
    mha_real_t mu,
    bool err_in )
```

4.213.3 Member Data Documentation

4.213.3.1 ntaps

`int MHAFilter::adapt_filter_state_t::ntaps [private]`

4.213.3.2 nchannels

`int MHAFilter::adapt_filter_state_t::nchannels [private]`

4.213.3.3 W

`MHASignal::waveform_t MHAFilter::adapt_filter_state_t::W [private]`

4.213.3.4 X

`MHASignal::waveform_t MHAFilter::adapt_filter_state_t::X [private]`

4.213.3.5 od

`MHASignal::waveform_t MHAFilter::adapt_filter_state_t::od [private]`

4.213.3.6 oy

`MHASignal::waveform_t MHAFilter::adapt_filter_state_t::oy [private]`

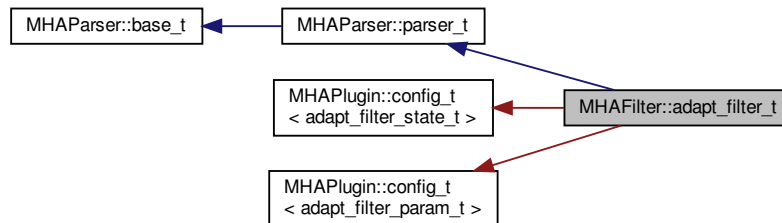
The documentation for this class was generated from the following files:

- `mha_filter.hh`
- `mha_filter.cpp`

4.214 MHAFilter::adapt_filter_t Class Reference

Adaptive filter.

Inheritance diagram for MHAFilter::adapt_filter_t:



Public Member Functions

- **adapt_filter_t** (std::string)
- void **filter** (mha_wave_t y, mha_wave_t e, mha_wave_t x, mha_wave_t d)
- void **set_channelcnt** (unsigned int)

Private Member Functions

- void **update_mu** ()
- void **update_ntaps** ()

Private Attributes

- MHAFilter::float_t **mu**
- MHAFilter::int_t **ntaps**
- MHAFilter::bool_t **err_in**
- MHAEvents::patchbay_t< adapt_filter_t > **connector**
- unsigned int **nchannels**

Additional Inherited Members

4.214.1 Detailed Description

Adaptive filter.

4.214.2 Constructor & Destructor Documentation

4.214.2.1 adapt_filter_t()

```
MHAFilter::adapt_filter_t::adapt_filter_t (  
    std::string help )
```

4.214.3 Member Function Documentation

4.214.3.1 filter()

```
void MHAFilter::adapt_filter_t::filter (  
    mha_wave_t y,  
    mha_wave_t e,  
    mha_wave_t x,  
    mha_wave_t d )
```

4.214.3.2 set_channelcnt()

```
void MHAFilter::adapt_filter_t::set_channelcnt (  
    unsigned int nch )
```

4.214.3.3 update_mu()

```
void MHAFilter::adapt_filter_t::update_mu ( ) [private]
```

4.214.3.4 update_ntaps()

```
void MHAFilter::adapt_filter_t::update_ntaps ( ) [private]
```

4.214.4 Member Data Documentation

4.214.4.1 mu

```
MHAParser::float_t MHAFilter::adapt_filter_t::mu [private]
```

4.214.4.2 ntabs

```
MHAParser::int_t MHAFilter::adapt_filter_t::ntaps [private]
```

4.214.4.3 err_in

```
MHAParser::bool_t MHAFilter::adapt_filter_t::err_in [private]
```

4.214.4.4 connector

```
MHAEvents::patchbay_t< adapt_filter_t> MHAFilter::adapt_filter_t::connector [private]
```

4.214.4.5 nchannels

```
unsigned int MHAFilter::adapt_filter_t::nchannels [private]
```

The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.215 MHAFilter::blockprocessing_polyphase_resampling_t Class Reference

A class that does polyphase resampling and takes into account block processing.

Public Member Functions

- **blockprocessing_polyphase_resampling_t** (float source_srate, unsigned source_fragsize, float target_srate, unsigned target_fragsize, float nyquist_ratio, float irslen, unsigned nchannels, bool add_delay)
Constructs a polyphase resampling filter that can be used for blockprocessing with the given parameters.
- virtual **~blockprocessing_polyphase_resampling_t** ()
- void **write** (**mha_wave_t** &signal)
Write signal to the ringbuffer.
- void **read** (**mha_wave_t** &signal)
Read resampled signal.
- bool **can_read** () const
Checks if the resampling ring buffer can produce another output signal block.

Private Attributes

- **polyphase_resampling_t * resampling**
- unsigned **fragsize_in**
- unsigned **fragsize_out**
- unsigned **num_channels**

4.215.1 Detailed Description

A class that does polyphase resampling and takes into account block processing.

4.215.2 Constructor & Destructor Documentation

4.215.2.1 blockprocessing_polyphase_resampling_t()

```
MHAFilter::blockprocessing_polyphase_resampling_t::blockprocessing_polyphase_resampling_t (
    float source_srate,
    unsigned source_frgsize,
    float target_srate,
    unsigned target_frgsize,
    float nyquist_ratio,
    float irslen,
    unsigned nchannels,
    bool add_delay )
```

Contructs a polyphase resampling filter that can be used for blockprocessing with the given parameters.

Parameters

<i>source_srate</i>	Source sampling rate / Hz
<i>source_frgsize</i>	Fragment size of incoming audio blocks / frames at source_srate
<i>target_srate</i>	Target sampling rate / Hz
<i>target_frgsize</i>	Fragment size of produced audio blocks / frames at target_srate
<i>nyquist_ratio</i>	Low pass filter cutoff frequency relative to the nyquist frequency of the smaller of the two sampling rates. Example values: 0.8, 0.9
<i>irslen</i>	Impulse response length used for low pass filtering / s
<i>nchannels</i>	Number of audio channels
<i>add_delay</i>	To avoid underruns, a delay is generally necessary for round trip block size adaptations. It is only necessary to add this delay to one of the two resampling chains. Set this parameter to true for the first resampling object of a round trip pair. It will add the necessary delay, and calculate the size of the ring buffer appropriately, When set to false, only the ringbuffer size will be set sufficiently.

4.215.2.2 ~blockprocessing_polyphase_resampling_t()

```
virtual MHAFilter::blockprocessing_polyphase_resampling_t::~blockprocessing_polyphase_resampling_t ( ) [inline], [virtual]
```

4.215.3 Member Function Documentation

4.215.3.1 write()

```
void MHAFilter::blockprocessing_polyphase_resampling_t::write (
    mha_wave_t & signal )
```

Write signal to the ringbuffer.

Parameters

<i>signal</i>	input signal in original sampling rate
---------------	--

Exceptions

<i>MHA_Error</i> (p. 707)	Raises exception if there is not enough room, if the number of channels does not match, or if the number of frames is not equal to the number specified in the constructor
----------------------------------	--

4.215.3.2 read()

```
void MHAFilter::blockprocessing_polyphase_resampling_t::read (
    mha_wave_t & signal )
```

Read resampled signal.

Will perform the resampling and remove no longer needed samples from the input buffer.

Parameters

<i>signal</i>	buffer to write the resampled signal to.
---------------	--

Exceptions

<i>MHA_Error</i> (p. 707)	Raises exception if there is not enough input signal, if the number of channels of frames does not match.
---	---

4.215.3.3 can_read()

```
bool MHAFilter::blockprocessing_polyphase_resampling_t::can_read ( ) const [inline]
```

Checks if the resampling ring buffer can produce another output signal block.

4.215.4 Member Data Documentation

4.215.4.1 resampling

```
polyphase_resampling_t* MHAFilter::blockprocessing_polyphase_resampling_t::resampling  
[private]
```

4.215.4.2 fragsize_in

```
unsigned MHAFilter::blockprocessing_polyphase_resampling_t::fragsize_in [private]
```

4.215.4.3 fragsize_out

```
unsigned MHAFilter::blockprocessing_polyphase_resampling_t::fragsize_out [private]
```

4.215.4.4 num_channels

```
unsigned MHAFilter::blockprocessing_polyphase_resampling_t::num_channels [private]
```

The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.216 MHAFilter::complex_bandpass_t Class Reference

Complex bandpass filter.

Public Member Functions

- **complex_bandpass_t** (std::vector< **mha_complex_t** > A, std::vector< **mha_↵
complex_t** > B)
Constructor with filter coefficients (one per channel)
- void **set_state** (**mha_real_t** val)
- void **set_state** (std::vector< **mha_real_t** > val)
- void **set_state** (**mha_complex_t** val)
- void **set_weights** (std::vector< **mha_complex_t** > new_B)
Allow to modify the input weights at a later stage.
- std::vector< **mha_complex_t** > **get_weights** () const
- void **filter** (const **mha_wave_t** &X, **mha_spec_t** &Y)
Filter method for real value input.
- void **filter** (const **mha_wave_t** &X, **mha_wave_t** &Yre, **mha_wave_t** &Yim)
Filter method for real value input.
- void **filter** (const **mha_spec_t** &X, **mha_spec_t** &Y)
Filter method for complex value input.
- void **filter** (const **mha_wave_t** &Xre, const **mha_wave_t** &Xim, **mha_wave_t** &Yre, **mha_wave_t** &Yim)
Filter method for complex value input.
- std::string **inspect** () const

Static Public Member Functions

- static std::vector< **mha_complex_t** > **creator_A** (std::vector< **mha_real_t** > cf, std↵
::vector< **mha_real_t** > bw, **mha_real_t** srate, unsigned int order)
- static std::vector< **mha_complex_t** > **creator_B** (std::vector< **mha_complex_t** > A, unsigned int order)

Private Attributes

- std::vector< **mha_complex_t** > **A_**
- std::vector< **mha_complex_t** > **B_**
- std::vector< **mha_complex_t** > **Yn**

4.216.1 Detailed Description

Complex bandpass filter.

4.216.2 Constructor & Destructor Documentation

4.216.2.1 complex_bandpass_t()

```
MHAFilter::complex_bandpass_t::complex_bandpass_t (
    std::vector< mha_complex_t > A,
    std::vector< mha_complex_t > B )
```

Constructor with filter coefficients (one per channel)

Parameters

<i>A</i>	complex filter coefficients, one per band
<i>B</i>	complex weights

4.216.3 Member Function Documentation

4.216.3.1 creator_A()

```
std::vector< mha_complex_t > MHAFilter::complex_bandpass_t::creator_A (
    std::vector< mha_real_t > cf,
    std::vector< mha_real_t > bw,
    mha_real_t srate,
    unsigned int order ) [static]
```

4.216.3.2 creator_B()

```
std::vector< mha_complex_t > MHAFilter::complex_bandpass_t::creator_B (
    std::vector< mha_complex_t > A,
    unsigned int order ) [static]
```

4.216.3.3 set_state() [1/3]

```
void MHAFilter::complex_bandpass_t::set_state (
    mha_real_t val )
```

4.216.3.4 set_state() [2/3]

```
void MHAFilter::complex_bandpass_t::set_state (
    std::vector< mha_real_t > val )
```

4.216.3.5 set_state() [3/3]

```
void MHAFilter::complex_bandpass_t::set_state (
    mha_complex_t val )
```

4.216.3.6 set_weights()

```
void MHAFilter::complex_bandpass_t::set_weights (
    std::vector< mha_complex_t > new_B )
```

Allow to modify the input weights at a later stage.

4.216.3.7 get_weights()

```
std::vector< mha_complex_t> MHAFilter::complex_bandpass_t::get_weights ( ) const
[inline]
```

4.216.3.8 filter() [1/4]

```
void MHAFilter::complex_bandpass_t::filter (
    const mha_wave_t & X,
    mha_spec_t & Y ) [inline]
```

Filter method for real value input.

4.216.3.9 filter() [2/4]

```
void MHAFilter::complex_bandpass_t::filter (
    const mha_wave_t & X,
    mha_wave_t & Yre,
    mha_wave_t & Yim ) [inline]
```

Filter method for real value input.

4.216.3.10 filter() [3/4]

```
void MHAFilter::complex_bandpass_t::filter (
    const mha_spec_t & X,
    mha_spec_t & Y ) [inline]
```

Filter method for complex value input.

4.216.3.11 filter() [4/4]

```
void MHAFilter::complex_bandpass_t::filter (
    const mha_wave_t & Xre,
    const mha_wave_t & Xim,
    mha_wave_t & Yre,
    mha_wave_t & Yim ) [inline]
```

Filter method for complex value input.

4.216.3.12 inspect()

```
std::string MHAFilter::complex_bandpass_t::inspect ( ) const [inline]
```

4.216.4 Member Data Documentation

4.216.4.1 A_

```
std::vector< mha_complex_t> MHAFilter::complex_bandpass_t::A_ [private]
```

4.216.4.2 B_

```
std::vector< mha_complex_t> MHAFilter::complex_bandpass_t::B_ [private]
```

4.216.4.3 Yn

```
std::vector< mha_complex_t> MHAFilter::complex_bandpass_t::Yn [private]
```

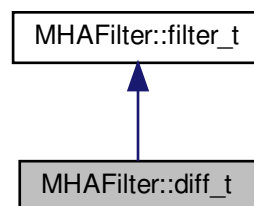
The documentation for this class was generated from the following files:

- **complex_filter.h**
- **complex_filter.cpp**

4.217 MHAFilter::diff_t Class Reference

Differentiator class (non-normalized)

Inheritance diagram for MHAFilter::diff_t:



Public Member Functions

- **diff_t** (unsigned int ch)

Additional Inherited Members

4.217.1 Detailed Description

Differentiator class (non-normalized)

4.217.2 Constructor & Destructor Documentation

4.217.2.1 diff_t()

```
MHAFilter::diff_t::diff_t (
    unsigned int ch )
```

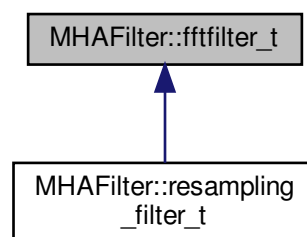
The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.218 MHAFilter::fftfilter_t Class Reference

FFT based FIR filter implementation.

Inheritance diagram for MHAFilter::fftfilter_t:



Public Member Functions

- **fftfilter_t** (unsigned int **fragsize**, unsigned int **channels**, unsigned int **ftlen**)
Constructor.
- **~fftfilter_t** ()
- void **update_coeffs** (const **mha_wave_t** *pwIRS)
Update the set of coefficients.
- void **filter** (const **mha_wave_t** *pwIn, **mha_wave_t** **ppwOut, const **mha_wave_t** *pwIRS)
Apply filter with changing coefficients to a waveform fragment.
- void **filter** (const **mha_wave_t** *pwIn, **mha_wave_t** **ppwOut)
Apply filter to waveform fragment, without changing the coefficients.
- void **filter** (const **mha_wave_t** *pwIn, **mha_wave_t** **ppwOut, const **mha_spec_t** *psWeights)
Apply filter with changing coefficients to a waveform fragment.

Private Attributes

- unsigned int **fragsize**
- unsigned int **channels**
- unsigned int **fftlen**
- **MHASignal::waveform_t** **wInput_fft**
- **mha_wave_t** **wInput**
- **MHASignal::waveform_t** **wOutput_fft**
- **mha_wave_t** **wOutput**
- **MHASignal::spectrum_t** **sInput**
- **MHASignal::spectrum_t** **sWeights**
- **MHASignal::waveform_t** **wIRS_fft**
- **mha_fft_t** **fft**

4.218.1 Detailed Description

FFT based FIR filter implementation.

The maximal number of coefficients can be FFT length - fragsize + 1.

4.218.2 Constructor & Destructor Documentation

4.218.2.1 `fftfilter_t()`

```
MHAFilter::fftfilter_t::fftfilter_t (
    unsigned int fragsize,
    unsigned int channels,
    unsigned int fftlen )
```

Constructor.

Parameters

<i>fragsize</i>	Number of frames expected in input signal (each cycle).
<i>channels</i>	Number of channels expected in input signal.
<i>fftlen</i>	FFT length of filter.

4.218.2.2 `~fftfilter_t()`

```
MHAFilter::fftfilter_t::~~fftfilter_t ( )
```

4.218.3 Member Function Documentation

4.218.3.1 update_coeffs()

```
void MHAFilter::fftfilter_t::update_coeffs (
    const mha_wave_t * pwIRS )
```

Update the set of coefficients.

Parameters

<i>pwIRS</i>	Coefficients structure
--------------	------------------------

Note

The number of channels in h must match the number of channels given in the constructor.
The filter length is limited to fftlen-fragsize+1 (longer IRS will be shortened).

4.218.3.2 filter() [1/3]

```
void MHAFilter::fftfilter_t::filter (
    const mha_wave_t * pwIn,
    mha_wave_t ** ppwOut,
    const mha_wave_t * pwIRS )
```

Apply filter with changing coefficients to a waveform fragment.

Parameters

<i>pwIn</i>	Input signal pointer.
-------------	-----------------------

Return values

<i>ppwOut</i>	Pointer to output signal pointer, will be set to a valid signal.
---------------	--

Parameters

<i>pwIRS</i>	Pointer to FIR coefficients structure.
--------------	--

4.218.3.3 filter() [2/3]

```
void MHAFilter::fftfilter_t::filter (
    const  mha_wave_t * pwIn,
    mha_wave_t ** ppwOut )
```

Apply filter to waveform fragment, without changing the coefficients.

Parameters

<i>pwIn</i>	Input signal pointer.
-------------	-----------------------

Return values

<i>ppwOut</i>	Pointer to output signal pointer, will be set to a valid signal
---------------	---

4.218.3.4 filter() [3/3]

```
void MHAFilter::fftfilter_t::filter (
    const  mha_wave_t * pwIn,
    mha_wave_t ** ppwOut,
    const  mha_spec_t * psWeights )
```

Apply filter with changing coefficients to a waveform fragment.

Parameters

<i>pwIn</i>	Input signal pointer.
-------------	-----------------------

Return values

<i>ppwOut</i>	Pointer to output signal pointer, will be set to a valid signal.
---------------	--

Parameters

<i>psWeights</i>	Pointer to filter weights structure.
------------------	--------------------------------------

4.218.4 Member Data Documentation

4.218.4.1 fragsize

unsigned int MHAFilter::fftfilter_t::fragsize [private]

4.218.4.2 channels

unsigned int MHAFilter::fftfilter_t::channels [private]

4.218.4.3 fftlen

unsigned int MHAFilter::fftfilter_t::fftlen [private]

4.218.4.4 wInput_fft

MHASignal::waveform_t MHAFilter::fftfilter_t::wInput_fft [private]

4.218.4.5 wInput

mha_wave_t MHAFilter::fftfilter_t::wInput [private]

4.218.4.6 wOutput_fft

MHASignal::waveform_t MHAFilter::fftfilter_t::wOutput_fft [private]

4.218.4.7 wOutput

mha_wave_t MHAFilter::fftfilter_t::wOutput [private]

4.218.4.8 sInput

MHASignal::spectrum_t MHAFilter::fftfilter_t::sInput [private]

4.218.4.9 sWeights

MHASignal::spectrum_t MHAFilter::fftfilter_t::sWeights [private]

4.218.4.10 wIRS_fft

MHASignal::waveform_t MHAFilter::fftfilter_t::wIRS_fft [private]

4.218.4.11 fft

mha_fft_t MHAFilter::fftfilter_t::fft [private]

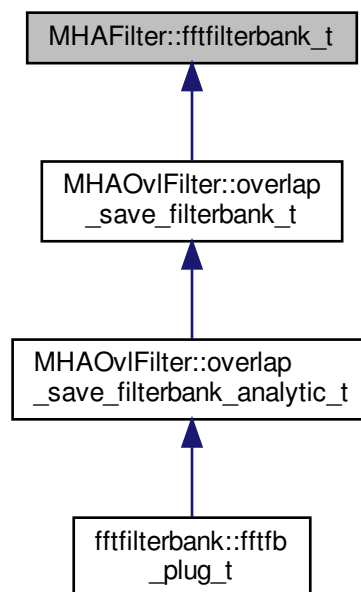
The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.219 MHAFilter::fftfilterbank_t Class Reference

FFT based FIR filterbank implementation.

Inheritance diagram for MHAFilter::fftfilterbank_t:



Public Member Functions

- **fftfilterbank_t** (unsigned int **fragsize**, unsigned int **inputchannels**, unsigned int **firchannels**, unsigned int **fftl**)
Constructor.
- **~fftfilterbank_t** ()
- void **update_coeffs** (const **mha_wave_t** *h)
Update the set of coefficients.
- void **filter** (const **mha_wave_t** *s_in, **mha_wave_t** **s_out, const **mha_wave_t** *h)
Apply filter with changing coefficients to a waveform fragment.
- void **filter** (const **mha_wave_t** *s_in, **mha_wave_t** **s_out)
Apply filter to waveform fragment, without changing the coefficients.
- const **mha_wave_t** * **get_irs** () const
Return the current IRS.

Private Attributes

- unsigned int **fragsize**
- unsigned int **inputchannels**
- unsigned int **firchannels**
- unsigned int **outputchannels**
- unsigned int **fftl**
- **MHASignal::waveform_t** hw
- **MHASignal::spectrum_t** Hs
- **MHASignal::waveform_t** xw
- **MHASignal::spectrum_t** Xs
- **MHASignal::waveform_t** yw
- **MHASignal::spectrum_t** Ys
- **MHASignal::waveform_t** yw_temp
- **MHASignal::waveform_t** tail
- **mha_fft_t** fft

4.219.1 Detailed Description

FFT based FIR filterbank implementation.

This class convolves n input channels with m filter coefficient sets and returns n*m output channels.

The maximal number of coefficients can be FFT length - fragsize + 1.

4.219.2 Constructor & Destructor Documentation

4.219.2.1 fftfilterbank_t()

```
MHAFilter::fftfilterbank_t::fftfilterbank_t (
    unsigned int fragsize,
    unsigned int inputchannels,
    unsigned int firchannels,
    unsigned int fftlen )
```

Constructor.

Parameters

<i>fragsize</i>	Number of frames expected in input signal (each cycle).
<i>inputchannels</i>	Number of channels expected in input signal.
<i>firchannels</i>	Number of channels expected in FIR filter coefficients (= number of bands).
<i>fftlen</i>	FFT length of filter.

The number of output channels is $\text{inputchannels} \times \text{firchannels}$.

4.219.2.2 ~fftfilterbank_t()

```
MHAFilter::fftfilterbank_t::~~fftfilterbank_t ( )
```

4.219.3 Member Function Documentation

4.219.3.1 update_coeffs()

```
void MHAFilter::fftfilterbank_t::update_coeffs (
    const mha_wave_t * h )
```

Update the set of coefficients.

Parameters

<i>h</i>	Coefficients structure
----------	------------------------

Note

The number of channels in *h* must match the number of channels given in the constructor, and the number of frames can not be more than $\text{fftlen} - \text{fragsize} + 1$.

4.219.3.2 filter() [1/2]

```
void MHAFilter::fftfilterbank_t::filter (
    const mha_wave_t * s_in,
    mha_wave_t ** s_out,
    const mha_wave_t * h )
```

Apply filter with changing coefficients to a waveform fragment.

Parameters

s_{in}	Input signal pointer.
----------	-----------------------

Return values

s_{out}	Pointer to output signal pointer, will be set to a valid signal
-----------	---

Parameters

h	FIR coefficients
-----	------------------

4.219.3.3 filter() [2/2]

```
void MHAFilter::fftfilterbank_t::filter (
    const mha_wave_t * s_in,
    mha_wave_t ** s_out )
```

Apply filter to waveform fragment, without changing the coefficients.

Parameters

s_{in}	Input signal pointer.
----------	-----------------------

Return values

s_{out}	Pointer to output signal pointer, will be set to a valid signal
-----------	---

4.219.3.4 get_irs()

```
const mha_wave_t* MHAFilter::fftfilterbank_t::get_irs ( ) const [inline]
```

Return the current IRS.

4.219.4 Member Data Documentation

4.219.4.1 fragsize

```
unsigned int MHAFilter::fftfilterbank_t::fragsize [private]
```

4.219.4.2 inputchannels

```
unsigned int MHAFilter::fftfilterbank_t::inputchannels [private]
```

4.219.4.3 firchannels

```
unsigned int MHAFilter::fftfilterbank_t::firchannels [private]
```

4.219.4.4 outputchannels

```
unsigned int MHAFilter::fftfilterbank_t::outputchannels [private]
```

4.219.4.5 fftlen

```
unsigned int MHAFilter::fftfilterbank_t::fftlen [private]
```

4.219.4.6 hw

```
MHASignal::waveform_t MHAFilter::fftfilterbank_t::hw [private]
```

4.219.4.7 Hs

```
MHASignal::spectrum_t MHAFilter::fftfilterbank_t::Hs [private]
```

4.219.4.8 xw

MHASignal::waveform_t MHAFilter::fftfilterbank_t::xw [private]

4.219.4.9 Xs

MHASignal::spectrum_t MHAFilter::fftfilterbank_t::Xs [private]

4.219.4.10 yw

MHASignal::waveform_t MHAFilter::fftfilterbank_t::yw [private]

4.219.4.11 Ys

MHASignal::spectrum_t MHAFilter::fftfilterbank_t::Ys [private]

4.219.4.12 yw_temp

MHASignal::waveform_t MHAFilter::fftfilterbank_t::yw_temp [private]

4.219.4.13 tail

MHASignal::waveform_t MHAFilter::fftfilterbank_t::tail [private]

4.219.4.14 fft

mha_fft_t MHAFilter::fftfilterbank_t::fft [private]

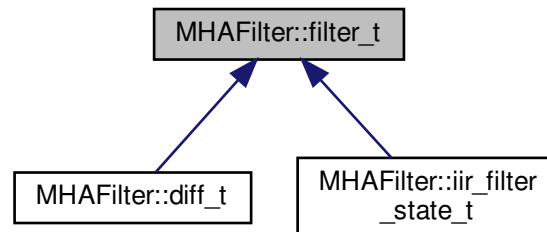
The documentation for this class was generated from the following files:

- mha_filter.hh
- mha_filter.cpp

4.220 MHAFilter::filter_t Class Reference

Generic IIR filter class.

Inheritance diagram for MHAFilter::filter_t:



Public Member Functions

- **filter_t** (unsigned int ch, unsigned int lena, unsigned int lenb)
Constructor.
- **filter_t** (unsigned int ch, const std::vector< **mha_real_t** > &vA, const std::vector< **mha_real_t** > &vB)
Constructor with initialization of coefficients.
- **filter_t** (const **MHAFilter::filter_t** &src)
- **~filter_t** ()
- void **filter** (**mha_wave_t** *out, const **mha_wave_t** *in)
Filter all channels in a waveform structure.
- void **filter** (**mha_real_t** *dest, const **mha_real_t** *src, unsigned int dframes, unsigned int frame_dist, unsigned int channel_dist, unsigned int channel_begin, unsigned int channel_end)
Filter parts of a waveform structure.
- **mha_real_t filter** (**mha_real_t** x, unsigned int ch)
Filter one sample.
- unsigned int **get_len_A** () const
Return length of recursive coefficients.
- unsigned int **get_len_B** () const
Return length of non-recursive coefficients.

Public Attributes

- double * **A**
Pointer to recursive coefficients.
- double * **B**
Pointer to non-recursive coefficients.

Private Attributes

- unsigned int **len_A**
- unsigned int **len_B**
- unsigned int **len**
- unsigned int **channels**
- double * **state**

4.220.1 Detailed Description

Generic IIR filter class.

This class implements a generic multichannel IIR filter. It is realized as direct form II. It can work on any float array or on **mha_wave_t** (p. 780) structs. The filter coefficients can be directly accessed.

4.220.2 Constructor & Destructor Documentation

4.220.2.1 filter_t() [1/3]

```
MHAFilter::filter_t::filter_t (
    unsigned int ch,
    unsigned int lena,
    unsigned int lenb )
```

Constructor.

Parameters

<i>ch</i>	Number of channels
<i>lena</i>	Number of recursive coefficients
<i>lenb</i>	Number of non-recursive coefficients

4.220.2.2 filter_t() [2/3]

```
MHAFilter::filter_t::filter_t (
    unsigned int ch,
    const std::vector< mha_real_t > & vA,
    const std::vector< mha_real_t > & vB )
```

Constructor with initialization of coefficients.

Parameters

<i>ch</i>	Number of channels.
<i>vA</i>	Recursive coefficients.
<i>vB</i>	Non-recursive coefficients.

4.220.2.3 filter_t() [3/3]

```
MHAFilter::filter_t::filter_t (
    const MHAFilter::filter_t & src )
```

4.220.2.4 ~filter_t()

```
MHAFilter::filter_t::~~filter_t ( )
```

4.220.3 Member Function Documentation**4.220.3.1 filter()** [1/3]

```
void MHAFilter::filter_t::filter (
    mha_wave_t * out,
    const mha_wave_t * in )
```

Filter all channels in a waveform structure.

Parameters

<i>out</i>	Output signal
<i>in</i>	Input signal

4.220.3.2 filter() [2/3]

```
void MHAFilter::filter_t::filter (
    mha_real_t * dest,
    const mha_real_t * src,
```

```

    unsigned int dframes,
    unsigned int frame_dist,
    unsigned int channel_dist,
    unsigned int channel_begin,
    unsigned int channel_end )

```

Filter parts of a waveform structure.

Parameters

<i>dest</i>	Output signal.
<i>src</i>	Input signal.
<i>dframes</i>	Number of frames to be filtered.
<i>frame_dist</i>	Index distance between frames of one channel
<i>channel_dist</i>	Index distance between audio channels
<i>channel_begin</i>	Number of first channel to be processed
<i>channel_end</i>	Number of last channel to be processed

4.220.3.3 filter() [3/3]

```

mha_real_t MHAFilter::filter_t::filter (
    mha_real_t x,
    unsigned int ch )

```

Filter one sample.

Parameters

<i>x</i>	Input value
<i>ch</i>	Channel number to use in filter state

4.220.3.4 get_len_A()

```

unsigned int MHAFilter::filter_t::get_len_A ( ) const [inline]

```

Return length of recursive coefficients.

4.220.3.5 get_len_B()

```

unsigned int MHAFilter::filter_t::get_len_B ( ) const [inline]

```

Return length of non-recursive coefficients.

4.220.4 Member Data Documentation

4.220.4.1 A

`double* MHAFilter::filter_t::A`

Pointer to recursive coefficients.

4.220.4.2 B

`double* MHAFilter::filter_t::B`

Pointer to non-recursive coefficients.

4.220.4.3 len_A

`unsigned int MHAFilter::filter_t::len_A [private]`

4.220.4.4 len_B

`unsigned int MHAFilter::filter_t::len_B [private]`

4.220.4.5 len

`unsigned int MHAFilter::filter_t::len [private]`

4.220.4.6 channels

`unsigned int MHAFilter::filter_t::channels [private]`

4.220.4.7 state

```
double* MHAFilter::filter_t::state [private]
```

The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.221 MHAFilter::gammaflt_t Class Reference

Class for gammatone filter.

Public Member Functions

- **gammaflt_t** (std::vector< **mha_real_t** > cf, std::vector< **mha_real_t** > bw, **mha_real_t** srate, unsigned int order)
Constructor.
- **~gammaflt_t** ()
- void **operator()** (**mha_wave_t** &X, **mha_spec_t** &Y)
Filter method.
- void **operator()** (**mha_wave_t** &X, **mha_wave_t** &Yre, **mha_wave_t** &Yim)
Filter method.
- void **operator()** (**mha_wave_t** &Yre, **mha_wave_t** &Yim, unsigned int stage)
Filter method for specific stage.
- void **phase_correction** (unsigned int desired_delay, unsigned int inchannels)
- void **set_weights** (std::vector< **mha_complex_t** > new_B)
- void **set_weights** (unsigned int stage, std::vector< **mha_complex_t** > new_B)
- std::vector< **mha_complex_t** > **get_weights** () const
- std::vector< **mha_complex_t** > **get_weights** (unsigned int stage) const
- std::vector< **mha_real_t** > **get_resynthesis_gain** () const
- void **reset_state** ()
- const std::vector< **mha_complex_t** > & **get_A** ()
- std::string **inspect** () const

Private Attributes

- std::vector< **mha_complex_t** > **A**
- std::vector< **complex_bandpass_t** > **GF**
- **MHASignal::delay_t** * **delay**
- std::vector< int > **envelope_delay**
- std::vector< **mha_real_t** > **resynthesis_gain**
- std::vector< **mha_real_t** > **cf_**
- std::vector< **mha_real_t** > **bw_**
- **mha_real_t** **srate_**

4.221.1 Detailed Description

Class for gammatone filter.

4.221.2 Constructor & Destructor Documentation

4.221.2.1 `gammaflt_t()`

```
MHAFilter::gammaflt_t::gammaflt_t (
    std::vector< mha_real_t > cf,
    std::vector< mha_real_t > bw,
    mha_real_t srates,
    unsigned int order )
```

Constructor.

Parameters

<i>cf</i>	Center frequency in Hz.
<i>bw</i>	Bandwidth in Hz (same number of entries as in cf).
<i>srates</i>	Sampling frequency in Hz.
<i>order</i>	Filter order.

4.221.2.2 `~gammaflt_t()`

```
MHAFilter::gammaflt_t::~~gammaflt_t ( )
```

4.221.3 Member Function Documentation

4.221.3.1 `operator()()` [1/3]

```
void MHAFilter::gammaflt_t::operator() (
    mha_wave_t & X,
    mha_spec_t & Y ) [inline]
```

Filter method.

4.221.3.2 operator() [2/3]

```
void MHAFilter::gammaflt_t::operator() (
    mha_wave_t & X,
    mha_wave_t & Yre,
    mha_wave_t & Yim ) [inline]
```

Filter method.

4.221.3.3 operator() [3/3]

```
void MHAFilter::gammaflt_t::operator() (
    mha_wave_t & Yre,
    mha_wave_t & Yim,
    unsigned int stage ) [inline]
```

Filter method for specific stage.

4.221.3.4 phase_correction()

```
void MHAFilter::gammaflt_t::phase_correction (
    unsigned int desired_delay,
    unsigned int inchannels )
```

4.221.3.5 set_weights() [1/2]

```
void MHAFilter::gammaflt_t::set_weights (
    std::vector< mha_complex_t > new_B )
```

4.221.3.6 set_weights() [2/2]

```
void MHAFilter::gammaflt_t::set_weights (
    unsigned int stage,
    std::vector< mha_complex_t > new_B )
```

4.221.3.7 get_weights() [1/2]

```
std::vector< mha_complex_t> MHAFilter::gammaflt_t::get_weights ( ) const [inline]
```

4.221.3.8 `get_weights()` [2/2]

```
std::vector< mha_complex_t> MHAFilter::gammaflt_t::get_weights (
    unsigned int stage ) const [inline]
```

4.221.3.9 `get_resynthesis_gain()`

```
std::vector< mha_real_t> MHAFilter::gammaflt_t::get_resynthesis_gain ( ) const
[inline]
```

4.221.3.10 `reset_state()`

```
void MHAFilter::gammaflt_t::reset_state ( )
```

4.221.3.11 `get_A()`

```
const std::vector< mha_complex_t>& MHAFilter::gammaflt_t::get_A ( ) [inline]
```

4.221.3.12 `inspect()`

```
std::string MHAFilter::gammaflt_t::inspect ( ) const [inline]
```

4.221.4 Member Data Documentation

4.221.4.1 `A`

```
std::vector< mha_complex_t> MHAFilter::gammaflt_t::A [private]
```

4.221.4.2 `GF`

```
std::vector< complex_bandpass_t> MHAFilter::gammaflt_t::GF [private]
```


4.221.4.3 delay

MHASignal::delay_t* MHAFilter::gammaflt_t::delay [private]

4.221.4.4 envelope_delay

std::vector<int> MHAFilter::gammaflt_t::envelope_delay [private]

4.221.4.5 resynthesis_gain

std::vector< **mha_real_t**> MHAFilter::gammaflt_t::resynthesis_gain [private]

4.221.4.6 cf_

std::vector< **mha_real_t**> MHAFilter::gammaflt_t::cf_ [private]

4.221.4.7 bw_

std::vector< **mha_real_t**> MHAFilter::gammaflt_t::bw_ [private]

4.221.4.8 srate_

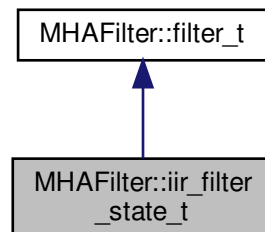
mha_real_t MHAFilter::gammaflt_t::srate_ [private]

The documentation for this class was generated from the following files:

- **complex_filter.h**
- **complex_filter.cpp**

4.222 MHAFilter::iir_filter_state_t Class Reference

Inheritance diagram for MHAFilter::iir_filter_state_t:



Public Member Functions

- **iir_filter_state_t** (unsigned int **channels**, std::vector< float > cf_A, std::vector< float > cf_B)

Additional Inherited Members

4.222.1 Constructor & Destructor Documentation

4.222.1.1 iir_filter_state_t()

```
MHAFilter::iir_filter_state_t::iir_filter_state_t (  
    unsigned int channels,  
    std::vector< float > cf_A,  
    std::vector< float > cf_B )
```

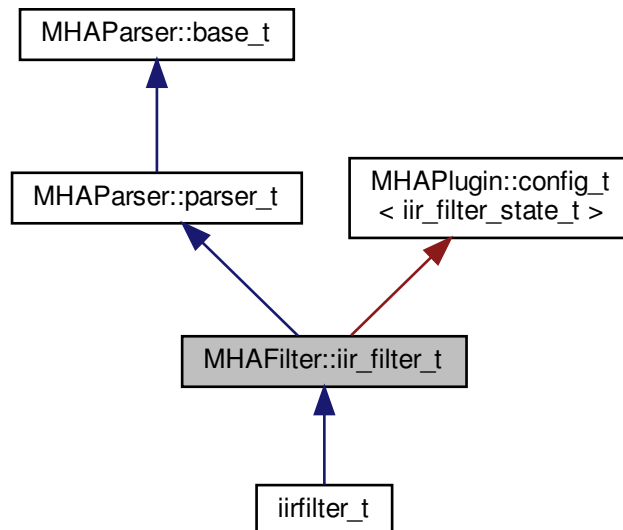
The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.223 MHAFilter::iir_filter_t Class Reference

IIR filter class wrapper for integration into parser structure.

Inheritance diagram for MHAFilter::iir_filter_t:



Public Member Functions

- **iir_filter_t** (std::string **help**="IIR **filter** structure", std::string def_A="[1]", std::string def_B="[1]", unsigned int **channels**=1)
Constructor of the IIR filter.
- void **filter** (**mha_wave_t** *y, const **mha_wave_t** *x)
The filter processes the audio signal.
- **mha_real_t** **filter** (**mha_real_t** x, unsigned int ch)
Filter a single audio sample.
- void **resize** (unsigned int **channels**)
Change the number of channels after object creation.

Private Member Functions

- void **update_filter** ()

Private Attributes

- **MHAParser::vfloat_t A**
- **MHAParser::vfloat_t B**
- **MHAEvents::patchbay_t < iir_filter_t > connector**
- unsigned int **nchannels**

Additional Inherited Members

4.223.1 Detailed Description

IIR filter class wrapper for integration into parser structure.

This class implements an infinite impulse response filter. Since it inherits from **MHAParser**↵
::**parser_t** (p. 1045), it can easily be integrated in the openMHA configuration tree. It provides the configuration language variables "A" (vector of recursive filter coefficients) and "B" (vector of non-recursive filter coefficients).

The filter instance reacts to changes in filter coefficients through the openMHA configuration language, and uses the updated coefficients in the next invocation of the filter method.

Update of the coefficients is thread-safe and non-blocking. Simply add this subparser to your parser items and use the "filter" member function. Filter states are reset to all 0 on update.

4.223.2 Constructor & Destructor Documentation

4.223.2.1 iir_filter_t()

```
MHAFilter::iir_filter_t::iir_filter_t (
    std::string help = "IIR filter structure",
    std::string def_A = "[1]",
    std::string def_B = "[1]",
    unsigned int channels = 1 )
```

Constructor of the IIR filter.

Initialises the sub-parser structure and the memory for holding the filter's state.

Parameters

<i>help</i>	The help string for the parser that groups the configuration variables of this filter. Could be used to describe the purpose of this IIR filter.
<i>def_A</i>	The initial value of the vector of the recursive filter coefficients, represented as string.
<i>def_B</i>	The initial value of the vector of the non-recursive filter coefficients, represented as string. © 2005-2020 HörTech gGmbH, Oldenburg
<i>channels</i>	The number of independent audio channels to process with this filter. Needed to allocate a state vector for each audio channel.

4.223.3 Member Function Documentation

4.223.3.1 filter() [1/2]

```
void MHAFilter::iir_filter_t::filter (
    mha_wave_t * y,
    const mha_wave_t * x )
```

The filter processes the audio signal.

All channels in the audio signal are processed using the same filter coefficients. Independent state is stored between calls for each audio channel.

Parameters

<i>y</i>	Pointer to output signal holder. The output signal is stored here. Has to have the same signal dimensions as the input signal x. In-place processing (y and x pointing to the same signal holder) is possible.
<i>x</i>	Pointer to input signal holder. Number of channels has to be the same as given to the constructor, or to the resize (p. 843) method.

4.223.3.2 filter() [2/2]

```
mha_real_t MHAFilter::iir_filter_t::filter (
    mha_real_t x,
    unsigned int ch )
```

Filter a single audio sample.

Parameters

<i>x</i>	The single audio sample
<i>ch</i>	Zero-based channel index. Use and change the state of channel ch. ch has to be less than the number of channels given to the constructor or the resize (p. 843) method.

Returns

the filtered result sample.

4.223.3.3 `resize()`

```
void MHAFilter::iir_filter_t::resize (
    unsigned int channels )
```

Change the number of channels after object creation.

Parameters

<i>channels</i>	The new number of channels. Old filter states are lost.
-----------------	---

4.223.3.4 `update_filter()`

```
void MHAFilter::iir_filter_t::update_filter ( ) [private]
```

4.223.4 Member Data Documentation

4.223.4.1 `A`

```
MHAParser::vfloat_t MHAFilter::iir_filter_t::A [private]
```

4.223.4.2 `B`

```
MHAParser::vfloat_t MHAFilter::iir_filter_t::B [private]
```

4.223.4.3 `connector`

```
MHAEvents::patchbay_t< iir_filter_t> MHAFilter::iir_filter_t::connector [private]
```

4.223.4.4 `nchannels`

```
unsigned int MHAFilter::iir_filter_t::nchannels [private]
```

The documentation for this class was generated from the following files:

- `mha_filter.hh`
- `mha_filter.cpp`

4.224 MHAFilter::iir_ord1_real_t Class Reference

First order recursive filter.

Public Member Functions

- **iir_ord1_real_t** (std::vector< **mha_real_t** > A, std::vector< **mha_real_t** > B)
Constructor with filter coefficients (one per channel)
- **iir_ord1_real_t** (std::vector< **mha_real_t** > tau, **mha_real_t** srate)
Constructor for low pass filter (one time constant per channel)
- void **set_state** (**mha_real_t** val)
- void **set_state** (std::vector< **mha_real_t** > val)
- void **set_state** (**mha_complex_t** val)
- **mha_real_t operator()** (unsigned int ch, **mha_real_t** x)
Filter method for real value input, one element.
- **mha_complex_t operator()** (unsigned int ch, **mha_complex_t** x)
Filter method for complex input, one element.
- void **operator()** (const **mha_wave_t** &X, **mha_wave_t** &Y)
Filter method for real value input.
- void **operator()** (const **mha_spec_t** &X, **mha_spec_t** &Y)
Filter method for complex value input.
- void **operator()** (const **mha_wave_t** &Xre, const **mha_wave_t** &Xim, **mha_wave_t** &Yre, **mha_wave_t** &Yim)
Filter method for complex value input.

Private Attributes

- std::vector< **mha_real_t** > **A_**
- std::vector< **mha_real_t** > **B_**
- std::vector< **mha_complex_t** > **Yn**

4.224.1 Detailed Description

First order recursive filter.

4.224.2 Constructor & Destructor Documentation

4.224.2.1 iir_ord1_real_t() [1/2]

```
MHAFilter::iir_ord1_real_t::iir_ord1_real_t (
    std::vector< mha_real_t > A,
    std::vector< mha_real_t > B )
```

Constructor with filter coefficients (one per channel)

4.224.2.2 iir_ord1_real_t() [2/2]

```
MHAFilter::iir_ord1_real_t::iir_ord1_real_t (
    std::vector< mha_real_t > tau,
    mha_real_t srate )
```

Constructor for low pass filter (one time constant per channel)

4.224.3 Member Function Documentation**4.224.3.1 set_state()** [1/3]

```
void MHAFilter::iir_ord1_real_t::set_state (
    mha_real_t val )
```

4.224.3.2 set_state() [2/3]

```
void MHAFilter::iir_ord1_real_t::set_state (
    std::vector< mha_real_t > val )
```

4.224.3.3 set_state() [3/3]

```
void MHAFilter::iir_ord1_real_t::set_state (
    mha_complex_t val )
```


4.224.3.4 operator() [1/5]

```
mha_real_t MHAFilter::iir_ord1_real_t::operator() (
    unsigned int ch,
    mha_real_t x ) [inline]
```

Filter method for real value input, one element.

4.224.3.5 operator() [2/5]

```
mha_complex_t MHAFilter::iir_ord1_real_t::operator() (
    unsigned int ch,
    mha_complex_t x ) [inline]
```

Filter method for complex input, one element.

4.224.3.6 operator() [3/5]

```
void MHAFilter::iir_ord1_real_t::operator() (
    const mha_wave_t & X,
    mha_wave_t & Y ) [inline]
```

Filter method for real value input.

4.224.3.7 operator() [4/5]

```
void MHAFilter::iir_ord1_real_t::operator() (
    const mha_spec_t & X,
    mha_spec_t & Y ) [inline]
```

Filter method for complex value input.

4.224.3.8 operator() [5/5]

```
void MHAFilter::iir_ord1_real_t::operator() (
    const mha_wave_t & Xre,
    const mha_wave_t & Xim,
    mha_wave_t & Yre,
    mha_wave_t & Yim ) [inline]
```

Filter method for complex value input.

4.224.4 Member Data Documentation

4.224.4.1 A_

```
std::vector< mha_real_t> MHAFilter::iir_ord1_real_t::A_ [private]
```

4.224.4.2 B_

```
std::vector< mha_real_t> MHAFilter::iir_ord1_real_t::B_ [private]
```

4.224.4.3 Yn

```
std::vector< mha_complex_t> MHAFilter::iir_ord1_real_t::Yn [private]
```

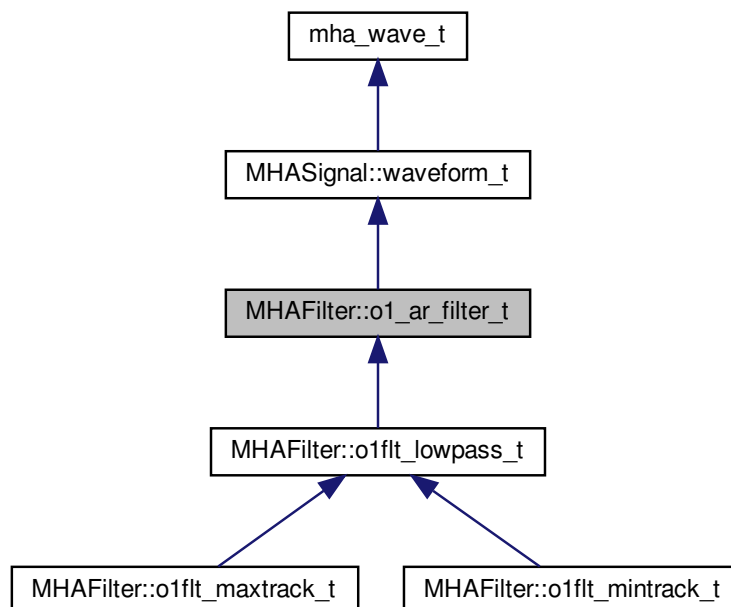
The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.225 MHAFilter::o1_ar_filter_t Class Reference

First order attack-release lowpass filter.

Inheritance diagram for MHAFilter::o1_ar_filter_t:



Public Member Functions

- **o1_ar_filter_t** (unsigned int **channels**, **mha_real_t** **fs**=1.0f, std::vector< **mha_real_t** > **tau_a**=std::vector< float >(1, 0.0f), std::vector< **mha_real_t** > **tau_r**=std::vector< float >(1, 0.0f))
Constructor, setting all taus to zero.
- void **set_tau_attack** (unsigned int ch, **mha_real_t** tau)
Set the attack time constant.
- void **set_tau_release** (unsigned int ch, **mha_real_t** tau)
Set the release time constant.
- **mha_real_t** **operator()** (unsigned int ch, **mha_real_t** x)
Apply filter to value x, using state channel ch.
- void **operator()** (const **mha_wave_t** &in, **mha_wave_t** &out)
*Apply filter to a **mha_wave_t** (p. 780) data.*

Protected Attributes

- **MHASignal::waveform_t** **c1_a**
- **MHASignal::waveform_t** **c2_a**
- **MHASignal::waveform_t** **c1_r**
- **MHASignal::waveform_t** **c2_r**
- **mha_real_t** **fs**

Additional Inherited Members

4.225.1 Detailed Description

First order attack-release lowpass filter.

This filter is the base of first order lowpass filter, maximum tracker and minimum tracker.

4.225.2 Constructor & Destructor Documentation

4.225.2.1 o1_ar_filter_t()

```
MHAFilter::o1_ar_filter_t::o1_ar_filter_t (
    unsigned int channels,
    mha_real_t fs = 1.0f,
    std::vector< mha_real_t > tau_a = std::vector<float>(1,0.0f),
    std::vector< mha_real_t > tau_r = std::vector<float>(1,0.0f) )
```

Constructor, setting all taus to zero.

The filter state can be accessed through the member functions of **MHASignal::waveform_t** (p. 1212).

Parameters

<i>channels</i>	Number of independent filters
<i>fs</i>	Sampling rate (optional, default = 1)
<i>tau_a</i>	Attack time constants (optional, default = 0)
<i>tau_r</i>	Release time constants (optional, default = 0)

4.225.3 Member Function Documentation**4.225.3.1 set_tau_attack()**

```
void MHAFilter::ol_ar_filter_t::set_tau_attack (
    unsigned int ch,
    mha_real_t tau )
```

Set the attack time constant.

Parameters

<i>ch</i>	Channel number
<i>tau</i>	Time constant

4.225.3.2 set_tau_release()

```
void MHAFilter::ol_ar_filter_t::set_tau_release (
    unsigned int ch,
    mha_real_t tau )
```

Set the release time constant.

Parameters

<i>ch</i>	Channel number
<i>tau</i>	Time constant

4.225.3.3 operator>() [1/2]

```
mha_real_t MHAFilter::ol_ar_filter_t::operator() (
```

```
unsigned int ch,  
    mha_real_t x ) [inline]
```

Apply filter to value *x*, using state channel *ch*.

Parameters

<i>ch</i>	Channel number
<i>x</i>	Input value

Returns

Output value

4.225.3.4 operator() [2/2]

```
void MHAFilter::ol_ar_filter_t::operator() (  
    const mha_wave_t & in,  
    mha_wave_t & out ) [inline]
```

Apply filter to a **mha_wave_t** (p. 780) data.

Parameters

<i>in</i>	Input signal
<i>out</i>	Output signal

The number of channels must match the number of filter bands.

4.225.4 Member Data Documentation

4.225.4.1 c1_a

MHASignal::waveform_t MHAFilter::ol_ar_filter_t::c1_a [protected]

4.225.4.2 c2_a

MHASignal::waveform_t MHAFilter::ol_ar_filter_t::c2_a [protected]

4.225.4.3 c1_r

MHASignal::waveform_t MHAFilter::o1_ar_filter_t::c1_r [protected]

4.225.4.4 c2_r

MHASignal::waveform_t MHAFilter::o1_ar_filter_t::c2_r [protected]

4.225.4.5 fs

mha_real_t MHAFilter::o1_ar_filter_t::fs [protected]

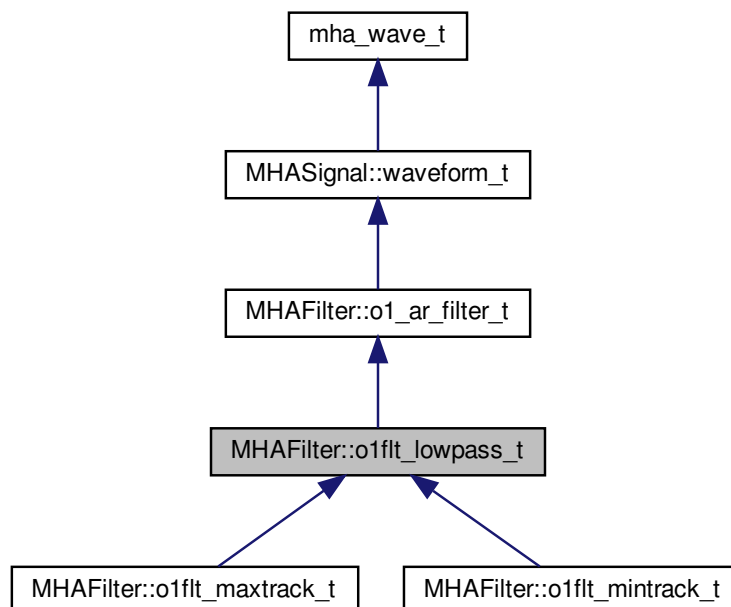
The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.226 MHAFilter::o1flt_lowpass_t Class Reference

First order low pass filter.

Inheritance diagram for MHAFilter::o1flt_lowpass_t:



Public Member Functions

- **o1flt_lowpass_t** (const std::vector< **mha_real_t** > &, **mha_real_t**, **mha_real_t**=0)
Constructor of low pass filter, sets sampling rate and time constants.
- **o1flt_lowpass_t** (const std::vector< **mha_real_t** > &tau, **mha_real_t** fs, const std::vector< **mha_real_t** > &startval)
Constructor of low pass filter, sets sampling rate and time constants.
- void **set_tau** (unsigned int ch, **mha_real_t** tau)
change the time constant in one channel
- void **set_tau** (**mha_real_t** tau)
set time constant in all channels to tau
- **mha_real_t** **get_c1** (unsigned int ch) const
- **mha_real_t** **get_last_output** (unsigned int ch) const

Additional Inherited Members

4.226.1 Detailed Description

First order low pass filter.

4.226.2 Constructor & Destructor Documentation

4.226.2.1 o1flt_lowpass_t() [1/2]

```
MHAFilter::o1flt_lowpass_t::o1flt_lowpass_t (
    const std::vector< mha_real_t > & tau,
    mha_real_t fs,
    mha_real_t startval = 0 )
```

Constructor of low pass filter, sets sampling rate and time constants.

Parameters

<i>tau</i>	Vector of time constants
<i>fs</i>	Sampling rate
<i>startval</i>	Initial internal state value

4.226.2.2 o1flt_lowpass_t() [2/2]

```
MHAFilter::o1flt_lowpass_t::o1flt_lowpass_t (
```

```
const std::vector< mha_real_t > & tau,
    mha_real_t fs,
const std::vector< mha_real_t > & startval )
```

Constructor of low pass filter, sets sampling rate and time constants.

Parameters

<i>tau</i>	Vector of time constants
<i>fs</i>	Sampling rate
<i>startval</i>	Initial internal state value

4.226.3 Member Function Documentation

4.226.3.1 set_tau() [1/2]

```
void MHAFilter::olflt_lowpass_t::set_tau (
    unsigned int ch,
    mha_real_t tau )
```

change the time constant in one channel

4.226.3.2 set_tau() [2/2]

```
void MHAFilter::olflt_lowpass_t::set_tau (
    mha_real_t tau )
```

set time constant in all channels to tau

4.226.3.3 get_c1()

```
mha_real_t MHAFilter::olflt_lowpass_t::get_c1 (
    unsigned int ch ) const [inline]
```


4.226.3.4 get_last_output()

```
mha_real_t MHAFilter::o1flt_lowpass_t::get_last_output (
    unsigned int ch ) const [inline]
```

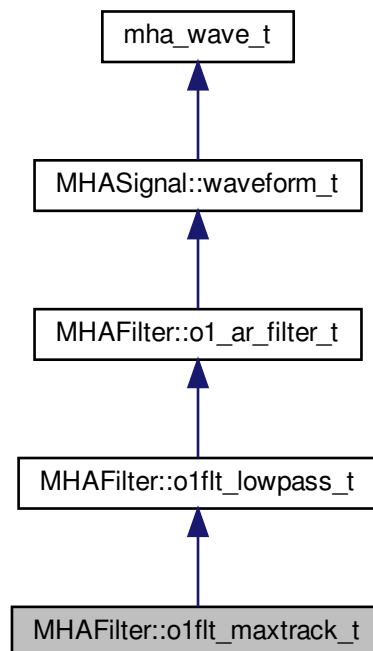
The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.227 MHAFilter::o1flt_maxtrack_t Class Reference

First order maximum tracker.

Inheritance diagram for MHAFilter::o1flt_maxtrack_t:



Public Member Functions

- **o1flt_maxtrack_t** (const std::vector< **mha_real_t** > &, **mha_real_t**, **mha_real_t**=0)
Constructor of low pass filter, sets sampling rate and time constants.
- **o1flt_maxtrack_t** (const std::vector< **mha_real_t** > &tau, **mha_real_t** fs, const std::vector< **mha_real_t** > &startval)
- void **set_tau** (unsigned int ch, **mha_real_t** tau)
change the time constant in one channel
- void **set_tau** (**mha_real_t** tau)
set time constant in all channels to tau

Additional Inherited Members

4.227.1 Detailed Description

First order maximum tracker.

4.227.2 Constructor & Destructor Documentation

4.227.2.1 o1flt_maxtrack_t() [1/2]

```
MHAFilter::o1flt_maxtrack_t::o1flt_maxtrack_t (
    const std::vector< mha_real_t > & tau,
    mha_real_t fs,
    mha_real_t startval = 0 )
```

Constructor of low pass filter, sets sampling rate and time constants.

Parameters

<i>tau</i>	Vector of time constants
<i>fs</i>	Sampling rate
<i>startval</i>	Initial internal state value

4.227.2.2 o1flt_maxtrack_t() [2/2]

```
MHAFilter::o1flt_maxtrack_t::o1flt_maxtrack_t (
    const std::vector< mha_real_t > & tau,
    mha_real_t fs,
    const std::vector< mha_real_t > & startval )
```

4.227.3 Member Function Documentation

4.227.3.1 set_tau() [1/2]

```
void MHAFilter::o1flt_maxtrack_t::set_tau (
    unsigned int ch,
    mha_real_t tau )
```

change the time constant in one channel

4.227.3.2 set_tau() [2/2]

```
void MHAFilter::o1flt_maxtrack_t::set_tau (
    mha_real_t tau )
```

set time constant in all channels to tau

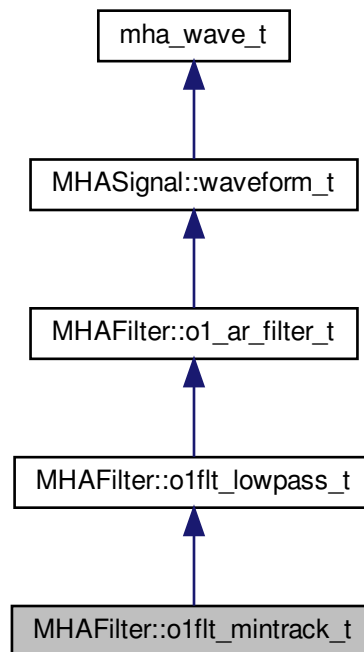
The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.228 MHAFilter::o1flt_mintrack_t Class Reference

First order minimum tracker.

Inheritance diagram for MHAFilter::o1flt_mintrack_t:



Public Member Functions

- **o1flt_mintrack_t** (const std::vector< **mha_real_t** > &, **mha_real_t**, **mha_real_t**=0)
- **o1flt_mintrack_t** (const std::vector< **mha_real_t** > &, **mha_real_t**, const std::vector< **mha_real_t** > &)
- void **set_tau** (unsigned int ch, **mha_real_t** tau)
change the time constant in one channel
- void **set_tau** (**mha_real_t** tau)
set time constant in all channels to tau

Additional Inherited Members

4.228.1 Detailed Description

First order minimum tracker.

4.228.2 Constructor & Destructor Documentation

4.228.2.1 `o1flt_mintrack_t()` [1/2]

```
MHAFilter::o1flt_mintrack_t::o1flt_mintrack_t (
    const std::vector< mha_real_t > & tau,
    mha_real_t fs,
    mha_real_t startval = 0 )
```

4.228.2.2 `o1flt_mintrack_t()` [2/2]

```
MHAFilter::o1flt_mintrack_t::o1flt_mintrack_t (
    const std::vector< mha_real_t > & tau,
    mha_real_t fs,
    const std::vector< mha_real_t > & startval )
```

4.228.3 Member Function Documentation

4.228.3.1 `set_tau()` [1/2]

```
void MHAFilter::o1flt_mintrack_t::set_tau (
    unsigned int ch,
    mha_real_t tau )
```

change the time constant in one channel

4.228.3.2 set_tau() [2/2]

```
void MHAFilter::olflt_mintrack_t::set_tau (
    mha_real_t tau )
```

set time constant in all channels to tau

The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.229 MHAFilter::partitioned_convolution_t Class Reference

A filter class for partitioned convolution.

Classes

- struct **index_t**
Bookkeeping class.

Public Member Functions

- **partitioned_convolution_t** (unsigned int **fragsize**, unsigned int **nchannels_in**, unsigned int **nchannels_out**, const **transfer_matrix_t** &transfer)
Create a new partitioned convolver.
- **~partitioned_convolution_t** ()
Free fftw resource allocated in constructor.
- **mha_wave_t * process** (const **mha_wave_t** *s_in)
processing

Public Attributes

- unsigned int **fragsize**
Audio fragment size, always equal to partition size.
- unsigned int **nchannels_in**
Number of audio input channels.
- unsigned int **nchannels_out**
Number of audio output channels.
- unsigned int **output_partitions**
The maximum number of partitions in any of the impulse responses.
- unsigned int **filter_partitions**
The total number of non-zero impulse response partitions.

- **MHASignal::waveform_t input_signal_wave**
Buffer for input signal.
- unsigned int **current_input_signal_buffer_half_index**
A counter modulo 2.
- **MHASignal::spectrum_t input_signal_spec**
Buffer for FFT transformed input signal.
- **MHASignal::spectrum_t frequency_response**
Buffers for frequency response spectra of impulse response partitions.
- std::vector< **index_t** > **bookkeeping**
Keeps track of input channels, output channels, impulse response partition, and delay.
- std::vector< **MHASignal::spectrum_t** > **output_signal_spec**
Buffers for FFT transformed output signal.
- unsigned int **current_output_partition_index**
A counter modulo output_partitions, indexing the "current" output partition.
- **MHASignal::waveform_t output_signal_wave**
Buffer for the wave output signal.
- **mha_fft_t fft**
The FFT transformer.

4.229.1 Detailed Description

A filter class for partitioned convolution.

Impulse responses are partitioned into sections of fragment size. Audio signal is convolved with every partition and delayed as needed. Convolution is done according to overlap-save. FFT length used is 2 times fragment size.

4.229.2 Constructor & Destructor Documentation

4.229.2.1 partitioned_convolution_t()

```
MHAFilter::partitioned_convolution_t::partitioned_convolution_t (
    unsigned int fragsize,
    unsigned int nchannels_in,
    unsigned int nchannels_out,
    const transfer_matrix_t & transfer )
```

Create a new partitioned convolver.

Parameters

<i>fragsize</i>	Audio fragment size, equal to partition size.
<i>nchannels_in</i>	Number of input audio channels.
<i>nchannels_out</i>	Number of output audio channels.
<i>transfer</i>	A sparse matrix of impulse responses.

4.229.2.2 ~partitioned_convolution_t()

`MHAFilter::partitioned_convolution_t::~~partitioned_convolution_t ()`

Free fftw resource allocated in constructor.

4.229.3 Member Function Documentation

4.229.3.1 process()

```
mha_wave_t * MHAFilter::partitioned_convolution_t::process (
    const mha_wave_t * s_in )
```

processing

4.229.4 Member Data Documentation

4.229.4.1 fragsize

`unsigned int MHAFilter::partitioned_convolution_t::fragsize`

Audio fragment size, always equal to partition size.

4.229.4.2 nchannels_in

`unsigned int MHAFilter::partitioned_convolution_t::nchannels_in`

Number of audio input channels.

4.229.4.3 nchannels_out

`unsigned int MHAFilter::partitioned_convolution_t::nchannels_out`

Number of audio output channels.

4.229.4.4 output_partitions

```
unsigned int MHAFilter::partitioned_convolution_t::output_partitions
```

The maximum number of partitions in any of the impulse responses.

Determines the size of the delay line.

4.229.4.5 filter_partitions

```
unsigned int MHAFilter::partitioned_convolution_t::filter_partitions
```

The total number of non-zero impulse response partitions.

4.229.4.6 input_signal_wave

```
MHASignal::waveform_t MHAFilter::partitioned_convolution_t::input_signal_wave
```

Buffer for input signal.

Has nchannels_in channels and fragsize*2 frames

4.229.4.7 current_input_signal_buffer_half_index

```
unsigned int MHAFilter::partitioned_convolution_t::current_input_signal_buffer_↔  
half_index
```

A counter modulo 2.

Indicates the buffer half in input signal wave into which to copy the current input signal.

4.229.4.8 input_signal_spec

```
MHASignal::spectrum_t MHAFilter::partitioned_convolution_t::input_signal_spec
```

Buffer for FFT transformed input signal.

Has nchannels_in channels and fragsize+1 frames (fft bins).

4.229.4.9 frequency_response

```
MHASignal::spectrum_t MHAFilter::partitioned_convolution_t::frequency_response
```

Buffers for frequency response spectra of impulse response partitions.

Each "channel" contains another partition of some impulse response. The bookkeeping array is used to keep track what to do with these frequency responses. This container has filter_↔ partitions channels and fragsize+1 frames (fft bins).

4.229.4.10 bookkeeping

```
std::vector< index_t> MHAFilter::partitioned_convolution_t::bookkeeping
```

Keeps track of input channels, output channels, impulse response partition, and delay.

The index into this array is the same as the "channel" index into the frequency_response array. Array has filter_partitions entries.

4.229.4.11 output_signal_spec

```
std::vector< MHASignal::spectrum_t> MHAFilter::partitioned_convolution_t::output_↔  
signal_spec
```

Buffers for FFT transformed output signal.

For each array member, Number of channels is equal to nchannels_out, number of frames (fft bins) is equal to fragsize+1. Array size is equal to output_partitions.

4.229.4.12 current_output_partition_index

```
unsigned int MHAFilter::partitioned_convolution_t::current_output_partition_index
```

A counter modulo output_partitions, indexing the "current" output partition.

4.229.4.13 output_signal_wave

```
MHASignal::waveform_t MHAFilter::partitioned_convolution_t::output_signal_wave
```

Buffer for the wave output signal.

Number of channels is equal to nchannels_out, number of frames is equal to fragsize

4.229.4.14 fft

```
mha_fft_t MHAFilter::partitioned_convolution_t::fft
```

The FFT transformer.

The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.230 MHAFilter::partitioned_convolution_t::index_t Struct Reference

Bookkeeping class.

Public Member Functions

- **index_t** (unsigned int src, unsigned int tgt, unsigned int dly)
Data constructor.
- **index_t** ()
Default constructor for STL compatibility.

Public Attributes

- unsigned int **source_channel_index**
The input channel index to apply the current partition to.
- unsigned int **target_channel_index**
The index of the output channel to which the filter result should go.
- unsigned int **delay**
The delay (in blocks) of this partition.

4.230.1 Detailed Description

Bookkeeping class.

For each impulse response partition, keeps track of which input to filter, which output channel to filter to, and the delay in blocks. Objects of class Index should be kept in an array with the same indices as the corresponding impulse response partitions.

4.230.2 Constructor & Destructor Documentation

4.230.2.1 index_t() [1/2]

```
MHAFilter::partitioned_convolution_t::index_t::index_t (
    unsigned int src,
    unsigned int tgt,
    unsigned int dly ) [inline]
```

Data constructor.

Parameters

<i>src</i>	The input channel index to apply the current partition to.
<i>tgt</i>	The index of the output channel to which the filter result should go.
<i>dly</i>	The delay (in blocks) of this partition

4.230.2.2 index_t() [2/2]

```
MHAFilter::partitioned_convolution_t::index_t::index_t ( ) [inline]
```

Default constructor for STL compatibility.

4.230.3 Member Data Documentation

4.230.3.1 source_channel_index

```
unsigned int MHAFilter::partitioned_convolution_t::index_t::source_channel_index
```

The input channel index to apply the current partition to.

4.230.3.2 target_channel_index

```
unsigned int MHAFilter::partitioned_convolution_t::index_t::target_channel_index
```

The index of the output channel to which the filter result should go.

4.230.3.3 delay

```
unsigned int MHAFilter::partitioned_convolution_t::index_t::delay
```

The delay (in blocks) of this partition.

The documentation for this struct was generated from the following file:

- **mha_filter.hh**

4.231 MHAFilter::polyphase_resampling_t Class Reference

A class that performs polyphase resampling.

Public Member Functions

- **polyphase_resampling_t** (unsigned n_up, unsigned n_down, **mha_real_t** nyquist_ratio, unsigned n_irs, unsigned n_ringbuffer, unsigned n_channels, unsigned n_prefill)
Construct a polyphase resampler instance.
- void **write** (**mha_wave_t** &signal)
Write signal to the ringbuffer.
- void **read** (**mha_wave_t** &signal)
Read resampled signal.
- unsigned **readable_frames** () const
Number of frames at target sampling rate that can be produced.

Private Attributes

- unsigned **upsampling_factor**
Integer upsampling factor.
- unsigned **downsampling_factor**
Integer downsampling factor.
- unsigned **now_index**
Index of "now" in the interpolated sampling rate.
- bool **underflow**
Set to true when an underflow has occurred.
- **MHAWindow::hanning_t** **impulse_response**
Contains the impulse response of the lowpass filter needed for anti-aliasing.
- **MHASignal::ringbuffer_t** **ringbuffer**
Storage of input signal.

4.231.1 Detailed Description

A class that performs polyphase resampling.

Background information: When resampling from one sampling rate to another, it helps when one sampling rate is a multiple of the other sampling rate: In the case of upsampling, the samples at the original rate are copied to the upsampled signal spread out with a constant number of zero samples between the originally adjacent samples. The signal is then low-pass filtered to avoid frequency aliasing and to fill the zero-samples with interpolated values. In the case of down-sampling, the signal is first low-pass filtered for anti-aliasing, and only every n^{th} sample of the filtered output is used for the signal at the new sample rate. Of course, for finite-impulse-response (FIR) filters this means that only every n^{th} sample needs to be computed.

When resampling from one sampling rate to another where neither is a multiple of the other, the signal first needs to be upsampled to a sampling rate that is a multiple of both (source and target) sampling rates, and then downsampled again to the target sampling rate. Instead of applying two separate lowpass filters directly after each other (one filter for upsampling and another for downsampling), it is sufficient to apply only one low-pass filter, when producing the output at the final target rate, with a cut-off frequency equal to the lower cut-off-frequency of the replaced two low-pass filters. Not filtering to produce a filtered signal already at the common multiple sampling rate has the side effect that this intermediate signal at the common multiple sampling rate keeps its filler zero samples unaltered. These zero samples can be taken advantage of when filtering to produce the output at the target rate: The zeros do not need to be multiplied with their corresponding filter coefficients, because the result is known to be zero again, and this zero product has no effect on the summation operation to compute a target sample at the target rate. To summarize, the following optimization techniques are available:

- The signal does not need to be stored in memory at the interpolation rate. It is sufficient to have the signal available at the source rate and to know where the zeros would be.
- The signal needs to be low-pass-filtered only once.
- The FIR low-pass filtering can take advantage of
 - computing only filter outputs for the required samples at the target rate,
 - skipping over zero-samples at the interpolation rate.

The procedure that takes advantage of these optimization possibilities is known as polyphase resampling.

This class implements polyphase resampling in this way for a source sampling rate and a target sampling rate that have common multiple, the interpolation sampling rate. Non-rational and drifting sample rates are outside the scope of this resampler.

4.231.2 Constructor & Destructor Documentation

4.231.2.1 polyphase_resampling_t()

```
MHAFilter::polyphase_resampling_t::polyphase_resampling_t (  
    unsigned n_up,  
    unsigned n_down,  
    mha_real_t nyquist_ratio,  
    unsigned n_irs,  
    unsigned n_ringbuffer,  
    unsigned n_channels,  
    unsigned n_prefill )
```

Construct a polyphase resampler instance.

Allocates a ringbuffer with the given capacity *n_ringbuffer*. Client that triggers the constructor must ensure that the capacity *n_ringbuffer* and the delay *n_prefill* are sufficient, i.e. enough old and new samples are always available to compute sufficient samples in using an impulse response of length *n_irs*. Audio block sizes at both sides of the resampler have to be taken into account. Class `MHASignal::blockprocessing_polyphase_resampling_t` takes care of this, and it is recommended to use this class for block-based processing.

Based on *n_up*, *n_down*, *n_irs* and *nyquist_ratio*, a suitable sinc impulse response is computed and windowed with a hanning window to limit its extent.

The actual source sampling rate, target sampling rate, and interpolation sampling rate are not parameters to this constructors, because only their ratios matter.

Parameters

<i>n_up</i>	upsampling factor, ratio between interpolation rate and source rate.
<i>n_down</i>	downsampling factor, ratio between interpolation rate and target rate.
<i>nyquist_ratio</i>	low pass filter cutoff frequency relative to the nyquist frequency of the smaller of the two sampling rates. Example values: E.g. 0.8, 0.9
<i>n_irs</i>	length of impulse response (in samples at interpolation rate)
<i>n_ringbuffer</i>	length of ringbuffer, in samples at source sampling rate
<i>n_channels</i>	audio channels count
<i>n_prefill</i>	Prefill the ringbuffer with this many zero frames in samples at source sampling rate

4.231.3 Member Function Documentation

4.231.3.1 write()

```
void MHAFilter::polyphase_resampling_t::write (
    mha_wave_t & signal )
```

Write signal to the ringbuffer.

Signal contained in *signal* is appended to the audio frames already present in the ringbuffer.

Parameters

<i>signal</i>	input signal in original sampling rate
---------------	--

Exceptions

<i>MHA_Error</i> (p. 707)	Raises exception if there is not enough room or if the number of channels does not match.
----------------------------------	---

4.231.3.2 read()

```
void MHAFilter::polyphase_resampling_t::read (
    mha_wave_t & signal )
```

Read resampled signal.

Will perform the resampling and remove no longer needed samples from the input buffer.

Parameters

<i>signal</i>	buffer to write the resampled signal to.
---------------	--

Exceptions

MHA_Error (p. 707)	Raises exception if there is not enough input signal or if the number of channels is too high.
---------------------------	--

4.231.3.3 readable_frames()

```
unsigned MHAFilter::polyphase_resampling_t::readable_frames ( ) const [inline]
```

Number of frames at target sampling rate that can be produced.

This method only checks for enough future samples present, therefore, this number can be positive and a read operation can still fail if there are not enough past samples present to perform the filtering for the first output sample. This could only happen if the constructor parameters *n_ringbuffer* or *n_prefill* have been chosen too small, because otherwise the method **read** (p. 869) ensures that enough past samples are present to compute the next target sample.

4.231.4 Member Data Documentation

4.231.4.1 upsampling_factor

```
unsigned MHAFilter::polyphase_resampling_t::upsampling_factor [private]
```

Integer upsampling factor.

Interpolation rate divided by source rate.

4.231.4.2 downsampling_factor

```
unsigned MHAFilter::polyphase_resampling_t::downsampling_factor [private]
```

Integer downsampling factor.

Interpolation rate divided by target rate.

4.231.4.3 now_index

```
unsigned MHAFilter::polyphase_resampling_t::now_index [private]
```

Index of "now" in the interpolated sampling rate.

4.231.4.4 underflow

```
bool MHAFilter::polyphase_resampling_t::underflow [private]
```

Set to true when an underflow has occurred.

When this is true, then the object can no longer be used. Underflows have to be avoided by clients, e.g. by checking that enough **readable_frames** (p. 869) are present before calling **read** (p. 869)

4.231.4.5 impulse_response

```
MHAWindow::hanning_t MHAFilter::polyphase_resampling_t::impulse_response [private]
```

Contains the impulse response of the lowpass filter needed for anti-aliasing.

The impulse response is stored at the interpolation sampling rate. We use an instance of **MHAWindow::hanning_t** (p. 1248) here because we are limiting the sinc impulse response with a Hanning window (otherwise the impulse response would extend indefinitely into past and future). And the samples inside an **MHAWindow::hanning_t** (p. 1248) can be altered with `*=`, which our constructor does.

4.231.4.6 ringbuffer

```
MHASignal::ringbuffer_t MHAFilter::polyphase_resampling_t::ringbuffer [private]
```

Storage of input signal.

Part of the polyphase resampling optimization is that apart from the FIR impulse response, nothing is stored at the interpolation rate, saving memory and computation cycles.

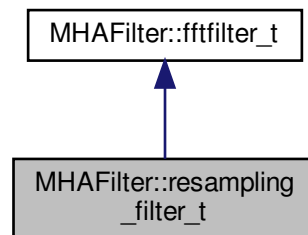
The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.232 MHAFilter::resampling_filter_t Class Reference

Hann shaped low pass filter for resampling.

Inheritance diagram for MHAFilter::resampling_filter_t:



Public Member Functions

- **resampling_filter_t** (unsigned int **fftl**en, unsigned int irslen, unsigned int **channels**, unsigned int Nup, unsigned int Ndown, double fCutOff)
Constructor.

Static Public Member Functions

- static unsigned int **fragsize_validator** (unsigned int **fftl**en, unsigned int irslen)

Private Attributes

- unsigned int **fragsize**

4.232.1 Detailed Description

Hann shaped low pass filter for resampling.

This class uses FFT filter at upsampled rate.

4.232.2 Constructor & Destructor Documentation

4.232.2.1 resampling_filter_t()

```
MHAFilter::resampling_filter_t::resampling_filter_t (
    unsigned int fftlen,
    unsigned int irslen,
    unsigned int channels,
    unsigned int Nup,
    unsigned int Ndown,
    double fCutOff )
```

Constructor.

Parameters

<i>fftlen</i>	FFT length.
<i>irslen</i>	Length of filter.
<i>channels</i>	Number of channels to be filtered.
<i>Nup</i>	Upsampling ratio.
<i>Ndown</i>	Downsampling ratio.
<i>fCutOff</i>	Cut off frequency (relative to lower Nyquist Frequency)

4.232.3 Member Function Documentation

4.232.3.1 fragsize_validator()

```
unsigned int MHAFilter::resampling_filter_t::fragsize_validator (
    unsigned int fftlen,
    unsigned int irslen ) [static]
```

4.232.4 Member Data Documentation

4.232.4.1 fragsize

```
unsigned int MHAFilter::resampling_filter_t::fragsize [private]
```

The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.233 MHAFilter::smoothspec_t Class Reference

Smooth spectral gains, create a windowed impulse response.

Public Member Functions

- **smoothspec_t** (unsigned int **fftl**, unsigned int **nchannels**, const **MHAWindow**↔
::**base_t** & **window**, bool **minphase**, bool **linphase_asym**=false)
Constructor.
- void **smoothspec** (const **mha_spec_t** &s_in, **mha_spec_t** &s_out)
Create a smoothed spectrum.
- void **smoothspec** (**mha_spec_t** &spec)
Create a smoothed spectrum (in place)
- void **spec2fir** (const **mha_spec_t** &spec, **mha_wave_t** &fir)
Return FIR coefficients.
- ~**smoothspec_t** ()

Private Member Functions

- void **internal_fir** (const **mha_spec_t** &)

Private Attributes

- unsigned int **fftl**
- unsigned int **nchannels**
- **MHAWindow::base_t** **window**
- **MHASignal::waveform_t** **tmp_wave**
- **MHASignal::spectrum_t** **tmp_spec**
- **MHASignal::minphase_t** * **minphase**
- bool **_linphase_asym**
- **mha_fft_t** **fft**

4.233.1 Detailed Description

Smooth spectral gains, create a windowed impulse response.

Spectral gains are smoothed by multiplying the impulse response with a window function.

If a minimal phase is used, then the original phase is discarded and replaced by the minimal phase function. In this case, the window is applied to the beginning of the inverse Fourier transform of the input spectrum, and the remaining signal set to zero. If the original phase is kept, the window is applied symmetrically around zero, i.e. to the first and last samples of the inverse Fourier transform of the input spectrum. The **spec2fir()** (p. 875) function creates a causal impulse response by circularly shifting the impulse response by half of the window length.

The signal dimensions of the arguments of **smoothspec()** (p. 874) must correspond to the FFT length and number of channels provided in the constructor. The function **spec2fir()** (p. 875) can fill signal structures with more than window length frames.

4.233.2 Constructor & Destructor Documentation

4.233.2.1 smoothspec_t()

```
MHAFilter::smoothspec_t::smoothspec_t (
    unsigned int fftlen,
    unsigned int nchannels,
    const MHAWindow::base_t & window,
    bool minphase,
    bool linphase_asym = false )
```

Constructor.

Parameters

<i>fftlen</i>	FFT length of input spectrum (fftlen/2+1 bins)
<i>nchannels</i>	Number of channels in input spectrum
<i>window</i>	Window used for smoothing
<i>minphase</i>	Use minimal phase (true) or original phase (false)
<i>linphase_asym</i>	Keep phase, but apply full window at beginning of IRS

4.233.2.2 ~smoothspec_t()

```
MHAFilter::smoothspec_t::~~smoothspec_t ( )
```

4.233.3 Member Function Documentation

4.233.3.1 smoothspec() [1/2]

```
void MHAFilter::smoothspec_t::smoothspec (
    const mha_spec_t & s_in,
    mha_spec_t & s_out )
```

Create a smoothed spectrum.

Parameters

$s \leftrightarrow$ <i>_in</i>	Input spectrum
-----------------------------------	----------------

Return values

<i>s_out</i>	Output spectrum
--------------	-----------------

4.233.3.2 smoothspec() [2/2]

```
void MHAFilter::smoothspec_t::smoothspec (  
    mha_spec_t & spec ) [inline]
```

Create a smoothed spectrum (in place)

Parameters

<i>spec</i>	Spectrum to be smoothed.
-------------	--------------------------

4.233.3.3 spec2fir()

```
void MHAFilter::smoothspec_t::spec2fir (  
    const mha_spec_t & spec,  
    mha_wave_t & fir )
```

Return FIR coefficients.

Parameters

<i>spec</i>	Input spectrum
-------------	----------------

Return values

<i>fir</i>	FIR coefficients, minimum length is window length
------------	---

4.233.3.4 internal_fir()

```
void MHAFilter::smoothspec_t::internal_fir (  
    const mha_spec_t & s_in ) [private]
```

4.233.4 Member Data Documentation

4.233.4.1 fftlen

unsigned int MHAFilter::smoothspect_t::fftlen [private]

4.233.4.2 nchannels

unsigned int MHAFilter::smoothspect_t::nchannels [private]

4.233.4.3 window

MHAWindow::base_t MHAFilter::smoothspect_t::window [private]

4.233.4.4 tmp_wave

MHASignal::waveform_t MHAFilter::smoothspect_t::tmp_wave [private]

4.233.4.5 tmp_spec

MHASignal::spectrum_t MHAFilter::smoothspect_t::tmp_spec [private]

4.233.4.6 minphase

MHASignal::minphase_t* MHAFilter::smoothspect_t::minphase [private]

4.233.4.7 _linphase_asym

bool MHAFilter::smoothspect_t::_linphase_asym [private]

4.233.4.8 fft

```
mha_fft_t MHAFilter::smoothspec_t::fft [private]
```

The documentation for this class was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.234 MHAFilter::thirddoctave_analyzer_t Class Reference

Public Member Functions

- **thirddoctave_analyzer_t** (**mhaconfig_t** cfg)
- **mha_wave_t * process** (**mha_wave_t ***)
- unsigned int **nbands** ()
- unsigned int **nchannels** ()
- std::vector< **mha_real_t** > **get_cf_hz** ()

Static Public Member Functions

- static std::vector< **mha_real_t** > **cf_generator** (**mhaconfig_t** cfg)
- static std::vector< **mha_real_t** > **bw_generator** (**mhaconfig_t** cfg)
- static std::vector< **mha_real_t** > **dup** (std::vector< **mha_real_t** >, **mhaconfig_t** cfg)

Private Attributes

- **mhaconfig_t** **cfg_**
- std::vector< **mha_real_t** > **cf**
- **MHAFilter::gammaflt_t** **fb**
- **MHASignal::waveform_t** **out_chunk**
- **MHASignal::waveform_t** **out_chunk_im**

4.234.1 Constructor & Destructor Documentation

4.234.1.1 thirddoctave_analyzer_t()

```
MHAFilter::thirddoctave_analyzer_t::thirddoctave_analyzer_t (  
    mhaconfig_t cfg )
```

4.234.2 Member Function Documentation

4.234.2.1 process()

```
mha_wave_t * MHAFilter::thirdoctave_analyzer_t::process (
    mha_wave_t * sIn )
```

4.234.2.2 nbands()

```
unsigned int MHAFilter::thirdoctave_analyzer_t::nbands ( )
```

4.234.2.3 nchannels()

```
unsigned int MHAFilter::thirdoctave_analyzer_t::nchannels ( )
```

4.234.2.4 get_cf_hz()

```
std::vector< mha_real_t > MHAFilter::thirdoctave_analyzer_t::get_cf_hz ( )
```

4.234.2.5 cf_generator()

```
std::vector< mha_real_t > MHAFilter::thirdoctave_analyzer_t::cf_generator (
    mhaconfig_t cfg ) [static]
```

4.234.2.6 bw_generator()

```
std::vector< mha_real_t > MHAFilter::thirdoctave_analyzer_t::bw_generator (
    mhaconfig_t cfg ) [static]
```

4.234.2.7 dup()

```
std::vector< mha_real_t > MHAFilter::thirdoctave_analyzer_t::dup (
    std::vector< mha_real_t > vec,
    mhaconfig_t cfg ) [static]
```


4.234.3 Member Data Documentation

4.234.3.1 cfg_

mhaconfig_t MHAFilter::thirdoctave_analyzer_t::cfg_ [private]

4.234.3.2 cf

std::vector< **mha_real_t**> MHAFilter::thirdoctave_analyzer_t::cf [private]

4.234.3.3 fb

MHAFilter::gammaflt_t MHAFilter::thirdoctave_analyzer_t::fb [private]

4.234.3.4 out_chunk

MHASignal::waveform_t MHAFilter::thirdoctave_analyzer_t::out_chunk [private]

4.234.3.5 out_chunk_im

MHASignal::waveform_t MHAFilter::thirdoctave_analyzer_t::out_chunk_im [private]

The documentation for this class was generated from the following files:

- **complex_filter.h**
- **complex_filter.cpp**

4.235 MHAFilter::transfer_function_t Struct Reference

a structure containing a source channel number, a target channel number, and an impulse response.

Public Member Functions

- **transfer_function_t** ()
Default constructor for STL conformity.
- **transfer_function_t** (unsigned int **source_channel_index**, unsigned int **target_channel_index**, const std::vector< float > & **impulse_response**)
Data constructor.
- unsigned int **partitions** (unsigned int fragsize) const
for the given partition size, return the number of partitions of the impulse response.
- unsigned int **non_empty_partitions** (unsigned int fragsize) const
for the given partition size, return the number of non-empty partitions of the impulse response.
- bool **isempty** (unsigned int fragsize, unsigned int index) const
checks if the partition contains only zeros

Public Attributes

- unsigned int **source_channel_index**
Source audio channel index for this transfer function.
- unsigned int **target_channel_index**
Target audio channel index for this transfer function.
- std::vector< float > **impulse_response**
Impulse response of transfer from source to target channel.

4.235.1 Detailed Description

a structure containing a source channel number, a target channel number, and an impulse response.

4.235.2 Constructor & Destructor Documentation

4.235.2.1 transfer_function_t() [1/2]

```
MHAFilter::transfer_function_t::transfer_function_t ( ) [inline]
```

Default constructor for STL conformity.

Not used.

4.235.2.2 transfer_function_t() [2/2]

```
MHAFilter::transfer_function_t::transfer_function_t (
    unsigned int source_channel_index,
    unsigned int target_channel_index,
    const std::vector< float > & impulse_response )
```

Data constructor.

Parameters

<i>source_channel_index</i>	Source audio channel index for this transfer function
<i>target_channel_index</i>	Target audio channel index for this transfer function
<i>impulse_response</i>	Impulse response of transfer from source to target channel

4.235.3 Member Function Documentation**4.235.3.1 partitions()**

```
unsigned int MHAFilter::transfer_function_t::partitions (  
    unsigned int fragsize ) const [inline]
```

for the given partition size, return the number of partitions of the impulse response.

Parameters

<i>fragsize</i>	partition size
-----------------	----------------

Returns

number of partitions occupied by the impulse response

4.235.3.2 non_empty_partitions()

```
unsigned int MHAFilter::transfer_function_t::non_empty_partitions (  
    unsigned int fragsize ) const [inline]
```

for the given partition size, return the number of non-empty partitions of the impulse response.

Parameters

<i>fragsize</i>	partition size
-----------------	----------------

Returns

the number of non-empty partitions of the impulse response, i.e. partitions containing only zeros are not counted.

4.235.3.3 isempty()

```
bool MHAFilter::transfer_function_t::isempty (
    unsigned int fragsize,
    unsigned int index ) const [inline]
```

checks if the partition contains only zeros

Parameters

<i>fragsize</i>	partition size
<i>index</i>	partition index

Returns

true when this partition of the impulse response contains only zeros.

4.235.4 Member Data Documentation

4.235.4.1 source_channel_index

```
unsigned int MHAFilter::transfer_function_t::source_channel_index
```

Source audio channel index for this transfer function.

4.235.4.2 target_channel_index

```
unsigned int MHAFilter::transfer_function_t::target_channel_index
```

Target audio channel index for this transfer function.

4.235.4.3 impulse_response

```
std::vector<float> MHAFilter::transfer_function_t::impulse_response
```

Impulse response of transfer from source to target channel.

The documentation for this struct was generated from the following files:

- **mha_filter.hh**
- **mha_filter.cpp**

4.236 MHAFilter::transfer_matrix_t Struct Reference

A sparse matrix of transfer function partitionss.

Inherits vector< transfer_function_t >.

Public Member Functions

- `std::valarray< unsigned int > partitions (unsigned fragsize) const`
*Returns an array of the results of calling the **partitions()** (p. 883) method on every matrix member.*
- `std::valarray< unsigned int > non_empty_partitions (unsigned int fragsize) const`
*Returns an array of the results of calling the **non_empty_partitions()** (p. 883) method on every matrix member.*

4.236.1 Detailed Description

A sparse matrix of transfer function partitionss.

Each matrix element knows its position in the matrix, so they can be stored as a vector.

4.236.2 Member Function Documentation

4.236.2.1 partitions()

```
std::valarray<unsigned int> MHAFilter::transfer_matrix_t::partitions (
    unsigned fragsize ) const [inline]
```

Returns an array of the results of calling the **partitions()** (p. 883) method on every matrix member.

4.236.2.2 non_empty_partitions()

```
std::valarray<unsigned int> MHAFilter::transfer_matrix_t::non_empty_partitions (
    unsigned int fragsize ) const [inline]
```

Returns an array of the results of calling the **non_empty_partitions()** (p. 883) method on every matrix member.

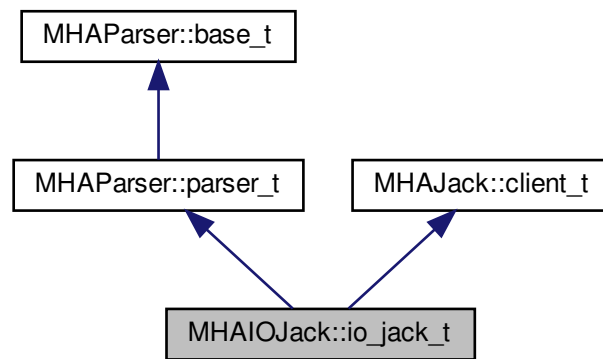
The documentation for this struct was generated from the following file:

- **mha_filter.hh**

4.237 MHAIOJack::io_jack_t Class Reference

Main class for JACK IO.

Inheritance diagram for MHAIOJack::io_jack_t:



Public Member Functions

- **io_jack_t** (unsigned int **fragsize**, float **samplerate**, **IOProcessEvent_t** **proc_event**, void * **proc_handle**, **IOStartedEvent_t** **start_event**, void * **start_handle**, **IOStoppedEvent_t** **stop_event**, void * **stop_handle**)
- void **prepare** (int, int)
Allocate buffers, activate JACK client and install internal ports.
- void **release** ()

Private Member Functions

- void **reconnect_inports** ()
Connect the input ports when connection variable is accessed.
- void **reconnect_outports** ()
Connect the output ports when connection variable is accessed.
- void **get_physical_input_ports** ()
- void **get_physical_output_ports** ()
- void **get_all_input_ports** ()
- void **get_all_output_ports** ()
- void **get_delays_in** ()
- void **get_delays_out** ()
- void **read_get_cpu_load** ()
- void **read_get_xruns** ()
- void **read_get_scheduler** ()

Private Attributes

- unsigned int **fw_fragsize**
- float **fw_samplerate**
- **MHAParser::string_t** **servername**
- **MHAParser::string_t** **clientname**
- **MHAParser::vstring_t** **connections_in**
- **MHAParser::vint_mon_t** **delays_in**
- **MHAParser::vstring_t** **connections_out**
- **MHAParser::vint_mon_t** **delays_out**
- **MHAParser::vstring_t** **portnames_in**
- **MHAParser::vstring_t** **portnames_out**
- **MHAParser::vstring_mon_t** **ports_in_physical**
- **MHAParser::vstring_mon_t** **ports_out_physical**
- **MHAParser::vstring_mon_t** **ports_in_all**
- **MHAParser::vstring_mon_t** **ports_out_all**
- **MHAParser::parser_t** **ports_parser**
- **MHAParser::float_mon_t** **state_cpuload**
- **MHAParser::int_mon_t** **state_xruns**
- **MHAParser::int_mon_t** **state_priority**
- **MHAParser::string_mon_t** **state_scheduler**
- **MHAParser::parser_t** **state_parser**
- **MHAEvents::patchbay_t** < **io_jack_t** > **patchbay**

Additional Inherited Members

4.237.1 Detailed Description

Main class for JACK IO.

This class registers a JACK client. JACK and framework states are managed by this class.

4.237.2 Constructor & Destructor Documentation

4.237.2.1 io_jack_t()

```
io_jack_t::io_jack_t (
    unsigned int fragsize,
    float samplerate,
    IOProcessEvent_t proc_event,
    void * proc_handle,
    IOWorkEvent_t start_event,
    void * start_handle,
    IOWorkEvent_t stop_event,
    void * stop_handle )
```

4.237.3 Member Function Documentation

4.237.3.1 prepare()

```
void io_jack_t::prepare (
    int nch_in,
    int nch_out )
```

Allocate buffers, activate JACK client and install internal ports.

4.237.3.2 release()

```
void io_jack_t::release (
    void )
```

4.237.3.3 reconnect_inports()

```
void io_jack_t::reconnect_inports ( ) [private]
```

Connect the input ports when connection variable is accessed.

4.237.3.4 reconnect_outports()

```
void io_jack_t::reconnect_outports ( ) [private]
```

Connect the output ports when connection variable is accessed.

4.237.3.5 get_physical_input_ports()

```
void io_jack_t::get_physical_input_ports ( ) [private]
```

4.237.3.6 get_physical_output_ports()

```
void io_jack_t::get_physical_output_ports ( ) [private]
```


4.237.3.7 get_all_input_ports()

```
void io_jack_t::get_all_input_ports ( ) [private]
```

4.237.3.8 get_all_output_ports()

```
void io_jack_t::get_all_output_ports ( ) [private]
```

4.237.3.9 get_delays_in()

```
void io_jack_t::get_delays_in ( ) [private]
```

4.237.3.10 get_delays_out()

```
void io_jack_t::get_delays_out ( ) [private]
```

4.237.3.11 read_get_cpu_load()

```
void io_jack_t::read_get_cpu_load ( ) [private]
```

4.237.3.12 read_get_xruns()

```
void io_jack_t::read_get_xruns ( ) [private]
```

4.237.3.13 read_get_scheduler()

```
void io_jack_t::read_get_scheduler ( ) [private]
```

4.237.4 Member Data Documentation

4.237.4.1 fw_fragsize

unsigned int MHAIOJack::io_jack_t::fw_fragsize [private]

4.237.4.2 fw_samplerate

float MHAIOJack::io_jack_t::fw_samplerate [private]

4.237.4.3 servername

MHAParser::string_t MHAIOJack::io_jack_t::servername [private]

4.237.4.4 clientname

MHAParser::string_t MHAIOJack::io_jack_t::clientname [private]

4.237.4.5 connections_in

MHAParser::vstring_t MHAIOJack::io_jack_t::connections_in [private]

4.237.4.6 delays_in

MHAParser::vint_mon_t MHAIOJack::io_jack_t::delays_in [private]

4.237.4.7 connections_out

MHAParser::vstring_t MHAIOJack::io_jack_t::connections_out [private]

4.237.4.8 delays_out

MHAParser::vint_mon_t MHAIOJack::io_jack_t::delays_out [private]

4.237.4.9 portnames_in

MHAParser::vstring_t MHAIOJack::io_jack_t::portnames_in [private]

4.237.4.10 portnames_out

MHAParser::vstring_t MHAIOJack::io_jack_t::portnames_out [private]

4.237.4.11 ports_in_physical

MHAParser::vstring_mon_t MHAIOJack::io_jack_t::ports_in_physical [private]

4.237.4.12 ports_out_physical

MHAParser::vstring_mon_t MHAIOJack::io_jack_t::ports_out_physical [private]

4.237.4.13 ports_in_all

MHAParser::vstring_mon_t MHAIOJack::io_jack_t::ports_in_all [private]

4.237.4.14 ports_out_all

MHAParser::vstring_mon_t MHAIOJack::io_jack_t::ports_out_all [private]

4.237.4.15 ports_parser

MHAParser::parser_t MHAIOJack::io_jack_t::ports_parser [private]

4.237.4.16 state_cpuload

MHAParser::float_mon_t MHAIOJack::io_jack_t::state_cpuload [private]

4.237.4.17 state_xruns

```
MHAParser::int_mon_t MHAIOJack::io_jack_t::state_xruns [private]
```

4.237.4.18 state_priority

```
MHAParser::int_mon_t MHAIOJack::io_jack_t::state_priority [private]
```

4.237.4.19 state_scheduler

```
MHAParser::string_mon_t MHAIOJack::io_jack_t::state_scheduler [private]
```

4.237.4.20 state_parser

```
MHAParser::parser_t MHAIOJack::io_jack_t::state_parser [private]
```

4.237.4.21 patchbay

```
MHAEvents::patchbay_t< io_jack_t> MHAIOJack::io_jack_t::patchbay [private]
```

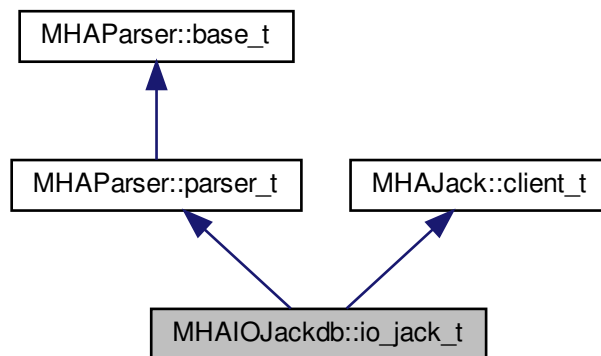
The documentation for this class was generated from the following file:

- **MHAIOJack.cpp**

4.238 MHAIOJackdb::io_jack_t Class Reference

Main class for JACK IO.

Inheritance diagram for MHAIOJackdb::io_jack_t:



Public Member Functions

- **io_jack_t** (unsigned int **fragsize**, float **samplerate**, **IOProcessEvent_t** **proc_event**, void * **proc_handle**, **IOStartedEvent_t** **start_event**, void * **start_handle**, **IOStoppedEvent_t** **stop_event**, void * **stop_handle**)
- void **prepare** (int, int)
Allocate buffers, activate JACK client and install internal ports.
- void **release** ()
- bool **fail_on_async_jackerror** () const

Private Member Functions

- int **IOProcessEvent_inner** (**mha_wave_t** *sIn, **mha_wave_t** **sOut)
- void **reconnect_inports** ()
Connect the input ports when connection variable is accessed.
- void **reconnect_outports** ()
Connect the output ports when connection variable is accessed.
- void **get_physical_input_ports** ()
- void **get_physical_output_ports** ()
- void **get_all_input_ports** ()
- void **get_all_output_ports** ()
- void **read_get_cpu_load** ()
- void **read_get_xruns** ()
- void **read_get_scheduler** ()
- void **set_use_jack_transport** ()
- void **set_locate** ()

Static Private Member Functions

- static int **IOProcessEvent_inner** (void *handle, **mha_wave_t** *sIn, **mha_wave_t** **sOut)

Private Attributes

- **IOProcessEvent_t** **proc_event**
- void * **proc_handle**
- unsigned int **mha_fragsize**
- float **mha_samplerate**
- unsigned int **fragsize_ratio**
- **MHAParser::string_t** **servername**
- **MHAParser::string_t** **clientname**
- **MHAParser::vstring_t** **connections_in**
- **MHAParser::vstring_t** **connections_out**
- **MHAParser::vstring_t** **portnames_in**
- **MHAParser::vstring_t** **portnames_out**

- **MHAParser::bool_t fail_on_async_jackerr**
- **MHAParser::bool_t use_jack_transport**
- **MHAParser::float_t locate**
- **MHAParser::float_mon_t server_srate**
- **MHAParser::int_mon_t server_fragsize**
- **MHAParser::vstring_mon_t ports_in_physical**
- **MHAParser::vstring_mon_t ports_out_physical**
- **MHAParser::vstring_mon_t ports_in_all**
- **MHAParser::vstring_mon_t ports_out_all**
- **MHAParser::parser_t ports_parser**
- **MHAParser::float_mon_t state_cpuload**
- **MHAParser::int_mon_t state_xruns**
- **MHAParser::int_mon_t state_priority**
- **MHAParser::string_mon_t state_scheduler**
- **MHAParser::parser_t state_parser**
- **MHASignal::waveform_t * pwinner_out**
- **MHAEvents::patchbay_t< io_jack_t > patchbay**

Additional Inherited Members

4.238.1 Detailed Description

Main class for JACK IO.

This class registers a JACK client. JACK and framework states are managed by this class.

4.238.2 Constructor & Destructor Documentation

4.238.2.1 io_jack_t()

```
io_jack_t::io_jack_t (
    unsigned int fragsize,
    float samplerate,
    IOProcessEvent_t proc_event,
    void * proc_handle,
    IOStartedEvent_t start_event,
    void * start_handle,
    IOStoppedEvent_t stop_event,
    void * stop_handle )
```

4.238.3 Member Function Documentation

4.238.3.1 prepare()

```
void io_jack_t::prepare (
    int nch_in,
    int nch_out )
```

Allocate buffers, activate JACK client and install internal ports.

4.238.3.2 release()

```
void io_jack_t::release (
    void )
```

4.238.3.3 fail_on_async_jackerror()

```
bool MHAIOJackdb::io_jack_t::fail_on_async_jackerror ( ) const [inline]
```

4.238.3.4 IOProcessEvent_inner() [1/2]

```
int io_jack_t::IOProcessEvent_inner (
    void * handle,
    mha_wave_t * sIn,
    mha_wave_t ** sOut ) [static], [private]
```

4.238.3.5 IOProcessEvent_inner() [2/2]

```
int io_jack_t::IOProcessEvent_inner (
    mha_wave_t * sIn,
    mha_wave_t ** sOut ) [private]
```

4.238.3.6 reconnect_inports()

```
void io_jack_t::reconnect_inports ( ) [private]
```

Connect the input ports when connection variable is accessed.

4.238.3.7 reconnect_outports()

```
void io_jack_t::reconnect_outports ( ) [private]
```

Connect the output ports when connection variable is accessed.

4.238.3.8 get_physical_input_ports()

```
void io_jack_t::get_physical_input_ports ( ) [private]
```

4.238.3.9 get_physical_output_ports()

```
void io_jack_t::get_physical_output_ports ( ) [private]
```

4.238.3.10 get_all_input_ports()

```
void io_jack_t::get_all_input_ports ( ) [private]
```

4.238.3.11 get_all_output_ports()

```
void io_jack_t::get_all_output_ports ( ) [private]
```

4.238.3.12 read_get_cpu_load()

```
void io_jack_t::read_get_cpu_load ( ) [private]
```

4.238.3.13 read_get_xruns()

```
void io_jack_t::read_get_xruns ( ) [private]
```


4.238.3.14 read_get_scheduler()

```
void io_jack_t::read_get_scheduler ( ) [private]
```

4.238.3.15 set_use_jack_transport()

```
void io_jack_t::set_use_jack_transport ( ) [private]
```

4.238.3.16 set_locate()

```
void io_jack_t::set_locate ( ) [private]
```

4.238.4 Member Data Documentation

4.238.4.1 proc_event

```
IOProcessEvent_t MHAIOJackdb::io_jack_t::proc_event [private]
```

4.238.4.2 proc_handle

```
void* MHAIOJackdb::io_jack_t::proc_handle [private]
```

4.238.4.3 mha_fragsize

```
unsigned int MHAIOJackdb::io_jack_t::mha_fragsize [private]
```

4.238.4.4 mha_samplerate

```
float MHAIOJackdb::io_jack_t::mha_samplerate [private]
```

4.238.4.5 fragsize_ratio

`unsigned int MHAIOJackdb::io_jack_t::fragsize_ratio [private]`

4.238.4.6 servername

`MHAParser::string_t MHAIOJackdb::io_jack_t::servername [private]`

4.238.4.7 clientname

`MHAParser::string_t MHAIOJackdb::io_jack_t::clientname [private]`

4.238.4.8 connections_in

`MHAParser::vstring_t MHAIOJackdb::io_jack_t::connections_in [private]`

4.238.4.9 connections_out

`MHAParser::vstring_t MHAIOJackdb::io_jack_t::connections_out [private]`

4.238.4.10 portnames_in

`MHAParser::vstring_t MHAIOJackdb::io_jack_t::portnames_in [private]`

4.238.4.11 portnames_out

`MHAParser::vstring_t MHAIOJackdb::io_jack_t::portnames_out [private]`

4.238.4.12 fail_on_async_jackerr

`MHAParser::bool_t MHAIOJackdb::io_jack_t::fail_on_async_jackerr [private]`

4.238.4.13 use_jack_transport

MHAParser::bool_t MHAIOJackdb::io_jack_t::use_jack_transport [private]

4.238.4.14 locate

MHAParser::float_t MHAIOJackdb::io_jack_t::locate [private]

4.238.4.15 server_srate

MHAParser::float_mon_t MHAIOJackdb::io_jack_t::server_srate [private]

4.238.4.16 server_fragsize

MHAParser::int_mon_t MHAIOJackdb::io_jack_t::server_fragsize [private]

4.238.4.17 ports_in_physical

MHAParser::vstring_mon_t MHAIOJackdb::io_jack_t::ports_in_physical [private]

4.238.4.18 ports_out_physical

MHAParser::vstring_mon_t MHAIOJackdb::io_jack_t::ports_out_physical [private]

4.238.4.19 ports_in_all

MHAParser::vstring_mon_t MHAIOJackdb::io_jack_t::ports_in_all [private]

4.238.4.20 ports_out_all

MHAParser::vstring_mon_t MHAIOJackdb::io_jack_t::ports_out_all [private]

4.238.4.21 ports_parser

MHAParser::parser_t MHAIOJackdb::io_jack_t::ports_parser [private]

4.238.4.22 state_cpuload

MHAParser::float_mon_t MHAIOJackdb::io_jack_t::state_cpuload [private]

4.238.4.23 state_xruns

MHAParser::int_mon_t MHAIOJackdb::io_jack_t::state_xruns [private]

4.238.4.24 state_priority

MHAParser::int_mon_t MHAIOJackdb::io_jack_t::state_priority [private]

4.238.4.25 state_scheduler

MHAParser::string_mon_t MHAIOJackdb::io_jack_t::state_scheduler [private]

4.238.4.26 state_parser

MHAParser::parser_t MHAIOJackdb::io_jack_t::state_parser [private]

4.238.4.27 pwinner_out

MHASignal::waveform_t* MHAIOJackdb::io_jack_t::pwinner_out [private]

4.238.4.28 patchbay

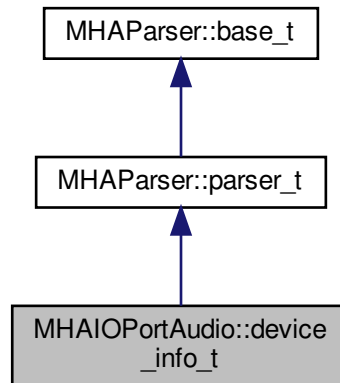
MHAEvents::patchbay_t< io_jack_t> MHAIOJackdb::io_jack_t::patchbay [private]

The documentation for this class was generated from the following file:

- **MHAIOJackdb.cpp**

4.239 MHAIOPortAudio::device_info_t Class Reference

Inheritance diagram for MHAIOPortAudio::device_info_t:



Public Member Functions

- **device_info_t** ()
- void **fill_info** ()

Public Attributes

- **MHAParser::int_mon_t** numDevices
- **MHAParser::vint_mon_t** structVersion
- **MHAParser::vstring_mon_t** name
- **MHAParser::vint_mon_t** hostApi
- **MHAParser::vint_mon_t** maxInputChannels
- **MHAParser::vint_mon_t** maxOutputChannels
- **MHAParser::vfloat_mon_t** defaultLowInputLatency
- **MHAParser::vfloat_mon_t** defaultLowOutputLatency
- **MHAParser::vfloat_mon_t** defaultHighInputLatency
- **MHAParser::vfloat_mon_t** defaultHighOutputLatency
- **MHAParser::vfloat_mon_t** defaultSampleRate

Additional Inherited Members

4.239.1 Constructor & Destructor Documentation

4.239.1.1 device_info_t()

```
MHAIOPortAudio::device_info_t::device_info_t ( ) [inline]
```

4.239.2 Member Function Documentation

4.239.2.1 fill_info()

```
void MHAIOPortAudio::device_info_t::fill_info ( ) [inline]
```

4.239.3 Member Data Documentation

4.239.3.1 numDevices

```
MHAParser::int_mon_t MHAIOPortAudio::device_info_t::numDevices
```

4.239.3.2 structVersion

```
MHAParser::vint_mon_t MHAIOPortAudio::device_info_t::structVersion
```

4.239.3.3 name

```
MHAParser::vstring_mon_t MHAIOPortAudio::device_info_t::name
```

4.239.3.4 hostApi

```
MHAParser::vint_mon_t MHAIOPortAudio::device_info_t::hostApi
```

4.239.3.5 maxInputChannels

```
MHAParser::vint_mon_t MHAIOPortAudio::device_info_t::maxInputChannels
```

4.239.3.6 maxOutputChannels

MHAParser::vint_mon_t MHAIOPortAudio::device_info_t::maxOutputChannels

4.239.3.7 defaultLowInputLatency

MHAParser::vfloat_mon_t MHAIOPortAudio::device_info_t::defaultLowInputLatency

4.239.3.8 defaultLowOutputLatency

MHAParser::vfloat_mon_t MHAIOPortAudio::device_info_t::defaultLowOutputLatency

4.239.3.9 defaultHighInputLatency

MHAParser::vfloat_mon_t MHAIOPortAudio::device_info_t::defaultHighInputLatency

4.239.3.10 defaultHighOutputLatency

MHAParser::vfloat_mon_t MHAIOPortAudio::device_info_t::defaultHighOutputLatency

4.239.3.11 defaultSampleRate

MHAParser::vfloat_mon_t MHAIOPortAudio::device_info_t::defaultSampleRate

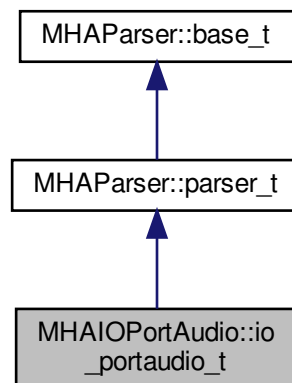
The documentation for this class was generated from the following file:

- **MHAIOPortAudio.cpp**

4.240 MHAIOPortAudio::io_portaudio_t Class Reference

Main class for Portaudio sound IO.

Inheritance diagram for MHAIOPortAudio::io_portaudio_t:



Public Member Functions

- **io_portaudio_t** (unsigned int **fragsize**, float **samplerate**, IOProcessEvent_t **proc_event**, void * **proc_handle**, IOStartedEvent_t **start_event**, void * **start_handle**, IOStoppedEvent_t **stop_event**, void * **stop_handle**)
- void **device_name_updated** ()
- void **device_index_updated** ()
- ~**io_portaudio_t** ()
- void **cmd_prepare** (int, int)
- void **cmd_start** ()
- void **cmd_stop** ()
- void **cmd_release** ()
- int **portaudio_callback** (const void *input, void *output, unsigned long frame_count, const PaStreamCallbackTimeInfo *time_info, PaStreamCallbackFlags status_flags)

Private Attributes

- **device_info_t** **device_info**
- MHASignal::waveform_t * **s_in**
- mha_wave_t * **s_out**
- float **samplerate**
- unsigned int **nchannels_out**
- unsigned int **nchannels_in**

- unsigned int **fragsize**
- **IOProcessEvent_t** **proc_event**
- void * **proc_handle**
- **IOStartedEvent_t** **start_event**
- void * **start_handle**
- **IOStoppedEvent_t** **stop_event**
- void * **stop_handle**
- PaStream * **portaudio_stream**
- **MHAParser::string_t** **device_name**
- **MHAParser::int_t** **device_index**
- **MHAEvents::patchbay_t** < **io_portaudio_t** > **patchbay**

Additional Inherited Members

4.240.1 Detailed Description

Main class for Portaudio sound IO.

4.240.2 Constructor & Destructor Documentation

4.240.2.1 io_portaudio_t()

```
MHAIOPortAudio::io_portaudio_t::io_portaudio_t (  
    unsigned int fragsize,  
    float samplerate,  
    IOProcessEvent_t proc_event,  
    void * proc_handle,  
    IOStartedEvent_t start_event,  
    void * start_handle,  
    IOStoppedEvent_t stop_event,  
    void * stop_handle ) [inline]
```

4.240.2.2 ~io_portaudio_t()

```
MHAIOPortAudio::io_portaudio_t::~io_portaudio_t ( ) [inline]
```

4.240.3 Member Function Documentation

4.240.3.1 device_name_updated()

```
void MHAIOPortAudio::io_portaudio_t::device_name_updated ( ) [inline]
```

4.240.3.2 device_index_updated()

```
void MHAIOPortAudio::io_portaudio_t::device_index_updated ( ) [inline]
```

4.240.3.3 cmd_prepare()

```
void MHAIOPortAudio::io_portaudio_t::cmd_prepare (
    int nchannels_in,
    int nchannels_out )
```

4.240.3.4 cmd_start()

```
void MHAIOPortAudio::io_portaudio_t::cmd_start ( )
```

4.240.3.5 cmd_stop()

```
void MHAIOPortAudio::io_portaudio_t::cmd_stop ( )
```

4.240.3.6 cmd_release()

```
void MHAIOPortAudio::io_portaudio_t::cmd_release ( )
```

4.240.3.7 portaudio_callback()

```
int MHAIOPortAudio::io_portaudio_t::portaudio_callback (
    const void * input,
    void * output,
    unsigned long frame_count,
    const PaStreamCallbackTimeInfo * time_info,
    PaStreamCallbackFlags status_flags )
```

4.240.4 Member Data Documentation

4.240.4.1 device_info

device_info_t MHAIOPortAudio::io_portaudio_t::device_info [private]

4.240.4.2 s_in

MHASignal::waveform_t* MHAIOPortAudio::io_portaudio_t::s_in [private]

4.240.4.3 s_out

mha_wave_t* MHAIOPortAudio::io_portaudio_t::s_out [private]

4.240.4.4 samplerate

float MHAIOPortAudio::io_portaudio_t::samplerate [private]

4.240.4.5 nchannels_out

unsigned int MHAIOPortAudio::io_portaudio_t::nchannels_out [private]

4.240.4.6 nchannels_in

unsigned int MHAIOPortAudio::io_portaudio_t::nchannels_in [private]

4.240.4.7 fragsize

unsigned int MHAIOPortAudio::io_portaudio_t::fragsize [private]

4.240.4.8 proc_event

IOProcessEvent_t MHAIOPortAudio::io_portaudio_t::proc_event [private]

4.240.4.9 proc_handle

void* MHAIOPortAudio::io_portaudio_t::proc_handle [private]

4.240.4.10 start_event

IOStartedEvent_t MHAIOPortAudio::io_portaudio_t::start_event [private]

4.240.4.11 start_handle

void* MHAIOPortAudio::io_portaudio_t::start_handle [private]

4.240.4.12 stop_event

IOStoppedEvent_t MHAIOPortAudio::io_portaudio_t::stop_event [private]

4.240.4.13 stop_handle

void* MHAIOPortAudio::io_portaudio_t::stop_handle [private]

4.240.4.14 portaudio_stream

PaStream* MHAIOPortAudio::io_portaudio_t::portaudio_stream [private]

4.240.4.15 device_name

MHAParser::string_t MHAIOPortAudio::io_portaudio_t::device_name [private]

4.240.4.16 device_index

```
MHAParser::int_t MHAIOPortAudio::io_portaudio_t::device_index [private]
```

4.240.4.17 patchbay

```
MHAEvents::patchbay_t< io_portaudio_t> MHAIOPortAudio::io_portaudio_t::patchbay  
[private]
```

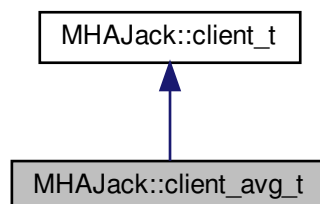
The documentation for this class was generated from the following file:

- MHAIOPortAudio.cpp

4.241 MHAJack::client_avg_t Class Reference

Generic JACK client for averaging a system response across time.

Inheritance diagram for MHAJack::client_avg_t:



Public Member Functions

- **client_avg_t** (const std::string & **name**, const unsigned int &nrep_)
Constructor for averaging client.
- void **io** (**mha_wave_t** * **s_out**, **mha_wave_t** * **s_in**, const std::vector< std::string > &p_out, const std::vector< std::string > &p_in, float *srate=NULL, unsigned int * **frag-size**=NULL)
Recording function.

Private Member Functions

- void **proc** (**mha_wave_t** *sIn, **mha_wave_t** **sOut)
- void **IOStoppedEvent** ()

Static Private Member Functions

- static int **proc** (void *handle, **mha_wave_t** *sIn, **mha_wave_t** **sOut)
- static void **IOStoppedEvent** (void *handle, int proc_err, int io_err)

Private Attributes

- bool **b_stopped**
- unsigned int **pos**
- **mha_wave_t** * **sn_in**
- **mha_wave_t** * **sn_out**
- std::string **name**
- **MHASignal::waveform_t** * **frag_out**
- const unsigned int **nrep**
- unsigned int **n**
- bool **b_ready**

Additional Inherited Members

4.241.1 Detailed Description

Generic JACK client for averaging a system response across time.

4.241.2 Constructor & Destructor Documentation

4.241.2.1 client_avg_t()

```
MHAJack::client_avg_t::client_avg_t (
    const std::string & name_,
    const unsigned int & nrep_ )
```

Constructor for averaging client.

Parameters

<i>name</i> ↔ —	Name of JACK client
<i>nrep</i> ↔ —	Number of repetitions

4.241.3 Member Function Documentation

4.241.3.1 io()

```
void MHAJack::client_avg_t::io (
    mha_wave_t * is_out,
    mha_wave_t * is_in,
    const std::vector< std::string > & p_out,
    const std::vector< std::string > & p_in,
    float * srate = NULL,
    unsigned int * fragsize = NULL )
```

Recording function.

long-description

Parameters

<i>is_out</i>	Input (test) signal, which will be repeated
<i>is_in</i>	System response (averaged, same length as input required)
<i>p_out</i>	Ports to play back the test signal
<i>p_in</i>	Ports to record from the system response
<i>srate</i>	Pointer to sampling rate variable, will be filled with server sampling rate
<i>fragsize</i>	Pointer to fragment size variable, will be filled with server fragment size

4.241.3.2 proc() [1/2]

```
int MHAJack::client_avg_t::proc (
    void * handle,
    mha_wave_t * sIn,
    mha_wave_t ** sOut ) [static], [private]
```

4.241.3.3 IOSToppedEvent() [1/2]

```
void MHAJack::client_avg_t::IOStoppedEvent (
    void * handle,
    int proc_err,
    int io_err ) [static], [private]
```

4.241.3.4 proc() [2/2]

```
void MHAJack::client_avg_t::proc (
    mha_wave_t * sIn,
    mha_wave_t ** sOut ) [private]
```

4.241.3.5 IOSToppedEvent() [2/2]

```
void MHAJack::client_avg_t::IOStoppedEvent ( ) [private]
```

4.241.4 Member Data Documentation**4.241.4.1 b_stopped**

```
bool MHAJack::client_avg_t::b_stopped [private]
```

4.241.4.2 pos

```
unsigned int MHAJack::client_avg_t::pos [private]
```

4.241.4.3 sn_in

```
mha_wave_t* MHAJack::client_avg_t::sn_in [private]
```


4.241.4.4 sn_out

mha_wave_t* MHAJack::client_avg_t::sn_out [private]

4.241.4.5 name

std::string MHAJack::client_avg_t::name [private]

4.241.4.6 frag_out

MHASignal::waveform_t* MHAJack::client_avg_t::frag_out [private]

4.241.4.7 nrep

const unsigned int MHAJack::client_avg_t::nrep [private]

4.241.4.8 n

unsigned int MHAJack::client_avg_t::n [private]

4.241.4.9 b_ready

bool MHAJack::client_avg_t::b_ready [private]

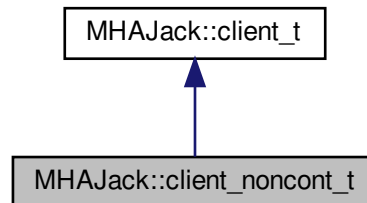
The documentation for this class was generated from the following files:

- **mhajack.h**
- **mhajack.cpp**

4.242 MHAJack::client_noncont_t Class Reference

Generic client for synchronous playback and recording of waveform fragments.

Inheritance diagram for MHAJack::client_noncont_t:



Public Member Functions

- **client_noncont_t** (const std::string & **name**, bool **use_jack_transport**=false)
- void **io** (**mha_wave_t** * **s_out**, **mha_wave_t** * **s_in**, const std::vector< std::string > &p_out, const std::vector< std::string > &p_in, float *srate=NULL, unsigned int * **frag-size**=NULL)

Private Member Functions

- void **proc** (**mha_wave_t** *sIn, **mha_wave_t** **sOut)
- void **IOStoppedEvent** ()

Static Private Member Functions

- static int **proc** (void *handle, **mha_wave_t** *sIn, **mha_wave_t** **sOut)
- static void **IOStoppedEvent** (void *handle, int proc_err, int io_err)

Private Attributes

- bool **b_stopped**
- unsigned int **pos**
- **mha_wave_t** * **sn_in**
- **mha_wave_t** * **sn_out**
- std::string **name**
- **MHASignal::waveform_t** * **frag_out**

Additional Inherited Members

4.242.1 Detailed Description

Generic client for synchronous playback and recording of waveform fragments.

4.242.2 Constructor & Destructor Documentation

4.242.2.1 client_noncont_t()

```
MHAJack::client_noncont_t::client_noncont_t (
    const std::string & name,
    bool use_jack_transport = false )
```

4.242.3 Member Function Documentation

4.242.3.1 io()

```
void MHAJack::client_noncont_t::io (
    mha_wave_t * s_out,
    mha_wave_t * s_in,
    const std::vector< std::string > & p_out,
    const std::vector< std::string > & p_in,
    float * srate = NULL,
    unsigned int * fragsize = NULL )
```

4.242.3.2 proc() [1/2]

```
int MHAJack::client_noncont_t::proc (
    void * handle,
    mha_wave_t * sIn,
    mha_wave_t ** sOut ) [static], [private]
```

4.242.3.3 IOStoppedEvent() [1/2]

```
void MHAJack::client_noncont_t::IOStoppedEvent (
    void * handle,
    int proc_err,
    int io_err ) [static], [private]
```

4.242.3.4 proc() [2/2]

```
void MHAJack::client_noncont_t::proc (
    mha_wave_t * sIn,
    mha_wave_t ** sOut ) [private]
```

4.242.3.5 IOStoppedEvent() [2/2]

```
void MHAJack::client_noncont_t::IOStoppedEvent ( ) [private]
```

4.242.4 Member Data Documentation

4.242.4.1 b_stopped

```
bool MHAJack::client_noncont_t::b_stopped [private]
```

4.242.4.2 pos

```
unsigned int MHAJack::client_noncont_t::pos [private]
```

4.242.4.3 sn_in

```
mha_wave_t* MHAJack::client_noncont_t::sn_in [private]
```

4.242.4.4 sn_out

```
mha_wave_t* MHAJack::client_noncont_t::sn_out [private]
```

4.242.4.5 name

```
std::string MHAJack::client_noncont_t::name [private]
```

4.242.4.6 frag_out

```
MHASignal::waveform_t* MHAJack::client_noncont_t::frag_out [private]
```

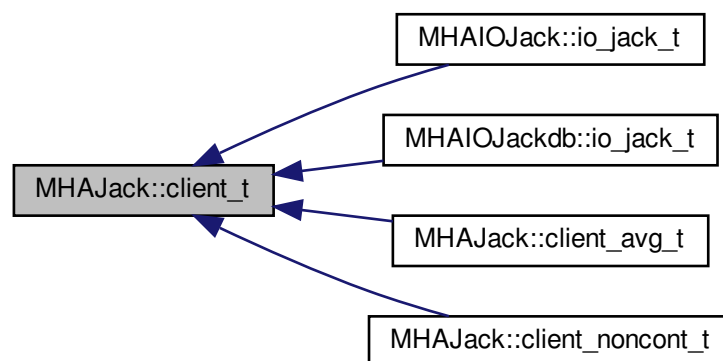
The documentation for this class was generated from the following files:

- mhajack.h
- mhajack.cpp

4.243 MHAJack::client_t Class Reference

Generic asynchronous JACK client.

Inheritance diagram for MHAJack::client_t:



Public Member Functions

- **client_t** (**IOProcessEvent_t** **proc_event**, void * **proc_handle**=NULL, **IOStartedEvent_t** **start_event**=NULL, void * **start_handle**=NULL, **IOStoppedEvent_t** **stop_event**=NULL, void * **stop_handle**=NULL, bool **use_jack_transport**=false)
- void **prepare** (const std::string &client_name, const unsigned int & **nchannels_in**, const unsigned int & **nchannels_out**)
Allocate buffers, activate JACK client and install internal ports.
- void **prepare** (const std::string &server_name, const std::string &client_name, const unsigned int & **nchannels_in**, const unsigned int & **nchannels_out**)
Allocate buffers, ports, and activates JACK client.
- void **release** ()
Remove JACK client and deallocate internal ports and buffers.
- void **start** (bool fail_on_async_jack_error=true)
- void **stop** ()
- void **connect_input** (const std::vector< std::string > &)
Connect the input ports when connection variable is accessed.
- void **connect_output** (const std::vector< std::string > &)
Connect the output ports when connection variable is accessed.
- unsigned int **get_fragsize** () const
- float **get_srate** () const
- unsigned long **get_xruns** ()
- unsigned long **get_xruns_reset** ()
- std::string **str_error** (int err)
- void **get_ports** (std::vector< std::string > &, unsigned long jack_flags)
Get a list of Jack ports.
- std::vector< std::string > **get_my_input_ports** ()
- std::vector< std::string > **get_my_output_ports** ()
- void **set_input_portnames** (const std::vector< std::string > &)
- void **set_output_portnames** (const std::vector< std::string > &)
- float **get_cpu_load** ()
- void **set_use_jack_transport** (bool ut)

Protected Attributes

- jack_client_t * **jc**

Private Member Functions

- void **prepare_impl** (const char *server_name, const char *client_name, const unsigned int & **nchannels_in**, const unsigned int & **nchannels_out**)
Allocate buffers, activate JACK client and allocates jack ports Registers the jack client with the given server and activates it.
- void **internal_start** ()
- void **internal_stop** ()
- void **stopped** (int, int)
- int **jack_proc_cb** (jack_nframes_t)
This is the main processing callback.
- int **jack_xrun_cb** ()

Static Private Member Functions

- static int **jack_proc_cb** (jack_nframes_t, void *)
- static int **jack_xrun_cb** (void *)

Private Attributes

- unsigned long **num_xruns**
- unsigned int **fragsize**
- float **samplerate**
- unsigned int **nchannels_in**
- unsigned int **nchannels_out**
- **IOProcessEvent_t** **proc_event**
- void * **proc_handle**
- **IOStartedEvent_t** **start_event**
- void * **start_handle**
- **IOStoppedEvent_t** **stop_event**
- void * **stop_handle**
- **MHASignal::waveform_t** * **s_in**
- **mha_wave_t** * **s_out**
- **MHAJack::port_t** ** **inch**
- **MHAJack::port_t** ** **outch**
- unsigned int **flags**
- bool **b_prepared**
- bool **use_jack_transport**
- **jack_transport_state_t** **jstate_prev**
- **std::vector< std::string >** **input_portnames**
- **std::vector< std::string >** **output_portnames**
- bool **fail_on_async_jackerror**

4.243.1 Detailed Description

Generic asynchronous JACK client.

4.243.2 Constructor & Destructor Documentation

4.243.2.1 client_t()

```
MHAJack::client_t::client_t (
    IOProcessEvent_t proc_event,
    void * proc_handle = NULL,
    IOStartedEvent_t start_event = NULL,
    void * start_handle = NULL,
    IOStoppedEvent_t stop_event = NULL,
    void * stop_handle = NULL,
    bool use_jack_transport = false )
```

4.243.3 Member Function Documentation

4.243.3.1 `prepare()` [1/2]

```
void MHAJack::client_t::prepare (
    const std::string & client_name,
    const unsigned int & nch_in,
    const unsigned int & nch_out )
```

Allocate buffers, activate JACK client and install internal ports.

Registers the jack client with the default jack server and activates it.

Parameters

<i>client_name</i>	Name of this jack client
<i>nch_in</i>	Input ports to register
<i>nch_out</i>	Output ports to register

4.243.3.2 `prepare()` [2/2]

```
void MHAJack::client_t::prepare (
    const std::string & server_name,
    const std::string & client_name,
    const unsigned int & nch_in,
    const unsigned int & nch_out )
```

Allocate buffers, ports, and activates JACK client.

Registers the jack client with specified jack server and activates it.

Parameters

<i>server_name</i>	Name of the jack server to register with
<i>client_name</i>	Name of this jack client
<i>nch_in</i>	Input ports to register
<i>nch_out</i>	Output ports to register

4.243.3.3 `release()`

```
void MHAJack::client_t::release (
```



```
void )
```

Remove JACK client and deallocate internal ports and buffers.

4.243.3.4 start()

```
void MHAJack::client_t::start (
    bool fail_on_async_jack_error = true )
```

4.243.3.5 stop()

```
void MHAJack::client_t::stop ( )
```

4.243.3.6 connect_input()

```
void MHAJack::client_t::connect_input (
    const std::vector< std::string > & con )
```

Connect the input ports when connection variable is accessed.

4.243.3.7 connect_output()

```
void MHAJack::client_t::connect_output (
    const std::vector< std::string > & con )
```

Connect the output ports when connection variable is accessed.

4.243.3.8 get_fragsize()

```
unsigned int MHAJack::client_t::get_fragsize ( ) const [inline]
```

4.243.3.9 get_srate()

```
float MHAJack::client_t::get_srate ( ) const [inline]
```

4.243.3.10 get_xruns()

```
unsigned long MHAJack::client_t::get_xruns ( ) [inline]
```

4.243.3.11 get_xruns_reset()

```
unsigned long MHAJack::client_t::get_xruns_reset ( )
```

4.243.3.12 str_error()

```
std::string MHAJack::client_t::str_error (
    int err )
```

4.243.3.13 get_ports()

```
void MHAJack::client_t::get_ports (
    std::vector< std::string > & res,
    unsigned long jack_flags )
```

Get a list of Jack ports.

Parameters

<i>res</i>	Result string vector
<i>jack_flags</i>	Jack port flags (JackPortInput etc.)

4.243.3.14 get_my_input_ports()

```
std::vector< std::string > MHAJack::client_t::get_my_input_ports ( )
```

4.243.3.15 get_my_output_ports()

```
std::vector< std::string > MHAJack::client_t::get_my_output_ports ( )
```

4.243.3.16 set_input_portnames()

```
void MHAJack::client_t::set_input_portnames (
    const std::vector< std::string > & names )
```

4.243.3.17 set_output_portnames()

```
void MHAJack::client_t::set_output_portnames (
    const std::vector< std::string > & names )
```

4.243.3.18 get_cpu_load()

```
float MHAJack::client_t::get_cpu_load ( )
```

4.243.3.19 set_use_jack_transport()

```
void MHAJack::client_t::set_use_jack_transport (
    bool ut ) [inline]
```

4.243.3.20 prepare_impl()

```
void MHAJack::client_t::prepare_impl (
    const char * server_name,
    const char * client_name,
    const unsigned int & nch_in,
    const unsigned int & nch_out ) [private]
```

Allocate buffers, activate JACK client and allocates jack ports Registers the jack client with the given server and activates it.

Parameters

<i>server_name</i>	Name of the jack server to register with
<i>client_name</i>	Name of this jack client
<i>nch_in</i>	Input ports to register
<i>nch_out</i>	Output ports to register

4.243.3.21 internal_start()

```
void MHAJack::client_t::internal_start ( ) [private]
```

4.243.3.22 internal_stop()

```
void MHAJack::client_t::internal_stop ( ) [private]
```

4.243.3.23 stopped()

```
void MHAJack::client_t::stopped (
    int proc_err,
    int io_err ) [private]
```

4.243.3.24 jack_proc_cb() [1/2]

```
int MHAJack::client_t::jack_proc_cb (
    jack_nframes_t n,
    void * h ) [static], [private]
```

4.243.3.25 jack_proc_cb() [2/2]

```
int MHAJack::client_t::jack_proc_cb (
    jack_nframes_t n ) [private]
```

This is the main processing callback.

Here happens double buffering and downsampling.

4.243.3.26 jack_xrun_cb() [1/2]

```
int MHAJack::client_t::jack_xrun_cb (
    void * h ) [static], [private]
```

4.243.3.27 jack_xrun_cb() [2/2]

```
int MHAJack::client_t::jack_xrun_cb ( ) [inline], [private]
```

4.243.4 Member Data Documentation

4.243.4.1 num_xruns

unsigned long MHAJack::client_t::num_xruns [private]

4.243.4.2 fragsize

unsigned int MHAJack::client_t::fragsize [private]

4.243.4.3 samplerate

float MHAJack::client_t::samplerate [private]

4.243.4.4 nchannels_in

unsigned int MHAJack::client_t::nchannels_in [private]

4.243.4.5 nchannels_out

unsigned int MHAJack::client_t::nchannels_out [private]

4.243.4.6 proc_event

IOProcessEvent_t MHAJack::client_t::proc_event [private]

4.243.4.7 proc_handle

void* MHAJack::client_t::proc_handle [private]

4.243.4.8 start_event

IOStartedEvent_t MHAJack::client_t::start_event [private]

4.243.4.9 start_handle

void* MHAJack::client_t::start_handle [private]

4.243.4.10 stop_event

IOStoppedEvent_t MHAJack::client_t::stop_event [private]

4.243.4.11 stop_handle

void* MHAJack::client_t::stop_handle [private]

4.243.4.12 s_in

MHASignal::waveform_t* MHAJack::client_t::s_in [private]

4.243.4.13 s_out

mha_wave_t* MHAJack::client_t::s_out [private]

4.243.4.14 inch

MHAJack::port_t** MHAJack::client_t::inch [private]

4.243.4.15 outch

MHAJack::port_t** MHAJack::client_t::outch [private]

4.243.4.16 jc

```
jack_client_t* MHAJack::client_t::jc [protected]
```

4.243.4.17 flags

```
unsigned int MHAJack::client_t::flags [private]
```

4.243.4.18 b_prepared

```
bool MHAJack::client_t::b_prepared [private]
```

4.243.4.19 use_jack_transport

```
bool MHAJack::client_t::use_jack_transport [private]
```

4.243.4.20 jstate_prev

```
jack_transport_state_t MHAJack::client_t::jstate_prev [private]
```

4.243.4.21 input_portnames

```
std::vector<std::string> MHAJack::client_t::input_portnames [private]
```

4.243.4.22 output_portnames

```
std::vector<std::string> MHAJack::client_t::output_portnames [private]
```

4.243.4.23 fail_on_async_jackerror

```
bool MHAJack::client_t::fail_on_async_jackerror [private]
```

The documentation for this class was generated from the following files:

- **mhajack.h**
- **mhajack.cpp**

4.244 MHAJack::port_t Class Reference

Class for one channel/port.

Public Types

- enum **dir_t** { **input**, **output** }

Public Member Functions

- **port_t** (jack_client_t * **jc**, **dir_t** dir, int id)
- **port_t** (jack_client_t * **jc**, **dir_t** dir, const std::string &id)
Constructor to create port with specific name.
- **~port_t** ()
- void **read** (**mha_wave_t** *s, unsigned int ch)
- void **write** (**mha_wave_t** *s, unsigned int ch)
- void **mute** (unsigned int n)
- void **connect_to** (const char *pn)
- const char * **get_short_name** ()
Return the port name.

Private Attributes

- **dir_t** **dir_type**
- jack_port_t * **port**
- jack_default_audio_sample_t * **iob**
- jack_client_t * **jc**

4.244.1 Detailed Description

Class for one channel/port.

This class represents one JACK port. Double buffering for asynchronous process callbacks is managed by this class.

4.244.2 Member Enumeration Documentation

4.244.2.1 dir_t

```
enum MHAJack::port_t::dir_t
```


Enumerator

input	
output	

4.244.3 Constructor & Destructor Documentation

4.244.3.1 port_t() [1/2]

```
MHAJack::port_t::port_t (
    jack_client_t * jc,
    dir_t dir,
    int id )
```

Parameters

<i>jc</i>	JACK client.
<i>dir</i>	Direction (input/output).
<i>id</i>	Number in port name (starting with 1).

4.244.3.2 port_t() [2/2]

```
MHAJack::port_t::port_t (
    jack_client_t * jc,
    dir_t dir,
    const std::string & id )
```

Constructor to create port with specific name.

Parameters

<i>jc</i>	JACK client.
<i>dir</i>	Direction (input/output).
<i>id</i>	Port name.

4.244.3.3 ~port_t()

```
MHAJack::port_t::~~port_t ( )
```

4.244.4 Member Function Documentation

4.244.4.1 read()

```
void MHAJack::port_t::read (
    mha_wave_t * s,
    unsigned int ch )
```

Parameters

<i>s</i>	Signal structure to store the audio data.
<i>ch</i>	Channel number in audio data structure to be used.

4.244.4.2 write()

```
void MHAJack::port_t::write (
    mha_wave_t * s,
    unsigned int ch )
```

Parameters

<i>s</i>	Signal structure from which the audio data is read.
<i>ch</i>	Channel number in audio data structure to be used.

4.244.4.3 mute()

```
void MHAJack::port_t::mute (
    unsigned int n )
```

Parameters

<i>n</i>	Number of samples to be muted (must be the same as reported by Jack processing callback).
----------	---

4.244.4.4 connect_to()

```
void MHAJack::port_t::connect_to (
    const char * pn )
```

Parameters

<i>pn</i>	Port name to connect to
-----------	-------------------------

4.244.4.5 get_short_name()

```
const char * MHAJack::port_t::get_short_name ( )
```

Return the port name.

4.244.5 Member Data Documentation

4.244.5.1 dir_type

```
dir_t MHAJack::port_t::dir_type [private]
```

4.244.5.2 port

```
jack_port_t* MHAJack::port_t::port [private]
```

4.244.5.3 iob

```
jack_default_audio_sample_t* MHAJack::port_t::iob [private]
```

4.244.5.4 jc

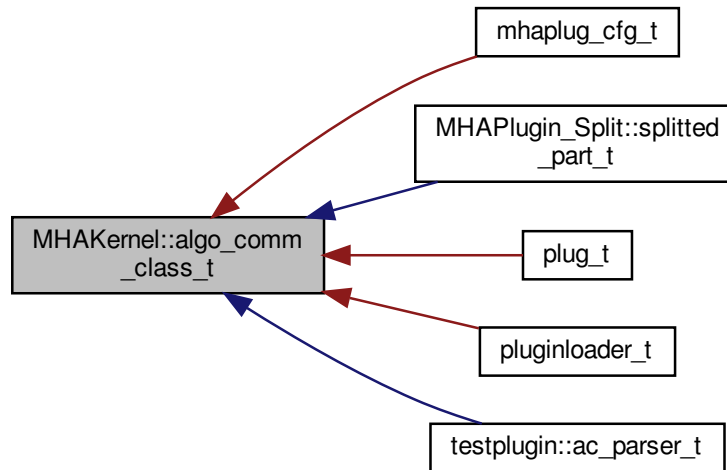
```
jack_client_t* MHAJack::port_t::jc [private]
```

The documentation for this class was generated from the following files:

- **mhajack.h**
- **mhajack.cpp**

4.245 MHAKernel::algo_comm_class_t Class Reference

Inheritance diagram for MHAKernel::algo_comm_class_t:



Public Member Functions

- **algo_comm_class_t** ()
- virtual **~algo_comm_class_t** ()
- **algo_comm_t get_c_handle** ()
- virtual void **local_insert_var** (const char *, **comm_var_t**)
- virtual void **local_remove_var** (const char *)
- virtual void **local_remove_ref** (void *)
- virtual bool **local_is_var** (const char *)
- virtual void **local_get_var** (const char *, **comm_var_t** *)
- virtual std::string **local_get_entries** ()
- virtual comm_var_map_t::size_type **size** () const

Static Public Member Functions

- static int **insert_var** (void *, const char *, **comm_var_t**)
- static int **insert_var_int** (void *, const char *, int *)
- static int **insert_var_vfloat** (void *handle, const char *name, std::vector< float > &ivar)
- static int **insert_var_float** (void *, const char *, float *)
- static int **remove_var** (void *, const char *)
- static int **remove_ref** (void *, void *)
- static int **is_var** (void *, const char *)

- static int **get_var** (void *, const char *, **comm_var_t** *)
- static int **get_var_int** (void *, const char *, int *)
- static int **get_var_float** (void *, const char *, float *)
- static int **get_entries** (void *, char *, unsigned int)
- static const char * **get_error** (int)

Public Attributes

- char * **algo_comm_id_string**

Private Attributes

- **algo_comm_t** ac
- int **algo_comm_id_string_len**
- **comm_var_map_t** vars

4.245.1 Constructor & Destructor Documentation

4.245.1.1 algo_comm_class_t()

```
MHAKernel::algo_comm_class_t::algo_comm_class_t ( )
```

4.245.1.2 ~algo_comm_class_t()

```
MHAKernel::algo_comm_class_t::~~algo_comm_class_t ( ) [virtual]
```

4.245.2 Member Function Documentation

4.245.2.1 get_c_handle()

```
algo_comm_t MHAKernel::algo_comm_class_t::get_c_handle ( )
```

4.245.2.2 insert_var()

```
int MHAKernel::algo_comm_class_t::insert_var (
    void * handle,
    const char * name,
    comm_var_t var ) [static]
```

4.245.2.3 insert_var_int()

```
int MHAKernel::algo_comm_class_t::insert_var_int (
    void * handle,
    const char * name,
    int * ivar ) [static]
```

4.245.2.4 insert_var_vfloat()

```
int MHAKernel::algo_comm_class_t::insert_var_vfloat (
    void * handle,
    const char * name,
    std::vector< float > & ivar ) [static]
```

4.245.2.5 insert_var_float()

```
int MHAKernel::algo_comm_class_t::insert_var_float (
    void * handle,
    const char * name,
    float * ivar ) [static]
```

4.245.2.6 remove_var()

```
int MHAKernel::algo_comm_class_t::remove_var (
    void * handle,
    const char * name ) [static]
```

4.245.2.7 remove_ref()

```
int MHAKernel::algo_comm_class_t::remove_ref (
    void * handle,
    void * ref ) [static]
```

4.245.2.8 is_var()

```
int MHAKernel::algo_comm_class_t::is_var (
    void * handle,
    const char * name ) [static]
```

4.245.2.9 get_var()

```
int MHAKernel::algo_comm_class_t::get_var (
    void * handle,
    const char * name,
    comm_var_t * var ) [static]
```

4.245.2.10 get_var_int()

```
int MHAKernel::algo_comm_class_t::get_var_int (
    void * handle,
    const char * name,
    int * ivar ) [static]
```

4.245.2.11 get_var_float()

```
int MHAKernel::algo_comm_class_t::get_var_float (
    void * handle,
    const char * name,
    float * ivar ) [static]
```

4.245.2.12 get_entries()

```
int MHAKernel::algo_comm_class_t::get_entries (
    void * handle,
    char * ret,
    unsigned int len ) [static]
```

4.245.2.13 get_error()

```
const char * MHAKernel::algo_comm_class_t::get_error (
    int e ) [static]
```

4.245.2.14 local_insert_var()

```
void MHAKernel::algo_comm_class_t::local_insert_var (
    const char * name,
    comm_var_t var ) [virtual]
```

4.245.2.15 local_remove_var()

```
void MHAKernel::algo_comm_class_t::local_remove_var (
    const char * name ) [virtual]
```

4.245.2.16 local_remove_ref()

```
void MHAKernel::algo_comm_class_t::local_remove_ref (
    void * addr ) [virtual]
```

4.245.2.17 local_is_var()

```
bool MHAKernel::algo_comm_class_t::local_is_var (
    const char * name ) [virtual]
```

4.245.2.18 local_get_var()

```
void MHAKernel::algo_comm_class_t::local_get_var (
    const char * name,
    comm_var_t * var ) [virtual]
```

4.245.2.19 local_get_entries()

```
std::string MHAKernel::algo_comm_class_t::local_get_entries ( ) [virtual]
```

4.245.2.20 size()

```
MHAKernel::comm_var_map_t::size_type MHAKernel::algo_comm_class_t::size ( ) const
[virtual]
```


4.245.3 Member Data Documentation

4.245.3.1 algo_comm_id_string

`char* MHAKernel::algo_comm_class_t::algo_comm_id_string`

4.245.3.2 ac

`algo_comm_t MHAKernel::algo_comm_class_t::ac [private]`

4.245.3.3 algo_comm_id_string_len

`int MHAKernel::algo_comm_class_t::algo_comm_id_string_len [private]`

4.245.3.4 vars

`comm_var_map_t MHAKernel::algo_comm_class_t::vars [private]`

The documentation for this class was generated from the following files:

- `mha_algo_comm.hh`
- `mha_algo_comm.cpp`

4.246 MHAKernel::comm_var_map_t Class Reference

Inherits `map< std::string, comm_var_t >`.

Public Member Functions

- `bool has_key (const std::string &name)`

4.246.1 Member Function Documentation

4.246.1.1 has_key()

```
bool MHAKernel::comm_var_map_t::has_key (
    const std::string & name ) [inline]
```

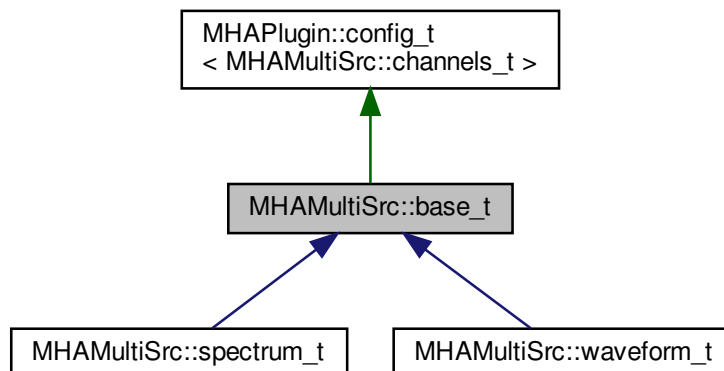
The documentation for this class was generated from the following file:

- **mha_algo_comm.hh**

4.247 MHAMultiSrc::base_t Class Reference

Base class for source selection.

Inheritance diagram for MHAMultiSrc::base_t:



Public Member Functions

- **base_t (algo_comm_t iac)**
- void **select_source** (const std::vector< std::string > &src, int in_channels)
Change the selection of input sources.

Protected Attributes

- **algo_comm_t ac**

Additional Inherited Members

4.247.1 Detailed Description

Base class for source selection.

See also

MHAMultiSrc::channel_t (p. [938](#))

MHAMultiSrc::channels_t (p. [938](#))

4.247.2 Constructor & Destructor Documentation

4.247.2.1 base_t()

```
MHAMultiSrc::base_t::base_t (  
    algo_comm_t iac )
```

4.247.3 Member Function Documentation

4.247.3.1 select_source()

```
void MHAMultiSrc::base_t::select_source (  
    const std::vector< std::string > & src,  
    int in_channels )
```

Change the selection of input sources.

This function is real-time and thread safe.

Parameters

<i>src</i>	List of input sources
<i>in_channels</i>	Number of input channels in direct input (the processed signal)

4.247.4 Member Data Documentation

4.247.4.1 ac

`algo_comm_t` MHAMultiSrc::base_t::ac [protected]

The documentation for this class was generated from the following files:

- `mha_multisrc.h`
- `mha_multisrc.cpp`

4.248 MHAMultiSrc::channel_t Class Reference

Public Attributes

- `std::string` **name**
- `int` **channel**

4.248.1 Member Data Documentation

4.248.1.1 name

`std::string` MHAMultiSrc::channel_t::name

4.248.1.2 channel

`int` MHAMultiSrc::channel_t::channel

The documentation for this class was generated from the following file:

- `mha_multisrc.h`

4.249 MHAMultiSrc::channels_t Class Reference

Inherits `vector< MHAMultiSrc::channel_t >`.

Public Member Functions

- **channels_t** (const `std::vector< std::string >` &src, int in_channels)
Separate a list of input sources into a parsable channel list.

4.249.1 Constructor & Destructor Documentation

4.249.1.1 channels_t()

```
MHAMultiSrc::channels_t::channels_t (
    const std::vector< std::string > & route,
    int in_channels )
```

Separate a list of input sources into a parsable channel list.

The number of input channels if verified, a list of **MHAMultiSrc::channel_t** (p. 938) is filled.

Parameters

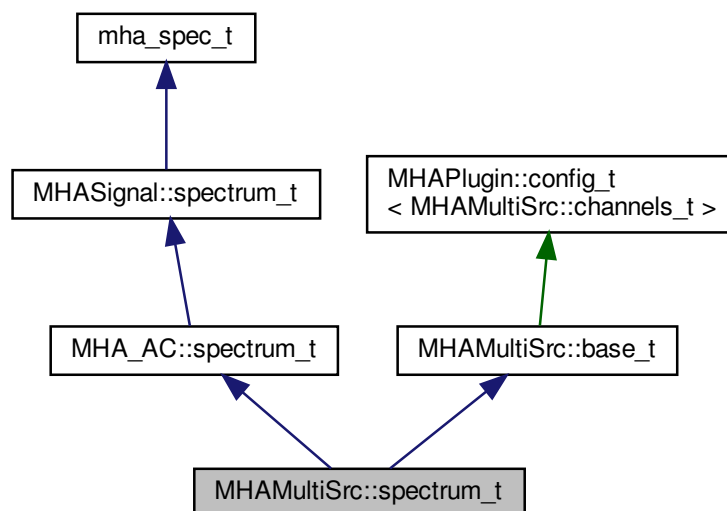
<i>route</i>	vector of source channel ids
<i>in_channels</i>	number of channels in the processed input signal

The documentation for this class was generated from the following files:

- **mha_multisrc.h**
- **mha_multisrc.cpp**

4.250 MHAMultiSrc::spectrum_t Class Reference

Inheritance diagram for MHAMultiSrc::spectrum_t:



Public Member Functions

- **spectrum_t** (**algo_comm_t** iac, std::string **name**, unsigned int frames, unsigned int channels)
- **mha_spec_t * update** (**mha_spec_t** *s)
Update data of spectrum to hold actual input data.

Additional Inherited Members

4.250.1 Constructor & Destructor Documentation

4.250.1.1 spectrum_t()

```
MHAMultiSrc::spectrum_t::spectrum_t (
    algo_comm_t iac,
    std::string name,
    unsigned int frames,
    unsigned int channels )
```

4.250.2 Member Function Documentation

4.250.2.1 update()

```
mha_spec_t * MHAMultiSrc::spectrum_t::update (
    mha_spec_t * s )
```

Update data of spectrum to hold actual input data.

Parameters

s	Input signal chunk
---	--------------------

Returns

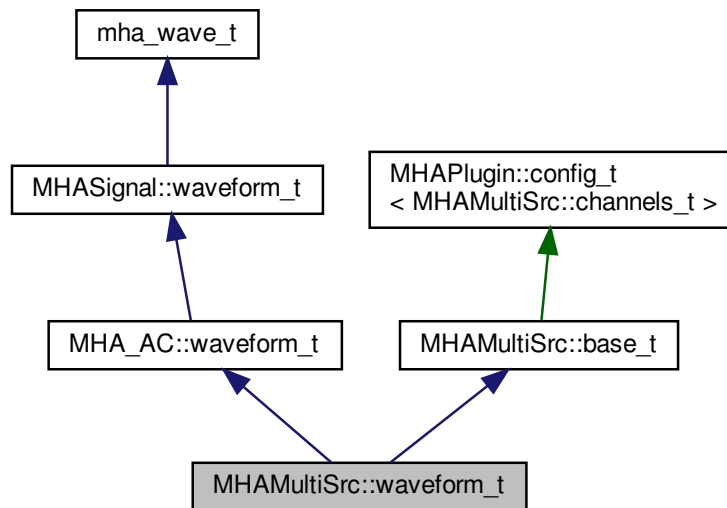
Return pointer to spectrum structure

The documentation for this class was generated from the following files:

- **mha_multisrc.h**
- **mha_multisrc.cpp**

4.251 MHAMultiSrc::waveform_t Class Reference

Inheritance diagram for MHAMultiSrc::waveform_t:



Public Member Functions

- **waveform_t** (**algo_comm_t** iac, std::string **name**, unsigned int frames, unsigned int channels)
- **mha_wave_t * update** (**mha_wave_t *s**)
Update data of waveform to hold actual input data.

Additional Inherited Members

4.251.1 Constructor & Destructor Documentation

4.251.1.1 waveform_t()

```

MHAMultiSrc::waveform_t::waveform_t (
    algo_comm_t iac,
    std::string name,
    unsigned int frames,
    unsigned int channels )

```

4.251.2 Member Function Documentation

4.251.2.1 update()

```
mha_wave_t * MHAMultiSrc::waveform_t::update (
    mha_wave_t * s )
```

Update data of waveform to hold actual input data.

Parameters

<i>s</i>	Input signal chunk
----------	--------------------

Returns

Return pointer to waveform structure

The documentation for this class was generated from the following files:

- **mha_multisrc.h**
- **mha_multisrc.cpp**

4.252 MHAOvFilter::band_descriptor_t Class Reference

Public Attributes

- **mha_real_t** *cf_l*
- **mha_real_t** *ef_l*
- **mha_real_t** *cf*
- **mha_real_t** *ef_h*
- **mha_real_t** *cf_h*
- **bool** *low_side_flat*
- **bool** *high_side_flat*

4.252.1 Member Data Documentation

4.252.1.1 cf_l

```
mha_real_t MHAOvFilter::band_descriptor_t::cf_l
```


4.252.1.2 ef_l

mha_real_t MHAOvlFilter::band_descriptor_t::ef_l

4.252.1.3 cf

mha_real_t MHAOvlFilter::band_descriptor_t::cf

4.252.1.4 ef_h

mha_real_t MHAOvlFilter::band_descriptor_t::ef_h

4.252.1.5 cf_h

mha_real_t MHAOvlFilter::band_descriptor_t::cf_h

4.252.1.6 low_side_flat

bool MHAOvlFilter::band_descriptor_t::low_side_flat

4.252.1.7 high_side_flat

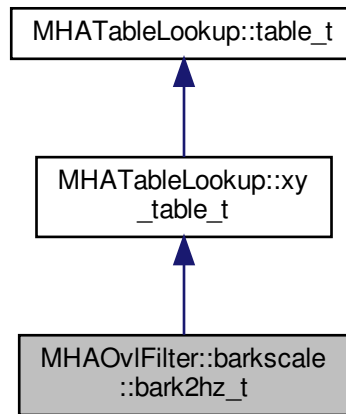
bool MHAOvlFilter::band_descriptor_t::high_side_flat

The documentation for this class was generated from the following file:

- **mha_fftfb.hh**

4.253 MHAOvFilter::barkscale::bark2hz_t Class Reference

Inheritance diagram for MHAOvFilter::barkscale::bark2hz_t:



Public Member Functions

- **bark2hz_t** ()
- **~bark2hz_t** ()

Additional Inherited Members

4.253.1 Constructor & Destructor Documentation

4.253.1.1 bark2hz_t()

```
MHAOvFilter::barkscale::bark2hz_t::bark2hz_t ( )
```

4.253.1.2 ~bark2hz_t()

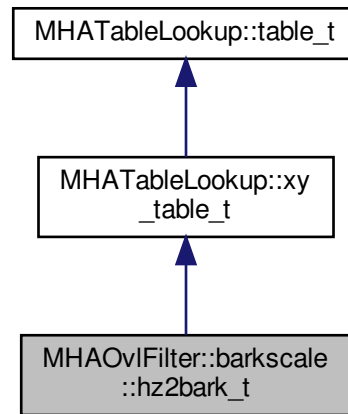
```
MHAOvFilter::barkscale::bark2hz_t::~~bark2hz_t ( )
```

The documentation for this class was generated from the following file:

- **mha_fftfb.cpp**

4.254 MHAOvIFilter::barkscale::hz2bark_t Class Reference

Inheritance diagram for MHAOvIFilter::barkscale::hz2bark_t:



Public Member Functions

- `hz2bark_t()`
- `~hz2bark_t()`

Additional Inherited Members

4.254.1 Constructor & Destructor Documentation

4.254.1.1 hz2bark_t()

```
MHAOvIFilter::barkscale::hz2bark_t::hz2bark_t ( )
```

4.254.1.2 ~hz2bark_t()

```
MHAOvIFilter::barkscale::hz2bark_t::~~hz2bark_t ( )
```

The documentation for this class was generated from the following file:

- `mha_fftfb.cpp`

4.255 MHAOvFilter::fftfb_ac_info_t Class Reference

Public Member Functions

- **fftfb_ac_info_t** (const **MHAOvFilter::fftfb_t** &fb, **algo_comm_t** ac, const std::string &prefix)
- void **insert** ()

Private Attributes

- **MHA_AC::waveform_t** cfv
vector of nominal center frequencies / Hz
- **MHA_AC::waveform_t** efv
vector of edge frequencies / Hz
- **MHA_AC::waveform_t** bwv
vector of band-weighths (sum of squared fft-bin-weighths)/num_frames
- **MHA_AC::waveform_t** cLTASS
vector of LTASS correction

4.255.1 Constructor & Destructor Documentation

4.255.1.1 fftfb_ac_info_t()

```
MHAOvFilter::fftfb_ac_info_t::fftfb_ac_info_t (
    const MHAOvFilter::fftfb_t & fb,
    algo_comm_t ac,
    const std::string & prefix )
```

4.255.2 Member Function Documentation

4.255.2.1 insert()

```
void MHAOvFilter::fftfb_ac_info_t::insert ( )
```

4.255.3 Member Data Documentation

4.255.3.1 cfv

MHA_AC::waveform_t MHAOvFilter::fftfb_ac_info_t::cfv [private]

vector of nominal center frequencies / Hz

4.255.3.2 efv

MHA_AC::waveform_t MHAOvFilter::fftfb_ac_info_t::efv [private]

vector of edge frequencies / Hz

4.255.3.3 bwv

MHA_AC::waveform_t MHAOvFilter::fftfb_ac_info_t::bwv [private]

vector of band-weigths (sum of squared fft-bin-weigths)/num_frames

4.255.3.4 cLTASS

MHA_AC::waveform_t MHAOvFilter::fftfb_ac_info_t::cLTASS [private]

vector of LTASS correction

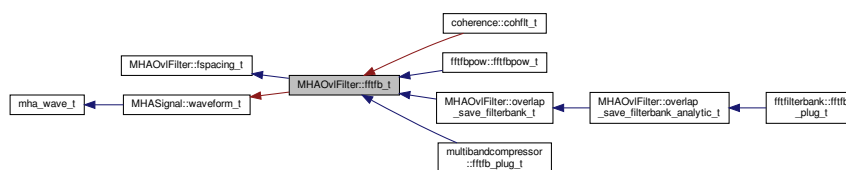
The documentation for this class was generated from the following files:

- mha_fftfb.hh
- mha_fftfb.cpp

4.256 MHAOvFilter::fftfb_t Class Reference

FFT based overlapping filter bank.

Inheritance diagram for MHAOvFilter::fftfb_t:



Public Member Functions

- **fftfb_t** (**MHAOvlFilter::fftfb_vars_t** &par, unsigned int nfft, **mha_real_t** fs)
Constructor for a FFT-based overlapping filter bank.
- **~fftfb_t** ()
- void **apply_gains** (**mha_spec_t** *s_out, const **mha_spec_t** *s_in, const **mha_wave_t** *gains)
- void **get_fbpower** (**mha_wave_t** *fbpow, const **mha_spec_t** *s_in)
- void **get_fbpower_db** (**mha_wave_t** *fbpow, const **mha_spec_t** *s_in)
- std::vector< **mha_real_t** > **get_ltass_gain_db** () const
- unsigned int **bin1** (unsigned int band) const
Return index of first non-zero filter shape window.
- unsigned int **bin2** (unsigned int band) const
Return index of first zero filter shape window above center frequency.
- unsigned int **get_fftlen** () const
Return fft length.
- **mha_real_t** **w** (unsigned int k, unsigned int b) const
Return filter shape window at index k in band b.

Private Attributes

- unsigned int * **vbin1**
- unsigned int * **vbin2**
- **mha_real_t**(* **shape**)(**mha_real_t**)
- unsigned int **fftlen**
- **mha_real_t** **samplingrate**

Additional Inherited Members

4.256.1 Detailed Description

FFT based overlapping filter bank.

4.256.2 Constructor & Destructor Documentation

4.256.2.1 fftfb_t()

```
MHAOvlFilter::fftfb_t::fftfb_t (
    MHAOvlFilter::fftfb_vars_t & par,
    unsigned int nfft,
    mha_real_t fs )
```

Constructor for a FFT-based overlapping filter bank.

Parameters

<i>par</i>	Parameters for the FFT filterbank that can not be deduced from the signal dimensions are taken from this set of configuration variables.
<i>nfft</i>	FFT length
<i>fs</i>	Sampling rate / Hz

4.256.2.2 ~fftfb_t()

```
MHAOvlFilter::fftfb_t::~~fftfb_t ( )
```

4.256.3 Member Function Documentation

4.256.3.1 apply_gains()

```
void MHAOvlFilter::fftfb_t::apply_gains (
    mha_spec_t * s_out,
    const mha_spec_t * s_in,
    const mha_wave_t * gains )
```

4.256.3.2 get_fbpower()

```
void MHAOvlFilter::fftfb_t::get_fbpower (
    mha_wave_t * fbpow,
    const mha_spec_t * s_in )
```

4.256.3.3 get_fbpower_db()

```
void MHAOvlFilter::fftfb_t::get_fbpower_db (
    mha_wave_t * fbpow,
    const mha_spec_t * s_in )
```

4.256.3.4 get_ltass_gain_db()

```
std::vector< float > MHAOvlFilter::fftfb_t::get_ltass_gain_db ( ) const
```

4.256.3.5 bin1()

```
unsigned int MHAOvlFilter::fftfb_t::bin1 (
    unsigned int band ) const [inline]
```

Return index of first non-zero filter shape window.

4.256.3.6 bin2()

```
unsigned int MHAOvlFilter::fftfb_t::bin2 (
    unsigned int band ) const [inline]
```

Return index of first zero filter shape window above center frequency.

4.256.3.7 get_fftlens()

```
unsigned int MHAOvlFilter::fftfb_t::get_fftlens ( ) const [inline]
```

Return fft length.

4.256.3.8 w()

```
mha_real_t MHAOvlFilter::fftfb_t::w (
    unsigned int k,
    unsigned int b ) const [inline]
```

Return filter shape window at index *k* in band *b*.

Parameters

<i>k</i>	Frequency index
<i>b</i>	Band index

4.256.4 Member Data Documentation

4.256.4.1 vbin1

```
unsigned int* MHAOvFilter::fftfb_t::vbin1 [private]
```

4.256.4.2 vbin2

```
unsigned int* MHAOvFilter::fftfb_t::vbin2 [private]
```

4.256.4.3 shape

```
mha_real_t (* MHAOvFilter::fftfb_t::shape) ( mha_real_t) [private]
```

4.256.4.4 fftlen

```
unsigned int MHAOvFilter::fftfb_t::fftlen [private]
```

4.256.4.5 samplingrate

```
mha_real_t MHAOvFilter::fftfb_t::samplingrate [private]
```

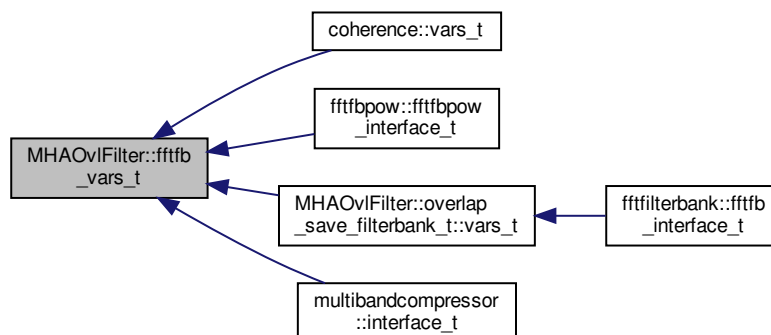
The documentation for this class was generated from the following files:

- **mha_fftfb.hh**
- **mha_fftfb.cpp**

4.257 MHAOvFilter::fftfb_vars_t Class Reference

Set of configuration variables for FFT-based overlapping filters.

Inheritance diagram for MHAOvFilter::fftfb_vars_t:



Public Member Functions

- **fftfb_vars_t (MHAParser::parser_t &p)**
construct a set of openMHA configuration language variables suitable for configuring the FFT-based overlapping filterbank.

Public Attributes

- **scale_var_t fscale**
Frequency scale type (lin/bark/log/erb).
- **scale_var_t ovftype**
Filter shape (rect/lin/hann).
- **MHAParser::float_t plateau**
relative plateau width.
- **MHAParser::kw_t ftype**
Flag to decide whether edge or center frequencies are used.
- **fscale_t f**
Frequency.
- **MHAParser::bool_t normalize**
Normalize sum of channels.
- **MHAParser::bool_t fail_on_nonmonotonic**
Fail if frequency entries are non-monotonic (otherwise sort)
- **MHAParser::bool_t fail_on_unique_bins**
Fail if center frequencies share the same FFT bin.
- **MHAParser::bool_t flag_allow_empty_bands**
Allow that frequency bands contain only zeros.
- **MHAParser::vfloat_mon_t cf**
Final center frequencies in Hz.
- **MHAParser::vfloat_mon_t ef**
Final edge frequencies in Hz.
- **MHAParser::vfloat_mon_t cLTASS**
Bandwidth correction for LTASS noise (level of 0 dB RMS LTASS noise)
- **MHAParser::mfloat_mon_t shapes**

4.257.1 Detailed Description

Set of configuration variables for FFT-based overlapping filters.

This class enables easy configuration of the FFT-based overlapping filterbank. An instance of **fftfb_vars_t** (p. 951) creates openMHA configuration language variables needed for configuring the filterbank, and inserts these variables in the openMHA configuration tree.

This way, the variables are visible to the user and can be configured using the openMHA configuration language.

4.257.2 Constructor & Destructor Documentation

4.257.2.1 fftfb_vars_t()

```
MHAOvlFilter::fftfb_vars_t::fftfb_vars_t (
    MHAParser::parser_t & p )
```

construct a set of openMHA configuration language variables suitable for configuring the FFT-based overlapping filterbank.

Parameters

<i>p</i>	The node of the configuration tree where the variables created by this instance are inserted.
----------	---

4.257.3 Member Data Documentation

4.257.3.1 fscale

```
scale_var_t MHAOvlFilter::fftfb_vars_t::fscale
```

Frequency scale type (lin/bark/log/erb).

4.257.3.2 ovltype

```
scale_var_t MHAOvlFilter::fftfb_vars_t::ovltype
```

Filter shape (rect/lin/hann).

4.257.3.3 plateau

```
MHAParser::float_t MHAOvlFilter::fftfb_vars_t::plateau
```

relative plateau width.

4.257.3.4 ftype

MHAParser::kw_t MHAOvlFilter::fftfb_vars_t::ftype

Flag to decide whether edge or center frequencies are used.

4.257.3.5 f

fscale_t MHAOvlFilter::fftfb_vars_t::f

Frequency.

4.257.3.6 normalize

MHAParser::bool_t MHAOvlFilter::fftfb_vars_t::normalize

Normalize sum of channels.

4.257.3.7 fail_on_nonmonotonic

MHAParser::bool_t MHAOvlFilter::fftfb_vars_t::fail_on_nonmonotonic

Fail if frequency entries are non-monotonic (otherwise sort)

4.257.3.8 fail_on_unique_bins

MHAParser::bool_t MHAOvlFilter::fftfb_vars_t::fail_on_unique_bins

Fail if center frequencies share the same FFT bin.

4.257.3.9 flag_allow_empty_bands

MHAParser::bool_t MHAOvlFilter::fftfb_vars_t::flag_allow_empty_bands

Allow that frequency bands contain only zeros.

4.257.3.10 cf

MHAParser::vfloat_mon_t MHAOvFilter::fftfb_vars_t::cf

Final center frequencies in Hz.

4.257.3.11 ef

MHAParser::vfloat_mon_t MHAOvFilter::fftfb_vars_t::ef

Final edge frequencies in Hz.

4.257.3.12 cLTASS

MHAParser::vfloat_mon_t MHAOvFilter::fftfb_vars_t::cLTASS

Bandwidth correction for LTASS noise (level of 0 dB RMS LTASS noise)

4.257.3.13 shapes

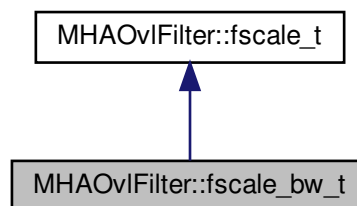
MHAParser::mfloat_mon_t MHAOvFilter::fftfb_vars_t::shapes

The documentation for this class was generated from the following files:

- mha_fftfb.hh
- mha_fftfb.cpp

4.258 MHAOvFilter::fscale_bw_t Class Reference

Inheritance diagram for MHAOvFilter::fscale_bw_t:



Public Member Functions

- **fscale_bw_t** (**MHAParser::parser_t** &parent)
- **std::vector< mha_real_t > get_bw_hz** () const

Protected Attributes

- **MHAParser::vfloat_t bw**
- **MHAParser::vfloat_mon_t bw_hz**

Private Member Functions

- void **update_hz** ()

Private Attributes

- **MHAEvents::connector_t< fscale_bw_t > updater**

Additional Inherited Members

4.258.1 Constructor & Destructor Documentation

4.258.1.1 fscale_bw_t()

```
MHAOvlFilter::fscale_bw_t::fscale_bw_t (
    MHAParser::parser_t & parent )
```

4.258.2 Member Function Documentation

4.258.2.1 get_bw_hz()

```
std::vector< mha_real_t > MHAOvlFilter::fscale_bw_t::get_bw_hz ( ) const
```

4.258.2.2 update_hz()

```
void MHAOvlFilter::fscale_bw_t::update_hz ( ) [private]
```

4.258.3 Member Data Documentation

4.258.3.1 bw

MHAParser::vfloat_t MHAOvFilter::fscale_bw_t::bw [protected]

4.258.3.2 bw_hz

MHAParser::vfloat_mon_t MHAOvFilter::fscale_bw_t::bw_hz [protected]

4.258.3.3 updater

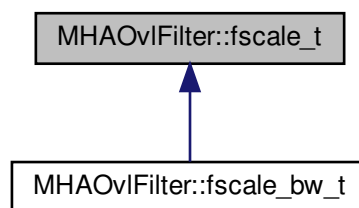
MHAEvents::connector_t< **fscale_bw_t**> MHAOvFilter::fscale_bw_t::updater [private]

The documentation for this class was generated from the following files:

- mha_fftfb.hh
- mha_fftfb.cpp

4.259 MHAOvFilter::fscale_t Class Reference

Inheritance diagram for MHAOvFilter::fscale_t:



Public Member Functions

- **fscale_t** (**MHAParser::parser_t** &parent)
- std::vector< **mha_real_t** > **get_f_hz** () const

Public Attributes

- **scale_var_t** unit
- **MHAParser::vfloat_t** f
- **MHAParser::vfloat_mon_t** f_hz

Private Member Functions

- void **update_hz** ()

Private Attributes

- **MHAEvents::connector_t**< **fscale_t** > **updater**

4.259.1 Constructor & Destructor Documentation**4.259.1.1 fscale_t()**

```
MHAOvlFilter::fscale_t::fscale_t (
    MHAParser::parser_t & parent )
```

4.259.2 Member Function Documentation**4.259.2.1 get_f_hz()**

```
std::vector< mha_real_t > MHAOvlFilter::fscale_t::get_f_hz ( ) const
```

4.259.2.2 update_hz()

```
void MHAOvlFilter::fscale_t::update_hz ( ) [private]
```

4.259.3 Member Data Documentation

4.259.3.1 unit

scale_var_t MHAOvIFilter::fscale_t::unit

4.259.3.2 f

MHAParser::vfloat_t MHAOvIFilter::fscale_t::f

4.259.3.3 f_hz

MHAParser::vfloat_mon_t MHAOvIFilter::fscale_t::f_hz

4.259.3.4 updater

MHAEvents::connector_t< **fscale_t**> MHAOvIFilter::fscale_t::updater [private]

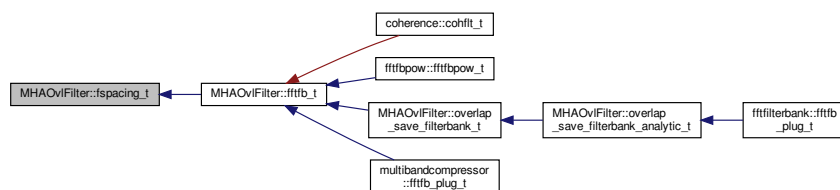
The documentation for this class was generated from the following files:

- mha_fftfb.hh
- mha_fftfb.cpp

4.260 MHAOvIFilter::fspacing_t Class Reference

Class for frequency spacing, used by filterbank shape generator class.

Inheritance diagram for MHAOvIFilter::fspacing_t:



Public Member Functions

- **fspaceing_t** (const **MHAOvFilter::fft_b_vars_t** &par, unsigned int nfft, **mha_real_t** fs)
- std::vector< unsigned int > **get_cf_fftbin** () const
- std::vector< **mha_real_t** > **get_cf_hz** () const
- std::vector< **mha_real_t** > **get_ef_hz** () const
- unsigned int **nbands** () const

Return number of bands in filter bank.

Protected Member Functions

- void **fail_on_nonmonotonic_cf** ()
- void **fail_on_unique_fftbins** ()

Protected Attributes

- std::vector< **MHAOvFilter::band_descriptor_t** > **bands**
- **mha_real_t**(* **symmetry_scale**)(**mha_real_t**)

Private Member Functions

- void **ef2bands** (std::vector< **mha_real_t** > vef)
- void **cf2bands** (std::vector< **mha_real_t** > vcf)
- void **equidist2bands** (std::vector< **mha_real_t** > vcf)

Private Attributes

- unsigned int **nfft_**
- **mha_real_t** **fs_**

4.260.1 Detailed Description

Class for frequency spacing, used by filterbank shape generator class.

4.260.2 Constructor & Destructor Documentation

4.260.2.1 fspacing_t()

```
MHAOvlFilter::fspacing_t::fspacing_t (
    const  MHAOvlFilter::fftfb_vars_t & par,
    unsigned int nfft,
    mha_real_t fs )
```

4.260.3 Member Function Documentation

4.260.3.1 get_cf_fftbins()

```
std::vector< unsigned int > MHAOvlFilter::fspacing_t::get_cf_fftbins ( ) const
```

4.260.3.2 get_cf_hz()

```
std::vector< mha_real_t > MHAOvlFilter::fspacing_t::get_cf_hz ( ) const
```

4.260.3.3 get_ef_hz()

```
std::vector< mha_real_t > MHAOvlFilter::fspacing_t::get_ef_hz ( ) const
```

4.260.3.4 nbands()

```
unsigned int MHAOvlFilter::fspacing_t::nbands ( ) const [inline]
```

Return number of bands in filter bank.

4.260.3.5 fail_on_nonmonotonic_cf()

```
void MHAOvlFilter::fspacing_t::fail_on_nonmonotonic_cf ( ) [protected]
```

4.260.3.6 fail_on_unique_fftbins()

```
void MHAOvlFilter::fspacing_t::fail_on_unique_fftbins ( ) [protected]
```

4.260.3.7 ef2bands()

```
void MHAOvlFilter::fspacing_t::ef2bands (
    std::vector< mha_real_t > vef ) [private]
```

4.260.3.8 cf2bands()

```
void MHAOvlFilter::fspacing_t::cf2bands (
    std::vector< mha_real_t > vcf ) [private]
```

4.260.3.9 equidist2bands()

```
void MHAOvlFilter::fspacing_t::equidist2bands (
    std::vector< mha_real_t > vcf ) [private]
```

4.260.4 Member Data Documentation

4.260.4.1 bands

```
std::vector< MHAOvlFilter::band_descriptor_t> MHAOvlFilter::fspacing_t::bands [protected]
```

4.260.4.2 symmetry_scale

```
mha_real_t(* MHAOvlFilter::fspacing_t::symmetry_scale) ( mha_real_t) [protected]
```

4.260.4.3 nfft_

```
unsigned int MHAOvlFilter::fspacing_t::nfft_ [private]
```

4.260.4.4 fs_

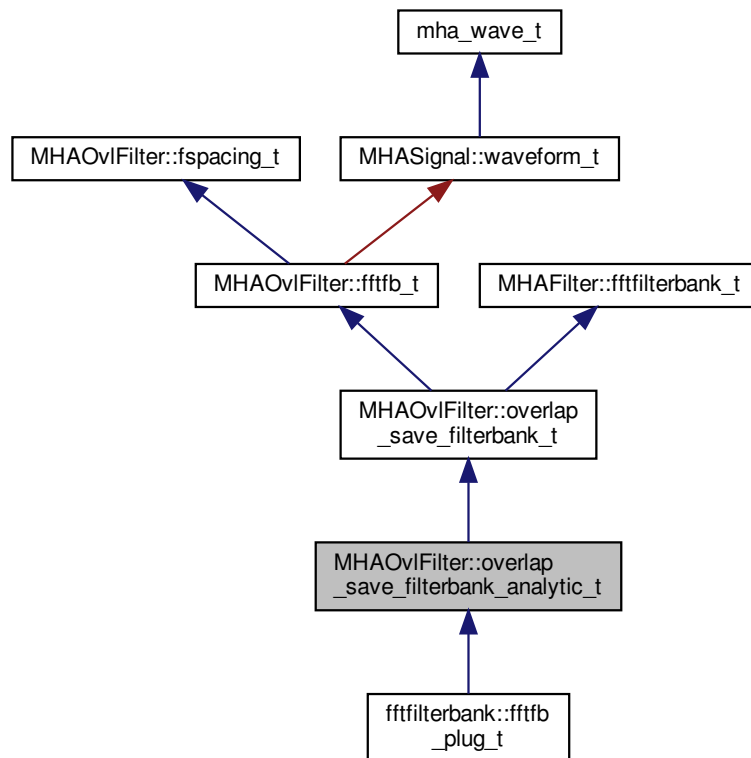
mha_real_t MHAOvFilter::fspacing_t::fs_ [private]

The documentation for this class was generated from the following files:

- **mha_fftfb.hh**
- **mha_fftfb.cpp**

4.261 MHAOvFilter::overlap_save_filterbank_analytic_t Class Reference

Inheritance diagram for MHAOvFilter::overlap_save_filterbank_analytic_t:



Public Member Functions

- **overlap_save_filterbank_analytic_t** (**MHAOvFilter::overlap_save_filterbank_t**↵
::vars_t &fbpar, **mhaconfig_t** channelconfig_in)
- void **filter_analytic** (const **mha_wave_t** *sIn, **mha_wave_t** **fltRe, **mha_wave_t** **fltIm)

Private Attributes

- **MHAFilter::fftfilterbank_t** **imagfb**

Additional Inherited Members

4.261.1 Constructor & Destructor Documentation

4.261.1.1 overlap_save_filterbank_analytic_t()

```
MHAOvlFilter::overlap_save_filterbank_analytic_t::overlap_save_filterbank_analytic(
_t (
    MHAOvlFilter::overlap_save_filterbank_t::vars_t & fbpar,
    mhaconfig_t channelconfig_in )
```

4.261.2 Member Function Documentation

4.261.2.1 filter_analytic()

```
void MHAOvlFilter::overlap_save_filterbank_analytic_t::filter_analytic (
    const mha_wave_t * sIn,
    mha_wave_t ** fltRe,
    mha_wave_t ** fltIm )
```

4.261.3 Member Data Documentation

4.261.3.1 imagfb

```
MHAFilter::fftfilterbank_t MHAOvlFilter::overlap_save_filterbank_analytic_t::imagfb
[private]
```

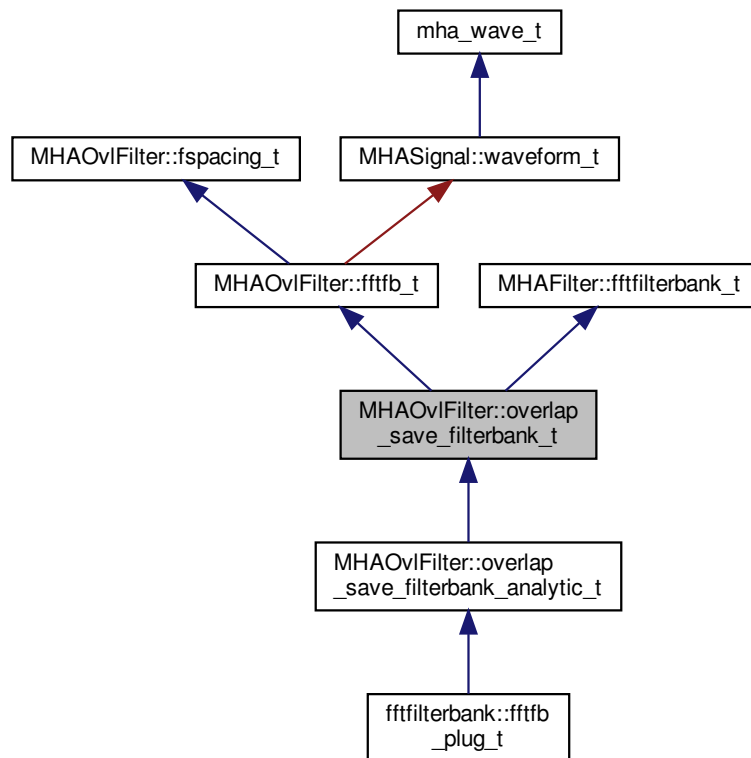
The documentation for this class was generated from the following files:

- **mha_fftfb.hh**
- **mha_fftfb.cpp**

4.262 MHAOvFilter::overlap_save_filterbank_t Class Reference

A time-domain minimal phase filter bank with frequency shapes from **MHAOvFilter::fftfb_t** (p. 947).

Inheritance diagram for MHAOvFilter::overlap_save_filterbank_t:



Classes

- class **vars_t**

Public Member Functions

- **overlap_save_filterbank_t** (**MHAOvFilter::overlap_save_filterbank_t::vars_t** &fbpar, **mhaconfig_t** channelconfig_in)
- **mhaconfig_t** **get_channelconfig** () const

Private Attributes

- **mhaconfig_t** **channelconfig_out_**

Additional Inherited Members

4.262.1 Detailed Description

A time-domain minimal phase filter bank with frequency shapes from **MHAOvlFilter::fftfb_t** (p. 947).

4.262.2 Constructor & Destructor Documentation

4.262.2.1 overlap_save_filterbank_t()

```
MHAOvlFilter::overlap_save_filterbank_t::overlap_save_filterbank_t (
    MHAOvlFilter::overlap_save_filterbank_t::vars_t & fbpar,
    mhaconfig_t channelconfig_in )
```

4.262.3 Member Function Documentation

4.262.3.1 get_channelconfig()

```
mhaconfig_t MHAOvlFilter::overlap_save_filterbank_t::get_channelconfig ( ) const
[inline]
```

4.262.4 Member Data Documentation

4.262.4.1 channelconfig_out_

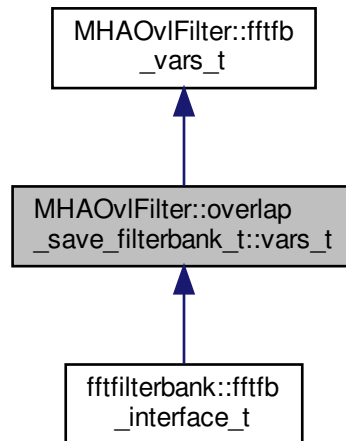
```
mhaconfig_t MHAOvlFilter::overlap_save_filterbank_t::channelconfig_out_ [private]
```

The documentation for this class was generated from the following files:

- **mha_fftfb.hh**
- **mha_fftfb.cpp**

4.263 MHAOvIFilter::overlap_save_filterbank_t::vars_t Class Reference

Inheritance diagram for MHAOvIFilter::overlap_save_filterbank_t::vars_t:



Public Member Functions

- **vars_t (MHAParser::parser_t &p)**

Public Attributes

- **MHAParser::int_t fftlen**
- **MHAParser::kw_t phasemodel**
- **MHAParser::window_t irswnd**

4.263.1 Constructor & Destructor Documentation

4.263.1.1 vars_t()

```

MHAOvIFilter::overlap_save_filterbank_t::vars_t::vars_t (
    MHAParser::parser_t & p )
    
```

4.263.2 Member Data Documentation

4.263.2.1 fftlen

MHAParser::int_t MHAOvlFilter::overlap_save_filterbank_t::vars_t::fftlen

4.263.2.2 phasemodel

MHAParser::kw_t MHAOvlFilter::overlap_save_filterbank_t::vars_t::phasemodel

4.263.2.3 irswnd

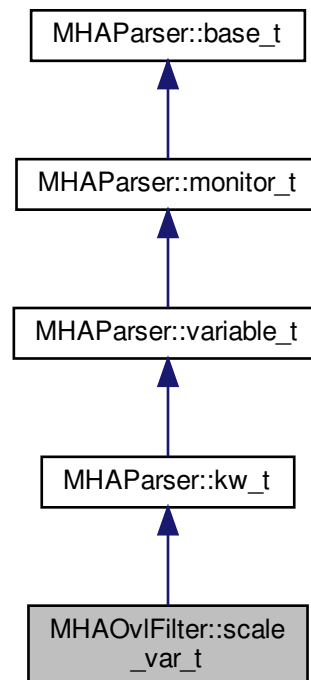
MHAParser::window_t MHAOvlFilter::overlap_save_filterbank_t::vars_t::irswnd

The documentation for this class was generated from the following files:

- **mha_fftfb.hh**
- **mha_fftfb.cpp**

4.264 MHAOvlFilter::scale_var_t Class Reference

Inheritance diagram for MHAOvlFilter::scale_var_t:



Public Member Functions

- **scale_var_t** (const std::string & **help**)
- void **add_fun** (const std::string &name, **scale_fun_t** *fun)
- std::string **get_name** () const
- **scale_fun_t** * **get_fun** () const
- **mha_real_t** **hz2unit** (**mha_real_t** x) const
- **mha_real_t** **unit2hz** (**mha_real_t** x) const

Private Attributes

- std::vector< std::string > **names**
- std::vector< **scale_fun_t** * > **funcs**

Additional Inherited Members

4.264.1 Constructor & Destructor Documentation

4.264.1.1 scale_var_t()

```
MHAOvFilter::scale_var_t::scale_var_t (  
    const std::string & help )
```

4.264.2 Member Function Documentation

4.264.2.1 add_fun()

```
void MHAOvFilter::scale_var_t::add_fun (  
    const std::string & name,  
    scale_fun_t * fun )
```

4.264.2.2 get_name()

```
std::string MHAOvFilter::scale_var_t::get_name ( ) const [inline]
```

4.264.2.3 get_fun()

```
scale_fun_t* MHAOvlFilter::scale_var_t::get_fun ( ) const [inline]
```

4.264.2.4 hz2unit()

```
mha_real_t MHAOvlFilter::scale_var_t::hz2unit (
    mha_real_t x ) const
```

4.264.2.5 unit2hz()

```
mha_real_t MHAOvlFilter::scale_var_t::unit2hz (
    mha_real_t x ) const
```

4.264.3 Member Data Documentation

4.264.3.1 names

```
std::vector<std::string> MHAOvlFilter::scale_var_t::names [private]
```

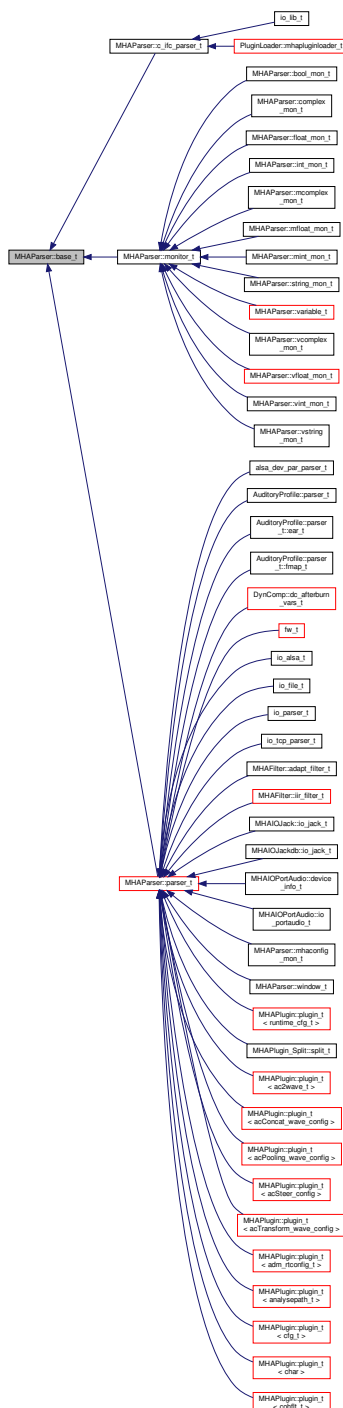
4.264.3.2 funs

```
std::vector< scale_fun_t*> MHAOvlFilter::scale_var_t::funs [private]
```

The documentation for this class was generated from the following files:

- **mha_fftfb.hh**
- **mha_fftfb.cpp**

Inheritance diagram for MHAParser::base_t:



- class **replace_t**

Public Member Functions

- **base_t** (const std::string &)
Constructor for base class of all parser nodes.
- **base_t** (const **base_t** &)
- virtual ~**base_t** ()
- virtual std::string **parse** (const std::string &)
Causes this node to process a command in the openMHA configuration language.
- virtual void **parse** (const char *, char *, unsigned int)
This function parses a command and writes the parsing result into a C character array.
- virtual void **parse** (const std::vector< std::string > &, std::vector< std::string > &)
- virtual std::string **op_subparse** (**expression_t** &)
- virtual std::string **op_setval** (**expression_t** &)
- virtual std::string **op_query** (**expression_t** &)
- virtual std::string **query_dump** (const std::string &)
- virtual std::string **query_entries** (const std::string &)
- virtual std::string **query_perm** (const std::string &)
- virtual std::string **query_range** (const std::string &)
- virtual std::string **query_type** (const std::string &)
- virtual std::string **query_val** (const std::string &)
- virtual std::string **query_readfile** (const std::string &)
- virtual std::string **query_savefile** (const std::string &)
- virtual std::string **query_savefile_compact** (const std::string &)
- virtual std::string **query_savemons** (const std::string &)
- virtual std::string **query_listids** (const std::string &)
- std::string **query_version** (const std::string &)
- std::string **query_id** (const std::string &)
- std::string **query_subst** (const std::string &)
- std::string **query_addsubst** (const std::string &)
- std::string **query_help** (const std::string &)
- std::string **query_cmds** (const std::string &)
- void **set_node_id** (const std::string &)
Set the identification string of this parser node.
- void **set_help** (const std::string &)
Set the help comment of a variable or parser.
- void **add_parent_on_insert** (**parser_t** *, std::string)
- void **rm_parent_on_remove** (**parser_t** *)
- const std::string & **fullname** () const
Return the full dot-separated path name of this parser node in the openMHA configuration tree.

Public Attributes

- **MHAEvents::emitter_t writeaccess**
Event emitted on write access.
- **MHAEvents::emitter_t valuechanged**
Event emitted if the value has changed.

- **MHAEvents::emitter_t readaccess**
Event emitted on read access.
- **MHAEvents::emitter_t prereadaccess**
Event emitted on read access, before the data field is accessed.

Protected Member Functions

- void **activate_query** (const std::string &, **query_t**)
- void **notify** ()

Protected Attributes

- **query_map_t** queries
- bool **data_is_initialized**

Private Types

- typedef std::vector< **replace_t** > **repl_list_t**

Private Member Functions

- void **add_replace_pair** (const std::string &, const std::string &)
- std::string **oplist** ()

Private Attributes

- std::string **help**
- std::string **id_str**
- **opact_map_t** operators
- **repl_list_t** repl_list
- bool **nested_lock**
- **parser_t** * **parent**
- std::string **thefullname**

4.265.1 Detailed Description

Base class for all parser items.

The key method of the parser base class is the std::string **parse(const std::string&)** (p. 974) method. Parser proxy derivatives which overwrite any of the other **parse()** (p. 974) methods to be the key method must make sure that the original **parse()** (p. 974) method utilizes the new key method.

4.265.2 Member Typedef Documentation

4.265.2.1 repl_list_t

```
typedef std::vector< replace_t> MHAParser::base_t::repl_list_t [private]
```

4.265.3 Constructor & Destructor Documentation

4.265.3.1 base_t() [1/2]

```
MHAParser::base_t::base_t (
    const std::string & h )
```

Constructor for base class of all parser nodes.

Parameters

<i>h</i>	Help text describing this parser node. This help text is accessible to the configuration language through the "?help" query command.
----------	--

4.265.3.2 base_t() [2/2]

```
MHAParser::base_t::base_t (
    const base_t & src )
```

4.265.3.3 ~base_t()

```
MHAParser::base_t::~base_t ( ) [virtual]
```

4.265.4 Member Function Documentation

4.265.4.1 parse() [1/3]

```
std::string MHAParser::base_t::parse (
    const std::string & cs ) [virtual]
```

Causes this node to process a command in the openMHA configuration language.

Parameters

<i>cs</i>	The command to parse
-----------	----------------------

Returns

The response to the command, if successful

Exceptions

<i>MHA_Error</i> (p. 707)	If the command cannot be executed successfully. The reason for failure is given in the message string of the exception.
---	---

Reimplemented in **PluginLoader::mhapluginloader_t** (p. [1318](#)), and **altplugins_t** (p. [295](#)).

4.265.4.2 parse() [2/3]

```
void MHAParser::base_t::parse (
    const char * cmd,
    char * retv,
    unsigned int len ) [virtual]
```

This function parses a command and writes the parsing result into a C character array.

This base class implementation delegates to **parse(const std::string &)** (p. [974](#)).

Parameters

<i>cmd</i>	Command to be parsed
<i>retv</i>	Buffer for the result
<i>len</i>	Length of buffer

Reimplemented in **altplugins_t** (p. [295](#)).

4.265.4.3 parse() [3/3]

```
void MHAParser::base_t::parse (
    const std::vector< std::string > & cs,
    std::vector< std::string > & retv ) [virtual]
```

4.265.4.4 op_subparse()

```
std::string MHAParser::base_t::op_subparse (
    expression_t & ) [virtual]
```

Reimplemented in **MHAParser::c_ifc_parser_t** (p. 991), and **MHAParser::parser_t** (p. 1048).

4.265.4.5 op_setval()

```
std::string MHAParser::base_t::op_setval (
    expression_t & ) [virtual]
```

Reimplemented in **MHAParser::mcomplex_t** (p. 1024), **MHAParser::mfloat_t** (p. 1029), **MHAParser::mint_t** (p. 1042), **MHAParser::vcomplex_t** (p. 1067), **MHAParser::vfloat_t** (p. 1073), **MHAParser::vint_t** (p. 1077), **MHAParser::complex_t** (p. 999), **MHAParser::float_t** (p. 1006), **MHAParser::int_t** (p. 1011), **MHAParser::bool_t** (p. 988), **MHAParser::vstring_t** (p. 1082), **MHAParser::string_t** (p. 1061), **MHAParser::kw_t** (p. 1019), **MHAParser::variable_t** (p. 1063), **MHAParser::c_ifc_parser_t** (p. 992), and **MHAParser::parser_t** (p. 1049).

4.265.4.6 op_query()

```
std::string MHAParser::base_t::op_query (
    expression_t & ) [virtual]
```

Reimplemented in **MHAParser::monitor_t** (p. 1044), **MHAParser::c_ifc_parser_t** (p. 992), and **MHAParser::parser_t** (p. 1049).

4.265.4.7 query_dump()

```
std::string MHAParser::base_t::query_dump (
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::monitor_t** (p. 1044), and **MHAParser::parser_t** (p. 1049).

4.265.4.8 query_entries()

```
std::string MHAParser::base_t::query_entries (
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::parser_t** (p. 1049).

4.265.4.9 query_perm()

```
std::string MHAParser::base_t::query_perm (
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::variable_t** (p. 1063), and **MHAParser::monitor_t** (p. 1044).

4.265.4.10 query_range()

```
std::string MHAParser::base_t::query_range (
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::kw_t** (p. 1019), and **MHAParser::range_var_t** (p. 1054).

4.265.4.11 query_type()

```
std::string MHAParser::base_t::query_type (
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::mcomplex_mon_t** (p. 1022), **MHAParser::vcomplex_mon_t** (p. 1065), **MHAParser::complex_mon_t** (p. 997), **MHAParser::float_mon_t** (p. 1004), **MHAParser::mfloat_mon_t** (p. 1027), **MHAParser::vfloat_mon_t** (p. 1070), **MHAParser::mint_mon_t** (p. 1039), **MHAParser::vint_mon_t** (p. 1075), **MHAParser::vstring_mon_t** (p. 1080), **MHAParser::string_mon_t** (p. 1058), **MHAParser::bool_mon_t** (p. 986), **MHAParser::int_mon_t** (p. 1009), **MHAParser::mcomplex_t** (p. 1024), **MHAParser::mfloat_t** (p. 1029), **MHAParser::mint_t** (p. 1042), **MHAParser::vcomplex_t** (p. 1067), **MHAParser::vfloat_t** (p. 1073), **MHAParser::vint_t** (p. 1078), **MHAParser::complex_t** (p. 999), **MHAParser::float_t** (p. 1006), **MHAParser::int_t** (p. 1012), **MHAParser::bool_t** (p. 989), **MHAParser::vstring_t** (p. 1082), **MHAParser::string_t** (p. 1061), **MHAParser::kw_t** (p. 1020), and **MHAParser::parser_t** (p. 1049).

4.265.4.12 query_val()

```
std::string MHAParser::base_t::query_val (
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::mcomplex_mon_t** (p. 1022), **MHAParser::vcomplex_mon_t** (p. 1065), **MHAParser::complex_mon_t** (p. 996), **MHAParser::float_mon_t** (p. 1003), **MHAParser::mfloat_mon_t** (p. 1026), **MHAParser::vfloat_mon_t** (p. 1070), **MHAParser::mint_mon_t** (p. 1039), **MHAParser::vint_mon_t** (p. 1075), **MHAParser::vstring_mon_t** (p. 1080), **MHAParser::string_mon_t** (p. 1058), **MHAParser::bool_mon_t** (p. 986), **MHAParser::int_mon_t** (p. 1009), **MHAParser::mcomplex_t** (p. 1025), **MHAParser::mfloat_t** (p. 1030), **MHAParser::mint_t** (p. 1042), **MHAParser::vcomplex_t** (p. 1068), **MHAParser::vfloat_t** (p. 1073), **MHAParser::vint_t** (p. 1078), **MHAParser::complex_t** (p. 999), **MHAParser::float_t** (p. 1007), **MHAParser::int_t** (p. 1012), **MHAParser::bool_t** (p. 989), **MHAParser::vstring_t** (p. 1082), **MHAParser::string_t** (p. 1061), **MHAParser::kw_t** (p. 1020), and **MHAParser::parser_t** (p. 1050).

4.265.4.13 query_readfile()

```
std::string MHAParser::base_t::query_readfile (  
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::parser_t** (p. [1050](#)).

4.265.4.14 query_savefile()

```
std::string MHAParser::base_t::query_savefile (  
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::parser_t** (p. [1050](#)).

4.265.4.15 query_savefile_compact()

```
std::string MHAParser::base_t::query_savefile_compact (  
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::parser_t** (p. [1050](#)).

4.265.4.16 query_savemons()

```
std::string MHAParser::base_t::query_savemons (  
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::parser_t** (p. [1050](#)).

4.265.4.17 query_listids()

```
std::string MHAParser::base_t::query_listids (  
    const std::string & s ) [virtual]
```

Reimplemented in **MHAParser::parser_t** (p. [1051](#)).

4.265.4.18 query_version()

```
std::string MHAParser::base_t::query_version (
    const std::string & )
```

4.265.4.19 query_id()

```
std::string MHAParser::base_t::query_id (
    const std::string & )
```

4.265.4.20 query_subst()

```
std::string MHAParser::base_t::query_subst (
    const std::string & s )
```

4.265.4.21 query_addsubst()

```
std::string MHAParser::base_t::query_addsubst (
    const std::string & s )
```

4.265.4.22 query_help()

```
std::string MHAParser::base_t::query_help (
    const std::string & s )
```

4.265.4.23 query_cmds()

```
std::string MHAParser::base_t::query_cmds (
    const std::string & s )
```

4.265.4.24 set_node_id()

```
void MHAParser::base_t::set_node_id (
    const std::string & s )
```

Set the identification string of this parser node.

The id can be queried from the configuration language using the ?id query command. Nodes can be found by id using the ?listid query command on a containing parser node.

Parameters

s	The new identification string.
----------	--------------------------------

4.265.4.25 set_help()

```
void MHAParser::base_t::set_help (
    const std::string & s )
```

Set the help comment of a variable or parser.

Parameters

s	New help comment.
----------	-------------------

4.265.4.26 add_parent_on_insert()

```
void MHAParser::base_t::add_parent_on_insert (
    parser_t * p,
    std::string n )
```

4.265.4.27 rm_parent_on_remove()

```
void MHAParser::base_t::rm_parent_on_remove (
    parser_t * )
```

4.265.4.28 fullname()

```
const std::string & MHAParser::base_t::fullname ( ) const
```

Return the full dot-separated path name of this parser node in the openMHA configuration tree.

4.265.4.29 activate_query()

```
void MHAParser::base_t::activate_query (
    const std::string & n,
    query_t a ) [protected]
```

4.265.4.30 notify()

```
void MHAParser::base_t::notify ( ) [protected]
```

4.265.4.31 add_replace_pair()

```
void MHAParser::base_t::add_replace_pair (
    const std::string & a,
    const std::string & b ) [private]
```

4.265.4.32 oplist()

```
std::string MHAParser::base_t::oplist ( ) [private]
```

4.265.5 Member Data Documentation

4.265.5.1 writeaccess

```
MHAEvents::emitter_t MHAParser::base_t::writeaccess
```

Event emitted on write access.

To connect a callback that is invoked on write access to this parser variable, use `MHAEvents::patchbay_t<receiver_t>` method `connect(&writeaccess,&receiver_t::callback)` where callback is a method that expects no parameters and returns void.

4.265.5.2 valuechanged

```
MHAEvents::emitter_t MHAParser::base_t::valuechanged
```

Event emitted if the value has changed.

To connect a callback that is invoked when write access to this parser variable actually changes its value, use `MHAEvents::patchbay_t<receiver_t>` method `connect(&valuechanged,&receiver_t::callback)` where callback is a method that expects no parameters and returns void.

4.265.5.3 readaccess

```
MHAEvents::emitter_t MHAParser::base_t::readaccess
```

Event emitted on read access.

To connect a callback that is invoked after the value of this variable has been read through the configuration interface, use `MHAEvents::patchbay_t<receiver_t>` method `connect(&readaccess,&receiver_t::callback)` where `callback` is a method that expects no parameters and returns void.

4.265.5.4 prereadaccess

```
MHAEvents::emitter_t MHAParser::base_t::prereadaccess
```

Event emitted on read access, before the data field is accessed.

To connect a callback that is invoked when the value of this variable is about to be read through the configuration interface, so that the callback can influence the value that is reported, use `MHAEvents::patchbay_t<receiver_t>` method `connect(&prereadaccess,&receiver_t::callback)` where `callback` is a method that expects no parameters and returns void.

4.265.5.5 queries

```
query_map_t MHAParser::base_t::queries [protected]
```

4.265.5.6 data_is_initialized

```
bool MHAParser::base_t::data_is_initialized [protected]
```

4.265.5.7 help

```
std::string MHAParser::base_t::help [private]
```

4.265.5.8 id_str

```
std::string MHAParser::base_t::id_str [private]
```


4.265.5.9 operators

opact_map_t MHAParser::base_t::operators [private]

4.265.5.10 repl_list

repl_list_t MHAParser::base_t::repl_list [private]

4.265.5.11 nested_lock

bool MHAParser::base_t::nested_lock [private]

4.265.5.12 parent

parser_t* MHAParser::base_t::parent [private]

4.265.5.13 thefullname

std::string MHAParser::base_t::thefullname [private]

The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.266 MHAParser::base_t::replace_t Class Reference

Public Member Functions

- **replace_t** (const std::string &, const std::string &)
- void **replace** (std::string &)
- const std::string & **get_a** () const
- const std::string & **get_b** () const

Private Attributes

- std::string **a**
- std::string **b**

4.266.1 Constructor & Destructor Documentation

4.266.1.1 replace_t()

```
MHAParser::base_t::replace_t::replace_t (
    const std::string & ia,
    const std::string & ib )
```

4.266.2 Member Function Documentation

4.266.2.1 replace()

```
void MHAParser::base_t::replace_t::replace (
    std::string & s )
```

4.266.2.2 get_a()

```
const std::string& MHAParser::base_t::replace_t::get_a ( ) const [inline]
```

4.266.2.3 get_b()

```
const std::string& MHAParser::base_t::replace_t::get_b ( ) const [inline]
```

4.266.3 Member Data Documentation

4.266.3.1 a

```
std::string MHAParser::base_t::replace_t::a [private]
```

4.266.3.2 b

```
std::string MHAParser::base_t::replace_t::b [private]
```

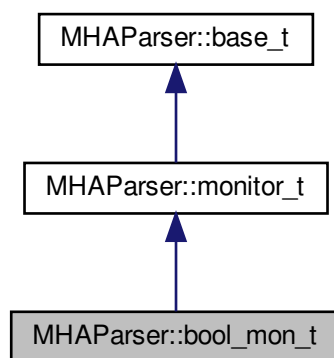
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.267 MHAParser::bool_mon_t Class Reference

Monitor with string value.

Inheritance diagram for MHAParser::bool_mon_t:

**Public Member Functions**

- **bool_mon_t** (const std::string &hlp)
Create a monitor variable for string values.

Public Attributes

- bool **data**
Data field.

Protected Member Functions

- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.267.1 Detailed Description

Monitor with string value.

4.267.2 Constructor & Destructor Documentation

4.267.2.1 `bool_mon_t()`

```
MHAParser::bool_mon_t::bool_mon_t (
    const std::string & hlp )
```

Create a monitor variable for string values.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.267.3 Member Function Documentation

4.267.3.1 `query_val()`

```
std::string MHAParser::bool_mon_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.267.3.2 `query_type()`

```
std::string MHAParser::bool_mon_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.267.4 Member Data Documentation

4.267.4.1 data

```
bool MHAParser::bool_mon_t::data
```

Data field.

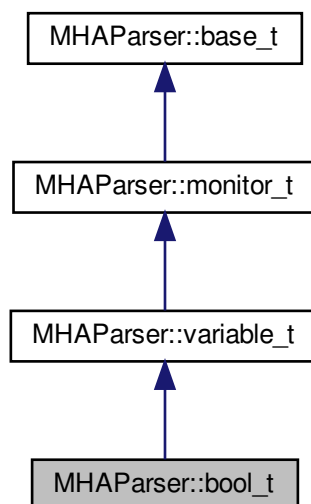
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.268 MHAParser::bool_t Class Reference

Variable with a boolean value ("yes"/"no")

Inheritance diagram for MHAParser::bool_t:



Public Member Functions

- **bool_t** (const std::string &help_text, const std::string &initial_value)
Constructor for a configuration language variable for boolean values.

Public Attributes

- bool **data**
Data field.

Protected Member Functions

- std::string **op_setval** (**expression_t** &)
- std::string **query_type** (const std::string &)
- std::string **query_val** (const std::string &)

Additional Inherited Members

4.268.1 Detailed Description

Variable with a boolean value ("yes"/"no")

4.268.2 Constructor & Destructor Documentation

4.268.2.1 bool_t()

```
MHAParser::bool_t::bool_t (
    const std::string & help_text,
    const std::string & initial_value )
```

Constructor for a configuration language variable for boolean values.

Parameters

<i>help_text</i>	A human-readable text describing the purpose of this configuration variable.
<i>initial_value</i>	The initial value for this variable as a string. The string representation of 'true' is either "yes" or "1". The string representation of 'false' is either "no" or "0".

4.268.3 Member Function Documentation

4.268.3.1 op_setval()

```
std::string MHAParser::bool_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.268.3.2 query_type()

```
std::string MHAParser::bool_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.268.3.3 query_val()

```
std::string MHAParser::bool_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.268.4 Member Data Documentation

4.268.4.1 data

```
bool MHAParser::bool_t::data
```

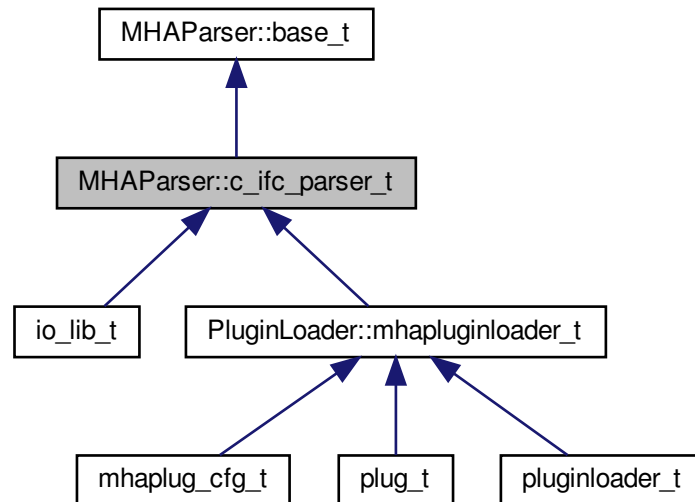
Data field.

The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.269 MHAParser::c_ifc_parser_t Class Reference

Inheritance diagram for MHAParser::c_ifc_parser_t:



Public Member Functions

- **c_ifc_parser_t** (const std::string &modulename_)
- **~c_ifc_parser_t** ()
- void **set_parse_cb** (**c_parse_cmd_t**, **c_parse_err_t**, void *)

Protected Member Functions

- std::string **op_subparse** (**MHAParser::expression_t** &)
- std::string **op_setval** (**MHAParser::expression_t** &)
- std::string **op_query** (**MHAParser::expression_t** &)

Private Member Functions

- void **test_error** ()

Private Attributes

- std::string **modulename**
- **c_parse_cmd_t** **c_parse_cmd**
- **c_parse_err_t** **c_parse_err**
- int **liberr**
- void * **libdata**
- unsigned int **ret_size**
- char * **retv**

Additional Inherited Members

4.269.1 Constructor & Destructor Documentation

4.269.1.1 c_ifc_parser_t()

```
MHAParser::c_ifc_parser_t::c_ifc_parser_t (
    const std::string & modulename_ )
```

4.269.1.2 ~c_ifc_parser_t()

```
MHAParser::c_ifc_parser_t::~~c_ifc_parser_t ( )
```

4.269.2 Member Function Documentation

4.269.2.1 set_parse_cb()

```
void MHAParser::c_ifc_parser_t::set_parse_cb (
    MHAParser::c_parse_cmd_t cb,
    MHAParser::c_parse_err_t strerr,
    void * d )
```

4.269.2.2 op_subparse()

```
std::string MHAParser::c_ifc_parser_t::op_subparse (
    MHAParser::expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 975).

4.269.2.3 op_setval()

```
std::string MHAParser::c_ifc_parser_t::op_setval (
    MHAParser::expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 976).

4.269.2.4 op_query()

```
std::string MHAParser::c_ifc_parser_t::op_query (
    MHAParser::expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 976).

4.269.2.5 test_error()

```
void MHAParser::c_ifc_parser_t::test_error ( ) [private]
```

4.269.3 Member Data Documentation

4.269.3.1 modulename

```
std::string MHAParser::c_ifc_parser_t::modulename [private]
```

4.269.3.2 c_parse_cmd

```
c_parse_cmd_t MHAParser::c_ifc_parser_t::c_parse_cmd [private]
```

4.269.3.3 c_parse_err

c_parse_err_t MHAParser::c_ifc_parser_t::c_parse_err [private]

4.269.3.4 liberr

int MHAParser::c_ifc_parser_t::liberr [private]

4.269.3.5 libdata

void* MHAParser::c_ifc_parser_t::libdata [private]

4.269.3.6 ret_size

unsigned int MHAParser::c_ifc_parser_t::ret_size [private]

4.269.3.7 retv

char* MHAParser::c_ifc_parser_t::retv [private]

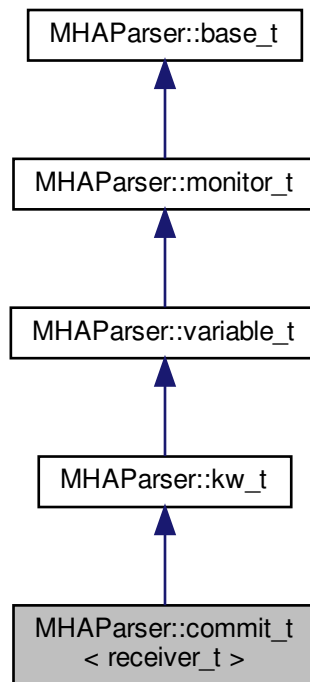
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.270 MHAParser::commit_t< receiver_t > Class Template Reference

Parser variable with event-emission functionality.

Inheritance diagram for MHAParser::commit_t< receiver_t >:



Public Member Functions

- **commit_t** (receiver_t *, void(receiver_t::*)(), const std::string & **help**="Variable changes action")

Private Attributes

- **MHAEvents::connector_t**< receiver_t > **extern_connector**

Additional Inherited Members

4.270.1 Detailed Description

```
template<class receiver_t>
class MHAParser::commit_t< receiver_t >
```

Parser variable with event-emission functionality.

The **commit_t** (p. 994) variable can register an event receiver in its constructor, which is called whenever the variable is set to "commit".

4.270.2 Constructor & Destructor Documentation

4.270.2.1 commit_t()

```
template<class receiver_t >
MHAParser::commit_t< receiver_t >:: commit_t (
    receiver_t * r,
    void(receiver_t::*)() rfun,
    const std::string & help = "Variable changes action" )
```

4.270.3 Member Data Documentation

4.270.3.1 extern_connector

```
template<class receiver_t >
MHAEvents::connector_t<receiver_t> MHAParser::commit_t< receiver_t >::extern_↵
connector [private]
```

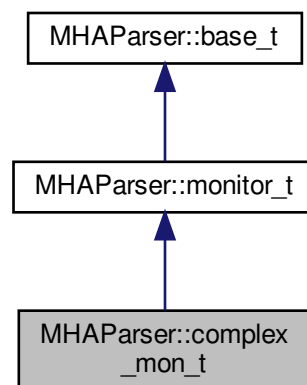
The documentation for this class was generated from the following file:

- mha_parser.hh

4.271 MHAParser::complex_mon_t Class Reference

Monitor with complex value.

Inheritance diagram for MHAParser::complex_mon_t:



Public Member Functions

- **complex_mon_t** (const std::string &hlp)
Create a complex monitor variable.

Public Attributes

- **mha_complex_t data**
Data field.

Protected Member Functions

- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.271.1 Detailed Description

Monitor with complex value.

4.271.2 Constructor & Destructor Documentation

4.271.2.1 complex_mon_t()

```
MHAParser::complex_mon_t::complex_mon_t (
    const std::string & hlp )
```

Create a complex monitor variable.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.271.3 Member Function Documentation

4.271.3.1 query_val()

```
std::string MHAParser::complex_mon_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.271.3.2 query_type()

```
std::string MHAParser::complex_mon_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.271.4 Member Data Documentation

4.271.4.1 data

```
mha_complex_t MHAParser::complex_mon_t::data
```

Data field.

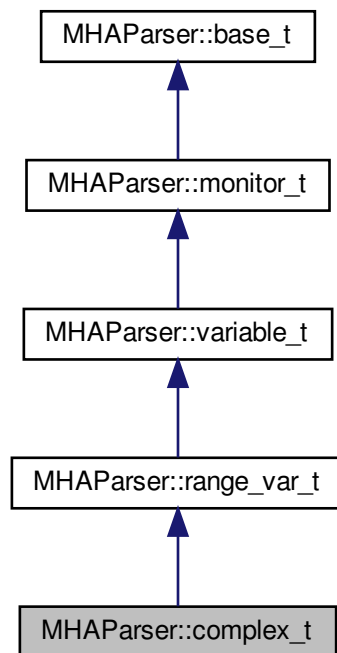
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.272 MHAParser::complex_t Class Reference

Variable with complex value.

Inheritance diagram for MHAParser::complex_t:



Public Member Functions

- **complex_t** (const std::string &, const std::string &, const std::string &= "")

Public Attributes

- **mha_complex_t data**
Data field.

Protected Member Functions

- std::string **op_setval** (**expression_t** &)
- std::string **query_type** (const std::string &)
- std::string **query_val** (const std::string &)

Additional Inherited Members

4.272.1 Detailed Description

Variable with complex value.

4.272.2 Constructor & Destructor Documentation

4.272.2.1 complex_t()

```
MHAParser::complex_t::complex_t (
    const std::string & h,
    const std::string & v,
    const std::string & rg = "" )
```

4.272.3 Member Function Documentation

4.272.3.1 op_setval()

```
std::string MHAParser::complex_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.272.3.2 query_type()

```
std::string MHAParser::complex_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.272.3.3 query_val()

```
std::string MHAParser::complex_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.272.4 Member Data Documentation

4.272.4.1 data

`mha_complex_t` MHAParser::complex_t::data

Data field.

The documentation for this class was generated from the following files:

- `mha_parser.hh`
- `mha_parser.cpp`

4.273 MHAParser::entry_t Class Reference

Public Member Functions

- `entry_t` (const std::string &, **base_t** *)

Public Attributes

- std::string **name**
- **base_t** * **entry**

4.273.1 Constructor & Destructor Documentation

4.273.1.1 entry_t()

```
MHAParser::entry_t::entry_t (  
    const std::string & n,  
    base_t * e )
```

4.273.2 Member Data Documentation

4.273.2.1 name

std::string MHAParser::entry_t::name

4.273.2.2 entry

```
base_t* MHAParser::entry_t::entry
```

The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.274 MHAParser::expression_t Class Reference

Public Member Functions

- **expression_t** (const std::string &, const std::string &)
Constructor.
- **expression_t** ()

Public Attributes

- std::string **lval**
- std::string **rval**
- std::string **op**

4.274.1 Constructor & Destructor Documentation

4.274.1.1 expression_t() [1/2]

```
expression_t::expression_t (
    const std::string & s,
    const std::string & o )
```

Constructor.

Parameters

s	String to be splitted
o	List of valid operators (single character only)

4.274.1.2 expression_t() [2/2]

```
expression_t::expression_t ( )
```

4.274.2 Member Data Documentation

4.274.2.1 lval

```
std::string MHAParser::expression_t::lval
```

4.274.2.2 rval

```
std::string MHAParser::expression_t::rval
```

4.274.2.3 op

```
std::string MHAParser::expression_t::op
```

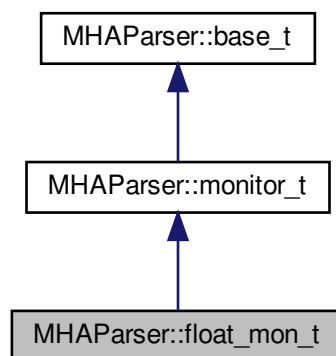
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.275 MHAParser::float_mon_t Class Reference

Monitor with float value.

Inheritance diagram for MHAParser::float_mon_t:



Public Member Functions

- **float_mon_t** (const std::string &hlp)
Initialize a floating point (32 bits) monitor variable.

Public Attributes

- float **data**
Data field.

Protected Member Functions

- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.275.1 Detailed Description

Monitor with float value.

4.275.2 Constructor & Destructor Documentation

4.275.2.1 float_mon_t()

```
MHAParser::float_mon_t::float_mon_t (  
    const std::string & hlp )
```

Initialize a floating point (32 bits) monitor variable.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.275.3 Member Function Documentation

4.275.3.1 query_val()

```
std::string MHAParser::float_mon_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.275.3.2 query_type()

```
std::string MHAParser::float_mon_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.275.4 Member Data Documentation

4.275.4.1 data

```
float MHAParser::float_mon_t::data
```

Data field.

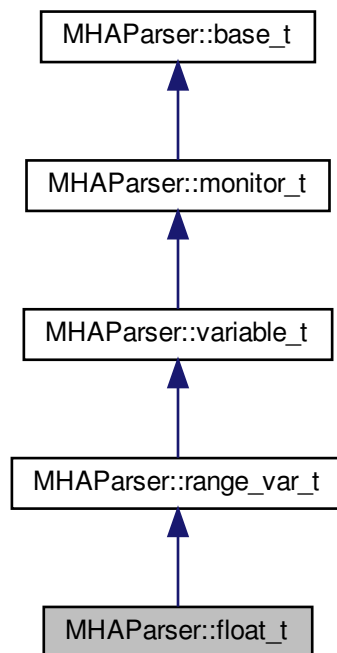
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.276 MHAParser::float_t Class Reference

Variable with float value.

Inheritance diagram for MHAParser::float_t:



Public Member Functions

- **float_t** (const std::string &help_text, const std::string &initial_value, const std::string &range="")

Constructor for a configuration language variable for 32bit ieee floating-point values.

Public Attributes

- float **data**
Data field.

Protected Member Functions

- std::string **op_setval** (**expression_t** &)
- std::string **query_type** (const std::string &)
- std::string **query_val** (const std::string &)

Additional Inherited Members

4.276.1 Detailed Description

Variable with float value.

4.276.2 Constructor & Destructor Documentation

4.276.2.1 float_t()

```
MHAParser::float_t::float_t (
    const std::string & help_text,
    const std::string & initial_value,
    const std::string & range = "" )
```

Constructor for a configuration language variable for 32bit ieee floating-point values.

Parameters

<i>help_text</i>	A human-readable text describing the purpose of this configuration variable.
<i>initial_value</i>	The initial value for this variable as a string (decimal representation of the floating-point variable). If a range is given in the third parameter, then the initial value has to be within the range. A human-readable text describing the purpose of this configuration variable.
<i>range</i>	The range of values that this variable can hold can be restricted. A range is a string of the form "[a,b]", where a and b are decimal representations of the inclusive boundaries of the range. $a \leq b$. In a range of the form "]a,b[" , both boundaries are excluded. Mixed forms are permitted. a or b can also be omitted if there is no lower or upper limit. The range of values is always restricted by the representable range of the underlying C data type.

4.276.3 Member Function Documentation

4.276.3.1 op_setval()

```
std::string MHAParser::float_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.276.3.2 query_type()

```
std::string MHAParser::float_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 977).

4.276.3.3 query_val()

```
std::string MHAParser::float_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 977).

4.276.4 Member Data Documentation

4.276.4.1 data

```
float MHAParser::float_t::data
```

Data field.

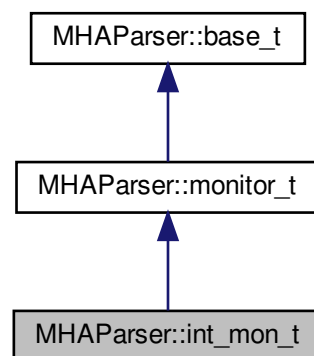
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.277 MHAParser::int_mon_t Class Reference

Monitor variable with int value.

Inheritance diagram for MHAParser::int_mon_t:



Public Member Functions

- **int_mon_t** (const std::string &hlp)
Create a monitor variable for integral values.

Public Attributes

- int **data**
Data field.

Protected Member Functions

- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.277.1 Detailed Description

Monitor variable with int value.

Monitor variables can be of many types. These variables can be queried through the parser. The public data element contains the monitored state. Write access is only possible from the C++ code by direct access to the data field.

4.277.2 Constructor & Destructor Documentation

4.277.2.1 int_mon_t()

```
MHAParser::int_mon_t::int_mon_t (
    const std::string & hlp )
```

Create a monitor variable for integral values.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.277.3 Member Function Documentation

4.277.3.1 query_val()

```
std::string MHAParser::int_mon_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.277.3.2 query_type()

```
std::string MHAParser::int_mon_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.277.4 Member Data Documentation

4.277.4.1 data

```
int MHAParser::int_mon_t::data
```

Data field.

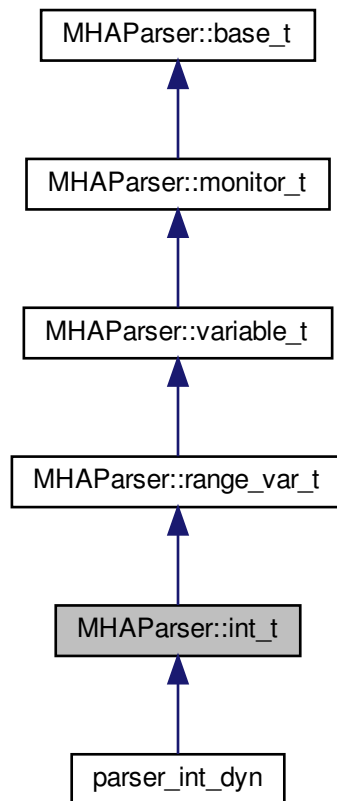
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.278 MHAParser::int_t Class Reference

Variable with integer value.

Inheritance diagram for MHAParser::int_t:



Public Member Functions

- **int_t** (const std::string &help_text, const std::string &initial_value, const std::string &range="")

Constructor for a configuration language variable for integral values.

Public Attributes

- int **data**

Data field.

Protected Member Functions

- `std::string op_setval (expression_t &)`
- `std::string query_type (const std::string &)`
- `std::string query_val (const std::string &)`

Additional Inherited Members

4.278.1 Detailed Description

Variable with integer value.

4.278.2 Constructor & Destructor Documentation

4.278.2.1 int_t()

```
MHAParser::int_t::int_t (
    const std::string & help_text,
    const std::string & initial_value,
    const std::string & range = "" )
```

Constructor for a configuration language variable for integral values.

Parameters

<i>help_text</i>	A human-readable text describing the purpose of this configuration variable.
<i>initial_value</i>	The initial value for this variable as a string (decimal representation of the integer variable). If a range is given in the third parameter, then the initial value has to be within the range.
<i>range</i>	The range of values that this variable can hold can be restricted. A range is a string of the form "[a,b]", where a and b are decimal representations of the integral inclusive boundaries of the range. $a \leq b$. In a range of the form "]a,b[" , both boundaries are excluded. Mixed forms are permitted. a or b can also be omitted if there is no lower or upper limit. The range of values is always restricted by the representable range of the underlying C data type (usually 32 bits, [-2147483648,2147483647]).

4.278.3 Member Function Documentation

4.278.3.1 op_setval()

```
std::string MHAParser::int_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.278.3.2 query_type()

```
std::string MHAParser::int_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.278.3.3 query_val()

```
std::string MHAParser::int_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.278.4 Member Data Documentation

4.278.4.1 data

```
int MHAParser::int_t::data
```

Data field.

The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.279 MHAParser::keyword_list_t Class Reference

Keyword list class.

Public Types

- typedef std::vector< std::string >::size_type **size_t**

Public Member Functions

- void **set_value** (const std::string &)
Select a value from keyword list.
- void **set_entries** (const std::string &)
Set keyword list entries.
- const std::string & **get_value** () const
Return selected value.
- const std::vector< std::string > & **get_entries** () const
Return keyword list.
- const **size_t** & **get_index** () const
Return index of selected value.
- void **set_index** (unsigned int)
- void **validate** () const
Check if index of selected value is valid.
- void **add_entry** (const std::string &en)
- **keyword_list_t** ()
Constructor.

Private Attributes

- **size_t** **index**
Index into list.
- std::vector< std::string > **entries**
List of valid entries.
- std::string **empty_string**

4.279.1 Detailed Description

Keyword list class.

The structure **keyword_list_t** (p. 1012) defines a keyword list (vector of strings) with an index into the list. Used as **MHAParser::kw_t** (p. 1017), it can be used to access a set of valid keywords through the parser (i.e. one of "pear apple banana").

4.279.2 Member Typedef Documentation

4.279.2.1 `size_t`

```
typedef std::vector<std::string>::size_type  MHAParser::keyword_list_t::size_t
```

4.279.3 Constructor & Destructor Documentation

4.279.3.1 `keyword_list_t()`

```
MHAParser::keyword_list_t::keyword_list_t ( )
```

Constructor.

4.279.4 Member Function Documentation

4.279.4.1 `set_value()`

```
void MHAParser::keyword_list_t::set_value (
    const std::string & s )
```

Select a value from keyword list.

This function selects a value from the keyword list. The index is set to the last matching entry.

Parameters

<code>s</code>	Value to be selected.
----------------	-----------------------

4.279.4.2 `set_entries()`

```
void MHAParser::keyword_list_t::set_entries (
    const std::string & s )
```

Set keyword list entries.

With this function, the keyword list can be set from a space separated string list.

Parameters

s	Space separated entry list.
---	-----------------------------

4.279.4.3 get_value()

```
const std::string & MHAParser::keyword_list_t::get_value ( ) const
```

Return selected value.

4.279.4.4 get_entries()

```
const std::vector< std::string > & MHAParser::keyword_list_t::get_entries ( ) const
```

Return keyword list.

4.279.4.5 get_index()

```
const MHAParser::keyword_list_t::size_t & MHAParser::keyword_list_t::get_index ( )  
const
```

Return index of selected value.

4.279.4.6 set_index()

```
void MHAParser::keyword_list_t::set_index (   
    unsigned int idx )
```

4.279.4.7 validate()

```
void MHAParser::keyword_list_t::validate ( ) const
```

Check if index of selected value is valid.

4.279.4.8 add_entry()

```
void MHAParser::keyword_list_t::add_entry (
    const std::string & en ) [inline]
```

4.279.5 Member Data Documentation

4.279.5.1 index

```
size_t MHAParser::keyword_list_t::index [private]
```

Index into list.

4.279.5.2 entries

```
std::vector<std::string> MHAParser::keyword_list_t::entries [private]
```

List of valid entries.

4.279.5.3 empty_string

```
std::string MHAParser::keyword_list_t::empty_string [private]
```

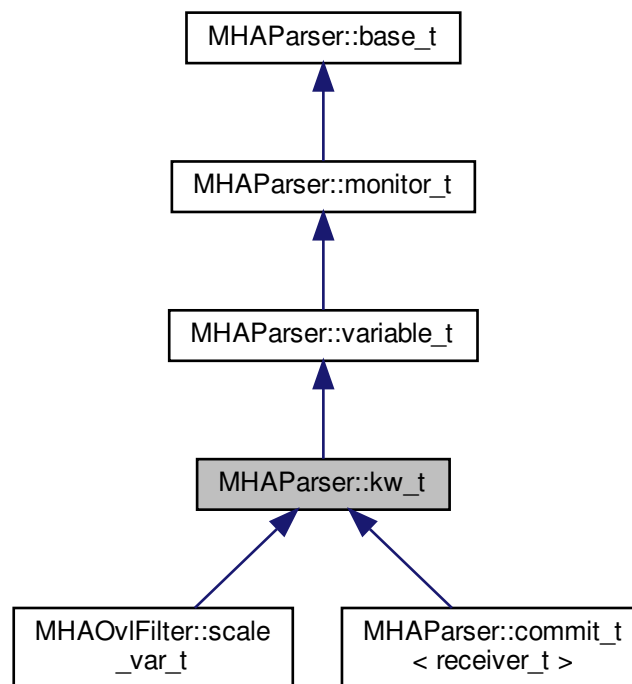
The documentation for this class was generated from the following files:

- mha_parser.hh
- mha_parser.cpp

4.280 MHAParser::kw_t Class Reference

Variable with keyword list value.

Inheritance diagram for MHAParser::kw_t:



Public Member Functions

- **kw_t** (const std::string &, const std::string &, const std::string &)
Constructor of a keyword list openMHA configuration variable.
- **kw_t** (const **kw_t** &)
Copy constructor.
- void **set_range** (const std::string &)
Set/change the list of valid entries.
- bool **isval** (const std::string &) const
Test if the given value is selected.

Public Attributes

- **keyword_list_t data**
Variable data in its native type.

Protected Member Functions

- void **validate** (const **keyword_list_t** &)
- std::string **op_setval** (**expression_t** &)
- std::string **query_range** (const std::string &)
- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.280.1 Detailed Description

Variable with keyword list value.

4.280.2 Constructor & Destructor Documentation

4.280.2.1 **kw_t()** [1/2]

```
MHAParser::kw_t::kw_t (
    const std::string & h,
    const std::string & v,
    const std::string & rg )
```

Constructor of a keyword list openMHA configuration variable.

Parameters

<i>h</i>	A help string describing the purpose of this variable.
<i>v</i>	The initial value, has to be a value from the list of possible values given in the last parameter.
<i>rg</i>	A string containing the list of valid entries. The entries have to be separated by spaces. The list of entries has to be delimited by brackets "[", "]".

4.280.2.2 **kw_t()** [2/2]

```
MHAParser::kw_t::kw_t (
    const kw_t & src )
```

Copy constructor.

4.280.3 Member Function Documentation

4.280.3.1 set_range()

```
void MHAParser::kw_t::set_range (
    const std::string & r )
```

Set/change the list of valid entries.

Parameters

<i>r</i>	A string containing the list of valid entries. The entries have to be separated by spaces. The list of entries has to be delimited by brackets "[", "]".
----------	--

4.280.3.2 isval()

```
bool MHAParser::kw_t::isval (
    const std::string & testval ) const
```

Test if the given value is selected.

4.280.3.3 validate()

```
void MHAParser::kw_t::validate (
    const keyword_list_t & s ) [protected]
```

4.280.3.4 op_setval()

```
std::string MHAParser::kw_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.280.3.5 query_range()

```
std::string MHAParser::kw_t::query_range (  
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.280.3.6 query_val()

```
std::string MHAParser::kw_t::query_val (  
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.280.3.7 query_type()

```
std::string MHAParser::kw_t::query_type (  
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.280.4 Member Data Documentation

4.280.4.1 data

```
keyword_list_t MHAParser::kw_t::data
```

Variable data in its native type.

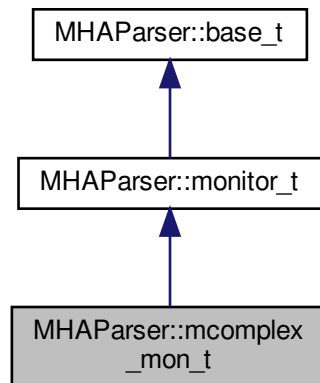
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.281 MHAParser::mcomplex_mon_t Class Reference

Matrix of complex numbers monitor.

Inheritance diagram for MHAParser::mcomplex_mon_t:



Public Member Functions

- **mcomplex_mon_t** (const std::string &hlp)
Create a matrix of complex floating point monitor values.

Public Attributes

- std::vector< std::vector< **mha_complex_t** > > **data**
Data field.

Protected Member Functions

- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.281.1 Detailed Description

Matrix of complex numbers monitor.

4.281.2 Constructor & Destructor Documentation

4.281.2.1 mcomplex_mon_t()

```
MHAParser::mcomplex_mon_t::mcomplex_mon_t (
    const std::string & hlp )
```

Create a matrix of complex floating point monitor values.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.281.3 Member Function Documentation

4.281.3.1 query_val()

```
std::string MHAParser::mcomplex_mon_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.281.3.2 query_type()

```
std::string MHAParser::mcomplex_mon_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.281.4 Member Data Documentation

4.281.4.1 data

```
std::vector< std::vector< mha_complex_t> > MHAParser::mcomplex_mon_t::data
```

Data field.

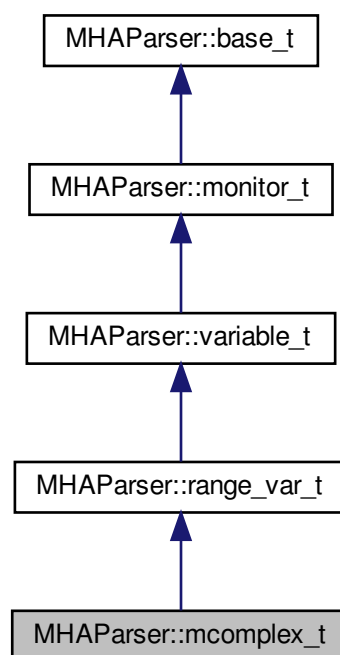
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.282 MHAParser::mcomplex_t Class Reference

Matrix variable with complex value.

Inheritance diagram for MHAParser::mcomplex_t:



Public Member Functions

- **mcomplex_t** (const std::string &, const std::string &, const std::string &="")

Public Attributes

- `std::vector< std::vector< mha_complex_t > > data`
Data field.

Protected Member Functions

- `std::string op_setval (expression_t &)`
- `std::string query_type (const std::string &)`
- `std::string query_val (const std::string &)`

Additional Inherited Members

4.282.1 Detailed Description

Matrix variable with complex value.

4.282.2 Constructor & Destructor Documentation

4.282.2.1 `mcomplex_t()`

```
MHAParser::mcomplex_t::mcomplex_t (
    const std::string & h,
    const std::string & v,
    const std::string & rg = "" )
```

4.282.3 Member Function Documentation

4.282.3.1 `op_setval()`

```
std::string MHAParser::mcomplex_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.282.3.2 query_type()

```
std::string MHAParser::mcomplex_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 977).

4.282.3.3 query_val()

```
std::string MHAParser::mcomplex_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 977).

4.282.4 Member Data Documentation

4.282.4.1 data

```
std::vector<std::vector< mha_complex_t> > MHAParser::mcomplex_t::data
```

Data field.

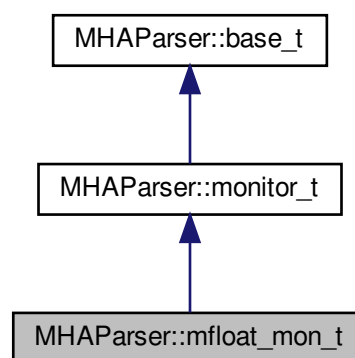
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.283 MHAParser::mfloat_mon_t Class Reference

Matrix of floats monitor.

Inheritance diagram for MHAParser::mfloat_mon_t:



Public Member Functions

- **mfloat_mon_t** (const std::string &hlp)
Create a matrix of floating point monitor values.

Public Attributes

- std::vector< std::vector< float > > **data**
Data field.

Protected Member Functions

- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.283.1 Detailed Description

Matrix of floats monitor.

4.283.2 Constructor & Destructor Documentation

4.283.2.1 mfloat_mon_t()

```
MHAParser::mfloat_mon_t::mfloat_mon_t (
    const std::string & hlp )
```

Create a matrix of floating point monitor values.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.283.3 Member Function Documentation

4.283.3.1 query_val()

```
std::string MHAParser::mfloat_mon_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.283.3.2 query_type()

```
std::string MHAParser::mfloat_mon_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.283.4 Member Data Documentation

4.283.4.1 data

```
std::vector< std::vector<float> > MHAParser::mfloat_mon_t::data
```

Data field.

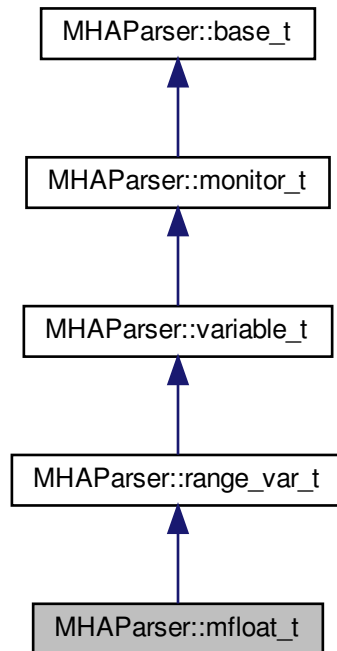
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.284 MHAParser::mfloat_t Class Reference

Matrix variable with float value.

Inheritance diagram for MHAParser::mfloat_t:



Public Member Functions

- **mfloat_t** (const std::string &, const std::string &, const std::string &="")
Create a float matrix parser variable.

Public Attributes

- std::vector< std::vector< float > > **data**
Data field.

Protected Member Functions

- std::string **op_setval** (**expression_t** &)
- std::string **query_type** (const std::string &)
- std::string **query_val** (const std::string &)

Additional Inherited Members

4.284.1 Detailed Description

Matrix variable with float value.

4.284.2 Constructor & Destructor Documentation

4.284.2.1 mfloat_t()

```
MHAParser::mfloat_t::mfloat_t (
    const std::string & h,
    const std::string & v,
    const std::string & rg = "" )
```

Create a float matrix parser variable.

Parameters

<i>h</i>	A human-readable text describing the purpose of this configuration variable.
<i>v</i>	The initial value of the variable, as a string, in openMHA configuration language: (e.g. "[[0 1]; [2 3]]" for a matrix), described in the "Multidimensional Variables" s2.1.3 section of the openMHA User Manual.
<i>rg</i>	The numeric range to enforce on all members of the matrix.

4.284.3 Member Function Documentation

4.284.3.1 op_setval()

```
std::string MHAParser::mfloat_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. 1063).

4.284.3.2 query_type()

```
std::string MHAParser::mfloat_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 977).

4.284.3.3 query_val()

```
std::string MHAParser::mfloat_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 977).

4.284.4 Member Data Documentation

4.284.4.1 data

```
std::vector<std::vector<float> > MHAParser::mfloat_t::data
```

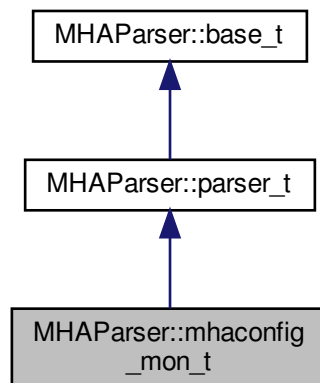
Data field.

The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.285 MHAParser::mhaconfig_mon_t Class Reference

Inheritance diagram for MHAParser::mhaconfig_mon_t:



Public Member Functions

- **mhaconfig_mon_t** (const std::string & **help**="")
- void **update** (const **mhaconfig_t** &cf)

Private Attributes

- **MHAParser::int_mon_t channels**
Number of audio channels.
- **MHAParser::string_mon_t domain**
Signal domain (MHA_WAVEFORM or MHA_SPECTRUM)
- **MHAParser::int_mon_t fragsize**
Fragment size of waveform data.
- **MHAParser::int_mon_t wndlen**
Window length of spectral data.
- **MHAParser::int_mon_t fftlen**
FFT length of spectral data.
- **MHAParser::float_mon_t srate**
Sampling rate in Hz.

Additional Inherited Members

4.285.1 Constructor & Destructor Documentation

4.285.1.1 mhaconfig_mon_t()

```
MHAParser::mhaconfig_mon_t::mhaconfig_mon_t (
    const std::string & help = "" )
```

4.285.2 Member Function Documentation

4.285.2.1 update()

```
void MHAParser::mhaconfig_mon_t::update (
    const mhaconfig_t & cf )
```

4.285.3 Member Data Documentation

4.285.3.1 channels

MHAParser::int_mon_t MHAParser::mhaconfig_mon_t::channels [private]

Number of audio channels.

4.285.3.2 domain

MHAParser::string_mon_t MHAParser::mhaconfig_mon_t::domain [private]

Signal domain (MHA_WAVEFORM or MHA_SPECTRUM)

4.285.3.3 fragsize

MHAParser::int_mon_t MHAParser::mhaconfig_mon_t::fragsize [private]

Fragment size of waveform data.

4.285.3.4 wndlen

MHAParser::int_mon_t MHAParser::mhaconfig_mon_t::wndlen [private]

Window length of spectral data.

4.285.3.5 fftlen

MHAParser::int_mon_t MHAParser::mhaconfig_mon_t::fftlen [private]

FFT length of spectral data.

4.285.3.6 srate

```
MHAParser::float_mon_t MHAParser::mhaconfig_mon_t::srate [private]
```

Sampling rate in Hz.

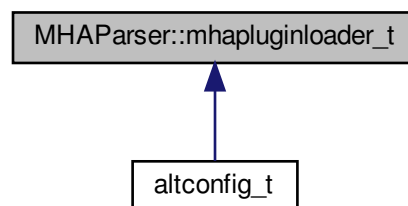
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.286 MHAParser::mhapluginloader_t Class Reference

Class to create a plugin loader in a parser, including the load logic.

Inheritance diagram for MHAParser::mhapluginloader_t:



Public Member Functions

- **mhapluginloader_t** (**MHAParser::parser_t** &parent, const **algo_comm_t** &ac, const std::string &plugname_name="plugin_name", const std::string &prefix="")
- **~mhapluginloader_t** ()
- void **prepare** (**mhaconfig_t** &cf)
- void **release** ()
- void **process** (**mha_wave_t** *sIn, **mha_wave_t** **sOut)
- void **process** (**mha_spec_t** *sIn, **mha_spec_t** **sOut)
- void **process** (**mha_wave_t** *sIn, **mha_spec_t** **sOut)
- void **process** (**mha_spec_t** *sIn, **mha_wave_t** **sOut)
- **mhaconfig_t** **get_cfin** () const
- **mhaconfig_t** **get_cfout** () const
- const std::string & **get_last_name** () const

Protected Attributes

- **PluginLoader::mhapluginloader_t * plug**

Private Member Functions

- void **load_plug** ()

Private Attributes

- **MHAParser::parser_t & parent_**
- **MHAParser::string_t plugname**
- std::string **prefix_**
- **MHAEvents::connector_t< mhapluginloader_t > connector**
- **algo_comm_t ac_**
- std::string **last_name**
- std::string **plugname_name_**
- **mhaconfig_t cf_in_**
- **mhaconfig_t cf_out_**

Static Private Attributes

- static double **bookkeeping**

4.286.1 Detailed Description

Class to create a plugin loader in a parser, including the load logic.

4.286.2 Constructor & Destructor Documentation

4.286.2.1 mhapluginloader_t()

```
MHAParser::mhapluginloader_t::mhapluginloader_t (
    MHAParser::parser_t & parent,
    const algo_comm_t & ac,
    const std::string & plugname_name = "plugin_name",
    const std::string & prefix = "" )
```

4.286.2.2 ~mhapluginloader_t()

```
MHAParser::mhapluginloader_t::~~mhapluginloader_t ( )
```

4.286.3 Member Function Documentation

4.286.3.1 prepare()

```
void MHAParser::mhapluginloader_t::prepare (
    mhaconfig_t & cf )
```

4.286.3.2 release()

```
void MHAParser::mhapluginloader_t::release ( )
```

4.286.3.3 process() [1/4]

```
void MHAParser::mhapluginloader_t::process (
    mha_wave_t * sIn,
    mha_wave_t ** sOut ) [inline]
```

4.286.3.4 process() [2/4]

```
void MHAParser::mhapluginloader_t::process (
    mha_spec_t * sIn,
    mha_spec_t ** sOut ) [inline]
```

4.286.3.5 process() [3/4]

```
void MHAParser::mhapluginloader_t::process (
    mha_wave_t * sIn,
    mha_spec_t ** sOut ) [inline]
```

4.286.3.6 process() [4/4]

```
void MHAParser::mhapluginloader_t::process (
    mha_spec_t * sIn,
    mha_wave_t ** sOut ) [inline]
```

4.286.3.7 get_cfin()

```
mhaconfig_t MHAParser::mhapluginloader_t::get_cfin ( ) const [inline]
```

4.286.3.8 get_cfout()

```
mhaconfig_t MHAParser::mhapluginloader_t::get_cfout ( ) const [inline]
```

4.286.3.9 get_last_name()

```
const std::string& MHAParser::mhapluginloader_t::get_last_name ( ) const [inline]
```

4.286.3.10 load_plug()

```
void MHAParser::mhapluginloader_t::load_plug ( ) [private]
```

4.286.4 Member Data Documentation

4.286.4.1 plug

```
PluginLoader::mhapluginloader_t* MHAParser::mhapluginloader_t::plug [protected]
```

4.286.4.2 parent_

```
MHAParser::parser_t& MHAParser::mhapluginloader_t::parent_ [private]
```

4.286.4.3 plugname

MHAParser::string_t MHAParser::mhapluginloader_t::plugname [private]

4.286.4.4 prefix_

std::string MHAParser::mhapluginloader_t::prefix_ [private]

4.286.4.5 connector

MHAEvents::connector_t< **mhapluginloader_t**> MHAParser::mhapluginloader_t::connector [private]

4.286.4.6 ac_

algo_comm_t MHAParser::mhapluginloader_t::ac_ [private]

4.286.4.7 last_name

std::string MHAParser::mhapluginloader_t::last_name [private]

4.286.4.8 plugname_name_

std::string MHAParser::mhapluginloader_t::plugname_name_ [private]

4.286.4.9 cf_in_

mhaconfig_t MHAParser::mhapluginloader_t::cf_in_ [private]

4.286.4.10 cf_out_

mhaconfig_t MHAParser::mhapluginloader_t::cf_out_ [private]

4.286.4.11 bookkeeping

```
double MHAParser::mhapluginloader_t::bookkeeping [static], [private]
```

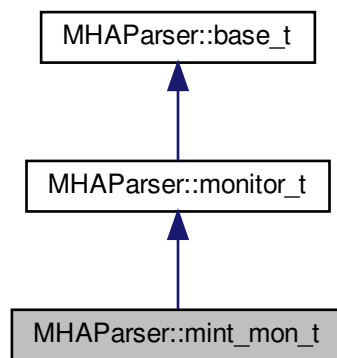
The documentation for this class was generated from the following files:

- **mhapluginloader.h**
- **mhapluginloader.cpp**

4.287 MHAParser::mint_mon_t Class Reference

Matrix of ints monitor.

Inheritance diagram for MHAParser::mint_mon_t:



Public Member Functions

- **mint_mon_t** (const std::string &hlp)
Create a matrix of integer monitor values.

Public Attributes

- std::vector< std::vector< int > > **data**
Data field.

Protected Member Functions

- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.287.1 Detailed Description

Matrix of ints monitor.

4.287.2 Constructor & Destructor Documentation

4.287.2.1 mint_mon_t()

```
MHAParser::mint_mon_t::mint_mon_t (
    const std::string & hlp )
```

Create a matrix of integer monitor values.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.287.3 Member Function Documentation

4.287.3.1 query_val()

```
std::string MHAParser::mint_mon_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.287.3.2 query_type()

```
std::string MHAParser::mint_mon_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.287.4 Member Data Documentation

4.287.4.1 data

```
std::vector< std::vector<int> > MHAParser::mint_mon_t::data
```

Data field.

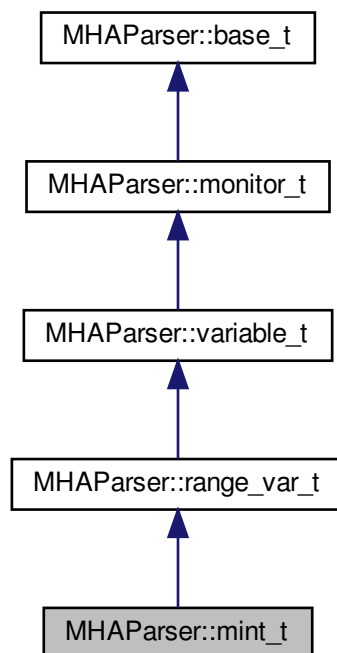
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.288 MHAParser::mint_t Class Reference

Matrix variable with int value.

Inheritance diagram for MHAParser::mint_t:



Public Member Functions

- **mint_t** (const std::string &, const std::string &, const std::string &="")
Create a int matrix parser variable.

Public Attributes

- std::vector< std::vector< int > > **data**
Data field.

Protected Member Functions

- std::string **op_setval** (**expression_t** &)
- std::string **query_type** (const std::string &)
- std::string **query_val** (const std::string &)

Additional Inherited Members

4.288.1 Detailed Description

Matrix variable with int value.

4.288.2 Constructor & Destructor Documentation

4.288.2.1 mint_t()

```
MHAParser::mint_t::mint_t (
    const std::string & h,
    const std::string & v,
    const std::string & rg = "" )
```

Create a int matrix parser variable.

Parameters

<i>h</i>	A human-readable text describing the purpose of this configuration variable.
<i>v</i>	The initial value of the variable, as a string, in openMHA configuration language: (e.g. "[[0 1]; [2 3]]" for a matrix), described in the "Multidimensional Variables" s2.1.3 section of the openMHA User Manual.
<i>rg</i>	The numeric range to enforce on all members of the matrix.

4.288.3 Member Function Documentation

4.288.3.1 op_setval()

```
std::string MHAParser::mint_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.288.3.2 query_type()

```
std::string MHAParser::mint_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.288.3.3 query_val()

```
std::string MHAParser::mint_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.288.4 Member Data Documentation

4.288.4.1 data

```
std::vector<std::vector<int> > MHAParser::mint_t::data
```

Data field.

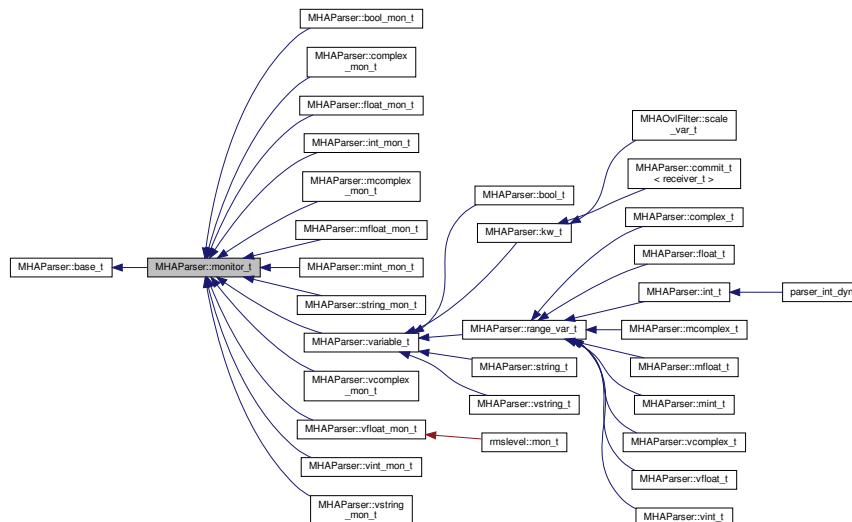
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.289 MHAParser::monitor_t Class Reference

Base class for monitors and variable nodes.

Inheritance diagram for MHAParser::monitor_t:



Public Member Functions

- **monitor_t** (const std::string &)
- **monitor_t** (const **monitor_t** &)
- std::string **op_query** (**expression_t** &)
- std::string **query_dump** (const std::string &)
- std::string **query_perm** (const std::string &)

Additional Inherited Members

4.289.1 Detailed Description

Base class for monitors and variable nodes.

4.289.2 Constructor & Destructor Documentation

4.289.2.1 monitor_t() [1/2]

```
MHAParser::monitor_t::monitor_t (  
    const std::string & h )
```

4.289.2.2 monitor_t() [2/2]

```
MHAParser::monitor_t::monitor_t (  
    const monitor_t & src )
```

4.289.3 Member Function Documentation

4.289.3.1 op_query()

```
std::string MHAParser::monitor_t::op_query (  
    expression_t & x ) [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [976](#)).

4.289.3.2 query_dump()

```
std::string MHAParser::monitor_t::query_dump (  
    const std::string & s ) [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [976](#)).

4.289.3.3 query_perm()

```
std::string MHAParser::monitor_t::query_perm (  
    const std::string & s ) [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [976](#)).

Reimplemented in **MHAParser::variable_t** (p. [1063](#)).

The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.290 MHAParser::parser_t Class Reference

Parser node class.

Inherits **MHAParser::base_t**.

Inherited by **alsa_dev_par_parser_t**, **AuditoryProfile::parser_t**, **AuditoryProfile::parser_t::ear_t**, **AuditoryProfile::parser_t::fmap_t**, **DynComp::dc_afterburn_vars_t**, **fw_t**, **io_alsa_t**, **io_file_t**, **io_parser_t**, **io_tcp_parser_t**, **MHAFilter::adapt_filter_t**, **MHAFilter::iir_filter_t**, **MHAIOJack::io_jack_t**, **MHAIOJackdb::io_jack_t**, **MHAIOPortAudio::device_info_t**, **MHAIOPortAudio::io_portaudio_t**, **MHAParser::mhaconfig_mon_t**, **MHAParser::window_t**, **MHAPlugin::plugin_t< runtime_cfg_t >**, **MHAPlugin::Split::split_t**, **MHAPlugin::plugin_t< ac2wave_t >**, **MHAPlugin::plugin_t< acConcat_wave_config >**, **MHAPlugin::plugin_t< acPooling_wave_config >**, **MHAPlugin::plugin_t< acSteer_config >**, **MHAPlugin::plugin_t< acTransform_wave_config >**, **MHAPlugin::plugin_t< adm_rtconfig_t >**, **MHAPlugin::plugin_t< analysepath_t >**, **MHAPlugin::plugin_t< cfg_t >**, **MHAPlugin::plugin_t< char >**, **MHAPlugin::plugin_t< cohflt_t >**, **MHAPlugin::plugin_t< combc_t >**, **MHAPlugin::plugin_t< cpuload_cfg_t >**, **MHAPlugin::plugin_t< db_t >**, **MHAPlugin::plugin_t< dbasync_t >**, **MHAPlugin::plugin_t< dc_t >**, **MHAPlugin::plugin_t< delaysum_t >**, **MHAPlugin::plugin_t< delaysum_wave_t >**, **MHAPlugin::plugin_t< doasvm_classification_config >**, **MHAPlugin::plugin_t< doasvm_feature_extraction_config >**, **MHAPlugin::plugin_t< example5_t >**, **MHAPlugin::plugin_t< fftfb_plug_t >**, **MHAPlugin::plugin_t< fftfbpow_t >**, **MHAPlugin::plugin_t< fftfilter_t >**, **MHAPlugin::plugin_t< fshift_config_t >**, **MHAPlugin::plugin_t< gsc_adaptive_stage >**, **MHAPlugin::plugin_t< gtfb_analyzer_cfg_t >**, **MHAPlugin::plugin_t< gtfb_simd_cfg_t >**, **MHAPlugin::plugin_t< gtfb_simple_rt_t >**, **MHAPlugin::plugin_t< hilbert_shifter_t >**, **MHAPlugin::plugin_t< int >**, **MHAPlugin::plugin_t< level_matching_config_t >**, **MHAPlugin::plugin_t< lpc_bl_predictor_config >**, **MHAPlugin::plugin_t< lpc_burglattice_config >**, **MHAPlugin::plugin_t< lpc_config >**, **MHAPlugin::plugin_t< MHA_AC::spectrum_t >**, **MHAPlugin::plugin_t< MHA_AC::waveform_t >**, **MHAPlugin::plugin_t< mhachain::plugs_t >**, **MHAPlugin::plugin_t< MHAFilter::partitioned_convolution_t >**, **MHAPlugin::plugin_t< MHASignal::async_rmslevel_t >**, **MHAPlugin::plugin_t< MHASignal::delay_t >**, **MHAPlugin::plugin_t< MHASignal::waveform_t >**, **MHAPlugin::plugin_t< MHAWindow::fun_t >**, **MHAPlugin::plugin_t< noise_psd_estimator_t >**, **MHAPlugin::plugin_t< overlapadd_t >**, **MHAPlugin::plugin_t< plingploing_t >**, **MHAPlugin::plugin_t< prediction_error_config >**, **MHAPlugin::plugin_t< resampling_t >**, **MHAPlugin::plugin_t< rmslevel_t >**, **MHAPlugin::plugin_t< rohConfig >**, **MHAPlugin::plugin_t< route::process_t >**, **MHAPlugin::plugin_t< rt_nlms_t >**, **MHAPlugin::plugin_t< scaler_t >**, **MHAPlugin::plugin_t< sine_cfg_t >**, **MHAPlugin::plugin_t< smooth_cepstrum_t >**, **MHAPlugin::plugin_t< smoothspec_wrap_t >**, **MHAPlugin::plugin_t< spec2wave_t >**, **MHAPlugin::plugin_t< spec_fader_t >**, **MHAPlugin::plugin_t< steerbf_config >**, **MHAPlugin::plugin_t< wave2spec_t >**, **MHAPlugin::plugin_t< wavwriter_t >**, **softclipper_variables_t**, **testplugin::ac_parser_t**, **testplugin::config_parser_t**, and **testplugin::signal_parser_t**.

Public Member Functions

- **parser_t** (const std::string &help_text="")
Construct detached node to be used in the configuration tree.

- **~parser_t** ()
- void **insert_item** (const std::string &, **base_t** *)
Register a parser item into this sub-parser.
- void **remove_item** (const std::string &)
Remove an item by name.
- void **force_remove_item** (const std::string &)
Remove an item by name.
- void **remove_item** (const **base_t** *)
Remove an item by address.

Protected Member Functions

- std::string **op_subparse** (**expression_t** &)
- std::string **op_setval** (**expression_t** &)
- std::string **op_query** (**expression_t** &)
- std::string **query_type** (const std::string &)
- std::string **query_dump** (const std::string &)
- std::string **query_entries** (const std::string &)
- std::string **query_readfile** (const std::string &)
- std::string **query_savefile** (const std::string &)
- std::string **query_savefile_compact** (const std::string &)
- std::string **query_savemons** (const std::string &)
- std::string **query_val** (const std::string &)
- std::string **query_listids** (const std::string &)
- void **set_id_string** (const std::string &)
- bool **has_entry** (const std::string &)

Private Attributes

- **entry_map_t** **entries**
- std::string **id_string**
identification string
- std::string **srcfile**
- unsigned int **srcline**
- std::string **last_errormsg**

Additional Inherited Members

4.290.1 Detailed Description

Parser node class.

A **parser_t** (p. 1045) instance is a node in the configuration tree. A parser node can contain any number of other **parser_t** (p. 1045) instances or configuration language variables. These items are inserted into a parser node using the **parser_t::insert_item** (p. 1047) method.

4.290.2 Constructor & Destructor Documentation

4.290.2.1 parser_t()

```
MHAParser::parser_t::parser_t (
    const std::string & help_text = "" )
```

Construct detached node to be used in the configuration tree.

Parameters

<i>help_text</i>	A text describing this node. E.g. if this node lives at the root of some openMHA plugin, then the help text should describe the functionality of the plugin.
------------------	--

4.290.2.2 ~parser_t()

```
MHAParser::parser_t::~~parser_t ( )
```

4.290.3 Member Function Documentation

4.290.3.1 insert_item()

```
void MHAParser::parser_t::insert_item (
    const std::string & n,
    MHAParser::base_t * e )
```

Register a parser item into this sub-parser.

This function registers an item under a given name into this sub-parser and makes it accessible to the parser interface.

Parameters

<i>n</i>	Name of the item in the configuration tree
<i>e</i>	C++ pointer to the item instance. e can either point to a variable, to a monitor, or to another sub-parser.

4.290.3.2 remove_item() [1/2]

```
void MHAParser::parser_t::remove_item (
    const std::string & n )
```

Remove an item by name.

If the item does not exist, an error is being reported.

Parameters

<i>n</i>	Name of parser item to be removed from list.
----------	--

4.290.3.3 force_remove_item()

```
void MHAParser::parser_t::force_remove_item (
    const std::string & n )
```

Remove an item by name.

Non-existing items are ignored.

Parameters

<i>n</i>	Name of parser item to be removed from list.
----------	--

4.290.3.4 remove_item() [2/2]

```
void MHAParser::parser_t::remove_item (
    const base_t * addr )
```

Remove an item by address.

The item belonging to an address is being removed from the list of items.

Parameters

<i>addr</i>	Address of parser item to be removed.
-------------	---------------------------------------

4.290.3.5 op_subparse()

```
std::string MHAParser::parser_t::op_subparse (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [975](#)).

4.290.3.6 op_setval()

```
std::string MHAParser::parser_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [976](#)).

4.290.3.7 op_query()

```
std::string MHAParser::parser_t::op_query (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [976](#)).

4.290.3.8 query_type()

```
std::string MHAParser::parser_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.290.3.9 query_dump()

```
std::string MHAParser::parser_t::query_dump (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [976](#)).

4.290.3.10 query_entries()

```
std::string MHAParser::parser_t::query_entries (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [976](#)).

4.290.3.11 query_readfile()

```
std::string MHAParser::parser_t::query_readfile (
    const std::string & fname ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.290.3.12 query_savefile()

```
std::string MHAParser::parser_t::query_savefile (
    const std::string & fname ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [978](#)).

4.290.3.13 query_savefile_compact()

```
std::string MHAParser::parser_t::query_savefile_compact (
    const std::string & fname ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [978](#)).

4.290.3.14 query_savemons()

```
std::string MHAParser::parser_t::query_savemons (
    const std::string & fname ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [978](#)).

4.290.3.15 query_val()

```
std::string MHAParser::parser_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.290.3.16 query_listids()

```
std::string MHAParser::parser_t::query_listids (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [978](#)).

4.290.3.17 set_id_string()

```
void MHAParser::parser_t::set_id_string (
    const std::string & s ) [protected]
```

4.290.3.18 has_entry()

```
bool MHAParser::parser_t::has_entry (
    const std::string & s ) [protected]
```

4.290.4 Member Data Documentation

4.290.4.1 entries

```
entry_map_t MHAParser::parser_t::entries [private]
```

4.290.4.2 id_string

```
std::string MHAParser::parser_t::id_string [private]
```

identification string

4.290.4.3 srcfile

```
std::string MHAParser::parser_t::srcfile [private]
```

4.290.4.4 srcline

```
unsigned int MHAParser::parser_t::srcline [private]
```

4.290.4.5 last_errormsg

```
std::string MHAParser::parser_t::last_errormsg [private]
```

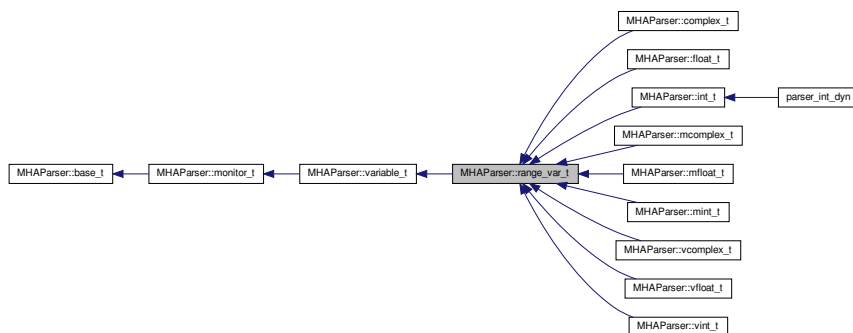
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.291 MHAParser::range_var_t Class Reference

Base class for all variables with a numeric value range.

Inheritance diagram for MHAParser::range_var_t:



Public Member Functions

- **range_var_t** (const std::string &, const std::string &="")
- **range_var_t** (const **range_var_t** &)
- std::string **query_range** (const std::string &)
- void **set_range** (const std::string &r)
Change the valid range of a variable.
- void **validate** (const int &)
- void **validate** (const float &)
- void **validate** (const **mha_complex_t** &)
- void **validate** (const std::vector< int > &)
- void **validate** (const std::vector< float > &)
- void **validate** (const std::vector< **mha_complex_t** > &)
- void **validate** (const std::vector< std::vector< int > > &)
- void **validate** (const std::vector< std::vector< float > > &)
- void **validate** (const std::vector< std::vector< **mha_complex_t** > > &)

Protected Attributes

- float **low_limit**
Lower limit of range.
- float **up_limit**
Upper limit of range.
- bool **low_incl**
Lower limit is included (or excluded) in range.
- bool **up_incl**
Upper limit is included (or excluded) in range.
- bool **check_low**
Check lower limit.
- bool **check_up**
Check upper limit.
- bool **check_range**
Range checking is active.

Additional Inherited Members

4.291.1 Detailed Description

Base class for all variables with a numeric value range.

4.291.2 Constructor & Destructor Documentation

4.291.2.1 range_var_t() [1/2]

```
MHAParser::range_var_t::range_var_t (
    const std::string & h,
    const std::string & r = "" )
```

4.291.2.2 range_var_t() [2/2]

```
MHAParser::range_var_t::range_var_t (
    const range_var_t & src )
```

4.291.3 Member Function Documentation**4.291.3.1 query_range()**

```
std::string MHAParser::range_var_t::query_range (
    const std::string & s ) [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.291.3.2 set_range()

```
void MHAParser::range_var_t::set_range (
    const std::string & r )
```

Change the valid range of a variable.

Parameters

<i>r</i>	New range of the variable (string representation)
----------	---

4.291.3.3 validate() [1/9]

```
void MHAParser::range_var_t::validate (
    const int & v )
```


4.291.3.4 validate() [2/9]

```
void MHAParser::range_var_t::validate (
    const float & v )
```

4.291.3.5 validate() [3/9]

```
void MHAParser::range_var_t::validate (
    const mha_complex_t & v )
```

4.291.3.6 validate() [4/9]

```
void MHAParser::range_var_t::validate (
    const std::vector< int > & v )
```

4.291.3.7 validate() [5/9]

```
void MHAParser::range_var_t::validate (
    const std::vector< float > & v )
```

4.291.3.8 validate() [6/9]

```
void MHAParser::range_var_t::validate (
    const std::vector< mha_complex_t > & v )
```

4.291.3.9 validate() [7/9]

```
void MHAParser::range_var_t::validate (
    const std::vector< std::vector< int > > & v )
```

4.291.3.10 validate() [8/9]

```
void MHAParser::range_var_t::validate (
    const std::vector< std::vector< float > > & v )
```

4.291.3.11 validate() [9/9]

```
void MHAParser::range_var_t::validate (
    const std::vector< std::vector< mha_complex_t > > & v )
```

4.291.4 Member Data Documentation**4.291.4.1 low_limit**

```
float MHAParser::range_var_t::low_limit [protected]
```

Lower limit of range.

4.291.4.2 up_limit

```
float MHAParser::range_var_t::up_limit [protected]
```

Upper limit of range.

4.291.4.3 low_incl

```
bool MHAParser::range_var_t::low_incl [protected]
```

Lower limit is included (or excluded) in range.

4.291.4.4 up_incl

```
bool MHAParser::range_var_t::up_incl [protected]
```

Upper limit is included (or excluded) in range.

4.291.4.5 check_low

```
bool MHAParser::range_var_t::check_low [protected]
```

Check lower limit.

4.291.4.6 check_up

```
bool MHAParser::range_var_t::check_up [protected]
```

Check upper limit.

4.291.4.7 check_range

```
bool MHAParser::range_var_t::check_range [protected]
```

Range checking is active.

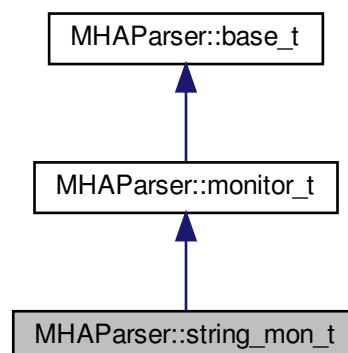
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.292 MHAParser::string_mon_t Class Reference

Monitor with string value.

Inheritance diagram for MHAParser::string_mon_t:



Public Member Functions

- **string_mon_t** (const std::string &hlp)
Create a monitor variable for string values.

Public Attributes

- `std::string` **data**
Data field.

Protected Member Functions

- `std::string` **query_val** (`const std::string &`)
- `std::string` **query_type** (`const std::string &`)

Additional Inherited Members

4.292.1 Detailed Description

Monitor with string value.

4.292.2 Constructor & Destructor Documentation

4.292.2.1 `string_mon_t()`

```
MHAParser::string_mon_t::string_mon_t (
    const std::string & hlp )
```

Create a monitor variable for string values.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.292.3 Member Function Documentation

4.292.3.1 `query_val()`

```
std::string MHAParser::string_mon_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.292.3.2 query_type()

```
std::string MHAParser::string_mon_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 977).

4.292.4 Member Data Documentation

4.292.4.1 data

```
std::string MHAParser::string_mon_t::data
```

Data field.

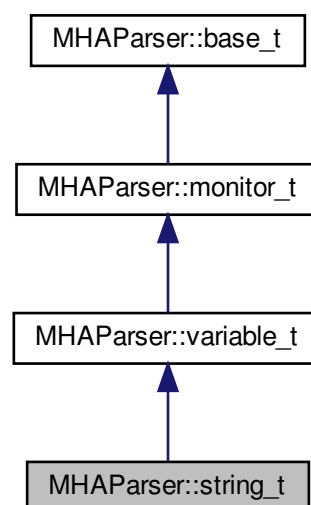
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.293 MHAParser::string_t Class Reference

Variable with a string value.

Inheritance diagram for MHAParser::string_t:



Public Member Functions

- **string_t** (const std::string &, const std::string &)
Constructor of a openMHA configuration variable for string values.

Public Attributes

- std::string **data**
Data field.

Protected Member Functions

- std::string **op_setval** (**expression_t** &)
- std::string **query_type** (const std::string &)
- std::string **query_val** (const std::string &)

Additional Inherited Members

4.293.1 Detailed Description

Variable with a string value.

4.293.2 Constructor & Destructor Documentation

4.293.2.1 string_t()

```
MHAParser::string_t::string_t (
    const std::string & h,
    const std::string & v )
```

Constructor of a openMHA configuration variable for string values.

Parameters

<i>h</i>	A help string describing the purpose of this variable.
<i>v</i>	The initial string value

4.293.3 Member Function Documentation

4.293.3.1 op_setval()

```
std::string MHAParser::string_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.293.3.2 query_type()

```
std::string MHAParser::string_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.293.3.3 query_val()

```
std::string MHAParser::string_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.293.4 Member Data Documentation

4.293.4.1 data

```
std::string MHAParser::string_t::data
```

Data field.

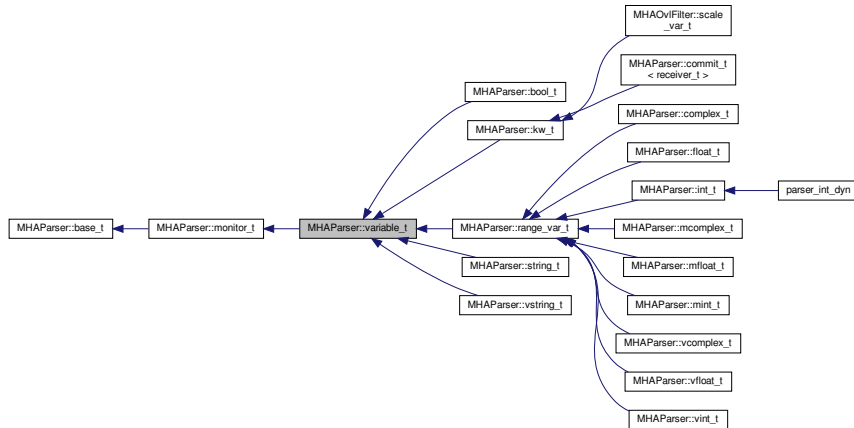
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.294 MHAParser::variable_t Class Reference

Base class for variable nodes.

Inheritance diagram for MHAParser::variable_t:



Public Member Functions

- **variable_t** (const std::string &)
- std::string **op_setval** (**expression_t** &)
- std::string **query_perm** (const std::string &)
- void **setlock** (const bool &)

Lock a variable against write access.

Private Attributes

- bool **locked**

Additional Inherited Members

4.294.1 Detailed Description

Base class for variable nodes.

4.294.2 Constructor & Destructor Documentation

4.294.2.1 variable_t()

```
MHAParser::variable_t::variable_t (
    const std::string & h )
```

4.294.3 Member Function Documentation

4.294.3.1 op_setval()

```
std::string MHAParser::variable_t::op_setval (
    expression_t & x ) [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 976).

Reimplemented in **MHAParser::mcomplex_t** (p. 1024), **MHAParser::mfloat_t** (p. 1029), **MHAParser::mint_t** (p. 1042), **MHAParser::vcomplex_t** (p. 1067), **MHAParser::vfloat_t** (p. 1073), **MHAParser::vint_t** (p. 1077), **MHAParser::complex_t** (p. 999), **MHAParser::float_t** (p. 1006), **MHAParser::int_t** (p. 1011), **MHAParser::bool_t** (p. 988), **MHAParser::vstring_t** (p. 1082), **MHAParser::string_t** (p. 1061), and **MHAParser::kw_t** (p. 1019).

4.294.3.2 query_perm()

```
std::string MHAParser::variable_t::query_perm (
    const std::string & s ) [virtual]
```

Reimplemented from **MHAParser::monitor_t** (p. 1044).

4.294.3.3 setlock()

```
void MHAParser::variable_t::setlock (
    const bool & b )
```

Lock a variable against write access.

Parameters

<i>b</i>	Lock state
----------	------------

4.294.4 Member Data Documentation

4.294.4.1 locked

```
bool MHAParser::variable_t::locked [private]
```

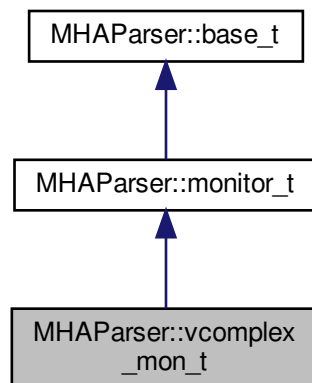
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.295 MHAParser::vcomplex_mon_t Class Reference

Monitor with vector of complex values.

Inheritance diagram for MHAParser::vcomplex_mon_t:



Public Member Functions

- **vcomplex_mon_t** (const std::string &hlp)
Create a vector of complex monitor values.

Public Attributes

- std::vector< **mha_complex_t** > **data**
Data field.

Protected Member Functions

- `std::string` **query_val** (const `std::string` &)
- `std::string` **query_type** (const `std::string` &)

Additional Inherited Members

4.295.1 Detailed Description

Monitor with vector of complex values.

4.295.2 Constructor & Destructor Documentation

4.295.2.1 vcomplex_mon_t()

```
MHAParser::vcomplex_mon_t::vcomplex_mon_t (  
    const std::string & hlp )
```

Create a vector of complex monitor values.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.295.3 Member Function Documentation

4.295.3.1 query_val()

```
std::string MHAParser::vcomplex_mon_t::query_val (  
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 977).

4.295.3.2 query_type()

```
std::string MHAParser::vcomplex_mon_t::query_type (  
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 977).

4.295.4 Member Data Documentation

4.295.4.1 data

```
std::vector< mha_complex_t> MHAParser::vcomplex_mon_t::data
```

Data field.

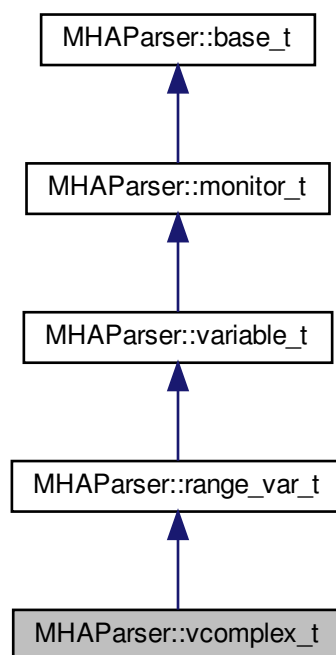
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.296 MHAParser::vcomplex_t Class Reference

Vector variable with complex value.

Inheritance diagram for MHAParser::vcomplex_t:



Public Member Functions

- **vcomplex_t** (const std::string &, const std::string &, const std::string &="")

Public Attributes

- std::vector< **mha_complex_t** > **data**
Data field.

Protected Member Functions

- std::string **op_setval** (**expression_t** &)
- std::string **query_type** (const std::string &)
- std::string **query_val** (const std::string &)

Additional Inherited Members

4.296.1 Detailed Description

Vector variable with complex value.

4.296.2 Constructor & Destructor Documentation

4.296.2.1 vcomplex_t()

```
MHAParser::vcomplex_t::vcomplex_t (
    const std::string & h,
    const std::string & v,
    const std::string & rg = "" )
```

4.296.3 Member Function Documentation

4.296.3.1 op_setval()

```
std::string MHAParser::vcomplex_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.296.3.2 query_type()

```
std::string MHAParser::vcomplex_t::query_type (  
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.296.3.3 query_val()

```
std::string MHAParser::vcomplex_t::query_val (  
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.296.4 Member Data Documentation

4.296.4.1 data

```
std::vector< mha_complex_t> MHAParser::vcomplex_t::data
```

Data field.

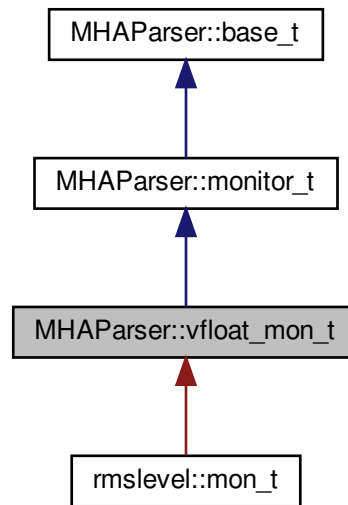
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.297 MHAParser::vfloat_mon_t Class Reference

Vector of floats monitor.

Inheritance diagram for MHAParser::vfloat_mon_t:



Public Member Functions

- **vfloat_mon_t** (const std::string &hlp)
Create a vector of floating point monitor values.

Public Attributes

- std::vector< float > **data**
Data field.

Protected Member Functions

- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.297.1 Detailed Description

Vector of floats monitor.

4.297.2 Constructor & Destructor Documentation

4.297.2.1 vfloat_mon_t()

```
MHAParser::vfloat_mon_t::vfloat_mon_t (
    const std::string & hlp )
```

Create a vector of floating point monitor values.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.297.3 Member Function Documentation

4.297.3.1 query_val()

```
std::string MHAParser::vfloat_mon_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.297.3.2 query_type()

```
std::string MHAParser::vfloat_mon_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.297.4 Member Data Documentation

4.297.4.1 data

```
std::vector<float> MHAParser::vfloat_mon_t::data
```

Data field.

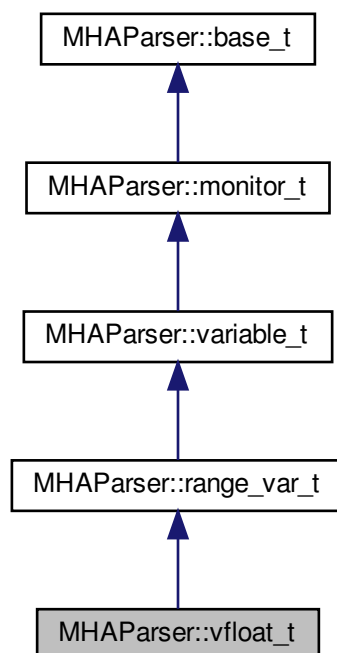
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.298 MHAParser::vfloat_t Class Reference

Vector variable with float value.

Inheritance diagram for MHAParser::vfloat_t:



Public Member Functions

- **vfloat_t** (const std::string &, const std::string &, const std::string &="")
Create a float vector parser variable.

Public Attributes

- `std::vector< float > data`
Data field.

Protected Member Functions

- `std::string op_setval (expression_t &)`
- `std::string query_type (const std::string &)`
- `std::string query_val (const std::string &)`

Additional Inherited Members

4.298.1 Detailed Description

Vector variable with float value.

4.298.2 Constructor & Destructor Documentation

4.298.2.1 vfloat_t()

```
MHAParser::vfloat_t::vfloat_t (
    const std::string & h,
    const std::string & v,
    const std::string & rg = "" )
```

Create a float vector parser variable.

Parameters

<i>h</i>	A human-readable text describing the purpose of this configuration variable.
<i>v</i>	The initial value of the variable, as a string, in openMHA configuration language: (e.g. "[0 1 2.1 3]" for a vector), described in the "Multidimensional Variables" s2.1.3 section of the openMHA User Manual.
<i>rg</i>	The numeric range to enforce on all members of the vector.

•

4.298.3 Member Function Documentation

4.298.3.1 op_setval()

```
std::string MHAParser::vfloat_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.298.3.2 query_type()

```
std::string MHAParser::vfloat_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.298.3.3 query_val()

```
std::string MHAParser::vfloat_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.298.4 Member Data Documentation

4.298.4.1 data

```
std::vector<float> MHAParser::vfloat_t::data
```

Data field.

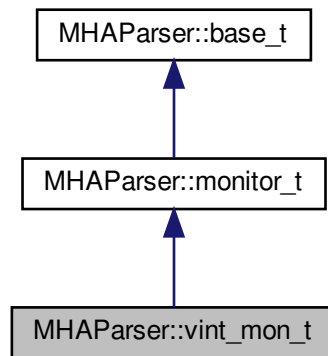
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.299 MHAParser::vint_mon_t Class Reference

Vector of ints monitor.

Inheritance diagram for MHAParser::vint_mon_t:



Public Member Functions

- **vint_mon_t** (const std::string &hlp)
Create a vector of integer monitor values.

Public Attributes

- std::vector< int > **data**
Data field.

Protected Member Functions

- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.299.1 Detailed Description

Vector of ints monitor.

4.299.2 Constructor & Destructor Documentation

4.299.2.1 vint_mon_t()

```
MHAParser::vint_mon_t::vint_mon_t (
    const std::string & hlp )
```

Create a vector of integer monitor values.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.299.3 Member Function Documentation

4.299.3.1 query_val()

```
std::string MHAParser::vint_mon_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.299.3.2 query_type()

```
std::string MHAParser::vint_mon_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.299.4 Member Data Documentation

4.299.4.1 data

```
std::vector<int> MHAParser::vint_mon_t::data
```

Data field.

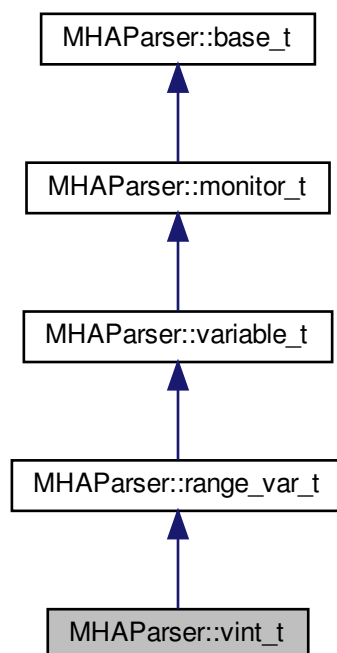
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.300 MHAParser::vint_t Class Reference

Variable with vector<int> value.

Inheritance diagram for MHAParser::vint_t:



Public Member Functions

- **vint_t** (const std::string &, const std::string &, const std::string &="")
Constructor.

Public Attributes

- `std::vector< int > data`
Data field.

Protected Member Functions

- `std::string op_setval (expression_t &)`
- `std::string query_type (const std::string &)`
- `std::string query_val (const std::string &)`

Additional Inherited Members

4.300.1 Detailed Description

Variable with `vector<int>` value.

4.300.2 Constructor & Destructor Documentation

4.300.2.1 vint_t()

```
MHAParser::vint_t::vint_t (  
    const std::string & h,  
    const std::string & v,  
    const std::string & rg = "" )
```

Constructor.

Parameters

<i>h</i>	help string
<i>v</i>	initial value
<i>rg</i>	optional: range constraint for all elements

4.300.3 Member Function Documentation

4.300.3.1 op_setval()

```
std::string MHAParser::vint_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.300.3.2 query_type()

```
std::string MHAParser::vint_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.300.3.3 query_val()

```
std::string MHAParser::vint_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.300.4 Member Data Documentation

4.300.4.1 data

```
std::vector<int> MHAParser::vint_t::data
```

Data field.

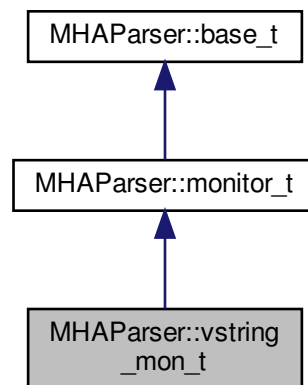
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.301 MHAParser::vstring_mon_t Class Reference

Vector of monitors with string value.

Inheritance diagram for MHAParser::vstring_mon_t:



Public Member Functions

- **vstring_mon_t** (const std::string &hlp)
Create a vector of string monitor values.

Public Attributes

- std::vector< std::string > **data**
Data field.

Protected Member Functions

- std::string **query_val** (const std::string &)
- std::string **query_type** (const std::string &)

Additional Inherited Members

4.301.1 Detailed Description

Vector of monitors with string value.

4.301.2 Constructor & Destructor Documentation

4.301.2.1 `vstring_mon_t()`

```
MHAParser::vstring_mon_t::vstring_mon_t (  
    const std::string & hlp )
```

Create a vector of string monitor values.

Parameters

<i>hlp</i>	A help text describing this monitor variable.
------------	---

4.301.3 Member Function Documentation

4.301.3.1 `query_val()`

```
std::string MHAParser::vstring_mon_t::query_val (  
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.301.3.2 `query_type()`

```
std::string MHAParser::vstring_mon_t::query_type (  
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.301.4 Member Data Documentation

4.301.4.1 data

```
std::vector<std::string> MHAParser::vstring_mon_t::data
```

Data field.

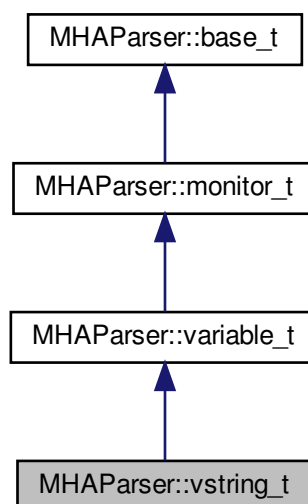
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.302 MHAParser::vstring_t Class Reference

Vector variable with string values.

Inheritance diagram for MHAParser::vstring_t:



Public Member Functions

- **vstring_t** (const std::string &, const std::string &)

Public Attributes

- std::vector< std::string > **data**
Data field.

Protected Member Functions

- `std::string op_setval (expression_t &)`
- `std::string query_type (const std::string &)`
- `std::string query_val (const std::string &)`

Additional Inherited Members

4.302.1 Detailed Description

Vector variable with string values.

4.302.2 Constructor & Destructor Documentation

4.302.2.1 `vstring_t()`

```
MHAParser::vstring_t::vstring_t (
    const std::string & h,
    const std::string & v )
```

4.302.3 Member Function Documentation

4.302.3.1 `op_setval()`

```
std::string MHAParser::vstring_t::op_setval (
    expression_t & x ) [protected], [virtual]
```

Reimplemented from **MHAParser::variable_t** (p. [1063](#)).

4.302.3.2 `query_type()`

```
std::string MHAParser::vstring_t::query_type (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. [977](#)).

4.302.3.3 query_val()

```
std::string MHAParser::vstring_t::query_val (
    const std::string & s ) [protected], [virtual]
```

Reimplemented from **MHAParser::base_t** (p. 977).

4.302.4 Member Data Documentation

4.302.4.1 data

```
std::vector<std::string> MHAParser::vstring_t::data
```

Data field.

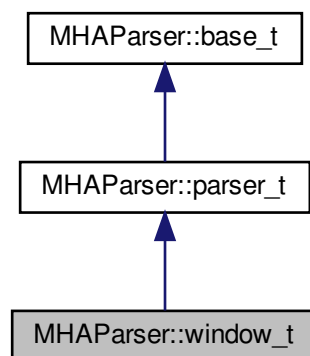
The documentation for this class was generated from the following files:

- **mha_parser.hh**
- **mha_parser.cpp**

4.303 MHAParser::window_t Class Reference

MHA configuration interface for a window function generator.

Inheritance diagram for MHAParser::window_t:



Public Types

- enum **wtype_t** {
wnd_rect =0, **wnd_hann** =1, **wnd_hamming** =2, **wnd_blackman** =3,
wnd_bartlett =4, **wnd_user** =5 }

Public Member Functions

- **window_t** (const std::string & **help**="Window type configuration.")
Constructor to create parser class.
- **MHAWindow::base_t get_window** (unsigned int len) const
Create a window instance, use default parameters.
- **MHAWindow::base_t get_window** (unsigned int len, float xmin) const
Create a window instance.
- **MHAWindow::base_t get_window** (unsigned int len, float xmin, float xmax) const
Create a window instance.
- **MHAWindow::base_t get_window** (unsigned int len, float xmin, float xmax, bool min-included) const
Create a window instance.
- **MHAWindow::base_t get_window** (unsigned int len, float xmin, float xmax, bool min-included, bool maxincluded) const
Create a window instance.
- **MHAParser::window_t::wtype_t get_type** () const
Return currently selected window type.
- void **setlock** (bool b)

Private Attributes

- **MHAParser::kw_t wtype**
- **MHAParser::vfloat_t user**

Additional Inherited Members

4.303.1 Detailed Description

MHA configuration interface for a window function generator.

This class implements a configuration interface (sub-parser) for window type selection and user-defined window type. It provides member functions to generate an instance of **MHAWindow::base_t** (p. 1242) based on the values provided by the configuration interface.

The configuration interface is derived from **MHAParser::parser_t** (p. 1045) and can thus be inserted into the configuration tree using the **insert_item()** (p. 1047) method of the parent parser.

If one of the pre-defined window types is used, then the window is generated using the **MHAWindow::fun_t** (p. 1245) class constructor; for the user-defined type the values from the "user" variable are copied.

4.303.2 Member Enumeration Documentation

4.303.2.1 wtype_t

enum **MHAParser::window_t::wtype_t**

Enumerator

wnd_rect	
wnd_hann	
wnd_hamming	
wnd_blackman	
wnd_bartlett	
wnd_user	

4.303.3 Constructor & Destructor Documentation

4.303.3.1 window_t()

```
MHAParser::window_t::window_t (
    const std::string & help = "Window type configuration." )
```

Constructor to create parser class.

4.303.4 Member Function Documentation

4.303.4.1 get_window() [1/5]

```
MHAWindow::base_t MHAParser::window_t::get_window (
    unsigned int len ) const
```

Create a window instance, use default parameters.

4.303.4.2 `get_window()` [2/5]

```
MHAWindow::base_t MHAParser::window_t::get_window (
    unsigned int len,
    float xmin ) const
```

Create a window instance.

4.303.4.3 `get_window()` [3/5]

```
MHAWindow::base_t MHAParser::window_t::get_window (
    unsigned int len,
    float xmin,
    float xmax ) const
```

Create a window instance.

4.303.4.4 `get_window()` [4/5]

```
MHAWindow::base_t MHAParser::window_t::get_window (
    unsigned int len,
    float xmin,
    float xmax,
    bool minincluded ) const
```

Create a window instance.

4.303.4.5 `get_window()` [5/5]

```
MHAWindow::base_t MHAParser::window_t::get_window (
    unsigned int len,
    float xmin,
    float xmax,
    bool minincluded,
    bool maxincluded ) const
```

Create a window instance.

4.303.4.6 get_type()

```
MHAParser::window_t::wtype_t MHAParser::window_t::get_type ( ) const
```

Return currently selected window type.

4.303.4.7 setlock()

```
void MHAParser::window_t::setlock (
    bool b ) [inline]
```

4.303.5 Member Data Documentation

4.303.5.1 wtype

```
MHAParser::kw_t MHAParser::window_t::wtype [private]
```

4.303.5.2 user

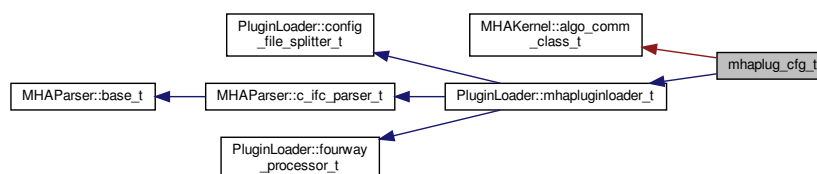
```
MHAParser::vfloat_t MHAParser::window_t::user [private]
```

The documentation for this class was generated from the following files:

- **mha_windowparser.h**
- **mha_windowparser.cpp**

4.304 mhaplug_cfg_t Class Reference

Inheritance diagram for mhaplug_cfg_t:



Public Member Functions

- **mhaplug_cfg_t** (**algo_comm_t** iac, const std::string & **libname**, bool use_own_ac)
- **~mhaplug_cfg_t** () throw ()

Additional Inherited Members

4.304.1 Constructor & Destructor Documentation

4.304.1.1 mhaplug_cfg_t()

```
mhaplug_cfg_t::mhaplug_cfg_t (
    algo_comm_t iac,
    const std::string & libname,
    bool use_own_ac )
```

4.304.1.2 ~mhaplug_cfg_t()

```
mhaplug_cfg_t::~~mhaplug_cfg_t ( ) throw ()    [inline]
```

The documentation for this class was generated from the following file:

- **altplugins.cpp**

4.305 MHAPlugin::cfg_node_t< runtime_cfg_t > Class Template Reference

A node class for storing MHA plugin runtime configurations as a singly linked list, where the nodes store besides the usual "next" and "data" pointers also a flag that indicates whether this node can be deleted.

Public Member Functions

- **cfg_node_t** (runtime_cfg_t *runtime_cfg)
Constructor for a singly linked list node.
- **~cfg_node_t** ()
Destructor of the singly linked list node.

Public Attributes

- std::atomic< **cfg_node_t**< runtime_cfg_t > * > **next**
A pointer to the next node in the singly linked list.
- std::atomic< bool > **not_in_use**
Initially this data member is set to false by the constructor.
- runtime_cfg_t * **data**
A native pointer to the runtime configuration managed by this node.

4.305.1 Detailed Description

```
template<class runtime_cfg_t>
class MHAPlugin::cfg_node_t< runtime_cfg_t >
```

A node class for storing MHA plugin runtime configurations as a singly linked list, where the nodes store besides the usual "next" and "data" pointers also a flag that indicates whether this node can be deleted.

The singly linked list is designed for a single producer thread and a single consumer thread, where the producer is also responsible for destroying objects when they are no longer needed because the consumer is the signal processing thread that cannot afford memory allocation or deallocation operations.

4.305.2 Constructor & Destructor Documentation

4.305.2.1 cfg_node_t()

```
template<class runtime_cfg_t>
MHAPlugin::cfg_node_t< runtime_cfg_t >:: cfg_node_t (
    runtime_cfg_t * runtime_cfg ) [explicit]
```

Constructor for a singly linked list node.

Parameters

<i>runtime_cfg</i>	Pointer to a runtime configuration object that was just created on the heap. The newly constructed cfg_node_t (p. 1088) object takes over object ownership of the pointed-to runtime configuration and will call delete on it in its destructor.
--------------------	---

4.305.2.2 ~cfg_node_t()

```
template<class runtime_cfg_t >
MHAPLugin::cfg_node_t< runtime_cfg_t >::~~ cfg_node_t ( )
```

Destructor of the singly linked list node.

Will also delete the pointed-to data object (the runtime configuration)

4.305.3 Member Data Documentation

4.305.3.1 next

```
template<class runtime_cfg_t>
std::atomic< cfg_node_t<runtime_cfg_t*> > MHAPLugin::cfg_node_t< runtime_cfg_t >↔
::next
```

A pointer to the next node in the singly linked list.

On construction, this will be a NULL pointer. New objects can be appended to the singly linked list by writing the address to the next node into this data member. Since this pointer is std::atomic, writing to it is a release operation which means all threads seeing the new value of the next pointer will also see all other writes to memory that the thread doing this write has performed, which includes anything the constructor of the new runtime config has written and the assignment of the address of the new runtime config to the data pointer of the next node. This prevents making half-constructed runtime configuration objects visible to the consumer thread.

4.305.3.2 not_in_use

```
template<class runtime_cfg_t>
std::atomic<bool> MHAPLugin::cfg_node_t< runtime_cfg_t >::not_in_use
```

Initially this data member is set to false by the constructor.

It is set to true by the consumer thread when it no longer needs the run time configuration pointed to by this node's data member. This bool is atomic because this node and the runtime object it points to can be deleted by the configuration thread as soon as value true is stored in this bool, which happens right after the processing thread acquires a pointer to the next node in the singly linked list. The atomic ensures all threads agree on this "right after" ordering.

4.305.3.3 data

```
template<class runtime_cfg_t>
runtime_cfg_t* MHAPLugin::cfg_node_t< runtime_cfg_t >::data
```

A native pointer to the runtime configuration managed by this node.

The runtime configuration lives on the heap and is owned by this node. It is deleted in this node's destructor. The runtime configuration object must be created by client code with operator new before ownership is transferred to this node by passing a pointer to it as the constructor's parameter. This pointer does not need to be atomic, memory access ordering is ensured by the atomic next pointer and placing accesses to "data" in the correct places relative to accesses to "next".

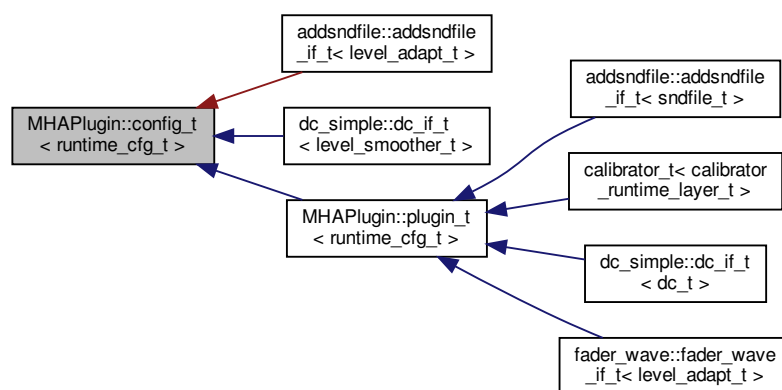
The documentation for this class was generated from the following file:

- **mha_plugin.hh**

4.306 MHAPLugin::config_t< runtime_cfg_t > Class Template Reference

Template class for thread safe configuration.

Inheritance diagram for MHAPLugin::config_t< runtime_cfg_t >:



Public Member Functions

- **config_t ()**
- **~config_t ()**

Protected Member Functions

- `runtime_cfg_t * poll_config ()`
Receive the latest run time configuration.
- `runtime_cfg_t * peek_config () const`
Receive the latest run time configuration without changing the configuration pointer.
- `void push_config (runtime_cfg_t *ncfg)`
Push a new run time configuration into the configuration fifo.
- `void cleanup_unused_cfg ()`
*To be called by the **push_config()** (p. 1095) for housekeeping.*
- `void remove_all_cfg ()`
To be called on Plugin destruction, will delete all runtime configuration list nodes and objects regardless of their `in_use` flag.

Protected Attributes

- `runtime_cfg_t * cfg`
Pointer to the runtime configuration currently used by the signal processing thread.

Private Attributes

- `std::atomic< MHAPLugin::cfg_node_t< runtime_cfg_t > * > cfg_root`
Start of a singly linked list of runtime configuration objects.
- `MHAPLugin::cfg_node_t< runtime_cfg_t > * cfg_node_current`
Pointer to the currently used plugin runtime configurations.

4.306.1 Detailed Description

```
template<class runtime_cfg_t>
class MHAPLugin::config_t< runtime_cfg_t >
```

Template class for thread safe configuration.

This template class provides a mechanism for the handling of thread safe configuration which is required for run time configuration changes of the openMHA plugins.

The template parameter `runtime_cfg_t` is the run time configuration class of the openMHA plugin. The constructor of that class should transform the **MHAParser** (p. 123) variables into derived runtime configuration. The constructor should fail if the configuration is invalid by any reason.

A new runtime configuration is provided by the function **push_config()** (p. 1095). In the processing thread, the actual configuration can be received by a call of **poll_config()** (p. 1094).

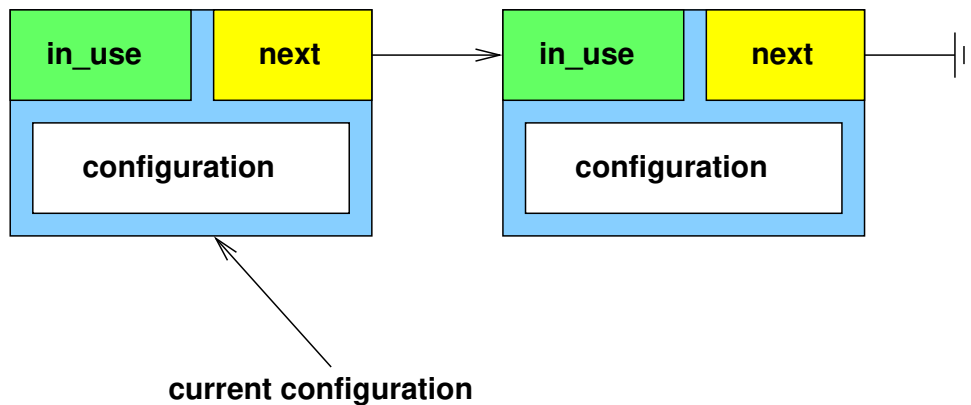


Figure 5 Schematic drawing of runtime configuration update: configuration updated, but not used yet.

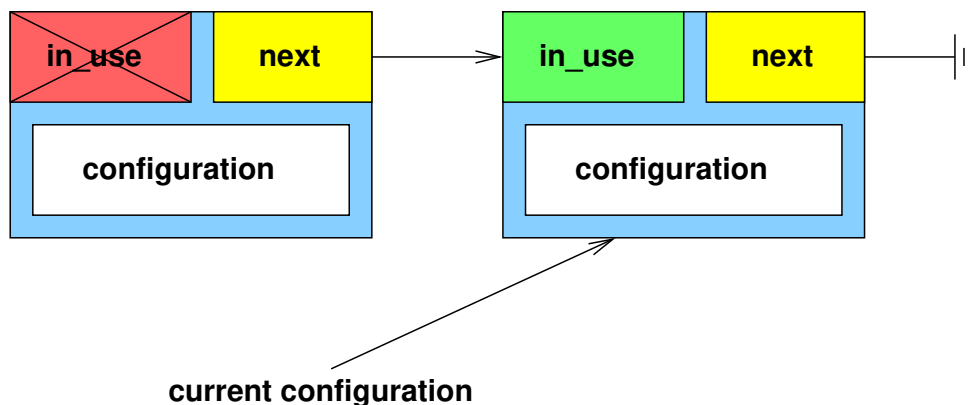


Figure 6 Schematic drawing of runtime configuration update: configuration in use.

To ensure lock-free thread safety, we use C++11 atomics and rely on the C++11 memory model. We only use store-release and load-acquire operations by using C++11 atomics with the default memory ordering. The semantics of these are:

The store-release operation atomically writes to an atomic variable, while the load-acquire operation atomically reads from an atomic variable.

The C++11 memory model guarantees that all previous writes to memory performed by the thread doing the store-release are visible to other threads when they see the new value in the shared atomic variable when that value is read by the other thread with a load-acquire operation.

An important precondition of this synchronization scheme is that there is only ever one audio thread and one configuration thread per plugin, i.e. there is only one thread doing the `push_config` and one thread doing the `poll_config` for each instance of `config_t` (p. 1091).

For more details on atomics, refer to the C++11 or later documentation, or to these conference talks by Sutter:

- Atomic Weapons, 2012
- Lock-Free Programming, 2014

4.306.2 Constructor & Destructor Documentation

4.306.2.1 config_t()

```
template<class runtime_cfg_t >
MHAPLugin::config_t< runtime_cfg_t >:: config_t ( )
```

4.306.2.2 ~config_t()

```
template<class runtime_cfg_t >
MHAPLugin::config_t< runtime_cfg_t >::~~ config_t ( )
```

4.306.3 Member Function Documentation

4.306.3.1 poll_config()

```
template<class runtime_cfg_t >
runtime_cfg_t * MHAPLugin::config_t< runtime_cfg_t >::poll_config ( ) [protected]
```

Receive the latest run time configuration.

This function stores the latest run time configuration into the protected class member variable 'cfg'. If no configuration exists, then an exception will be thrown. If no changes occurred, then the value of 'cfg' will be untouched.

This function should be only called from the *processing* thread.

Should be called at the start of each process() callback to get the latest runtime configuration.

When this function finds newer run time configurations, it returns the newest and ensures the older run time configurations have their not_in_use flag set to true.

Returns

Pointer to the latest runtime configuration object (same pointer as stored by this function in data member 'cfg').

Exceptions

MHA_Error (p. 707)	if the resulting runtime configuration is NULL. This usually means that no push_config has occurred.
---------------------------	--

4.306.3.2 peek_config()

```
template<class runtime_cfg_t >
runtime_cfg_t * MHAPlugin::config_t< runtime_cfg_t >::peek_config ( ) const [protected]
```

Receive the latest run time configuration without changing the configuration pointer.

This function retrieves the latest run time configuration. Returns a pointer to the latest runtime configuration without updating the data member cfg. For use in the configuration thread when creation of a new runtime configuration object needs access to the previously created runtime configuration object. Should normally not be used because it introduces synchronization requirements between configuration thread and signal processing thread.

4.306.3.3 push_config()

```
template<class runtime_cfg_t>
void MHAPlugin::config_t< runtime_cfg_t >::push_config (
    runtime_cfg_t * ncfg ) [protected]
```

Push a new run time configuration into the configuration fifo.

Should be called only by the configuration thread when a new runtime configuration object has been constructed in response to configuration changes, or during execution of the prepare() method to ensure that there is a valid runtime configuration for the signal processing which can start after prepare() returns.

For housekeeping, this method will also delete any runtime configuration objects that have previously been passed to **push_config()** (p. 1095) if they are no longer needed.

Parameters

<i>ncfg</i>	A pointer to the new runtime configuration object. This object must have been created on the heap by the configuration thread with operator new. By passing the pointer to this method, client code gives up ownership. The object will be deleted in a future invocation of push_config, or on destruction of this config_t (p. 1091) instance.
-------------	---

4.306.3.4 cleanup_unused_cfg()

```
template<class runtime_cfg_t >
```

```
void MHAPPlugin::config_t< runtime_cfg_t >::cleanup_unused_cfg ( ) [protected]
```

To be called by the **push_config()** (p. 1095) for housekeeping.

Will delete any no longer used runtime configuration objects.

4.306.3.5 remove_all_cfg()

```
template<class runtime_cfg_t >
void MHAPPlugin::config_t< runtime_cfg_t >::remove_all_cfg ( ) [protected]
```

To be called on Plugin destruction, will delete all runtime configuration list nodes and objects regardless of their in_use flag.

4.306.4 Member Data Documentation

4.306.4.1 cfg

```
template<class runtime_cfg_t>
runtime_cfg_t* MHAPPlugin::config_t< runtime_cfg_t >::cfg [protected]
```

Pointer to the runtime configuration currently used by the signal processing thread.

Should be used to access the current runtime configuration during signal processing. This pointer is updated as a side effect of calling **poll_config()** (p. 1094) on this object.

4.306.4.2 cfg_root

```
template<class runtime_cfg_t>
std::atomic< MHAPPlugin::cfg_node_t<runtime_cfg_t> *> MHAPPlugin::config_t< runtime↔
_cfg_t >::cfg_root [private]
```

Start of a singly linked list of runtime configuration objects.

cfg_root points to the oldest still existing node of that list. After object creation this pointer is updated by the configuration thread and then read by the signal processing thread. To ensure proper order of memory accesses for this transfer between threads, it needs to be atomic, this ensures that the start of the singly linked list of runtime configurations will be properly visible to the signal processing on startup.

4.306.4.3 cfg_node_current

```
template<class runtime_cfg_t>
```

```
MHAPLugin::cfg_node_t<runtime_cfg_t>* MHAPLugin::config_t< runtime_cfg_t >::cfg_↔  
node_current [private]
```

Pointer to the currently used plugin runtime configurations.

Used as a hint for poll_config where to start looking for the newest node. This optimization allows poll_config to scale better with the number of nodes not yet cleaned up by push_config. Does not need to be atomic because it is only used within the signal processing thread.

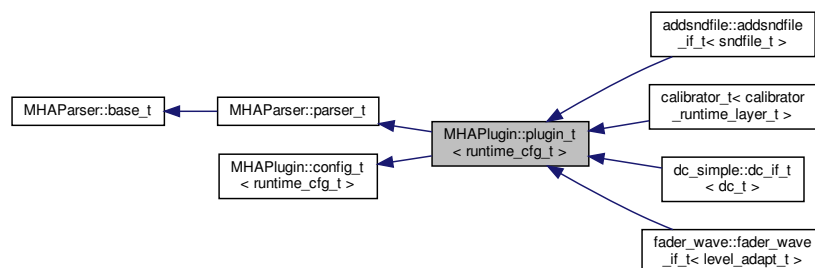
The documentation for this class was generated from the following file:

- mha_plugin.hh

4.307 MHAPLugin::plugin_t< runtime_cfg_t > Class Template Reference

The template class for C++ openMHA plugins.

Inheritance diagram for MHAPLugin::plugin_t< runtime_cfg_t >:



Public Member Functions

- **plugin_t** (const std::string &, const **algo_comm_t** &)
Constructor of plugin template.
- virtual **~plugin_t** ()
- virtual void **prepare** (**mhaconfig_t** &)=0
- virtual void **release** ()
- void **prepare_** (**mhaconfig_t** &)
- void **release_** ()
- bool **is_prepared** () const
Flag, if the prepare method is successfully called (or currently evaluated)
- **mhaconfig_t** **input_cfg** () const
Current input channel configuration.
- **mhaconfig_t** **output_cfg** () const
Current output channel configuration.

Protected Attributes

- **mhaconfig_t tftype**
Member for storage of plugin interface configuration.
- **algo_comm_t ac**
AC handle of the chain.

Private Attributes

- bool **is_prepared_**
- **mhaconfig_t input_cfg_**
- **mhaconfig_t output_cfg_**
- **MHAParser::mhaconfig_mon_t mhaconfig_in**
- **MHAParser::mhaconfig_mon_t mhaconfig_out**

Additional Inherited Members

4.307.1 Detailed Description

```
template<class runtime_cfg_t>
class MHAPlugin::plugin_t< runtime_cfg_t >
```

The template class for C++ openMHA plugins.

Template Parameters

<i>runtime_↔ cfg_t</i>	run-time configuration.
----------------------------	-------------------------

This template class provides thread safe configuration handling and standard methods to be compatible to the C++ openMHA plugin wrapper macro **MHAPLUGIN_CALLBACKS** (p. [1568](#)).

The template parameter `runtime_cfg_t` should be the runtime configuration of the plugin.

See **MHAPlugin::config_t** (p. [1091](#)) for details on the thread safe communication update mechanism.

4.307.2 Constructor & Destructor Documentation

4.307.2.1 plugin_t()

```
template<class runtime_cfg_t >
MHAPLugin::plugin_t< runtime_cfg_t >:: plugin_t (
    const std::string & help,
    const algo_comm_t & iac )
```

Constructor of plugin template.

Parameters

<i>help</i>	Help comment to provide some general information about the plugin.
<i>iac</i>	AC space handle (will be stored into the member variable ac).

4.307.2.2 ~plugin_t()

```
template<class runtime_cfg_t >
MHAPLugin::plugin_t< runtime_cfg_t >::~~ plugin_t ( ) [virtual]
```

4.307.3 Member Function Documentation

4.307.3.1 prepare()

```
template<class runtime_cfg_t>
virtual void MHAPLugin::plugin_t< runtime_cfg_t >::prepare (
    mhaconfig_t & ) [pure virtual]
```

Implemented in [bbcalib_interface_t](#) (p. 317), [gtfb_simd_t](#) (p. 545), [calibrator_t](#) (p. 322), [gtfb_simple_t](#) (p. 554), [addsndfile::addsndfile_if_t](#) (p. 242), [testplugin::if_t](#) (p. 1437), [adm_if_t](#) (p. 264), [analysispath_if_t](#) (p. 305), [dbasync_native::db_if_t](#) (p. 358), [ac2lsl::ac2lsl_t](#) (p. 164), [osc2ac_t](#) (p. 1273), [lsl2ac::lsl2ac_t](#) (p. 648), [windnoise::if_t](#) (p. 1466), [noise_psd_estimator::noise_psd_estimator_if_t](#) (p. 1264), [fftfiler::interface_t](#) (p. 480), [rohBeam::rohBeam](#) (p. 1348), [smooth_cepstrum::smooth_cepstrum_if_t](#) (p. 1388), [dc_simple::dc_if_t](#) (p. 378), [multibandcompressor::interface_t](#) (p. 1255), [plingploing::if_t](#) (p. 1294), [wave2spec_if_t](#) (p. 1444), [dc::dc_if_t](#) (p. 365), [combc_if_t](#) (p. 341), [gtfb_analyzer::gtfb_analyzer_t](#) (p. 536), [rmslevel::rmslevel_if_t](#) (p. 1339), [coherence::cohflt_if_t](#) (p. 331), [plugin_interface_t](#) (p. 1304), [smoothgains_bridge::overlapadd_if_t](#) (p. 1403), [example6_t](#) (p. 460), [cpuload::cpuload_if_t](#) (p. 350), [noise_t](#) (p. 1270), [MHAPLugin_Resampling::resampling_if_t](#) (p. 1104), [shadowfilter_end::shadowfilter_end_t](#) (p. 1381), [ac2wave_if_t](#) (p. 189), [prediction_error](#) (p. 1327), [nlms_t](#) (p. 1260), [fshift_hilbert::frequency_translator_t](#) (p. 495), [spec2wave_if_t](#) (p. 1415), [level_matching::level_matching_t](#) (p. 619), [fader_wave::fader_wave_if_t](#) (p. 467), [mhachain::chain_base_t](#) (p. 784), [overlapadd::overlapadd_if_t](#) (p. 1283), [acsave::acsave_t](#) (p. 220),

doasvm_feature_extraction (p. 410), **fshift::fshift_t** (p. 492), **shadowfilter_begin_**↵
::shadowfilter_begin_t (p. 1377), **example3_t** (p. 451), **example4_t** (p. 455), **lpc_bl_**↵
predictor (p. 630), **lpc_burglattice** (p. 637), **acPooling_wave** (p. 212), **steerbf** (p. 1425),
delaysum::delaysum_wave_if_t (p. 395), **lpc** (p. 626), **db_if_t** (p. 353), **droptect_**↵
t (p. 420), **fader_if_t** (p. 464), **acConcat_wave** (p. 199), **acSteer** (p. 230), **gain_**↵
::gain_if_t (p. 515), **acTransform_wave** (p. 236), **fftfbpow::fftfbpow_interface_t** (p. 472),
example1_t (p. 445), **sine_t** (p. 1385), **example2_t** (p. 447), **doasvm_classification**
(p. 404), **wavrec_t** (p. 1455), **fftfilterbank::fftfb_interface_t** (p. 482), **altconfig_t** (p. 289),
matrixmixer::matmix_t (p. 657), **route::interface_t** (p. 1362), **mconv::MConv** (p. 661),
equalize::freqgains_t (p. 442), **altplugs_t** (p. 294), **softclip_t** (p. 1408), **delaysum_**↵
spec::delaysum_spec_if_t (p. 400), **ac_proc::interface_t** (p. 195), **ac2osc_t** (p. 184),
save_spec_t (p. 1372), **save_wave_t** (p. 1374), **example7_t** (p. 462), **gsc_adaptive_**↵
stage::gsc_adaptive_stage_if (p. 529), **acmon::acmon_t** (p. 207), **dropgen_t** (p. 417),
delay::interface_t (p. 392), **identity_t** (p. 560), **levelmeter_t** (p. 623), **ds_t** (p. 424), and
us_t (p. 1441).

4.307.3.2 release()

```
template<class runtime_cfg_t >
void MHAPlugin::plugin_t< runtime_cfg_t >::release ( ) [virtual]
```

Reimplemented in **bbcalib_interface_t** (p. 317), **calibrator_t** (p. 322), **gtfb_simple_**↵
t (p. 554), **addsndfile::addsndfile_if_t** (p. 242), **adm_if_t** (p. 264), **analysispath_**↵
if_t (p. 305), **ac2lsl::ac2lsl_t** (p. 165), **dbasync_native::db_if_t** (p. 358), **lsl2ac_**↵
::lsl2ac_t (p. 649), **osc2ac_t** (p. 1273), **windnoise::if_t** (p. 1466), **rohBeam::roh_**↵
Beam (p. 1348), **smooth_cepstrum::smooth_cepstrum_if_t** (p. 1389), **dc_simple::dc_**↵
if_t (p. 378), **multibandcompressor::interface_t** (p. 1255), **wave2spec_if_t** (p. 1444),
coherence::cohflt_if_t (p. 331), **smoothgains_bridge::overlapadd_if_t** (p. 1403), **MHA_**↵
Plugin_Resampling::resampling_if_t (p. 1104), **ac2wave_if_t** (p. 189), **prediction_error**
(p. 1327), **nlms_t** (p. 1260), **fshift_hilbert::frequency_translator_t** (p. 495), **spec2wave_**↵
if_t (p. 1415), **level_matching::level_matching_t** (p. 620), **fader_wave::fader_wave_**↵
if_t (p. 467), **mhachain::chain_base_t** (p. 784), **overlapadd::overlapadd_if_t** (p. 1284),
acsave::acsave_t (p. 220), **doasvm_feature_extraction** (p. 410), **fshift::fshift_t** (p. 492),
example3_t (p. 451), **example4_t** (p. 456), **lpc_bl_predictor** (p. 630), **lpc_burglattice**
(p. 637), **acPooling_wave** (p. 212), **steerbf** (p. 1426), **delaysum::delaysum_wave_if_**↵
t (p. 395), **droptect_t** (p. 420), **lpc** (p. 627), **db_if_t** (p. 353), **acConcat_wave** (p. 199),
acSteer (p. 231), **gain::gain_if_t** (p. 515), **acTransform_wave** (p. 236), **example2_**↵
t (p. 448), **altconfig_t** (p. 289), **doasvm_classification** (p. 405), **wavrec_t** (p. 1455),
fftfilterbank::fftfb_interface_t (p. 483), **route::interface_t** (p. 1362), **mconv::MConv**
(p. 661), **ac2osc_t** (p. 184), **example1_t** (p. 444), **altplugs_t** (p. 294), **ac_proc::interface_**↵
t (p. 195), **gsc_adaptive_stage::gsc_adaptive_stage_if** (p. 529), **acmon::acmon_**↵
t (p. 207), **example7_t** (p. 462), **dropgen_t** (p. 417), **identity_t** (p. 560), **ds_t** (p. 424), and
us_t (p. 1441).

4.307.3.3 prepare_()

```
template<class runtime_cfg_t >
void MHAPlugin::plugin_t< runtime_cfg_t >::prepare_ (
    mhaconfig_t & cf )
```

4.307.3.4 release_()

```
template<class runtime_cfg_t >
void MHAPLugin::plugin_t< runtime_cfg_t >::release_ ( )
```

4.307.3.5 is_prepared()

```
template<class runtime_cfg_t>
bool MHAPLugin::plugin_t< runtime_cfg_t >::is_prepared ( ) const [inline]
```

Flag, if the prepare method is successfully called (or currently evaluated)

4.307.3.6 input_cfg()

```
template<class runtime_cfg_t>
mhaconfig_t MHAPLugin::plugin_t< runtime_cfg_t >::input_cfg ( ) const [inline]
```

Current input channel configuration.

4.307.3.7 output_cfg()

```
template<class runtime_cfg_t>
mhaconfig_t MHAPLugin::plugin_t< runtime_cfg_t >::output_cfg ( ) const [inline]
```

Current output channel configuration.

4.307.4 Member Data Documentation

4.307.4.1 tftype

```
template<class runtime_cfg_t>
mhaconfig_t MHAPLugin::plugin_t< runtime_cfg_t >::tftype [protected]
```

Member for storage of plugin interface configuration.

This member is defined for convenience of the developer. Typically, the actual contents of **mhaconfig_t** (p. 792) are stored in this member in the **prepare()** (p. 1099) method.

Note

This member is likely to be removed in later versions, use **input_cfg()** (p. 1101) and **output_cfg()** (p. 1101) instead.

4.307.4.2 ac

```
template<class runtime_cfg_t>
algo_comm_t  MHAPugin::plugin_t< runtime_cfg_t >::ac  [protected]
```

AC handle of the chain.

This variable is initialized in the constructor and can be used by derived plugins to access the AC space. Its contents should not be modified.

4.307.4.3 is_prepared_

```
template<class runtime_cfg_t>
bool  MHAPugin::plugin_t< runtime_cfg_t >::is_prepared_  [private]
```

4.307.4.4 input_cfg_

```
template<class runtime_cfg_t>
mhaconfig_t  MHAPugin::plugin_t< runtime_cfg_t >::input_cfg_  [private]
```

4.307.4.5 output_cfg_

```
template<class runtime_cfg_t>
mhaconfig_t  MHAPugin::plugin_t< runtime_cfg_t >::output_cfg_  [private]
```

4.307.4.6 mhaconfig_in

```
template<class runtime_cfg_t>
MHAParser::mhaconfig_mon_t  MHAPugin::plugin_t< runtime_cfg_t >::mhaconfig_in  [private]
```

4.307.4.7 mhaconfig_out

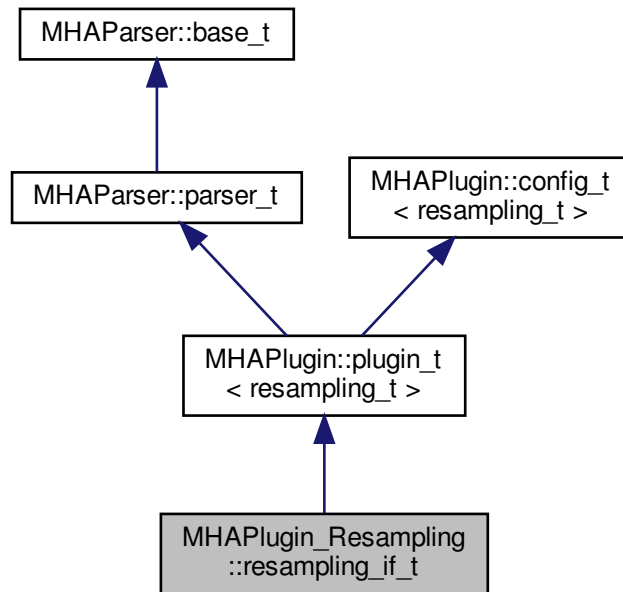
```
template<class runtime_cfg_t>
MHAParser::mhaconfig_mon_t  MHAPugin::plugin_t< runtime_cfg_t >::mhaconfig_out
[private]
```

The documentation for this class was generated from the following file:

- **mha_plugin.hh**

4.308 MHAPLugin_Resampling::resampling_if_t Class Reference

Inheritance diagram for MHAPLugin_Resampling::resampling_if_t:



Public Member Functions

- **resampling_if_t** (**algo_comm_t**, std::string, std::string)
- **mha_wave_t** * **process** (**mha_wave_t** *)
- void **prepare** (**mhaconfig_t** &)
- void **release** ()

Private Attributes

- **MHAParser::float_t** **srate**
- **MHAParser::int_t** **fragsize**
- **MHAParser::float_t** **nyquist_ratio**
- **MHAParser::float_t** **irslens_outer2inner**
- **MHAParser::float_t** **irslens_inner2outer**
- **MHAParser::mhapluginloader_t** **plugloader**
- std::string **chain**
- std::string **algo**

Additional Inherited Members

4.308.1 Constructor & Destructor Documentation

4.308.1.1 `resampling_if_t()`

```
MHAPLugin_Resampling::resampling_if_t::resampling_if_t (
    algo_comm_t iac,
    std::string th,
    std::string al )
```

4.308.2 Member Function Documentation

4.308.2.1 `process()`

```
mha_wave_t * MHAPLugin_Resampling::resampling_if_t::process (
    mha_wave_t * s )
```

4.308.2.2 `prepare()`

```
void MHAPLugin_Resampling::resampling_if_t::prepare (
    mhaconfig_t & conf ) [virtual]
```

Implements **MHAPLugin::plugin_t< resampling_t >** (p. [1099](#)).

4.308.2.3 `release()`

```
void MHAPLugin_Resampling::resampling_if_t::release (
    void ) [virtual]
```

Reimplemented from **MHAPLugin::plugin_t< resampling_t >** (p. [1100](#)).

4.308.3 Member Data Documentation

4.308 MHAPugin_Resampling::resampling_if_t Class Reference

4.308.3.1 srate

MHAParser::float_t MHAPugin_Resampling::resampling_if_t::srate [private]

4.308.3.2 fragsize

MHAParser::int_t MHAPugin_Resampling::resampling_if_t::fragsize [private]

4.308.3.3 nyquist_ratio

MHAParser::float_t MHAPugin_Resampling::resampling_if_t::nyquist_ratio [private]

4.308.3.4 irslen_outer2inner

MHAParser::float_t MHAPugin_Resampling::resampling_if_t::irslen_outer2inner [private]

4.308.3.5 irslen_inner2outer

MHAParser::float_t MHAPugin_Resampling::resampling_if_t::irslen_inner2outer [private]

4.308.3.6 plugloader

MHAParser::mhapuginloader_t MHAPugin_Resampling::resampling_if_t::plugloader
[private]

4.308.3.7 chain

std::string MHAPugin_Resampling::resampling_if_t::chain [private]

4.308.3.8 algo

```
std::string MHAPlugin_Resampling::resampling_if_t::algo [private]
```

The documentation for this class was generated from the following file:

- **resampling.cpp**

4.309 MHAPlugin_Resampling::resampling_t Class Reference

Public Member Functions

- **resampling_t** (unsigned int **outer_fragsize**, float **outer_srate**, unsigned int **inner_↵
fragsize**, float **inner_srate**, unsigned int **nch_in**, float **filter_length_in**, unsigned int **nch_↵
_out**, float **filter_length_out**, float **nyquist_ratio**, **MHAParser::mhapluginloader_t** &plug)
- **mha_wave_t * process (mha_wave_t *)**

Private Attributes

- unsigned **outer_fragsize**
- unsigned **inner_fragsize**
- float **outer_srate**
- float **inner_srate**
- unsigned **nchannels_in**
- unsigned **nchannels_out**
- **MHAFilter::blockprocessing_polyphase_resampling_t** **outer2inner_resampling**
- **MHAFilter::blockprocessing_polyphase_resampling_t** **inner2outer_resampling**
- **MHAParser::mhapluginloader_t** & **plugloader**
- **MHASignal::waveform_t** **inner_signal**
- **MHASignal::waveform_t** **output_signal**

4.309.1 Constructor & Destructor Documentation

4.309.1.1 resampling_t()

```
MHAPlugin_Resampling::resampling_t::resampling_t (
    unsigned int outer_fragsize,
    float outer_srate,
    unsigned int inner_fragsize,
    float inner_srate,
    unsigned int nch_in,
    float filter_length_in,
    unsigned int nch_out,
    float filter_length_out,
    float nyquist_ratio,
    MHAParser::mhapluginloader_t & plug )
```

4.309.2 Member Function Documentation

4.309.2.1 process()

```
mha_wave_t * MHAPlugin_Resampling::resampling_t::process (  
    mha_wave_t * s )
```

4.309.3 Member Data Documentation

4.309.3.1 outer_fragsize

```
unsigned MHAPlugin_Resampling::resampling_t::outer_fragsize [private]
```

4.309.3.2 inner_fragsize

```
unsigned MHAPlugin_Resampling::resampling_t::inner_fragsize [private]
```

4.309.3.3 outer_srate

```
float MHAPlugin_Resampling::resampling_t::outer_srate [private]
```

4.309.3.4 inner_srate

```
float MHAPlugin_Resampling::resampling_t::inner_srate [private]
```

4.309.3.5 nchannels_in

```
unsigned MHAPlugin_Resampling::resampling_t::nchannels_in [private]
```

4.309.3.6 nchannels_out

```
unsigned MHAPLugin_Resampling::resampling_t::nchannels_out [private]
```

4.309.3.7 outer2inner_resampling

```
MHAFilter::blockprocessing_polyphase_resampling_t MHAPLugin_Resampling::resampling←  
_t::outer2inner_resampling [private]
```

4.309.3.8 inner2outer_resampling

```
MHAFilter::blockprocessing_polyphase_resampling_t MHAPLugin_Resampling::resampling←  
_t::inner2outer_resampling [private]
```

4.309.3.9 plugloader

```
MHAParser::mhapluginloader_t& MHAPLugin_Resampling::resampling_t::plugloader [private]
```

4.309.3.10 inner_signal

```
MHASignal::waveform_t MHAPLugin_Resampling::resampling_t::inner_signal [private]
```

4.309.3.11 output_signal

```
MHASignal::waveform_t MHAPLugin_Resampling::resampling_t::output_signal [private]
```

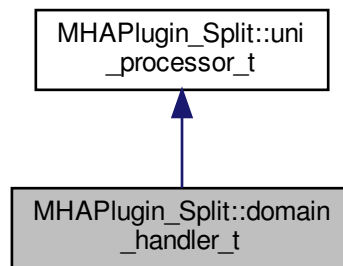
The documentation for this class was generated from the following file:

- **resampling.cpp**

4.310 MHAPlugin_Split::domain_handler_t Class Reference

Handles domain-specific partial input and output signal.

Inheritance diagram for MHAPlugin_Split::domain_handler_t:



Public Member Functions

- void **set_input_domain** (const **mhaconfig_t** &settings_in)
Set parameters of input signal.
- void **set_output_domain** (const **mhaconfig_t** &settings_out)
Set output signal parameters.
- void **deallocate_domains** ()
Deallocate domain indicators and signal holders.
- **domain_handler_t** (const **mhaconfig_t** &settings_in, const **mhaconfig_t** &settings_out, **PluginLoader::fourway_processor_t** * processor)
Construct a new domain handler once the domains and dimensions of input and output signal of one of the child plugins of split are known.
- virtual ~**domain_handler_t** ()
Deallocation of signal holders.
- unsigned **put_signal** (**mha_wave_t** *s_in, unsigned start_channel)
Store the relevant channels from the input signal for processing.
- unsigned **put_signal** (**mha_spec_t** *s_in, unsigned start_channel)
Store the relevant channels from the input signal for processing.
- unsigned **get_signal** (**MHASignal::waveform_t** *s_out, unsigned start_channel)
Store all partial signal output channels in the combined waveform signal with the given channel offset.
- unsigned **get_signal** (**MHASignal::spectrum_t** *s_out, unsigned start_channel)
Store all partial signal output channels in the combined spectrum signal with the given channel offset.
- void **process** ()
Call the processing method of the processor with configured input/output signal domains.

Public Attributes

- **MHASignal::waveform_t * wave_in**
Partial wave input signal.
- **mha_wave_t ** wave_out**
Partial wave output signal.
- **MHASignal::spectrum_t * spec_in**
Partial spec input signal.
- **mha_spec_t ** spec_out**
Partial spec input signal.
- **PluginLoader::fourway_processor_t * processor**
The domain-specific signal processing methods are implemented here.

Private Member Functions

- **domain_handler_t (const domain_handler_t &)**
Disallow copy constructor.
- **domain_handler_t & operator= (const domain_handler_t &)**
Disallow assignment operator.

4.310.1 Detailed Description

Handles domain-specific partial input and output signal.

4.310.2 Constructor & Destructor Documentation

4.310.2.1 domain_handler_t() [1/2]

```
MHAPPlugin_Split::domain_handler_t::domain_handler_t (
    const domain_handler_t & ) [private]
```

Disallow copy constructor.

4.310.2.2 domain_handler_t() [2/2]

```
MHAPPlugin_Split::domain_handler_t::domain_handler_t (
    const mhaconfig_t & settings_in,
    const mhaconfig_t & settings_out,
    PluginLoader::fourway_processor_t * processor ) [inline]
```

Construct a new domain handler once the domains and dimensions of input and output signal of one of the child plugins of split are known.

4.310.2.3 ~domain_handler_t()

```
virtual MHAPlugin_Split::domain_handler_t::~~domain_handler_t ( ) [inline], [virtual]
```

Deallocation of signal holders.

4.310.3 Member Function Documentation

4.310.3.1 operator=()

```
domain_handler_t& MHAPlugin_Split::domain_handler_t::operator= (
    const domain_handler_t & ) [private]
```

Disallow assignment operator.

4.310.3.2 set_input_domain()

```
void MHAPlugin_Split::domain_handler_t::set_input_domain (
    const mhaconfig_t & settings_in ) [inline]
```

Set parameters of input signal.

Parameters

<i>settings_in</i>	domain and dimensions of partial input signal
--------------------	---

4.310.3.3 set_output_domain()

```
void MHAPlugin_Split::domain_handler_t::set_output_domain (
    const mhaconfig_t & settings_out ) [inline]
```

Set output signal parameters.

Parameters

<i>settings_out</i>	domain and dimensions of partial output signal
---------------------	--

4.310.3.4 deallocate_domains()

```
void MHAPugin_Split::domain_handler_t::deallocate_domains ( ) [inline]
```

Deallocate domain indicators and signal holders.

4.310.3.5 put_signal() [1/2]

```
unsigned MHAPugin_Split::domain_handler_t::put_signal (
    mha_wave_t * s_in,
    unsigned start_channel ) [inline]
```

Store the relevant channels from the input signal for processing.

The number of channels to store is taken from the dimensions of the partial input signal holder **wave_in** (p. 1114).

Parameters

<i>s_in</i>	The combined waveform input signal.
<i>start_channel</i>	The index (0-based) of the first channel in <i>s_in</i> to be copied to the partial input signal.

Returns

The number of channels that were copied from the input signal

4.310.3.6 put_signal() [2/2]

```
unsigned MHAPugin_Split::domain_handler_t::put_signal (
    mha_spec_t * s_in,
    unsigned start_channel ) [inline]
```

Store the relevant channels from the input signal for processing.

The number of channels to store is taken from the dimensions of the partial input signal holder **spec_in** (p. 1114).

Parameters

<i>s_in</i>	The combined spectrum input signal.
<i>start_channel</i>	The index (0-based) of the first channel in <i>s_in</i> to be copied to the partial input signal.

Returns

The number of channels that were copied from the input signal

4.310.3.7 get_signal() [1/2]

```
unsigned MHAPugin_Split::domain_handler_t::get_signal (
    MHASignal::waveform_t * s_out,
    unsigned start_channel ) [inline]
```

Store all partial signal output channels in the combined waveform signal with the given channel offset.

All channels present in **wave_out** (p. 1114) will be copied. Caller may use (*wave_out)->num↔_channels to check the number of channels in advance.

Parameters

<i>s_out</i>	The combined waveform output signal.
<i>start_channel</i>	The channel offset (0-based) in s_out.

Returns

The number of channels that were copied to the output signal

4.310.3.8 get_signal() [2/2]

```
unsigned MHAPugin_Split::domain_handler_t::get_signal (
    MHASignal::spectrum_t * s_out,
    unsigned start_channel ) [inline]
```

Store all partial signal output channels in the combined spectrum signal with the given channel offset.

All channels present in **spec_out** (p. 1114) will be copied. Caller may use (*spec_out)->num↔_channels to check the number of channels in advance.

Parameters

<i>s_out</i>	The combined spectrum output signal.
<i>start_channel</i>	The channel offset (0-based) in s_out.

Returns

The number of channels that were copied to the output signal

4.310.3.9 process()

```
void MHAPugin_Split::domain_handler_t::process (  
    void ) [inline], [virtual]
```

Call the processing method of the processor with configured input/output signal domains.

The input signal has to be stored using **put_signal** (p. 1112) before this method may be called.

Implements **MHAPugin_Split::uni_processor_t** (p. 1138).

4.310.4 Member Data Documentation

4.310.4.1 wave_in

```
MHASignal::waveform_t* MHAPugin_Split::domain_handler_t::wave_in
```

Partial wave input signal.

4.310.4.2 wave_out

```
mha_wave_t** MHAPugin_Split::domain_handler_t::wave_out
```

Partial wave output signal.

4.310.4.3 spec_in

```
MHASignal::spectrum_t* MHAPugin_Split::domain_handler_t::spec_in
```

Partial spec input signal.

4.310.4.4 spec_out

mha_spec_t** MHAPLugin_Split::domain_handler_t::spec_out

Partial spec input signal.

4.310.4.5 processor

PluginLoader::fourway_processor_t* MHAPLugin_Split::domain_handler_t::processor

The domain-specific signal processing methods are implemented here.

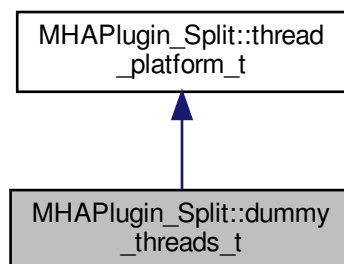
The documentation for this class was generated from the following file:

- **split.cpp**

4.311 MHAPLugin_Split::dummy_threads_t Class Reference

Dummy specification of a thread platform: This class implements everything in a single thread.

Inheritance diagram for MHAPLugin_Split::dummy_threads_t:



Public Member Functions

- void **kick_thread** ()
perform signal processing immediately (no multiple threads in this dummy class)
- void **catch_thread** ()
No implementation needed: Processing has been completed during ummy_threads_t::kick_↔ thread.
- **dummy_threads_t** (**uni_processor_t** *proc, const std::string &thread_scheduler, int thread_priority)
Constructor.

Additional Inherited Members

4.311.1 Detailed Description

Dummy specification of a thread platform: This class implements everything in a single thread.

4.311.2 Constructor & Destructor Documentation

4.311.2.1 dummy_threads_t()

```
MHAPLugin_Split::dummy_threads_t::dummy_threads_t (
    uni_processor_t * proc,
    const std::string & thread_scheduler,
    int thread_priority ) [inline]
```

Constructor.

Parameters

<i>proc</i>	Pointer to the associated plugin loader
<i>thread_scheduler</i>	Unused in dummy thread platform
<i>thread_priority</i>	Unused in dummy thread platform

4.311.3 Member Function Documentation

4.311.3.1 kick_thread()

```
void MHAPLugin_Split::dummy_threads_t::kick_thread ( ) [inline], [virtual]
```

perform signal processing immediately (no multiple threads in this dummy class)

Implements **MHAPLugin_Split::thread_platform_t** (p. [1136](#)).

4.311.3.2 catch_thread()

```
void MHAPlugin_Split::dummy_threads_t::catch_thread ( ) [inline], [virtual]
```

No implementation needed: Processing has been completed during ummy_threads_t::kick_↔ thread.

Implements **MHAPlugin_Split::thread_platform_t** (p. 1136).

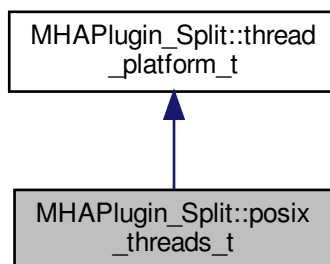
The documentation for this class was generated from the following file:

- **split.cpp**

4.312 MHAPlugin_Split::posix_threads_t Class Reference

Posix threads specification of thread platform.

Inheritance diagram for MHAPlugin_Split::posix_threads_t:



Public Member Functions

- void **kick_thread** ()
Start signal processing in separate thread.
- void **catch_thread** ()
Wait for signal processing to finish.
- **posix_threads_t** (**uni_processor_t** *proc, const std::string &thread_scheduler, int thread_priority)
Constructor.
- **~posix_threads_t** ()
Terminate thread.
- void **main** ()
Thread main loop. Wait for process/termination trigger, then act.

Static Public Member Functions

- static void * **thread_start** (void *thr)
Thread start function.
- static std::string **current_thread_scheduler** ()
- static int **current_thread_priority** ()

Private Attributes

- pthread_mutex_t **mutex**
The mutex.
- pthread_cond_t **kick_condition**
The condition for signalling the kicking and termination.
- pthread_cond_t **catch_condition**
The condition for signalling the processing is finished.
- pthread_attr_t **attr**
Thread attributes.
- struct sched_param **priority**
Thread scheduling priority.
- int **scheduler**
- pthread_t **thread**
The thread object.
- bool **kicked**
A flag that is set to true by kick_thread and to false by the thread after it has woken up from the kicking.
- bool **processing_done**
A flag that is set to true by the thread when it returns from processing and to false by catch_↵ thread after it has waited for that return.
- bool **termination_request**
Set to true by the destructor.

Additional Inherited Members

4.312.1 Detailed Description

Posix threads specification of thread platform.

4.312.2 Constructor & Destructor Documentation

4.312.2.1 posix_threads_t()

```
MHAPPlugin_Split::posix_threads_t::posix_threads_t (
    uni_processor_t * proc,
    const std::string & thread_scheduler,
    int thread_priority ) [inline]
```

Constructor.

Parameters

<i>proc</i>	Pointer to the associated signal processor instance
<i>thread_scheduler</i>	A string describing the posix thread scheduler. Possible values: "SCHED_OTHER", "SCHED_RR", "SCHED_FIFO".
<i>thread_priority</i>	The scheduling priority of the new thread.

4.312.2.2 ~posix_threads_t()

```
MHAPugin_Split::posix_threads_t::~posix_threads_t ( ) [inline]
```

Terminate thread.

4.312.3 Member Function Documentation

4.312.3.1 kick_thread()

```
void MHAPugin_Split::posix_threads_t::kick_thread ( ) [inline], [virtual]
```

Start signal processing in separate thread.

Implements **MHAPugin_Split::thread_platform_t** (p. [1136](#)).

4.312.3.2 catch_thread()

```
void MHAPugin_Split::posix_threads_t::catch_thread ( ) [inline], [virtual]
```

Wait for signal processing to finish.

Implements **MHAPugin_Split::thread_platform_t** (p. [1136](#)).

4.312.3.3 thread_start()

```
static void* MHAPugin_Split::posix_threads_t::thread_start (
    void * thr ) [inline], [static]
```

Thread start function.

4.312.3.4 main()

```
void MHAPlugin_Split::posix_threads_t::main ( ) [inline]
```

Thread main loop. Wait for process/termination trigger, then act.

4.312.3.5 current_thread_scheduler()

```
static std::string MHAPlugin_Split::posix_threads_t::current_thread_scheduler ( )  
[inline], [static]
```

4.312.3.6 current_thread_priority()

```
static int MHAPlugin_Split::posix_threads_t::current_thread_priority ( ) [inline],  
[static]
```

4.312.4 Member Data Documentation

4.312.4.1 mutex

```
pthread_mutex_t MHAPlugin_Split::posix_threads_t::mutex [private]
```

The mutex.

4.312.4.2 kick_condition

```
pthread_cond_t MHAPlugin_Split::posix_threads_t::kick_condition [private]
```

The condition for signalling the kicking and termination.

4.312.4.3 catch_condition

```
pthread_cond_t MHAPlugin_Split::posix_threads_t::catch_condition [private]
```

The condition for signalling the processing is finished.

4.312.4.4 attr

```
pthread_attr_t MHAPugin_Split::posix_threads_t::attr [private]
```

Thread attributes.

4.312.4.5 priority

```
struct sched_param MHAPugin_Split::posix_threads_t::priority [private]
```

Thread scheduling priority.

4.312.4.6 scheduler

```
int MHAPugin_Split::posix_threads_t::scheduler [private]
```

4.312.4.7 thread

```
pthread_t MHAPugin_Split::posix_threads_t::thread [private]
```

The thread object.

4.312.4.8 kicked

```
bool MHAPugin_Split::posix_threads_t::kicked [private]
```

A flag that is set to true by `kick_thread` and to false by the thread after it has woken up from the kicking.

4.312.4.9 processing_done

```
bool MHAPugin_Split::posix_threads_t::processing_done [private]
```

A flag that is set to true by the thread when it returns from processing and to false by `catch_↵` thread after it has waited for that return.

4.312.4.10 termination_request

```
bool MHAPLugin_Split::posix_threads_t::termination_request [private]
```

Set to true by the destructor.

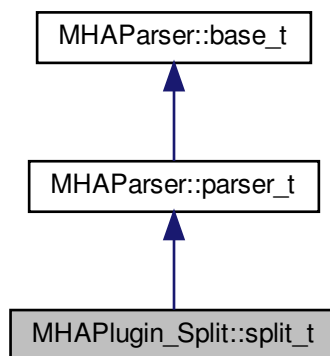
The documentation for this class was generated from the following file:

- **split.cpp**

4.313 MHAPLugin_Split::split_t Class Reference

Implements split plugin.

Inheritance diagram for MHAPLugin_Split::split_t:



Public Member Functions

- **split_t** (**algo_comm_t** iac, const std::string &chain_name, const std::string &algo_name)
Plugin constructor.
- **~split_t** ()
Plugin destructor. Unloads nested plugins.
- void **prepare_** (**mhaconfig_t** &)
Check signal parameters, prepare chains, and allocate output signal holders.
- void **release_** ()
Delete output signal holder and release chains.
- template<class SigTypeIn , class SigTypeOut >
void **process** (SigTypeIn *, SigTypeOut **)
Let the parallel plugins process channel groups of the input signal.

Private Member Functions

- void **update** ()
Load plugins in response to a value change in the algos variable.
- void **clear_chains** ()
Unload the plugins.
- **mha_wave_t** * **copy_output_wave** ()
- **mha_spec_t** * **copy_output_spec** ()
- template<class SigType >
void **trigger_processing** (SigType *s_in)
Split the argument input signal to groups of channels for the plugins and initiate signal processing.
- template<class SigType >
void **collect_result** (SigType *s_out)
Combine the output signal from the plugins.
- **MHASignal::waveform_t** * **signal_out** (**mha_wave_t** **)
Waveform domain output signal structure accessor.
- **MHASignal::spectrum_t** * **signal_out** (**mha_spec_t** **)
Spectrum domain output signal structure. Parameter is ignored.

Private Attributes

- **MHAEvents::patchbay_t**< **split_t** > **patchbay**
Reload plugins when the algos variable changes.
- **MHAParser::vstring_t** **algos**
Vector of plugins to load in parallel.
- **MHAParser::vint_t** **channels**
Number of channels to route through each plugin.
- **MHAParser::kw_t** **thread_platform**
Thread platform chooser.
- **MHAParser::kw_t** **worker_thread_scheduler**
Scheduler used for worker threads.
- **MHAParser::int_t** **worker_thread_priority**
Priority of worker threads.
- **MHAParser::string_mon_t** **framework_thread_scheduler**
Scheduler of the signal processing thread.
- **MHAParser::int_mon_t** **framework_thread_priority**
Priority of signal processing thread.
- **MHAParser::bool_t** **delay**
Switch to activate parallel processing of plugins at the cost of one block of additional delay.
- std::vector< **splitted_part_t** * > **chains**
Interfaces to parallel plugins.
- **MHASignal::waveform_t** * **wave_out**
Combined output waveforms structure.
- **MHASignal::spectrum_t** * **spec_out**
Combined output spectra structure.

Additional Inherited Members

4.313.1 Detailed Description

Implements split plugin.

An instance of class **split_t** (p. 1122) implements the split plugin functionality: The audio channels are splitted and groups of audio channels are processed by different plugins in parallel.

4.313.2 Constructor & Destructor Documentation

4.313.2.1 split_t()

```
MHAPLugin_Split::split_t::split_t (
    algo_comm_t iac,
    const std::string & chain_name,
    const std::string & algo_name )
```

Plugin constructor.

4.313.2.2 ~split_t()

```
MHAPLugin_Split::split_t::~~split_t ( )
```

Plugin destructor. Unloads nested plugins.

4.313.3 Member Function Documentation

4.313.3.1 prepare_()

```
void MHAPLugin_Split::split_t::prepare_ (
    mhaconfig_t & signal_parameters )
```

Check signal parameters, prepare chains, and allocate output signal holders.

4.313.3.2 release_()

```
void MHAPugin_Split::split_t::release_ ( )
```

Delete output signal holder and release chains.

4.313.3.3 process()

```
template<class SigTypeIn , class SigTypeOut >  
void MHAPugin_Split::split_t::process (   
    SigTypeIn * s_in,  
    SigTypeOut ** s_out )
```

Let the parallel plugins process channel groups of the input signal.

4.313.3.4 update()

```
void MHAPugin_Split::split_t::update ( ) [private]
```

Load plugins in response to a value change in the algos variable.

4.313.3.5 clear_chains()

```
void MHAPugin_Split::split_t::clear_chains ( ) [private]
```

Unload the plugins.

4.313.3.6 copy_output_wave()

```
mha_wave_t* MHAPugin_Split::split_t::copy_output_wave ( ) [private]
```

4.313.3.7 copy_output_spec()

```
mha_spec_t* MHAPugin_Split::split_t::copy_output_spec ( ) [private]
```

4.313.3.8 trigger_processing()

```
template<class SigType >
void MHAPLugin_Split::split_t::trigger_processing (
    SigType * s_in ) [private]
```

Split the argument input signal to groups of channels for the plugins and initiate signal processing.

4.313.3.9 collect_result()

```
template<class SigType >
void MHAPLugin_Split::split_t::collect_result (
    SigType * s_out ) [private]
```

Combine the output signal from the plugins.

4.313.3.10 signal_out() [1/2]

```
MHASignal::waveform_t* MHAPLugin_Split::split_t::signal_out (
    mha_wave_t ** ) [inline], [private]
```

Waveform domain output signal structure accessor.

Parameter is only for domain disambiguation and is ignored.

4.313.3.11 signal_out() [2/2]

```
MHASignal::spectrum_t* MHAPLugin_Split::split_t::signal_out (
    mha_spec_t ** ) [inline], [private]
```

Spectrum domain output signal structure. Parameter is ignored.

4.313.4 Member Data Documentation

4.313.4.1 patchbay

```
MHAEvents::patchbay_t< split_t> MHAPLugin_Split::split_t::patchbay [private]
```

Reload plugins when the algos variable changes.

4.313.4.2 algos

MHAParser::vstring_t MHAPLugin_Split::split_t::algos [private]

Vector of plugins to load in parallel.

4.313.4.3 channels

MHAParser::vint_t MHAPLugin_Split::split_t::channels [private]

Number of channels to route through each plugin.

4.313.4.4 thread_platform

MHAParser::kw_t MHAPLugin_Split::split_t::thread_platform [private]

Thread platform chooser.

4.313.4.5 worker_thread_scheduler

MHAParser::kw_t MHAPLugin_Split::split_t::worker_thread_scheduler [private]

Scheduler used for worker threads.

4.313.4.6 worker_thread_priority

MHAParser::int_t MHAPLugin_Split::split_t::worker_thread_priority [private]

Priority of worker threads.

4.313.4.7 framework_thread_scheduler

MHAParser::string_mon_t MHAPLugin_Split::split_t::framework_thread_scheduler [private]

Scheduler of the signal processing thread.

4.313.4.8 framework_thread_priority

```
MHAParser::int_mon_t MHAPugin_Split::split_t::framework_thread_priority [private]
```

Priority of signal processing thread.

4.313.4.9 delay

```
MHAParser::bool_t MHAPugin_Split::split_t::delay [private]
```

Switch to activate parallel processing of plugins at the cost of one block of additional delay.

4.313.4.10 chains

```
std::vector< splitted_part_t*> MHAPugin_Split::split_t::chains [private]
```

Interfaces to parallel plugins.

4.313.4.11 wave_out

```
MHASignal::waveform_t* MHAPugin_Split::split_t::wave_out [private]
```

Combined output waveforms structure.

4.313.4.12 spec_out

```
MHASignal::spectrum_t* MHAPugin_Split::split_t::spec_out [private]
```

Combined output spectra structure.

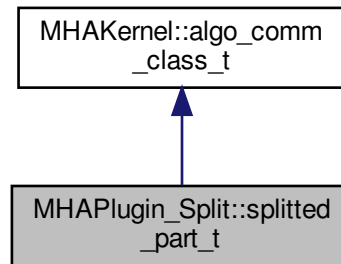
The documentation for this class was generated from the following file:

- **split.cpp**

4.314 MHAPLugin_Split::splitted_part_t Class Reference

The **splitted_part_t** (p. 1129) instance manages the plugin that performs processing on the reduced set of channels.

Inheritance diagram for MHAPLugin_Split::splitted_part_t:



Public Member Functions

- **splitted_part_t** (const std::string &plugname, **MHAParser::parser_t** *parent)
Load the plugin for this partial signal path.
- **splitted_part_t** (**PluginLoader::fourway_processor_t** *plugin)
Create the handler for the partial signal.
- **~splitted_part_t** () throw ()
*Destructor. Deletes the plugin **plug** (p. 1133).*
- void **prepare** (**mhaconfig_t** &signal_parameters, const std::string &thread_platform, const std::string &thread_scheduler, int thread_priority)
*Delegates the prepare method to the plugin and allocates a suitable **MHAPLugin_Split::domain_handler_t** (p. 1109) instance.*
- void **release** ()
*Delegates the release method to the plugin and deletes the **MHAPLugin_Split::domain_handler_t** (p. 1109) instance.*
- std::string **parse** (const std::string &str)
Delegates parser incovation to plugin.
- template<class SigType >
unsigned **trigger_processing** (SigType *s_in, unsigned start_channel)
The domain handler copies the input signal channels.
- template<class SigType >
unsigned **collect_result** (SigType *s_out, unsigned start_channel)
Wait until processing is finished, then copy the output data.

Private Member Functions

- **splitted_part_t** (const **splitted_part_t** &)
Disallow copy constructor.
- **splitted_part_t** & **operator=** (const **splitted_part_t** &)
Disallow assignment operator.

Private Attributes

- **PluginLoader::fourway_processor_t** * **plug**
The plugin that performs the signal processing on the prepared channels.
- **domain_handler_t** * **domain**
The domain specific signal handler, allocated from prepare when input and output domains and signal parameters are known.
- **thread_platform_t** * **thread**
The platform-dependent thread synchronization implementation.

Additional Inherited Members

4.314.1 Detailed Description

The **splitted_part_t** (p. 1129) instance manages the plugin that performs processing on the reduced set of channels.

The signal is split by channels by this instance, but the signal is combined again by the calling class.

4.314.2 Constructor & Destructor Documentation

4.314.2.1 splitted_part_t() [1/3]

```
MHAPugin_Split::splitted_part_t::splitted_part_t (
    const splitted_part_t & ) [private]
```

Disallow copy constructor.

4.314.2.2 splitted_part_t() [2/3]

```
MHAPugin_Split::splitted_part_t::splitted_part_t (
    const std::string & plugname,
    MHAParser::parser_t * parent )
```

Load the plugin for this partial signal path.

Loads the MHA plugin for a signal path of these audio channels.

Parameters

<i>pluginame</i>	The name of the MHA plugin, optionally followed by a colon and the algorithm name.
<i>parent</i>	The parser node where the configuration of the new plugin is inserted. The plugin's parser name is the configured name (colon syntax).

4.314.2.3 splitted_part_t() [3/3]

```
MHAPLugin_Split::splitted_part_t::splitted_part_t (
    PluginLoader::fourway_processor_t * plugin )
```

Create the handler for the partial signal.

The plugin is loaded by the caller, but it will be deleted by the destructor of this class. This constructor exists solely for testing purposes.

Parameters

<i>plugin</i>	The plugin used for processing the signal. The new splitted_part_t (p. 1130) instance will take ownership of this instance and release it in the destructor.
---------------	---

4.314.2.4 ~splitted_part_t()

```
MHAPLugin_Split::splitted_part_t::~~splitted_part_t ( ) throw ( )
```

Destructor. Deletes the plugin **plug** (p. 1133).

4.314.3 Member Function Documentation

4.314.3.1 operator=()

```
splitted_part_t& MHAPLugin_Split::splitted_part_t::operator= (
    const splitted_part_t & ) [private]
```

Disallow assignment operator.

4.314.3.2 prepare()

```
void MHAPLugin_Split::splitted_part_t::prepare (
    mhaconfig_t & signal_parameters,
    const std::string & thread_platform,
    const std::string & thread_scheduler,
    int thread_priority )
```

Delegates the prepare method to the plugin and allocates a suitable **MHAPLugin_Split::domain_handler_t** (p. 1109) instance.

Prepare the loaded plugin.

Plugin preparation.

Parameters

<i>signal_parameters</i>	The signal description parameters for this path.
<i>thread_platform</i>	The name of the thread platform to use. Possible values: "posix", "win32", "dummy".
<i>thread_scheduler</i>	The name of the scheduler to use. Posix threads support "SCHED_OTHER", "SCHED_RR", "SCHED_FIFO". The other thread platforms do not support different thread schedulers. This value is not used for platforms other than "posix".
<i>thread_priority</i>	The new thread priority. Interpretation and permitted range depend on the thread platform and possibly on the scheduler.

4.314.3.3 release()

```
void MHAPLugin_Split::splitted_part_t::release (
    void )
```

Delegates the release method to the plugin and deletes the **MHAPLugin_Split::domain_handler_t** (p. 1109) instance.

Release the loaded plugin.

Plugin release.

4.314.3.4 parse()

```
std::string MHAPLugin_Split::splitted_part_t::parse (
    const std::string & str ) [inline]
```

Delegates parser incovation to plugin.

4.314.3.5 trigger_processing()

```
template<class SigType >
unsigned MHAPLugin_Split::splitted_part_t::trigger_processing (
    SigType * s_in,
    unsigned start_channel ) [inline]
```

The domain handler copies the input signal channels.

Then, processing is initiated.

Parameters

<i>s_in</i>	The combined input signal.
<i>start_channel</i>	The index (0-based) of the first channel in s_in to be copied to the partial input signal.

Returns

The number of channels that were copied from the input signal

4.314.3.6 collect_result()

```
template<class SigType >
unsigned MHAPLugin_Split::splitted_part_t::collect_result (
    SigType * s_out,
    unsigned start_channel ) [inline]
```

Wait until processing is finished, then copy the output data.

Parameters

<i>s_out</i>	The combined waveform output signal.
<i>start_channel</i>	The channel offset (0-based) in s_out.

Returns

The number of channels that were copied to the output signal

4.314.4 Member Data Documentation

4.314.4.1 plug

```
PluginLoader::fourway_processor_t* MHAPlugin_Split::splitted_part_t::plug [private]
```

The plugin that performs the signal processing on the prepared channels.

4.314.4.2 domain

```
domain_handler_t* MHAPlugin_Split::splitted_part_t::domain [private]
```

The domain specific signal handler, allocated from prepare when input and output domains and signal parameters are known.

4.314.4.3 thread

```
thread_platform_t* MHAPlugin_Split::splitted_part_t::thread [private]
```

The platform-dependent thread synchronization implementation.

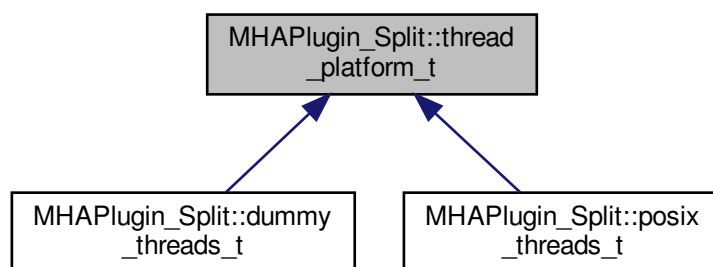
The documentation for this class was generated from the following file:

- **split.cpp**

4.315 MHAPlugin_Split::thread_platform_t Class Reference

Basic interface for encapsulating thread creation, thread priority setting, and synchronization on any threading platform (i.e., pthreads or win32threads).

Inheritance diagram for MHAPlugin_Split::thread_platform_t:



Public Member Functions

- **thread_platform_t** (**uni_processor_t** *proc)
Constructor.
- virtual **~thread_platform_t** ()
Make derived classes destructable via pointer to this base class.
- virtual void **kick_thread** ()=0
Derived classes notify their processing thread that it should call processor->process().
- virtual void **catch_thread** ()=0
Derived classes wait for their signal processing thread to return from the call to part->process().

Protected Attributes

- **uni_processor_t** * **processor**
A pointer to the plugin loader that processes the sound data in the channels for which this thread was created.

Private Member Functions

- **thread_platform_t** (const **thread_platform_t** &)
Disallow copy constructor.
- **thread_platform_t** & **operator=** (const **thread_platform_t** &)
Disallow assignment operator.

4.315.1 Detailed Description

Basic interface for encapsulating thread creation, thread priority setting, and synchronization on any threading platform (i.e., pthreads or win32threads).

Derived classes specialize in the actual thread platform.

4.315.2 Constructor & Destructor Documentation

4.315.2.1 thread_platform_t() [1/2]

```
MHAPugin_Split::thread_platform_t::thread_platform_t (
    const thread_platform_t & ) [private]
```

Disallow copy constructor.

4.315.2.2 thread_platform_t() [2/2]

```
MHAPugin_Split::thread_platform_t::thread_platform_t (
    uni_processor_t * proc ) [inline]
```

Constructor.

Derived classes create the thread in the constructor.

Parameters

<i>proc</i>	Pointer to the associated plugin loader. This plugin loader has to live at least as long as this instance. This instance does not take possession of the plugin loader. In production code, this thread platform and the plugin loader are both created and destroyed by the MHAPLugin_Split::splitted_part_t (p. 1129) instance.
-------------	--

4.315.2.3 ~thread_platform_t()

```
virtual MHAPLugin_Split::thread_platform_t::~~thread_platform_t ( ) [inline], [virtual]
```

Make derived classes destructable via pointer to this base class.

Derived classes' destructors notify the thread that it should terminate itself, and wait for the termination to occur.

4.315.3 Member Function Documentation

4.315.3.1 operator=()

```
thread_platform_t& MHAPLugin_Split::thread_platform_t::operator= (
    const thread_platform_t & ) [private]
```

Disallow assignment operator.

4.315.3.2 kick_thread()

```
virtual void MHAPLugin_Split::thread_platform_t::kick_thread ( ) [pure virtual]
```

Derived classes notify their processing thread that it should call processor->process().

Implemented in **MHAPLugin_Split::posix_threads_t** (p. 1119), and **MHAPLugin_Split::dummy_threads_t** (p. 1116).

4.315.3.3 catch_thread()

```
virtual void MHAPLugin_Split::thread_platform_t::catch_thread ( ) [pure virtual]
```

Derived classes wait for their signal processing thread to return from the call to `part->process()`.

Implemented in **MHAPLugin_Split::posix_threads_t** (p. 1119), and **MHAPLugin_Split::dummy_threads_t** (p. 1116).

4.315.4 Member Data Documentation

4.315.4.1 processor

```
uni_processor_t* MHAPLugin_Split::thread_platform_t::processor [protected]
```

A pointer to the plugin loader that processes the sound data in the channels for which this thread was created.

Using the **MHAPLugin_Split::uni_processor_t** (p. 1137) interface instead of the `mhaplugin_loader` class directly for testability (no need to load real plugins for testing the thread platform).

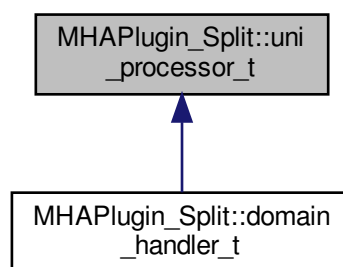
The documentation for this class was generated from the following file:

- **split.cpp**

4.316 MHAPLugin_Split::uni_processor_t Class Reference

An interface to a class that sports a process method with no parameters and no return value.

Inheritance diagram for `MHAPLugin_Split::uni_processor_t`:



Public Member Functions

- virtual void **process** ()=0

This method uses some input signal, performs processing and stores the output signal somewhere.

- virtual **~uni_processor_t** ()

Classes containing virtual methods need virtual destructors.

4.316.1 Detailed Description

An interface to a class that sports a process method with no parameters and no return value.

No signal transfer occurs through this interface, because the signal transfer is performed in another thread than the processing.

4.316.2 Constructor & Destructor Documentation

4.316.2.1 ~uni_processor_t()

```
virtual MHAPlugin_Split::uni_processor_t::~~uni_processor_t ( ) [inline], [virtual]
```

Classes containing virtual methods need virtual destructors.

4.316.3 Member Function Documentation

4.316.3.1 process()

```
virtual void MHAPlugin_Split::uni_processor_t::process ( ) [pure virtual]
```

This method uses some input signal, performs processing and stores the output signal somewhere.

This method also has to dispatch the process call based on the configured domains.

Signal transfer and domain configuration have to be done in derived class in different methods.

Implemented in **MHAPlugin_Split::domain_handler_t** (p. [1114](#)).

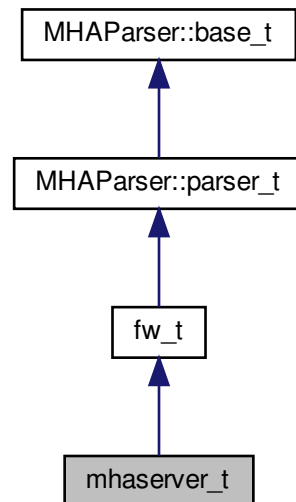
The documentation for this class was generated from the following file:

- **split.cpp**

4.317 mhaserver_t Class Reference

MHA Framework listening on TCP port for commands.

Inheritance diagram for mhaserver_t:



Classes

- class **tcp_server_t**

Public Member Functions

- **mhaserver_t** (const std::string &ao, const std::string &af, const std::string &lf, bool b_
interactive_)
- **~mhaserver_t** ()
- virtual std::string **on_received_line** (const std::string &line)
A line of text was received from network client.
- virtual void **acceptor_started** ()
Notification: "TCP port is open".
- virtual void **send_port_announcement** ()
sends an announcement which port this MHA is listening on to the creator of the process.
- virtual void **start_stdin_thread** ()
Starts a separate thread that reads lines from stdin and forwards these lines over TCP to the MHA configuration thread which multiplexes multiple TCP connections.
- virtual void **set_announce_port** (unsigned short **announce_port**)

If set to nonzero, the spawning process has asked to be notified of the TCP port used by this process.

- void **logstring** (const std::string &)
Log a message to log file.
- int **run** (unsigned short **port**, const std::string &_interface)
Accept network connections and act on commands.

Public Attributes

- **MHAParser::int_t port**

Private Attributes

- std::shared_ptr< **tcp_server_t** > **tcpserver**
- std::string **ack_ok**
- std::string **ack_fail**
- std::string **logfile**
- unsigned short **announce_port**
- bool **b_interactive**
- **MHAParser::int_mon_t pid_mon**

Additional Inherited Members

4.317.1 Detailed Description

MHA Framework listening on TCP port for commands.

4.317.2 Constructor & Destructor Documentation

4.317.2.1 mhaserver_t()

```
mhaserver_t::mhaserver_t (
    const std::string & ao,
    const std::string & af,
    const std::string & lf,
    bool b_interactive_ )
```

Parameters

<i>ao</i>	Acknowledgement string at end of successful command responses
<i>af</i>	Acknowledgement string at end of failed command responses
<i>lf</i>	File system path of file to use as log file. MHA appends.

4.317.2.2 ~mhaserver_t()

```
mhaserver_t::~~mhaserver_t ( )
```

4.317.3 Member Function Documentation

4.317.3.1 on_received_line()

```
std::string mhaserver_t::on_received_line (
    const std::string & line ) [virtual]
```

A line of text was received from network client.

4.317.3.2 acceptor_started()

```
void mhaserver_t::acceptor_started ( ) [virtual]
```

Notification: "TCP port is open".

4.317.3.3 send_port_announcement()

```
void mhaserver_t::send_port_announcement ( ) [virtual]
```

sends an announcement which port this MHA is listening on to the creator of the process.

See command line option `–announce`

4.317.3.4 start_stdin_thread()

```
void mhaserver_t::start_stdin_thread ( ) [virtual]
```

Starts a separate thread that reads lines from stdin and forwards these lines over TCP to the MHA configuration thread which multiplexes multiple TCP connections.

Enables users to type mha configuration language commands directly into the terminal where MHA was started, without the need to use third-party tools like nc or putty.

4.317.3.5 set_announce_port()

```
void mhaserver_t::set_announce_port (
    unsigned short announce_port ) [virtual]
```

If set to nonzero, the spawning process has asked to be notified of the TCP port used by this process.

4.317.3.6 logstring()

```
void mhaserver_t::logstring (
    const std::string & s ) [inline]
```

Log a message to log file.

4.317.3.7 run()

```
int mhaserver_t::run (
    unsigned short port,
    const std::string & _interface )
```

Accept network connections and act on commands.

Calls **acceptor_started()** (p. 1141) when the TCP port is opened. Calls `on_received_line` for every line received.

Returns

exit code that can be used as process exit code

4.317.4 Member Data Documentation

4.317.4.1 tcpserver

```
std::shared_ptr< tcp_server_t> mhaserver_t::tcpserver [private]
```


4.317.4.2 ack_ok

```
std::string mhaserver_t::ack_ok [private]
```

4.317.4.3 ack_fail

```
std::string mhaserver_t::ack_fail [private]
```

4.317.4.4 logfile

```
std::string mhaserver_t::logfile [private]
```

4.317.4.5 announce_port

```
unsigned short mhaserver_t::announce_port [private]
```

4.317.4.6 b_interactive

```
bool mhaserver_t::b_interactive [private]
```

4.317.4.7 pid_mon

```
MHAParser::int_mon_t mhaserver_t::pid_mon [private]
```

4.317.4.8 port

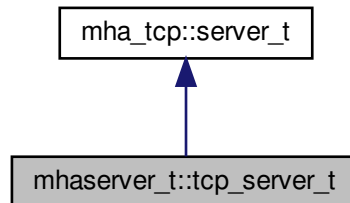
```
MHAParser::int_t mhaserver_t::port
```

The documentation for this class was generated from the following file:

- **mhamain.cpp**

4.318 mhaserver_t::tcp_server_t Class Reference

Inheritance diagram for mhaserver_t::tcp_server_t:



Public Member Functions

- **tcp_server_t** (const std::string &interface, uint16_t **port**, mhaserver_t * mha)
- virtual bool **on_received_line** (std::shared_ptr< mha_tcp::buffered_socket_t > c, const std::string &l) override

This method is invoked when a line of text is received on one of the accepted connections.

Private Attributes

- mhaserver_t * mha

4.318.1 Constructor & Destructor Documentation

4.318.1.1 tcp_server_t()

```

mhaserver_t::tcp_server_t::tcp_server_t (
    const std::string & interface,
    uint16_t port,
    mhaserver_t * mha ) [inline]
  
```

4.318.2 Member Function Documentation

4.318.2.1 on_received_line()

```
virtual bool mhaserver_t::tcp_server_t::on_received_line (
    std::shared_ptr< mha_tcp::buffered_socket_t > c,
    const std::string & l ) [inline], [override], [virtual]
```

This method is invoked when a line of text is received on one of the accepted connections.

Override this method to process the communication with the client.

Parameters

<i>c</i>	the connection that has received this line
<i>/</i>	the line that has been received, without the line ending

Returns

client should return true when client wants to read another line of text, else false.

Reimplemented from **mha_tcp::server_t** (p. 761).

4.318.3 Member Data Documentation**4.318.3.1 mha**

```
mhaserver_t* mhaserver_t::tcp_server_t::mha [private]
```

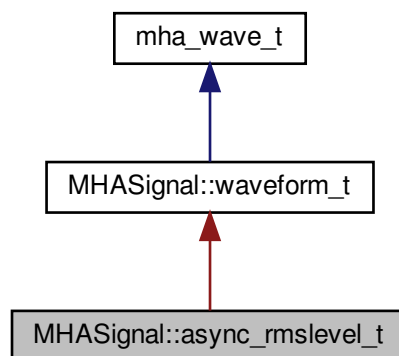
The documentation for this class was generated from the following file:

- **mhamain.cpp**

4.319 MHASignal::async_rmslevel_t Class Reference

Class for asynchronous level metering.

Inheritance diagram for MHASignal::async_rmslevel_t:



Public Member Functions

- **async_rmslevel_t** (unsigned int frames, unsigned int **channels**)
Constructor for level metering class.
- std::vector< float > **rmslevel** () const
Read-only function for querying the current RMS level.
- std::vector< float > **peaklevel** () const
Read-only function for querying the current peak level.
- void **process** (**mha_wave_t** *s)
Function to store a chunk of audio in the level meter.

Private Attributes

- unsigned int **pos**
- unsigned int **filled**

Additional Inherited Members

4.319.1 Detailed Description

Class for asynchronous level metering.

4.319.2 Constructor & Destructor Documentation

4.319.2.1 async_rmslevel_t()

```
MHASignal::async_rmslevel_t::async_rmslevel_t (
    unsigned int frames,
    unsigned int channels )
```

Constructor for level metering class.

Allocate memory for metering. The RMS integration time corresponds to the number of frames in the buffer.

Parameters

<i>frames</i>	Number of frames to integrate.
<i>channels</i>	Number of channels used for level-metering.

4.319.3 Member Function Documentation

4.319.3.1 rmslevel()

```
std::vector< float > MHASignal::async_rmslevel_t::rmslevel ( ) const
```

Read-only function for querying the current RMS level.

Returns

Vector of floats, one value for each channel, containing the RMS level in dB (SPL if calibrated properly).

4.319.3.2 peaklevel()

```
std::vector< float > MHASignal::async_rmslevel_t::peaklevel ( ) const
```

Read-only function for querying the current peak level.

Returns

Vector of floats, one value for each channel, containing the peak level in dB (SPL if calibrated properly).

4.319.3.3 process()

```
void MHASignal::async_rmslevel_t::process (
    mha_wave_t * s )
```

Function to store a chunk of audio in the level meter.

Parameters

s	Audio chunk (same number of channels required as given in the constructor).
----------	---

4.319.4 Member Data Documentation

4.319.4.1 pos

```
unsigned int MHASignal::async_rmslevel_t::pos [private]
```

4.319.4.2 filled

```
unsigned int MHASignal::async_rmslevel_t::filled [private]
```

The documentation for this class was generated from the following files:

- **mha_signal.hh**
- **mha_signal.cpp**

4.320 MHASignal::delay_spec_t Class Reference

Public Member Functions

- **delay_spec_t** (unsigned int **delay**, unsigned int frames, unsigned int **channels**)
- **~delay_spec_t** ()
- **mha_spec_t * process** (**mha_spec_t ***)

Private Attributes

- unsigned int **delay**
- **MHASignal::spectrum_t ** buffer**
- unsigned int **pos**

4.320.1 Constructor & Destructor Documentation

4.320.1.1 delay_spec_t()

```
MHASignal::delay_spec_t::delay_spec_t (  
    unsigned int delay,  
    unsigned int frames,  
    unsigned int channels )
```

4.320.1.2 ~delay_spec_t()

```
MHASignal::delay_spec_t::~~delay_spec_t ( )
```

4.320.2 Member Function Documentation

4.320.2.1 process()

```
mha_spec_t * MHASignal::delay_spec_t::process (
    mha_spec_t * s )
```

4.320.3 Member Data Documentation

4.320.3.1 delay

```
unsigned int MHASignal::delay_spec_t::delay [private]
```

4.320.3.2 buffer

```
MHASignal::spectrum_t** MHASignal::delay_spec_t::buffer [private]
```

4.320.3.3 pos

```
unsigned int MHASignal::delay_spec_t::pos [private]
```

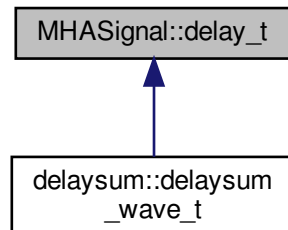
The documentation for this class was generated from the following files:

- **mha_signal.hh**
- **mha_signal.cpp**

4.321 MHASignal::delay_t Class Reference

Class to realize a simple delay of waveform streams.

Inheritance diagram for MHASignal::delay_t:



Public Member Functions

- **delay_t** (std::vector< int > **delays**, unsigned int **channels**)
Constructor.
- **mha_wave_t * process** (**mha_wave_t *s**)
Processing method.
- **~delay_t** ()
- std::string **inspect** () const

Private Attributes

- unsigned int **channels**
- unsigned int * **delays**
- unsigned int * **pos**
- **mha_real_t ** buffer**

4.321.1 Detailed Description

Class to realize a simple delay of waveform streams.

4.321.2 Constructor & Destructor Documentation

4.321.2.1 delay_t()

```

MHASignal::delay_t::delay_t (
    std::vector< int > delays,
    unsigned int channels )
  
```

Constructor.

Parameters

<i>delays</i>	Vector of delays, one entry for each channel.
<i>channels</i>	Number of channels expected.

4.321.2.2 ~delay_t()

```
MHASignal::delay_t::~~delay_t ( )
```

4.321.3 Member Function Documentation**4.321.3.1 process()**

```
mha_wave_t * MHASignal::delay_t::process (
    mha_wave_t * s )
```

Processing method.

Parameters

<i>s</i>	Input waveform fragment, with number of channels provided in constructor.
----------	---

Returns

Output waveform fragment.

4.321.3.2 inspect()

```
std::string MHASignal::delay_t::inspect ( ) const [inline]
```

4.321.4 Member Data Documentation

4.321.4.1 channels

```
unsigned int MHASignal::delay_t::channels [private]
```

4.321.4.2 delays

```
unsigned int* MHASignal::delay_t::delays [private]
```

4.321.4.3 pos

```
unsigned int* MHASignal::delay_t::pos [private]
```

4.321.4.4 buffer

```
mha_real_t** MHASignal::delay_t::buffer [private]
```

The documentation for this class was generated from the following files:

- **mha_signal.hh**
- **mha_signal.cpp**

4.322 MHASignal::delay_wave_t Class Reference

Delayline containing wave fragments.

Public Member Functions

- **delay_wave_t** (unsigned int **delay**, unsigned int frames, unsigned int **channels**)
- **~delay_wave_t** ()
- **mha_wave_t * process** (**mha_wave_t ***)

Private Attributes

- unsigned int **delay**
- **MHASignal::waveform_t **** **buffer**
- unsigned int **pos**

4.322.1 Detailed Description

Delayline containing wave fragments.

The delayline contains waveform fragments. The delay can be configured in integer fragments (sample delay or sub-sample delay is not possible).

4.322.2 Constructor & Destructor Documentation

4.322.2.1 `delay_wave_t()`

```
MHASignal::delay_wave_t::delay_wave_t (
    unsigned int delay,
    unsigned int frames,
    unsigned int channels )
```

4.322.2.2 `~delay_wave_t()`

```
MHASignal::delay_wave_t::~~delay_wave_t ( )
```

4.322.3 Member Function Documentation

4.322.3.1 `process()`

```
mha_wave_t * MHASignal::delay_wave_t::process (
    mha_wave_t * s )
```

4.322.4 Member Data Documentation

4.322.4.1 `delay`

```
unsigned int MHASignal::delay_wave_t::delay [private]
```

4.322.4.2 buffer

```
MHASignal::waveform_t** MHASignal::delay_wave_t::buffer [private]
```

4.322.4.3 pos

```
unsigned int MHASignal::delay_wave_t::pos [private]
```

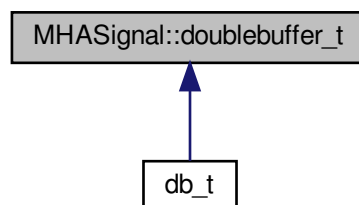
The documentation for this class was generated from the following files:

- **mha_signal.hh**
- **mha_signal.cpp**

4.323 MHASignal::doublebuffer_t Class Reference

Double-buffering class.

Inheritance diagram for MHASignal::doublebuffer_t:



Public Member Functions

- **doublebuffer_t** (unsigned int nchannels_in, unsigned int nchannels_out, unsigned int outer_fragsize, unsigned int inner_fragsize)
Constructor of double buffer.
- virtual **~doublebuffer_t** ()
- **mha_wave_t * outer_process** (mha_wave_t *s)
Method to pass audio fragments into the inner layer.

Protected Member Functions

- virtual **mha_wave_t * inner_process (mha_wave_t *s)=0**
Method to realize inner processing callback.

Private Member Functions

- unsigned int **min** (unsigned int a, unsigned int b)

Private Attributes

- **waveform_t outer_out**
- **mha_wave_t this_outer_out**
- **waveform_t inner_in**
- **waveform_t inner_out**
- unsigned int **k_inner**
- unsigned int **k_outer**
- unsigned int **ch**

4.323.1 Detailed Description

Double-buffering class.

This class has two layers: The outer layer, with an outer fragment size, and an inner layer, with its own fragment size. Data is passed into the inner layer through the `doublebuffer_t::out_process()` callback. The pure virtual method **`doublebuffer_t::inner_process()`** (p. 1157) is called whenever enough data is available.

4.323.2 Constructor & Destructor Documentation

4.323.2.1 `doublebuffer_t()`

```
MHASignal::doublebuffer_t::doublebuffer_t (
    unsigned int nchannels_in,
    unsigned int nchannels_out,
    unsigned int outer_fragsize,
    unsigned int inner_fragsize )
```

Constructor of double buffer.

Parameters

<i>nchannels_in</i>	Number of channels at the input (both layers).
<i>nchannels_out</i>	Number of channels at the output (both layers).
<i>outer_fragsize</i>	Fragment size of the outer layer (e.g., hardware fragment size)
<i>inner_fragsize</i>	Fragment size of the inner layer (e.g., software fragment size)

4.323.2.2 ~doublebuffer_t()

MHASignal::doublebuffer_t::~~doublebuffer_t () [virtual]

4.323.3 Member Function Documentation

4.323.3.1 outer_process()

```
mha_wave_t * MHASignal::doublebuffer_t::outer_process (
    mha_wave_t * s )
```

Method to pass audio fragments into the inner layer.

Parameters

<i>s</i>	Pointer to input waveform fragment.
----------	-------------------------------------

Returns

Pointer to output waveform fragment.

4.323.3.2 inner_process()

```
virtual mha_wave_t* MHASignal::doublebuffer_t::inner_process (
    mha_wave_t * s ) [protected], [pure virtual]
```

Method to realize inner processing callback.

To be overwritten by derived classes.

Parameters

s	Pointer to input waveform fragment.
----------	-------------------------------------

Returns

Pointer to output waveform fragment.

Implemented in **db_t** (p. [355](#)).

4.323.3.3 min()

```
unsigned int MHASignal::doublebuffer_t::min (
    unsigned int a,
    unsigned int b ) [inline], [private]
```

4.323.4 Member Data Documentation**4.323.4.1 outer_out**

```
waveform_t MHASignal::doublebuffer_t::outer_out [private]
```

4.323.4.2 this_outer_out

```
mha_wave_t MHASignal::doublebuffer_t::this_outer_out [private]
```

4.323.4.3 inner_in

```
waveform_t MHASignal::doublebuffer_t::inner_in [private]
```

4.323.4.4 inner_out

```
waveform_t MHASignal::doublebuffer_t::inner_out [private]
```


4.323.4.5 k_inner

```
unsigned int MHASignal::doublebuffer_t::k_inner [private]
```

4.323.4.6 k_outer

```
unsigned int MHASignal::doublebuffer_t::k_outer [private]
```

4.323.4.7 ch

```
unsigned int MHASignal::doublebuffer_t::ch [private]
```

The documentation for this class was generated from the following files:

- **mha_signal.hh**
- **mha_signal.cpp**

4.324 MHASignal::fft_t Class Reference

Public Member Functions

- **fft_t** (const unsigned int &)
- **~fft_t** ()
- void **wave2spec** (const **mha_wave_t** *, **mha_spec_t** *, bool swap)
fast fourier transform.
- void **spec2wave** (const **mha_spec_t** *, **mha_wave_t** *)
- void **spec2wave** (const **mha_spec_t** *, **mha_wave_t** *, unsigned int offset)
wave may have fewer number of frames than needed for a complete iFFT.
- void **forward** (**mha_spec_t** *sIn, **mha_spec_t** *sOut)
- void **backward** (**mha_spec_t** *sIn, **mha_spec_t** *sOut)
- void **wave2spec_scale** (const **mha_wave_t** *, **mha_spec_t** *, bool swap)
- void **spec2wave_scale** (const **mha_spec_t** *, **mha_wave_t** *)
- void **forward_scale** (**mha_spec_t** *sIn, **mha_spec_t** *sOut)
- void **backward_scale** (**mha_spec_t** *sIn, **mha_spec_t** *sOut)

Private Member Functions

- void **sort_fftw2spec** (fftw_real *s_fftw, **mha_spec_t** *s_spec, unsigned int ch)
Arrange the order of an fftw spectrum to the internal order.
- void **sort_spec2fftw** (fftw_real *s_fftw, const **mha_spec_t** *s_spec, unsigned int ch)
Arrange the order of an internal spectrum to the fftw order.

Private Attributes

- unsigned int **nfft**
- unsigned int **n_re**
- unsigned int **n_im**
- **mha_real_t** **scale**
- **mha_real_t** * **buf_in**
- **mha_real_t** * **buf_out**
- rfftw_plan **fftw_plan_wave2spec**
- rfftw_plan **fftw_plan_spec2wave**
- fftw_plan **fftw_plan_fft**
- fftw_plan **fftw_plan_ifft**

4.324.1 Constructor & Destructor Documentation

4.324.1.1 `fft_t()`

```
MHASignal::fft_t::fft_t (
    const unsigned int & n )
```

4.324.1.2 `~fft_t()`

```
MHASignal::fft_t::~~fft_t ( )
```

4.324.2 Member Function Documentation

4.324.2.1 `wave2spec()`

```
void MHASignal::fft_t::wave2spec (
    const mha_wave_t * wave,
    mha_spec_t * spec,
    bool swap )
```

fast fourier transform.

if swap is set, the buffer halves of the wave signal are exchanged before computing the fft.

4.324.2.2 spec2wave() [1/2]

```
void MHASignal::fft_t::spec2wave (
    const  mha_spec_t * spec,
    mha_wave_t * wave )
```

4.324.2.3 spec2wave() [2/2]

```
void MHASignal::fft_t::spec2wave (
    const  mha_spec_t * spec,
    mha_wave_t * wave,
    unsigned int offset )
```

wave may have fewer number of frames than needed for a complete iFFT.

Only as many frames are written into wave as fit, starting with offset offset of the complete iFFT.

4.324.2.4 forward()

```
void MHASignal::fft_t::forward (
    mha_spec_t * sIn,
    mha_spec_t * sOut )
```

4.324.2.5 backward()

```
void MHASignal::fft_t::backward (
    mha_spec_t * sIn,
    mha_spec_t * sOut )
```

4.324.2.6 wave2spec_scale()

```
void MHASignal::fft_t::wave2spec_scale (
    const  mha_wave_t * wave,
    mha_spec_t * spec,
    bool swap )
```

4.324.2.7 spec2wave_scale()

```
void MHASignal::fft_t::spec2wave_scale (
    const  mha_spec_t * spec,
    mha_wave_t * wave )
```

4.324.2.8 forward_scale()

```
void MHASignal::fft_t::forward_scale (
    mha_spec_t * sIn,
    mha_spec_t * sOut )
```

4.324.2.9 backward_scale()

```
void MHASignal::fft_t::backward_scale (
    mha_spec_t * sIn,
    mha_spec_t * sOut )
```

4.324.2.10 sort_fftw2spec()

```
void MHASignal::fft_t::sort_fftw2spec (
    fftw_real * s_fftw,
    mha_spec_t * s_spec,
    unsigned int ch ) [private]
```

Arrange the order of an fftw spectrum to the internal order.

The fftw spectrum is arranged [r0 r1 r2 ... rn-1 in in-1 ... i1], while the internal order is [r0 – r1 i1 r2 i2 ... rn-1 in-1 rn –].

4.324.2.11 sort_spec2fftw()

```
void MHASignal::fft_t::sort_spec2fftw (
    fftw_real * s_fftw,
    const  mha_spec_t * s_spec,
    unsigned int ch ) [private]
```

Arrange the order of an internal spectrum to the fftw order.

4.324.3 Member Data Documentation

4.324.3.1 nfft

unsigned int MHASignal::fft_t::nfft [private]

4.324.3.2 n_re

unsigned int MHASignal::fft_t::n_re [private]

4.324.3.3 n_im

unsigned int MHASignal::fft_t::n_im [private]

4.324.3.4 scale

mha_real_t MHASignal::fft_t::scale [private]

4.324.3.5 buf_in

mha_real_t* MHASignal::fft_t::buf_in [private]

4.324.3.6 buf_out

mha_real_t* MHASignal::fft_t::buf_out [private]

4.324.3.7 fftw_plan_wave2spec

rfftw_plan MHASignal::fft_t::fftw_plan_wave2spec [private]

4.324.3.8 fftw_plan_spec2wave

rfftw_plan MHASignal::fft_t::fftw_plan_spec2wave [private]

4.324.3.9 fftw_plan_fft

```
fftw_plan MHASignal::fftw_t::fftw_plan_fft [private]
```

4.324.3.10 fftw_plan_ifft

```
fftw_plan MHASignal::fftw_t::fftw_plan_ifft [private]
```

The documentation for this class was generated from the following files:

- **mha_signal_fft.h**
- **mha_signal.cpp**

4.325 MHASignal::hilbert_fftw_t Class Reference

Public Member Functions

- **hilbert_fftw_t** (unsigned int len)
*C'tor of **hilbert_fftw_t** (p. 1164).*
- **~hilbert_fftw_t** ()
*D'tor of **hilbert_fftw_t** (p. 1164).*
- void **hilbert** (const **mha_wave_t** *, **mha_wave_t** *)

Private Attributes

- unsigned int **n**
- rfftw_plan **p1**
- fftw_plan **p2**
- fftw_real * **buf_r_in**
- fftw_real * **buf_r_out**
- fftw_complex * **buf_c_in**
- fftw_complex * **buf_c_out**
- **mha_real_t** **sc**

4.325.1 Constructor & Destructor Documentation

4.325.1.1 hilbert_fftw_t()

```
MHASignal::hilbert_fftw_t::hilbert_fftw_t (
    unsigned int len )
```

C'tor of **hilbert_fftw_t** (p. 1164).

Parameters

<i>len</i>	fft length
------------	------------

4.325.1.2 ~hilbert_fftw_t()

MHASignal::hilbert_fftw_t::~~hilbert_fftw_t ()

D'tor of **hilbert_fftw_t** (p. [1164](#)).

4.325.2 Member Function Documentation

4.325.2.1 hilbert()

```
void MHASignal::hilbert_fftw_t::hilbert (
    const mha_wave_t * s_in,
    mha_wave_t * s_out )
```

4.325.3 Member Data Documentation

4.325.3.1 n

unsigned int MHASignal::hilbert_fftw_t::n [private]

4.325.3.2 p1

rfftw_plan MHASignal::hilbert_fftw_t::p1 [private]

4.325.3.3 p2

fftw_plan MHASignal::hilbert_fftw_t::p2 [private]

4.325.3.4 buf_r_in

```
fftw_real* MHASignal::hilbert_fftw_t::buf_r_in [private]
```

4.325.3.5 buf_r_out

```
fftw_real* MHASignal::hilbert_fftw_t::buf_r_out [private]
```

4.325.3.6 buf_c_in

```
fftw_complex* MHASignal::hilbert_fftw_t::buf_c_in [private]
```

4.325.3.7 buf_c_out

```
fftw_complex* MHASignal::hilbert_fftw_t::buf_c_out [private]
```

4.325.3.8 sc

```
mha_real_t MHASignal::hilbert_fftw_t::sc [private]
```

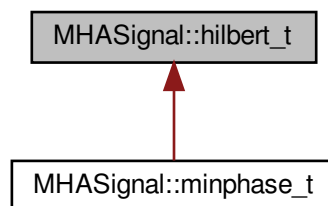
The documentation for this class was generated from the following file:

- **mha_signal.cpp**

4.326 MHASignal::hilbert_t Class Reference

Hilbert transformation of a waveform segment.

Inheritance diagram for MHASignal::hilbert_t:



Public Member Functions

- **hilbert_t** (unsigned int len)
- **~hilbert_t** ()
- void **operator()** (const **mha_wave_t** *, **mha_wave_t** *)
Apply Hilbert transformation on a waveform segment.

Private Attributes

- void * **h**

4.326.1 Detailed Description

Hilbert transformation of a waveform segment.

Returns the imaginary part of the inverse Fourier transformation of the Fourier transformed input signal with negative frequencies set to zero.

4.326.2 Constructor & Destructor Documentation

4.326.2.1 hilbert_t()

```
MHASignal::hilbert_t::hilbert_t (  
    unsigned int len )
```

Parameters

<i>len</i>	Length of waveform segment
------------	----------------------------

4.326.2.2 ~hilbert_t()

```
MHASignal::hilbert_t::~~hilbert_t ( )
```

4.326.3 Member Function Documentation

4.326.3.1 operator()

```
void MHASignal::hilbert_t::operator() (
    const mha_wave_t * s_in,
    mha_wave_t * s_out )
```

Apply Hilbert transformation on a waveform segment.

4.326.4 Member Data Documentation

4.326.4.1 h

```
void* MHASignal::hilbert_t::h [private]
```

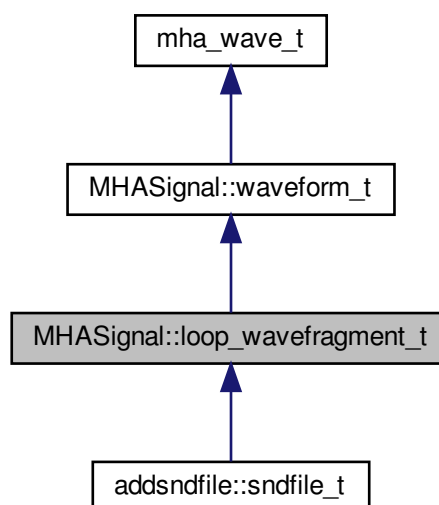
The documentation for this class was generated from the following files:

- **mha_signal.hh**
- **mha_signal.cpp**

4.327 MHASignal::loop_wavefragment_t Class Reference

Copy a fixed waveform fragment to a series of waveform fragments of other size.

Inheritance diagram for MHASignal::loop_wavefragment_t:



Public Types

- enum **level_mode_t** { **relative**, **peak**, **rms**, **rms_limit40** }
Switch for playback level mode.
- enum **playback_mode_t** { **add**, **replace**, **input**, **mute** }
Switch for playback mode.

Public Member Functions

- **loop_wavefragment_t** (const **mha_wave_t** &src, bool loop, **level_mode_t** level_mode, std::vector< int > **channels**, unsigned int startpos=0)
*Constructor to create an instance of **loop_wavefragment_t** (p. 1168) based on an existing waveform block.*
- std::vector< int > **get_mapping** (unsigned int **channels**)
- void **playback** (**mha_wave_t** *s, **playback_mode_t** pmode, **mha_wave_t** *level_pa, const std::vector< int > & **channels**)
Add source waveform block to an output block.
- void **playback** (**mha_wave_t** *s, **playback_mode_t** pmode, **mha_wave_t** *level_pa)
Add source waveform block to an output block.
- void **playback** (**mha_wave_t** *s, **playback_mode_t** pmode)
Add source waveform block to an output block.
- void **set_level_lin** (**mha_real_t** l)
- void **set_level_db** (**mha_real_t** l)
- void **rewind** ()
- void **locate_end** ()
- bool **is_playback_active** () const

Private Attributes

- std::vector< int > **playback_channels**
- bool **b_loop**
- unsigned int **pos**
- **MHASignal::waveform_t** **intern_level**

Additional Inherited Members

4.327.1 Detailed Description

Copy a fixed waveform fragment to a series of waveform fragments of other size.

This class is designed to continuously play back a waveform to an output stream, with variable output block size.

4.327.2 Member Enumeration Documentation

4.327.2.1 level_mode_t

```
enum MHASignal::loop_wavefragment_t::level_mode_t
```

Switch for playback level mode.

Enumerator

relative	The nominal level is applied as a gain to the source signal.
peak	The nominal level is the peak level of source signal in Pascal.
rms	The nominal level is the RMS level of the source signal in Pascal.
rms_limit40	

4.327.2.2 playback_mode_t

```
enum MHASignal::loop_wavefragment_t::playback_mode_t
```

Switch for playback mode.

Enumerator

add	Add source signal to output stream.
replace	Replace output stream by source signal.
input	Do nothing, keep output stream (source position is unchanged).
mute	Mute output stream (source position is unchanged).

4.327.3 Constructor & Destructor Documentation

4.327.3.1 loop_wavefragment_t()

```
MHASignal::loop_wavefragment_t::loop_wavefragment_t (
    const mha_wave_t & src,
    bool loop,
    level_mode_t level_mode,
```

```
std::vector< int > channels,
unsigned int startpos = 0 )
```

Constructor to create an instance of **loop_wavefragment_t** (p. 1168) based on an existing waveform block.

Parameters

<i>src</i>	Waveform block to copy data from.
<i>loop</i>	Flag whether the block should be looped or played once.
<i>level_mode</i>	Configuration of playback level (see MHASignal::loop_wavefragment_t::level_mode_t (p. 1170) for details)
<i>channels</i>	Mapping of input to output channels.
<i>startpos</i>	Starting position

4.327.4 Member Function Documentation

4.327.4.1 get_mapping()

```
std::vector< int > MHASignal::loop_wavefragment_t::get_mapping (
    unsigned int channels )
```

4.327.4.2 playback() [1/3]

```
void MHASignal::loop_wavefragment_t::playback (
    mha_wave_t * s,
    playback_mode_t pmode,
    mha_wave_t * level_pa,
    const std::vector< int > & channels )
```

Add source waveform block to an output block.

Parameters

<i>s</i>	Output block (streamed signal).
<i>pmode</i>	Playback mode (add, replace, input, mute).
<i>level_pa</i>	Linear output level/gain (depending on level_mode parameter in constructor); one value for each sample in output block.
<i>channels</i>	Output channels

4.327.4.3 playback() [2/3]

```
void MHASignal::loop_wavefragment_t::playback (
    mha_wave_t * s,
    playback_mode_t pmode,
    mha_wave_t * level_pa )
```

Add source waveform block to an output block.

Parameters

<i>s</i>	Output block (streamed signal).
<i>pmode</i>	Playback mode (add, replace, input, mute).
<i>level_pa</i>	Linear output level/gain (depending on level_mode parameter in constructor); one value for each sample in output block.

4.327.4.4 playback() [3/3]

```
void MHASignal::loop_wavefragment_t::playback (
    mha_wave_t * s,
    playback_mode_t pmode )
```

Add source waveform block to an output block.

Parameters

<i>s</i>	Output block (streamed signal).
<i>pmode</i>	Playback mode (add, replace, input, mute).

4.327.4.5 set_level_lin()

```
void MHASignal::loop_wavefragment_t::set_level_lin (
    mha_real_t l )
```

4.327.4.6 set_level_db()

```
void MHASignal::loop_wavefragment_t::set_level_db (
    mha_real_t l )
```

4.327.4.7 rewind()

```
void MHASignal::loop_wavefragment_t::rewind ( ) [inline]
```

4.327.4.8 locate_end()

```
void MHASignal::loop_wavefragment_t::locate_end ( ) [inline]
```

4.327.4.9 is_playback_active()

```
bool MHASignal::loop_wavefragment_t::is_playback_active ( ) const [inline]
```

4.327.5 Member Data Documentation

4.327.5.1 playback_channels

```
std::vector<int> MHASignal::loop_wavefragment_t::playback_channels [private]
```

4.327.5.2 b_loop

```
bool MHASignal::loop_wavefragment_t::b_loop [private]
```

4.327.5.3 pos

```
unsigned int MHASignal::loop_wavefragment_t::pos [private]
```

4.327.5.4 intern_level

```
MHASignal::waveform_t MHASignal::loop_wavefragment_t::intern_level [private]
```

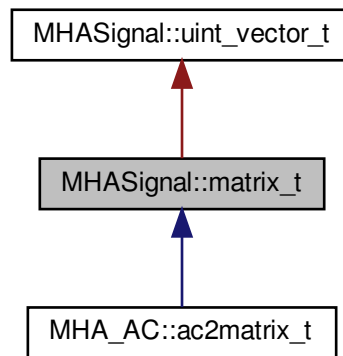
The documentation for this class was generated from the following files:

- **mha_signal.hh**
- **mha_signal.cpp**

4.328 MHASignal::matrix_t Class Reference

n-dimensional matrix with real or complex floating point values.

Inheritance diagram for MHASignal::matrix_t:



Public Member Functions

- **matrix_t** (unsigned int nrows, unsigned int ncols, bool b_is_complex=true)
Create a two-dimensional matrix.
- **matrix_t** (const **mha_spec_t** &spec)
Create a two-dimensional matrix from a spectrum, copy values.
- **matrix_t** (const **MHASignal::uint_vector_t** &size, bool b_is_complex=true)
Create n-dimensional matrix, described by size argument.
- **matrix_t** (const **MHASignal::matrix_t** &)
- **matrix_t** (const uint8_t *buf, unsigned int len)
Construct from memory area.
- **~matrix_t** ()
- **MHASignal::matrix_t** & **operator=** (const **MHASignal::matrix_t** &)
- **MHASignal::matrix_t** & **operator=** (const **comm_var_t** &v)
Fill matrix with data of an AC variable object.
- **comm_var_t** **get_comm_var** ()
Return a AC communication variable pointing to the data of the current matrix.
- unsigned int **dimension** () const
Return the dimension of the matrix.
- unsigned int **size** (unsigned int k) const
Return the size of the matrix.
- unsigned int **get_nelements** () const
Return total number of elements.

- **bool is_same_size** (const **MHASignal::matrix_t** &)
Test if matrix has same size as other.
- **bool iscomplex** () const
Return information about complexity.
- **mha_real_t & real** (const **MHASignal::uint_vector_t** &index)
Access real part of an element in a n-dimensional matrix.
- **mha_real_t & imag** (const **MHASignal::uint_vector_t** &index)
Access imaginary part of an element in a n-dimensional matrix.
- **mha_complex_t & operator()** (const **MHASignal::uint_vector_t** &index)
Access complex value of an element in a n-dimensional matrix.
- **const mha_real_t & real** (const **MHASignal::uint_vector_t** &index) const
Access real part of an element in a n-dimensional matrix.
- **const mha_real_t & imag** (const **MHASignal::uint_vector_t** &index) const
Access imaginary part of an element in a n-dimensional matrix.
- **const mha_complex_t & operator()** (const **MHASignal::uint_vector_t** &index) const
Access complex value of an element in a n-dimensional matrix.
- **mha_real_t & real** (unsigned int row, unsigned int col)
Access real part of an element in a two-dimensional matrix.
- **mha_real_t & imag** (unsigned int row, unsigned int col)
Access imaginary part of an element in a two-dimensional matrix.
- **mha_complex_t & operator()** (unsigned int row, unsigned int col)
Access complex value of an element in a two-dimensional matrix.
- **const mha_real_t & real** (unsigned int row, unsigned int col) const
Access real part of an element in a two-dimensional matrix.
- **const mha_real_t & imag** (unsigned int row, unsigned int col) const
Access imaginary part of an element in a two-dimensional matrix.
- **const mha_complex_t & operator()** (unsigned int row, unsigned int col) const
Access complex value of an element in a two-dimensional matrix.
- unsigned int **get_nreals** () const
- unsigned int **get_index** (unsigned int row, unsigned int col) const
- unsigned int **get_index** (const **MHASignal::uint_vector_t** &index) const
- unsigned int **numbytes** () const
Return number of bytes needed to store into memory.
- unsigned int **write** (uint8_t *buf, unsigned int len) const
Copy to memory area.
- **const mha_real_t * get_rdata** () const
Return pointer of real data.
- **const mha_complex_t * get_cdata** () const
Return pointer of complex data.

Private Attributes

- uint32_t **complex_ofs**
 - uint32_t **nelements**
 - union {
 - mha_real_t * rdata**
 - mha_complex_t * cdata**
- ```
};
```

### Additional Inherited Members

#### 4.328.1 Detailed Description

n-dimensional matrix with real or complex floating point values.

#### Warning

The member functions **imag()** (p. 1180) and **operator()** should only be called if the matrix is defined to hold complex values.

#### 4.328.2 Constructor & Destructor Documentation

##### 4.328.2.1 **matrix\_t()** [1/5]

```
MHASignal::matrix_t::matrix_t (
 unsigned int nrows,
 unsigned int ncols,
 bool b_is_complex = true)
```

Create a two-dimensional matrix.

#### Parameters

|                     |                              |
|---------------------|------------------------------|
| <i>nrows</i>        | Number of rows               |
| <i>ncols</i>        | Number of columns            |
| <i>b_is_complex</i> | Add space for complex values |

##### 4.328.2.2 **matrix\_t()** [2/5]

```
MHASignal::matrix_t::matrix_t (
```

```
const mha_spec_t & spec)
```

Create a two-dimensional matrix from a spectrum, copy values.

#### Parameters

|             |                           |
|-------------|---------------------------|
| <i>spec</i> | Source spectrum structure |
|-------------|---------------------------|

#### 4.328.2.3 matrix\_t() [3/5]

```
MHASignal::matrix_t::matrix_t (
 const MHASignal::uint_vector_t & size,
 bool b_is_complex = true)
```

Create n-dimensional matrix, described by size argument.

#### Parameters

|                     |                              |
|---------------------|------------------------------|
| <i>size</i>         | Size vector                  |
| <i>b_is_complex</i> | Add space for complex values |

#### 4.328.2.4 matrix\_t() [4/5]

```
MHASignal::matrix_t::matrix_t (
 const MHASignal::matrix_t & src)
```

#### 4.328.2.5 matrix\_t() [5/5]

```
MHASignal::matrix_t::matrix_t (
 const uint8_t * buf,
 unsigned int len)
```

Construct from memory area.

#### Warning

This constructor is not real time safe

#### 4.328.2.6 ~matrix\_t()

```
MHASignal::matrix_t::~~matrix_t ()
```

### 4.328.3 Member Function Documentation

#### 4.328.3.1 operator=() [1/2]

```
matrix_t & MHASignal::matrix_t::operator= (
 const MHASignal::matrix_t & src)
```

#### 4.328.3.2 operator=() [2/2]

```
MHASignal::matrix_t & MHASignal::matrix_t::operator= (
 const comm_var_t & v)
```

Fill matrix with data of an AC variable object.

##### Parameters

|          |                                                                   |
|----------|-------------------------------------------------------------------|
| <i>v</i> | Source AC variable ( <b>comm_var_t</b> (p. <a href="#">344</a> )) |
|----------|-------------------------------------------------------------------|

##### Note

The type and dimension of the AC variable must match the type and dimension of the matrix.

#### 4.328.3.3 get\_comm\_var()

```
comm_var_t MHASignal::matrix_t::get_comm_var ()
```

Return a AC communication variable pointing to the data of the current matrix.

##### Returns

AC variable object (**comm\_var\_t** (p. [344](#))), valid for the life time of the matrix.

#### 4.328.3.4 dimension()

```
unsigned int MHASignal::matrix_t::dimension () const [inline]
```

Return the dimension of the matrix.

##### Returns

Dimension of the matrix

#### 4.328.3.5 size()

```
unsigned int MHASignal::matrix_t::size (
 unsigned int k) const [inline]
```

Return the size of the matrix.

##### Parameters

|          |           |
|----------|-----------|
| <i>k</i> | Dimension |
|----------|-----------|

##### Returns

Size of the matrix in dimension k

#### 4.328.3.6 get\_nelements()

```
unsigned int MHASignal::matrix_t::get_nelements () const
```

Return total number of elements.

#### 4.328.3.7 is\_same\_size()

```
bool MHASignal::matrix_t::is_same_size (
 const MHASignal::matrix_t & src)
```

Test if matrix has same size as other.

#### 4.328.3.8 iscomplex()

```
bool MHASignal::matrix_t::iscomplex () const [inline]
```

Return information about complexity.

#### 4.328.3.9 real() [1/4]

```
mha_real_t& MHASignal::matrix_t::real (
 const MHASignal::uint_vector_t & index) [inline]
```

Access real part of an element in a n-dimensional matrix.

##### Parameters

|              |              |
|--------------|--------------|
| <i>index</i> | Index vector |
|--------------|--------------|

#### 4.328.3.10 imag() [1/4]

```
mha_real_t& MHASignal::matrix_t::imag (
 const MHASignal::uint_vector_t & index) [inline]
```

Access imaginary part of an element in a n-dimensional matrix.

##### Parameters

|              |              |
|--------------|--------------|
| <i>index</i> | Index vector |
|--------------|--------------|

#### 4.328.3.11 operator>() [1/4]

```
mha_complex_t& MHASignal::matrix_t::operator() (
 const MHASignal::uint_vector_t & index) [inline]
```

Access complex value of an element in a n-dimensional matrix.

##### Parameters

|              |              |
|--------------|--------------|
| <i>index</i> | Index vector |
|--------------|--------------|

#### 4.328.3.12 real() [2/4]

```
const mha_real_t& MHASignal::matrix_t::real (
 const MHASignal::uint_vector_t & index) const [inline]
```

Access real part of an element in a n-dimensional matrix.

##### Parameters

|              |              |
|--------------|--------------|
| <i>index</i> | Index vector |
|--------------|--------------|

#### 4.328.3.13 imag() [2/4]

```
const mha_real_t& MHASignal::matrix_t::imag (
 const MHASignal::uint_vector_t & index) const [inline]
```

Access imaginary part of an element in a n-dimensional matrix.

##### Parameters

|              |              |
|--------------|--------------|
| <i>index</i> | Index vector |
|--------------|--------------|

#### 4.328.3.14 operator>() [2/4]

```
const mha_complex_t& MHASignal::matrix_t::operator() (
 const MHASignal::uint_vector_t & index) const [inline]
```

Access complex value of an element in a n-dimensional matrix.

##### Parameters

|              |              |
|--------------|--------------|
| <i>index</i> | Index vector |
|--------------|--------------|

#### 4.328.3.15 real() [3/4]

```
mha_real_t& MHASignal::matrix_t::real (
 unsigned int row,
 unsigned int col) [inline]
```

Access real part of an element in a two-dimensional matrix.

**Parameters**

|            |                          |
|------------|--------------------------|
| <i>row</i> | Row number of element    |
| <i>col</i> | Column number of element |

**4.328.3.16 imag()** [3/4]

```
mha_real_t& MHASignal::matrix_t::imag (
 unsigned int row,
 unsigned int col) [inline]
```

Access imaginary part of an element in a two-dimensional matrix.

**Parameters**

|            |                          |
|------------|--------------------------|
| <i>row</i> | Row number of element    |
| <i>col</i> | Column number of element |

**4.328.3.17 operator()()** [3/4]

```
mha_complex_t& MHASignal::matrix_t::operator() (
 unsigned int row,
 unsigned int col) [inline]
```

Access complex value of an element in a two-dimensional matrix.

**Parameters**

|            |                          |
|------------|--------------------------|
| <i>row</i> | Row number of element    |
| <i>col</i> | Column number of element |

**4.328.3.18 real()** [4/4]

```
const mha_real_t& MHASignal::matrix_t::real (
 unsigned int row,
 unsigned int col) const [inline]
```

Access real part of an element in a two-dimensional matrix.



## Parameters

|            |                          |
|------------|--------------------------|
| <i>row</i> | Row number of element    |
| <i>col</i> | Column number of element |

4.328.3.19 `imag()` [4/4]

```
const mha_real_t& MHASignal::matrix_t::imag (
 unsigned int row,
 unsigned int col) const [inline]
```

Access imaginary part of an element in a two-dimensional matrix.

## Parameters

|            |                          |
|------------|--------------------------|
| <i>row</i> | Row number of element    |
| <i>col</i> | Column number of element |

4.328.3.20 `operator>()` [4/4]

```
const mha_complex_t& MHASignal::matrix_t::operator() (
 unsigned int row,
 unsigned int col) const [inline]
```

Access complex value of an element in a two-dimensional matrix.

## Parameters

|            |                          |
|------------|--------------------------|
| <i>row</i> | Row number of element    |
| <i>col</i> | Column number of element |

4.328.3.21 `get_nreals()`

```
unsigned int MHASignal::matrix_t::get_nreals () const [inline]
```

**4.328.3.22 get\_index()** [1/2]

```
unsigned int MHASignal::matrix_t::get_index (
 unsigned int row,
 unsigned int col) const
```

**4.328.3.23 get\_index()** [2/2]

```
unsigned int MHASignal::matrix_t::get_index (
 const MHASignal::uint_vector_t & index) const
```

**4.328.3.24 numbytes()**

```
unsigned int MHASignal::matrix_t::numbytes () const
```

Return number of bytes needed to store into memory.

**4.328.3.25 write()**

```
unsigned int MHASignal::matrix_t::write (
 uint8_t * buf,
 unsigned int len) const
```

Copy to memory area.

**4.328.3.26 get\_rdata()**

```
const mha_real_t* MHASignal::matrix_t::get_rdata () const [inline]
```

Return pointer of real data.

**4.328.3.27 get\_cdata()**

```
const mha_complex_t* MHASignal::matrix_t::get_cdata () const [inline]
```

Return pointer of complex data.

#### 4.328.4 Member Data Documentation

##### 4.328.4.1 complex\_ofs

```
uint32_t MHASignal::matrix_t::complex_ofs [private]
```

##### 4.328.4.2 nelements

```
uint32_t MHASignal::matrix_t::nelements [private]
```

##### 4.328.4.3 rdata

```
mha_real_t* MHASignal::matrix_t::rdata
```

##### 4.328.4.4 cdata

```
mha_complex_t* MHASignal::matrix_t::cdata
```

##### 4.328.4.5 "@1

```
union { ... } [private]
```

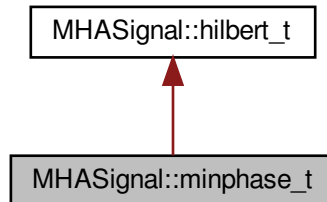
The documentation for this class was generated from the following files:

- **mha\_signal.hh**
- **mha\_signal.cpp**

### 4.329 MHASignal::minphase\_t Class Reference

Minimal phase function.

Inheritance diagram for MHASignal::minphase\_t:



#### Public Member Functions

- **minphase\_t** (unsigned int fftlen, unsigned int ch)  
*Constructor.*
- void **operator()** ( mha\_spec\_t \*s)  
*Transform input spectrum to a minimal-phase spectrum, discarding the original phase.*

#### Private Attributes

- **MHASignal::waveform\_t** phase

#### Additional Inherited Members

#### 4.329.1 Detailed Description

Minimal phase function.

The output spectrum  $Y(f)$  is

$$Y(f) = |X(f)|e^{i\mathcal{H}\{\log |X(f)|\}},$$

with the input spectrum  $X(f)$  and the Hilbert transformation  $\mathcal{H}\{\dots\}$ .

#### 4.329.2 Constructor & Destructor Documentation

##### 4.329.2.1 minphase\_t()

```

MHASignal::minphase_t::minphase_t (
 unsigned int fftlen,
 unsigned int ch)

```

Constructor.

## Parameters

|              |                    |
|--------------|--------------------|
| <i>ftlen</i> | FFT length         |
| <i>ch</i>    | Number of channels |

## 4.329.3 Member Function Documentation

## 4.329.3.1 operator()

```
void MHASignal::minphase_t::operator() (
 mha_spec_t * s)
```

Transform input spectrum to a minimal-phase spectrum, discarding the original phase.

## Parameters

|          |                         |
|----------|-------------------------|
| <i>s</i> | Spectrum to operate on. |
|----------|-------------------------|

## 4.329.4 Member Data Documentation

## 4.329.4.1 phase

```
MHASignal::waveform_t MHASignal::minphase_t::phase [private]
```

The documentation for this class was generated from the following files:

- **mha\_signal.hh**
- **mha\_signal.cpp**

## 4.330 MHASignal::quantizer\_t Class Reference

Simple simulation of fixpoint quantization.

## Public Member Functions

- **quantizer\_t** (unsigned int num\_bits)  
*Constructor.*
- void **operator()** ( mha\_wave\_t &s)  
*Quantization of a waveform fragment.*

## Private Attributes

- `bool limit`
- `mha_real_t upscale`
- `mha_real_t downscale`
- `mha_real_t up_limit`

### 4.330.1 Detailed Description

Simple simulation of fixpoint quantization.

### 4.330.2 Constructor & Destructor Documentation

#### 4.330.2.1 `quantizer_t()`

```
MHASignal::quantizer_t::quantizer_t (
 unsigned int num_bits)
```

Constructor.

#### Parameters

|                 |                                                                  |
|-----------------|------------------------------------------------------------------|
| <i>num_bits</i> | Number of bits to simulate, or zero for limiting to [-1,1] only. |
|-----------------|------------------------------------------------------------------|

### 4.330.3 Member Function Documentation

#### 4.330.3.1 `operator()()`

```
void MHASignal::quantizer_t::operator() (
 mha_wave_t & s)
```

Quantization of a waveform fragment.

#### Parameters

|          |                                    |
|----------|------------------------------------|
| <i>s</i> | Waveform fragment to be quantized. |
|----------|------------------------------------|

#### 4.330.4 Member Data Documentation

##### 4.330.4.1 limit

`bool MHASignal::quantizer_t::limit [private]`

##### 4.330.4.2 upscale

`mha_real_t MHASignal::quantizer_t::upscale [private]`

##### 4.330.4.3 downscale

`mha_real_t MHASignal::quantizer_t::downscale [private]`

##### 4.330.4.4 up\_limit

`mha_real_t MHASignal::quantizer_t::up_limit [private]`

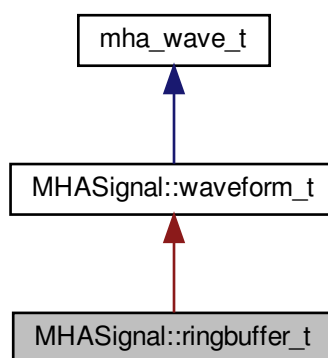
The documentation for this class was generated from the following files:

- **mha\_signal.hh**
- **mha\_signal.cpp**

#### 4.331 MHASignal::ringbuffer\_t Class Reference

A ringbuffer class for time domain audio signal, which makes no assumptions with respect to fragment size.

Inheritance diagram for MHASignal::ringbuffer\_t:



## Public Member Functions

- **ringbuffer\_t** (unsigned frames, unsigned **channels**, unsigned prefilled\_frames)  
*Creates new ringbuffer for time domain signal.*
- unsigned **contained\_frames** () const  
*number of currently contained frames*
- **mha\_real\_t** & **value** (unsigned frame, unsigned channel)  
*Access to value stored in ringbuffer.*
- void **discard** (unsigned frames)  
*Discards the oldest frames.*
- void **write** ( **mha\_wave\_t** &signal)  
*Copies the contents of the signal into the ringbuffer if there is enough space.*

## Private Attributes

- unsigned **next\_read\_frame\_index**  
*Index of oldest frame in underlying storage for the ringbuffer.*
- unsigned **next\_write\_frame\_index**  
*Index of first free frame in underlying storage.*

## Additional Inherited Members

### 4.331.1 Detailed Description

A ringbuffer class for time domain audio signal, which makes no assumptions with respect to fragment size.

Blocks of audio signal can be placed into the ringbuffer using the **write** (p. 1192) method. Individual audio samples can be accessed and altered using the **value** (p. 1191) method. Blocks of audio data can be deleted from the ringbuffer using the **discard** (p. 1192) method.

### 4.331.2 Constructor & Destructor Documentation

#### 4.331.2.1 ringbuffer\_t()

```
ringbuffer_t::ringbuffer_t (
 unsigned frames,
 unsigned channels,
 unsigned prefilled_frames)
```

Creates new ringbuffer for time domain signal.

Constructor allocates enough storage so that *frames* audio samples can be stored in the ringbuffer.



## Parameters

|                         |                                                                                                                                                                                                                                                                                                    |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>frames</i>           | Size of ringbuffer in samples per channel. Maximum number of frames that can be stored in the ringbuffer at one time. This number cannot be changed after instance creation.                                                                                                                       |
| <i>channels</i>         | Number of audio channels.                                                                                                                                                                                                                                                                          |
| <i>prefilled_frames</i> | Number of frames to be prefilled with zero values. Many applications of a ringbuffer require the introduction of a delay. In practice, this delay is achieved by inserting silence audio samples (zeros) into the ringbuffer before the start of the actual signal is inserted for the first time. |

## Exceptions

|                                                   |                                              |
|---------------------------------------------------|----------------------------------------------|
| <b><i>MHA_Error</i></b> (p. <a href="#">707</a> ) | if <code>prefilled_frames &gt; frames</code> |
|---------------------------------------------------|----------------------------------------------|

## 4.331.3 Member Function Documentation

## 4.331.3.1 contained\_frames()

```
unsigned MHASignal::ringbuffer_t::contained_frames () const [inline]
```

number of currently contained frames

## 4.331.3.2 value()

```
mha_real_t& MHASignal::ringbuffer_t::value (
 unsigned frame,
 unsigned channel) [inline]
```

Access to value stored in ringbuffer.

*frame* index is relative to the oldest frame stored in the ringbuffer, therefore, the meaning of the *frame* changes when the **discard** (p. [1192](#)) method is called.

## Parameters

|                |                                                    |
|----------------|----------------------------------------------------|
| <i>frame</i>   | frame index, 0 corresponds to oldest frame stored. |
| <i>channel</i> | audio channel                                      |

**Returns**

reference to contained sample value

**Exceptions**

|                                  |                                    |
|----------------------------------|------------------------------------|
| <b><i>MHA_Error</i></b> (p. 707) | if channel or frame out of bounds. |
|----------------------------------|------------------------------------|

**4.331.3.3 discard()**

```
void MHASignal::ringbuffer_t::discard (
 unsigned frames) [inline]
```

Discards the oldest frames.

Makes room for new **write** (p. 1192), alters base frame index for **value** (p. 1191)

**Parameters**

|               |                             |
|---------------|-----------------------------|
| <i>frames</i> | how many frames to discard. |
|---------------|-----------------------------|

**Exceptions**

|                                  |                                               |
|----------------------------------|-----------------------------------------------|
| <b><i>MHA_Error</i></b> (p. 707) | if frames > <b>contained_frames</b> (p. 1191) |
|----------------------------------|-----------------------------------------------|

**4.331.3.4 write()**

```
void MHASignal::ringbuffer_t::write (
 mha_wave_t & signal) [inline]
```

Copies the contents of the signal into the ringbuffer if there is enough space.

**Parameters**

|               |                                                                           |
|---------------|---------------------------------------------------------------------------|
| <i>signal</i> | New signal to be appended to the signal already present in the ringbuffer |
|---------------|---------------------------------------------------------------------------|

**Exceptions**

|                                  |                                                                                                                     |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b><i>MHA_Error</i></b> (p. 707) | if there is not enough space or if the channel count mismatches.<br>Nothing is copied if the space is insufficient. |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------|

## 4.331.4 Member Data Documentation

## 4.331.4.1 next\_read\_frame\_index

```
unsigned MHASignal::ringbuffer_t::next_read_frame_index [private]
```

Index of oldest frame in underlying storage for the ringbuffer.

This value is added to the frame parameter of the **value** (p. 1191) method, and this value is altered when **discard** (p. 1192) is called.

## 4.331.4.2 next\_write\_frame\_index

```
unsigned MHASignal::ringbuffer_t::next_write_frame_index [private]
```

Index of first free frame in underlying storage.

Next frame to be stored will be placed here.

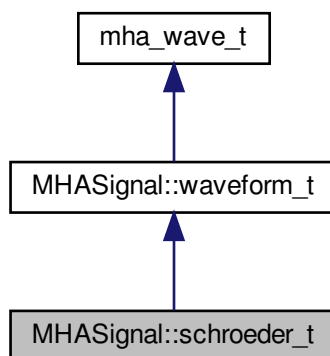
The documentation for this class was generated from the following files:

- **mha\_signal.hh**
- **mha\_signal.cpp**

## 4.332 MHASignal::schroeder\_t Class Reference

Schroeder tone complex class.

Inheritance diagram for MHASignal::schroeder\_t:



## Public Types

- enum **sign\_t** { **up**, **down** }  
*Enumerator for sign of Schroeder tone complex sweep direction.*
- typedef float(\* **groupdelay\_t**) (float f, float fmin, float fmax)  
*Function type for group delay definition.*

## Public Member Functions

- **schroeder\_t** (unsigned int len, unsigned int **channels**=1, **schroeder\_t::sign\_t** sign=**up**, **mha\_real\_t** speed=1)  
*Constructor.*
- **schroeder\_t** (unsigned int len, unsigned int **channels**=1, **schroeder\_t::groupdelay\_t** freqfun= **MHASignal::schroeder\_t::identity**, float fmin=0, float fmax=1, float eps=1e-10)  
*Construct create Schroeder tone complex from a given frequency function.*

## Static Public Member Functions

- static float **identity** (float x, float, float)
- static float **log\_up** (float x, float fmin, float fmax)
- static float **log\_down** (float x, float fmin, float fmax)

## Additional Inherited Members

### 4.332.1 Detailed Description

Schroeder tone complex class.

The Schroeder tone complex is a sweep defined in the sampled spectrum:

$$\Phi(f) = \sigma 2\pi\tau (2f/f_s)^{2\alpha}, \quad S(f) = e^{i\Phi(f)}$$

$f$  is the sampled frequency in Hz,  $\sigma$  is the sign of the sweep (-1 for up sweep, +1 for down sweep),  $\tau$  is the sweep duration in samples,  $f_s$  is the sampling rate in Hz and  $\alpha$  is the relative sweep speed.

### 4.332.2 Member Typedef Documentation

#### 4.332.2.1 groupdelay\_t

```
typedef float(* MHASignal::schroeder_t::groupdelay_t) (float f, float fmin, float fmax)
```

Function type for group delay definition.

## Parameters

|             |                                                  |
|-------------|--------------------------------------------------|
| <i>f</i>    | Frequency relative to Nyquist frequency.         |
| <i>fmin</i> | Minimum frequency relative to Nyquist frequency. |
| <i>fmax</i> | Maximum frequency relative to Nyquist frequency. |

## 4.332.3 Member Enumeration Documentation

## 4.332.3.1 sign\_t

```
enum MHASignal::schroeder_t::sign_t
```

Enumerator for sign of Schroeder tone complex sweep direction.

## Enumerator

|      |                                                        |
|------|--------------------------------------------------------|
| up   | Sweep from zero to Nyquist frequency ( $\sigma = -1$ ) |
| down | Sweep from Nyquist frequency to zero ( $\sigma = +1$ ) |

## 4.332.4 Constructor &amp; Destructor Documentation

## 4.332.4.1 schroeder\_t() [1/2]

```
MHASignal::schroeder_t::schroeder_t (
 unsigned int len,
 unsigned int channels = 1,
 schroeder_t::sign_t sign = up,
 mha_real_t speed = 1)
```

Constructor.

Parameters of the Schroeder tone complex are configured in the constructor.

## Parameters

|                 |                                                        |
|-----------------|--------------------------------------------------------|
| <i>len</i>      | Length $\tau$ of the Schroeder tone complex in samples |
| <i>channels</i> | Number of channels                                     |
| <i>sign</i>     | Sign $\sigma$ of Schroeder sweep                       |
| <i>speed</i>    | Relative speed $\alpha$ (curvature of phase function)  |

#### 4.332.4.2 schroeder\_t() [2/2]

```
MHASignal::schroeder_t::schroeder_t (
 unsigned int len,
 unsigned int channels = 1,
 schroeder_t::groupdelay_t freqfun = MHASignal::schroeder_t::identity,
 float fmin = 0,
 float fmax = 1,
 float eps = 1e-10)
```

Construct create Schroeder tone complex from a given frequency function.

The frequency function  $g(f)$  defines the sweep speed and sign (based on the group delay). It must be defined in the interval  $[0,1)$  and should return values in the interval  $[0,1]$ .

$$\Phi(f) = -4\pi\tau \int_0^{\tau} g(f) \mathrm{d}f, \quad S(f) = e^{i\Phi(f)}$$

#### Parameters

|                 |                                                                                |
|-----------------|--------------------------------------------------------------------------------|
| <i>len</i>      | Length $\tau$ of the Schroeder tone complex in samples.                        |
| <i>channels</i> | Number of channels.                                                            |
| <i>freqfun</i>  | Frequency function $g(f)$ .                                                    |
| <i>fmin</i>     | Start frequency (relative to Nyquist frequency).                               |
| <i>fmax</i>     | End frequency (relative to Nyquist frequency).                                 |
| <i>eps</i>      | Stability constant for frequency ranges not covered by Schroeder tone complex. |

### 4.332.5 Member Function Documentation

#### 4.332.5.1 identity()

```
static float MHASignal::schroeder_t::identity (
 float x,
 float ,
 float) [inline], [static]
```

```
static float MHASignal::schroeder_t::log_up (
 float x,
 float fmin,
 float fmax) [inline], [static]
```

```
static float MHASignal::schroeder_t::log_down (
 float x,
 float fmin,
 float fmax) [inline], [static]
```

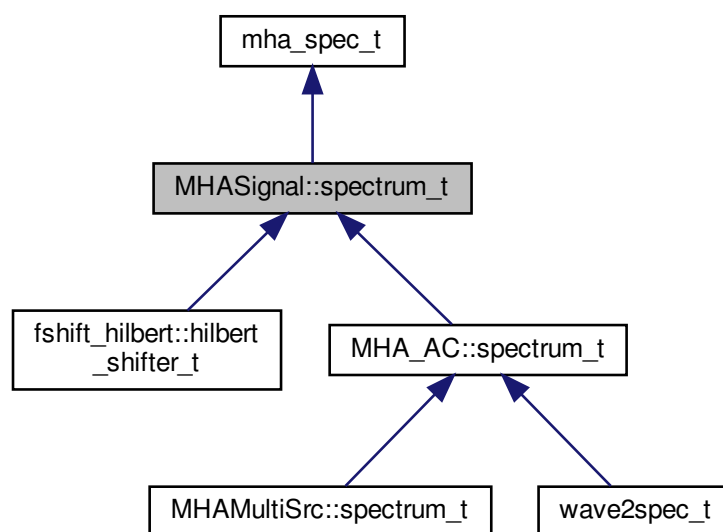
The documentation for this class was generated from the following files:

- mha\_signal.hh
- mha\_signal.cpp

### 4.333 MHASignal::spectrum\_t Class Reference

a signal processing class for spectral data (based on `mha_spec_t` (p. 732))

Inheritance diagram for MHASignal::spectrum\_t:



## Public Member Functions

- **spectrum\_t** (const unsigned int &frames, const unsigned int & **channels**)  
*constructor of spectrum class*
- **spectrum\_t** (const **mha\_spec\_t** &)  
*Copy constructor.*
- **spectrum\_t** (const **MHASignal::spectrum\_t** &)  
*Copy constructor.*
- **spectrum\_t** (const std::vector< **mha\_complex\_t** > &)
- virtual ~**spectrum\_t** (void)
- **mha\_complex\_t** & **operator()** (unsigned int f, unsigned int ch)  
*Access to element.*
- **mha\_complex\_t** & **operator[]** (unsigned int k)  
*Access to a single element, direct index into data buffer.*
- **mha\_complex\_t** & **value** (unsigned int f, unsigned int ch)  
*Access to element.*
- void **copy** (const **mha\_spec\_t** &)  
*copy all elements from a spectrum*
- void **copy\_channel** (const **mha\_spec\_t** &s, unsigned sch, unsigned dch)  
*Copy one channel of a given spectrum signal to a target channel.*
- void **export\_to** ( **mha\_spec\_t** &)  
*copy elements to spectrum structure*
- void **scale** (const unsigned int &, const unsigned int &, const unsigned int &, const **mha\_real\_t** &)  
*scale section [a,b) in channel "ch" by "val"*
- void **scale\_channel** (const unsigned int &, const **mha\_real\_t** &)  
*scale all elements in one channel*

## Additional Inherited Members

### 4.333.1 Detailed Description

a signal processing class for spectral data (based on **mha\_spec\_t** (p. [732](#)))

### 4.333.2 Constructor & Destructor Documentation

#### 4.333.2.1 **spectrum\_t()** [1/4]

```
spectrum_t::spectrum_t (
 const unsigned int & frames,
 const unsigned int & channels)
```

constructor of spectrum class

Allocates buffers and initializes memory to zeros.



## Parameters

|                 |                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------|
| <i>frames</i>   | number of frames (fft bins) in one channel. Number of Frames is usually $\text{fftlen} / 2 + 1$ |
| <i>channels</i> | number of channels                                                                              |

## 4.333.2.2 spectrum\_t() [2/4]

```
spectrum_t::spectrum_t (
 const mha_spec_t & src) [explicit]
```

Copy constructor.

## 4.333.2.3 spectrum\_t() [3/4]

```
spectrum_t::spectrum_t (
 const MHASignal::spectrum_t & src)
```

Copy constructor.

## 4.333.2.4 spectrum\_t() [4/4]

```
spectrum_t::spectrum_t (
 const std::vector< mha_complex_t > & src)
```

## 4.333.2.5 ~spectrum\_t()

```
spectrum_t::~~spectrum_t (
 void) [virtual]
```

Reimplemented in **MHA\_AC::spectrum\_t** (p. 678).

## 4.333.3 Member Function Documentation

## 4.333.3.1 operator()()

```
mha_complex_t& MHASignal::spectrum_t::operator() (
 unsigned int f,
 unsigned int ch) [inline]
```

Access to element.

**Parameters**

|           |                |
|-----------|----------------|
| <i>f</i>  | Bin number     |
| <i>ch</i> | Channel number |

**Returns**

Reference to element

**4.333.3.2 operator[]()**

```
mha_complex_t& MHASignal::spectrum_t::operator[] (
 unsigned int k) [inline]
```

Access to a single element, direct index into data buffer.

**Parameters**

|          |              |
|----------|--------------|
| <i>k</i> | Buffer index |
|----------|--------------|

**Returns**

Reference to element

**4.333.3.3 value()**

```
mha_complex_t& MHASignal::spectrum_t::value (
 unsigned int f,
 unsigned int ch) [inline]
```

Access to element.

**Parameters**

|           |                |
|-----------|----------------|
| <i>f</i>  | Bin number     |
| <i>ch</i> | Channel number |

**Returns**

Reference to element

#### 4.333.3.4 copy()

```
void spectrum_t::copy (
 const mha_spec_t & src)
```

copy all elements from a spectrum

##### Parameters

|            |                |
|------------|----------------|
| <i>src</i> | input spectrum |
|------------|----------------|

#### 4.333.3.5 copy\_channel()

```
void spectrum_t::copy_channel (
 const mha_spec_t & s,
 unsigned sch,
 unsigned dch)
```

Copy one channel of a given spectrum signal to a target channel.

##### Parameters

|            |                                            |
|------------|--------------------------------------------|
| <i>s</i>   | Input spectrum signal                      |
| <i>sch</i> | Channel index in source signal             |
| <i>dch</i> | Channel index in destination (this) signal |

#### 4.333.3.6 export\_to()

```
void spectrum_t::export_to (
 mha_spec_t & dest)
```

copy elements to spectrum structure

##### Parameters

|             |                                |
|-------------|--------------------------------|
| <i>dest</i> | destination spectrum structure |
|-------------|--------------------------------|

#### 4.333.3.7 scale()

```
void spectrum_t::scale (
 const unsigned int & a,
```

```
const unsigned int & b,
const unsigned int & ch,
const mha_real_t & val)
```

scale section [a,b) in channel "ch" by "val"

#### Parameters

|            |                      |
|------------|----------------------|
| <i>a</i>   | starting frame       |
| <i>b</i>   | end frame (excluded) |
| <i>ch</i>  | channel number       |
| <i>val</i> | scale factor         |

#### 4.333.3.8 `scale_channel()`

```
void spectrum_t::scale_channel (
 const unsigned int & ch,
 const mha_real_t & src)
```

scale all elements in one channel

#### Parameters

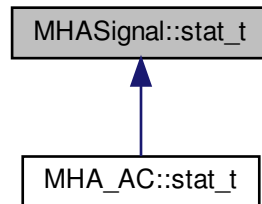
|            |                |
|------------|----------------|
| <i>ch</i>  | channel number |
| <i>src</i> | scale factor   |

The documentation for this class was generated from the following files:

- **mha\_signal.hh**
- **mha\_signal.cpp**

### 4.334 MHASignal::stat\_t Class Reference

Inheritance diagram for MHASignal::stat\_t:



#### Public Member Functions

- **stat\_t** (const unsigned int &frames, const unsigned int & **channels**)
- void **mean** ( **mha\_wave\_t** &m)
- void **mean\_std** ( **mha\_wave\_t** &m, **mha\_wave\_t** &s)
- void **push** (const **mha\_wave\_t** &)
- void **push** (const **mha\_real\_t** &x, const unsigned int &k, const unsigned int &ch)

#### Private Attributes

- **MHASignal::waveform\_t** n
- **MHASignal::waveform\_t** sum
- **MHASignal::waveform\_t** sum2

#### 4.334.1 Constructor & Destructor Documentation

##### 4.334.1.1 stat\_t()

```
MHASignal::stat_t::stat_t (
 const unsigned int & frames,
 const unsigned int & channels)
```

#### 4.334.2 Member Function Documentation

**4.334.2.1 mean()**

```
void MHASignal::stat_t::mean (
 mha_wave_t & m)
```

**4.334.2.2 mean\_std()**

```
void MHASignal::stat_t::mean_std (
 mha_wave_t & m,
 mha_wave_t & s)
```

**4.334.2.3 push() [1/2]**

```
void MHASignal::stat_t::push (
 const mha_wave_t & x)
```

**4.334.2.4 push() [2/2]**

```
void MHASignal::stat_t::push (
 const mha_real_t & x,
 const unsigned int & k,
 const unsigned int & ch)
```

**4.334.3 Member Data Documentation****4.334.3.1 n**

```
MHASignal::waveform_t MHASignal::stat_t::n [private]
```

**4.334.3.2 sum**

```
MHASignal::waveform_t MHASignal::stat_t::sum [private]
```

## 4.334.3.3 sum2

```
MHASignal::waveform_t MHASignal::stat_t::sum2 [private]
```

The documentation for this class was generated from the following files:

- **mha\_signal.hh**
- **mha\_signal.cpp**

## 4.335 MHASignal::subsample\_delay\_t Class Reference

implements subsample delay in spectral domain.

## Public Member Functions

- **subsample\_delay\_t** (const std::vector< float > &subsample\_delay, unsigned fftlen)  
*Constructor computes complex phase factors to apply to achieve subsample delay.*
- void **process** ( **mha\_spec\_t** \*s)  
*Apply the phase\_gains to s to achieve the subsample delay.*
- void **process** ( **mha\_spec\_t** \*s, unsigned idx)  
*Apply the pase gains to channel idx in s to achieve the subsample delay in channel idx.*

## Public Attributes

- **spectrum\_t phase\_gains**  
*The complex factors to apply to achieve the necessary phase shift.*

## Private Attributes

- unsigned **last\_complex\_bin**  
*index of the last complex fft bin for the used fft length.*

## 4.335.1 Detailed Description

implements subsample delay in spectral domain.

When transformed back to the time domain, the signal is delayed by the configured fraction of a sample. This operation must not be used in a smoothgains bracket.

## 4.335.2 Constructor &amp; Destructor Documentation

## 4.335.2.1 subsample\_delay\_t()

```
MHASignal::subsample_delay_t::subsample_delay_t (
 const std::vector< float > & subsample_delay,
 unsigned fftlen)
```

Constructor computes complex phase factors to apply to achieve subsample delay.

**Parameters**

|                        |                                                                            |
|------------------------|----------------------------------------------------------------------------|
| <i>subsample_delay</i> | The subsample delay to apply. $-0.5 \leq \text{subsample\_delay} \leq 0.5$ |
| <i>fftl</i>            | FFT length                                                                 |

**Exceptions**

|                                                   |                                    |
|---------------------------------------------------|------------------------------------|
| <b><i>MHA_Error</i></b> (p. <a href="#">707</a> ) | if the parameters are out of range |
|---------------------------------------------------|------------------------------------|

**4.335.3 Member Function Documentation****4.335.3.1 process()** [1/2]

```
void MHA_Signal::subsample_delay_t::process (
 mha_spec_t * s)
```

Apply the phase\_gains to s to achieve the subsample delay.

**4.335.3.2 process()** [2/2]

```
void MHA_Signal::subsample_delay_t::process (
 mha_spec_t * s,
 unsigned idx)
```

Apply the phase\_gains to channel idx in s to achieve the subsample delay in channel idx.

**Parameters**

|            |                        |
|------------|------------------------|
| <i>s</i>   | signal                 |
| <i>idx</i> | channel index, 0-based |

**Exceptions**

|                                                   |                                              |
|---------------------------------------------------|----------------------------------------------|
| <b><i>MHA_Error</i></b> (p. <a href="#">707</a> ) | if $\text{idx} \geq \text{s->num\_channels}$ |
|---------------------------------------------------|----------------------------------------------|

**4.335.4 Member Data Documentation**



## 4.335.4.1 phase\_gains

**spectrum\_t** MHASignal::subsample\_delay\_t::phase\_gains

The complex factors to apply to achieve the necessary phase shift.

## 4.335.4.2 last\_complex\_bin

unsigned MHASignal::subsample\_delay\_t::last\_complex\_bin [private]

index of the last complex fft bin for the used fft length.

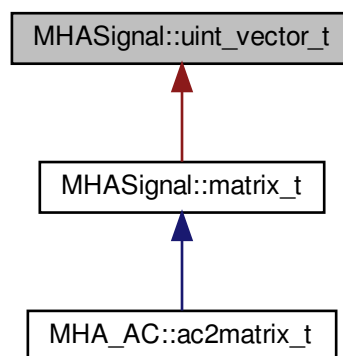
The documentation for this class was generated from the following files:

- **mha\_signal.hh**
- **mha\_signal.cpp**

## 4.336 MHASignal::uint\_vector\_t Class Reference

Vector of unsigned values, used for size and index description of n-dimensional matrixes.

Inheritance diagram for MHASignal::uint\_vector\_t:



## Public Member Functions

- **uint\_vector\_t** (unsigned int len)  
*Constructor, initializes all elements to zero.*
- **uint\_vector\_t** (const **uint\_vector\_t** &)
- **uint\_vector\_t** (const uint8\_t \*buf, unsigned int len)  
*Construct from memory area.*
- **~uint\_vector\_t** ()
- bool **operator==** (const **uint\_vector\_t** &) const  
*Check for equality.*
- **uint\_vector\_t** & **operator=** (const **uint\_vector\_t** &)  
*Assign from other **uint\_vector\_t** (p. 1207).*
- unsigned int **get\_length** () const  
*Return the length of the vector.*
- const uint32\_t & **operator[]** (unsigned int k) const  
*Read-only access to elements.*
- uint32\_t & **operator[]** (unsigned int k)  
*Access to elements.*
- unsigned int **numbytes** () const  
*Return number of bytes needed to store into memory.*
- unsigned int **write** (uint8\_t \*buf, unsigned int len) const  
*Copy to memory area.*
- const uint32\_t \* **getdata** () const  
*Return pointer to the data field.*

## Protected Attributes

- uint32\_t **length**
- uint32\_t \* **data**

### 4.336.1 Detailed Description

Vector of unsigned values, used for size and index description of n-dimensional matrixes.

### 4.336.2 Constructor & Destructor Documentation

#### 4.336.2.1 **uint\_vector\_t**() [1/3]

```
MHASignal::uint_vector_t::uint_vector_t (
 unsigned int len)
```

Constructor, initializes all elements to zero.

### Parameters

|            |                   |
|------------|-------------------|
| <i>len</i> | Length of vector. |
|------------|-------------------|

#### 4.336.2.2 uint\_vector\_t() [2/3]

```
MHASignal::uint_vector_t::uint_vector_t (
 const uint_vector_t & src)
```

#### 4.336.2.3 uint\_vector\_t() [3/3]

```
MHASignal::uint_vector_t::uint_vector_t (
 const uint8_t * buf,
 unsigned int len)
```

Construct from memory area.

### Warning

This constructor is not real time safe

#### 4.336.2.4 ~uint\_vector\_t()

```
MHASignal::uint_vector_t::~~uint_vector_t ()
```

### 4.336.3 Member Function Documentation

#### 4.336.3.1 operator==( )

```
bool MHASignal::uint_vector_t::operator== (
 const uint_vector_t & src) const
```

Check for equality.

#### 4.336.3.2 operator=()

```
uint_vector_t & MHASignal::uint_vector_t::operator= (
 const uint_vector_t & src)
```

Assign from other `uint_vector_t` (p. [1207](#)).

#### Warning

This assignment will fail if the lengths mismatch.

#### 4.336.3.3 get\_length()

```
unsigned int MHASignal::uint_vector_t::get_length () const [inline]
```

Return the length of the vector.

#### 4.336.3.4 operator[]() [1/2]

```
const uint32_t& MHASignal::uint_vector_t::operator[] (
 unsigned int k) const [inline]
```

Read-only access to elements.

#### 4.336.3.5 operator[]() [2/2]

```
uint32_t& MHASignal::uint_vector_t::operator[] (
 unsigned int k) [inline]
```

Access to elements.

#### 4.336.3.6 numbytes()

```
unsigned int MHASignal::uint_vector_t::numbytes () const
```

Return number of bytes needed to store into memory.

#### 4.336.3.7 write()

```
unsigned int MHASignal::uint_vector_t::write (
 uint8_t * buf,
 unsigned int len) const
```

Copy to memory area.

#### 4.336.3.8 getdata()

```
const uint32_t* MHASignal::uint_vector_t::getdata () const [inline]
```

Return pointer to the data field.

### 4.336.4 Member Data Documentation

#### 4.336.4.1 length

```
uint32_t MHASignal::uint_vector_t::length [protected]
```

#### 4.336.4.2 data

```
uint32_t* MHASignal::uint_vector_t::data [protected]
```

The documentation for this class was generated from the following files:

- **mha\_signal.hh**
- **mha\_signal.cpp**



*Element accessor.*

- const **mha\_real\_t** & **value** (unsigned int t, unsigned int ch) const  
*Constant element accessor.*
- const **mha\_real\_t** & **operator()** (unsigned int t, unsigned int ch) const  
*Constant element accessor.*
- **mha\_real\_t** **sum** (const unsigned int &a, const unsigned int &b)  
*sum of all elements between [a,b] in all channels*
- **mha\_real\_t** **sum** (const unsigned int &a, const unsigned int &b, const unsigned int &ch)  
*sum of all elements between [a,b] in channel ch*
- **mha\_real\_t** **sum** ()  
*sum of all elements*
- **mha\_real\_t** **sumsq** ()  
*sum of square of all elements*
- **mha\_real\_t** **sum\_channel** (const unsigned int &)  
*return sum of all elements in one channel*
- void **assign** (const unsigned int &k, const unsigned int &ch, const **mha\_real\_t** &val)  
*set frame "k" in channel "ch" to value "val"*
- void **assign** (const **mha\_real\_t** &)  
*set all elements to value*
- void **assign\_frame** (const unsigned int &k, const **mha\_real\_t** &val)  
*assign value "val" to frame k in all channels*
- void **assign\_channel** (const unsigned int &c, const **mha\_real\_t** &val)  
*assign value "val" to channel ch in all frames*
- void **copy** (const std::vector< **mha\_real\_t** > &v)
- void **copy** (const **mha\_wave\_t** &)  
*copy data from source into current waveform*
- void **copy** (const **mha\_wave\_t** \*)
- void **copy\_channel** (const **mha\_wave\_t** &, unsigned int, unsigned int)  
*Copy one channel of a given waveform signal to a target channel.*
- void **copy\_from\_at** (unsigned int, unsigned int, const **mha\_wave\_t** &, unsigned int)  
*Copy part of the source signal into part of this waveform object.*
- void **export\_to** (**mha\_wave\_t** &)  
*copy data into allocated **mha\_wave\_t** (p. 780) structure*
- void **limit** (const **mha\_real\_t** &min, const **mha\_real\_t** &max)  
*limit target to range [min,max]*
- void **power** (const **waveform\_t** &)  
*transform waveform signal (in Pa) to squared signal (in W/m^2)*
- void **powspec** (const **mha\_spec\_t** &)  
*get the power spectrum (in W/m^2) from a complex spectrum*
- void **scale** (const unsigned int &a, const unsigned int &b, const unsigned int &ch, const **mha\_real\_t** &val)  
*scale section [a,b] in channel "ch" by "val"*
- void **scale** (const unsigned int &k, const unsigned int &ch, const **mha\_real\_t** &val)  
*scale one element*
- void **scale\_channel** (const unsigned int &, const **mha\_real\_t** &)  
*scale one channel of target with a scalar*
- void **scale\_frame** (const unsigned int &, const **mha\_real\_t** &)
- unsigned int **get\_size** () const

## Additional Inherited Members

### 4.337.1 Detailed Description

signal processing class for waveform data (based on **mha\_wave\_t** (p. 780))

### 4.337.2 Constructor & Destructor Documentation

#### 4.337.2.1 **waveform\_t()** [1/5]

```
waveform_t::waveform_t (
 const unsigned int & frames,
 const unsigned int & channels)
```

constructor of **waveform\_t** (p. 1212)

Allocates buffer memory and initializes values to zero.

#### Parameters

|                 |                                  |
|-----------------|----------------------------------|
| <i>frames</i>   | number of frames in each channel |
| <i>channels</i> | number of channels               |

#### 4.337.2.2 **waveform\_t()** [2/5]

```
waveform_t::waveform_t (
 const mhaconfig_t & cf) [explicit]
```

Constructor to create a waveform from plugin configuration.

#### Parameters

|           |                      |
|-----------|----------------------|
| <i>cf</i> | Plugin configuration |
|-----------|----------------------|

#### 4.337.2.3 **waveform\_t()** [3/5]

```
waveform_t::waveform_t (
 const mha_wave_t & src) [explicit]
```



Copy constructor for **mha\_wave\_t** (p. 780) source.

#### 4.337.2.4 waveform\_t() [4/5]

```
waveform_t::waveform_t (
 const MHASignal::waveform_t & src)
```

Copy constructor.

#### 4.337.2.5 waveform\_t() [5/5]

```
waveform_t::waveform_t (
 const std::vector< mha_real_t > & src)
```

Copy constructor for `std::vector<mha_real_t>` source.

A waveform structure with a single channel is created, the length is equal to the number of elements in the source vector.

#### 4.337.2.6 ~waveform\_t()

```
waveform_t::~~waveform_t (
 void) [virtual]
```

Reimplemented in **MHA\_AC::waveform\_t** (p. 682).

### 4.337.3 Member Function Documentation

#### 4.337.3.1 flatten()

```
std::vector< mha_real_t > waveform_t::flatten () const
```

#### 4.337.3.2 operator std::vector< mha\_real\_t >()

```
MHASignal::waveform_t::operator std::vector< mha_real_t > () const [explicit]
```

**4.337.3.3 operator=()**

```
void MHASignal::waveform_t::operator= (
 const mha_real_t & v) [inline]
```

**4.337.3.4 operator[]()** [1/2]

```
mha_real_t& MHASignal::waveform_t::operator[] (
 unsigned int k) [inline]
```

**4.337.3.5 operator[]()** [2/2]

```
const mha_real_t& MHASignal::waveform_t::operator[] (
 unsigned int k) const [inline]
```

**4.337.3.6 value()** [1/2]

```
mha_real_t& MHASignal::waveform_t::value (
 unsigned int t,
 unsigned int ch) [inline]
```

Element accessor.

**Parameters**

|           |                |
|-----------|----------------|
| <i>t</i>  | Frame number   |
| <i>ch</i> | Channel number |

**Returns**

Reference to element

**4.337.3.7 operator()()** [1/2]

```
mha_real_t& MHASignal::waveform_t::operator() (
 unsigned int t,
 unsigned int ch) [inline]
```

Element accessor.

**Parameters**

|           |                |
|-----------|----------------|
| <i>t</i>  | Frame number   |
| <i>ch</i> | Channel number |

**Returns**

Reference to element

**4.337.3.8 value()** [2/2]

```
const mha_real_t& MHASignal::waveform_t::value (
 unsigned int t,
 unsigned int ch) const [inline]
```

Constant element accessor.

**Parameters**

|           |                |
|-----------|----------------|
| <i>t</i>  | Frame number   |
| <i>ch</i> | Channel number |

**Returns**

Reference to element

**4.337.3.9 operator()()** [2/2]

```
const mha_real_t& MHASignal::waveform_t::operator() (
 unsigned int t,
 unsigned int ch) const [inline]
```

Constant element accessor.

**Parameters**

|           |                |
|-----------|----------------|
| <i>t</i>  | Frame number   |
| <i>ch</i> | Channel number |

**Returns**

Reference to element

**4.337.3.10 sum()** [1/3]

```
mha_real_t waveform_t::sum (
 const unsigned int & a,
 const unsigned int & b)
```

sum of all elements between [a,b) in all channels

**Parameters**

|          |                      |
|----------|----------------------|
| <i>a</i> | starting frame       |
| <i>b</i> | end frame (excluded) |

**Returns**

sum

**4.337.3.11 sum()** [2/3]

```
mha_real_t waveform_t::sum (
 const unsigned int & a,
 const unsigned int & b,
 const unsigned int & ch)
```

sum of all elements between [a,b) in channel ch

**Parameters**

|           |                      |
|-----------|----------------------|
| <i>a</i>  | starting frame       |
| <i>b</i>  | end frame (excluded) |
| <i>ch</i> | channel number       |

**Returns**

sum

**4.337.3.12 sum()** [3/3]

```
mha_real_t waveform_t::sum ()
```

sum of all elements

**Returns**

sum of all elements

**4.337.3.13 sumsqr()**

```
mha_real_t waveform_t::sumsqr ()
```

sum of square of all elements

**Returns**

sum of square of all elements

**4.337.3.14 sum\_channel()**

```
mha_real_t waveform_t::sum_channel (
 const unsigned int & ch)
```

return sum of all elements in one channel

**Parameters**

|           |                |
|-----------|----------------|
| <i>ch</i> | channel number |
|-----------|----------------|

**Returns**

sum

**4.337.3.15 assign()** [1/2]

```
void waveform_t::assign (
 const unsigned int & k,
```

```
const unsigned int & ch,
const mha_real_t & val)
```

set frame "k" in channel "ch" to value "val"

### Parameters

|            |                |
|------------|----------------|
| <i>k</i>   | frame number   |
| <i>ch</i>  | channel number |
| <i>val</i> | new value      |

#### 4.337.3.16 assign() [2/2]

```
void waveform_t::assign (
 const mha_real_t & val)
```

set all elements to value

### Parameters

|            |           |
|------------|-----------|
| <i>val</i> | new value |
|------------|-----------|

#### 4.337.3.17 assign\_frame()

```
void waveform_t::assign_frame (
 const unsigned int & k,
 const mha_real_t & val)
```

assign value "val" to frame k in all channels

### Parameters

|            |              |
|------------|--------------|
| <i>k</i>   | frame number |
| <i>val</i> | new value    |

#### 4.337.3.18 assign\_channel()

```
void waveform_t::assign_channel (
 const unsigned int & ch,
 const mha_real_t & val)
```

assign value "val" to channel ch in all frames

**Parameters**

|            |                |
|------------|----------------|
| <i>ch</i>  | channel number |
| <i>val</i> | new value      |

**4.337.3.19 copy()** [1/3]

```
void waveform_t::copy (
 const std::vector< mha_real_t > & v)
```

**4.337.3.20 copy()** [2/3]

```
void waveform_t::copy (
 const mha_wave_t & src)
```

copy data from source into current waveform

**Parameters**

|            |                                             |
|------------|---------------------------------------------|
| <i>src</i> | input data (need to be same size as target) |
|------------|---------------------------------------------|

**4.337.3.21 copy()** [3/3]

```
void waveform_t::copy (
 const mha_wave_t * src)
```

**4.337.3.22 copy\_channel()**

```
void waveform_t::copy_channel (
 const mha_wave_t & src,
 unsigned int src_channel,
 unsigned int dest_channel)
```

Copy one channel of a given waveform signal to a target channel.

**Parameters**

|                     |                                      |
|---------------------|--------------------------------------|
| <i>src</i>          | Input waveform signal                |
| <i>src_channel</i>  | Channel in source signal             |
| <i>dest_channel</i> | Channel number in destination signal |



#### 4.337.3.23 copy\_from\_at()

```
void waveform_t::copy_from_at (
 unsigned int to_pos,
 unsigned int len,
 const mha_wave_t & src,
 unsigned int from_pos)
```

Copy part of the source signal into part of this waveform object.

Source and target have to have the same number of channels.

##### Parameters

|                 |                         |
|-----------------|-------------------------|
| <i>to_pos</i>   | Offset in target        |
| <i>len</i>      | Number of frames copied |
| <i>src</i>      | Source                  |
| <i>from_pos</i> | Offset in source        |

#### 4.337.3.24 export\_to()

```
void waveform_t::export_to (
 mha_wave_t & dest)
```

copy data into allocated **mha\_wave\_t** (p. 780) structure

##### Parameters

|             |                       |
|-------------|-----------------------|
| <i>dest</i> | destination structure |
|-------------|-----------------------|

#### 4.337.3.25 limit()

```
void waveform_t::limit (
 const mha_real_t & min,
 const mha_real_t & max)
```

limit target to range [min,max]

##### Parameters

|            |             |
|------------|-------------|
| <i>min</i> | lower limit |
| <i>max</i> | upper limit |

**4.337.3.26 power()**

```
void waveform_t::power (
 const waveform_t & src)
```

transform waveform signal (in Pa) to squared signal (in W/m<sup>2</sup>)

**Parameters**

|            |                                |
|------------|--------------------------------|
| <i>src</i> | linear waveform signal (in Pa) |
|------------|--------------------------------|

**4.337.3.27 powspec()**

```
void waveform_t::powspec (
 const mha_spec_t & src)
```

get the power spectrum (in W/m<sup>2</sup>) from a complex spectrum

**Parameters**

|            |                                     |
|------------|-------------------------------------|
| <i>src</i> | complex spectrum (normalized to Pa) |
|------------|-------------------------------------|

**4.337.3.28 scale()** [1/2]

```
void waveform_t::scale (
 const unsigned int & a,
 const unsigned int & b,
 const unsigned int & ch,
 const mha_real_t & val)
```

scale section [a,b) in channel "ch" by "val"

**Parameters**

|            |                      |
|------------|----------------------|
| <i>a</i>   | starting frame       |
| <i>b</i>   | end frame (excluded) |
| <i>ch</i>  | channel number       |
| <i>val</i> | scale factor         |

**4.337.3.29 scale()** [2/2]

```
void waveform_t::scale (
 const unsigned int & k,
 const unsigned int & ch,
 const mha_real_t & val)
```

scale one element

**Parameters**

|            |                |
|------------|----------------|
| <i>k</i>   | frame number   |
| <i>ch</i>  | channel number |
| <i>val</i> | scale factor   |

**4.337.3.30 scale\_channel()**

```
void waveform_t::scale_channel (
 const unsigned int & ch,
 const mha_real_t & src)
```

scale one channel of target with a scalar

**Parameters**

|            |                |
|------------|----------------|
| <i>ch</i>  | channel number |
| <i>src</i> | factor         |

**4.337.3.31 scale\_frame()**

```
void waveform_t::scale_frame (
 const unsigned int & frame,
 const mha_real_t & val)
```

**4.337.3.32 get\_size()**

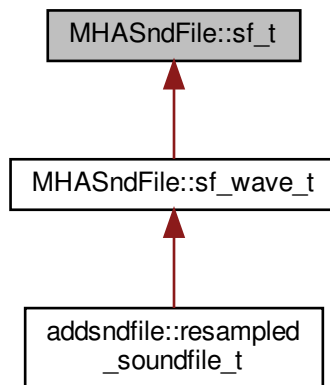
```
unsigned int MHASignal::waveform_t::get_size () const [inline]
```

The documentation for this class was generated from the following files:

- **mha\_signal.hh**
- **mha\_signal.cpp**

### 4.338 MHASndFile::sf\_t Class Reference

Inheritance diagram for MHASndFile::sf\_t:



#### Public Member Functions

- **sf\_t** (const std::string &fname)
- **~sf\_t** ()

#### Public Attributes

- SNDFILE \* **sf**

### 4.338.1 Constructor & Destructor Documentation

#### 4.338.1.1 sf\_t()

```

MHASndFile::sf_t::sf_t (
 const std::string & fname)

```

#### 4.338.1.2 ~sf\_t()

```

MHASndFile::sf_t::~~sf_t ()

```

## 4.338.2 Member Data Documentation

## 4.338.2.1 sf

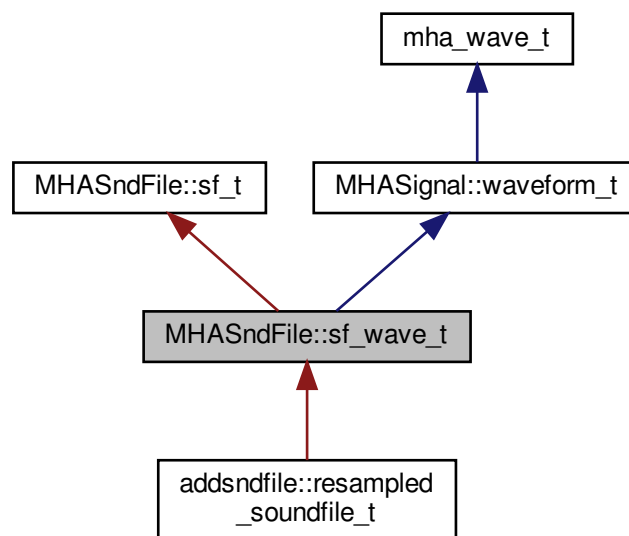
```
SNDFILE* MHASndFile::sf_t::sf
```

The documentation for this class was generated from the following files:

- **mhasndfile.h**
- **mhasndfile.cpp**

## 4.339 MHASndFile::sf\_wave\_t Class Reference

Inheritance diagram for MHASndFile::sf\_wave\_t:



## Public Member Functions

- **sf\_wave\_t** (const std::string &fname, **mha\_real\_t** peaklevel\_db, unsigned int maxlen=std::numeric\_limits< unsigned int >:: **max**(), unsigned int startpos=0, std::vector< int > channel\_map=std::vector< int >())

## Additional Inherited Members

### 4.339.1 Constructor & Destructor Documentation

#### 4.339.1.1 sf\_wave\_t()

```
MHASndFile::sf_wave_t::sf_wave_t (
 const std::string & fname,
 mha_real_t peaklevel_db,
 unsigned int maxlen = std::numeric_limits<unsigned int>::max(),
 unsigned int startpos = 0,
 std::vector< int > channel_map = std::vector<int>())
```

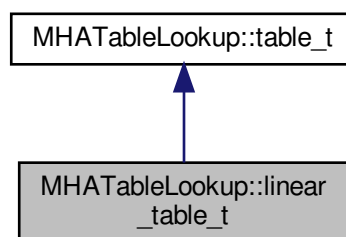
The documentation for this class was generated from the following files:

- mhasndfile.h
- mhasndfile.cpp

### 4.340 MHATableLookup::linear\_table\_t Class Reference

Class for interpolation with equidistant x values.

Inheritance diagram for MHATableLookup::linear\_table\_t:



## Public Member Functions

- **linear\_table\_t** (void)  
*contructor creates an empty **linear\_table\_t** (p. 1228) object.*
- **mha\_real\_t lookup** ( **mha\_real\_t** x) const  
*look up the y value that is stored for the mesh point where x is lower than or equal to the x value given here.*
- **mha\_real\_t interp** ( **mha\_real\_t** x) const  
*interpolate y value for the given x value.*
- **~linear\_table\_t** (void)  
*destructor*
- void **set\_xmin** ( **mha\_real\_t** xmin)  
*set the x value for the first mesh point.*
- void **add\_entry** ( **mha\_real\_t** y)  
*set the y value for the next mesh point.*
- void **set\_xmax** ( **mha\_real\_t** xmax)  
*this sets the x value for a past-the-end, not added mesh point.*
- void **prepare** (void)  
*prepare computes the x distance of the mesh points based on the values given to set\_xmin, set\_xmax, and the number of times that add\_entry was called.*
- void **clear** (void)  
*clear resets the state of this object to the state directly after construction.*

## Protected Attributes

- **mha\_real\_t** \* **vy**
- unsigned int **len**

## Private Attributes

- vector< **mha\_real\_t** > **vec\_y**
- **mha\_real\_t** **xmin**
- **mha\_real\_t** **xmax**
- **mha\_real\_t** **scalefac**

## Additional Inherited Members

## 4.340.1 Detailed Description

Class for interpolation with equidistant x values.

This class can be used for linear interpolation tasks where the mesh points are known for equidistant x values.

Before the class can be used for interpolation, it has to be filled with the y values for the mesh points, the x range has to be specified, and when all values are given, the prepare method has to be called so that the object can determine the distance between x values from the range and the number of mesh points given.

Only after prepare has returned, the object may be used for interpolation.

## 4.340.2 Constructor & Destructor Documentation

### 4.340.2.1 `linear_table_t()`

```
linear_table_t::linear_table_t (
 void)
```

constructor creates an empty **linear\_table\_t** (p. 1228) object.

`add_entry`, `set_xmin`, `set_xmax` and `prepare` methods have to be called before the object can be used to lookup and interpolate values.

### 4.340.2.2 `~linear_table_t()`

```
linear_table_t::~~linear_table_t (
 void)
```

destructor

## 4.340.3 Member Function Documentation

### 4.340.3.1 `lookup()`

```
mha_real_t linear_table_t::lookup (
 mha_real_t x) const [virtual]
```

look up the y value that is stored for the mesh point where x is lower than or equal to the x value given here.

This method does not extrapolate, so for  $x < x_{\min}$ , the y value for  $x_{\min}$  is returned. For all x greater than the x of the last mesh point, the y value of the last mesh point is returned.

#### Precondition

`prepare` must have been called before `lookup` may be called.

Implements **MHATableLookup::table\_t** (p. 1234).



#### 4.340.3.2 interp()

```
mha_real_t linear_table_t::interp (
 mha_real_t x) const [virtual]
```

interpolate y value for the given x value.

The y values for the neighbouring mesh points are looked up and linearly interpolated. For x values outside the range of mesh points, the y value is extrapolated from the nearest two mesh points.

##### Precondition

prepare must have been called before interp may be called.

Implements **MHTableLookup::table\_t** (p. [1234](#)).

#### 4.340.3.3 set\_xmin()

```
void linear_table_t::set_xmin (
 mha_real_t xmin)
```

set the x value for the first mesh point.

Must be called before prepare can be called.

#### 4.340.3.4 add\_entry()

```
void linear_table_t::add_entry (
 mha_real_t y)
```

set the y value for the next mesh point.

Must be called at least twice before prepare can be called.

#### 4.340.3.5 set\_xmax()

```
void linear_table_t::set_xmax (
 mha_real_t xmax)
```

this sets the x value for a past-the-end, not added mesh point.

Example:

```
t.set_xmin(100);
t.add_entry(0); // mesh point {100,0}
t.add_entry(1); // mesh point {110,1}
// the next mesh point would be at x=120, but we do not add this
t.set_xmax(120); // the x where the next mesh point would be
t.prepare();
```

now, `t.interp(100) == 0`; `t.interp(110) == 1`; `t.interp(105) == 0.5`;

#### 4.340.3.6 prepare()

```
void linear_table_t::prepare (
 void)
```

prepare computes the x distance of the mesh points based on the values given to set\_xmin, set\_xmax, and the number of times that add\_entry was called.

##### Precondition

set\_xmin, set\_xmax, add\_entry functions must have been called before calling prepare, add\_entry must have been called at least twice.

Only after this method has been called, interp or lookup may be called.

#### 4.340.3.7 clear()

```
void linear_table_t::clear (
 void) [virtual]
```

clear resets the state of this object to the state directly after construction.

mesh entries and x range are deleted.

interp and lookup may not be called after this function has been called unless prepare and before that its precondition methods are called again.

Implements **MHATableLookup::table\_t** (p. [1235](#)).

### 4.340.4 Member Data Documentation

#### 4.340.4.1 vy

```
mha_real_t* MHATableLookup::linear_table_t::vy [protected]
```

#### 4.340.4.2 len

```
unsigned int MHATableLookup::linear_table_t::len [protected]
```

## 4.340.4.3 vec\_y

```
vector< mha_real_t> MHATableLookup::linear_table_t::vec_y [private]
```

## 4.340.4.4 xmin

```
mha_real_t MHATableLookup::linear_table_t::xmin [private]
```

## 4.340.4.5 xmax

```
mha_real_t MHATableLookup::linear_table_t::xmax [private]
```

## 4.340.4.6 scalefac

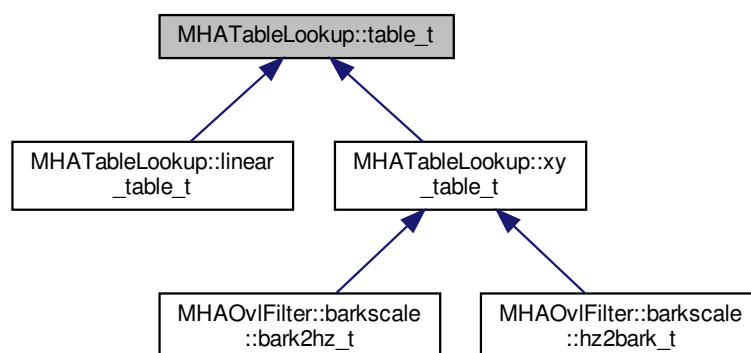
```
mha_real_t MHATableLookup::linear_table_t::scalefac [private]
```

The documentation for this class was generated from the following files:

- **mha\_tablelookup.hh**
- **mha\_tablelookup.cpp**

## 4.341 MHATableLookup::table\_t Class Reference

Inheritance diagram for MHATableLookup::table\_t:



## Public Member Functions

- **table\_t** (void)
- virtual **~table\_t** (void)
- virtual **mha\_real\_t lookup** ( **mha\_real\_t** ) const =0
- virtual **mha\_real\_t interp** ( **mha\_real\_t** ) const =0

## Protected Member Functions

- virtual void **clear** (void)=0

## 4.341.1 Constructor & Destructor Documentation

### 4.341.1.1 table\_t()

```
table_t::table_t (
 void)
```

### 4.341.1.2 ~table\_t()

```
table_t::~~table_t (
 void) [virtual]
```

## 4.341.2 Member Function Documentation

### 4.341.2.1 lookup()

```
virtual mha_real_t MHATableLookup::table_t::lookup (
 mha_real_t) const [pure virtual]
```

Implemented in **MHATableLookup::xy\_table\_t** (p. [1237](#)), and **MHATableLookup::linear\_↔table\_t** (p. [1230](#)).

## 4.341.2.2 interp()

```
virtual mha_real_t MHATableLookup::table_t::interp (
 mha_real_t) const [pure virtual]
```

Implemented in **MHATableLookup::xy\_table\_t** (p. 1237), and **MHATableLookup::linear\_table\_t** (p. 1230).

## 4.341.2.3 clear()

```
virtual void MHATableLookup::table_t::clear (
 void) [protected], [pure virtual]
```

Implemented in **MHATableLookup::xy\_table\_t** (p. 1238), and **MHATableLookup::linear\_table\_t** (p. 1232).

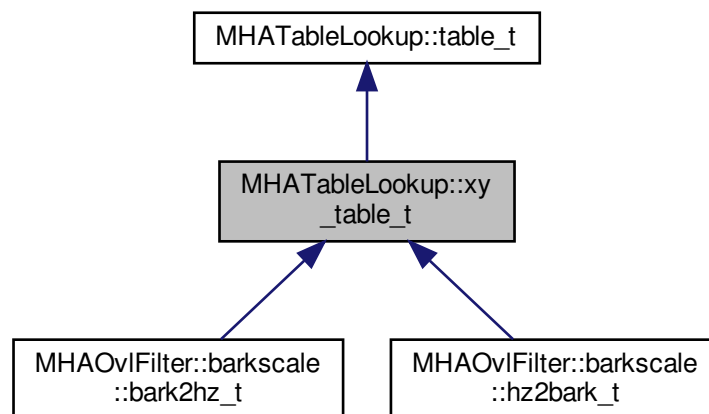
The documentation for this class was generated from the following files:

- **mha\_tablelookup.hh**
- **mha\_tablelookup.cpp**

## 4.342 MHATableLookup::xy\_table\_t Class Reference

Class for interpolation with non-equidistant x values.

Inheritance diagram for MHATableLookup::xy\_table\_t:



## Public Member Functions

- **xy\_table\_t** ()
- **mha\_real\_t lookup** ( **mha\_real\_t** x) const  
*Return the y-value at the position of the nearest x value below input.*
- **mha\_real\_t interp** ( **mha\_real\_t** x) const  
*Linear interpolation function.*
- void **add\_entry** ( **mha\_real\_t** x, **mha\_real\_t** y)  
*Add a single x-y pair entry.*
- void **add\_entry** ( **mha\_real\_t** \*pVX, **mha\_real\_t** \*pVY, unsigned int len)  
*Add multiple entries at once.*
- void **clear** ()  
*Clear the table and transformation functions.*
- void **set\_xfun** (float(\*pXFun)(float))  
*Set transformation function for x values.*
- void **set\_yfun** (float(\*pYFun)(float))  
*Set transformation function for y values during insertion.*
- void **set\_xyfun** (float(\*pYFun)(float, float))  
*Set transformation function for y values during insertion, based on x and y values.*
- std::pair< **mha\_real\_t**, **mha\_real\_t** > **get\_xlimits** () const  
*returns the min and max x of all mesh points that are stored in the lookup table, i.e.*

## Private Attributes

- std::map< **mha\_real\_t**, **mha\_real\_t** > **mXY**
- float(\* **xfun** )(float)
- float(\* **yfun** )(float)
- float(\* **xyfun** )(float, float)

## Additional Inherited Members

### 4.342.1 Detailed Description

Class for interpolation with non-equidistant x values.

Linear interpolation of the x-y table is performed. A transformation of x and y-values is possible; if a transformation function is provided for the x-values, the same function is applied to the argument of **xy\_table\_t::interp()** (p. 1237) and **xy\_table\_t::lookup()** (p. 1237). The transformation of y values is applied only during insertion into the table. Two functions for y-transformation can be provided: a simple transformation which depends only on the y values, or a transformation which takes both (non-transformed) x and y value as an argument. The two-argument transformation is applied before the one-argument transformation.

## 4.342.2 Constructor & Destructor Documentation

### 4.342.2.1 xy\_table\_t()

```
xy_table_t::xy_table_t ()
```

## 4.342.3 Member Function Documentation

### 4.342.3.1 lookup()

```
mha_real_t xy_table_t::lookup (
 mha_real_t x) const [virtual]
```

Return the y-value at the position of the nearest x value below input.

#### Parameters

|   |             |
|---|-------------|
| x | Input value |
|---|-------------|

#### Returns

y value at nearest x value below input.

Implements **MHATableLookup::table\_t** (p. [1234](#)).

### 4.342.3.2 interp()

```
mha_real_t xy_table_t::interp (
 mha_real_t x) const [virtual]
```

Linear interpolation function.

#### Parameters

|   |         |
|---|---------|
| x | x value |
|---|---------|

**Returns**

interpolated y value

Implements **MHATableLookup::table\_t** (p. [1234](#)).

**4.342.3.3 add\_entry()** [1/2]

```
void xy_table_t::add_entry (
 mha_real_t x,
 mha_real_t y)
```

Add a single x-y pair entry.

**Parameters**

|          |                       |
|----------|-----------------------|
| <i>x</i> | x value               |
| <i>y</i> | corresponding y value |

**4.342.3.4 add\_entry()** [2/2]

```
void xy_table_t::add_entry (
 mha_real_t * pVX,
 mha_real_t * pVY,
 unsigned int uLength)
```

Add multiple entries at once.

**Parameters**

|                |                          |
|----------------|--------------------------|
| <i>pVX</i>     | array of x values        |
| <i>pVY</i>     | array of y values        |
| <i>uLength</i> | Length of x and y arrays |

**4.342.3.5 clear()**

```
void xy_table_t::clear (
 void) [virtual]
```

Clear the table and transformation functions.

Implements **MHATableLookup::table\_t** (p. [1235](#)).



#### 4.342.3.6 set\_xfun()

```
void xy_table_t::set_xfun (
 float(*) (float) fun)
```

Set transformation function for x values.

##### Parameters

|            |                          |
|------------|--------------------------|
| <i>fun</i> | Transformation function. |
|------------|--------------------------|

#### 4.342.3.7 set\_yfun()

```
void xy_table_t::set_yfun (
 float(*) (float) fun)
```

Set transformation function for y values during insertion.

##### Parameters

|            |                          |
|------------|--------------------------|
| <i>fun</i> | Transformation function. |
|------------|--------------------------|

#### 4.342.3.8 set\_xyfun()

```
void xy_table_t::set_xyfun (
 float(*) (float, float) fun)
```

Set transformation function for y values during insertion, based on x and y values.

##### Parameters

|            |                          |
|------------|--------------------------|
| <i>fun</i> | Transformation function. |
|------------|--------------------------|

#### 4.342.3.9 get\_xlimits()

```
std::pair< mha_real_t, mha_real_t> MHATableLookup::xy_table_t::get_xlimits () const
[inline]
```

returns the min and max x of all mesh points that are stored in the lookup table, i.e.

after transformation with xfun, if any. Not real-time safe

#### 4.342.4 Member Data Documentation

##### 4.342.4.1 mXY

```
std::map< mha_real_t, mha_real_t> MHATableLookup::xy_table_t::mXY [private]
```

##### 4.342.4.2 xfun

```
float(* MHATableLookup::xy_table_t::xfun) (float) [private]
```

##### 4.342.4.3 yfun

```
float(* MHATableLookup::xy_table_t::yfun) (float) [private]
```

##### 4.342.4.4 xyfun

```
float(* MHATableLookup::xy_table_t::xyfun) (float, float) [private]
```

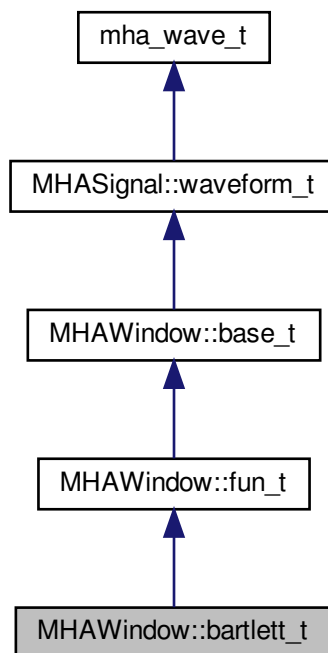
The documentation for this class was generated from the following files:

- **mha\_tablelookup.hh**
- **mha\_tablelookup.cpp**

#### 4.343 MHAWindow::bartlett\_t Class Reference

Bartlett window.

Inheritance diagram for MHAWindow::bartlett\_t:



#### Public Member Functions

- **bartlett\_t** (unsigned int n)

#### Additional Inherited Members

##### 4.343.1 Detailed Description

Bartlett window.

##### 4.343.2 Constructor & Destructor Documentation

###### 4.343.2.1 bartlett\_t()

```
MHAWindow::bartlett_t::bartlett_t (
 unsigned int n) [inline]
```

The documentation for this class was generated from the following file:

- **mha\_windowparser.h**



### Parameters

|            |                           |
|------------|---------------------------|
| <i>len</i> | Window length in samples. |
|------------|---------------------------|

#### 4.344.2.2 base\_t() [2/2]

```
MHAWindow::base_t::base_t (
 const MHAWindow::base_t & src)
```

Copy constructor.

### Parameters

|            |                     |
|------------|---------------------|
| <i>src</i> | Source to be copied |
|------------|---------------------|

### 4.344.3 Member Function Documentation

#### 4.344.3.1 operator>() [1/2]

```
void MHAWindow::base_t::operator() (
 mha_wave_t & s) const
```

Apply window to waveform segment (reference)

#### 4.344.3.2 operator>() [2/2]

```
void MHAWindow::base_t::operator() (
 mha_wave_t * s) const
```

Apply window to waveform segment (pointer)

#### 4.344.3.3 ramp\_begin()

```
void MHAWindow::base_t::ramp_begin (
 mha_wave_t & s) const
```

Apply a ramp at the begining.

#### 4.344.3.4 ramp\_end()

```
void MHAWindow::base_t::ramp_end (
 mha_wave_t & s) const
```

Apply a ramp at the end.

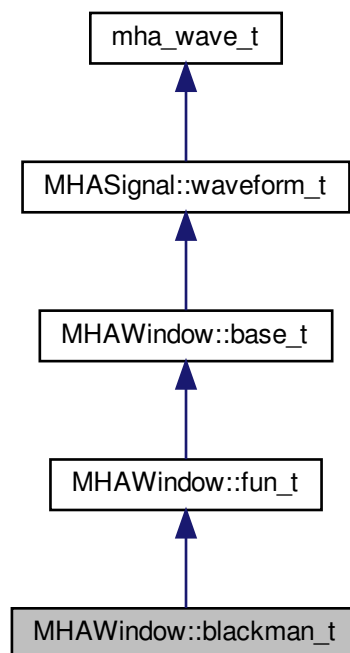
The documentation for this class was generated from the following files:

- **mha\_windowparser.h**
- **mha\_windowparser.cpp**

#### 4.345 MHAWindow::blackman\_t Class Reference

Blackman window.

Inheritance diagram for MHAWindow::blackman\_t:



#### Public Member Functions

- **blackman\_t** (unsigned int n)

## Additional Inherited Members

## 4.345.1 Detailed Description

Blackman window.

## 4.345.2 Constructor &amp; Destructor Documentation

## 4.345.2.1 blackman\_t()

```
MHAWindow::blackman_t::blackman_t (
 unsigned int n) [inline]
```

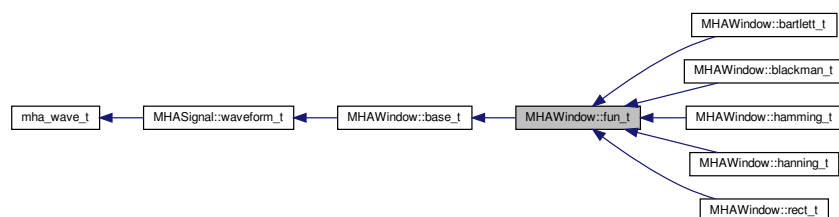
The documentation for this class was generated from the following file:

- **mha\_windowparser.h**

## 4.346 MHAWindow::fun\_t Class Reference

Generic window based on a generator function.

Inheritance diagram for MHAWindow::fun\_t:



- **fun\_t** (unsigned int n, float(\*fun)(float), float xmin=-1, float xmax=1, bool min\_included=true, bool max\_included=false)  
*Constructor.*

## Additional Inherited Members

### 4.346.1 Detailed Description

Generic window based on a generator function.

The generator function should return a valid window function in the interval  $[-1,1[$ .

### 4.346.2 Constructor & Destructor Documentation

#### 4.346.2.1 `fun_t()`

```
MHAWindow::fun_t::fun_t (
 unsigned int n,
 float(*) (float) fun,
 float xmin = -1,
 float xmax = 1,
 bool min_included = true,
 bool max_included = false)
```

Constructor.

#### Parameters

|                     |                                                                        |
|---------------------|------------------------------------------------------------------------|
| <i>n</i>            | Window length                                                          |
| <i>fun</i>          | Generator function, i.e. <b>MHAWindow::hanning()</b> (p. 156)          |
| <i>xmin</i>         | Start value of window, i.e. -1 for full window or 0 for fade-out ramp. |
| <i>xmax</i>         | Last value of window, i.e. 1 for full window                           |
| <i>min_included</i> | Flag if minimum value is included                                      |
| <i>max_included</i> | Flag if maximum value is included                                      |

The documentation for this class was generated from the following files:

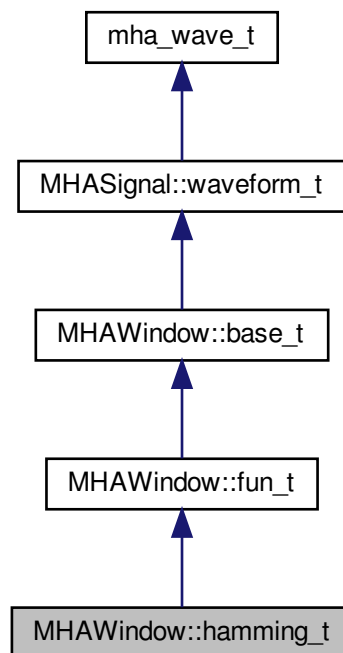
- **mha\_windowparser.h**
- **mha\_windowparser.cpp**

### 4.347 MHAWindow::hamming\_t Class Reference

Hamming window.



Inheritance diagram for MHAWindow::hamming\_t:



#### Public Member Functions

- **hamming\_t** (unsigned int n)

#### Additional Inherited Members

##### 4.347.1 Detailed Description

Hamming window.

##### 4.347.2 Constructor & Destructor Documentation

###### 4.347.2.1 hamming\_t()

```
MHAWindow::hamming_t::hamming_t (
 unsigned int n) [inline]
```

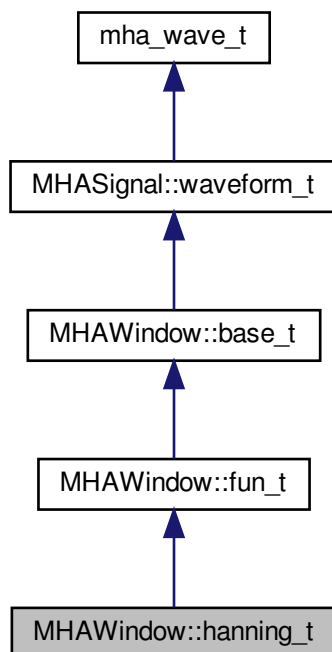
The documentation for this class was generated from the following file:

- **mha\_windowparser.h**

#### 4.348 MHAWindow::hanning\_t Class Reference

von-Hann window

Inheritance diagram for MHAWindow::hanning\_t:



##### Public Member Functions

- **hanning\_t** (unsigned int n)

##### Additional Inherited Members

#### 4.348.1 Detailed Description

von-Hann window

#### 4.348.2 Constructor & Destructor Documentation

## 4.348.2.1 hanning\_t()

```
MHAWindow::hanning_t::hanning_t (
 unsigned int n) [inline]
```

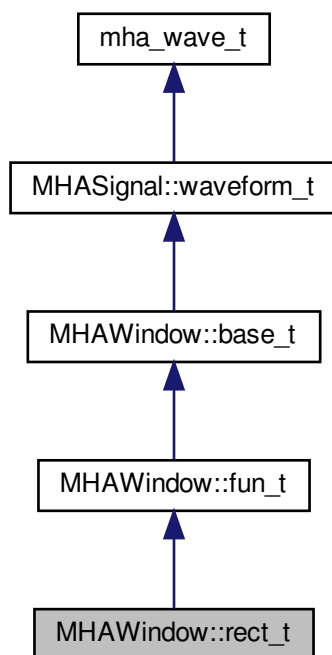
The documentation for this class was generated from the following file:

- **mha\_windowparser.h**

## 4.349 MHAWindow::rect\_t Class Reference

Rectangular window.

Inheritance diagram for MHAWindow::rect\_t:



## Public Member Functions

- **rect\_t** (unsigned int n)

## Additional Inherited Members

### 4.349.1 Detailed Description

Rectangular window.

### 4.349.2 Constructor & Destructor Documentation

#### 4.349.2.1 `rect_t()`

```
MHAWindow::rect_t::rect_t (
 unsigned int n) [inline]
```

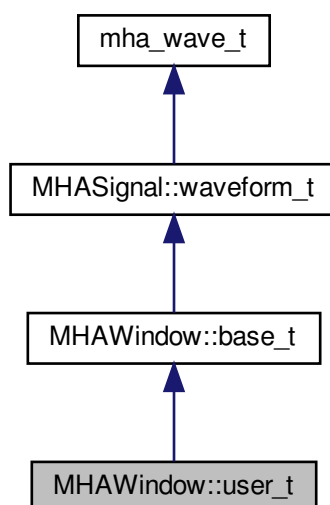
The documentation for this class was generated from the following file:

- **mha\_windowparser.h**

### 4.350 MHAWindow::user\_t Class Reference

User defined window.

Inheritance diagram for MHAWindow::user\_t:



## Public Member Functions

- **user\_t** (const std::vector< **mha\_real\_t** > &wnd)  
*Constructor.*

## Additional Inherited Members

### 4.350.1 Detailed Description

User defined window.

### 4.350.2 Constructor & Destructor Documentation

#### 4.350.2.1 user\_t()

```
MHAWindow::user_t::user_t (
 const std::vector< mha_real_t > & wnd)
```

Constructor.

#### Parameters

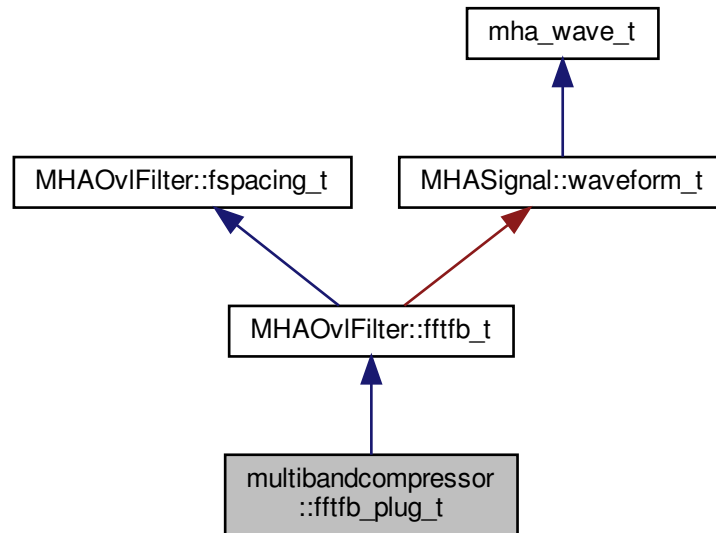
|            |                     |
|------------|---------------------|
| <i>wnd</i> | User defined window |
|------------|---------------------|

The documentation for this class was generated from the following files:

- **mha\_windowparser.h**
- **mha\_windowparser.cpp**

#### 4.351 multibandcompressor::fftfb\_plug\_t Class Reference

Inheritance diagram for multibandcompressor::fftfb\_plug\_t:



#### Public Member Functions

- **fftfb\_plug\_t** ( **MHAOvfFilter::fftfb\_vars\_t** &, const **mhaconfig\_t** &cfg, **algo\_comm\_t** ac, std::string alg)
- void **insert** ()

#### Private Attributes

- **MHA\_AC::waveform\_t cfv**  
*vector of nominal center frequencies / Hz*
- **MHA\_AC::waveform\_t efv**  
*vector of edge frequencies / Hz*
- **MHA\_AC::waveform\_t bwv**  
*vector of band-weights (sum of squared fft-bin-weights)/num\_frames*

#### Additional Inherited Members

##### 4.351.1 Constructor & Destructor Documentation

#### 4.351.1.1 fftfb\_plug\_t()

```
multibandcompressor::fftfb_plug_t::fftfb_plug_t (
 MHAOvlFilter::fftfb_vars_t & vars,
 const mhaconfig_t & cfg,
 algo_comm_t ac,
 std::string alg)
```

### 4.351.2 Member Function Documentation

#### 4.351.2.1 insert()

```
void multibandcompressor::fftfb_plug_t::insert ()
```

### 4.351.3 Member Data Documentation

#### 4.351.3.1 cfv

**MHA\_AC::waveform\_t** multibandcompressor::fftfb\_plug\_t::cfv [private]

vector of nominal center frequencies / Hz

#### 4.351.3.2 efv

**MHA\_AC::waveform\_t** multibandcompressor::fftfb\_plug\_t::efv [private]

vector of edge frequencies / Hz

#### 4.351.3.3 bwv

**MHA\_AC::waveform\_t** multibandcompressor::fftfb\_plug\_t::bwv [private]

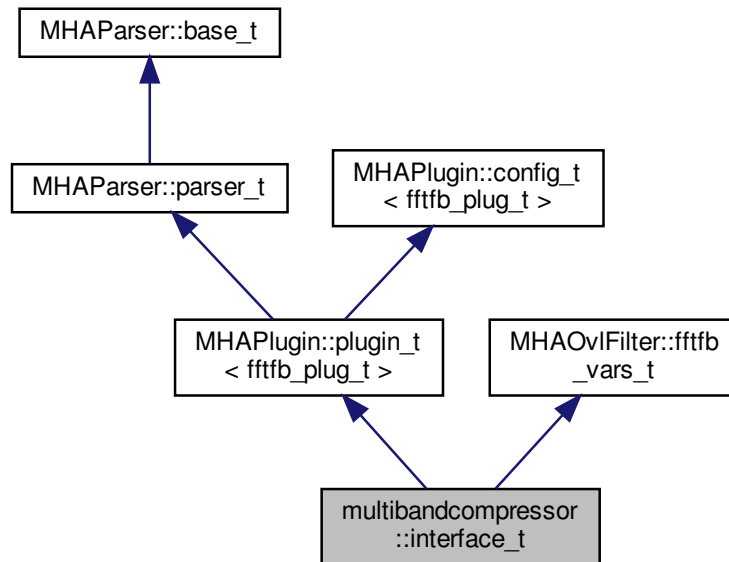
vector of band-weights (sum of squared fft-bin-weights)/num\_frames

The documentation for this class was generated from the following file:

- **multibandcompressor.cpp**

#### 4.352 multibandcompressor::interface\_t Class Reference

Inheritance diagram for multibandcompressor::interface\_t:



#### Public Member Functions

- **interface\_t** (const **algo\_comm\_t** &, const std::string &, const std::string &)
- void **prepare** ( **mhaconfig\_t** &)
- void **release** ()
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)

#### Private Member Functions

- void **update\_cfg** ()

#### Private Attributes

- int **num\_channels**
- **DynComp::dc\_afterburn\_t** **burn**
- **MHAEvents::patchbay\_t** < **interface\_t** > **patchbay**
- std::string **algo**
- **MHAParser::mhapluginloader\_t** **plug**
- **plugin\_signals\_t** \* **plug\_sigs**



## Additional Inherited Members

## 4.352.1 Constructor &amp; Destructor Documentation

## 4.352.1.1 interface\_t()

```
multibandcompressor::interface_t::interface_t (
 const algo_comm_t & ac_,
 const std::string & th,
 const std::string & al)
```

Default values are set and MHA configuration variables registered into the parser.

## Parameters

|             |                                |
|-------------|--------------------------------|
| <i>ac</i> ↔ | algorithm communication handle |
| <i>th</i>   | chain name                     |
| <i>al</i>   | algorithm name                 |

## 4.352.2 Member Function Documentation

## 4.352.2.1 prepare()

```
void multibandcompressor::interface_t::prepare (
 mhaconfig_t & tf) [virtual]
```

Implements **MHAPlugin::plugin\_t< fftfb\_plug\_t >** (p. 1099).

## 4.352.2.2 release()

```
void multibandcompressor::interface_t::release (
 void) [virtual]
```

Reimplemented from **MHAPlugin::plugin\_t< fftfb\_plug\_t >** (p. 1100).

#### 4.352.2.3 process()

```
mha_spec_t * multibandcompressor::interface_t::process (
 mha_spec_t * s)
```

#### 4.352.2.4 update\_cfg()

```
void multibandcompressor::interface_t::update_cfg (
 void) [private]
```

### 4.352.3 Member Data Documentation

#### 4.352.3.1 num\_channels

```
int multibandcompressor::interface_t::num_channels [private]
```

#### 4.352.3.2 burn

```
DynComp::dc_afterburn_t multibandcompressor::interface_t::burn [private]
```

#### 4.352.3.3 patchbay

```
MHAEvents::patchbay_t< interface_t> multibandcompressor::interface_t::patchbay
[private]
```

#### 4.352.3.4 algo

```
std::string multibandcompressor::interface_t::algo [private]
```

#### 4.352.3.5 plug

```
MHAParser::mhapluginloader_t multibandcompressor::interface_t::plug [private]
```

## 4.353 multibandcompressor::plugin\_signals\_t Class Reference 1257

### 4.352.3.6 plug\_sigs

```
plugin_signals_t* multibandcompressor::interface_t::plug_sigs [private]
```

The documentation for this class was generated from the following file:

- **multibandcompressor.cpp**

## 4.353 multibandcompressor::plugin\_signals\_t Class Reference

### Public Member Functions

- **plugin\_signals\_t** (unsigned int **channels**, unsigned int bands)
- void **update\_levels** ( **MHAOvIFilter::fftfb\_t** \*, **mha\_spec\_t** \*s\_in)
- void **apply\_gains** ( **MHAOvIFilter::fftfb\_t** \*, **DynComp::dc\_afterburn\_t** &burn, **mha\_spec\_t** \*s\_out)

### Public Attributes

- **mha\_wave\_t** \* **plug\_output**

### Private Attributes

- **MHASignal::waveform\_t** **plug\_level**
- **MHASignal::waveform\_t** **gain**

### 4.353.1 Constructor & Destructor Documentation

#### 4.353.1.1 plugin\_signals\_t()

```
multibandcompressor::plugin_signals_t::plugin_signals_t (
 unsigned int channels,
 unsigned int bands)
```

### 4.353.2 Member Function Documentation

#### 4.353.2.1 update\_levels()

```
void multibandcompressor::plugin_signals_t::update_levels (
 MHAOvlFilter::fftfb_t * pFb,
 mha_spec_t * s_in)
```

#### 4.353.2.2 apply\_gains()

```
void multibandcompressor::plugin_signals_t::apply_gains (
 MHAOvlFilter::fftfb_t * pFb,
 DynComp::dc_afterburn_t & burn,
 mha_spec_t * s_out)
```

### 4.353.3 Member Data Documentation

#### 4.353.3.1 plug\_level

```
MHASignal::waveform_t multibandcompressor::plugin_signals_t::plug_level [private]
```

#### 4.353.3.2 gain

```
MHASignal::waveform_t multibandcompressor::plugin_signals_t::gain [private]
```

#### 4.353.3.3 plug\_output

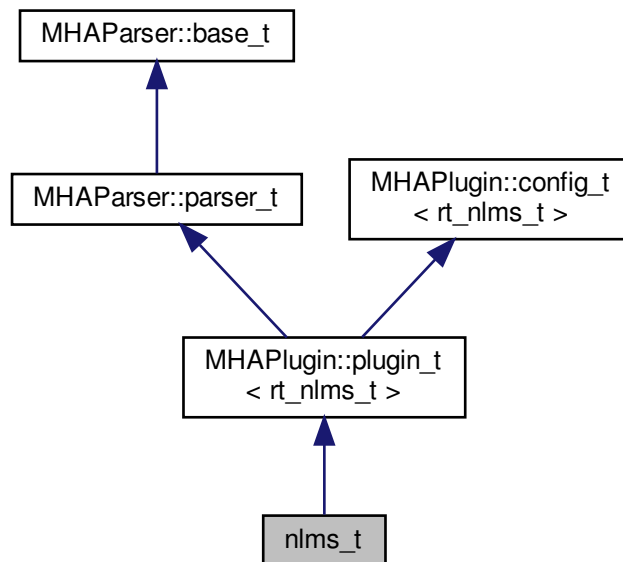
```
mha_wave_t* multibandcompressor::plugin_signals_t::plug_output
```

The documentation for this class was generated from the following file:

- **multibandcompressor.cpp**

## 4.354 nlms\_t Class Reference

Inheritance diagram for nlms\_t:



## Public Member Functions

- **nlms\_t** ( **algo\_comm\_t**, const char \*, const char \*)
- void **prepare** ( **mhaconfig\_t** &)
- void **release** ()
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)

## Private Member Functions

- void **update** ()

## Private Attributes

- **MHAParser::float\_t** rho
- **MHAParser::float\_t** c
- **MHAParser::int\_t** ntaps
- **MHAParser::string\_t** name\_u
- **MHAParser::string\_t** name\_d
- **MHAParser::kw\_t** normtype

- **MHAParser::kw\_t** estimtype
- **MHAParser::float\_t** lambda\_smoothing\_power
- **MHAParser::string\_t** name\_e
- **MHAParser::string\_t** name\_f
- **MHAParser::int\_t** n\_no\_update
- **std::string** algo
- **MHAEvents::patchbay\_t**< **nlms\_t** > patchbay

## Additional Inherited Members

### 4.354.1 Constructor & Destructor Documentation

#### 4.354.1.1 nlms\_t()

```
nlms_t::nlms_t (
 algo_comm_t ac,
 const char * ,
 const char * ialg)
```

### 4.354.2 Member Function Documentation

#### 4.354.2.1 prepare()

```
void nlms_t::prepare (
 mhaconfig_t & cf) [virtual]
```

Implements **MHAPlugin::plugin\_t**< **rt\_nlms\_t** > (p. [1099](#)).

#### 4.354.2.2 release()

```
void nlms_t::release (
 void) [virtual]
```

Reimplemented from **MHAPlugin::plugin\_t**< **rt\_nlms\_t** > (p. [1100](#)).

#### 4.354.2.3 process()

```
mha_wave_t * nlms_t::process (
 mha_wave_t * s)
```

#### 4.354.2.4 update()

```
void nlms_t::update () [private]
```

### 4.354.3 Member Data Documentation

#### 4.354.3.1 rho

```
MHAParser::float_t nlms_t::rho [private]
```

#### 4.354.3.2 c

```
MHAParser::float_t nlms_t::c [private]
```

#### 4.354.3.3 ntaps

```
MHAParser::int_t nlms_t::ntaps [private]
```

#### 4.354.3.4 name\_u

```
MHAParser::string_t nlms_t::name_u [private]
```

#### 4.354.3.5 name\_d

```
MHAParser::string_t nlms_t::name_d [private]
```

#### 4.354.3.6 normtype

**MHAParser::kw\_t** nlms\_t::normtype [private]

#### 4.354.3.7 estimtype

**MHAParser::kw\_t** nlms\_t::estimtype [private]

#### 4.354.3.8 lambda\_smoothing\_power

**MHAParser::float\_t** nlms\_t::lambda\_smoothing\_power [private]

#### 4.354.3.9 name\_e

**MHAParser::string\_t** nlms\_t::name\_e [private]

#### 4.354.3.10 name\_f

**MHAParser::string\_t** nlms\_t::name\_f [private]

#### 4.354.3.11 n\_no\_update

**MHAParser::int\_t** nlms\_t::n\_no\_update [private]

#### 4.354.3.12 algo

**std::string** nlms\_t::algo [private]

#### 4.354.3.13 patchbay

**MHAEvents::patchbay\_t< nlms\_t>** nlms\_t::patchbay [private]

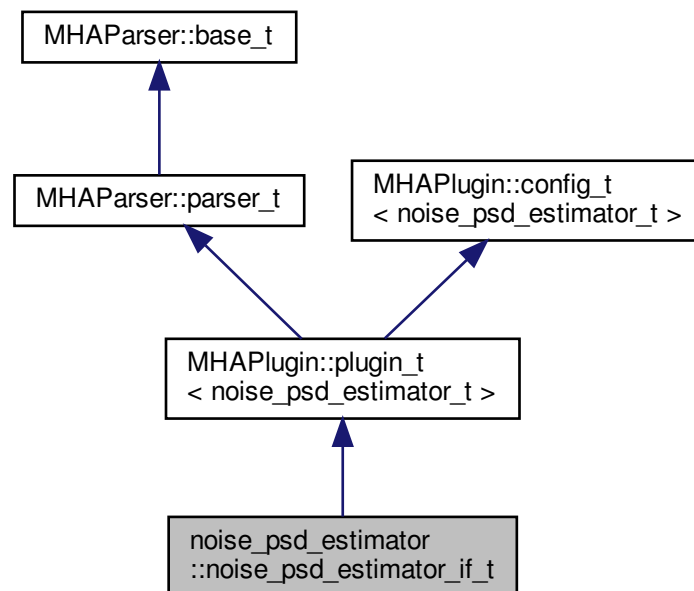
The documentation for this class was generated from the following file:

- **nlms\_wave.cpp**



## 4.355 noise\_psd\_estimator::noise\_psd\_estimator\_if\_t Class Reference

Inheritance diagram for noise\_psd\_estimator::noise\_psd\_estimator\_if\_t:



### Public Member Functions

- **noise\_psd\_estimator\_if\_t** (const **algo\_comm\_t** &, const std::string &, const std::string &)
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)
- void **prepare** ( **mhaconfig\_t** &)

### Private Member Functions

- void **update\_cfg** ()

### Private Attributes

- **MHAParser::float\_t** **alphaPH1mean**
- **MHAParser::float\_t** **alphaPSD**
- **MHAParser::float\_t** **q**
- **MHAParser::float\_t** **xiOptDb**
- std::string **name**
- **MHAEvents::patchbay\_t** < **noise\_psd\_estimator\_if\_t** > **patchbay**

## Additional Inherited Members

### 4.355.1 Constructor & Destructor Documentation

#### 4.355.1.1 noise\_psd\_estimator\_if\_t()

```
noise_psd_estimator::noise_psd_estimator_if_t::noise_psd_estimator_if_t (
 const algo_comm_t & iac,
 const std::string & ,
 const std::string & iname)
```

### 4.355.2 Member Function Documentation

#### 4.355.2.1 process()

```
mha_spec_t * noise_psd_estimator::noise_psd_estimator_if_t::process (
 mha_spec_t * s)
```

#### 4.355.2.2 prepare()

```
void noise_psd_estimator::noise_psd_estimator_if_t::prepare (
 mhaconfig_t & cf) [virtual]
```

Implements **MHAPlugin::plugin\_t**< **noise\_psd\_estimator\_t** > (p. [1099](#)).

#### 4.355.2.3 update\_cfg()

```
void noise_psd_estimator::noise_psd_estimator_if_t::update_cfg (
 void) [private]
```

### 4.355.3 Member Data Documentation

#### 4.355.3.1 alphaPH1mean

```
MHAParser::float_t noise_psd_estimator::noise_psd_estimator_if_t::alphaPH1mean
[private]
```

#### 4.355.3.2 alphaPSD

```
MHAParser::float_t noise_psd_estimator::noise_psd_estimator_if_t::alphaPSD [private]
```

#### 4.355.3.3 q

```
MHAParser::float_t noise_psd_estimator::noise_psd_estimator_if_t::q [private]
```

#### 4.355.3.4 xiOptDb

```
MHAParser::float_t noise_psd_estimator::noise_psd_estimator_if_t::xiOptDb [private]
```

#### 4.355.3.5 name

```
std::string noise_psd_estimator::noise_psd_estimator_if_t::name [private]
```

#### 4.355.3.6 patchbay

```
MHAEvents::patchbay_t< noise_psd_estimator_if_t> noise_psd_estimator::noise_psd_↵
estimator_if_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **noise\_psd\_estimator.cpp**

### 4.356 noise\_psd\_estimator::noise\_psd\_estimator\_t Class Reference

#### Public Member Functions

- **noise\_psd\_estimator\_t** (const **mhaconfig\_t** &cf, **algo\_comm\_t** ac, const std::string &name, float alphaPH1mean, float alphaPSD, float q, float xiOptDb)
- void **process** ( **mha\_spec\_t** \*noisyDftFrame)
- void **insert** ()

## Private Attributes

- **MHASignal::waveform\_t** **noisyPer**
- **MHASignal::waveform\_t** **PH1mean**
- **MHA\_AC::waveform\_t** **noisePow**
- **MHA\_AC::waveform\_t** **inputPow**
- **MHA\_AC::waveform\_t** **snrPost1Debug**
- **MHA\_AC::waveform\_t** **GLRDebug**
- **MHA\_AC::waveform\_t** **PH1Debug**
- **MHA\_AC::waveform\_t** **estimateDebug**
- **MHA\_AC::spectrum\_t** **inputSpec**
- float **alphaPH1mean\_**
- float **alphaPSD\_**
- float **priorFact**
- float **xiOpt**
- float **logGLRFact**
- float **GLRexp**
- int **frameno**

## 4.356.1 Constructor & Destructor Documentation

### 4.356.1.1 noise\_psd\_estimator\_t()

```
noise_psd_estimator::noise_psd_estimator_t::noise_psd_estimator_t (
 const mhaconfig_t & cf,
 algo_comm_t ac,
 const std::string & name,
 float alphaPH1mean,
 float alphaPSD,
 float q,
 float xiOptDb)
```

## 4.356.2 Member Function Documentation

### 4.356.2.1 process()

```
void noise_psd_estimator::noise_psd_estimator_t::process (
 mha_spec_t * noisyDftFrame)
```

#### 4.356.2.2 insert()

```
void noise_psd_estimator::noise_psd_estimator_t::insert () [inline]
```

### 4.356.3 Member Data Documentation

#### 4.356.3.1 noisyPer

```
MHASignal::waveform_t noise_psd_estimator::noise_psd_estimator_t::noisyPer [private]
```

#### 4.356.3.2 PH1mean

```
MHASignal::waveform_t noise_psd_estimator::noise_psd_estimator_t::PH1mean [private]
```

#### 4.356.3.3 noisePow

```
MHA_AC::waveform_t noise_psd_estimator::noise_psd_estimator_t::noisePow [private]
```

#### 4.356.3.4 inputPow

```
MHA_AC::waveform_t noise_psd_estimator::noise_psd_estimator_t::inputPow [private]
```

#### 4.356.3.5 snrPost1Debug

```
MHA_AC::waveform_t noise_psd_estimator::noise_psd_estimator_t::snrPost1Debug [private]
```

#### 4.356.3.6 GLRDebug

```
MHA_AC::waveform_t noise_psd_estimator::noise_psd_estimator_t::GLRDebug [private]
```

**4.356.3.7 PH1Debug**

**MHA\_AC::waveform\_t** noise\_psd\_estimator::noise\_psd\_estimator\_t::PH1Debug [private]

**4.356.3.8 estimateDebug**

**MHA\_AC::waveform\_t** noise\_psd\_estimator::noise\_psd\_estimator\_t::estimateDebug [private]

**4.356.3.9 inputSpec**

**MHA\_AC::spectrum\_t** noise\_psd\_estimator::noise\_psd\_estimator\_t::inputSpec [private]

**4.356.3.10 alphaPH1mean\_**

float noise\_psd\_estimator::noise\_psd\_estimator\_t::alphaPH1mean\_ [private]

**4.356.3.11 alphaPSD\_**

float noise\_psd\_estimator::noise\_psd\_estimator\_t::alphaPSD\_ [private]

**4.356.3.12 priorFact**

float noise\_psd\_estimator::noise\_psd\_estimator\_t::priorFact [private]

**4.356.3.13 xiOpt**

float noise\_psd\_estimator::noise\_psd\_estimator\_t::xiOpt [private]

**4.356.3.14 logGLRFact**

float noise\_psd\_estimator::noise\_psd\_estimator\_t::logGLRFact [private]

## 4.356.3.15 GLRexp

```
float noise_psd_estimator::noise_psd_estimator_t::GLRexp [private]
```

## 4.356.3.16 frameno

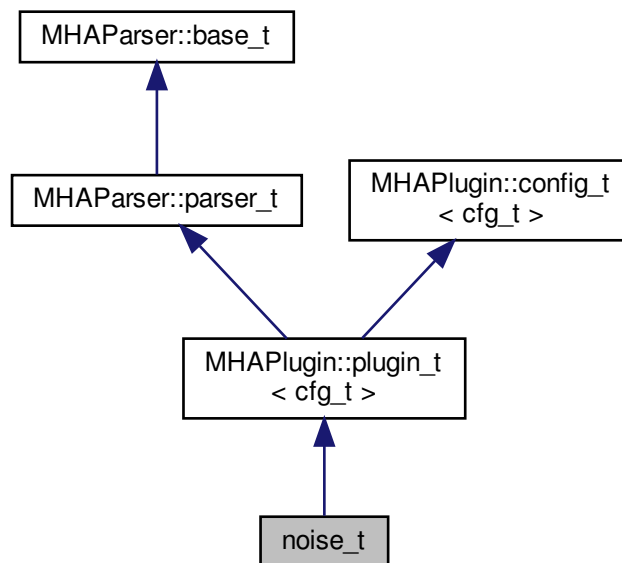
```
int noise_psd_estimator::noise_psd_estimator_t::frameno [private]
```

The documentation for this class was generated from the following file:

- **noise\_psd\_estimator.cpp**

## 4.357 noise\_t Class Reference

Inheritance diagram for noise\_t:



## Public Member Functions

- **noise\_t** (const **algo\_comm\_t** &, const std::string &, const std::string &)
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)
- void **prepare** ( **mhaconfig\_t** &)
- void **update\_cfg** ()

## Private Attributes

- `MHAParser::float_t lev`
- `MHAParser::kw_t mode`
- `MHAParser::float_t frozennoise_length`
- `MHAParser::int_t seed`
- `MHAEvents::patchbay_t< noise_t > patchbay`

## Additional Inherited Members

### 4.357.1 Constructor & Destructor Documentation

#### 4.357.1.1 `noise_t()`

```
noise_t::noise_t (
 const algo_comm_t & iac,
 const std::string & ,
 const std::string &)
```

### 4.357.2 Member Function Documentation

#### 4.357.2.1 `process()` [1/2]

```
mha_wave_t * noise_t::process (
 mha_wave_t * s)
```

#### 4.357.2.2 `process()` [2/2]

```
mha_spec_t * noise_t::process (
 mha_spec_t * s)
```

#### 4.357.2.3 `prepare()`

```
void noise_t::prepare (
 mhaconfig_t & tf) [virtual]
```

Implements `MHAPlugin::plugin_t< cfg_t >` (p. [1099](#)).



#### 4.357.2.4 update\_cfg()

```
void noise_t::update_cfg (
 void)
```

### 4.357.3 Member Data Documentation

#### 4.357.3.1 lev

```
MHAParser::float_t noise_t::lev [private]
```

#### 4.357.3.2 mode

```
MHAParser::kw_t noise_t::mode [private]
```

#### 4.357.3.3 frozennoise\_length

```
MHAParser::float_t noise_t::frozennoise_length [private]
```

#### 4.357.3.4 seed

```
MHAParser::int_t noise_t::seed [private]
```

#### 4.357.3.5 patchbay

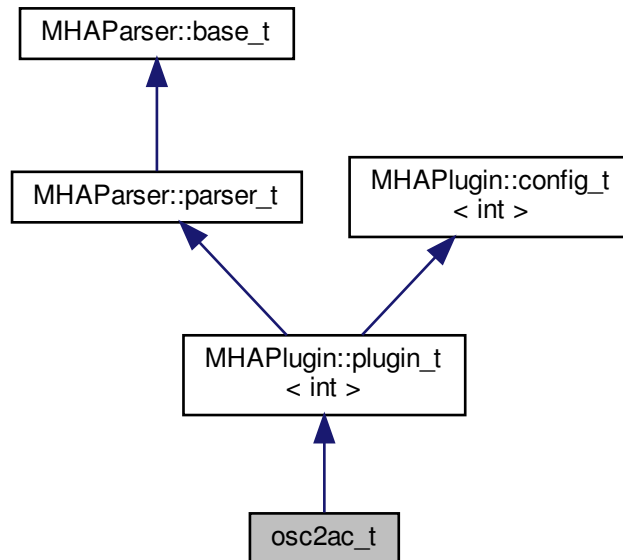
```
MHAEvents::patchbay_t< noise_t> noise_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **noise.cpp**

#### 4.358 osc2ac\_t Class Reference

Inheritance diagram for osc2ac\_t:



#### Public Member Functions

- **osc2ac\_t** ( **algo\_comm\_t** iac, const char \*chain, const char \*algo)
- void **prepare** ( **mhaconfig\_t** &)
- void **release** ()
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*s)
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*s)
- void **process** ()

#### Private Member Functions

- void **setlock** (bool b)

#### Private Attributes

- **MHAParser::string\_t** host
- **MHAParser::string\_t** port
- **MHAParser::vstring\_t** vars
- **MHAParser::vint\_t** size
- **MHAEvents::patchbay\_t**< **osc2ac\_t** > patchbay
- **std::unique\_ptr**< **osc\_server\_t** > srv

## Additional Inherited Members

### 4.358.1 Constructor & Destructor Documentation

#### 4.358.1.1 osc2ac\_t()

```
osc2ac_t::osc2ac_t (
 algo_comm_t iac,
 const char * chain,
 const char * algo)
```

### 4.358.2 Member Function Documentation

#### 4.358.2.1 prepare()

```
void osc2ac_t::prepare (
 mhaconfig_t & cf) [virtual]
```

Implements **MHAPlugin::plugin\_t< int >** (p. [1099](#)).

#### 4.358.2.2 release()

```
void osc2ac_t::release (
 void) [virtual]
```

Reimplemented from **MHAPlugin::plugin\_t< int >** (p. [1100](#)).

#### 4.358.2.3 process() [1/3]

```
mha_wave_t* osc2ac_t::process (
 mha_wave_t * s) [inline]
```

**4.358.2.4 process()** [2/3]

```
mha_spec_t* osc2ac_t::process (
 mha_spec_t * s) [inline]
```

**4.358.2.5 process()** [3/3]

```
void osc2ac_t::process (
 void)
```

**4.358.2.6 setlock()**

```
void osc2ac_t::setlock (
 bool b) [private]
```

**4.358.3 Member Data Documentation****4.358.3.1 host**

```
MHAParser::string_t osc2ac_t::host [private]
```

**4.358.3.2 port**

```
MHAParser::string_t osc2ac_t::port [private]
```

**4.358.3.3 vars**

```
MHAParser::vstring_t osc2ac_t::vars [private]
```

**4.358.3.4 size**

```
MHAParser::vint_t osc2ac_t::size [private]
```

4.358.3.5 **patchbay**

```
MHAEvents::patchbay_t< osc2ac_t> osc2ac_t::patchbay [private]
```

4.358.3.6 **srv**

```
std::unique_ptr< osc_server_t> osc2ac_t::srv [private]
```

The documentation for this class was generated from the following file:

- **osc2ac.cpp**

4.359 **osc\_server\_t** Class Reference

OSC receiver implemented using liblo.

**Public Member Functions**

- **osc\_server\_t** (const std::string &multicast\_addr, const std::string &port)
- **~osc\_server\_t** ()
- void **server\_stop** ()
- void **server\_start** ()
- void **insert\_variable** (const std::string &name, unsigned int **size**, **algo\_comm\_t** hAC)
- void **sync\_osc2ac** ()
- void **ac\_insert** ()

**Static Public Member Functions**

- static void **error\_h** (int num, const char \*msg, const char \*path)

**Private Attributes**

- std::vector< std::unique\_ptr< **osc\_variable\_t** > > **pVars**
- lo\_server\_thread **lost**
- bool **is\_running**

4.359.1 **Detailed Description**

OSC receiver implemented using liblo.

## 4.359.2 Constructor & Destructor Documentation

### 4.359.2.1 `osc_server_t()`

```
osc_server_t::osc_server_t (
 const std::string & multicast_addr,
 const std::string & port)
```

### 4.359.2.2 `~osc_server_t()`

```
osc_server_t::~~osc_server_t ()
```

## 4.359.3 Member Function Documentation

### 4.359.3.1 `server_stop()`

```
void osc_server_t::server_stop ()
```

### 4.359.3.2 `server_start()`

```
void osc_server_t::server_start ()
```

### 4.359.3.3 `insert_variable()`

```
void osc_server_t::insert_variable (
 const std::string & name,
 unsigned int size,
 algo_comm_t hAC)
```

### 4.359.3.4 `sync_osc2ac()`

```
void osc_server_t::sync_osc2ac ()
```

#### 4.359.3.5 **ac\_insert()**

```
void osc_server_t::ac_insert ()
```

#### 4.359.3.6 **error\_h()**

```
void osc_server_t::error_h (
 int num,
 const char * msg,
 const char * path) [static]
```

### 4.359.4 Member Data Documentation

#### 4.359.4.1 **pVars**

```
std::vector<std::unique_ptr< osc_variable_t> > osc_server_t::pVars [private]
```

#### 4.359.4.2 **lost**

```
lo_server_thread osc_server_t::lost [private]
```

#### 4.359.4.3 **is\_running**

```
bool osc_server_t::is_running [private]
```

The documentation for this class was generated from the following file:

- **osc2ac.cpp**

### 4.360 **osc\_variable\_t** Class Reference

Class for converting messages received at a single osc address to a single AC variable.

## Public Member Functions

- **osc\_variable\_t** (const **osc\_variable\_t** &)=delete  
*An instance of this class cannot safely be copied.*
- **osc\_variable\_t** (const std::string &name, unsigned int **size**, **algo\_comm\_t** hAC, lo\_↔server\_thread lost)  
*Constructor.*
- void **sync\_osc2ac** ()  
*Copies the latest OSC data from the OSC storage to the AC storage.*
- void **ac\_insert** ()  
*Insert/Re-insert the AC variable into AC space.*
- int **handler** (const char \*types, lo\_arg \*\*argv, int argc)  
*Callback function called by network thread managed by liblo when a new OSC message has been received.*

## Static Public Member Functions

- static int **handler** (const char \*path, const char \*types, lo\_arg \*\*argv, int argc, lo\_↔message msg, void \*user\_data)  
*Callback function called by network thread managed by liblo when a new OSC message has been received.*

## Private Attributes

- **MHA\_AC::waveform\_t ac\_data**  
*AC variable storage.*
- **MHASignal::waveform\_t osc\_data**  
*OSC variable storage.*
- std::string **name\_**  
*Name of AC variable and OSC address without the initial slash.*

### 4.360.1 Detailed Description

Class for converting messages received at a single osc address to a single AC variable.

OSC variables are received asynchronously in a network thread and must not modify their AC variables directly, because MHA plugins may only access their AC variables while executing their prepare, release, or process callbacks.

One osc2ac plugin uses multiple instances of **osc\_variable\_t** (p. 1277), one for each mapping of an OSC address to an AC variable.

### 4.360.2 Constructor & Destructor Documentation



**4.360.2.1 osc\_variable\_t()** [1/2]

```
osc_variable_t::osc_variable_t (
 const osc_variable_t &) [delete]
```

An instance of this class cannot safely be copied.

**4.360.2.2 osc\_variable\_t()** [2/2]

```
osc_variable_t::osc_variable_t (
 const std::string & name,
 unsigned int size,
 algo_comm_t hAC,
 lo_server_thread lost)
```

Constructor.

Allocates memory.

**Parameters**

|             |                                                             |
|-------------|-------------------------------------------------------------|
| <i>name</i> | The name of the AC variable that stores the latest value.   |
| <i>size</i> | Number of elements to copy from OSC message to AC variable. |
| <i>hAC</i>  | Handle of Algorithm Communication Variable space.           |
| <i>lost</i> | libLO Server Thread.                                        |

**4.360.3 Member Function Documentation****4.360.3.1 sync\_osc2ac()**

```
void osc_variable_t::sync_osc2ac () [inline]
```

Copies the latest OSC data from the OSC storage to the AC storage.

To be executed during process callback of osc2ac plugin.

**4.360.3.2 ac\_insert()**

```
void osc_variable_t::ac_insert () [inline]
```

Insert/Re-insert the AC variable into AC space.

Should be done in each process callback.

**4.360.3.3 handler()** [1/2]

```
int osc_variable_t::handler (
 const char * path,
 const char * types,
 lo_arg ** argv,
 int argc,
 lo_message msg,
 void * user_data) [static]
```

Callback function called by network thread managed by liblo when a new OSC message has been received.

This static method forwards to the instance method by casting `user_data` to `osc_variable_t*`.

**Parameters**

|                  |                                                      |
|------------------|------------------------------------------------------|
| <i>path</i>      | Unused.                                              |
| <i>types</i>     | The OSC data type indicator of the received message. |
| <i>argv</i>      | Array of received OSC data.                          |
| <i>argc</i>      | Number of elements in array of received OSC data.    |
| <i>msg</i>       | Unused.                                              |
| <i>user_data</i> | Pointer to <b>osc_variable_t</b> (p. 1277) instance. |

**Returns**

1 if the message was accepted, 0 if not.

**4.360.3.4 handler()** [2/2]

```
int osc_variable_t::handler (
 const char * types,
 lo_arg ** argv,
 int argc)
```

Callback function called by network thread managed by liblo when a new OSC message has been received.

This instance method checks if the received data is of expected length and contains only floats, and if yes, copies the data into the buffer `osc_data` where the latest received data for this osc address is stored until it is either overwritten by the next data for the same osc address or copied to an AC variable.

**Parameters**

|              |                                                      |
|--------------|------------------------------------------------------|
| <i>types</i> | The OSC data type indicator of the received message. |
| <i>argv</i>  | Array of received OSC data.                          |
| <i>argc</i>  | Number of elements in array of received OSC data.    |

## Returns

1 if the message had correct length and contained only floats, 0 if not.

## 4.360.4 Member Data Documentation

### 4.360.4.1 `ac_data`

```
MHA_AC::waveform_t osc_variable_t::ac_data [private]
```

AC variable storage.

### 4.360.4.2 `osc_data`

```
MHASignal::waveform_t osc_variable_t::osc_data [private]
```

OSC variable storage.

### 4.360.4.3 `name_`

```
std::string osc_variable_t::name_ [private]
```

Name of AC variable and OSC address without the initial slash.

The documentation for this class was generated from the following file:

- **`osc2ac.cpp`**



## Private Attributes

- **MHAParser::int\_t nfft**  
*FFT length to be used, zero-padding is FFT length-wndlength.*
- **MHAParser::int\_t nwnd**  
*Window length to be used (overlap is 1-fragsize/wndlength)*
- **MHAParser::float\_t wndpos**  
*Relative position of zero padding (0 end, 0.5 center, 1 start)*
- **MHAParser::window\_t window**
- **MHAParser::float\_t wndexp**
- **MHAParser::window\_t zerowindow**
- **MHAParser::bool\_t strict\_window\_ratio**  
*Disallow window sizes that are not a multiple of the hop size ("fragsize" in MHA) a by power of two.*
- **MHAParser::mhapluginloader\_t plugloader**
- **MHAParser::float\_mon\_t prescale**
- **MHAParser::float\_mon\_t postscale**
- **std::string algo**
- **mhaconfig\_t cf\_in**
- **mhaconfig\_t cf\_out**

## Additional Inherited Members

## 4.361.1 Constructor &amp; Destructor Documentation

## 4.361.1.1 overlapadd\_if\_t()

```
overlapadd::overlapadd_if_t::overlapadd_if_t (
 const algo_comm_t & iac,
 const std::string & ,
 const std::string & ialg)
```

## 4.361.1.2 ~overlapadd\_if\_t()

```
overlapadd::overlapadd_if_t::~~overlapadd_if_t () [default]
```

## 4.361.2 Member Function Documentation

**4.361.2.1 prepare()**

```
void overlapadd::overlapadd_if_t::prepare (
 mhaconfig_t & t) [virtual]
```

Implements **MHAPlugin::plugin\_t< overlapadd\_t >** (p. [1099](#)).

**4.361.2.2 release()**

```
void overlapadd::overlapadd_if_t::release (
 void) [virtual]
```

Reimplemented from **MHAPlugin::plugin\_t< overlapadd\_t >** (p. [1100](#)).

**4.361.2.3 process()**

```
mha_wave_t * overlapadd::overlapadd_if_t::process (
 mha_wave_t * wave_in)
```

**4.361.2.4 update()**

```
void overlapadd::overlapadd_if_t::update () [private]
```

**4.361.2.5 setlock()**

```
void overlapadd::overlapadd_if_t::setlock (
 bool b) [inline], [private]
```

Lock/Unlock all configuration variables.

**Parameters**

|          |                    |
|----------|--------------------|
| <i>b</i> | Desired lock state |
|----------|--------------------|

**4.361.3 Member Data Documentation**

#### 4.361.3.1 nfft

**MHAParser::int\_t** overlapadd::overlapadd\_if\_t::nfft [private]

FFT length to be used, zero-padding is FFT length-wndlength.

#### 4.361.3.2 nwnd

**MHAParser::int\_t** overlapadd::overlapadd\_if\_t::nwnd [private]

Window length to be used (overlap is 1-fragsize/wndlength)

#### 4.361.3.3 wndpos

**MHAParser::float\_t** overlapadd::overlapadd\_if\_t::wndpos [private]

Relative position of zero padding (0 end, 0.5 center, 1 start)

#### 4.361.3.4 window

**MHAParser::window\_t** overlapadd::overlapadd\_if\_t::window [private]

#### 4.361.3.5 wndexp

**MHAParser::float\_t** overlapadd::overlapadd\_if\_t::wndexp [private]

#### 4.361.3.6 zerowindow

**MHAParser::window\_t** overlapadd::overlapadd\_if\_t::zerowindow [private]

#### 4.361.3.7 strict\_window\_ratio

**MHAParser::bool\_t** overlapadd::overlapadd\_if\_t::strict\_window\_ratio [private]

Disallow window sizes that are not a multiple of the hop size ("fragsize" in MHA) a by power of two.

#### 4.361.3.8 plugloader

**MHAParser::mhapluginloader\_t** overlapadd::overlapadd\_if\_t::plugloader [private]

#### 4.361.3.9 prescale

**MHAParser::float\_mon\_t** overlapadd::overlapadd\_if\_t::prescale [private]

#### 4.361.3.10 postscale

**MHAParser::float\_mon\_t** overlapadd::overlapadd\_if\_t::postscale [private]

#### 4.361.3.11 algo

std::string overlapadd::overlapadd\_if\_t::algo [private]

#### 4.361.3.12 cf\_in

**mhaconfig\_t** overlapadd::overlapadd\_if\_t::cf\_in [private]

#### 4.361.3.13 cf\_out

**mhaconfig\_t** overlapadd::overlapadd\_if\_t::cf\_out [private]

The documentation for this class was generated from the following files:

- **overlapadd.hh**
- **overlapadd.cpp**

### 4.362 overlapadd::overlapadd\_t Class Reference

#### Public Member Functions

- **overlapadd\_t** ( **mhaconfig\_t** spar\_in, **mhaconfig\_t** spar\_out, float wexp, float wndpos, const **MHAParser::window\_t** &window, const **MHAParser::window\_t** &zerowindow, float &prescale\_fac, float &postscale\_fac)
- **~overlapadd\_t** ()
- **mha\_spec\_t** \* **wave2spec** ( **mha\_wave\_t** \*)
- **mha\_wave\_t** \* **spec2wave** ( **mha\_spec\_t** \*)



### Private Member Functions

- void **wave2spec\_hop\_forward** ( mha\_wave\_t \*)
- void **wave2spec\_apply\_window** (void)
- mha\_spec\_t \* **wave2spec\_compute\_fft** (void)

### Private Attributes

- mha\_fft\_t **fft**
- MHAWindow::base\_t **prewnd**
- MHAWindow::base\_t **postwnd**
- MHASignal::waveform\_t **wave\_in1**
- MHASignal::waveform\_t **wave\_out1**
- MHASignal::spectrum\_t **spec\_in**
- MHASignal::waveform\_t **calc\_out**
- MHASignal::waveform\_t **out\_buf**
- MHASignal::waveform\_t **write\_buf**
- unsigned int **n\_zero**
- unsigned int **n\_pad1**
- unsigned int **n\_pad2**

## 4.362.1 Constructor & Destructor Documentation

### 4.362.1.1 overlapadd\_t()

```
overlapadd::overlapadd_t::overlapadd_t (
 mhaconfig_t spar_in,
 mhaconfig_t spar_out,
 float wexp,
 float wndpos,
 const MHAParser::window_t & window,
 const MHAParser::window_t & zerowindow,
 float & prescale_fac,
 float & postscale_fac)
```

### 4.362.1.2 ~overlapadd\_t()

```
overlapadd::overlapadd_t::~~overlapadd_t ()
```

## 4.362.2 Member Function Documentation

#### 4.362.2.1 wave2spec()

```
mha_spec_t * overlapadd::overlapadd_t::wave2spec (
 mha_wave_t * s)
```

#### 4.362.2.2 spec2wave()

```
mha_wave_t * overlapadd::overlapadd_t::spec2wave (
 mha_spec_t * s)
```

#### 4.362.2.3 wave2spec\_hop\_forward()

```
void overlapadd::overlapadd_t::wave2spec_hop_forward (
 mha_wave_t * s) [private]
```

#### 4.362.2.4 wave2spec\_apply\_window()

```
void overlapadd::overlapadd_t::wave2spec_apply_window (
 void) [private]
```

#### 4.362.2.5 wave2spec\_compute\_fft()

```
mha_spec_t * overlapadd::overlapadd_t::wave2spec_compute_fft (
 void) [private]
```

### 4.362.3 Member Data Documentation

#### 4.362.3.1 fft

```
mha_fft_t overlapadd::overlapadd_t::fft [private]
```

#### 4.362.3.2 prewnd

**MHAWindow::base\_t** overlapadd::overlapadd\_t::prewnd [private]

#### 4.362.3.3 postwnd

**MHAWindow::base\_t** overlapadd::overlapadd\_t::postwnd [private]

#### 4.362.3.4 wave\_in1

**MHASignal::waveform\_t** overlapadd::overlapadd\_t::wave\_in1 [private]

#### 4.362.3.5 wave\_out1

**MHASignal::waveform\_t** overlapadd::overlapadd\_t::wave\_out1 [private]

#### 4.362.3.6 spec\_in

**MHASignal::spectrum\_t** overlapadd::overlapadd\_t::spec\_in [private]

#### 4.362.3.7 calc\_out

**MHASignal::waveform\_t** overlapadd::overlapadd\_t::calc\_out [private]

#### 4.362.3.8 out\_buf

**MHASignal::waveform\_t** overlapadd::overlapadd\_t::out\_buf [private]

#### 4.362.3.9 write\_buf

**MHASignal::waveform\_t** overlapadd::overlapadd\_t::write\_buf [private]

#### 4.362.3.10 n\_zero

```
unsigned int overlapadd::overlapadd_t::n_zero [private]
```

#### 4.362.3.11 n\_pad1

```
unsigned int overlapadd::overlapadd_t::n_pad1 [private]
```

#### 4.362.3.12 n\_pad2

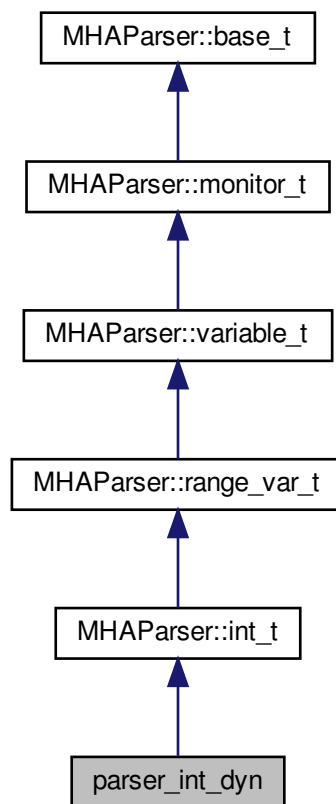
```
unsigned int overlapadd::overlapadd_t::n_pad2 [private]
```

The documentation for this class was generated from the following files:

- **overlapadd.hh**
- **overlapadd.cpp**

### 4.363 parser\_int\_dyn Class Reference

Inheritance diagram for parser\_int\_dyn:



## Public Member Functions

- **parser\_int\_dyn** (const std::string &help\_text, const std::string &initial\_value, const std::string &range)
- void **set\_max\_angle\_ind** (unsigned int max\_ind)

## Additional Inherited Members

### 4.363.1 Constructor & Destructor Documentation

#### 4.363.1.1 parser\_int\_dyn()

```
parser_int_dyn::parser_int_dyn (
 const std::string & help_text,
 const std::string & initial_value,
 const std::string & range) [inline]
```

### 4.363.2 Member Function Documentation

#### 4.363.2.1 set\_max\_angle\_ind()

```
void parser_int_dyn::set_max_angle_ind (
 unsigned int max_ind) [inline]
```

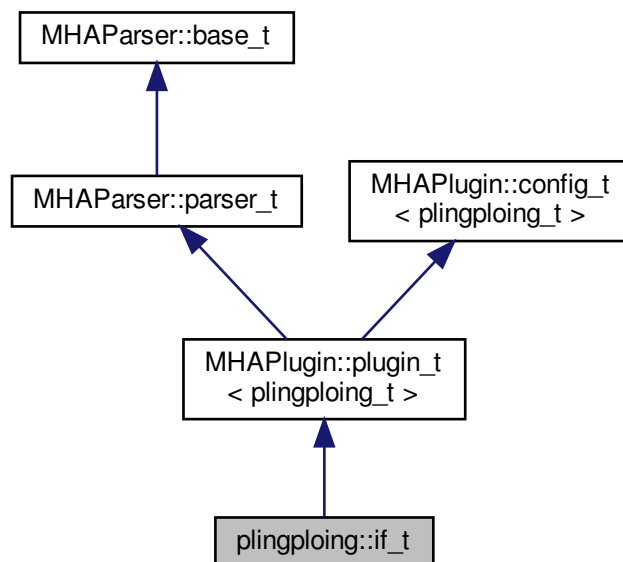
The documentation for this class was generated from the following file:

- **steerbf.h**

#### 4.364 plingploing::if\_t Class Reference

Plugin class of the plingploing music generator.

Inheritance diagram for plingploing::if\_t:



##### Public Member Functions

- **if\_t** ( **algo\_comm\_t**, const char \*, const char \*)
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)
- void **prepare** ( **mhaconfig\_t** &cf)

##### Private Member Functions

- void **update** ()

##### Private Attributes

- **MHAEvents::patchbay\_t** < **if\_t** > **patchbay**
- **MHAParser::float\_t** **level**  
*Output level in dB SPL.*
- **MHAParser::float\_t** **pitch**  
*Bass pitch in Hz.*

- **MHAParser::float\_t fun1\_key**  
*Key1.*
- **MHAParser::float\_t fun1\_range**  
*Range1.*
- **MHAParser::float\_t fun2\_key**  
*Key 2.*
- **MHAParser::float\_t fun2\_range**  
*Range 2.*
- **MHAParser::float\_t bpm**  
*Speed in beats per minute (bpm)*
- **MHAParser::float\_t minlen**  
*Minimum note length in beats.*
- **MHAParser::float\_t maxlen**  
*Maximum note length in beats.*
- **MHAParser::float\_t bassmod**  
*Bass key modulation depth.*
- **MHAParser::float\_t bassperiod**  
*Bass key modulation period.*

#### Additional Inherited Members

##### 4.364.1 Detailed Description

Plugin class of the plingploing music generator.

##### 4.364.2 Constructor & Destructor Documentation

###### 4.364.2.1 if\_t()

```
plingploing::if_t::if_t (
 algo_comm_t iac,
 const char * ,
 const char *)
```

##### 4.364.3 Member Function Documentation

#### 4.364.3.1 process()

```
mha_wave_t * plingploing::if_t::process (
 mha_wave_t * s)
```

#### 4.364.3.2 prepare()

```
void plingploing::if_t::prepare (
 mhaconfig_t & cf) [virtual]
```

Implements **MHAPLugin::plugin\_t**< **plingploing\_t** > (p. [1099](#)).

#### 4.364.3.3 update()

```
void plingploing::if_t::update () [private]
```

### 4.364.4 Member Data Documentation

#### 4.364.4.1 patchbay

```
MHAEvents::patchbay_t< if_t> plingploing::if_t::patchbay [private]
```

#### 4.364.4.2 level

```
MHAParser::float_t plingploing::if_t::level [private]
```

Output level in dB SPL.

#### 4.364.4.3 pitch

```
MHAParser::float_t plingploing::if_t::pitch [private]
```

Bass pitch in Hz.



#### 4.364.4.4 fun1\_key

```
MHAParser::float_t plingploing::if_t::fun1_key [private]
```

Key1.

#### 4.364.4.5 fun1\_range

```
MHAParser::float_t plingploing::if_t::fun1_range [private]
```

Range1.

#### 4.364.4.6 fun2\_key

```
MHAParser::float_t plingploing::if_t::fun2_key [private]
```

Key 2.

#### 4.364.4.7 fun2\_range

```
MHAParser::float_t plingploing::if_t::fun2_range [private]
```

Range 2.

#### 4.364.4.8 bpm

```
MHAParser::float_t plingploing::if_t::bpm [private]
```

Speed in beats per minute (bpm)

#### 4.364.4.9 minlen

```
MHAParser::float_t plingploing::if_t::minlen [private]
```

Minimum note length in beats.

#### 4.364.4.10 maxlen

```
MHAParser::float_t plingploing::if_t::maxlen [private]
```

Maximum note length in beats.

#### 4.364.4.11 bassmod

```
MHAParser::float_t plingploing::if_t::bassmod [private]
```

Bass key modulation depth.

#### 4.364.4.12 bassperiod

```
MHAParser::float_t plingploing::if_t::bassperiod [private]
```

Bass key modulation period.

The documentation for this class was generated from the following file:

- **plingploing.cpp**

### 4.365 plingploing::plingploing\_t Class Reference

Run-time configuration of the plingploing music generator.

#### Public Member Functions

- **plingploing\_t** ( **mhaconfig\_t**, **mha\_real\_t** level, **mha\_real\_t** pitch, **mha\_real\_t** k1, **mha\_real\_t** k2, **mha\_real\_t** i1, **mha\_real\_t** i2, **mha\_real\_t** bpm, **mha\_real\_t** minlen, **mha\_real\_t** maxlen, **mha\_real\_t** bassmod, **mha\_real\_t** bassperiod)
- void **process** ( **mha\_wave\_t** \*)

### Private Attributes

- **mhaconfig\_t** cf
- **mha\_real\_t** pitch\_
- unsigned int **bt**
- unsigned int **t**
- unsigned int **len**
- **mha\_real\_t** dur\_
- **mha\_real\_t** minlen\_
- **mha\_real\_t** maxlen\_
- **mha\_real\_t** bass
- **mha\_real\_t** freq
- **mha\_real\_t** fun1\_key
- **mha\_real\_t** fun1\_range
- **mha\_real\_t** fun1
- **mha\_real\_t** fun2
- **mha\_real\_t** fun2\_key
- **mha\_real\_t** fun2\_range
- **mha\_real\_t** dist
- **mha\_real\_t** dist1
- **mha\_real\_t** alph
- **mha\_real\_t** rms
- **mha\_real\_t** bassmod\_
- **mha\_real\_t** bassperiod\_
- **MHAWindow::hanning\_t** hann1
- **MHAWindow::hanning\_t** hann2
- **mha\_real\_t** level

#### 4.365.1 Detailed Description

Run-time configuration of the plingploing music generator.

#### 4.365.2 Constructor & Destructor Documentation

#### 4.365.2.1 plingploing\_t()

```
plingploing::plingploing_t::plingploing_t (
 mhaconfig_t c,
 mha_real_t level,
 mha_real_t pitch,
 mha_real_t k1,
 mha_real_t k2,
 mha_real_t i1,
 mha_real_t i2,
 mha_real_t bpm,
 mha_real_t minlen,
 mha_real_t maxlen,
 mha_real_t bassmod,
 mha_real_t bassperiod)
```

#### 4.365.3 Member Function Documentation

##### 4.365.3.1 process()

```
void plingploing::plingploing_t::process (
 mha_wave_t * s)
```

#### 4.365.4 Member Data Documentation

##### 4.365.4.1 cf

```
mhaconfig_t plingploing::plingploing_t::cf [private]
```

##### 4.365.4.2 pitch\_

```
mha_real_t plingploing::plingploing_t::pitch_ [private]
```

##### 4.365.4.3 bt

```
unsigned int plingploing::plingploing_t::bt [private]
```

#### 4.365.4.4 t

unsigned int plingploing::plingploing\_t::t [private]

#### 4.365.4.5 len

unsigned int plingploing::plingploing\_t::len [private]

#### 4.365.4.6 dur\_

mha\_real\_t plingploing::plingploing\_t::dur\_ [private]

#### 4.365.4.7 minlen\_

mha\_real\_t plingploing::plingploing\_t::minlen\_ [private]

#### 4.365.4.8 maxlen\_

mha\_real\_t plingploing::plingploing\_t::maxlen\_ [private]

#### 4.365.4.9 bass

mha\_real\_t plingploing::plingploing\_t::bass [private]

#### 4.365.4.10 freq

mha\_real\_t plingploing::plingploing\_t::freq [private]

#### 4.365.4.11 fun1\_key

mha\_real\_t plingploing::plingploing\_t::fun1\_key [private]

**4.365.4.12 fun1\_range**

```
mha_real_t plingploing::plingploing_t::fun1_range [private]
```

**4.365.4.13 fun1**

```
mha_real_t plingploing::plingploing_t::fun1 [private]
```

**4.365.4.14 fun2**

```
mha_real_t plingploing::plingploing_t::fun2 [private]
```

**4.365.4.15 fun2\_key**

```
mha_real_t plingploing::plingploing_t::fun2_key [private]
```

**4.365.4.16 fun2\_range**

```
mha_real_t plingploing::plingploing_t::fun2_range [private]
```

**4.365.4.17 dist**

```
mha_real_t plingploing::plingploing_t::dist [private]
```

**4.365.4.18 dist1**

```
mha_real_t plingploing::plingploing_t::dist1 [private]
```

**4.365.4.19 alph**

```
mha_real_t plingploing::plingploing_t::alph [private]
```

## 4.365.4.20 rms

```
mha_real_t plingploing::plingploing_t::rms [private]
```

## 4.365.4.21 bassmod\_

```
mha_real_t plingploing::plingploing_t::bassmod_ [private]
```

## 4.365.4.22 bassperiod\_

```
mha_real_t plingploing::plingploing_t::bassperiod_ [private]
```

## 4.365.4.23 hann1

```
MHAWindow::hanning_t plingploing::plingploing_t::hann1 [private]
```

## 4.365.4.24 hann2

```
MHAWindow::hanning_t plingploing::plingploing_t::hann2 [private]
```

## 4.365.4.25 level

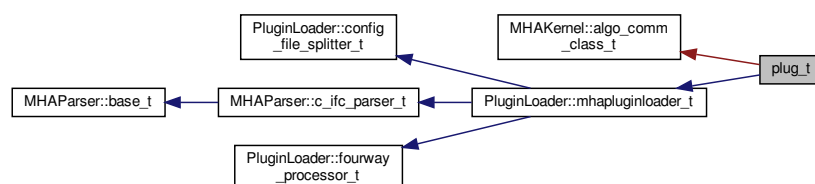
```
mha_real_t plingploing::plingploing_t::level [private]
```

The documentation for this class was generated from the following file:

- **plingploing.cpp**

## 4.366 plug\_t Class Reference

Inheritance diagram for plug\_t:



## Public Member Functions

- **plug\_t** (const std::string & **libname**, const std::string &chain, const std::string &algo)
- **~plug\_t** () throw ()
- **MHAProc\_wave2wave\_t** **get\_process\_wave** ()
- **MHAProc\_wave2spec\_t** **get\_process\_spec** ()
- void \* **get\_handle** ()
- **algo\_comm\_t** **get\_ac** ()

## Additional Inherited Members

### 4.366.1 Constructor & Destructor Documentation

#### 4.366.1.1 plug\_t()

```
plug_t::plug_t (
 const std::string & libname,
 const std::string & chain,
 const std::string & algo)
```

#### 4.366.1.2 ~plug\_t()

```
plug_t::~~plug_t () throw () [inline]
```

### 4.366.2 Member Function Documentation

#### 4.366.2.1 get\_process\_wave()

```
MHAProc_wave2wave_t plug_t::get_process_wave ()
```

#### 4.366.2.2 get\_process\_spec()

```
MHAProc_wave2spec_t plug_t::get_process_spec ()
```



## 4.366.2.3 get\_handle()

```
void * plug_t::get_handle ()
```

## 4.366.2.4 get\_ac()

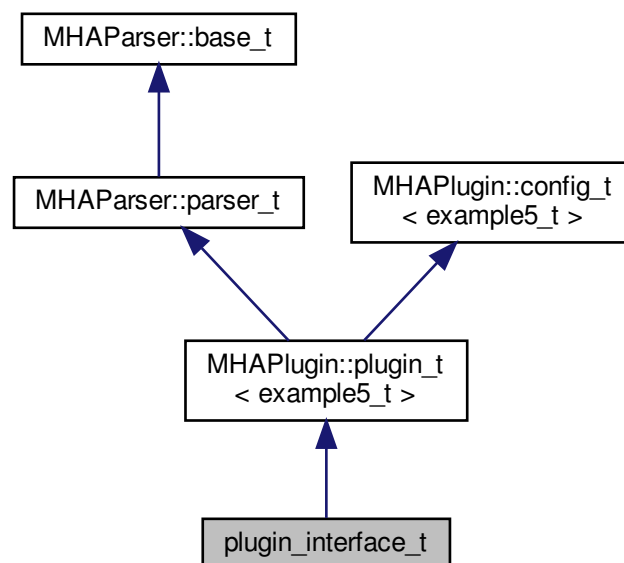
```
algo_comm_t plug_t::get_ac () [inline]
```

The documentation for this class was generated from the following file:

- **analysispath.cpp**

## 4.367 plugin\_interface\_t Class Reference

Inheritance diagram for plugin\_interface\_t:



## Public Member Functions

- **plugin\_interface\_t** (const **algo\_comm\_t** &, const std::string &, const std::string &)
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)
- void **prepare** ( **mhaconfig\_t** &)

## Private Member Functions

- void **update\_cfg** ()

## Private Attributes

- **MHAParser::int\_t** **scale\_ch**
- **MHAParser::float\_t** **factor**
- **MHAEvents::patchbay\_t** < **plugin\_interface\_t** > **patchbay**

## Additional Inherited Members

### 4.367.1 Constructor & Destructor Documentation

#### 4.367.1.1 plugin\_interface\_t()

```
plugin_interface_t::plugin_interface_t (
 const algo_comm_t & iac,
 const std::string & ,
 const std::string &)
```

### 4.367.2 Member Function Documentation

#### 4.367.2.1 process()

```
mha_spec_t * plugin_interface_t::process (
 mha_spec_t * spec)
```

#### 4.367.2.2 prepare()

```
void plugin_interface_t::prepare (
 mhaconfig_t & tfcfg) [virtual]
```

Implements **MHAPlugin::plugin\_t** < **example5\_t** > (p. [1099](#)).

#### 4.367.2.3 update\_cfg()

```
void plugin_interface_t::update_cfg () [private]
```

### 4.367.3 Member Data Documentation

#### 4.367.3.1 scale\_ch

```
MHAParser::int_t plugin_interface_t::scale_ch [private]
```

#### 4.367.3.2 factor

```
MHAParser::float_t plugin_interface_t::factor [private]
```

#### 4.367.3.3 patchbay

```
MHAEvents::patchbay_t< plugin_interface_t> plugin_interface_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **example5.cpp**

### 4.368 pluginbrowser\_t Class Reference

#### Public Member Functions

- **pluginbrowser\_t** ()
- void **get\_paths** ()
- **plugindescription\_t** **scan\_plugin** (const std::string &name)
- void **add\_plugins** ()
- void **clear\_plugins** ()
- void **scan\_plugins** ()
- void **add\_plugin** (const std::string &name)
- std::list< **plugindescription\_t** > **get\_plugins** () const

## Private Attributes

- `std::string` **plugin\_extension**
- `std::list< std::string >` **library\_paths**
- `std::list< pluginindescription_t >` **plugins**
- `std::map< std::string, pluginloader_t * >` **p**

## 4.368.1 Constructor & Destructor Documentation

### 4.368.1.1 pluginbrowser\_t()

```
pluginbrowser_t::pluginbrowser_t ()
```

## 4.368.2 Member Function Documentation

### 4.368.2.1 get\_paths()

```
void pluginbrowser_t::get_paths ()
```

### 4.368.2.2 scan\_plugin()

```
pluginindescription_t pluginbrowser_t::scan_plugin (
 const std::string & name)
```

### 4.368.2.3 add\_plugins()

```
void pluginbrowser_t::add_plugins ()
```

### 4.368.2.4 clear\_plugins()

```
void pluginbrowser_t::clear_plugins ()
```

#### 4.368.2.5 scan\_plugins()

```
void pluginbrowser_t::scan_plugins ()
```

#### 4.368.2.6 add\_plugin()

```
void pluginbrowser_t::add_plugin (
 const std::string & name)
```

#### 4.368.2.7 get\_plugins()

```
std::list< pluginindexdescription_t> pluginbrowser_t::get_plugins () const [inline]
```

### 4.368.3 Member Data Documentation

#### 4.368.3.1 plugin\_extension

```
std::string pluginbrowser_t::plugin_extension [private]
```

#### 4.368.3.2 library\_paths

```
std::list<std::string> pluginbrowser_t::library_paths [private]
```

#### 4.368.3.3 plugins

```
std::list< pluginindexdescription_t> pluginbrowser_t::plugins [private]
```

#### 4.368.3.4 p

```
std::map<std::string, pluginloader_t*> pluginbrowser_t::p [private]
```

The documentation for this class was generated from the following files:

- **pluginbrowser.h**
- **pluginbrowser.cpp**

## 4.369 plugindescription\_t Class Reference

### Public Attributes

- `std::string` **name**
- `std::string` **fullname**
- `std::string` **documentation**
- `std::vector< std::string >` **categories**
- `bool` **wave2wave**
- `bool` **wave2spec**
- `bool` **spec2wave**
- `bool` **spec2spec**
- `std::vector< std::string >` **query\_cmds**
- `std::map< std::string, std::string >` **queries**

### 4.369.1 Member Data Documentation

#### 4.369.1.1 name

`std::string plugindescription_t::name`

#### 4.369.1.2 fullname

`std::string plugindescription_t::fullname`

#### 4.369.1.3 documentation

`std::string plugindescription_t::documentation`

#### 4.369.1.4 categories

`std::vector<std::string> plugindescription_t::categories`

#### 4.369.1.5 wave2wave

```
bool plugindescription_t::wave2wave
```

#### 4.369.1.6 wave2spec

```
bool plugindescription_t::wave2spec
```

#### 4.369.1.7 spec2wave

```
bool plugindescription_t::spec2wave
```

#### 4.369.1.8 spec2spec

```
bool plugindescription_t::spec2spec
```

#### 4.369.1.9 query\_cmds

```
std::vector<std::string> plugindescription_t::query_cmds
```

#### 4.369.1.10 queries

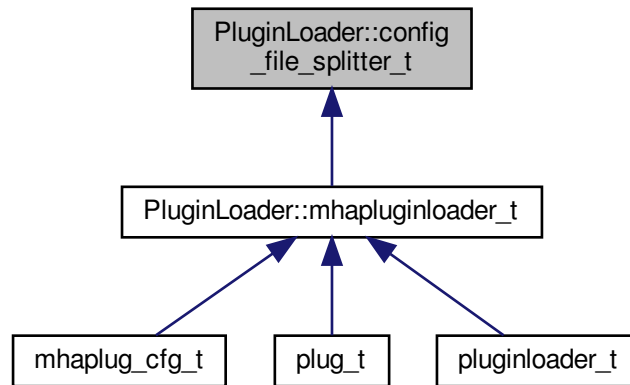
```
std::map<std::string, std::string> plugindescription_t::queries
```

The documentation for this class was generated from the following file:

- **pluginbrowser.h**

#### 4.370 PluginLoader::config\_file\_splitter\_t Class Reference

Inheritance diagram for PluginLoader::config\_file\_splitter\_t:



##### Public Member Functions

- **config\_file\_splitter\_t** (const std::string &name)
- const std::string & **get\_configname** () const
- const std::string & **get\_libname** () const
- const std::string & **get\_oriname** () const
- const std::string & **get\_configfile** () const

##### Private Attributes

- std::string **libname**
- std::string **configname**
- std::string **oriname**
- std::string **configfile**

#### 4.370.1 Constructor & Destructor Documentation

##### 4.370.1.1 config\_file\_splitter\_t()

```

PluginLoader::config_file_splitter_t::config_file_splitter_t (
 const std::string & name)

```



## 4.370.2 Member Function Documentation

### 4.370.2.1 get\_configname()

```
const std::string& PluginLoader::config_file_splitter_t::get_configname () const
[inline]
```

### 4.370.2.2 get\_libname()

```
const std::string& PluginLoader::config_file_splitter_t::get_libname () const [inline]
```

### 4.370.2.3 get\_oriname()

```
const std::string& PluginLoader::config_file_splitter_t::get_oriname () const
[inline]
```

### 4.370.2.4 get\_configfile()

```
const std::string& PluginLoader::config_file_splitter_t::get_configfile () const
[inline]
```

## 4.370.3 Member Data Documentation

### 4.370.3.1 libname

```
std::string PluginLoader::config_file_splitter_t::libname [private]
```

### 4.370.3.2 configname

```
std::string PluginLoader::config_file_splitter_t::configname [private]
```

#### 4.370.3.3 origname

```
std::string PluginLoader::config_file_splitter_t::origname [private]
```

#### 4.370.3.4 configfile

```
std::string PluginLoader::config_file_splitter_t::configfile [private]
```

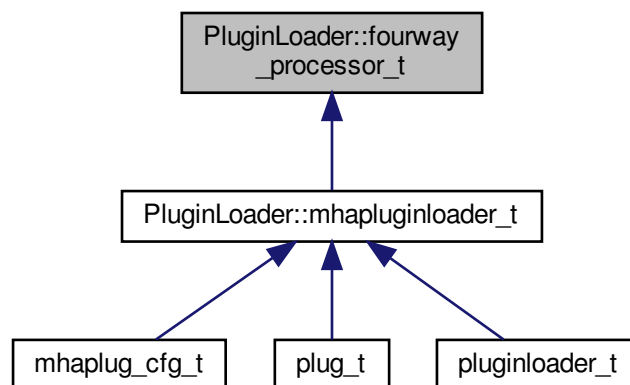
The documentation for this class was generated from the following files:

- **mhapluginloader.h**
- **mhapluginloader.cpp**

#### 4.371 PluginLoader::fourway\_processor\_t Class Reference

This abstract class defines the interface for classes that implement all types of signal domain processing supported by the MHA: wave2wave, spec2spec, wave2spec, and spec2wave.

Inheritance diagram for PluginLoader::fourway\_processor\_t:



## Public Member Functions

- virtual void **process** ( mha\_wave\_t \*s\_in, mha\_wave\_t \*\*s\_out)=0  
*Pure waveform processing.*
- virtual void **process** ( mha\_spec\_t \*s\_in, mha\_spec\_t \*\*s\_out)=0  
*Pure spectrum processing.*
- virtual void **process** ( mha\_wave\_t \*s\_in, mha\_spec\_t \*\*s\_out)=0  
*Signal processing with domain transformation from waveform to spectrum.*
- virtual void **process** ( mha\_spec\_t \*s\_in, mha\_wave\_t \*\*s\_out)=0  
*Signal processing with domain transformation from spectrum to waveform.*
- virtual void **prepare** ( mhaconfig\_t &settings)=0  
*Prepares the processor for signal processing.*
- virtual void **release** ()=0  
*Resources allocated for signal processing in **fourway\_processor\_t::prepare** (p. 1315) are released here in **fourway\_processor\_t::release** (p. 1315).*
- virtual std::string **parse** (const std::string &query)=0  
*Parser interface.*
- virtual ~**fourway\_processor\_t** ()  
*Classes with virtual methods need virtual destructor.*

## 4.371.1 Detailed Description

This abstract class defines the interface for classes that implement all types of signal domain processing supported by the MHA: wave2wave, spec2spec, wave2spec, and spec2wave.

For supporting different output domains for the same input domain, the processing methods are overloaded with respect to input domain and output domain.

## 4.371.2 Constructor &amp; Destructor Documentation

## 4.371.2.1 ~fourway\_processor\_t()

```
virtual PluginLoader::fourway_processor_t::~~fourway_processor_t () [inline], [virtual]
```

Classes with virtual methods need virtual destructor.

This destructor is empty.

## 4.371.3 Member Function Documentation

## 4.371.3.1 process() [1/4]

```
virtual void PluginLoader::fourway_processor_t::process (
 mha_wave_t * s_in,
 mha_wave_t ** s_out) [pure virtual]
```

Pure waveform processing.

**Parameters**

|              |                        |
|--------------|------------------------|
| <i>s_in</i>  | input waveform signal  |
| <i>s_out</i> | output waveform signal |

Implemented in **PluginLoader::mhapluginloader\_t** (p. [1319](#)).

**4.371.3.2 process()** [2/4]

```
virtual void PluginLoader::fourway_processor_t::process (
 mha_spec_t * s_in,
 mha_spec_t ** s_out) [pure virtual]
```

Pure spectrum processing.

**Parameters**

|              |                        |
|--------------|------------------------|
| <i>s_in</i>  | input spectrum signal  |
| <i>s_out</i> | output spectrum signal |

Implemented in **PluginLoader::mhapluginloader\_t** (p. [1319](#)).

**4.371.3.3 process()** [3/4]

```
virtual void PluginLoader::fourway_processor_t::process (
 mha_wave_t * s_in,
 mha_spec_t ** s_out) [pure virtual]
```

Signal processing with domain transformation from waveform to spectrum.

**Parameters**

|              |                        |
|--------------|------------------------|
| <i>s_in</i>  | input waveform signal  |
| <i>s_out</i> | output spectrum signal |

Implemented in **PluginLoader::mhapluginloader\_t** (p. [1320](#)).

**4.371.3.4 process()** [4/4]

```
virtual void PluginLoader::fourway_processor_t::process (
```

```

 mha_spec_t * s_in,
 mha_wave_t ** s_out) [pure virtual]

```

Signal processing with domain transformation from spectrum to waveform.

#### Parameters

|              |                        |
|--------------|------------------------|
| <i>s_in</i>  | input spectrum signal  |
| <i>s_out</i> | output waveform signal |

Implemented in **PluginLoader::mhapluginloader\_t** (p. 1320).

#### 4.371.3.5 prepare()

```

virtual void PluginLoader::fourway_processor_t::prepare (
 mhaconfig_t & settings) [pure virtual]

```

Prepares the processor for signal processing.

#### Parameters

|                 |                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>settings</i> | domain and dimensions of the signal. The contents of settings may be modified by the prepare implementation. Upon calling <b>fourway_processor_t::prepare</b> (p. 1315), settings reflects domain and dimensions of the input signal. When <b>fourway_processor_t::prepare</b> (p. 1315) returns, settings reflects domain and dimensions of the output signal. |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Implemented in **PluginLoader::mhapluginloader\_t** (p. 1319).

#### 4.371.3.6 release()

```

virtual void PluginLoader::fourway_processor_t::release () [pure virtual]

```

Resources allocated for signal processing in **fourway\_processor\_t::prepare** (p. 1315) are released here in **fourway\_processor\_t::release** (p. 1315).

Implemented in **PluginLoader::mhapluginloader\_t** (p. 1319).

#### 4.371.3.7 parse()

```
virtual std::string PluginLoader::fourway_processor_t::parse (
 const std::string & query) [pure virtual]
```

Parser interface.

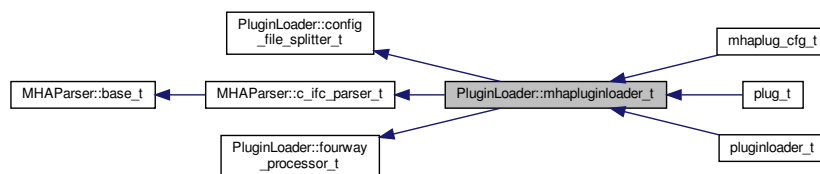
Implemented in **PluginLoader::mhapluginloader\_t** (p. 1318).

The documentation for this class was generated from the following file:

- **mhapluginloader.h**

#### 4.372 PluginLoader::mhapluginloader\_t Class Reference

Inheritance diagram for PluginLoader::mhapluginloader\_t:



#### Public Member Functions

- `std::string` **parse** (const `std::string` &str) override
- **mhapluginloader\_t** ( `algo_comm_t` iac, const `std::string` & **libname**, bool check\_↔ version=true)
- *Loads and initializes mha plugin and establishes interface.*
- `~mhapluginloader_t` () throw ()
- bool **has\_process** ( `mha_domain_t` in, `mha_domain_t` out) const
- bool **has\_parser** () const
- `mha_domain_t` **input\_domain** () const
- `mha_domain_t` **output\_domain** () const
- void **prepare** ( `mhaconfig_t` &) override
- void **release** () override
- void **process** ( `mha_wave_t` \*, `mha_wave_t` \*\*) override
- void **process** ( `mha_spec_t` \*, `mha_spec_t` \*\*) override
- void **process** ( `mha_wave_t` \*, `mha_spec_t` \*\*) override
- void **process** ( `mha_spec_t` \*, `mha_wave_t` \*\*) override
- `std::string` **getfullname** () const
- `std::string` **get\_documentation** () const
- `std::vector< std::string >` **get\_categories** () const
- bool **is\_prepared** () const

## Protected Member Functions

- void **test\_error** ()
- void **test\_version** ()
- void **mha\_test\_struct\_size** (unsigned int s)
- void **resolve\_and\_init** ()

## Protected Attributes

- int **lib\_err**
- **algo\_comm\_t** **ac**
- **dynamiclib\_t** **lib\_handle**
- void \* **lib\_data**
- **MHAGetVersion\_t** **MHAGetVersion\_cb**
- **MHAINit\_t** **MHAINit\_cb**
- **MHADestroy\_t** **MHADestroy\_cb**
- **MHAPrepate\_t** **MHAPrepate\_cb**
- **MHARelease\_t** **MHARelease\_cb**
- **MHAProc\_wave2wave\_t** **MHAProc\_wave2wave\_cb**
- **MHAProc\_spec2spec\_t** **MHAProc\_spec2spec\_cb**
- **MHAProc\_wave2spec\_t** **MHAProc\_wave2spec\_cb**
- **MHAProc\_spec2wave\_t** **MHAProc\_spec2wave\_cb**
- **MHASet\_t** **MHASet\_cb**
- **MHASetcpp\_t** **MHASetcpp\_cb**
- **MHAStrError\_t** **MHAStrError\_cb**
- **mhaconfig\_t** **cf\_input**
- **mhaconfig\_t** **cf\_output**
- std::string **plugin\_documentation**
- std::vector< std::string > **plugin\_categories**
- bool **b\_check\_version**
- bool **b\_is\_prepared**

## Additional Inherited Members

## 4.372.1 Constructor &amp; Destructor Documentation

## 4.372.1.1 mhapluginloader\_t()

```
PluginLoader::mhapluginloader_t::mhapluginloader_t (
 algo_comm_t iac,
 const std::string & libname,
 bool check_version = true)
```

Loads and initializes mha plugin and establishes interface.

**Parameters**

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>iac</i>     | AC space (algorithm communication variables)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>libname</i> | Either file name of MHA plugin without platform-specific extension (i.e. "identity" for "identity.so" or "identity.dll") to be found on the MHA_LIBRARY_PATH (which is an environment variable). Or the same file name without extension followed by a colon ":" followed by the "configuration name" of the MHA plugin, which may be used to differentiate between multiple identical MHA plugins or to give the plugin a self-documenting name that fits its purpose. The library name - configuration name expression can be followed by a "<" followed by a configuration file name, which will be read after initialization of the plugin. |

Example: "overlapadd:agc<compression.cfg" will load the plugin "overlapadd.so" or "overlapadd.dll", insert it as the configuration node "agc", and reads the configuration file "compression.cfg" into that node.

**Parameters**

|                      |                                                                                                                                                                  |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>check_version</i> | Pluginloader will not check that the plugin was built using a known compatible MHA version if this flag is set to false. Disabling version check is discouraged. |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**4.372.1.2 ~mhapluginloader\_t()**

```
PluginLoader::mhapluginloader_t::~~mhapluginloader_t () throw ()
```

**4.372.2 Member Function Documentation****4.372.2.1 parse()**

```
std::string PluginLoader::mhapluginloader_t::parse (
 const std::string & str) [override], [virtual]
```

Implements **PluginLoader::fourway\_processor\_t** (p. 1315).

**4.372.2.2 has\_process()**

```
bool PluginLoader::mhapluginloader_t::has_process (
 mha_domain_t in,
 mha_domain_t out) const
```



#### 4.372.2.3 has\_parser()

```
bool PluginLoader::mhapluginloader_t::has_parser () const
```

#### 4.372.2.4 input\_domain()

```
mha_domain_t PluginLoader::mhapluginloader_t::input_domain () const
```

#### 4.372.2.5 output\_domain()

```
mha_domain_t PluginLoader::mhapluginloader_t::output_domain () const
```

#### 4.372.2.6 prepare()

```
void PluginLoader::mhapluginloader_t::prepare (
 mhaconfig_t & tf) [override], [virtual]
```

Implements **PluginLoader::fourway\_processor\_t** (p. [1315](#)).

#### 4.372.2.7 release()

```
void PluginLoader::mhapluginloader_t::release () [override], [virtual]
```

Implements **PluginLoader::fourway\_processor\_t** (p. [1315](#)).

#### 4.372.2.8 process() [1/4]

```
void PluginLoader::mhapluginloader_t::process (
 mha_wave_t * s_in,
 mha_wave_t ** s_out) [override], [virtual]
```

Implements **PluginLoader::fourway\_processor\_t** (p. [1313](#)).

**4.372.2.9 process()** [2/4]

```
void PluginLoader::mhappluginloader_t::process (
 mha_spec_t * s_in,
 mha_spec_t ** s_out) [override], [virtual]
```

Implements **PluginLoader::fourway\_processor\_t** (p. [1314](#)).

**4.372.2.10 process()** [3/4]

```
void PluginLoader::mhappluginloader_t::process (
 mha_wave_t * s_in,
 mha_spec_t ** s_out) [override], [virtual]
```

Implements **PluginLoader::fourway\_processor\_t** (p. [1314](#)).

**4.372.2.11 process()** [4/4]

```
void PluginLoader::mhappluginloader_t::process (
 mha_spec_t * s_in,
 mha_wave_t ** s_out) [override], [virtual]
```

Implements **PluginLoader::fourway\_processor\_t** (p. [1314](#)).

**4.372.2.12 getfullname()**

```
std::string PluginLoader::mhappluginloader_t::getfullname () const [inline]
```

**4.372.2.13 get\_documentation()**

```
std::string PluginLoader::mhappluginloader_t::get_documentation () const [inline]
```

**4.372.2.14 get\_categories()**

```
std::vector<std::string> PluginLoader::mhappluginloader_t::get_categories () const
[inline]
```

#### 4.372.2.15 is\_prepared()

```
bool PluginLoader::mhapluginloader_t::is_prepared () const [inline]
```

#### 4.372.2.16 test\_error()

```
void PluginLoader::mhapluginloader_t::test_error () [protected]
```

#### 4.372.2.17 test\_version()

```
void PluginLoader::mhapluginloader_t::test_version () [protected]
```

#### 4.372.2.18 mha\_test\_struct\_size()

```
void PluginLoader::mhapluginloader_t::mha_test_struct_size (
 unsigned int s) [protected]
```

#### 4.372.2.19 resolve\_and\_init()

```
void PluginLoader::mhapluginloader_t::resolve_and_init () [protected]
```

### 4.372.3 Member Data Documentation

#### 4.372.3.1 lib\_err

```
int PluginLoader::mhapluginloader_t::lib_err [protected]
```

#### 4.372.3.2 ac

```
algo_comm_t PluginLoader::mhapluginloader_t::ac [protected]
```

**4.372.3.3 lib\_handle**

**dynamiclib\_t** PluginLoader::mhapluginloader\_t::lib\_handle [protected]

**4.372.3.4 lib\_data**

**void\*** PluginLoader::mhapluginloader\_t::lib\_data [protected]

**4.372.3.5 MHAGetVersion\_cb**

**MHAGetVersion\_t** PluginLoader::mhapluginloader\_t::MHAGetVersion\_cb [protected]

**4.372.3.6 MHAInit\_cb**

**MHAInit\_t** PluginLoader::mhapluginloader\_t::MHAInit\_cb [protected]

**4.372.3.7 MHADestroy\_cb**

**MHADestroy\_t** PluginLoader::mhapluginloader\_t::MHADestroy\_cb [protected]

**4.372.3.8 MHAPrepare\_cb**

**MHAPrepare\_t** PluginLoader::mhapluginloader\_t::MHAPrepare\_cb [protected]

**4.372.3.9 MHARelease\_cb**

**MHARelease\_t** PluginLoader::mhapluginloader\_t::MHARelease\_cb [protected]

**4.372.3.10 MHAProc\_wave2wave\_cb**

**MHAProc\_wave2wave\_t** PluginLoader::mhapluginloader\_t::MHAProc\_wave2wave\_cb [protected]

#### 4.372.3.11 MHAProc\_spec2spec\_cb

**MHAProc\_spec2spec\_t** PluginLoader::mhapluginloader\_t::MHAProc\_spec2spec\_cb [protected]

#### 4.372.3.12 MHAProc\_wave2spec\_cb

**MHAProc\_wave2spec\_t** PluginLoader::mhapluginloader\_t::MHAProc\_wave2spec\_cb [protected]

#### 4.372.3.13 MHAProc\_spec2wave\_cb

**MHAProc\_spec2wave\_t** PluginLoader::mhapluginloader\_t::MHAProc\_spec2wave\_cb [protected]

#### 4.372.3.14 MHASet\_cb

**MHASet\_t** PluginLoader::mhapluginloader\_t::MHASet\_cb [protected]

#### 4.372.3.15 MHASetcpp\_cb

**MHASetcpp\_t** PluginLoader::mhapluginloader\_t::MHASetcpp\_cb [protected]

#### 4.372.3.16 MHAStrError\_cb

**MHAStrError\_t** PluginLoader::mhapluginloader\_t::MHAStrError\_cb [protected]

#### 4.372.3.17 cf\_input

**mhaconfig\_t** PluginLoader::mhapluginloader\_t::cf\_input [protected]

#### 4.372.3.18 cf\_output

**mhaconfig\_t** PluginLoader::mhapluginloader\_t::cf\_output [protected]

#### 4.372.3.19 plugin\_documentation

```
std::string PluginLoader::mhapluginloader_t::plugin_documentation [protected]
```

#### 4.372.3.20 plugin\_categories

```
std::vector<std::string> PluginLoader::mhapluginloader_t::plugin_categories [protected]
```

#### 4.372.3.21 b\_check\_version

```
bool PluginLoader::mhapluginloader_t::b_check_version [protected]
```

#### 4.372.3.22 b\_is\_prepared

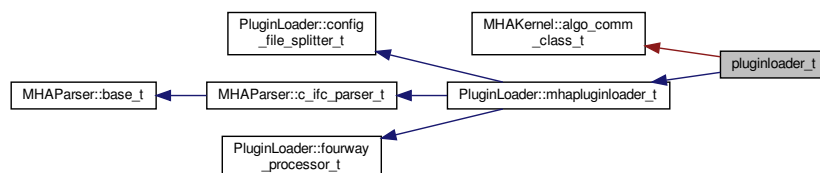
```
bool PluginLoader::mhapluginloader_t::b_is_prepared [protected]
```

The documentation for this class was generated from the following files:

- **mhapluginloader.h**
- **mhapluginloader.cpp**

### 4.373 pluginloader\_t Class Reference

Inheritance diagram for pluginloader\_t:



#### Public Member Functions

- **pluginloader\_t** (const std::string &name)
- **~pluginloader\_t** () throw ()

## Additional Inherited Members

## 4.373.1 Constructor &amp; Destructor Documentation

## 4.373.1.1 pluginloader\_t()

```
pluginloader_t::pluginloader_t (
 const std::string & name)
```

## 4.373.1.2 ~pluginloader\_t()

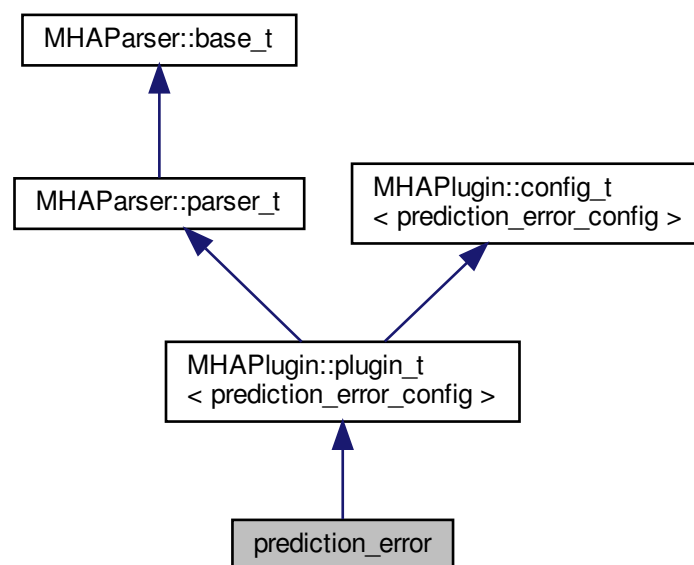
```
pluginloader_t::~~pluginloader_t () throw)
```

The documentation for this class was generated from the following files:

- **pluginbrowser.h**
- **pluginbrowser.cpp**

## 4.374 prediction\_error Class Reference

Inheritance diagram for prediction\_error:



### Public Member Functions

- **prediction\_error** ( **algo\_comm\_t** & **ac**, const std::string &chain\_name, const std::string &algo\_name)  
*Constructs our plugin.*
- **~prediction\_error** ()
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)  
*Checks for the most recent configuration and defers processing to it.*
- void **prepare** ( **mhaconfig\_t** &)  
*Plugin preparation.*
- void **release** (void)

### Public Attributes

- **MHAParser::float\_t** rho
- **MHAParser::float\_t** c
- **MHAParser::int\_t** ntaps
- **MHAParser::vfloat\_t** gains
- **MHAParser::string\_t** name\_e
- **MHAParser::string\_t** name\_f
- **MHAParser::string\_t** name\_lpc
- **MHAParser::int\_t** lpc\_order
- **MHAParser::vint\_t** pred\_err\_delay
- **MHAParser::vint\_t** delay\_w
- **MHAParser::vint\_t** delay\_d
- **MHAParser::int\_t** n\_no\_update

### Private Member Functions

- void **update\_cfg** ()

### Private Attributes

- **MHAEvents::patchbay\_t** < **prediction\_error** > **patchbay**

### Additional Inherited Members

#### 4.374.1 Constructor & Destructor Documentation



## 4.374.1.1 prediction\_error()

```
prediction_error::prediction_error (
 algo_comm_t & ac,
 const std::string & chain_name,
 const std::string & algo_name)
```

Constructs our plugin.

## 4.374.1.2 ~prediction\_error()

```
prediction_error::~~prediction_error ()
```

## 4.374.2 Member Function Documentation

## 4.374.2.1 process()

```
mha_wave_t * prediction_error::process (
 mha_wave_t * signal)
```

Checks for the most recent configuration and defers processing to it.

## 4.374.2.2 prepare()

```
void prediction_error::prepare (
 mhaconfig_t & signal_info) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

## Parameters

|                    |                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <i>signal_info</i> | Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate). |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|

Implements **MHAPlugin::plugin\_t**< **prediction\_error\_config** > (p. [1099](#)).

#### 4.374.2.3 release()

```
void prediction_error::release (
 void) [inline], [virtual]
```

Reimplemented from **MHAParser::plugin\_t**< **prediction\_error\_config** > (p. [1100](#)).

#### 4.374.2.4 update\_cfg()

```
void prediction_error::update_cfg (
 void) [private]
```

### 4.374.3 Member Data Documentation

#### 4.374.3.1 rho

```
MHAParser::float_t prediction_error::rho
```

#### 4.374.3.2 c

```
MHAParser::float_t prediction_error::c
```

#### 4.374.3.3 ntaps

```
MHAParser::int_t prediction_error::ntaps
```

#### 4.374.3.4 gains

```
MHAParser::vfloat_t prediction_error::gains
```

#### 4.374.3.5 name\_e

```
MHAParser::string_t prediction_error::name_e
```

## 4.374.3.6 name\_f

```
MHAParser::string_t prediction_error::name_f
```

## 4.374.3.7 name\_lpc

```
MHAParser::string_t prediction_error::name_lpc
```

## 4.374.3.8 lpc\_order

```
MHAParser::int_t prediction_error::lpc_order
```

## 4.374.3.9 pred\_err\_delay

```
MHAParser::vint_t prediction_error::pred_err_delay
```

## 4.374.3.10 delay\_w

```
MHAParser::vint_t prediction_error::delay_w
```

## 4.374.3.11 delay\_d

```
MHAParser::vint_t prediction_error::delay_d
```

## 4.374.3.12 n\_no\_update

```
MHAParser::int_t prediction_error::n_no_update
```

## 4.374.3.13 patchbay

```
MHAEvents::patchbay_t< prediction_error> prediction_error::patchbay [private]
```

The documentation for this class was generated from the following files:

- **prediction\_error.h**
- **prediction\_error.cpp**

## 4.375 prediction\_error\_config Class Reference

## Public Member Functions

- **prediction\_error\_config** ( **algo\_comm\_t** & **ac**, const **mhaconfig\_t** **in\_cfg**, **prediction\_error** \***pred\_err**)
- **~prediction\_error\_config** ()
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \***s\_Y**, **mha\_real\_t** **rho**, **mha\_real\_t** **c**)
- void **insert** ()

## Private Attributes

- **algo\_comm\_t** **ac**
- unsigned int **ntaps**
- unsigned int **frames**
- unsigned int **channels**
- **MHA\_AC::waveform\_t** **s\_E**
- **MHA\_AC::waveform\_t** **F**
- **MHASignal::waveform\_t** **Pu**  
*Power of input signal delayline.*
- std::string **name\_d\_**
- std::string **name\_lpc\_**
- int **n\_no\_update\_**
- int **no\_iter**
- int **iter**
- double **PSD\_val**
- **MHASignal::waveform\_t** **v\_G**
- **MHASignal::waveform\_t** **s\_U**
- **MHASignal::delay\_t** **s\_E\_pred\_err\_delay**
- **MHASignal::delay\_t** **s\_W**
- **MHASignal::ringbuffer\_t** **s\_Wflt**
- **MHASignal::delay\_t** **s\_U\_delay**
- **MHASignal::ringbuffer\_t** **s\_U\_delayflt**
- **MHASignal::waveform\_t** **F\_Uflt**
- **MHASignal::delay\_t** **s\_Y\_delay**
- **MHASignal::ringbuffer\_t** **s\_Y\_delayflt**

- `MHASignal::ringbuffer_t UbufferPrew`
- `mha_wave_t s_LPC`
- `mha_wave_t UPrew`
- `mha_wave_t YPrew`
- `mha_wave_t EPrew`
- `mha_wave_t UPrewW`
- `mha_wave_t smpl`
- `mha_wave_t * s_Usmpl`

#### 4.375.1 Constructor & Destructor Documentation

##### 4.375.1.1 prediction\_error\_config()

```
prediction_error_config::prediction_error_config (
 algo_comm_t & ac,
 const mhaconfig_t in_cfg,
 prediction_error * pred_err)
```

##### 4.375.1.2 ~prediction\_error\_config()

```
prediction_error_config::~prediction_error_config ()
```

#### 4.375.2 Member Function Documentation

##### 4.375.2.1 process()

```
mha_wave_t * prediction_error_config::process (
 mha_wave_t * s_Y,
 mha_real_t rho,
 mha_real_t c)
```

##### 4.375.2.2 insert()

```
void prediction_error_config::insert ()
```

### 4.375.3 Member Data Documentation

#### 4.375.3.1 ac

**algo\_comm\_t** prediction\_error\_config::ac [private]

#### 4.375.3.2 ntaps

unsigned int prediction\_error\_config::ntaps [private]

#### 4.375.3.3 frames

unsigned int prediction\_error\_config::frames [private]

#### 4.375.3.4 channels

unsigned int prediction\_error\_config::channels [private]

#### 4.375.3.5 s\_E

**MHA\_AC::waveform\_t** prediction\_error\_config::s\_E [private]

#### 4.375.3.6 F

**MHA\_AC::waveform\_t** prediction\_error\_config::F [private]

#### 4.375.3.7 Pu

**MHASignal::waveform\_t** prediction\_error\_config::Pu [private]

Power of input signal delayline.

**4.375.3.8 name\_d\_**

```
std::string prediction_error_config::name_d_ [private]
```

**4.375.3.9 name\_lpc\_**

```
std::string prediction_error_config::name_lpc_ [private]
```

**4.375.3.10 n\_no\_update\_**

```
int prediction_error_config::n_no_update_ [private]
```

**4.375.3.11 no\_iter**

```
int prediction_error_config::no_iter [private]
```

**4.375.3.12 iter**

```
int prediction_error_config::iter [private]
```

**4.375.3.13 PSD\_val**

```
double prediction_error_config::PSD_val [private]
```

**4.375.3.14 v\_G**

```
MHASignal::waveform_t prediction_error_config::v_G [private]
```

**4.375.3.15 s\_U**

```
MHASignal::waveform_t prediction_error_config::s_U [private]
```

**4.375.3.16 s\_E\_pred\_err\_delay**

**MHASignal::delay\_t** prediction\_error\_config::s\_E\_pred\_err\_delay [private]

**4.375.3.17 s\_W**

**MHASignal::delay\_t** prediction\_error\_config::s\_W [private]

**4.375.3.18 s\_Wflt**

**MHASignal::ringbuffer\_t** prediction\_error\_config::s\_Wflt [private]

**4.375.3.19 s\_U\_delay**

**MHASignal::delay\_t** prediction\_error\_config::s\_U\_delay [private]

**4.375.3.20 s\_U\_delayflt**

**MHASignal::ringbuffer\_t** prediction\_error\_config::s\_U\_delayflt [private]

**4.375.3.21 F\_Uflt**

**MHASignal::waveform\_t** prediction\_error\_config::F\_Uflt [private]

**4.375.3.22 s\_Y\_delay**

**MHASignal::delay\_t** prediction\_error\_config::s\_Y\_delay [private]

**4.375.3.23 s\_Y\_delayflt**

**MHASignal::ringbuffer\_t** prediction\_error\_config::s\_Y\_delayflt [private]



#### 4.375.3.24 UbufferPrew

**MHASignal::ringbuffer\_t** prediction\_error\_config::UbufferPrew [private]

#### 4.375.3.25 s\_LPC

**mha\_wave\_t** prediction\_error\_config::s\_LPC [private]

#### 4.375.3.26 UPrew

**mha\_wave\_t** prediction\_error\_config::UPrew [private]

#### 4.375.3.27 YPrew

**mha\_wave\_t** prediction\_error\_config::YPrew [private]

#### 4.375.3.28 EPrew

**mha\_wave\_t** prediction\_error\_config::EPrew [private]

#### 4.375.3.29 UPrewW

**mha\_wave\_t** prediction\_error\_config::UPrewW [private]

#### 4.375.3.30 smpl

**mha\_wave\_t** prediction\_error\_config::smpl [private]

## 4.375.3.31 s\_Usmpl

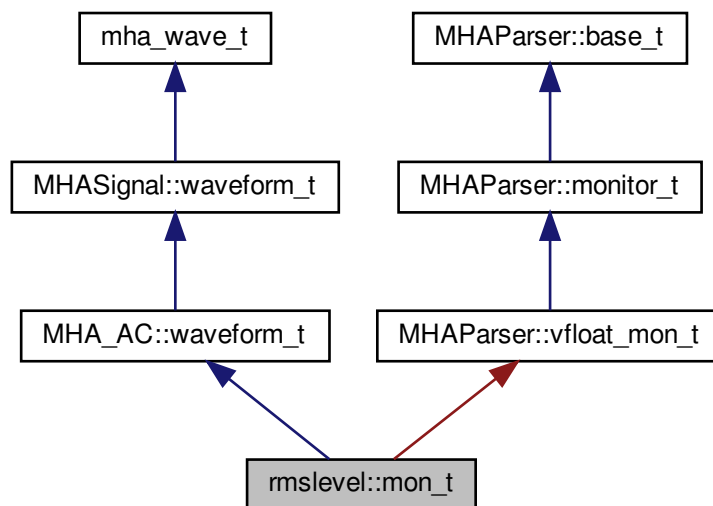
```
mha_wave_t* prediction_error_config::s_Usmpl [private]
```

The documentation for this class was generated from the following files:

- **prediction\_error.h**
- **prediction\_error.cpp**

## 4.376 rmslevel::mon\_t Class Reference

Inheritance diagram for rmslevel::mon\_t:



## Public Member Functions

- **mon\_t** (unsigned int nch, const std::string & name, algo\_comm\_t ac, const std::string &base, MHAParser::parser\_t &p, const std::string &help)
- **mon\_t** (const mon\_t &)=delete
- **mon\_t** ( mon\_t &&)=delete
- **mon\_t & operator=** (const mon\_t &)=delete
- **mon\_t & operator=** ( mon\_t &&)=delete
- void **store** ()

## Additional Inherited Members

### 4.376.1 Constructor & Destructor Documentation

#### 4.376.1.1 mon\_t() [1/3]

```
rmslevel::mon_t::mon_t (
 unsigned int nch,
 const std::string & name,
 algo_comm_t ac,
 const std::string & base,
 MHAParser::parser_t & p,
 const std::string & help)
```

#### 4.376.1.2 mon\_t() [2/3]

```
rmslevel::mon_t::mon_t (
 const mon_t &) [delete]
```

#### 4.376.1.3 mon\_t() [3/3]

```
rmslevel::mon_t::mon_t (
 mon_t &&) [delete]
```

### 4.376.2 Member Function Documentation

#### 4.376.2.1 operator=() [1/2]

```
mon_t& rmslevel::mon_t::operator= (
 const mon_t &) [delete]
```

#### 4.376.2.2 operator=() [2/2]

```
mon_t& rmslevel::mon_t::operator= (
 mon_t &&) [delete]
```

### 4.376.2.3 store()

```
void rmslevel::mon_t::store ()
```

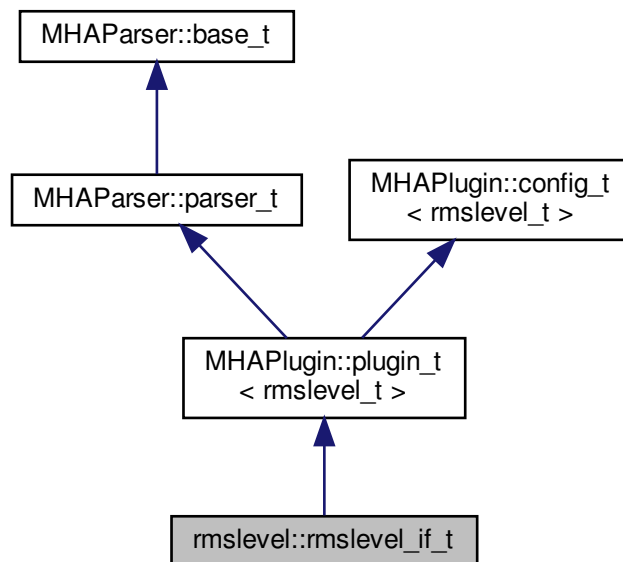
The documentation for this class was generated from the following file:

- **rmslevel.cpp**

### 4.377 rmslevel::rmslevel\_if\_t Class Reference

Interface class of the rmslevel plugin.

Inheritance diagram for rmslevel::rmslevel\_if\_t:



#### Public Member Functions

- **rmslevel\_if\_t** (const **algo\_comm\_t** &, const std::string &, const std::string &)
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)
- void **prepare** ( **mhaconfig\_t** &)

#### Private Member Functions

- void **update** ( )

### Private Attributes

- **MHAEvents::patchbay\_t**< rmslevel\_if\_t > patchbay
- std::string name
- **MHAParser::kw\_t** unit

### Additional Inherited Members

#### 4.377.1 Detailed Description

Interface class of the rmslevel plugin.

#### 4.377.2 Constructor & Destructor Documentation

##### 4.377.2.1 rmslevel\_if\_t()

```
rmslevel::rmslevel_if_t::rmslevel_if_t (
 const algo_comm_t & iac,
 const std::string & ith,
 const std::string & ial)
```

#### 4.377.3 Member Function Documentation

##### 4.377.3.1 process() [1/2]

```
mha_spec_t * rmslevel::rmslevel_if_t::process (
 mha_spec_t * s)
```

##### 4.377.3.2 process() [2/2]

```
mha_wave_t * rmslevel::rmslevel_if_t::process (
 mha_wave_t * s)
```

### 4.377.3.3 prepare()

```
void rmslevel::rmslevel_if_t::prepare (
 mhaconfig_t & tf) [virtual]
```

Implements **MHAPlugin::plugin\_t< rmslevel\_t >** (p. [1099](#)).

### 4.377.3.4 update()

```
void rmslevel::rmslevel_if_t::update () [private]
```

## 4.377.4 Member Data Documentation

### 4.377.4.1 patchbay

```
MHAEvents::patchbay_t< rmslevel_if_t> rmslevel::rmslevel_if_t::patchbay [private]
```

### 4.377.4.2 name

```
std::string rmslevel::rmslevel_if_t::name [private]
```

### 4.377.4.3 unit

```
MHAParser::kw_t rmslevel::rmslevel_if_t::unit [private]
```

The documentation for this class was generated from the following file:

- **rmslevel.cpp**

## 4.378 rmslevel::rmslevel\_t Class Reference

Run-time configuration class of the rmslevel plugin.

## Public Member Functions

- **rmslevel\_t** (const **mhaconfig\_t** &tf, **algo\_comm\_t** ac, const std::string &name, **MHAParser::parser\_t** &p, **UNIT** unit\_)  
*C'tor of the runtime configuration class.*
- **~rmslevel\_t** ()
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)
- void **fill** ( **mha\_spec\_t** \*)
- void **sum\_and\_fill** ( **mha\_spec\_t** \*)
- void **fill** ( **mha\_wave\_t** \*)
- void **sum\_and\_fill** ( **mha\_wave\_t** \*)
- void **insert** ()

## Private Attributes

- std::unordered\_map< std::string, std::unique\_ptr< **mon\_t** > > **monitors**
- unsigned int **fftl**
- **UNIT** **unit**
- **mha\_domain\_t** **domain**
- std::vector< **mha\_real\_t** > **freq\_offsets**  
*freq\_offsets provides the conversion of dB(SPL) to dB(HL) for every frequency bin in the stft used by coloured\_intensity.*

## 4.378.1 Detailed Description

Run-time configuration class of the rmslevel plugin.

## 4.378.2 Constructor &amp; Destructor Documentation

## 4.378.2.1 rmslevel\_t()

```
rmslevel::rmslevel_t::rmslevel_t (
 const mhaconfig_t & tf,
 algo_comm_t ac,
 const std::string & name,
 MHAParser::parser_t & p,
 UNIT unit_)
```

C'tor of the runtime configuration class.

**Parameters**

|                            |                                                                               |
|----------------------------|-------------------------------------------------------------------------------|
| <i>tf</i>                  | Input signal configuration                                                    |
| <i>ac</i>                  | AC space, needed to publish ac variables                                      |
| <i>name</i>                | Configured name of the plugin within the parser structure                     |
| <i>p</i>                   | Instance of the parent interface class, needed to publish monitor variables   |
| <i>unit_</i>               | Configured dB scale                                                           |
| <i>num_↔<br/>channels_</i> | Number of monitor channels if channel summation shall be used, zero otherwise |

**4.378.2.2 ~rmslevel\_t()**

```
rmslevel::rmslevel_t::~~rmslevel_t () [inline]
```

**4.378.3 Member Function Documentation****4.378.3.1 process() [1/2]**

```
mha_spec_t * rmslevel::rmslevel_t::process (
 mha_spec_t * s)
```

**4.378.3.2 process() [2/2]**

```
mha_wave_t * rmslevel::rmslevel_t::process (
 mha_wave_t * s)
```

**4.378.3.3 fill() [1/2]**

```
void rmslevel::rmslevel_t::fill (
 mha_spec_t *)
```



#### 4.378.3.4 sum\_and\_fill() [1/2]

```
void rmslevel::rmslevel_t::sum_and_fill (
 mha_spec_t *)
```

#### 4.378.3.5 fill() [2/2]

```
void rmslevel::rmslevel_t::fill (
 mha_wave_t *)
```

#### 4.378.3.6 sum\_and\_fill() [2/2]

```
void rmslevel::rmslevel_t::sum_and_fill (
 mha_wave_t *)
```

#### 4.378.3.7 insert()

```
void rmslevel::rmslevel_t::insert ()
```

### 4.378.4 Member Data Documentation

#### 4.378.4.1 monitors

```
std::unordered_map<std::string, std::unique_ptr< mon_t> > rmslevel::rmslevel_t←
::monitors [private]
```

#### 4.378.4.2 fftlen

```
unsigned int rmslevel::rmslevel_t::fftlen [private]
```

#### 4.378.4.3 unit

```
UNIT rmslevel::rmslevel_t::unit [private]
```

#### 4.378.4.4 domain

```
mha_domain_t rmslevel::rmslevel_t::domain [private]
```

#### 4.378.4.5 freq\_offsets

```
std::vector< mha_real_t> rmslevel::rmslevel_t::freq_offsets [private]
```

freq\_offsets provides the conversion of dB(SPL) to dB(HL) for every frequency bin in the stft used by coloured\_intensity.

Unused when not in spectral domain and unit=hl.

The documentation for this class was generated from the following file:

- **rmslevel.cpp**

### 4.379 rohBeam::configOptions Struct Reference

#### Public Attributes

- bool **enable\_adaptive\_beam**
- int **binaural\_type\_index**
- float **alpha\_postfilter**
- float **alpha\_blocking\_XkXi**
- float **alpha\_blocking\_XkY**

#### 4.379.1 Member Data Documentation

##### 4.379.1.1 enable\_adaptive\_beam

```
bool rohBeam::configOptions::enable_adaptive_beam
```

##### 4.379.1.2 binaural\_type\_index

```
int rohBeam::configOptions::binaural_type_index
```

#### 4.379.1.3 alpha\_postfilter

```
float rohBeam::configOptions::alpha_postfilter
```

#### 4.379.1.4 alpha\_blocking\_XkXi

```
float rohBeam::configOptions::alpha_blocking_XkXi
```

#### 4.379.1.5 alpha\_blocking\_XkY

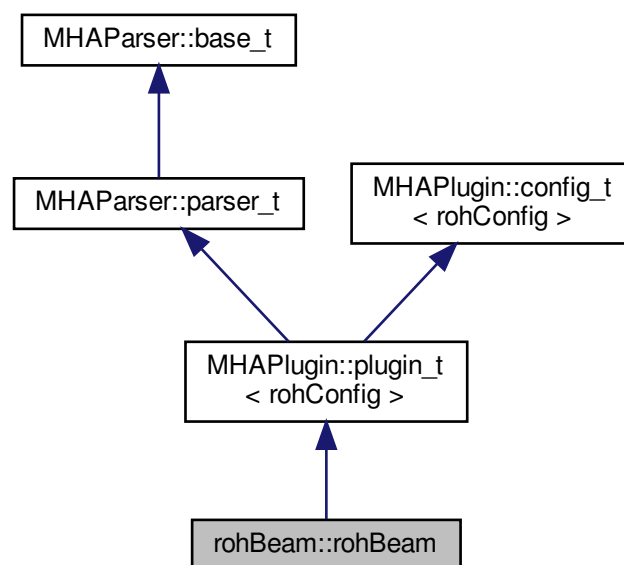
```
float rohBeam::configOptions::alpha_blocking_XkY
```

The documentation for this struct was generated from the following file:

- **rohBeam.hh**

### 4.380 rohBeam::rohBeam Class Reference

Inheritance diagram for rohBeam::rohBeam:



## Public Member Functions

- **rohBeam** ( **algo\_comm\_t** & **ac**, const std::string &chain\_name, const std::string &algo\_name)
  - Constructs the beamforming plugin.*
- **~rohBeam** ()
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)
  - This plugin implements noise reduction using spectral subtraction: by nonnegative subtraction from the output magnitude of the estimated noise magnitude spectrum.*
- void **prepare** ( **mhaconfig\_t** &)
  - Plugin preparation.*
- void **release** (void)

## Private Types

- typedef const Eigen::MatrixXf(rohBeam::\* **noiseFuncPtr**) (float)

## Private Member Functions

- void **update\_cfg** ()
- float **compute\_head\_model\_T** (float)
- float **compute\_head\_model\_alpha** (float)
- Eigen::MatrixXcf \* **compute\_head\_model\_mat** (float src\_az\_degrees)
- **MHASignal::matrix\_t** \* **compute\_delaycomp\_vec** (Eigen::MatrixXcf \*headModel)
- std::vector< Eigen::MatrixXcf > \* **noise\_integrate\_hrtf** ()
- Eigen::VectorXcf **solve\_MVDR** (Eigen::VectorXcf propVec, Eigen::MatrixXcf noiseM)
- const Eigen::MatrixXf **compute\_uncorr** (float w)
- const Eigen::MatrixXf **compute\_diff2D** (float)
- const Eigen::MatrixXf **compute\_diff3D** (float)
- **MHASignal::matrix\_t** \* **compute\_beamW** (Eigen::MatrixXcf \*)
- float **compute\_wng** (Eigen::VectorXcf freqRes, Eigen::VectorXcf propVec)
- void **export\_beam\_design** (const **MHASignal::matrix\_t** &beamW, const Eigen::MatrixXcf &headModel)
- **noiseFuncPtr** **get\_noise\_model\_func** (void)
- void **on\_model\_param\_valuechanged** ()

## Private Attributes

- **MHAParser::kw\_t** **prop\_type**
- **MHAParser::string\_t** **sampled\_hrir\_path**
- **MHAParser::float\_t** **source\_azimuth\_degrees**
- **MHAParser::vfloat\_t** **mic\_azimuth\_degrees\_vec**
- **MHAParser::float\_t** **head\_model\_sphere\_radius\_cm**
- **MHAParser::mfloat\_t** **intermic\_distance\_cm**
- **MHAParser::kw\_t** **noise\_field\_model**

- **MHAParser::bool\_t enable\_adaptive\_beam**
- **MHAParser::kw\_t binaural\_type**
- **MHAParser::float\_t diag\_loading\_mu**
- **MHAParser::bool\_t enable\_export**
- **MHAParser::bool\_t enable\_wng\_optimization**
- **MHAParser::float\_t tau\_postfilter\_ms**
- **MHAParser::float\_t tau\_blocking\_XkXi\_ms**
- **MHAParser::float\_t tau\_blocking\_XkY\_ms**
- **MHAEvents::patchbay\_t< rohBeam > patchbay**
- **bool prepared**
- **MHA\_AC::spectrum\_t \* beamExport**
- **MHA\_AC::waveform\_t \* noiseModelExport**
- **MHA\_AC::spectrum\_t \* propExport**

#### Additional Inherited Members

### 4.380.1 Member Typedef Documentation

#### 4.380.1.1 noiseFuncPtr

```
typedef const Eigen::MatrixXf(rohBeam::* rohBeam::rohBeam::noiseFuncPtr) (float)
[private]
```

### 4.380.2 Constructor & Destructor Documentation

#### 4.380.2.1 rohBeam()

```
rohBeam::rohBeam::rohBeam (
 algo_comm_t & ac,
 const std::string & chain_name,
 const std::string & algo_name)
```

Constructs the beamforming plugin.

#### 4.380.2.2 ~rohBeam()

```
rohBeam::rohBeam::~~rohBeam ()
```

### 4.380.3 Member Function Documentation

#### 4.380.3.1 process()

```
mha_spec_t * rohBeam::rohBeam::process (
 mha_spec_t * signal)
```

This plugin implements noise reduction using spectral subtraction: by nonnegative subtraction from the output magnitude of the estimated noise magnitude spectrum.

##### Parameters

|               |                                        |
|---------------|----------------------------------------|
| <i>signal</i> | Pointer to the input signal structure. |
|---------------|----------------------------------------|

##### Returns

Returns a pointer to the input signal structure, with a the signal modified by this plugin.

#### 4.380.3.2 prepare()

```
void rohBeam::rohBeam::prepare (
 mhaconfig_t & signal_info) [virtual]
```

Plugin preparation.

This plugin checks that the input signal has the spectral domain and contains at least one channel

##### Parameters

|                    |                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <i>signal_info</i> | Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate). |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|

Implements **MHAPLugin::plugin\_t< rohConfig >** (p. [1099](#)).

#### 4.380.3.3 release()

```
void rohBeam::rohBeam::release (
 void) [inline], [virtual]
```

Reimplemented from **MHAPLugin::plugin\_t< rohConfig >** (p. [1100](#)).

#### 4.380.3.4 update\_cfg()

```
void rohBeam::rohBeam::update_cfg (
 void) [private]
```

#### 4.380.3.5 compute\_head\_model\_T()

```
float rohBeam::rohBeam::compute_head_model_T (
 float angle_rads) [private]
```

#### 4.380.3.6 compute\_head\_model\_alpha()

```
float rohBeam::rohBeam::compute_head_model_alpha (
 float angle_rads) [private]
```

#### 4.380.3.7 compute\_head\_model\_mat()

```
MatrixXcf * rohBeam::rohBeam::compute_head_model_mat (
 float src_az_degrees) [private]
```

#### 4.380.3.8 compute\_delaycomp\_vec()

```
MHASignal::matrix_t * rohBeam::rohBeam::compute_delaycomp_vec (
 Eigen::MatrixXcf * headModel) [private]
```

#### 4.380.3.9 noise\_integrate\_hrtf()

```
std::vector< MatrixXcf > * rohBeam::rohBeam::noise_integrate_hrtf () [private]
```

#### 4.380.3.10 solve\_MVDR()

```
VectorXcf rohBeam::rohBeam::solve_MVDR (
 Eigen::VectorXcf propVec,
 Eigen::MatrixXcf noiseM) [private]
```

**4.380.3.11 compute\_uncorr()**

```
const MatrixXf rohBeam::rohBeam::compute_uncorr (
 float w) [private]
```

**4.380.3.12 compute\_diff2D()**

```
const MatrixXf rohBeam::rohBeam::compute_diff2D (
 float w) [private]
```

**4.380.3.13 compute\_diff3D()**

```
const MatrixXf rohBeam::rohBeam::compute_diff3D (
 float w) [private]
```

**4.380.3.14 compute\_beamW()**

```
MHASignal::matrix_t * rohBeam::rohBeam::compute_beamW (
 Eigen::MatrixXcf *) [private]
```

**4.380.3.15 compute\_wng()**

```
float rohBeam::rohBeam::compute_wng (
 Eigen::VectorXcf freqRes,
 Eigen::VectorXcf propVec) [private]
```

**4.380.3.16 export\_beam\_design()**

```
void rohBeam::rohBeam::export_beam_design (
 const MHASignal::matrix_t & beamW,
 const Eigen::MatrixXcf & headModel) [private]
```

**4.380.3.17 get\_noise\_model\_func()**

```
rohBeam::noiseFuncPtr rohBeam::rohBeam::get_noise_model_func (
 void) [private]
```



#### 4.380.3.18 on\_model\_param\_valuechanged()

```
void rohBeam::rohBeam::on_model_param_valuechanged () [private]
```

### 4.380.4 Member Data Documentation

#### 4.380.4.1 prop\_type

```
MHAParser::kw_t rohBeam::rohBeam::prop_type [private]
```

#### 4.380.4.2 sampled\_hrir\_path

```
MHAParser::string_t rohBeam::rohBeam::sampled_hrir_path [private]
```

#### 4.380.4.3 source\_azimuth\_degrees

```
MHAParser::float_t rohBeam::rohBeam::source_azimuth_degrees [private]
```

#### 4.380.4.4 mic\_azimuth\_degrees\_vec

```
MHAParser::vfloat_t rohBeam::rohBeam::mic_azimuth_degrees_vec [private]
```

#### 4.380.4.5 head\_model\_sphere\_radius\_cm

```
MHAParser::float_t rohBeam::rohBeam::head_model_sphere_radius_cm [private]
```

#### 4.380.4.6 intermic\_distance\_cm

```
MHAParser::mfloat_t rohBeam::rohBeam::intermic_distance_cm [private]
```

#### 4.380.4.7 noise\_field\_model

**MHAParser::kw\_t** rohBeam::rohBeam::noise\_field\_model [private]

#### 4.380.4.8 enable\_adaptive\_beam

**MHAParser::bool\_t** rohBeam::rohBeam::enable\_adaptive\_beam [private]

#### 4.380.4.9 binaural\_type

**MHAParser::kw\_t** rohBeam::rohBeam::binaural\_type [private]

#### 4.380.4.10 diag\_loading\_mu

**MHAParser::float\_t** rohBeam::rohBeam::diag\_loading\_mu [private]

#### 4.380.4.11 enable\_export

**MHAParser::bool\_t** rohBeam::rohBeam::enable\_export [private]

#### 4.380.4.12 enable\_wng\_optimization

**MHAParser::bool\_t** rohBeam::rohBeam::enable\_wng\_optimization [private]

#### 4.380.4.13 tau\_postfilter\_ms

**MHAParser::float\_t** rohBeam::rohBeam::tau\_postfilter\_ms [private]

#### 4.380.4.14 tau\_blocking\_XkXi\_ms

**MHAParser::float\_t** rohBeam::rohBeam::tau\_blocking\_XkXi\_ms [private]

## 4.380.4.15 tau\_blocking\_XkY\_ms

```
MHAParser::float_t rohBeam::rohBeam::tau_blocking_XkY_ms [private]
```

## 4.380.4.16 patchbay

```
MHAEvents::patchbay_t< rohBeam> rohBeam::rohBeam::patchbay [private]
```

## 4.380.4.17 prepared

```
bool rohBeam::rohBeam::prepared [private]
```

## 4.380.4.18 beamExport

```
MHA_AC::spectrum_t* rohBeam::rohBeam::beamExport [private]
```

## 4.380.4.19 noiseModelExport

```
MHA_AC::waveform_t* rohBeam::rohBeam::noiseModelExport [private]
```

## 4.380.4.20 propExport

```
MHA_AC::spectrum_t* rohBeam::rohBeam::propExport [private]
```

The documentation for this class was generated from the following files:

- rohBeam.hh
- rohBeam.cpp

## 4.381 rohBeam::rohConfig Class Reference

### Public Member Functions

- **rohConfig** (const **mhaconfig\_t** **in\_cfg**, const **mhaconfig\_t** **out\_cfg**, std::unique\_ptr< Eigen::MatrixXcf > **headModel\_**, std::unique\_ptr< **MHASignal::matrix\_t** > **beamW\_**, std::unique\_ptr< **MHASignal::matrix\_t** > **delayComp\_**, const **configOptions** &**options**)
- **rohConfig** ( **rohConfig** \***lastConfig**, const **mhaconfig\_t**, const **mhaconfig\_t** **out\_cfg**, std::unique\_ptr< Eigen::MatrixXcf > **headModel\_**, std::unique\_ptr< **MHASignal::matrix\_t** > **beamW\_**, std::unique\_ptr< **MHASignal::matrix\_t** > **delayComp\_**, const **configOptions** &**options**)
- **~rohConfig** ()
- **rohConfig** (const **rohConfig** &)=delete
- **rohConfig** & **operator=** (const **rohConfig** &)=delete
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)
- void **init\_dynamic** ()

### Private Member Functions

- void **phasereconstruction** ( **MHASignal::spectrum\_t** \*)
- void **postfilter** ( **mha\_spec\_t** \*, **MHASignal::spectrum\_t** \*)
- void **copyfixedbfoutput** ( **MHASignal::spectrum\_t** \*)

### Private Attributes

- int **nfreq**
- int **nchan\_block**
- **mhaconfig\_t** **in\_cfg**
- **mhaconfig\_t** **out\_cfg**
- bool **enable\_adaptive\_beam**
- int **binaural\_type\_index**
- std::unique\_ptr< Eigen::MatrixXcf > **headModel**
- std::unique\_ptr< **MHASignal::matrix\_t** > **beamW**
- std::unique\_ptr< **MHASignal::matrix\_t** > **delayComp**
- **MHASignal::spectrum\_t** \* **beam1**
- **MHASignal::spectrum\_t** \* **beamA**
- **MHASignal::spectrum\_t** \* **blockSpec**
- **MHASignal::spectrum\_t** \* **outSpec**
- float **alpha\_postfilter**
- float **alpha\_blocking\_XkXi**
- float **alpha\_blocking\_XkY**
- std::vector< Eigen::MatrixXcf > **corrXpXp**
- std::vector< Eigen::VectorXcf > **corrXpYf**
- Eigen::VectorXf **corrZZ**
- Eigen::VectorXf **corrLL**
- Eigen::VectorXf **corrRR**

- Eigen::HouseholderQR< Eigen::MatrixXcf > **hhCorrXpXp**
- Eigen::VectorXcf **nextXpYf**
- Eigen::VectorXcf **blockXp**
- Eigen::VectorXcf **freqResp**
- Eigen::ArrayXf **magResp**
- float **minLim**
- float **maxLim**

#### 4.381.1 Constructor & Destructor Documentation

##### 4.381.1.1 rohConfig() [1/3]

```
rohBeam::rohConfig::rohConfig (
 const mhaconfig_t in_cfg,
 const mhaconfig_t out_cfg,
 std::unique_ptr< Eigen::MatrixXcf > headModel_,
 std::unique_ptr< MHASignal::matrix_t > beamW_,
 std::unique_ptr< MHASignal::matrix_t > delayComp_,
 const configOptions & options)
```

##### 4.381.1.2 rohConfig() [2/3]

```
rohBeam::rohConfig::rohConfig (
 rohConfig * lastConfig,
 const mhaconfig_t ,
 const mhaconfig_t out_cfg,
 std::unique_ptr< Eigen::MatrixXcf > headModel_,
 std::unique_ptr< MHASignal::matrix_t > beamW_,
 std::unique_ptr< MHASignal::matrix_t > delayComp_,
 const configOptions & options)
```

##### 4.381.1.3 ~rohConfig()

```
rohBeam::rohConfig::~~rohConfig ()
```

##### 4.381.1.4 rohConfig() [3/3]

```
rohBeam::rohConfig::rohConfig (
 const rohConfig &) [delete]
```

## 4.381.2 Member Function Documentation

### 4.381.2.1 operator=()

```
rohConfig& rohBeam::rohConfig::operator= (
 const rohConfig &) [delete]
```

### 4.381.2.2 process()

```
mha_spec_t * rohBeam::rohConfig::process (
 mha_spec_t * inSpec)
```

### 4.381.2.3 init\_dynamic()

```
void rohBeam::rohConfig::init_dynamic ()
```

### 4.381.2.4 phasereconstruction()

```
void rohBeam::rohConfig::phasereconstruction (
 MHASignal::spectrum_t * prevSpecPost) [private]
```

### 4.381.2.5 postfilter()

```
void rohBeam::rohConfig::postfilter (
 mha_spec_t * inSpec,
 MHASignal::spectrum_t * prevSpecPost) [private]
```

### 4.381.2.6 copyfixedbfoutput()

```
void rohBeam::rohConfig::copyfixedbfoutput (
 MHASignal::spectrum_t * prevSpecPost) [private]
```

### 4.381.3 Member Data Documentation

#### 4.381.3.1 nfreq

`int rohBeam::rohConfig::nfreq [private]`

#### 4.381.3.2 nchan\_block

`int rohBeam::rohConfig::nchan_block [private]`

#### 4.381.3.3 in\_cfg

`mhaconfig_t rohBeam::rohConfig::in_cfg [private]`

#### 4.381.3.4 out\_cfg

`mhaconfig_t rohBeam::rohConfig::out_cfg [private]`

#### 4.381.3.5 enable\_adaptive\_beam

`bool rohBeam::rohConfig::enable_adaptive_beam [private]`

#### 4.381.3.6 binaural\_type\_index

`int rohBeam::rohConfig::binaural_type_index [private]`

#### 4.381.3.7 headModel

`std::unique_ptr<Eigen::MatrixXcf> rohBeam::rohConfig::headModel [private]`

#### 4.381.3.8 beamW

`std::unique_ptr< MHASignal::matrix_t> rohBeam::rohConfig::beamW [private]`

#### 4.381.3.9 delayComp

`std::unique_ptr< MHASignal::matrix_t> rohBeam::rohConfig::delayComp [private]`

#### 4.381.3.10 beam1

`MHASignal::spectrum_t* rohBeam::rohConfig::beam1 [private]`

#### 4.381.3.11 beamA

`MHASignal::spectrum_t* rohBeam::rohConfig::beamA [private]`

#### 4.381.3.12 blockSpec

`MHASignal::spectrum_t* rohBeam::rohConfig::blockSpec [private]`

#### 4.381.3.13 outSpec

`MHASignal::spectrum_t* rohBeam::rohConfig::outSpec [private]`

#### 4.381.3.14 alpha\_postfilter

`float rohBeam::rohConfig::alpha_postfilter [private]`

#### 4.381.3.15 alpha\_blocking\_XkXi

`float rohBeam::rohConfig::alpha_blocking_XkXi [private]`



**4.381.3.16 alpha\_blocking\_XkY**

```
float rohBeam::rohConfig::alpha_blocking_XkY [private]
```

**4.381.3.17 corrXpXp**

```
std::vector<Eigen::MatrixXcf> rohBeam::rohConfig::corrXpXp [private]
```

**4.381.3.18 corrXpYf**

```
std::vector<Eigen::VectorXcf> rohBeam::rohConfig::corrXpYf [private]
```

**4.381.3.19 corrZZ**

```
Eigen::VectorXf rohBeam::rohConfig::corrZZ [private]
```

**4.381.3.20 corrLL**

```
Eigen::VectorXf rohBeam::rohConfig::corrLL [private]
```

**4.381.3.21 corrRR**

```
Eigen::VectorXf rohBeam::rohConfig::corrRR [private]
```

**4.381.3.22 hhCorrXpXp**

```
Eigen::HouseholderQR<Eigen::MatrixXcf> rohBeam::rohConfig::hhCorrXpXp [private]
```

**4.381.3.23 nextXpYf**

```
Eigen::VectorXcf rohBeam::rohConfig::nextXpYf [private]
```

**4.381.3.24 blockXp**

```
Eigen::VectorXcf rohBeam::rohConfig::blockXp [private]
```

**4.381.3.25 freqResp**

```
Eigen::VectorXcf rohBeam::rohConfig::freqResp [private]
```

**4.381.3.26 magResp**

```
Eigen::ArrayXf rohBeam::rohConfig::magResp [private]
```

**4.381.3.27 minLim**

```
float rohBeam::rohConfig::minLim [private]
```

**4.381.3.28 maxLim**

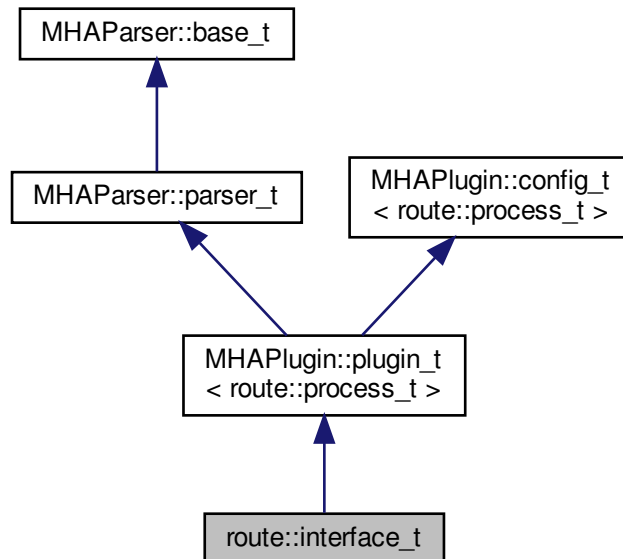
```
float rohBeam::rohConfig::maxLim [private]
```

The documentation for this class was generated from the following files:

- **rohBeam.hh**
- **rohBeam.cpp**

## 4.382 route::interface\_t Class Reference

Inheritance diagram for route::interface\_t:



## Public Member Functions

- **interface\_t** ( **algo\_comm\_t** iac, const std::string &, const std::string &)
- void **prepare** ( **mhaconfig\_t** &)
- void **release** ()
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)

## Private Member Functions

- void **update** ()

## Private Attributes

- **MHAEvents::patchbay\_t** < **route::interface\_t** > **patchbay**
- **MHAParser::vstring\_t** **route\_out**
- **MHAParser::vstring\_t** **route\_ac**
- **mhaconfig\_t** **cfin**
- **mhaconfig\_t** **cfout**
- **mhaconfig\_t** **cfac**
- bool **prepared**
- bool **stopped**
- std::string **algo**

## Additional Inherited Members

### 4.382.1 Constructor & Destructor Documentation

#### 4.382.1.1 interface\_t()

```
route::interface_t::interface_t (
 algo_comm_t iac,
 const std::string & ,
 const std::string & ialg)
```

### 4.382.2 Member Function Documentation

#### 4.382.2.1 prepare()

```
void route::interface_t::prepare (
 mhaconfig_t & cf) [virtual]
```

Implements **MHAPLugin::plugin\_t< route::process\_t >** (p. [1099](#)).

#### 4.382.2.2 release()

```
void route::interface_t::release (
 void) [virtual]
```

Reimplemented from **MHAPLugin::plugin\_t< route::process\_t >** (p. [1100](#)).

#### 4.382.2.3 process() [1/2]

```
mha_wave_t * route::interface_t::process (
 mha_wave_t * s)
```

#### 4.382.2.4 process() [2/2]

```
mha_spec_t * route::interface_t::process (
 mha_spec_t * s)
```

#### 4.382.2.5 update()

```
void route::interface_t::update () [private]
```

### 4.382.3 Member Data Documentation

#### 4.382.3.1 patchbay

```
MHAEvents::patchbay_t< route::interface_t> route::interface_t::patchbay [private]
```

#### 4.382.3.2 route\_out

```
MHAParser::vstring_t route::interface_t::route_out [private]
```

#### 4.382.3.3 route\_ac

```
MHAParser::vstring_t route::interface_t::route_ac [private]
```

#### 4.382.3.4 cfin

```
mhaconfig_t route::interface_t::cfin [private]
```

#### 4.382.3.5 cfout

```
mhaconfig_t route::interface_t::cfout [private]
```

#### 4.382.3.6 cfac

```
mhaconfig_t route::interface_t::cfac [private]
```

#### 4.382.3.7 prepared

```
bool route::interface_t::prepared [private]
```

#### 4.382.3.8 stopped

```
bool route::interface_t::stopped [private]
```

#### 4.382.3.9 algo

```
std::string route::interface_t::algo [private]
```

The documentation for this class was generated from the following file:

- **route.cpp**

### 4.383 route::process\_t Class Reference

#### Public Member Functions

- **process\_t** ( **algo\_comm\_t** iac, const std::string acname, const std::vector< std::string > &r\_out, const std::vector< std::string > &r\_ac, const **mhaconfig\_t** &cf\_in, const **mhaconfig\_t** &cf\_out, const **mhaconfig\_t** &cf\_ac, bool sync)
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)

#### Private Attributes

- **MHAMultiSrc::waveform\_t** wout
- **MHAMultiSrc::spectrum\_t** sout
- **MHAMultiSrc::waveform\_t** wout\_ac
- **MHAMultiSrc::spectrum\_t** sout\_ac

### 4.383.1 Constructor & Destructor Documentation

#### 4.383.1.1 process\_t()

```
route::process_t::process_t (
 algo_comm_t iac,
 const std::string acname,
 const std::vector< std::string > & r_out,
 const std::vector< std::string > & r_ac,
 const mhaconfig_t & cf_in,
 const mhaconfig_t & cf_out,
 const mhaconfig_t & cf_ac,
 bool sync)
```

### 4.383.2 Member Function Documentation

#### 4.383.2.1 process() [1/2]

```
mha_wave_t * route::process_t::process (
 mha_wave_t * s)
```

#### 4.383.2.2 process() [2/2]

```
mha_spec_t * route::process_t::process (
 mha_spec_t * s)
```

### 4.383.3 Member Data Documentation

#### 4.383.3.1 wout

```
MHAMultiSrc::waveform_t route::process_t::wout [private]
```

4.383.3.2 `sout`

```
MHAMultiSrc::spectrum_t route::process_t::sout [private]
```

4.383.3.3 `wout_ac`

```
MHAMultiSrc::waveform_t route::process_t::wout_ac [private]
```

4.383.3.4 `sout_ac`

```
MHAMultiSrc::spectrum_t route::process_t::sout_ac [private]
```

The documentation for this class was generated from the following file:

- **route.cpp**

4.384 `rt_nlms_t` Class Reference

## Public Member Functions

- **rt\_nlms\_t** ( **algo\_comm\_t** iac, const std::string &name, const **mhaconfig\_t** &cfg, unsigned int naps\_, const std::string &name\_u, const std::string &name\_d, const std::string &name\_e, const std::string &name\_f, const int n\_no\_update)
- **~rt\_nlms\_t** ()
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*sUD, **mha\_real\_t** rho, **mha\_real\_t** c, unsigned int norm\_type, unsigned int estim\_type, **mha\_real\_t** lambda\_smooth)
- void **insert** ()

## Private Attributes

- **algo\_comm\_t** **ac**
- unsigned int **ntaps**
- unsigned int **frames**
- unsigned int **channels**
- **MHA\_AC::waveform\_t** **F**
- **MHASignal::waveform\_t** **U**  
*Input signal cache.*
- **MHASignal::waveform\_t** **Uflt**  
*Input signal cache (second filter)*
- **MHASignal::waveform\_t** **Pu**  
*Power of input signal delayline.*



- **MHASignal::waveform\_t fu**  
*Filtered input signal.*
- **MHASignal::waveform\_t fufilt**  
*Filtered input signal.*
- **MHASignal::waveform\_t fu\_previous**
- **MHASignal::waveform\_t y\_previous**
- **MHASignal::waveform\_t P\_Sum**
- **std::string name\_u\_**
- **std::string name\_d\_**
- **std::string name\_e\_**
- **int n\_no\_update\_**
- **int no\_iter**
- **mha\_wave\_t s\_E**

#### 4.384.1 Constructor & Destructor Documentation

##### 4.384.1.1 rt\_nlms\_t()

```
rt_nlms_t::rt_nlms_t (
 algo_comm_t iac,
 const std::string & name,
 const mhaconfig_t & cfg,
 unsigned int ntaps_,
 const std::string & name_u,
 const std::string & name_d,
 const std::string & name_e,
 const std::string & name_f,
 const int n_no_update)
```

##### 4.384.1.2 ~rt\_nlms\_t()

```
rt_nlms_t::~~rt_nlms_t () [inline]
```

#### 4.384.2 Member Function Documentation

#### 4.384.2.1 process()

```
mha_wave_t * rt_nlms_t::process (
 mha_wave_t * sUD,
 mha_real_t rho,
 mha_real_t c,
 unsigned int norm_type,
 unsigned int estim_type,
 mha_real_t lambda_smooth)
```

#### 4.384.2.2 insert()

```
void rt_nlms_t::insert ()
```

### 4.384.3 Member Data Documentation

#### 4.384.3.1 ac

```
algo_comm_t rt_nlms_t::ac [private]
```

#### 4.384.3.2 ntaps

```
unsigned int rt_nlms_t::ntaps [private]
```

#### 4.384.3.3 frames

```
unsigned int rt_nlms_t::frames [private]
```

#### 4.384.3.4 channels

```
unsigned int rt_nlms_t::channels [private]
```

## 4.384.3.5 F

**MHA\_AC::waveform\_t** rt\_nlms\_t::F [private]

## 4.384.3.6 U

**MHASignal::waveform\_t** rt\_nlms\_t::U [private]

Input signal cache.

## 4.384.3.7 Uflt

**MHASignal::waveform\_t** rt\_nlms\_t::Uflt [private]

Input signal cache (second filter)

## 4.384.3.8 Pu

**MHASignal::waveform\_t** rt\_nlms\_t::Pu [private]

Power of input signal delayline.

## 4.384.3.9 fu

**MHASignal::waveform\_t** rt\_nlms\_t::fu [private]

Filtered input signal.

## 4.384.3.10 fuflt

**MHASignal::waveform\_t** rt\_nlms\_t::fuflt [private]

Filtered input signal.

**4.384.3.11 fu\_previous**

**MHASignal::waveform\_t** rt\_nlms\_t::fu\_previous [private]

**4.384.3.12 y\_previous**

**MHASignal::waveform\_t** rt\_nlms\_t::y\_previous [private]

**4.384.3.13 P\_Sum**

**MHASignal::waveform\_t** rt\_nlms\_t::P\_Sum [private]

**4.384.3.14 name\_u\_**

std::string rt\_nlms\_t::name\_u\_ [private]

**4.384.3.15 name\_d\_**

std::string rt\_nlms\_t::name\_d\_ [private]

**4.384.3.16 name\_e\_**

std::string rt\_nlms\_t::name\_e\_ [private]

**4.384.3.17 n\_no\_update\_**

int rt\_nlms\_t::n\_no\_update\_ [private]

**4.384.3.18 no\_iter**

int rt\_nlms\_t::no\_iter [private]

## 4.384.3.19 s\_E

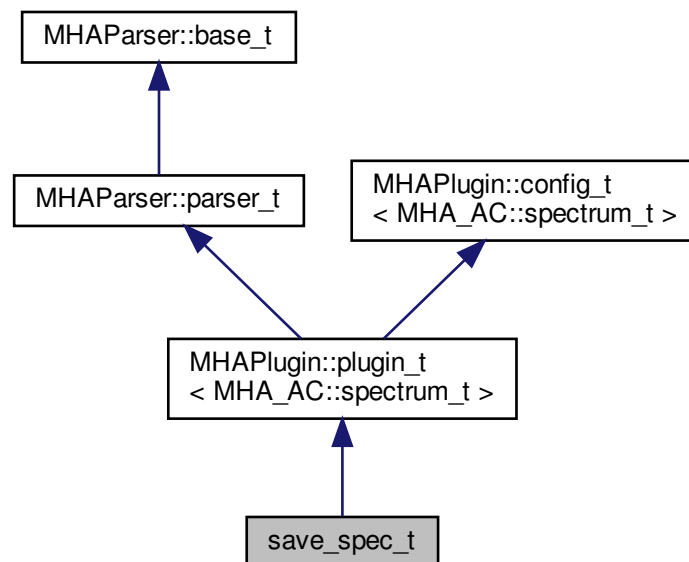
```
mha_wave_t rt_nlms_t::s_E [private]
```

The documentation for this class was generated from the following file:

- **nlms\_wave.cpp**

## 4.385 save\_spec\_t Class Reference

Inheritance diagram for save\_spec\_t:



## Public Member Functions

- **save\_spec\_t** (const **algo\_comm\_t** &iac, const std::string &ith, const std::string &ial)
- **mha\_spec\_t \* process** ( **mha\_spec\_t** \*s)
- void **prepare** ( **mhaconfig\_t** &tf)

## Private Attributes

- std::string **basename**

## Additional Inherited Members

### 4.385.1 Constructor & Destructor Documentation

#### 4.385.1.1 save\_spec\_t()

```
save_spec_t::save_spec_t (
 const algo_comm_t & iac,
 const std::string & ith,
 const std::string & ial) [inline]
```

### 4.385.2 Member Function Documentation

#### 4.385.2.1 process()

```
mha_spec_t* save_spec_t::process (
 mha_spec_t * s) [inline]
```

#### 4.385.2.2 prepare()

```
void save_spec_t::prepare (
 mhaconfig_t & tf) [inline], [virtual]
```

Implements **MHAPlugin::plugin\_t**< **MHA\_AC::spectrum\_t** > (p. [1099](#)).

### 4.385.3 Member Data Documentation

#### 4.385.3.1 basename

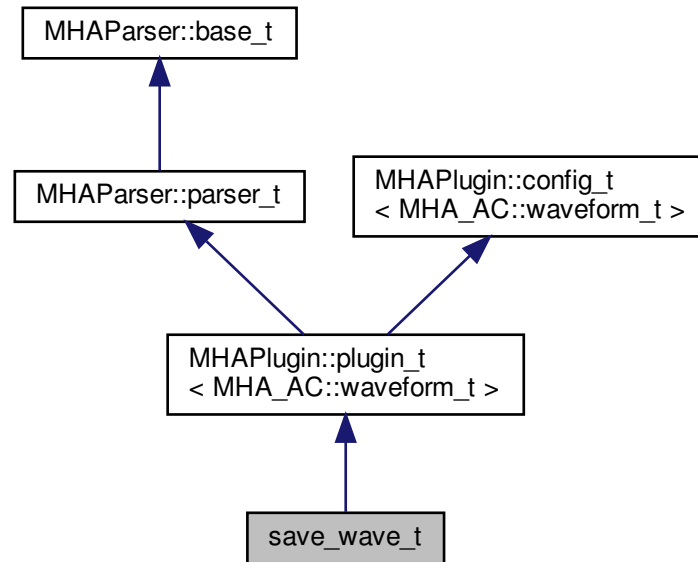
```
std::string save_spec_t::basename [private]
```

The documentation for this class was generated from the following file:

- **save\_spec.cpp**

## 4.386 save\_wave\_t Class Reference

Inheritance diagram for save\_wave\_t:



## Public Member Functions

- **save\_wave\_t** (const **algo\_comm\_t** &iac, const std::string &ith, const std::string &ial)
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*s)
- void **prepare** ( **mhaconfig\_t** &tf)

## Private Attributes

- std::string **basename**

## Additional Inherited Members

## 4.386.1 Constructor &amp; Destructor Documentation

#### 4.386.1.1 save\_wave\_t()

```
save_wave_t::save_wave_t (
 const algo_comm_t & iac,
 const std::string & ith,
 const std::string & ial) [inline]
```

#### 4.386.2 Member Function Documentation

##### 4.386.2.1 process()

```
mha_wave_t* save_wave_t::process (
 mha_wave_t * s) [inline]
```

##### 4.386.2.2 prepare()

```
void save_wave_t::prepare (
 mhaconfig_t & tf) [inline], [virtual]
```

Implements **MHAPlugin::plugin\_t**< **MHA\_AC::waveform\_t** > (p. [1099](#)).

#### 4.386.3 Member Data Documentation

##### 4.386.3.1 basename

```
std::string save_wave_t::basename [private]
```

The documentation for this class was generated from the following file:

- **save\_wave.cpp**

#### 4.387 shadowfilter\_begin::cfg\_t Class Reference

##### Public Member Functions

- **cfg\_t** (int nfft, int inch, int outch, **algo\_comm\_t** ac, std::string name)
- **mha\_spec\_t**\* **process** ( **mha\_spec\_t** \*)



### Private Attributes

- **MHA\_AC::spectrum\_t** in\_spec\_copy
- **MHASignal::spectrum\_t** out\_spec
- **MHA\_AC::int\_t** nch
- **MHA\_AC::int\_t** ntracks

## 4.387.1 Constructor & Destructor Documentation

### 4.387.1.1 cfg\_t()

```
cfg_t::cfg_t (
 int nfft,
 int inch,
 int outch,
 algo_comm_t ac,
 std::string name)
```

## 4.387.2 Member Function Documentation

### 4.387.2.1 process()

```
mha_spec_t * cfg_t::process (
 mha_spec_t * s)
```

## 4.387.3 Member Data Documentation

### 4.387.3.1 in\_spec\_copy

```
MHA_AC::spectrum_t shadowfilter_begin::cfg_t::in_spec_copy [private]
```

### 4.387.3.2 out\_spec

```
MHASignal::spectrum_t shadowfilter_begin::cfg_t::out_spec [private]
```



### Private Attributes

- `std::string` **basename**
- `MHAParser::int_t` **nch**
- `MHAParser::int_t` **ntracks**

### Additional Inherited Members

#### 4.388.1 Constructor & Destructor Documentation

##### 4.388.1.1 shadowfilter\_begin\_t()

```
shadowfilter_begin::shadowfilter_begin_t::shadowfilter_begin_t (
 const algo_comm_t & iac,
 const std::string & ith,
 const std::string & ial)
```

#### 4.388.2 Member Function Documentation

##### 4.388.2.1 process()

```
mha_spec_t * shadowfilter_begin::shadowfilter_begin_t::process (
 mha_spec_t * s)
```

##### 4.388.2.2 prepare()

```
void shadowfilter_begin::shadowfilter_begin_t::prepare (
 mhaconfig_t & tf) [virtual]
```

Implements `MHAPLugin::plugin_t< cfg_t >` (p. 1099).

#### 4.388.3 Member Data Documentation

#### 4.388.3.1 basename

```
std::string shadowfilter_begin::shadowfilter_begin_t::basename [private]
```

#### 4.388.3.2 nch

```
MHAParser::int_t shadowfilter_begin::shadowfilter_begin_t::nch [private]
```

#### 4.388.3.3 ntracks

```
MHAParser::int_t shadowfilter_begin::shadowfilter_begin_t::ntracks [private]
```

The documentation for this class was generated from the following file:

- **shadowfilter\_begin.cpp**

### 4.389 shadowfilter\_end::cfg\_t Class Reference

#### Public Member Functions

- **cfg\_t** (int nfft\_, **algo\_comm\_t** ac\_, std::string name\_)
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)

#### Private Attributes

- **algo\_comm\_t** ac
- std::string name
- int nfft
- int ntracks
- int nch\_out
- **mha\_spec\_t** in\_spec
- **MHASignal::spectrum\_t** out\_spec
- **MHA\_AC::spectrum\_t** gains

#### 4.389.1 Constructor & Destructor Documentation

#### 4.389.1.1 cfg\_t()

```
cfg_t::cfg_t (
 int nfft_,
 algo_comm_t ac_,
 std::string name_)
```

### 4.389.2 Member Function Documentation

#### 4.389.2.1 process()

```
mha_spec_t * cfg_t::process (
 mha_spec_t * s)
```

### 4.389.3 Member Data Documentation

#### 4.389.3.1 ac

```
algo_comm_t shadowfilter_end::cfg_t::ac [private]
```

#### 4.389.3.2 name

```
std::string shadowfilter_end::cfg_t::name [private]
```

#### 4.389.3.3 nfft

```
int shadowfilter_end::cfg_t::nfft [private]
```

#### 4.389.3.4 ntracks

```
int shadowfilter_end::cfg_t::ntracks [private]
```

#### 4.389.3.5 nch\_out

```
int shadowfilter_end::cfg_t::nch_out [private]
```

#### 4.389.3.6 in\_spec

```
mha_spec_t shadowfilter_end::cfg_t::in_spec [private]
```

#### 4.389.3.7 out\_spec

```
MHASignal::spectrum_t shadowfilter_end::cfg_t::out_spec [private]
```

#### 4.389.3.8 gains

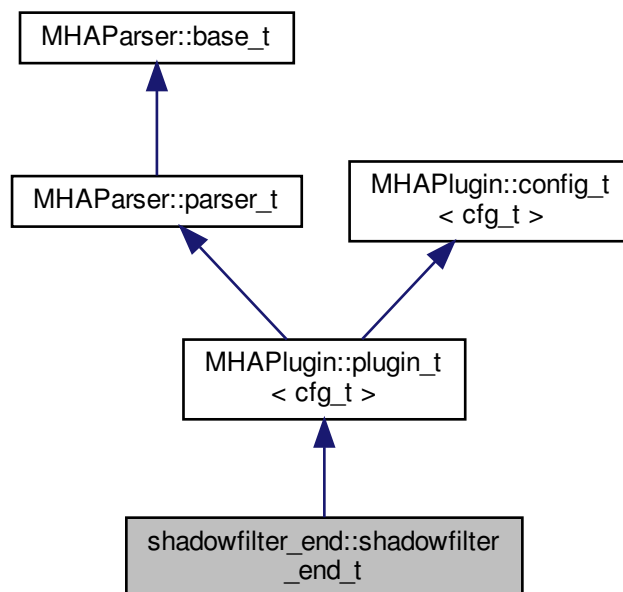
```
MHA_AC::spectrum_t shadowfilter_end::cfg_t::gains [private]
```

The documentation for this class was generated from the following file:

- **shadowfilter\_end.cpp**

### 4.390 shadowfilter\_end::shadowfilter\_end\_t Class Reference

Inheritance diagram for shadowfilter\_end::shadowfilter\_end\_t:



## Public Member Functions

- **shadowfilter\_end\_t** (const **algo\_comm\_t** &, const std::string &, const std::string &)
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)
- void **prepare** ( **mhaconfig\_t** &)

## Private Attributes

- **MHAParser::string\_t** **basename**

## Additional Inherited Members

### 4.390.1 Constructor & Destructor Documentation

#### 4.390.1.1 shadowfilter\_end\_t()

```
shadowfilter_end::shadowfilter_end_t::shadowfilter_end_t (
 const algo_comm_t & iac,
 const std::string & ith,
 const std::string & ial)
```

### 4.390.2 Member Function Documentation

#### 4.390.2.1 process()

```
mha_spec_t * shadowfilter_end::shadowfilter_end_t::process (
 mha_spec_t * s)
```

#### 4.390.2.2 prepare()

```
void shadowfilter_end::shadowfilter_end_t::prepare (
 mhaconfig_t & tf) [virtual]
```

Implements **MHAPugin::plugin\_t**< **cfg\_t** > (p. [1099](#)).

### 4.390.3 Member Data Documentation

#### 4.390.3.1 basename

```
MHAParser::string_t shadowfilter_end::shadowfilter_end_t::basename [private]
```

The documentation for this class was generated from the following file:

- **shadowfilter\_end.cpp**

### 4.391 sine\_cfg\_t Struct Reference

#### Public Member Functions

- **sine\_cfg\_t** (double *sampling\_rate*, **mha\_real\_t** *frequency*, **mha\_real\_t** *newlev*, int *\_mix*, const std::vector< int > &*\_channels*)

#### Public Attributes

- double **phase\_increment\_div\_2pi**
- double **amplitude**
- int **mix**
- const std::vector< int > **channels**

### 4.391.1 Constructor & Destructor Documentation

#### 4.391.1.1 sine\_cfg\_t()

```
sine_cfg_t::sine_cfg_t (
 double sampling_rate,
 mha_real_t frequency,
 mha_real_t newlev,
 int _mix,
 const std::vector< int > & _channels) [inline]
```

### 4.391.2 Member Data Documentation



#### 4.391.2.1 phase\_increment\_div\_2pi

```
double sine_cfg_t::phase_increment_div_2pi
```

#### 4.391.2.2 amplitude

```
double sine_cfg_t::amplitude
```

#### 4.391.2.3 mix

```
int sine_cfg_t::mix
```

#### 4.391.2.4 channels

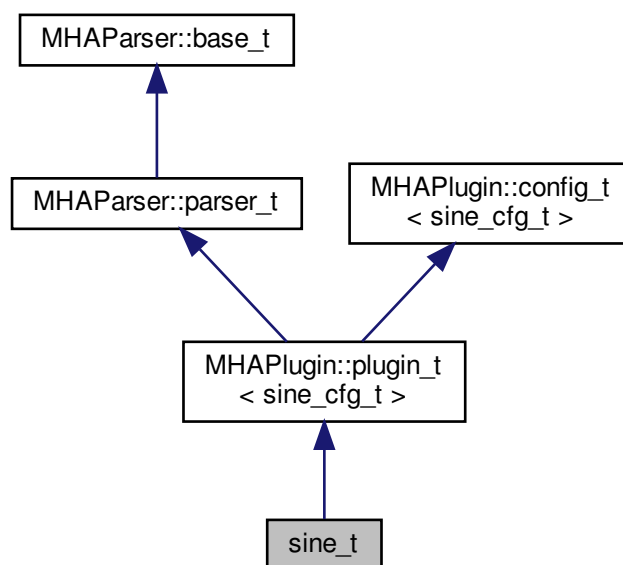
```
const std::vector<int> sine_cfg_t::channels
```

The documentation for this struct was generated from the following file:

- **sine.cpp**

### 4.392 sine\_t Class Reference

Inheritance diagram for sine\_t:



### Public Member Functions

- **sine\_t** (const **algo\_comm\_t** &, const std::string &chain\_name, const std::string &algo\_name)
- **~sine\_t** ()
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)
- void **prepare** ( **mhaconfig\_t** &)

### Private Member Functions

- void **update\_cfg** ()

### Private Attributes

- **MHAParser::float\_t** lev
- **MHAParser::float\_t** frequency
- **MHAParser::kw\_t** mode
- **MHAParser::vint\_t** channels
- double **phase\_div\_2pi**
- **MHAEvents::patchbay\_t** < **sine\_t** > patchbay

### Additional Inherited Members

## 4.392.1 Constructor & Destructor Documentation

### 4.392.1.1 sine\_t()

```
sine_t::sine_t (
 const algo_comm_t & iac,
 const std::string & chain_name,
 const std::string & algo_name)
```

### 4.392.1.2 ~sine\_t()

```
sine_t::~sine_t ()
```

## 4.392.2 Member Function Documentation

#### 4.392.2.1 process()

```
mha_wave_t * sine_t::process (
 mha_wave_t * s)
```

#### 4.392.2.2 prepare()

```
void sine_t::prepare (
 mhaconfig_t & tf) [virtual]
```

Implements **MHAParser::plugin\_t**< **sine\_cfg\_t** > (p. [1099](#)).

#### 4.392.2.3 update\_cfg()

```
void sine_t::update_cfg (
 void) [private]
```

### 4.392.3 Member Data Documentation

#### 4.392.3.1 lev

```
MHAParser::float_t sine_t::lev [private]
```

#### 4.392.3.2 frequency

```
MHAParser::float_t sine_t::frequency [private]
```

#### 4.392.3.3 mode

```
MHAParser::kw_t sine_t::mode [private]
```

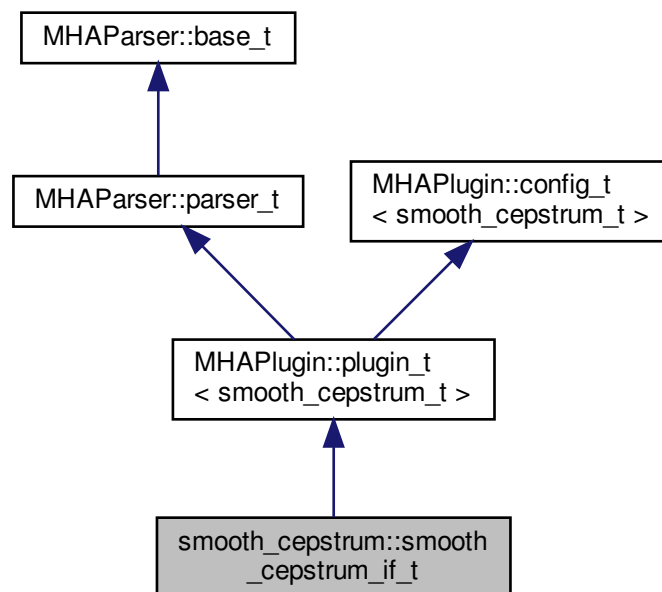
```
MHAParser::vint_t sine_t::channels [private]
```

```
double sine_t::phase_div_2pi [private]
```

```
MHAEvents::patchbay_t< sine_t> sine_t::patchbay [private]
```

- **sine.cpp**

Inheritance diagram for smooth\_cepstrum::smooth\_cepstrum\_if\_t:



## Public Member Functions

- **smooth\_cepstrum\_if\_t** ( **algo\_comm\_t** & **ac**, const std::string &chain\_name, const std::string &algo\_name)  
*Constructs the beamforming plugin.*
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)  
*This plugin implements noise reduction using spectral subtraction: by nonnegative subtraction from the output magnitude of the estimated noise magnitude spectrum.*
- void **prepare** ( **mhaconfig\_t** &)  
*Plugin preparation.*
- void **release** (void)

## Private Member Functions

- void **update\_cfg** ()
- void **on\_model\_param\_valuechanged** ()

## Private Attributes

- **MHAParser::float\_t** **xi\_min\_db**
- **MHAParser::float\_t** **f0\_low**
- **MHAParser::float\_t** **f0\_high**
- **MHAParser::float\_t** **delta\_pitch**
- **MHAParser::float\_t** **lambda\_thresh**
- **MHAParser::float\_t** **alpha\_pitch**
- **MHAParser::float\_t** **beta\_const**
- **MHAParser::float\_t** **kappa\_const**
- **MHAParser::float\_t** **gain\_min\_db**
- **MHAParser::vfloat\_t** **win\_f0**
- **MHAParser::vfloat\_t** **alpha\_const\_vals**
- **MHAParser::vfloat\_t** **alpha\_const\_limits\_hz**
- **MHAParser::string\_t** **noisePow\_name**
- **MHAParser::parser\_t** **spp**
- **MHAParser::float\_t** **prior\_q**
- **MHAParser::float\_t** **xi\_opt\_db**
- **MHAEvents::patchbay\_t** < **smooth\_cepstrum\_if\_t** > **patchbay**
- bool **prepared**

## Additional Inherited Members

## 4.393.1 Constructor &amp; Destructor Documentation

#### 4.393.1.1 smooth\_cepstrum\_if\_t()

```
smooth_cepstrum::smooth_cepstrum_if_t::smooth_cepstrum_if_t (
 algo_comm_t & ac,
 const std::string & chain_name,
 const std::string & algo_name)
```

Constructs the beamforming plugin.

### 4.393.2 Member Function Documentation

#### 4.393.2.1 process()

```
mha_spec_t * smooth_cepstrum::smooth_cepstrum_if_t::process (
 mha_spec_t * signal)
```

This plugin implements noise reduction using spectral subtraction: by nonnegative subtraction from the output magnitude of the estimated noise magnitude spectrum.

##### Parameters

|               |                                        |
|---------------|----------------------------------------|
| <i>signal</i> | Pointer to the input signal structure. |
|---------------|----------------------------------------|

##### Returns

Returns a pointer to the input signal structure, with a the signal modified by this plugin.

#### 4.393.2.2 prepare()

```
void smooth_cepstrum::smooth_cepstrum_if_t::prepare (
 mhaconfig_t & signal_info) [virtual]
```

Plugin preparation.

This plugin checks that the input signal has the spectral domain and contains at least one channel

##### Parameters

|                    |                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <i>signal_info</i> | Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate). |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|

## 4.393 smooth\_cepstrum::smooth\_cepstrum\_if\_t Class Reference 389

Implements **MHAPLugin::plugin\_t**< **smooth\_cepstrum\_t** > (p. 1099).

### 4.393.2.3 release()

```
void smooth_cepstrum::smooth_cepstrum_if_t::release (
 void) [inline], [virtual]
```

Reimplemented from **MHAPLugin::plugin\_t**< **smooth\_cepstrum\_t** > (p. 1100).

### 4.393.2.4 update\_cfg()

```
void smooth_cepstrum::smooth_cepstrum_if_t::update_cfg (
 void) [private]
```

### 4.393.2.5 on\_model\_param\_valuechanged()

```
void smooth_cepstrum::smooth_cepstrum_if_t::on_model_param_valuechanged () [private]
```

## 4.393.3 Member Data Documentation

### 4.393.3.1 xi\_min\_db

```
MHAParser::float_t smooth_cepstrum::smooth_cepstrum_if_t::xi_min_db [private]
```

### 4.393.3.2 f0\_low

```
MHAParser::float_t smooth_cepstrum::smooth_cepstrum_if_t::f0_low [private]
```

### 4.393.3.3 f0\_high

```
MHAParser::float_t smooth_cepstrum::smooth_cepstrum_if_t::f0_high [private]
```

**4.393.3.4 delta\_pitch**

**MHAParser::float\_t** smooth\_cepstrum::smooth\_cepstrum\_if\_t::delta\_pitch [private]

**4.393.3.5 lambda\_thresh**

**MHAParser::float\_t** smooth\_cepstrum::smooth\_cepstrum\_if\_t::lambda\_thresh [private]

**4.393.3.6 alpha\_pitch**

**MHAParser::float\_t** smooth\_cepstrum::smooth\_cepstrum\_if\_t::alpha\_pitch [private]

**4.393.3.7 beta\_const**

**MHAParser::float\_t** smooth\_cepstrum::smooth\_cepstrum\_if\_t::beta\_const [private]

**4.393.3.8 kappa\_const**

**MHAParser::float\_t** smooth\_cepstrum::smooth\_cepstrum\_if\_t::kappa\_const [private]

**4.393.3.9 gain\_min\_db**

**MHAParser::float\_t** smooth\_cepstrum::smooth\_cepstrum\_if\_t::gain\_min\_db [private]

**4.393.3.10 win\_f0**

**MHAParser::vfloat\_t** smooth\_cepstrum::smooth\_cepstrum\_if\_t::win\_f0 [private]

**4.393.3.11 alpha\_const\_vals**

**MHAParser::vfloat\_t** smooth\_cepstrum::smooth\_cepstrum\_if\_t::alpha\_const\_vals [private]



## 4.393 smooth\_cepstrum::smooth\_cepstrum\_if\_t Class Reference

### 4.393.3.12 alpha\_const\_limits\_hz

```
MHAParser::vfloat_t smooth_cepstrum::smooth_cepstrum_if_t::alpha_const_limits_hz
[private]
```

### 4.393.3.13 noisePow\_name

```
MHAParser::string_t smooth_cepstrum::smooth_cepstrum_if_t::noisePow_name [private]
```

### 4.393.3.14 spp

```
MHAParser::parser_t smooth_cepstrum::smooth_cepstrum_if_t::spp [private]
```

### 4.393.3.15 prior\_q

```
MHAParser::float_t smooth_cepstrum::smooth_cepstrum_if_t::prior_q [private]
```

### 4.393.3.16 xi\_opt\_db

```
MHAParser::float_t smooth_cepstrum::smooth_cepstrum_if_t::xi_opt_db [private]
```

### 4.393.3.17 patchbay

```
MHAEvents::patchbay_t< smooth_cepstrum_if_t> smooth_cepstrum::smooth_cepstrum_if_t::patchbay [private]
```

### 4.393.3.18 prepared

```
bool smooth_cepstrum::smooth_cepstrum_if_t::prepared [private]
```

The documentation for this class was generated from the following files:

- **smooth\_cepstrum.hh**
- **smooth\_cepstrum.cpp**

#### 4.394 smooth\_cepstrum::smooth\_cepstrum\_t Class Reference

##### Public Member Functions

- **smooth\_cepstrum\_t** ( **algo\_comm\_t** & **ac**, **smooth\_params** & **params**)
- **smooth\_cepstrum\_t** (const **smooth\_cepstrum\_t** &)=delete
- **smooth\_cepstrum\_t** & **operator=** (const **smooth\_cepstrum\_t** &)=delete
- **~smooth\_cepstrum\_t** ()
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)

##### Private Attributes

- **algo\_comm\_t** **ac**
- **smooth\_params** **params**
- unsigned int **fftl**
- **mha\_fft\_t** **mha\_fft**
- unsigned int **nfreq**
- unsigned int **nchan**
- float **ola\_powspec\_scale**
- float **q\_low**
- float **q\_high**
- **MHASignal::waveform\_t** **winF0**
- float **xi\_min**
- float **gain\_min**
- **MHASignal::waveform\_t** **alpha\_const**
- **MHASignal::waveform\_t** **alpha\_prev**
- **MHASignal::waveform\_t** **noisePow**
- **MHASignal::waveform\_t** **powSpec**
- **MHASignal::waveform\_t** **gamma\_post**
- **MHASignal::waveform\_t** **xi\_ml**
- **MHASignal::spectrum\_t** **lambda\_ml\_full**
- **MHASignal::spectrum\_t** **lambda\_ml\_ceps**
- **MHASignal::waveform\_t** **lambda\_ml\_smooth**
- **MHASignal::waveform\_t** **alpha\_hat**
- **MHASignal::waveform\_t** **alpha\_frame**
- **MHASignal::spectrum\_t** **lambda\_ceps**
- **MHASignal::waveform\_t** **lambda\_ceps\_prev**
- **MHASignal::spectrum\_t** **log\_lambda\_spec**
- **MHASignal::waveform\_t** **lambda\_spec**
- **MHASignal::waveform\_t** **xi\_est**
- **MHASignal::waveform\_t** **gain\_wiener**
- **MHASignal::spectrum\_t** **spec\_out**
- double \* **max\_val**
- int \* **max\_q**
- int \* **pitch\_set\_first**
- int \* **pitch\_set\_last**
- float **priorFact**
- float **xiOpt**
- float **logGLRFact**
- float **GLRexp**
- **MHASignal::waveform\_t** **GLR**

## 4.394 smooth\_cepstrum::smooth\_cepstrum\_t Class Reference 1393

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### 4.394.1 Constructor & Destructor Documentation

#### 4.394.1.1 smooth\_cepstrum\_t() [1/2]

```
smooth_cepstrum::smooth_cepstrum_t::smooth_cepstrum_t (
 algo_comm_t & ac,
 smooth_params & params)
```

#### 4.394.1.2 smooth\_cepstrum\_t() [2/2]

```
smooth_cepstrum::smooth_cepstrum_t::smooth_cepstrum_t (
 const smooth_cepstrum_t &) [delete]
```

#### 4.394.1.3 ~smooth\_cepstrum\_t()

```
smooth_cepstrum::smooth_cepstrum_t::~~smooth_cepstrum_t ()
```

### 4.394.2 Member Function Documentation

#### 4.394.2.1 operator=()

```
smooth_cepstrum_t& smooth_cepstrum::smooth_cepstrum_t::operator= (
 const smooth_cepstrum_t &) [delete]
```

#### 4.394.2.2 process()

```
mha_spec_t * smooth_cepstrum::smooth_cepstrum_t::process (
 mha_spec_t * noisyFrame)
```

### 4.394.3 Member Data Documentation

**4.394.3.1 ac**

**algo\_comm\_t** smooth\_cepstrum::smooth\_cepstrum\_t::ac [private]

**4.394.3.2 params**

**smooth\_params** smooth\_cepstrum::smooth\_cepstrum\_t::params [private]

**4.394.3.3 fftlen**

unsigned int smooth\_cepstrum::smooth\_cepstrum\_t::fftlen [private]

**4.394.3.4 mha\_fft**

**mha\_fft\_t** smooth\_cepstrum::smooth\_cepstrum\_t::mha\_fft [private]

**4.394.3.5 nfreq**

unsigned int smooth\_cepstrum::smooth\_cepstrum\_t::nfreq [private]

**4.394.3.6 nchan**

unsigned int smooth\_cepstrum::smooth\_cepstrum\_t::nchan [private]

**4.394.3.7 ola\_powspec\_scale**

float smooth\_cepstrum::smooth\_cepstrum\_t::ola\_powspec\_scale [private]

**4.394.3.8 q\_low**

float smooth\_cepstrum::smooth\_cepstrum\_t::q\_low [private]

### 4.394.3.9 q\_high

float smooth\_cepstrum::smooth\_cepstrum\_t::q\_high [private]

### 4.394.3.10 winF0

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::winF0 [private]

### 4.394.3.11 xi\_min

float smooth\_cepstrum::smooth\_cepstrum\_t::xi\_min [private]

### 4.394.3.12 gain\_min

float smooth\_cepstrum::smooth\_cepstrum\_t::gain\_min [private]

### 4.394.3.13 alpha\_const

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::alpha\_const [private]

### 4.394.3.14 alpha\_prev

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::alpha\_prev [private]

### 4.394.3.15 noisePow

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::noisePow [private]

### 4.394.3.16 powSpec

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::powSpec [private]

**4.394.3.17 gamma\_post**

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::gamma\_post [private]

**4.394.3.18 xi\_ml**

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::xi\_ml [private]

**4.394.3.19 lambda\_ml\_full**

**MHASignal::spectrum\_t** smooth\_cepstrum::smooth\_cepstrum\_t::lambda\_ml\_full [private]

**4.394.3.20 lambda\_ml\_ceps**

**MHASignal::spectrum\_t** smooth\_cepstrum::smooth\_cepstrum\_t::lambda\_ml\_ceps [private]

**4.394.3.21 lambda\_ml\_smooth**

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::lambda\_ml\_smooth [private]

**4.394.3.22 alpha\_hat**

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::alpha\_hat [private]

**4.394.3.23 alpha\_frame**

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::alpha\_frame [private]

**4.394.3.24 lambda\_ceps**

**MHASignal::spectrum\_t** smooth\_cepstrum::smooth\_cepstrum\_t::lambda\_ceps [private]

## 4.394 smooth\_cepstrum::smooth\_cepstrum\_t Class Reference 1397

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### 4.394.3.25 lambda\_ceps\_prev

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::lambda\_ceps\_prev [private]

### 4.394.3.26 log\_lambda\_spec

**MHASignal::spectrum\_t** smooth\_cepstrum::smooth\_cepstrum\_t::log\_lambda\_spec [private]

### 4.394.3.27 lambda\_spec

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::lambda\_spec [private]

### 4.394.3.28 xi\_est

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::xi\_est [private]

### 4.394.3.29 gain\_wiener

**MHASignal::waveform\_t** smooth\_cepstrum::smooth\_cepstrum\_t::gain\_wiener [private]

### 4.394.3.30 spec\_out

**MHASignal::spectrum\_t** smooth\_cepstrum::smooth\_cepstrum\_t::spec\_out [private]

### 4.394.3.31 max\_val

double\* smooth\_cepstrum::smooth\_cepstrum\_t::max\_val [private]

### 4.394.3.32 max\_q

int\* smooth\_cepstrum::smooth\_cepstrum\_t::max\_q [private]

**4.394.3.33 pitch\_set\_first**

```
int* smooth_cepstrum::smooth_cepstrum_t::pitch_set_first [private]
```

**4.394.3.34 pitch\_set\_last**

```
int* smooth_cepstrum::smooth_cepstrum_t::pitch_set_last [private]
```

**4.394.3.35 priorFact**

```
float smooth_cepstrum::smooth_cepstrum_t::priorFact [private]
```

**4.394.3.36 xiOpt**

```
float smooth_cepstrum::smooth_cepstrum_t::xiOpt [private]
```

**4.394.3.37 logGLRFact**

```
float smooth_cepstrum::smooth_cepstrum_t::logGLRFact [private]
```

**4.394.3.38 GLRexp**

```
float smooth_cepstrum::smooth_cepstrum_t::GLRexp [private]
```

**4.394.3.39 GLR**

```
MHASignal::waveform_t smooth_cepstrum::smooth_cepstrum_t::GLR [private]
```

The documentation for this class was generated from the following files:

- **smooth\_cepstrum.hh**
- **smooth\_cepstrum.cpp**



4.395 `smooth_cepstrum::smooth_params` Class Reference

## Public Member Functions

- **`smooth_params`** (const `mhaconfig_t` &`_in_cfg`, float `_xi_min_db`, float `_f0_low`, float `_f0_high`, float `_delta_pitch`, float `_lambda_thresh`, float `_alpha_pitch`, float `_beta_const`, float `_kappa_const`, float `_prior_q`, float `_xi_opt_db`, float `_gain_min_db`, std::vector< float > &`_winF0`, std::vector< float > &`_alpha_const_vals`, std::vector< float > &`_alpha_const_limits_hz`, std::string &`_noisePow_name`)

## Public Attributes

- const `mhaconfig_t` `in_cfg`
- float `xi_min_db`
- float `f0_low`
- float `f0_high`
- float `delta_pitch`
- float `lambda_thresh`
- float `alpha_pitch`
- float `beta_const`
- float `kappa_const`
- float `prior_q`
- float `xi_opt_db`
- float `gain_min_db`
- std::vector< float > `winF0`
- std::vector< float > `alpha_const_vals`
- std::vector< float > `alpha_const_limits_hz`
- std::string `noisePow_name`

## 4.395.1 Constructor &amp; Destructor Documentation

4.395.1.1 `smooth_params()`

```
smooth_cepstrum::smooth_params::smooth_params (
 const mhaconfig_t & _in_cfg,
 float _xi_min_db,
 float _f0_low,
 float _f0_high,
 float _delta_pitch,
 float _lambda_thresh,
 float _alpha_pitch,
 float _beta_const,
 float _kappa_const,
 float _prior_q,
```

```
float _xi_opt_db,
float _gain_min_db,
std::vector< float > & _winF0,
std::vector< float > & _alpha_const_vals,
std::vector< float > & _alpha_const_limits_hz,
std::string & _noisePow_name) [inline]
```

## 4.395.2 Member Data Documentation

### 4.395.2.1 in\_cfg

```
const mhaconfig_t smooth_cepstrum::smooth_params::in_cfg
```

### 4.395.2.2 xi\_min\_db

```
float smooth_cepstrum::smooth_params::xi_min_db
```

### 4.395.2.3 f0\_low

```
float smooth_cepstrum::smooth_params::f0_low
```

### 4.395.2.4 f0\_high

```
float smooth_cepstrum::smooth_params::f0_high
```

### 4.395.2.5 delta\_pitch

```
float smooth_cepstrum::smooth_params::delta_pitch
```

### 4.395.2.6 lambda\_thresh

```
float smooth_cepstrum::smooth_params::lambda_thresh
```

**4.395.2.7 alpha\_pitch**

```
float smooth_cepstrum::smooth_params::alpha_pitch
```

**4.395.2.8 beta\_const**

```
float smooth_cepstrum::smooth_params::beta_const
```

**4.395.2.9 kappa\_const**

```
float smooth_cepstrum::smooth_params::kappa_const
```

**4.395.2.10 prior\_q**

```
float smooth_cepstrum::smooth_params::prior_q
```

**4.395.2.11 xi\_opt\_db**

```
float smooth_cepstrum::smooth_params::xi_opt_db
```

**4.395.2.12 gain\_min\_db**

```
float smooth_cepstrum::smooth_params::gain_min_db
```

**4.395.2.13 winF0**

```
std::vector<float> smooth_cepstrum::smooth_params::winF0
```

**4.395.2.14 alpha\_const\_vals**

```
std::vector<float> smooth_cepstrum::smooth_params::alpha_const_vals
```

#### 4.395.2.15 alpha\_const\_limits\_hz

```
std::vector<float> smooth_cepstrum::smooth_params::alpha_const_limits_hz
```

#### 4.395.2.16 noisePow\_name

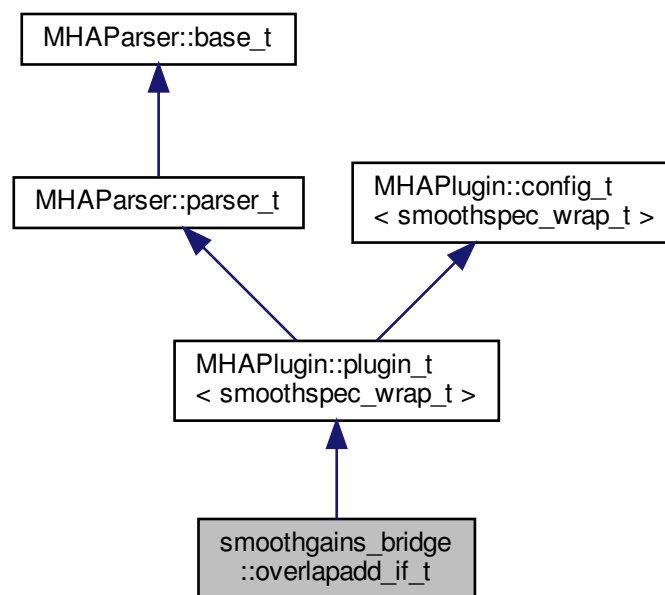
```
std::string smooth_cepstrum::smooth_params::noisePow_name
```

The documentation for this class was generated from the following file:

- **smooth\_cepstrum.hh**

### 4.396 smoothgains\_bridge::overlapadd\_if\_t Class Reference

Inheritance diagram for smoothgains\_bridge::overlapadd\_if\_t:



#### Public Member Functions

- **overlapadd\_if\_t** (const **algo\_comm\_t** &, const std::string &, const std::string &)
- **~overlapadd\_if\_t** ()
- void **prepare** ( **mhaconfig\_t** &)
- void **release** ()
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)

## Private Member Functions

- void **update** ()

## Private Attributes

- **MHAEvents::patchbay\_t**< **overlapadd\_if\_t** > **patchbay**
- **MHAParser::kw\_t** **mode**
- **MHAParser::window\_t** **irswnd**
- **MHAParser::float\_t** **epsilon**
- **MHAParser::mhapluginloader\_t** **plugloader**
- std::string **algo**
- **mhaconfig\_t** **cf\_in**
- **mhaconfig\_t** **cf\_out**

## Additional Inherited Members

## 4.396.1 Constructor &amp; Destructor Documentation

## 4.396.1.1 overlapadd\_if\_t()

```
smoothgains_bridge::overlapadd_if_t::overlapadd_if_t (
 const algo_comm_t & iac,
 const std::string & ,
 const std::string & ialg)
```

## 4.396.1.2 ~overlapadd\_if\_t()

```
smoothgains_bridge::overlapadd_if_t::~~overlapadd_if_t ()
```

## 4.396.2 Member Function Documentation

## 4.396.2.1 prepare()

```
void smoothgains_bridge::overlapadd_if_t::prepare (
 mhaconfig_t & t) [virtual]
```

Implements **MHAPLugin::plugin\_t**< **smoothspec\_wrap\_t** > (p. [1099](#)).

#### 4.396.2.2 release()

```
void smoothgains_bridge::overlapadd_if_t::release (
 void) [virtual]
```

Reimplemented from **MHAPLugin::plugin\_t< smoothspec\_wrap\_t >** (p. 1100).

#### 4.396.2.3 process()

```
mha_spec_t * smoothgains_bridge::overlapadd_if_t::process (
 mha_spec_t * spec)
```

#### 4.396.2.4 update()

```
void smoothgains_bridge::overlapadd_if_t::update () [private]
```

### 4.396.3 Member Data Documentation

#### 4.396.3.1 patchbay

```
MHAEvents::patchbay_t< overlapadd_if_t> smoothgains_bridge::overlapadd_if_t::patchbay
[private]
```

#### 4.396.3.2 mode

```
MHAParser::kw_t smoothgains_bridge::overlapadd_if_t::mode [private]
```

#### 4.396.3.3 irswnd

```
MHAParser::window_t smoothgains_bridge::overlapadd_if_t::irswnd [private]
```

## 4.397 smoothgains\_bridge::smoothspec\_wrap\_t Class Reference 405

### 4.396.3.4 epsilon

**MHAParser::float\_t** smoothgains\_bridge::overlapadd\_if\_t::epsilon [private]

### 4.396.3.5 plugloader

**MHAParser::mhapluginloader\_t** smoothgains\_bridge::overlapadd\_if\_t::plugloader [private]

### 4.396.3.6 algo

std::string smoothgains\_bridge::overlapadd\_if\_t::algo [private]

### 4.396.3.7 cf\_in

**mhaconfig\_t** smoothgains\_bridge::overlapadd\_if\_t::cf\_in [private]

### 4.396.3.8 cf\_out

**mhaconfig\_t** smoothgains\_bridge::overlapadd\_if\_t::cf\_out [private]

The documentation for this class was generated from the following file:

- **smoothgains\_bridge.cpp**

## 4.397 smoothgains\_bridge::smoothspec\_wrap\_t Class Reference

### Public Member Functions

- **smoothspec\_wrap\_t** ( **mhaconfig\_t** spar\_in, **mhaconfig\_t** spar\_out, const **MHAParser::kw\_t** &mode, const **MHAParser::window\_t** &irswnd, const **MHAParser::float\_t** &epsilon)
- **mha\_spec\_t \* proc\_1** ( **mha\_spec\_t** \*)
- **mha\_spec\_t \* proc\_2** ( **mha\_spec\_t** \*)

## Private Attributes

- **MHASignal::spectrum\_t spec\_in\_copy**  
*Copy of input spectrum for smoothspec.*
- **MHAFilter::smoothspec\_t smoothspec**  
*Smoothspec calculator.*
- **bool use\_smoothspec**
- **float smoothspec\_epsilon**

## 4.397.1 Constructor & Destructor Documentation

### 4.397.1.1 smoothspec\_wrap\_t()

```
smoothgains_bridge::smoothspec_wrap_t::smoothspec_wrap_t (
 mhaconfig_t spar_in,
 mhaconfig_t spar_out,
 const MHAParser::kw_t & mode,
 const MHAParser::window_t & irswnd,
 const MHAParser::float_t & epsilon)
```

## 4.397.2 Member Function Documentation

### 4.397.2.1 proc\_1()

```
mha_spec_t * smoothgains_bridge::smoothspec_wrap_t::proc_1 (
 mha_spec_t * s)
```

### 4.397.2.2 proc\_2()

```
mha_spec_t * smoothgains_bridge::smoothspec_wrap_t::proc_2 (
 mha_spec_t * s)
```

## 4.397.3 Member Data Documentation



## 4.397.3.1 spec\_in\_copy

**MHASignal::spectrum\_t** smoothgains\_bridge::smoothspec\_wrap\_t::spec\_in\_copy [private]

Copy of input spectrum for smoothspec.

## 4.397.3.2 smoothspec

**MHAFilter::smoothspec\_t** smoothgains\_bridge::smoothspec\_wrap\_t::smoothspec [private]

Smoothspec calculator.

## 4.397.3.3 use\_smoothspec

**bool** smoothgains\_bridge::smoothspec\_wrap\_t::use\_smoothspec [private]

## 4.397.3.4 smoothspec\_epsilon

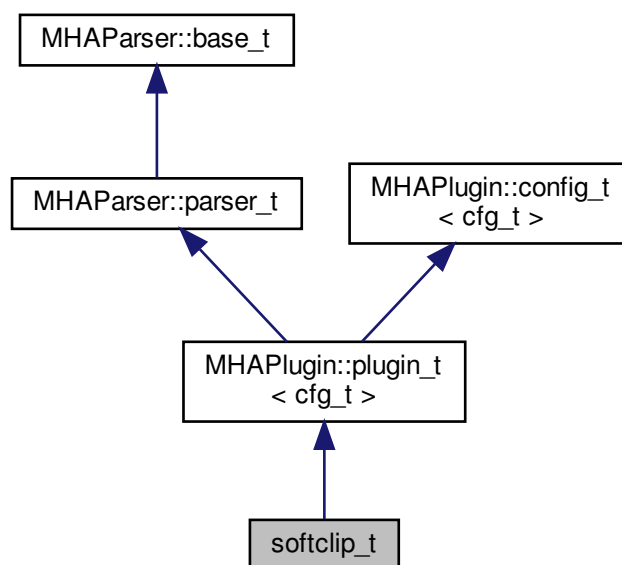
**float** smoothgains\_bridge::smoothspec\_wrap\_t::smoothspec\_epsilon [private]

The documentation for this class was generated from the following file:

- **smoothgains\_bridge.cpp**

## 4.398 softclip\_t Class Reference

Inheritance diagram for softclip\_t:



## Public Member Functions

- **softclip\_t** (const **algo\_comm\_t** &, const std::string &, const std::string &)
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)
- void **prepare** ( **mhaconfig\_t** &)
- void **update** ()

## Private Attributes

- **mhaconfig\_t** **tftype**
- **MHAParser::float\_t** **attack**
- **MHAParser::float\_t** **decay**
- **MHAParser::float\_t** **start\_limit**
- **MHAParser::float\_t** **slope\_db**
- **MHAEvents::patchbay\_t** < **softclip\_t** > **patchbay**

## Additional Inherited Members

### 4.398.1 Constructor & Destructor Documentation

#### 4.398.1.1 softclip\_t()

```
softclip_t::softclip_t (
 const algo_comm_t & iac,
 const std::string & chain,
 const std::string & name)
```

### 4.398.2 Member Function Documentation

#### 4.398.2.1 process()

```
mha_wave_t * softclip_t::process (
 mha_wave_t * s)
```

#### 4.398.2.2 prepare()

```
void softclip_t::prepare (
 mhaconfig_t & tf) [virtual]
```

Implements **MHAPugin::plugin\_t**< **cfg\_t** > (p. 1099).

#### 4.398.2.3 update()

```
void softclip_t::update ()
```

### 4.398.3 Member Data Documentation

#### 4.398.3.1 tftype

```
mhaconfig_t softclip_t::tftype [private]
```

#### 4.398.3.2 attack

```
MHAParser::float_t softclip_t::attack [private]
```

#### 4.398.3.3 decay

```
MHAParser::float_t softclip_t::decay [private]
```

#### 4.398.3.4 start\_limit

```
MHAParser::float_t softclip_t::start_limit [private]
```

#### 4.398.3.5 slope\_db

```
MHAParser::float_t softclip_t::slope_db [private]
```

#### 4.398.3.6 patchbay

```
MHAEvents::patchbay_t< softclip_t> softclip_t::patchbay [private]
```

The documentation for this class was generated from the following file:

- **softclip.cpp**

### 4.399 softclipper\_t Class Reference

#### Public Member Functions

- **softclipper\_t** (const **softclipper\_variables\_t** &v, const **mhaconfig\_t** &)
- **mha\_real\_t process** ( **mha\_wave\_t** \*)

#### Private Attributes

- **MHAFilter::o1flt\_lowpass\_t** attack
- **MHAFilter::o1flt\_maxtrack\_t** decay
- **MHAFilter::o1flt\_lowpass\_t** clipmeter
- **mha\_real\_t** threshold
- **mha\_real\_t** hardlimit
- **mha\_real\_t** slope
- bool **linear**

### 4.399.1 Constructor & Destructor Documentation

#### 4.399.1.1 softclipper\_t()

```
softclipper_t::softclipper_t (
 const softclipper_variables_t & v,
 const mhaconfig_t & tf)
```

### 4.399.2 Member Function Documentation

#### 4.399.2.1 process()

```
mha_real_t softclipper_t::process (
 mha_wave_t * s)
```

### 4.399.3 Member Data Documentation

#### 4.399.3.1 attack

**MHAFilter::olflt\_lowpass\_t** softclipper\_t::attack [private]

#### 4.399.3.2 decay

**MHAFilter::olflt\_maxtrack\_t** softclipper\_t::decay [private]

#### 4.399.3.3 clipmeter

**MHAFilter::olflt\_lowpass\_t** softclipper\_t::clipmeter [private]

#### 4.399.3.4 threshold

**mha\_real\_t** softclipper\_t::threshold [private]

#### 4.399.3.5 hardlimit

**mha\_real\_t** softclipper\_t::hardlimit [private]

#### 4.399.3.6 slope

**mha\_real\_t** softclipper\_t::slope [private]

#### 4.399.3.7 linear

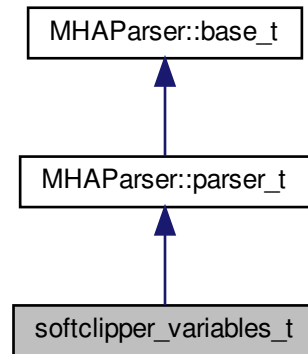
**bool** softclipper\_t::linear [private]

The documentation for this class was generated from the following file:

- **transducers.cpp**

#### 4.400 softclipper\_variables\_t Class Reference

Inheritance diagram for softclipper\_variables\_t:



##### Public Member Functions

- `softclipper_variables_t()`

##### Public Attributes

- `MHAParser::float_t tau_attack`
- `MHAParser::float_t tau_decay`
- `MHAParser::float_t tau_clip`
- `MHAParser::float_t threshold`
- `MHAParser::float_t hardlimit`
- `MHAParser::float_t slope`
- `MHAParser::bool_t linear`
- `MHAParser::float_mon_t clipped`
- `MHAParser::float_t max_clipped`

##### Additional Inherited Members

#### 4.400.1 Constructor & Destructor Documentation

#### 4.400.1.1 softclipper\_variables\_t()

softclipper\_variables\_t::softclipper\_variables\_t ( )

### 4.400.2 Member Data Documentation

#### 4.400.2.1 tau\_attack

**MHAParser::float\_t** softclipper\_variables\_t::tau\_attack

#### 4.400.2.2 tau\_decay

**MHAParser::float\_t** softclipper\_variables\_t::tau\_decay

#### 4.400.2.3 tau\_clip

**MHAParser::float\_t** softclipper\_variables\_t::tau\_clip

#### 4.400.2.4 threshold

**MHAParser::float\_t** softclipper\_variables\_t::threshold

#### 4.400.2.5 hardlimit

**MHAParser::float\_t** softclipper\_variables\_t::hardlimit

#### 4.400.2.6 slope

**MHAParser::float\_t** softclipper\_variables\_t::slope

#### 4.400.2.7 linear

**MHAParser::bool\_t** softclipper\_variables\_t::linear

#### 4.400.2.8 clipped

**MHAParser::float\_mon\_t** softclipper\_variables\_t::clipped

#### 4.400.2.9 max\_clipped

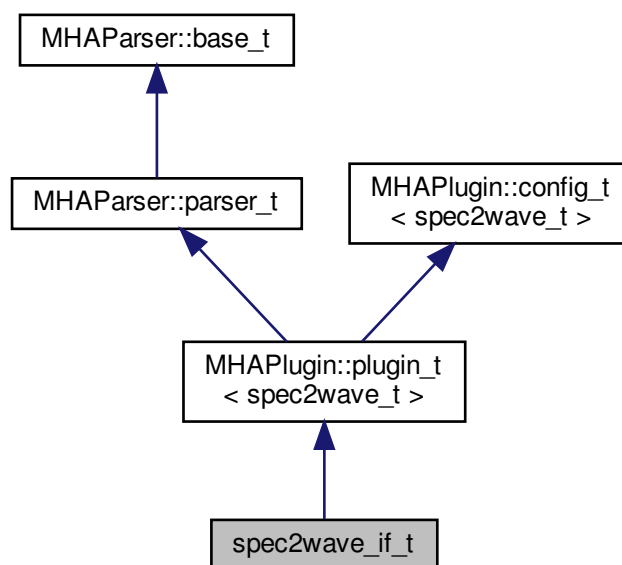
**MHAParser::float\_t** softclipper\_variables\_t::max\_clipped

The documentation for this class was generated from the following file:

- **transducers.cpp**

### 4.401 spec2wave\_if\_t Class Reference

Inheritance diagram for spec2wave\_if\_t:





### Public Member Functions

- **spec2wave\_if\_t** (const **algo\_comm\_t** &, const std::string &, const std::string &)
- void **prepare** ( **mhaconfig\_t** &)
- void **release** ()
- **mha\_wave\_t** \* **process** ( **mha\_spec\_t** \*)

### Private Member Functions

- void **update** ()
- void **setlock** (bool b)

### Private Attributes

- **MHAParser::float\_t** **ramplen**
- **windowselector\_t** **window\_config**

### Additional Inherited Members

#### 4.401.1 Constructor & Destructor Documentation

##### 4.401.1.1 spec2wave\_if\_t()

```
spec2wave_if_t::spec2wave_if_t (
 const algo_comm_t & iac,
 const std::string & ,
 const std::string &)
```

#### 4.401.2 Member Function Documentation

##### 4.401.2.1 prepare()

```
void spec2wave_if_t::prepare (
 mhaconfig_t & t) [virtual]
```

Implements **MHAPLugin::plugin\_t**< **spec2wave\_t** > (p. [1099](#)).

#### 4.401.2.2 release()

```
void spec2wave_if_t::release (
 void) [virtual]
```

Reimplemented from **MHAPlugin::plugin\_t**< **spec2wave\_t** > (p. [1100](#)).

#### 4.401.2.3 process()

```
mha_wave_t * spec2wave_if_t::process (
 mha_spec_t * spec_in)
```

#### 4.401.2.4 update()

```
void spec2wave_if_t::update () [private]
```

#### 4.401.2.5 setlock()

```
void spec2wave_if_t::setlock (
 bool b) [private]
```

### 4.401.3 Member Data Documentation

#### 4.401.3.1 ramplen

```
MHAParser::float_t spec2wave_if_t::ramplen [private]
```

#### 4.401.3.2 window\_config

```
windowselector_t spec2wave_if_t::window_config [private]
```

The documentation for this class was generated from the following file:

- **spec2wave.cpp**

## 4.402 spec2wave\_t Class Reference

## Public Member Functions

- **spec2wave\_t** (unsigned int *nfft\_*, unsigned int *nwnd\_*, unsigned int *nwndshift\_*, unsigned int *nch*, **mha\_real\_t** *ramplen*, const **MHAWindow::base\_t** &*postwin*)
- **~spec2wave\_t** ()
- **mha\_wave\_t** \* **process** ( **mha\_spec\_t** \*)

## Private Attributes

- **mha\_fft\_t** *ft*  
*FFT class.*
- unsigned int **npad1**  
*length of zero padding before window*
- unsigned int **npad2**  
*length of zero padding after window*
- **hanning\_ramps\_t** *ramps*
- **MHASignal::waveform\_t** *calc\_out*
- **MHASignal::waveform\_t** *out\_buf*
- **MHASignal::waveform\_t** *write\_buf*
- **mha\_real\_t** *sc*
- unsigned int **nfft**
- unsigned int **nwndshift**
- **MHAWindow::base\_t** *postwindow*

## 4.402.1 Constructor &amp; Destructor Documentation

## 4.402.1.1 spec2wave\_t()

```
spec2wave_t::spec2wave_t (
 unsigned int nfft_,
 unsigned int nwnd_,
 unsigned int nwndshift_,
 unsigned int nch,
 mha_real_t ramplen,
 const MHAWindow::base_t & postwin)
```

## 4.402.1.2 ~spec2wave\_t()

```
spec2wave_t::~~spec2wave_t ()
```

## 4.402.2 Member Function Documentation

### 4.402.2.1 process()

```
mha_wave_t * spec2wave_t::process (
 mha_spec_t * spec_in)
```

## 4.402.3 Member Data Documentation

### 4.402.3.1 ft

```
mha_fft_t spec2wave_t::ft [private]
```

FFT class.

### 4.402.3.2 npad1

```
unsigned int spec2wave_t::npad1 [private]
```

length of zero padding before window

### 4.402.3.3 npad2

```
unsigned int spec2wave_t::npad2 [private]
```

length of zero padding after window

### 4.402.3.4 ramps

```
hanning_ramps_t spec2wave_t::ramps [private]
```

#### 4.402.3.5 calc\_out

**MHASignal::waveform\_t** spec2wave\_t::calc\_out [private]

#### 4.402.3.6 out\_buf

**MHASignal::waveform\_t** spec2wave\_t::out\_buf [private]

#### 4.402.3.7 write\_buf

**MHASignal::waveform\_t** spec2wave\_t::write\_buf [private]

#### 4.402.3.8 sc

**mha\_real\_t** spec2wave\_t::sc [private]

#### 4.402.3.9 nfft

unsigned int spec2wave\_t::nfft [private]

#### 4.402.3.10 nwndshift

unsigned int spec2wave\_t::nwndshift [private]

#### 4.402.3.11 postwindow

**MHAWindow::base\_t** spec2wave\_t::postwindow [private]

The documentation for this class was generated from the following file:

- **spec2wave.cpp**

## 4.403 spec\_fader\_t Class Reference

### Public Member Functions

- **spec\_fader\_t** (unsigned int *ch*, **mha\_real\_t** *fr*, **MHAParser::vfloat\_t** &*ng*, **MHAParser::float\_t** &*t*)
- **~spec\_fader\_t** ()

### Public Attributes

- unsigned int **nch**
- **mha\_real\_t** \* **gains**
- unsigned int **fr**

## 4.403.1 Constructor & Destructor Documentation

### 4.403.1.1 spec\_fader\_t()

```
spec_fader_t::spec_fader_t (
 unsigned int ch,
 mha_real_t fr,
 MHAParser::vfloat_t & ng,
 MHAParser::float_t & t)
```

### 4.403.1.2 ~spec\_fader\_t()

```
spec_fader_t::~~spec_fader_t () [inline]
```

## 4.403.2 Member Data Documentation

### 4.403.2.1 nch

```
unsigned int spec_fader_t::nch
```

## 4.403.2.2 gains

```
mha_real_t* spec_fader_t::gains
```

## 4.403.2.3 fr

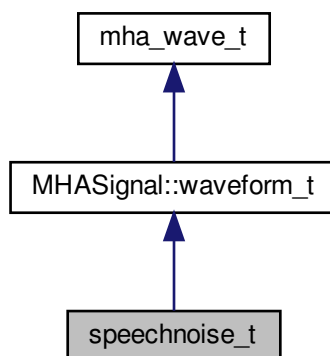
```
unsigned int spec_fader_t::fr
```

The documentation for this class was generated from the following file:

- **fader\_spec.cpp**

## 4.404 speechnoise\_t Class Reference

Inheritance diagram for speechnoise\_t:



## Public Types

- enum **noise\_type\_t** {  
  **mha**, **olnoise**, **LTASS\_combined**, **LTASS\_female**,  
  **LTASS\_male**, **white**, **pink**, **brown**,  
  **TEN\_SPL**, **TEN\_SPL\_250\_8k**, **TEN\_SPL\_50\_16k**, **sin125**,  
  **sin250**, **sin500**, **sin1k**, **sin2k**,  
  **sin4k**, **sin8k** }

## Public Member Functions

- **speechnoise\_t** (float duration, float srates, unsigned int **channels**, **speechnoise\_t::noise\_type\_t** noise\_type= **speechnoise\_t::mha**)
- **speechnoise\_t** (unsigned int length\_samples, float srates, unsigned int **channels**, **speechnoise\_t::noise\_type\_t** noise\_type= **speechnoise\_t::mha**)

## Private Member Functions

- void **creator** ( **speechnoise\_t::noise\_type\_t** noise\_type, float srates)

## Additional Inherited Members

### 4.404.1 Member Enumeration Documentation

#### 4.404.1.1 noise\_type\_t

enum **speechnoise\_t::noise\_type\_t**

#### Enumerator

|                |  |
|----------------|--|
| mha            |  |
| olnoise        |  |
| LTASS_combined |  |
| LTASS_female   |  |
| LTASS_male     |  |
| white          |  |
| pink           |  |
| brown          |  |
| TEN_SPL        |  |
| TEN_SPL_250_8k |  |
| TEN_SPL_50_16k |  |
| sin125         |  |
| sin250         |  |
| sin500         |  |
| sin1k          |  |
| sin2k          |  |
| sin4k          |  |
| sin8k          |  |



## 4.404.2 Constructor & Destructor Documentation

### 4.404.2.1 speechnoise\_t() [1/2]

```
speechnoise_t::speechnoise_t (
 float duration,
 float srate,
 unsigned int channels,
 speechnoise_t::noise_type_t noise_type = speechnoise_t::mha)
```

### 4.404.2.2 speechnoise\_t() [2/2]

```
speechnoise_t::speechnoise_t (
 unsigned int length_samples,
 float srate,
 unsigned int channels,
 speechnoise_t::noise_type_t noise_type = speechnoise_t::mha)
```

## 4.404.3 Member Function Documentation

### 4.404.3.1 creator()

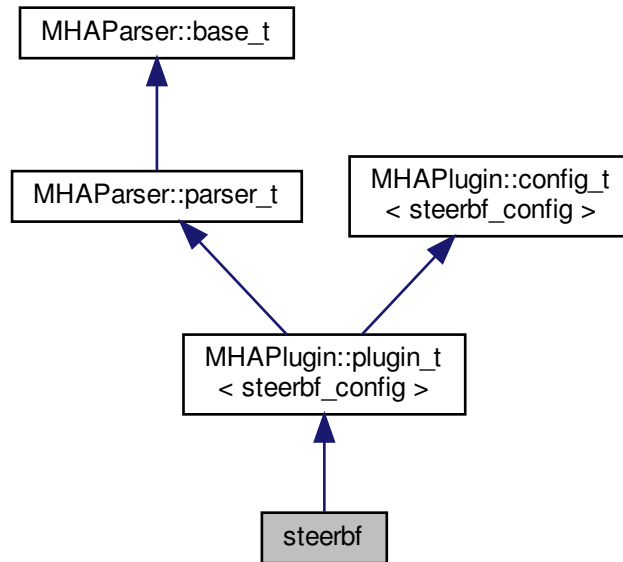
```
void speechnoise_t::creator (
 speechnoise_t::noise_type_t noise_type,
 float srate) [private]
```

The documentation for this class was generated from the following files:

- **speechnoise.h**
- **speechnoise.cpp**

#### 4.405 steerbf Class Reference

Inheritance diagram for steerbf:



#### Public Member Functions

- **steerbf** ( **algo\_comm\_t** & **ac**, const std::string &chain\_name, const std::string &algo\_name)  
*Constructs our plugin.*
- ~**steerbf** ()
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)  
*Defers to configuration class.*
- void **prepare** ( **mhaconfig\_t** &)  
*Plugin preparation.*
- void **release** (void)

#### Public Attributes

- **MHAParser::string\_t** **bf\_src**
- **parser\_int\_dyn** **angle\_ind**
- **MHAParser::string\_t** **angle\_src**

### Private Member Functions

- void **update\_cfg** ()

### Private Attributes

- **MHAEvents::patchbay\_t**< **steerbf** > **patchbay**

### Additional Inherited Members

## 4.405.1 Constructor & Destructor Documentation

### 4.405.1.1 steerbf()

```
steerbf::steerbf (
 algo_comm_t & ac,
 const std::string & chain_name,
 const std::string & algo_name)
```

Constructs our plugin.

### 4.405.1.2 ~steerbf()

```
steerbf::~steerbf ()
```

## 4.405.2 Member Function Documentation

### 4.405.2.1 process()

```
mha_spec_t * steerbf::process (
 mha_spec_t * signal)
```

Defers to configuration class.

### 4.405.2.2 prepare()

```
void steerbf::prepare (
 mhaconfig_t & signal_info) [virtual]
```

Plugin preparation.

An opportunity to validate configuration parameters before instantiating a configuration.

**Parameters**

|                    |                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <i>signal_info</i> | Structure containing a description of the form of the signal (domain, number of channels, frames per block, sampling rate). |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|

Implements **MHAPLugin::plugin\_t< steerbf\_config >** (p. [1099](#)).

**4.405.2.3 release()**

```
void steerbf::release (
 void) [inline], [virtual]
```

Reimplemented from **MHAPLugin::plugin\_t< steerbf\_config >** (p. [1100](#)).

**4.405.2.4 update\_cfg()**

```
void steerbf::update_cfg (
 void) [private]
```

**4.405.3 Member Data Documentation****4.405.3.1 bf\_src**

```
MHAParser::string_t steerbf::bf_src
```

**4.405.3.2 angle\_ind**

```
parser_int_dyn steerbf::angle_ind
```

**4.405.3.3 angle\_src**

```
MHAParser::string_t steerbf::angle_src
```

## 4.405.3.4 patchbay

```
MHAEvents::patchbay_t< steerbf> steerbf::patchbay [private]
```

The documentation for this class was generated from the following files:

- **steerbf.h**
- **steerbf.cpp**

## 4.406 steerbf\_config Class Reference

## Public Member Functions

- **steerbf\_config** ( **algo\_comm\_t** & **ac**, const **mhaconfig\_t** **in\_cfg**, **steerbf** \* **steerbf**)
- **~steerbf\_config** ()
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*)

## Private Attributes

- unsigned int **nchan**
- unsigned int **nfreq**
- **MHASignal::spectrum\_t** **outSpec**
- **mha\_spec\_t** **bf\_vec**
- unsigned int **nangle**
- **steerbf** \* **\_steerbf**
- **algo\_comm\_t** & **ac**
- std::string **bf\_src\_copy**

## 4.406.1 Constructor &amp; Destructor Documentation

## 4.406.1.1 steerbf\_config()

```
steerbf_config::steerbf_config (
 algo_comm_t & ac,
 const mhaconfig_t in_cfg,
 steerbf * steerbf)
```

## 4.406.1.2 ~steerbf\_config()

```
steerbf_config::~steerbf_config ()
```

## 4.406.2 Member Function Documentation

### 4.406.2.1 process()

```
mha_spec_t * steerbf_config::process (
 mha_spec_t * inSpec)
```

## 4.406.3 Member Data Documentation

### 4.406.3.1 nchan

```
unsigned int steerbf_config::nchan [private]
```

### 4.406.3.2 nfreq

```
unsigned int steerbf_config::nfreq [private]
```

### 4.406.3.3 outSpec

```
MHASignal::spectrum_t steerbf_config::outSpec [private]
```

### 4.406.3.4 bf\_vec

```
mha_spec_t steerbf_config::bf_vec [private]
```

### 4.406.3.5 nangle

```
unsigned int steerbf_config::nangle [private]
```

## 4.406.3.6 \_steerbf

```
steerbf* steerbf_config::_steerbf [private]
```

## 4.406.3.7 ac

```
algo_comm_t& steerbf_config::ac [private]
```

## 4.406.3.8 bf\_src\_copy

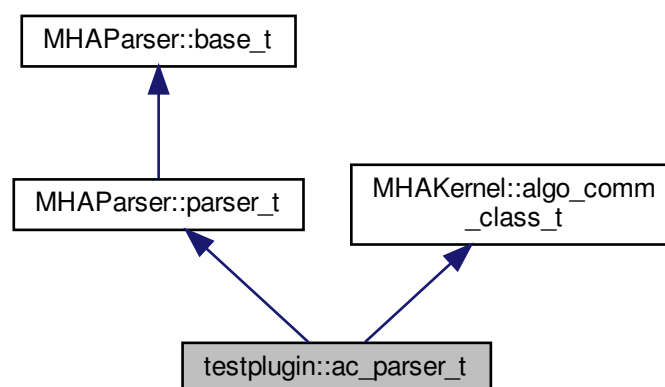
```
std::string steerbf_config::bf_src_copy [private]
```

The documentation for this class was generated from the following files:

- **steerbf.h**
- **steerbf.cpp**

## 4.407 testplugin::ac\_parser\_t Class Reference

Inheritance diagram for testplugin::ac\_parser\_t:



## Public Types

- **enum data\_type\_t** {  
   \_MHA\_AC\_CHAR, \_MHA\_AC\_INT, \_MHA\_AC\_MHAREAL, \_MHA\_AC\_FLOAT,  
   \_MHA\_AC\_DOUBLE, \_MHA\_AC\_MHACOMPLEX, \_unknown }

## Public Member Functions

- **ac\_parser\_t** ()
- void **do\_insert\_var** ()  
*Insert variable into AC space.*
- void **do\_get\_var** ()

## Public Attributes

- **MHAParser::string\_t** insert\_var
- **MHAParser::string\_t** get\_var
- **MHAParser::kw\_t** data\_type
- **MHAParser::int\_t** num\_entries
- **MHAParser::int\_t** stride
- **MHAParser::string\_t** char\_data
- **MHAParser::vint\_t** int\_data
- **MHAParser::vfloat\_t** float\_data
- **MHAParser::vcomplex\_t** complex\_data
- **MHAEvents::patchbay\_t** < **ac\_parser\_t** > patchbay

## Additional Inherited Members

### 4.407.1 Member Enumeration Documentation

#### 4.407.1.1 data\_type\_t

```
enum testplugin::ac_parser_t::data_type_t
```

#### Enumerator

|                    |  |
|--------------------|--|
| _MHA_AC_CHAR       |  |
| _MHA_AC_INT        |  |
| _MHA_AC_MHAREAL    |  |
| _MHA_AC_FLOAT      |  |
| _MHA_AC_DOUBLE     |  |
| _MHA_AC_MHACOMPLEX |  |
| _unknown           |  |

### 4.407.2 Constructor & Destructor Documentation



#### 4.407.2.1 ac\_parser\_t()

```
testplugin::ac_parser_t::ac_parser_t () [inline]
```

### 4.407.3 Member Function Documentation

#### 4.407.3.1 do\_insert\_var()

```
void testplugin::ac_parser_t::do_insert_var () [inline]
```

Insert variable into AC space.

This leaks memory by design, as the plugin is for testing only

#### 4.407.3.2 do\_get\_var()

```
void testplugin::ac_parser_t::do_get_var () [inline]
```

### 4.407.4 Member Data Documentation

#### 4.407.4.1 insert\_var

```
MHAParser::string_t testplugin::ac_parser_t::insert_var
```

#### 4.407.4.2 get\_var

```
MHAParser::string_t testplugin::ac_parser_t::get_var
```

#### 4.407.4.3 data\_type

```
MHAParser::kw_t testplugin::ac_parser_t::data_type
```

#### 4.407.4.4 num\_entries

**MHAParser::int\_t** testplugin::ac\_parser\_t::num\_entries

#### 4.407.4.5 stride

**MHAParser::int\_t** testplugin::ac\_parser\_t::stride

#### 4.407.4.6 char\_data

**MHAParser::string\_t** testplugin::ac\_parser\_t::char\_data

#### 4.407.4.7 int\_data

**MHAParser::vint\_t** testplugin::ac\_parser\_t::int\_data

#### 4.407.4.8 float\_data

**MHAParser::vfloat\_t** testplugin::ac\_parser\_t::float\_data

#### 4.407.4.9 complex\_data

**MHAParser::vcomplex\_t** testplugin::ac\_parser\_t::complex\_data

#### 4.407.4.10 patchbay

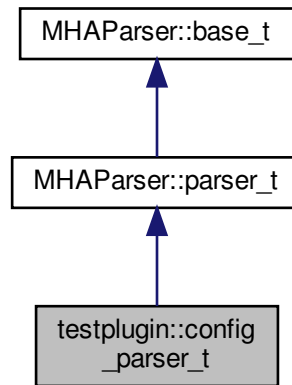
**MHAEvents::patchbay\_t**< **ac\_parser\_t**> testplugin::ac\_parser\_t::patchbay

The documentation for this class was generated from the following file:

- **testplugin.cpp**

## 4.408 testplugin::config\_parser\_t Class Reference

Inheritance diagram for testplugin::config\_parser\_t:



#### Public Member Functions

- void **setlock** (const bool &b)
- **config\_parser\_t** ()
- **mhaconfig\_t get** () const
- void **set** ( **mhaconfig\_t** c)

#### Public Attributes

- **MHAParser::int\_t channels**
- **MHAParser::kw\_t domain**
- **MHAParser::int\_t fragsize**
- **MHAParser::int\_t wndlen**
- **MHAParser::int\_t fftlen**
- **MHAParser::float\_t srate**

#### Additional Inherited Members

##### 4.408.1 Constructor & Destructor Documentation

#### 4.408.1.1 `config_parser_t()`

```
testplugin::config_parser_t::config_parser_t () [inline]
```

### 4.408.2 Member Function Documentation

#### 4.408.2.1 `setlock()`

```
void testplugin::config_parser_t::setlock (
 const bool & b) [inline]
```

#### 4.408.2.2 `get()`

```
mhaconfig_t testplugin::config_parser_t::get () const [inline]
```

#### 4.408.2.3 `set()`

```
void testplugin::config_parser_t::set (
 mhaconfig_t c) [inline]
```

### 4.408.3 Member Data Documentation

#### 4.408.3.1 `channels`

```
MHAParser::int_t testplugin::config_parser_t::channels
```

#### 4.408.3.2 `domain`

```
MHAParser::kw_t testplugin::config_parser_t::domain
```

## 4.408.3.3 fragsize

```
MHAParser::int_t testplugin::config_parser_t::fragsize
```

## 4.408.3.4 wndlen

```
MHAParser::int_t testplugin::config_parser_t::wndlen
```

## 4.408.3.5 fftlen

```
MHAParser::int_t testplugin::config_parser_t::fftlen
```

## 4.408.3.6 srate

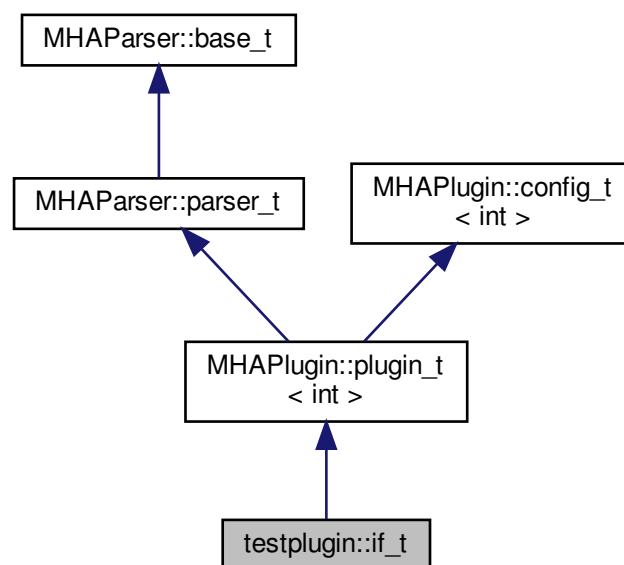
```
MHAParser::float_t testplugin::config_parser_t::srate
```

The documentation for this class was generated from the following file:

- **testplugin.cpp**

## 4.409 testplugin::if\_t Class Reference

Inheritance diagram for testplugin::if\_t:



## Public Member Functions

- **if\_t** (const **algo\_comm\_t** &iac, const std::string &ith, const std::string &ial)
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*s\_in)
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*s\_in)
- void **prepare** ( **mhaconfig\_t** &)

## Private Member Functions

- void **test\_prepare** ()
- void **test\_process** ()

## Private Attributes

- **config\_parser\_t** **config\_in**
- **config\_parser\_t** **config\_out**
- **ac\_parser\_t** **ac**
- **signal\_parser\_t** **signal**
- **MHAParser::bool\_t** **\_prepare**
- **MHAEvents::patchbay\_t**< **if\_t** > **patchbay**
- **MHAParser::mhapluginloader\_t** **plug**

## Additional Inherited Members

### 4.409.1 Constructor & Destructor Documentation

#### 4.409.1.1 if\_t()

```
testplugin::if_t::if_t (
 const algo_comm_t & iac,
 const std::string & ith,
 const std::string & ial)
```

### 4.409.2 Member Function Documentation

#### 4.409.2.1 process() [1/2]

```
mha_spec_t* testplugin::if_t::process (
 mha_spec_t * s_in) [inline]
```

#### 4.409.2.2 process() [2/2]

```
mha_wave_t* testplugin::if_t::process (
 mha_wave_t * s_in) [inline]
```

#### 4.409.2.3 prepare()

```
void testplugin::if_t::prepare (
 mhaconfig_t &) [inline], [virtual]
```

Implements **MHAPlugin::plugin\_t< int >** (p. 1099).

#### 4.409.2.4 test\_prepare()

```
void testplugin::if_t::test_prepare () [private]
```

#### 4.409.2.5 test\_process()

```
void testplugin::if_t::test_process () [private]
```

### 4.409.3 Member Data Documentation

#### 4.409.3.1 config\_in

```
config_parser_t testplugin::if_t::config_in [private]
```

#### 4.409.3.2 config\_out

```
config_parser_t testplugin::if_t::config_out [private]
```

#### 4.409.3.3 ac

```
ac_parser_t testplugin::if_t::ac [private]
```

#### 4.409.3.4 signal

```
signal_parser_t testplugin::if_t::signal [private]
```

#### 4.409.3.5 \_prepare

```
MHAParser::bool_t testplugin::if_t::_prepare [private]
```

#### 4.409.3.6 patchbay

```
MHAEvents::patchbay_t< if_t> testplugin::if_t::patchbay [private]
```

#### 4.409.3.7 plug

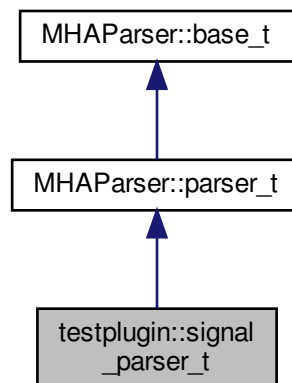
```
MHAParser::mhapluginloader_t testplugin::if_t::plug [private]
```

The documentation for this class was generated from the following file:

- **testplugin.cpp**

### 4.410 testplugin::signal\_parser\_t Class Reference

Inheritance diagram for testplugin::signal\_parser\_t:





## Public Member Functions

- **signal\_parser\_t()**

## Public Attributes

- **MHAParser::mfloat\_t input\_wave**
- **MHAParser::mcomplex\_t input\_spec**
- **MHAParser::mfloat\_mon\_t output\_wave**
- **MHAParser::mcomplex\_mon\_t output\_spec**

## Additional Inherited Members

### 4.410.1 Constructor & Destructor Documentation

#### 4.410.1.1 signal\_parser\_t()

testplugin::signal\_parser\_t::signal\_parser\_t ( ) [inline]

### 4.410.2 Member Data Documentation

#### 4.410.2.1 input\_wave

**MHAParser::mfloat\_t** testplugin::signal\_parser\_t::input\_wave

#### 4.410.2.2 input\_spec

**MHAParser::mcomplex\_t** testplugin::signal\_parser\_t::input\_spec

#### 4.410.2.3 output\_wave

**MHAParser::mfloat\_mon\_t** testplugin::signal\_parser\_t::output\_wave

#### 4.410.2.4 output\_spec

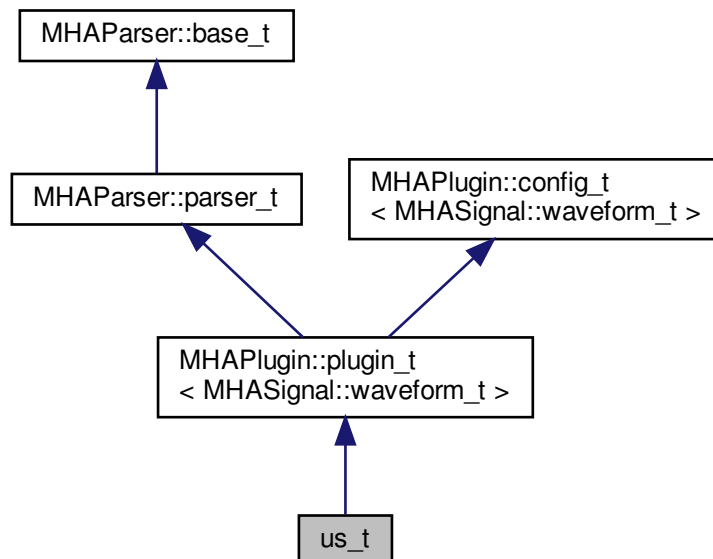
`MHAParser::mcomplex_mon_t testplugin::signal_parser_t::output_spec`

The documentation for this class was generated from the following file:

- **testplugin.cpp**

#### 4.411 us\_t Class Reference

Inheritance diagram for `us_t`:



#### Public Member Functions

- **us\_t** ( **algo\_comm\_t**, std::string, std::string)
- **mha\_wave\_t** \* **process** ( **mha\_wave\_t** \*)
- void **prepare** ( **mhaconfig\_t** &)
- void **release** ()

#### Private Attributes

- **MHAParser::int\_t** **ratio**
- **MHAFilter::iir\_filter\_t** **antialias**

## Additional Inherited Members

### 4.411.1 Constructor & Destructor Documentation

#### 4.411.1.1 `us_t()`

```
us_t::us_t (
 algo_comm_t iac,
 std::string ,
 std::string)
```

### 4.411.2 Member Function Documentation

#### 4.411.2.1 `process()`

```
mha_wave_t * us_t::process (
 mha_wave_t * s)
```

#### 4.411.2.2 `prepare()`

```
void us_t::prepare (
 mhaconfig_t & cf) [virtual]
```

Implements **MHAPLugin::plugin\_t**< **MHASignal::waveform\_t** > (p. [1099](#)).

#### 4.411.2.3 `release()`

```
void us_t::release (
 void) [virtual]
```

Reimplemented from **MHAPLugin::plugin\_t**< **MHASignal::waveform\_t** > (p. [1100](#)).

### 4.411.3 Member Data Documentation

#### 4.411.3.1 ratio

```
MHAParser::int_t us_t::ratio [private]
```

#### 4.411.3.2 antialias

```
MHAFilter::iir_filter_t us_t::antialias [private]
```

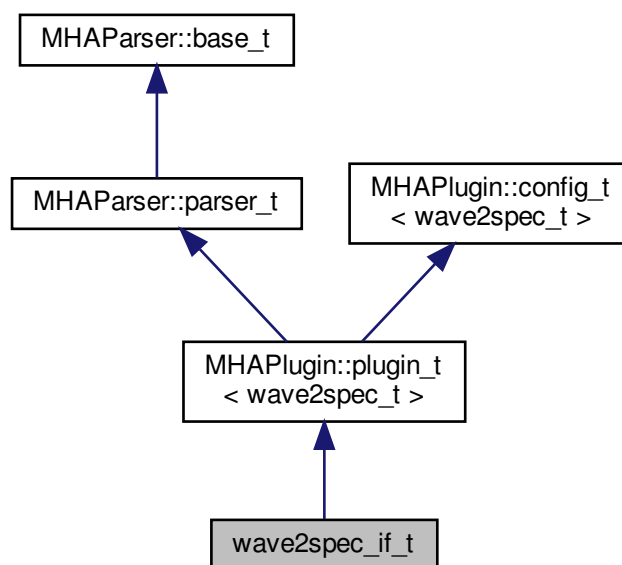
The documentation for this class was generated from the following file:

- **upsample.cpp**

### 4.412 wave2spec\_if\_t Class Reference

Plugin wave2spec interface class, uses **wave2spec\_t** (p. [1448](#)) as runtime configuration.

Inheritance diagram for wave2spec\_if\_t:



## Public Member Functions

- **wave2spec\_if\_t** (const **algo\_comm\_t** &iac, const std::string &, const std::string &ialg)  
*Constructor of wave2spec plugin, sets up configuration variables and callbacks.*
- void **prepare** ( **mhaconfig\_t** &t)  
*prepare for signal processing*
- void **release** ()  
*Unprepare signal processing.*
- void **process** ( **mha\_wave\_t** \*wave\_in, **mha\_spec\_t** \*\*sout)  
*processing callback used for domain transformation*
- void **process** ( **mha\_wave\_t** \*wave\_in, **mha\_wave\_t** \*\*sout)  
*processing callback used if output of original waveform is requested.*

## Private Member Functions

- void **update** ()  
*Create a new runtime configuration from configuration parameters when the plugin is prepared, or when the window position or other window parameters change.*
- void **setlock** (bool b)  
*Lock/Unlock all configuration variables.*

## Private Attributes

- **MHAParser::int\_t** **nfft**  
*FFT length selector.*
- **MHAParser::int\_t** **nwnd**  
*Window length selector.*
- **MHAParser::float\_t** **wndpos**  
*Window position selector.*
- **windowselector\_t** **window\_config**
- **MHAParser::bool\_t** **strict\_window\_ratio**  
*Switch to disallow window sizes that are not a multiple of the fragsize a by power of two.*
- **MHAParser::bool\_t** **return\_wave**  
*Switch to select return domain.*
- std::string **algo**  
*configured name this plugin, used to name the AC variables*
- **MHAParser::vfloat\_mon\_t** **zeropadding**

## Additional Inherited Members

### 4.412.1 Detailed Description

Plugin wave2spec interface class, uses **wave2spec\_t** (p. 1448) as runtime configuration.

## 4.412.2 Constructor & Destructor Documentation

### 4.412.2.1 wave2spec\_if\_t()

```

wave2spec_if_t::wave2spec_if_t (
 const algo_comm_t & iac,
 const std::string & ,
 const std::string & ialg)

```

Constructor of wave2spec plugin, sets up configuration variables and callbacks.

#### Parameters

|             |                                                                                      |
|-------------|--------------------------------------------------------------------------------------|
| <i>iac</i>  | algorithm communication storage accessor                                             |
| <i>ialg</i> | configured name of this plugin, used to name the AC variables published by wave2spec |

## 4.412.3 Member Function Documentation

### 4.412.3.1 prepare()

```

void wave2spec_if_t::prepare (
 mhaconfig_t & t) [virtual]

```

prepare for signal processing

#### Parameters

|                |          |                                                                                 |
|----------------|----------|---------------------------------------------------------------------------------|
| <i>in, out</i> | <i>t</i> | signal dimenstions, modified by prepare as determined by the STFT configuration |
|----------------|----------|---------------------------------------------------------------------------------|

Implements **MHAPLugin::plugin\_t< wave2spec\_t >** (p. [1099](#)).

### 4.412.3.2 release()

```

void wave2spec_if_t::release (
 void) [virtual]

```

Unprepare signal processing.

Reimplemented from **MHAPLugin::plugin\_t< wave2spec\_t >** (p. [1100](#)).

## 4.412.3.3 process() [1/2]

```
void wave2spec_if_t::process (
 mha_wave_t * wave_in,
 mha_spec_t ** sout)
```

processing callback used for domain transformation

## Parameters

|                |                                                             |
|----------------|-------------------------------------------------------------|
| <i>wave_in</i> | latest block of audio signal (hop size samples per channel) |
| <i>sout</i>    | output spectrum pointer                                     |

## 4.412.3.4 process() [2/2]

```
void wave2spec_if_t::process (
 mha_wave_t * wave_in,
 mha_wave_t ** sout)
```

processing callback used if output of original waveform is requested.

The STFT spectrum is computed and can only be accessed by downstream plugins through the AC variable published by this plugin.

## Parameters

|                |                                                             |
|----------------|-------------------------------------------------------------|
| <i>wave_in</i> | latest block of audio signal (hop size samples per channel) |
| <i>sout</i>    | output waveform pointer (FFT length samples per channel)    |

## 4.412.3.5 update()

```
void wave2spec_if_t::update () [private]
```

Create a new runtime configuration from configuration parameters when the plugin is prepared, or when the window position or other window parameters change.

## Exceptions

|                                            |                                                                                                  |
|--------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>MHA_Error</b> (p. <a href="#">707</a> ) | if the configuration change is not compatible with the current input and FFT length constraints. |
|--------------------------------------------|--------------------------------------------------------------------------------------------------|

#### 4.412.3.6 setlock()

```
void wave2spec_if_t::setlock (
 bool b) [private]
```

Lock/Unlock all configuration variables.

##### Parameters

|          |                    |
|----------|--------------------|
| <i>b</i> | Desired lock state |
|----------|--------------------|

#### 4.412.4 Member Data Documentation

##### 4.412.4.1 nfft

```
MHAParser::int_t wave2spec_if_t::nfft [private]
```

FFT length selector.

##### 4.412.4.2 nwnd

```
MHAParser::int_t wave2spec_if_t::nwnd [private]
```

Window length selector.

##### 4.412.4.3 wndpos

```
MHAParser::float_t wave2spec_if_t::wndpos [private]
```

Window position selector.

##### 4.412.4.4 window\_config

```
windowselector_t wave2spec_if_t::window_config [private]
```



#### 4.412.4.5 strict\_window\_ratio

```
MHAParser::bool_t wave2spec_if_t::strict_window_ratio [private]
```

Switch to disallow window sizes that are not a multiple of the fragsize a by power of two.

#### 4.412.4.6 return\_wave

```
MHAParser::bool_t wave2spec_if_t::return_wave [private]
```

Switch to select return domain.

#### 4.412.4.7 algo

```
std::string wave2spec_if_t::algo [private]
```

configured name this plugin, used to name the AC variables

#### 4.412.4.8 zeropadding

```
MHAParser::vfloat_mon_t wave2spec_if_t::zeropadding [private]
```

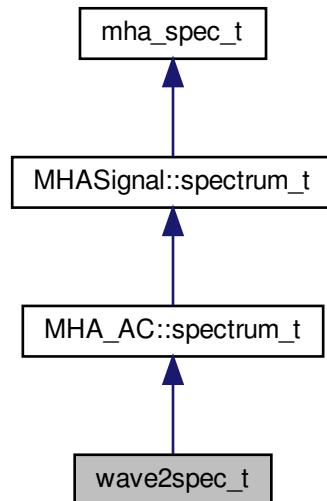
The documentation for this class was generated from the following files:

- **wave2spec.hh**
- **wave2spec.cpp**

#### 4.413 wave2spec\_t Class Reference

Runtime configuration class for plugin wave2spec.

Inheritance diagram for wave2spec\_t:



#### Public Member Functions

- **wave2spec\_t** (unsigned int nfft, unsigned int nwnd\_, unsigned int nwndshift\_, unsigned int nch, **mha\_real\_t** wndpos, const **MHAWindow::base\_t** & **window**, **algo\_comm\_t** **ac**, std::string algo)  
*Constructor computes window and zeropadding, allocates storage and FFT plan.*
- void **publish\_ac\_variables** ()  
*Insert two AC variables into AC space:*
- **mha\_spec\_t** \* **process** ( **mha\_wave\_t** \*wave\_in)  
*Perform signal shift, windowing, zero-padding and FFT.*
- ~**wave2spec\_t** ()  
*Destructor removes AC variables from AC space and deallocates memory.*
- unsigned **get\_zeropadding** (bool after) const  
*Getter method to read zeropadding computed for the STFT configuration parameters.*

#### Private Member Functions

- void **calc\_pre\_wnd** ( **MHASignal::waveform\_t** &dest, const **MHASignal::waveform\_t** &src)  
*Applies analysis window weights to current input signal and writes windowed signal to correct place in FFT buffer.*

## Private Attributes

- unsigned int **nwnd**  
*window length*
- unsigned int **nwndshift**  
*window shift or hop size*
- **mha\_fft\_t** **ft**  
*FFT instance used for transformation.*
- unsigned int **npad1**  
*length of zero padding before window*
- unsigned int **npad2**  
*length of zero padding after window*
- **MHAWindow::base\_t** **window**  
*Analysis window.*
- **MHASignal::waveform\_t** **calc\_in**  
*waveform buffer with FFT length samples per channel*
- **MHASignal::waveform\_t** **in\_buf**  
*waveform buffer with window length samples per channel*
- **MHASignal::spectrum\_t** **spec\_in**  
*spectrum buffer containing only the positive frequency bins*
- std::string **ac\_wndshape\_name**  
*name of window shape AC variable*

## Additional Inherited Members

## 4.413.1 Detailed Description

Runtime configuration class for plugin wave2spec.

Manages window shift, windowing, zero-padding, and FFT. Inserts current window shape and current STFT spectrum into AC space.

## 4.413.2 Constructor &amp; Destructor Documentation

## 4.413.2.1 wave2spec\_t()

```

wave2spec_t::wave2spec_t (
 unsigned int nfft,
 unsigned int nwnd_,
 unsigned int nwndshift_,
 unsigned int nch,
 mha_real_t wndpos,
 const MHAWindow::base_t & window,
 algo_comm_t ac,
 std::string algo)

```

Constructor computes window and zeropadding, allocates storage and FFT plan.

**Parameters**

|                         |                                                                                                                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>nfft</i>             | FFT length                                                                                                                                                                            |
| <i>nwnd_</i>            | window length in samples                                                                                                                                                              |
| <i>nwndshift</i> ↔<br>— | window shift (hop size) in samples                                                                                                                                                    |
| <i>nch</i>              | number of audio channels                                                                                                                                                              |
| <i>wndpos</i>           | for cases $nfft > nwnd_$ , where to place the window inside the FFT buffer: 0 = at start, 1 = at end, 0.5 = centered. Position is rounded to full samples and determines zero-padding |
| <i>window</i>           | Analysis window shape                                                                                                                                                                 |
| <i>ac</i>               | algorithm communication storage accessor                                                                                                                                              |
| <i>algo</i>             | configured name of this plugin, used to name the AC variables published by wave2spec                                                                                                  |

**4.413.2.2 ~wave2spec\_t()**

```
wave2spec_t::~~wave2spec_t ()
```

Destructor removes AC variables from AC space and deallocates memory.

**4.413.3 Member Function Documentation****4.413.3.1 publish\_ac\_variables()**

```
void wave2spec_t::publish_ac_variables ()
```

Insert two AC variables into AC space:

- `<configured_name>`: Contains the current STFT spectrum.
- `<configured_name>_wnd`: Contains the window shape as individual weights.

**4.413.3.2 process()**

```
mha_spec_t * wave2spec_t::process (
 mha_wave_t * wave_in)
```

Perform signal shift, windowing, zero-padding and FFT.

**Parameters**

|                             |                                                             |
|-----------------------------|-------------------------------------------------------------|
| <i>wave</i> ↔<br><i>_in</i> | latest block of audio signal (hop size samples per channel) |
|-----------------------------|-------------------------------------------------------------|

**Returns**

pointer to current STFT spectrum. Storage is managed by this object. Downstream plugins may modify the signal in place.

**4.413.3.3 get\_zeropadding()**

```
unsigned wave2spec_t::get_zeropadding (
 bool after) const [inline]
```

Getter method to read zeropadding computed for the STFT configuration parameters.

Result is only valid after prepare() has been called.

**Returns**

Computed zeropadding before or after the analysis window in number of samples.

**Parameters**

|              |                                                                                                                                                    |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>after</i> | When false, return length of zeropadding before the analysis window. When true, return length of zeropadding in samples after the analysis window. |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

**4.413.3.4 calc\_pre\_wnd()**

```
void wave2spec_t::calc_pre_wnd (
 MHASignal::waveform_t & dest,
 const MHASignal::waveform_t & src) [private]
```

Applies analysis window weights to current input signal and writes windowed signal to correct place in FFT buffer.

Ensures zero-padding regions contain only zeros. To be invoked before applying FFT.

**Parameters**

|     |             |                                                                                                                                                    |
|-----|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| out | <i>dest</i> | waveform buffer with FFT length audio samples, completely overwritten by this method                                                               |
| in  | <i>src</i>  | waveform buffer with window length audio samples, these samples are written to dest after window shape has been applied to the individual samples. |

**4.413.4 Member Data Documentation****4.413.4.1 nwnd**

```
unsigned int wave2spec_t::nwnd [private]
```

window length

**4.413.4.2 nwndshift**

```
unsigned int wave2spec_t::nwndshift [private]
```

window shift or hop size

**4.413.4.3 ft**

```
mha_fft_t wave2spec_t::ft [private]
```

FFT instance used for transformation.

**4.413.4.4 npad1**

```
unsigned int wave2spec_t::npad1 [private]
```

length of zero padding before window

#### 4.413.4.5 npad2

`unsigned int wave2spec_t::npad2 [private]`

length of zero padding after window

#### 4.413.4.6 window

`MHAWindow::base_t wave2spec_t::window [private]`

Analysis window.

#### 4.413.4.7 calc\_in

`MHASignal::waveform_t wave2spec_t::calc_in [private]`

waveform buffer with FFT length samples per channel

#### 4.413.4.8 in\_buf

`MHASignal::waveform_t wave2spec_t::in_buf [private]`

waveform buffer with window length samples per channel

#### 4.413.4.9 spec\_in

`MHASignal::spectrum_t wave2spec_t::spec_in [private]`

spectrum buffer containing only the positive frequency bins

#### 4.413.4.10 ac\_wndshape\_name

`std::string wave2spec_t::ac_wndshape_name [private]`

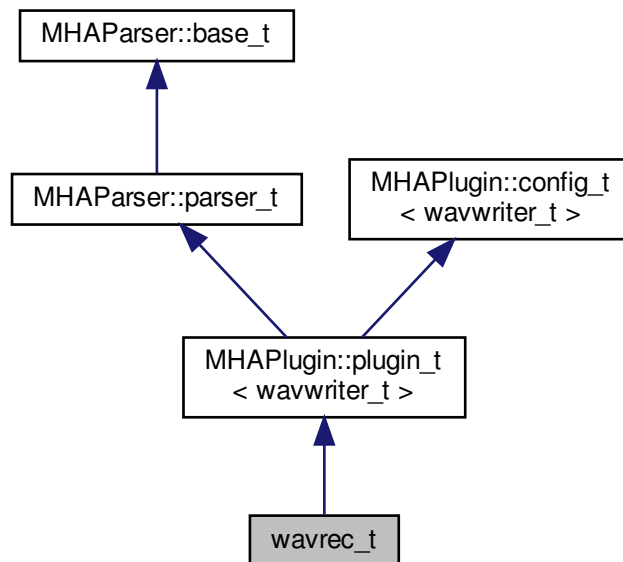
name of window shape AC variable

The documentation for this class was generated from the following files:

- **wave2spec.hh**
- **wave2spec.cpp**

#### 4.414 wavrec\_t Class Reference

Inheritance diagram for wavrec\_t:



#### Public Member Functions

- **mha\_wave\_t \* process ( mha\_wave\_t \*)**
- void **prepare ( mhaconfig\_t &cf)**
- void **release ()**
- **wavrec\_t** (const **algo\_comm\_t** &iac, const std::string &, const std::string &)

#### Private Member Functions

- void **start\_new\_session ()**

#### Private Attributes

- **MHAParser::bool\_t record**
- **MHAParser::int\_t fifolen**
- **MHAParser::int\_t minwrite**
- **MHAParser::string\_t prefix**
- **MHAParser::bool\_t use\_date**
- **MHAEvents::patchbay\_t< wavrec\_t > patchbay**



## Additional Inherited Members

### 4.414.1 Constructor & Destructor Documentation

#### 4.414.1.1 wavrec\_t()

```
wavrec_t::wavrec_t (
 const algo_comm_t & iac,
 const std::string & ,
 const std::string & algo_name)
```

### 4.414.2 Member Function Documentation

#### 4.414.2.1 process()

```
mha_wave_t * wavrec_t::process (
 mha_wave_t * s)
```

#### 4.414.2.2 prepare()

```
void wavrec_t::prepare (
 mhaconfig_t & cf) [virtual]
```

Implements **MHAPLugin::plugin\_t< wavwriter\_t >** (p. [1099](#)).

#### 4.414.2.3 release()

```
void wavrec_t::release (
 void) [virtual]
```

Reimplemented from **MHAPLugin::plugin\_t< wavwriter\_t >** (p. [1100](#)).

#### 4.414.2.4 start\_new\_session()

```
void wavrec_t::start_new_session () [private]
```

#### 4.414.3 Member Data Documentation

##### 4.414.3.1 record

**MHAParser::bool\_t** wavrec\_t::record [private]

##### 4.414.3.2 fifolen

**MHAParser::int\_t** wavrec\_t::fifolen [private]

##### 4.414.3.3 minwrite

**MHAParser::int\_t** wavrec\_t::minwrite [private]

##### 4.414.3.4 prefix

**MHAParser::string\_t** wavrec\_t::prefix [private]

##### 4.414.3.5 use\_date

**MHAParser::bool\_t** wavrec\_t::use\_date [private]

##### 4.414.3.6 patchbay

**MHAEvents::patchbay\_t**< **wavrec\_t**> wavrec\_t::patchbay [private]

The documentation for this class was generated from the following file:

- **wavrec.cpp**

## 4.415 wavwriter\_t Class Reference

### Public Member Functions

- **wavwriter\_t** (bool *active*, const **mhaconfig\_t** &*cf*, unsigned int *fifosize*, unsigned int *minwrite*, const std::string &*prefix*, bool *use\_date*)
- ~**wavwriter\_t** ()
- void **process** ( **mha\_wave\_t** \*)
- void **exit\_request** ()

### Private Member Functions

- void **write\_thread** ()
- void **create\_soundfile** (const std::string &*prefix*, bool *use\_date*)

### Static Private Member Functions

- static void \* **write\_thread** (void \**this\_*)

### Private Attributes

- std::atomic< bool > **close\_session**
- bool **act\_**
- **mhaconfig\_t** **cf\_**
- SNDFILE \* **sf**
- **mha\_fifo\_t**< **mha\_real\_t** > **fifo**
- unsigned int **minw\_**
- pthread\_t **writethread**
- float \* **data**

## 4.415.1 Constructor & Destructor Documentation

### 4.415.1.1 wavwriter\_t()

```
wavwriter_t::wavwriter_t (
 bool active,
 const mhaconfig_t & cf,
 unsigned int fifosize,
 unsigned int minwrite,
 const std::string & prefix,
 bool use_date)
```

#### 4.415.1.2 ~wavwriter\_t()

```
wavwriter_t::~wavwriter_t ()
```

### 4.415.2 Member Function Documentation

#### 4.415.2.1 process()

```
void wavwriter_t::process (
 mha_wave_t * s)
```

#### 4.415.2.2 exit\_request()

```
void wavwriter_t::exit_request ()
```

#### 4.415.2.3 write\_thread() [1/2]

```
static void* wavwriter_t::write_thread (
 void * this_) [inline], [static], [private]
```

#### 4.415.2.4 write\_thread() [2/2]

```
void wavwriter_t::write_thread () [private]
```

#### 4.415.2.5 create\_soundfile()

```
void wavwriter_t::create_soundfile (
 const std::string & prefix,
 bool use_date) [private]
```

### 4.415.3 Member Data Documentation

#### 4.415.3.1 close\_session

```
std::atomic<bool> wavwriter_t::close_session [private]
```

#### 4.415.3.2 act\_

```
bool wavwriter_t::act_ [private]
```

#### 4.415.3.3 cf\_

```
mhaconfig_t wavwriter_t::cf_ [private]
```

#### 4.415.3.4 sf

```
SNDFILE* wavwriter_t::sf [private]
```

#### 4.415.3.5 fifo

```
mha_fifo_t< mha_real_t> wavwriter_t::fifo [private]
```

#### 4.415.3.6 minw\_

```
unsigned int wavwriter_t::minw_ [private]
```

#### 4.415.3.7 writethread

```
pthread_t wavwriter_t::writethread [private]
```

#### 4.415.3.8 data

```
float* wavwriter_t::data [private]
```

The documentation for this class was generated from the following file:

- **wavrec.cpp**

## 4.416 windnoise::cfg\_t Class Reference

Runtime config class for windnoise plugin.

### Public Member Functions

- **cfg\_t** (const **mhaconfig\_t** &signal\_info, bool **UseChannel\_LF\_attenuation**, float tau↵\_Lowpass, float LowPassCutOffFrequency, float LowPassFraction\_dB, float LowPass↵WindGain\_dB)  
*constructor translates configuration variables to runtime config*
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*signal, std::vector< int > &detected, std↵::vector< float > &lowpass\_quotient)  
*Detect windnoise.*
- void **update\_PSD\_Lowpass** (const **mha\_spec\_t** \*signal)  
*Low-pass filters the power spectrum.*
- void **threshold\_compare** (std::vector< int > &detected, std::vector< float > &lowpass↵\_quotient)  
*Wind noise detection by comparing low-frequency intensity with broadband intensity.*
- int **remapping** (const std::vector< float > &lowpass\_quotient)
- void **compensation** ( **mha\_spec\_t** \*signal, int best\_signal\_channel\_index)

### Public Attributes

- bool **UseChannel\_LF\_attenuation** = false  
*FIXME: documentation for UseChannel\_LF\_attenuation.*
- float **alpha\_Lowpass** = 0  
*Filter coefficient for low-pass filtering each bin in the power spectrum with a first-order recursive low-pass filter.*
- unsigned **FrequencyBinLowPass** = 0  
*Only smoothed power spectrum bins < FrequencyBinLowPass are added to the low-pass intensity.*
- float **LowPassFraction** = 1  
*The wind noise detection threshold: We have wind noise if lowFreqIntensity / broadBand↵Intensity > LowPassFraction.*
- float **LowPassWindGain** = 1  
*FIXME: documentation for LowPassWindGain.*
- **MHASignal::waveform\_t** **PSD\_Lowpass**  
*The smoothed-over-time power spectrum.*
- **MHASignal::waveform\_t** **powspec**  
*Temporary storage for the power spectrum of the current input spectrum.*

### 4.416.1 Detailed Description

Runtime config class for windnoise plugin.

Computes power spectra of incoming STFT spectra, smoothes the power spectrum over time by low-pass filtering the intensities of each bin over time, then detects wind noise presence by comparing intensity at low frequency bins to broadband intensity.

### 4.416.2 Constructor & Destructor Documentation

#### 4.416.2.1 cfg\_t()

```
cfg_t::cfg_t (
 const mhaconfig_t & signal_info,
 bool UseChannel_LF_attenuation,
 float tau_Lowpass,
 float LowPassCutOffFrequency,
 float LowPassFraction_dB,
 float LowPassWindGain_dB)
```

constructor translates configuration variables to runtime config

### 4.416.3 Member Function Documentation

#### 4.416.3.1 process()

```
mha_spec_t * cfg_t::process (
 mha_spec_t * signal,
 std::vector< int > & detected,
 std::vector< float > & lowpass_quotient)
```

Detect windnoise.

FIXME: cancel it. The process method calls update\_PSD\_Lowpass and threshold\_compare to do its work.

#### Parameters

|         |                         |                                                                                                                                                                                                              |
|---------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in, out | <i>signal</i>           | The current STFT spectrum.                                                                                                                                                                                   |
| out     | <i>detected</i>         | This Method changes the elements of the vector but not its size. Each element is set to 1 or 0, depending on windnoise being detected in the corresponding audio channel.                                    |
| out     | <i>lowpass_quotient</i> | This Method changes elements of the vector but not its size. Each element is set to the ratio between intensity of the signal, at low frequencies and overall intensity, in the corresponding audio channel. |

## Exceptions

|                                                   |                                                        |
|---------------------------------------------------|--------------------------------------------------------|
| <b><i>MHA_Error</i></b> (p. <a href="#">707</a> ) | if windnoise_indicators.size() != signal.num_channels. |
|---------------------------------------------------|--------------------------------------------------------|

### 4.416.3.2 update\_PSD\_Lowpass()

```
void cfg_t::update_PSD_Lowpass (
 const mha_spec_t * signal)
```

Low-pass filters the power spectrum.

### 4.416.3.3 threshold\_compare()

```
void cfg_t::threshold_compare (
 std::vector< int > & detected,
 std::vector< float > & lowpass_quotient)
```

Wind noise detection by comparing low-frequency intensity with broadband intensity.

#### Parameters

|     |                         |                                                                                                                                                                                                              |
|-----|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| out | <i>detected</i>         | This Method changes the elements of the vector but not its size. Each element is set to 1 or 0, depending on windnoise being detected in the corresponding audio channel.                                    |
| out | <i>lowpass_quotient</i> | This Method changes elements of the vector but not its size. Each element is set to the ratio between intensity of the signal, at low frequencies and overall intensity, in the corresponding audio channel. |

### 4.416.3.4 remapping()

```
int cfg_t::remapping (
 const std::vector< float > & lowpass_quotient)
```

### 4.416.3.5 compensation()

```
void cfg_t::compensation (
 mha_spec_t * signal,
 int best_signal_channel_index)
```



#### 4.416.4 Member Data Documentation

##### 4.416.4.1 UseChannel\_LF\_attenuation

```
bool windnoise::cfg_t::UseChannel_LF_attenuation = false
```

FIXME: documentation for UseChannel\_LF\_attenuation.

##### 4.416.4.2 alpha\_Lowpass

```
float windnoise::cfg_t::alpha_Lowpass = 0
```

Filter coefficient for low-pass filtering each bin in the power spectrum with a first-order recursive low-pass filter.

##### 4.416.4.3 FrequencyBinLowPass

```
unsigned windnoise::cfg_t::FrequencyBinLowPass = 0
```

Only smoothed power spectrum bins  $< \text{FrequencyBinLowPass}$  are added to the low-pass intensity.

##### 4.416.4.4 LowPassFraction

```
float windnoise::cfg_t::LowPassFraction = 1
```

The wind noise detection threshold: We have wind noise if  $\text{lowFreqIntensity} / \text{broadBandIntensity} > \text{LowPassFraction}$ .

##### 4.416.4.5 LowPassWindGain

```
float windnoise::cfg_t::LowPassWindGain = 1
```

FIXME: documentation for LowPassWindGain.

#### 4.416.4.6 PSD\_Lowpass

**MHASignal::waveform\_t** windnoise::cfg\_t::PSD\_Lowpass

The smoothed-over-time power spectrum.

#### 4.416.4.7 powspec

**MHASignal::waveform\_t** windnoise::cfg\_t::powspec

Temporary storage for the power spectrum of the current input spectrum.

Only needed to hold the newest squared magnitudes until they are filtered into PSD\_Lowpass.

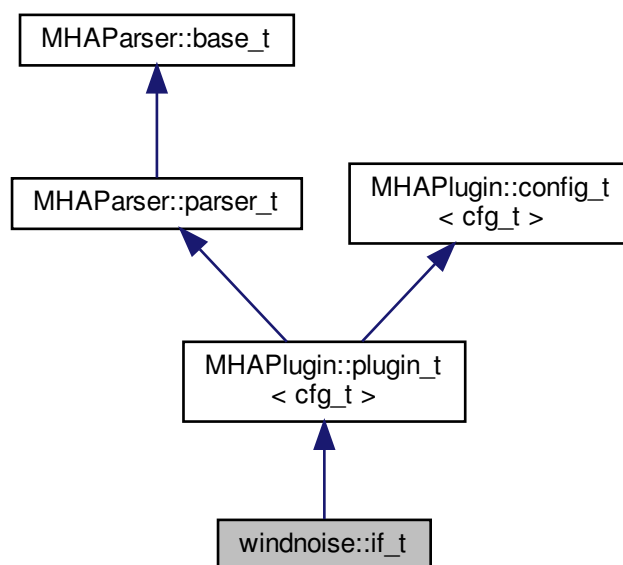
The documentation for this class was generated from the following files:

- **windnoise.hh**
- **windnoise.cpp**

#### 4.417 windnoise::if\_t Class Reference

interface class for windnoise plugin

Inheritance diagram for windnoise::if\_t:



## Public Member Functions

- **if\_t** ( **algo\_comm\_t** ac, const std::string &chain\_name, const std::string &algo\_name)  
*Constructor instantiates one windnoise plugin.*
- void **prepare** ( **mhaconfig\_t** &signal\_info) override  
*Prepare windnoise plugin for signal processing.*
- void **release** (void) override  
*Nothing needs to be deallocated on release.*
- **mha\_spec\_t** \* **process** ( **mha\_spec\_t** \*signal)  
*signal processing, delegates to **cfg\_t::process** (p. 1461)*
- void **update** (void)  
*update runtime config when configuration parameters have changed*
- void **insert** ()  
*inserts the windnoise detection vector into AC space*

## Public Attributes

- **MHAParser::bool\_t** UseChannel\_LF\_attenuation
- **MHAParser::float\_t** tau\_Lowpass
- **MHAParser::float\_t** LowPassCutOffFrequency
- **MHAParser::float\_t** LowPassFraction
- **MHAParser::float\_t** LowPassWindGain
- **MHAParser::kw\_t** WindNoiseDetector
- **MHAParser::vint\_mon\_t** detected
- **MHAParser::vfloat\_mon\_t** lowpass\_quotient
- const std::string **detected\_acname**  
*Name of AC variable mirroring the configuration monitor variable "detector".*
- const std::string **lowpass\_quotient\_acname**  
*Name of AC variable mirroring the configuration monitor variable "lowpass\_quotient".*

## Private Attributes

- **MHAEvents::patchbay\_t** < **if\_t** > patchbay  
*The Event connector.*

## Additional Inherited Members

## 4.417.1 Detailed Description

interface class for windnoise plugin

## 4.417.2 Constructor & Destructor Documentation

### 4.417.2.1 if\_t()

```
windnoise::if_t::if_t (
 algo_comm_t ac,
 const std::string & chain_name,
 const std::string & algo_name)
```

Constructor instantiates one windnoise plugin.

## 4.417.3 Member Function Documentation

### 4.417.3.1 prepare()

```
void windnoise::if_t::prepare (
 mhaconfig_t & signal_info) [override], [virtual]
```

Prepare windnoise plugin for signal processing.

#### Parameters

|                    |                                               |
|--------------------|-----------------------------------------------|
| <i>signal_info</i> | signal dimensions, not changed by this plugin |
|--------------------|-----------------------------------------------|

Implements **MHAPlugin::plugin\_t< cfg\_t >** (p. [1099](#)).

### 4.417.3.2 release()

```
void windnoise::if_t::release (
 void) [inline], [override], [virtual]
```

Nothing needs to be deallocated on release.

Reimplemented from **MHAPlugin::plugin\_t< cfg\_t >** (p. [1100](#)).

#### 4.417.3.3 process()

```
mha_spec_t * windnoise::if_t::process (
 mha_spec_t * signal)
```

signal processing, delegates to **cfg\_t::process** (p. [1461](#))

#### 4.417.3.4 update()

```
void windnoise::if_t::update (
 void)
```

update runtime config when configuration parameters have changed

#### 4.417.3.5 insert()

```
void windnoise::if_t::insert () [inline]
```

inserts the windnoise detection vector into AC space

### 4.417.4 Member Data Documentation

#### 4.417.4.1 patchbay

```
MHAEvents::patchbay_t< if_t> windnoise::if_t::patchbay [private]
```

The Event connector.

#### 4.417.4.2 UseChannel\_LF\_attenuation

```
MHAParser::bool_t windnoise::if_t::UseChannel_LF_attenuation
```

#### 4.417.4.3 tau\_Lowpass

```
MHAParser::float_t windnoise::if_t::tau_Lowpass
```

#### 4.417.4.4 LowPassCutOffFrequency

**MHAParser::float\_t** windnoise::if\_t::LowPassCutOffFrequency

#### 4.417.4.5 LowPassFraction

**MHAParser::float\_t** windnoise::if\_t::LowPassFraction

#### 4.417.4.6 LowPassWindGain

**MHAParser::float\_t** windnoise::if\_t::LowPassWindGain

#### 4.417.4.7 WindNoiseDetector

**MHAParser::kw\_t** windnoise::if\_t::WindNoiseDetector

#### 4.417.4.8 detected

**MHAParser::vint\_mon\_t** windnoise::if\_t::detected

#### 4.417.4.9 lowpass\_quotient

**MHAParser::vfloat\_mon\_t** windnoise::if\_t::lowpass\_quotient

#### 4.417.4.10 detected\_acname

**const std::string** windnoise::if\_t::detected\_acname

Name of AC variable mirroring the configuration monitor variable "detector".

Usually "windnoise\_detected".

## 4.417.4.11 lowpass\_quotient\_acname

```
const std::string windnoise::if_t::lowpass_quotient_acname
```

Name of AC variable mirroring the configuration monitor variable "lowpass\_quotient".

Usually "windnoise\_lowpass\_quotient".

The documentation for this class was generated from the following files:

- **windnoise.hh**
- **windnoise.cpp**

## 4.418 windowselector\_t Class Reference

A combination of mha parser variables to describe an overlapadd analysis window.

## Public Member Functions

- **windowselector\_t** (const std::string &default\_type)  
*constructor creates the mha parser variables that describe an overlapadd analysis window.*
- **~windowselector\_t** ()  
*destructor frees window data that were allocated*
- const **MHAWindow::base\_t** & **get\_window\_data** (unsigned length)  
*re-computes the window if required.*
- void **insert\_items** ( MHAParser::parser\_t \*p)  
*insert the window parameters "wndtype", "wndexp", and "userwnd" as mha configuration parameters into the given mha configuration parser.*
- void **setlock** (bool b\_)  
*Lock/Unlock variables.*

## Public Attributes

- **MHAEvents::emitter\_t** **updated**  
*A collector event that fires when any of the window parameters managed here is written to.*

## Private Member Functions

- void **invalidate\_window\_data** ()  
*invalidates any allocated window samples.*
- void **update\_parser** ()  
*invoked when a parser parameter changes.*

## Private Attributes

- **MHAWindow::base\_t \* wnd**  
*Storage for the window data returned by `get_window_data()` (p. 1471)*
- **MHAParser::kw\_t wndtype**  
*parser variable for window type*
- **MHAParser::float\_t wndexp**  
*parser variable for window exponent*
- **MHAParser::vfloat\_t userwnd**  
*parser variable for user window samples to use*
- **MHAEvents::patchbay\_t< windowselector\_t > patchbay**  
*patchbay to watch for changes for the parser variables*

### 4.418.1 Detailed Description

A combination of mha parser variables to describe an overlapadd analysis window.

Provides a method to get the window samples as an instance of **MHAWindow::base\_t** (p. 1242) when needed.

### 4.418.2 Constructor & Destructor Documentation

#### 4.418.2.1 windowselector\_t()

```
windowselector_t::windowselector_t (
 const std::string & default_type)
```

constructor creates the mha parser variables that describe an overlapadd analysis window.

#### Parameters

|                     |                                                                                                                |
|---------------------|----------------------------------------------------------------------------------------------------------------|
| <i>default_type</i> | name of the default analysis window type. Must be one of: "rect", "bartlett", "hanning", "hamming", "blackman" |
|---------------------|----------------------------------------------------------------------------------------------------------------|

#### 4.418.2.2 ~windowselector\_t()

```
windowselector_t::~~windowselector_t ()
```

destructor frees window data that were allocated



## 4.418.3 Member Function Documentation

## 4.418.3.1 get\_window\_data()

```
const MHAWindow::base_t & windowselector_t::get_window_data (
 unsigned length)
```

re-computes the window if required.

## Parameters

|               |                                                                                                                                                                                                                                                                        |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>length</i> | the desired window length in samples return the window's samples as a constref to <b>MHAWindow::base_t</b> (p. 1242) instance. The referenced instance lives until the window parameters are changed, or this <b>windowselector_t</b> (p. 1469) instance is destroyed. |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 4.418.3.2 insert\_items()

```
void windowselector_t::insert_items (
 MHAParser::parser_t * p)
```

insert the window parameters "wndtype", "wndexp", and "userwnd" as mha configuration parameters into the given mha configuration parser.

## Parameters

|          |                                                                                                              |
|----------|--------------------------------------------------------------------------------------------------------------|
| <i>p</i> | The configuration parser where to insert the window parameters. E.g. the plugin wave2spec's interface class. |
|----------|--------------------------------------------------------------------------------------------------------------|

## 4.418.3.3 setlock()

```
void windowselector_t::setlock (
 bool b_)
```

Lock/Unlock variables.

## Parameters

|           |                    |
|-----------|--------------------|
| <i>b_</i> | Desired lock state |
| <i>_</i>  |                    |

#### 4.418.3.4 invalidate\_window\_data()

```
void windowselector_t::invalidate_window_data () [private]
```

invalidates any allocated window samples.

#### 4.418.3.5 update\_parser()

```
void windowselector_t::update_parser () [private]
```

invoked when a parser parameter changes.

Calls **invalidate\_window\_data()** (p. [1472](#)) and emits the updated event.

### 4.418.4 Member Data Documentation

#### 4.418.4.1 updated

```
MHAEvents::emitter_t windowselector_t::updated
```

A collector event that fires when any of the window parameters managed here is written to.

#### 4.418.4.2 wnd

```
MHAWindow::base_t* windowselector_t::wnd [private]
```

Storage for the window data returned by **get\_window\_data()** (p. [1471](#))

#### 4.418.4.3 wndtype

```
MHAParser::kw_t windowselector_t::wndtype [private]
```

parser variable for window type

## 4.418.4.4 wndexp

```
MHAParser::float_t windowselector_t::wndexp [private]
```

parser variable for window exponent

## 4.418.4.5 userwnd

```
MHAParser::vfloat_t windowselector_t::userwnd [private]
```

parser variable for user window samples to use

## 4.418.4.6 patchbay

```
MHAEvents::patchbay_t< windowselector_t> windowselector_t::patchbay [private]
```

patchbay to watch for changes for the parser variables

The documentation for this class was generated from the following files:

- **windowselector.h**
- **windowselector.cpp**

## 5 File Documentation

### 5.1 ac2lsl.cpp File Reference

#### Classes

- struct **ac2lsl::type\_info**
- class **ac2lsl::save\_var\_base\_t**  
*Interface for ac to lsl bridge variable.*
- class **ac2lsl::save\_var\_t**< **T** >  
*Implementation for all ac to lsl bridges except complex types.*
- class **ac2lsl::save\_var\_t**< **mha\_complex\_t** >  
*Template specialization of the **ac2lsl** (p. 82) bridge to take care of complex numbers.*
- class **ac2lsl::cfg\_t**  
*Runtime configuration class of the **ac2lsl** (p. 82) plugin.*
- class **ac2lsl::ac2lsl\_t**  
*Plugin class of **ac2lsl** (p. 82).*

## Namespaces

- **ac2lsl**

*All types for the **ac2lsl** (p. 82) plugins live in this namespace.*

## Variables

- `const std::map< int, type_info > ac2lsl::types`

## 5.2 ac2osc.cpp File Reference

### Classes

- class **ac2osc\_t**

*Plugin class of the ac2osc plugin.*

## 5.3 ac2wave.cpp File Reference

### Classes

- class **ac2wave\_t**
- class **ac2wave\_if\_t**

## 5.4 ac\_monitor\_type.cpp File Reference

## 5.5 ac\_monitor\_type.hh File Reference

### Classes

- class **acmon::ac\_monitor\_t**

*A class for converting AC variables to Parser monitors of correct type.*

## Namespaces

- **acmon**

*Namespace for displaying ac variables as parser monitors.*

## 5.6 ac\_proc.cpp File Reference

### Classes

- class **ac\_proc::interface\_t**

## Namespaces

- **ac\_proc**

## 5.7 acConcat\_wave.cpp File Reference

### Macros

- **#define PATCH\_VAR**(var) patchbay.connect(&var.valuechanged, this, & **acConcat\_wave::update\_cfg**)
- **#define INSERT\_PATCH**(var) **insert\_member**(var); **PATCH\_VAR**(var)

### 5.7.1 Macro Definition Documentation

#### 5.7.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & acConcat_wave::update
_cfg)
```

#### 5.7.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

## 5.8 acConcat\_wave.h File Reference

### Classes

- class **acConcat\_wave\_config**
- class **acConcat\_wave**

## 5.9 acmon.cpp File Reference

### Classes

- class **acmon::acmon\_t**

## Namespaces

- **acmon**

*Namespace for displaying ac variables as parser monitors.*

## 5.10 acPooling\_wave.cpp File Reference

### Macros

- **#define PATCH\_VAR**(var) patchbay.connect(&var.valuechanged, this, & **acPooling\_wave::update\_cfg**)
- **#define INSERT\_PATCH**(var) **insert\_member**(var); **PATCH\_VAR**(var)

### 5.10.1 Macro Definition Documentation

#### 5.10.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & acPooling_wave::update
_cfg)
```

#### 5.10.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

## 5.11 acPooling\_wave.h File Reference

### Classes

- class **acPooling\_wave\_config**
- class **acPooling\_wave**

## 5.12 acsave.cpp File Reference

### Classes

- class **acsave::save\_var\_t**
- class **acsave::cfg\_t**
- class **acsave::acsave\_t**
- struct **acsave::mat4head\_t**

## Namespaces

- **acsave**

## Macros

- `#define ACSAVE_FMT_TXT 0`
- `#define ACSAVE_SFMT_TXT "txt"`
- `#define ACSAVE_FMT_MAT4 1`
- `#define ACSAVE_SFMT_MAT4 "mat4"`
- `#define ACSAVE_FMT_M 2`
- `#define ACSAVE_SFMT_M "m"`

### 5.12.1 Macro Definition Documentation

#### 5.12.1.1 ACSAVE\_FMT\_TXT

```
#define ACSAVE_FMT_TXT 0
```

#### 5.12.1.2 ACSAVE\_SFMT\_TXT

```
#define ACSAVE_SFMT_TXT "txt"
```

#### 5.12.1.3 ACSAVE\_FMT\_MAT4

```
#define ACSAVE_FMT_MAT4 1
```

#### 5.12.1.4 ACSAVE\_SFMT\_MAT4

```
#define ACSAVE_SFMT_MAT4 "mat4"
```

#### 5.12.1.5 ACSAVE\_FMT\_M

```
#define ACSAVE_FMT_M 2
```

### 5.12.1.6 ACSAVE\_SFMT\_M

```
#define ACSAVE_SFMT_M "m"
```

## 5.13 acSteer.cpp File Reference

### Macros

- `#define PATCH_VAR(var) patchbay.connect(&var.valuechanged, this, & acSteer↵::update_cfg)`
- `#define INSERT_PATCH(var) insert_member(var); PATCH_VAR(var)`

### 5.13.1 Macro Definition Documentation

#### 5.13.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & acSteer::update_cfg)
```

#### 5.13.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

## 5.14 acSteer.h File Reference

### Classes

- class **acSteer\_config**
- class **acSteer**

## 5.15 acTransform\_wave.cpp File Reference

### Macros

- `#define PATCH_VAR(var) patchbay.connect(&var.valuechanged, this, & acTransform↵_wave::update_cfg)`
- `#define INSERT_PATCH(var) insert_member(var); PATCH_VAR(var)`



### 5.15.1 Macro Definition Documentation

#### 5.15.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & acTransform_wave↵
::update_cfg)
```

#### 5.15.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

### 5.16 acTransform\_wave.h File Reference

#### Classes

- class **acTransform\_wave\_config**
- class **acTransform\_wave**

### 5.17 addsndfile.cpp File Reference

#### Classes

- class **addsndfile::waveform\_proxy\_t**  
*Class helps to specify which instance of MHASignal\_waveform\_t parent instance is meant in resampled\_soundfile\_t (p. 248).*
- class **addsndfile::resampled\_soundfile\_t**  
*Reads sound from file and resamples it if necessary and wanted.*
- class **addsndfile::sndfile\_t**
- class **addsndfile::level\_adapt\_t**
- class **addsndfile::addsndfile\_if\_t**

#### Namespaces

- **addsndfile**

## Macros

- `#define DEBUG(x) std::cerr << __FILE__ << ":" << __LINE__ << " " #x "=" << x << std::endl`

## Typedefs

- `typedef MHAPLugin::config_t< level_adapt_t > addsndfile::level_adaptor`
- `typedef MHAPLugin::plugin_t< sndfile_t > addsndfile::wave_reader`

## Enumerations

- `enum addsndfile::addsndfile_resampling_mode_t { addsndfile::DONT_RESAMPLE_PERMISSIVE, addsndfile::DONT_RESAMPLE_STRICT, addsndfile::DO_RESAMPLE }`

*Specifies the resampling mode in `resampled_soundfile_t`.*

## Functions

- static unsigned **addsndfile::resampled\_num\_frames** (unsigned num\_source\_frames, float source\_rate, float target\_rate, addsndfile\_resampling\_mode\_t resampling\_mode)

## 5.17.1 Macro Definition Documentation

### 5.17.1.1 DEBUG

```
#define DEBUG(
 x) std::cerr << __FILE__ << ":" << __LINE__ << " " #x "=" << x <<
std::endl
```

## 5.18 adm.cpp File Reference

### Classes

- class **adm\_rtconfig\_t**
- class **adm\_if\_t**

## Functions

- **MHASignal::waveform\_t \* adm\_fir\_lp** (unsigned int fs, unsigned f\_pass, unsigned int f\_stop, unsigned int order)
- **MHASignal::waveform\_t \* adm\_fir\_decomb** (unsigned int fs, float dist\_m, unsigned int order)

### 5.18.1 Function Documentation

#### 5.18.1.1 adm\_fir\_lp()

```
MHASignal::waveform_t* adm_fir_lp (
 unsigned int fs,
 unsigned f_pass,
 unsigned int f_stop,
 unsigned int order)
```

#### 5.18.1.2 adm\_fir\_decomb()

```
MHASignal::waveform_t* adm_fir_decomb (
 unsigned int fs,
 float dist_m,
 unsigned int order)
```

## 5.19 adm.hh File Reference

### Classes

- class **ADM::Linearphase\_FIR< F >**  
*An efficient linear-phase fir filter implementation.*
- class **ADM::Delay< F >**  
*A delay-line class.*
- class **ADM::ADM< F >**  
*Adaptive differential microphone, working for speech frequency range.*

### Namespaces

- **ADM**

## Functions

- static double **ADM::subsampledelay\_coeff** (double samples, double f\_design, double fs=1.0)  
*compute IIR coefficient for subsample delay*

## Variables

- const double **ADM::PI** = 3.14159265358979312
- const double **ADM::C** = 340
- const double **ADM::DELAY\_FREQ** = 2000
- const double **ADM::START\_BETA** = 0.5

## 5.20 altconfig.cpp File Reference

## 5.21 altconfig.hh File Reference

### Classes

- class **altconfig\_t**  
*Single class implementing plugin altconfig.*

### Macros

- **#define MHAPLUGIN\_OVERLOAD\_OUTDOMAIN**

#### 5.21.1 Macro Definition Documentation

##### 5.21.1.1 MHAPLUGIN\_OVERLOAD\_OUTDOMAIN

```
#define MHAPLUGIN_OVERLOAD_OUTDOMAIN
```

## 5.22 altplugins.cpp File Reference

### Classes

- class **mhaplug\_cfg\_t**
- class **altplugins\_t**

## Macros

- `#define MHAPLUGIN_OVERLOAD_OUTDOMAIN`

### 5.22.1 Macro Definition Documentation

#### 5.22.1.1 MHAPLUGIN\_OVERLOAD\_OUTDOMAIN

```
#define MHAPLUGIN_OVERLOAD_OUTDOMAIN
```

## 5.23 analysemhaplugin.cpp File Reference

## Functions

- `std::string strdom ( mha_domain_t d)`
- `void print_ac ( MHAKernel::algo_comm_class_t &ac, std::string txt)`
- `int main (int argc, char **argv)`

### 5.23.1 Function Documentation

#### 5.23.1.1 strdom()

```
std::string strdom (
 mha_domain_t d)
```

#### 5.23.1.2 print\_ac()

```
void print_ac (
 MHAKernel::algo_comm_class_t & ac,
 std::string txt)
```

#### 5.23.1.3 main()

```
int main (
 int argc,
 char ** argv)
```

## 5.24 analysispath.cpp File Reference

### Classes

- class **analysepath\_t**
- class **plug\_t**
- class **analysispath\_if\_t**

### Functions

- static void \* **thread\_start** (void \*instance)

### 5.24.1 Function Documentation

#### 5.24.1.1 thread\_start()

```
static void* thread_start (
 void * instance) [static]
```

## 5.25 auditory\_profile.cpp File Reference

## 5.26 auditory\_profile.h File Reference

### Classes

- class **AuditoryProfile::fmap\_t**  
*A class to store frequency dependent data (e.g., HTL and UCL).*
- class **AuditoryProfile::profile\_t**  
*The Auditory Profile class.*
- class **AuditoryProfile::profile\_t::ear\_t**  
*Class for ear-dependent parameters, e.g., audiograms or unilateral loudness scaling.*
- class **AuditoryProfile::parser\_t**  
*Class to make the auditory profile accessible through the parser interface.*
- class **AuditoryProfile::parser\_t::fmap\_t**
- class **AuditoryProfile::parser\_t::ear\_t**

### Namespaces

- **AuditoryProfile**  
*Namespace for classes and functions around the auditory profile (e.g., audiogram handling)*

## 5.27 browsemhaplugins.cpp File Reference

### Macros

- `#define DEBUG(x) std::cerr << __FILE__ << ":" << __LINE__ << " " << #x << "=< " << x << std::endl`

### Functions

- `int main (int argc, char **argv)`

## 5.27.1 Macro Definition Documentation

### 5.27.1.1 **DEBUG**

```
#define DEBUG(
 x) std::cerr << __FILE__ << ":" << __LINE__ << " " << #x << "=< " << x
<< std::endl
```

## 5.27.2 Function Documentation

### 5.27.2.1 **main()**

```
int main (
 int argc,
 char ** argv)
```

## 5.28 coherence.cpp File Reference

### Classes

- class **coherence::vars\_t**
- class **coherence::cohflt\_t**
- class **coherence::cohflt\_if\_t**

### Namespaces

- **coherence**

## Functions

- void **coherence::getcipd** ( **mha\_complex\_t** &c, **mha\_real\_t** &a, const **mha\_↵  
complex\_t** &xl, const **mha\_complex\_t** &xr)

## 5.29 combinechannels.cpp File Reference

## Classes

- class **combc\_t**
- class **combc\_if\_t**

## 5.30 compiler\_id.cpp File Reference

## 5.31 compiler\_id.hh File Reference

## Macros

- #define **COMPILER\_ID\_VENDOR** "gcc"
- #define **COMPILER\_ID\_MAJOR** \_\_GNUC\_\_
- #define **COMPILER\_ID\_MINOR** \_\_GNUC\_MINOR\_\_
- #define **COMPILER\_ID\_PATCH** \_\_GNUC\_PATCHLEVEL\_\_
- #define **COMPILER\_ID\_VERSION\_HELPER2**(x, y, z) #x "." #y "." #z
- #define **COMPILER\_ID\_VERSION\_HELPER1**(x, y, z) **COMPILER\_ID\_VERSION\_H↵  
ELPER2**(x,y,z)
- #define **COMPILER\_ID\_VERSION**
- #define **COMPILER\_ID** **COMPILER\_ID\_VENDOR** "-" **COMPILER\_ID\_VERSION** "-"  
**COMPILER\_ID\_STANDARD**

### 5.31.1 Macro Definition Documentation

#### 5.31.1.1 COMPILER\_ID\_VENDOR

```
#define COMPILER_ID_VENDOR "gcc"
```

#### 5.31.1.2 COMPILER\_ID\_MAJOR

```
#define COMPILER_ID_MAJOR __GNUC__
```



### 5.31.1.3 COMPILER\_ID\_MINOR

```
#define COMPILER_ID_MINOR __GNUC_MINOR__
```

### 5.31.1.4 COMPILER\_ID\_PATCH

```
#define COMPILER_ID_PATCH __GNUC_PATCHLEVEL__
```

### 5.31.1.5 COMPILER\_ID\_VERSION\_HELPER2

```
#define COMPILER_ID_VERSION_HELPER2 (
 x,
 y,
 z) #x "." #y "." #z
```

### 5.31.1.6 COMPILER\_ID\_VERSION\_HELPER1

```
#define COMPILER_ID_VERSION_HELPER1 (
 x,
 y,
 z) COMPILER_ID_VERSION_HELPER2 (x, y, z)
```

### 5.31.1.7 COMPILER\_ID\_VERSION

```
#define COMPILER_ID_VERSION
```

### 5.31.1.8 COMPILER\_ID

```
#define COMPILER_ID COMPILER_ID_VENDOR "-" COMPILER_ID_VERSION "-" COMPILER_ID_S↵
TANDARD
```

### 5.32 complex\_filter.cpp File Reference

### 5.33 complex\_filter.h File Reference

#### Classes

- class **MHAFilter::complex\_bandpass\_t**  
*Complex bandpass filter.*
- class **MHAFilter::gammaflt\_t**  
*Class for gammatone filter.*
- class **MHAFilter::thirddoctave\_analyzer\_t**

#### Namespaces

- **MHAFilter**  
*Namespace for IIR and FIR filter classes.*

### 5.34 cpuload.cpp File Reference

#### Classes

- class **cpuload::cpuload\_cfg\_t**
- class **cpuload::cpuload\_if\_t**

#### Namespaces

- **cpuload**

### 5.35 db.cpp File Reference

#### Classes

- class **db\_t**
- class **db\_if\_t**

### 5.36 dbasync.cpp File Reference

#### Classes

- class **dbasync\_native::delay\_check\_t**
- class **dbasync\_native::dbasync\_t**
- class **dbasync\_native::db\_if\_t**

## Namespaces

- **dbasync\_native**

## Enumerations

- enum { **dbasync\_native::INVALID\_THREAD\_PRIORITY** = 999999999 }

## Functions

- static void \* **dbasync\_native::thread\_start** (void \*instance)
- static unsigned **dbasync\_native::gcd** (unsigned a, unsigned b)

## 5.37 dc.cpp File Reference

## Macros

- #define **DUPVEC**(x) v.x.data = **MHASignal::dupvec\_chk**(v.x.data,s)

## Functions

- unsigned int **get\_audiochannels** (unsigned int totalchannels, std::string acname, **algo\_←  
\_comm\_t** ac)

## 5.37.1 Macro Definition Documentation

## 5.37.1.1 DUPVEC

```
#define DUPVEC (
 x) v.x.data = MHASignal::dupvec_chk (v.x.data,s)
```

## 5.37.2 Function Documentation

## 5.37.2.1 get\_audiochannels()

```
unsigned int get_audiochannels (
 unsigned int totalchannels,
 std::string acname,
 algo_comm_t ac)
```

## 5.38 dc.hh File Reference

### Classes

- class **dc::dc\_vars\_t**
- class **dc::dc\_vars\_validator\_t**
- class **dc::dc\_t**
- class **dc::dc\_if\_t**

### Namespaces

- **dc**

## 5.39 dc\_afterburn.cpp File Reference

### Namespaces

- **DynComp**  
*dynamic compression related classes and functions*

### Functions

- float **mylogf** (float x)

### 5.39.1 Function Documentation

#### 5.39.1.1 mylogf()

```
float mylogf (
 float x)
```

## 5.40 dc\_afterburn.h File Reference

### Classes

- class **DynComp::dc\_afterburn\_vars\_t**  
*Variables for **dc\_afterburn\_t** (p. 429) class.*
- class **DynComp::dc\_afterburn\_rt\_t**  
*Real-time class for after burn effect.*
- class **DynComp::dc\_afterburn\_t**  
*Afterburn class, to be defined as a member of compressors.*

## Namespaces

- **DynComp**  
*dynamic compression related classes and functions*

## 5.41 dc\_simple.cpp File Reference

### Classes

- class **dc\_simple::dc\_vars\_t**
- class **dc\_simple::dc\_vars\_validator\_t**
- class **dc\_simple::level\_smoother\_t**
- class **dc\_simple::dc\_t**
- class **dc\_simple::dc\_t::line\_t**
- class **dc\_simple::dc\_if\_t**

### Namespaces

- **dc\_simple**

### Typedefs

- typedef **MHAPLugin::plugin\_t< dc\_t > dc\_simple::DC**
- typedef **MHAPLugin::config\_t< level\_smoother\_t > dc\_simple::LEVEL**

### Functions

- void **dc\_simple::test\_fail** (const std::vector< float > &v, unsigned int s, const std::string &name)
- std::vector< float > **dc\_simple::force\_resize** (const std::vector< float > &v, unsigned int s, const std::string &name)
- **mha\_real\_t dc\_simple::not\_zero** ( **mha\_real\_t** x, const std::string &comment="")

## 5.42 delay.cpp File Reference

### Classes

- class **delay::interface\_t**

### Namespaces

- **delay**

### 5.43 delaysum\_spec.cpp File Reference

#### Classes

- class **delaysum\_spec::delaysum\_t**
- class **delaysum\_spec::delaysum\_spec\_if\_t**

#### Namespaces

- **delaysum\_spec**

### 5.44 delaysum\_wave.cpp File Reference

#### Classes

- class **delaysum::delaysum\_wave\_t**  
*Runtime configuration of the delaysum\_wave plugin.*
- class **delaysum::delaysum\_wave\_if\_t**  
*Interface class for the delaysum plugin.*

#### Namespaces

- **delaysum**  
*This namespace contains the delaysum plugin.*

### 5.45 doasvm\_classification.cpp File Reference

#### Macros

- **#define PATCH\_VAR(var)** patchbay.connect(&var.valuechanged, this, & **doasvm\_classification::update\_cfg**)↔
- **#define INSERT\_PATCH(var)** insert\_member(var); **PATCH\_VAR(var)**

#### 5.45.1 Macro Definition Documentation

##### 5.45.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect (&var.valuechanged, this, & doasvm_classification↔
::update_cfg)
```

### 5.45.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

## 5.46 doasvm\_classification.h File Reference

### Classes

- class **doasvm\_classification\_config**
- class **doasvm\_classification**

## 5.47 doasvm\_feature\_extraction.cpp File Reference

### Macros

- #define **PATCH\_VAR**(var) patchbay.connect(&var.valuechanged, this, & **doasvm\_↵  
feature\_extraction::update\_cfg**)
- #define **INSERT\_PATCH**(var) insert\_member(var); **PATCH\_VAR**(var)

### 5.47.1 Macro Definition Documentation

#### 5.47.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & doasvm_feature_↵
extraction::update_cfg)
```

#### 5.47.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

## 5.48 doasvm\_feature\_extraction.h File Reference

### Classes

- class **doasvm\_feature\_extraction\_config**
- class **doasvm\_feature\_extraction**

5.49 `doc_appendix.h` File Reference

5.50 `doc_examples.h` File Reference

5.51 `doc_frameworks.h` File Reference

5.52 `doc_general.h` File Reference

5.53 `doc_kernel.h` File Reference

5.54 `doc_matlab.h` File Reference

5.55 `doc_mhamain.h` File Reference

5.56 `doc_parser.h` File Reference

5.57 `doc_plugins.h` File Reference

5.58 `doc_system.h` File Reference

5.59 `doc_toolbox.h` File Reference

5.60 `downsample.cpp` File Reference

#### Classes

- class **ds\_t**

5.61 `dropgen.cpp` File Reference

#### Classes

- class **dropgen\_t**

5.62 `droptect.cpp` File Reference

#### Classes

- class **droptect\_t**  
*Detect dropouts in a signal with a constant spectrum.*



## 5.63 equalize.cpp File Reference

### Classes

- class **equalize::cfg\_t**
- class **equalize::freqgains\_t**

### Namespaces

- **equalize**

## 5.64 example1.cpp File Reference

### Classes

- class **example1\_t**  
*This C++ class implements the simplest example plugin for the step-by-step tutorial.*

## 5.65 example2.cpp File Reference

### Classes

- class **example2\_t**  
*This C++ class implements the second example plugin for the step-by-step tutorial.*

## 5.66 example3.cpp File Reference

### Classes

- class **example3\_t**  
*A Plugin class using the openMHA Event mechanism.*

## 5.67 example4.cpp File Reference

### Classes

- class **example4\_t**  
*A Plugin class using the spectral signal.*

## 5.68 example5.cpp File Reference

### Classes

- class **example5\_t**
- class **plugin\_interface\_t**

### Macros

- #define **\_\_declspec(p)**

## 5.68.1 Macro Definition Documentation

### 5.68.1.1 \_\_declspec

```
#define __declspec(
 p)
```

## 5.69 example6.cpp File Reference

### Classes

- class **cfg\_t**
- class **example6\_t**

### Macros

- #define **\_\_declspec(p)**

## 5.69.1 Macro Definition Documentation

### 5.69.1.1 \_\_declspec

```
#define __declspec(
 p)
```

## 5.70 example7.cpp File Reference

### 5.71 example7.hh File Reference

#### Classes

- class **example7\_t**

## 5.72 fader\_spec.cpp File Reference

#### Classes

- class **spec\_fader\_t**
- class **fader\_if\_t**

## 5.73 fader\_wave.cpp File Reference

#### Classes

- class **fader\_wave::level\_adapt\_t**
- class **fader\_wave::fader\_wave\_if\_t**

#### Namespaces

- **fader\_wave**

#### Macros

- **#define DEBUG(x)** std::cerr << \_\_FILE\_\_ << ":" << \_\_LINE\_\_ << " " #x "=" << x << std::endl

#### Typedefs

- typedef **MHAPLugin::plugin\_t**< level\_adapt\_t > **fader\_wave::level\_adaptor**

### 5.73.1 Macro Definition Documentation

### 5.73.1.1 DEBUG

```
#define DEBUG(
 x) std::cerr << __FILE__ << ":" << __LINE__ << " " #x "=" << x <<
std::endl
```

## 5.74 fftbpow.cpp File Reference

### Classes

- class **fftbpow::fftbpow\_t**  
*Run time configuration for the fftbpow plugin.*
- class **fftbpow::fftbpow\_interface\_t**  
*Interface class for fftbpow plugin.*

### Namespaces

- **fftbpow**  
*Namespace for the fftbpow plugin.*

## 5.75 fftfilter.cpp File Reference

### Classes

- class **fftfilter::fftfilter\_t**
- class **fftfilter::interface\_t**

### Namespaces

- **fftfilter**

### Functions

- unsigned int **fftfilter::irs\_length** (const **MHAParser::mfloat\_t** &irs)
- unsigned int **fftfilter::irs\_validator** (const **MHAParser::mfloat\_t** &irs, const unsigned int &**channels**, const unsigned int &fragsize, const unsigned int &fftlens)

## 5.76 fftfilterbank.cpp File Reference

### Classes

- class **fftfilterbank::fftfb\_plug\_t**
- class **fftfilterbank::fftfb\_interface\_t**

## Namespaces

- **fftfilterbank**

## 5.77 fshift.cpp File Reference

## 5.78 fshift.hh File Reference

## Classes

- class **fshift::fshift\_config\_t**  
*fshift runtime config class*
- class **fshift::fshift\_t**  
*fshift plugin interface class*

## Namespaces

- **fshift**  
*All types for the fshift plugin live in this namespace.*

## Functions

- int **fshift::fft\_find\_bin** ( **mha\_real\_t** frequency, unsigned fftlen, **mha\_real\_t** srates)  
*Finds bin number of FFT bin nearest to the given frequency.*

## 5.79 fshift\_hilbert.cpp File Reference

## Classes

- class **fshift\_hilbert::hilbert\_shifter\_t**
- class **fshift\_hilbert::frequency\_translator\_t**

## Namespaces

- **fshift\_hilbert**  
*All types for the hilbert frequency shifter live in this namespace.*

## 5.80 gain.cpp File Reference

## Classes

- class **gain::scaler\_t**
- class **gain::gain\_if\_t**

## Namespaces

- **gain**

## 5.81 gaintable.cpp File Reference

### Functions

- `std::vector< mha_real_t > convert_f2logf` (const std::vector< mha\_real\_t > &vF)
- `bool isempty` (const std::vector< std::vector< mha\_real\_t > > &arg)

### 5.81.1 Function Documentation

#### 5.81.1.1 convert\_f2logf()

```
std::vector< mha_real_t> convert_f2logf (
 const std::vector< mha_real_t > & vF)
```

#### 5.81.1.2 isempty()

```
bool isempty (
 const std::vector< std::vector< mha_real_t > > & arg)
```

## 5.82 gaintable.h File Reference

### Classes

- class **DynComp::gaintable\_t**  
*Gain table class.*

## Namespaces

- **DynComp**  
*dynamic compression related classes and functions*

## Functions

- **mha\_real\_t DynComp::interp1** (const std::vector< **mha\_real\_t** > &vX, const std::vector< **mha\_real\_t** > &vY, **mha\_real\_t** X)  
*One-dimensional linear interpolation.*
- **mha\_real\_t DynComp::interp2** (const std::vector< **mha\_real\_t** > &vX, const std::vector< **mha\_real\_t** > &vY, const std::vector< std::vector< **mha\_real\_t** > > &mZ, **mha\_real\_t** X, **mha\_real\_t** Y)  
*Linear interpolation in a two-dimensional field.*

## 5.83 generatemhaplugindoc.cpp File Reference

### Classes

- class **latex\_doc\_t**  
*Class to access the information stored in the plugin source code's MHAPLUGIN\_DOCUMENTATION macro.*

### Functions

- std::string **conv2latex** (std::string s, bool iscolored=false)  
*Escapes various character sequences in texts not intended to be processed by LaTeX for processing by LaTeX.*
- static void **print\_plugin\_references** (const **std::set**< std::string > &all\_categories, std::map< std::string, std::vector< std::string > > main\_category\_plugins, std::map< std::string, std::vector< std::string > > additional\_category\_plugins, std::ofstream &ofile, const std::string &category\_macro)  
*Function prints an overview of all categories and their associated plugins into the document.*
- std::vector< std::string > **create\_latex\_doc** (std::map< std::string, std::string > &doc, const std::string &pluginname, const std::string &plugin\_macro)  
*Loads the plugin, creates the latex documentation for the plugin, and adds the latex documentation for this plugin to the plugin's main category entry in doc.*
- int **main** (int argc, char \*\*argv)

#### 5.83.1 Function Documentation

### 5.83.1.1 conv2latex()

```
std::string conv2latex (
 std::string s,
 bool iscolored = false)
```

Escapes various character sequences in texts not intended to be processed by LaTeX for processing by LaTeX.

Focus is on correct display of symbols contained in these texts. E.g. the help texts of MHA configuration variables can be processed by this function. The contents of the MHAPLUGIN↵\_DOCUMENTATION is already in LaTeX format and should not be processed by this function.

#### Returns

A copy of s with various symbols escaped for LaTeX processing

#### Parameters

|                  |                                                                                        |
|------------------|----------------------------------------------------------------------------------------|
| <i>s</i>         | Text not ready for LaTeX                                                               |
| <i>iscolored</i> | if true, the complete returned text is surrounded with "\color{monitorcolor}{" and "}" |

### 5.83.1.2 print\_plugin\_references()

```
static void print_plugin_references (
 const std::set< std::string > & all_categories,
 std::map< std::string, std::vector< std::string > > main_category↵
plugins,
 std::map< std::string, std::vector< std::string > > additional_category↵
_plugins,
 std::ofstream & ofile,
 const std::string & category_macro) [static]
```

Function prints an overview of all categories and their associated plugins into the document.

#### Parameters

|                                    |                                                             |
|------------------------------------|-------------------------------------------------------------|
| <i>all_categories</i>              | A sorted container with all category names                  |
| <i>main_category_plugins</i>       | map of main categories to plugin names                      |
| <i>additional_category_plugins</i> | map of tags to plugin names                                 |
| <i>ofile</i>                       | Latex document is produced by writing output to this stream |



## 5.83.1.3 create\_latex\_doc()

```
std::vector<std::string> create_latex_doc (
 std::map< std::string, std::string > & doc,
 const std::string & pluginname,
 const std::string & plugin_macro)
```

Loads the plugin, creates the latex documentation for the plugin, and adds the latex documentation for this plugin to the plugin's main category entry in doc.

## Returns

the vector of all categories.

## Parameters

|                     |                                                                                                                                                                                                                                                  |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>doc</i>          | map of main categories to a string containing the documentation of all plugins in that categories. The documentation of the current plugin will be appended to the existing documentation of its main category. Will be created if non-existent. |
| <i>pluginname</i>   | Name of the MHA plugin to process                                                                                                                                                                                                                |
| <i>plugin_macro</i> | name of the LaTeX section macro that documents a single plugin (e.g. "section", "subsection", "subsubsection", ...)                                                                                                                              |

## 5.83.1.4 main()

```
int main (
 int argc,
 char ** argv)
```

## 5.84 gsc\_adaptive\_stage.cpp File Reference

## 5.85 gsc\_adaptive\_stage.hh File Reference

## Classes

- class **gsc\_adaptive\_stage::gsc\_adaptive\_stage**

## Namespaces

- **gsc\_adaptive\_stage**

## Variables

- constexpr **mha\_real\_t gsc\_adaptive\_stage::DELT** = 1e-12  
*Small constant to ensure no division by zero occurs.*

## 5.86 gsc\_adaptive\_stage\_if.cpp File Reference

## 5.87 gsc\_adaptive\_stage\_if.hh File Reference

## Classes

- class **gsc\_adaptive\_stage::gsc\_adaptive\_stage\_if**  
*Plugin interface class.*

## Namespaces

- **gsc\_adaptive\_stage**

## 5.88 gtfb\_analyzer.cpp File Reference

Gammatone Filterbank Analyzer Plugin.

## Classes

- struct **gtfb\_analyzer::gtfb\_analyzer\_cfg\_t**  
*Configuration for Gammatone Filterbank Analyzer.*
- class **gtfb\_analyzer::gtfb\_analyzer\_t**  
*Gammatone Filterbank Analyzer Plugin.*

## Namespaces

- **gtfb\_analyzer**

## Functions

- static const **mha\_complex\_t & filter\_complex** (const **mha\_complex\_t** &input, const **mha\_complex\_t** &coeff, **mha\_complex\_t** \*states, unsigned orders)  
*Filters a complex input sample with the given filter coefficient.*
- static const **mha\_complex\_t & filter\_real** (**mha\_real\_t** input, **mha\_complex\_t** &tmp, **mha\_complex\_t** &coeff, **mha\_complex\_t** \*states, unsigned orders, const **mha\_complex\_t** &normphase)  
*Filters a real input sample with the given filter coefficient and applies the given normalization with phase correction.*

### 5.88.1 Detailed Description

Gammatone Filterbank Analyzer Plugin.

### 5.88.2 Function Documentation

#### 5.88.2.1 filter\_complex()

```
static const mha_complex_t& filter_complex (
 const mha_complex_t & input,
 const mha_complex_t & coeff,
 mha_complex_t * states,
 unsigned orders) [inline], [static]
```

Filters a complex input sample with the given filter coefficient.

No normalization takes place. The implementation is tail-recursive and to exploit compiler optimization.

#### Parameters

|               |                                                |
|---------------|------------------------------------------------|
| <i>input</i>  | The complex input sample                       |
| <i>coeff</i>  | The complex filter coefficient                 |
| <i>states</i> | Pointer to the array of complex filter states. |
| <i>orders</i> | The filter order                               |

#### Returns

A const ref to the filtered sample

#### 5.88.2.2 filter\_real()

```
static const mha_complex_t& filter_real (
 mha_real_t input,
 mha_complex_t & tmp_complex,
 const mha_complex_t & coeff,
 mha_complex_t * states,
 unsigned orders,
 const mha_complex_t & normphase) [inline], [static]
```

Filters a real input sample with the given filter coefficient and applies the given normalization with phase correction.

**Parameters**

|                    |                                                                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>input</i>       | The real input sample                                                                                                                                                                                                                                                        |
| <i>tmp_complex</i> | A reference to a <b>mha_complex_t</b> (p. 688) used for intermediate results. No assumptions should be made about the state of tmp_complex after the return of filter_real. This is an optimization to reduce the number of ctor/dtor calls of <b>mha_complex_t</b> (p. 688) |
| <i>coeff</i>       | The complex filter coefficient                                                                                                                                                                                                                                               |
| <i>states</i>      | Pointer to the array of complex filter states.                                                                                                                                                                                                                               |
| <i>orders</i>      | The filter order                                                                                                                                                                                                                                                             |
| <i>normphase</i>   | Normalization coefficient including the phase correction                                                                                                                                                                                                                     |

**Returns**

A const ref to the filtered sample

**5.89 gtfb\_simd.cpp File Reference**

Gammatone Filterbank Analyzer Plugin using SIMD.

**Classes**

- class **gtfb\_simd\_cfg\_t**
- class **gtfb\_simd\_t**

**Macros**

- #define **MXCSR\_DAZ** (1 << 6) /\* Enable denormals are zero mode \*/
- #define **MXCSR\_FTZ** (1 << 15) /\* Enable flush to zero mode \*/
- #define **check\_alignment**(ptr, alignment)  
*Checks alignment of pointer address.*
- #define **add4f**(a, b) \_\_builtin\_ia32\_addps(a,b)
- #define **sub4f**(a, b) \_\_builtin\_ia32\_subps(a,b)
- #define **mul4f**(a, b) \_\_builtin\_ia32\_mulpd(a,b)

## Functions

- void **filter\_sisd\_complex** (const unsigned bands, const unsigned order, const **mha\_complex\_t** \*inputs, **mha\_complex\_t** \*outputs, const **mha\_complex\_t** \*coefficients, **mha\_complex\_t** \*states)  
*Filters one sample per band, using SISD operations and the mha\_complex operations.*
- void **filter\_sisd\_real** (const unsigned bands, const unsigned order, const **mha\_complex\_t** \*inputs, **mha\_complex\_t** \*outputs, const **mha\_complex\_t** \*coefficients, **mha\_complex\_t** \*states)  
*Filters one sample per band, using SISD operations and real operations (operating on real and imaginary part as necessary).*
- void **filter\_simd** (const unsigned bands, const unsigned order, const **mha\_real\_t** \*inputs, const **mha\_real\_t** \*iinputs, **mha\_real\_t** \*routputs, **mha\_real\_t** \*ioutputs, const **mha\_real\_t** \*rcoefficients, const **mha\_real\_t** \*icoefficients, **mha\_real\_t** \*rstates, **mha\_real\_t** \*istates)  
*Filters one sample per band, using simd operations on float32 To process more than one sample, the function must be called repeatedly in correct order (from oldest sample to newest sample), and the calling function must preserve the filter state (parameters rstates and istates).*

### 5.89.1 Detailed Description

Gammatone Filterbank Analyzer Plugin using SIMD.

A single-instruction-multiple-data (SIMD) implementation of a gammatone filterbank (GTFB)

Not all functions in this file are actually used. Read the functions in this file as a path to convert an algorithm, here complex-valued gammatone filtering as introduced in Hohmann 2002, from a single-instruction-single-data (SISD) implementation that uses complex arithmetic operations to a SIMD implementation of the same, splitting the complex arithmetic operations into their defining real operations, i.e  $(a+b).real == a.real + b.real$ ,  $(a+b).imag == a.imag + b.imag$ ,  $(a*b).real == a.real*b.real - a.imag*b.imag$ ,  $(a*b).imag == a.real*b.imag + a.imag*b.real$ .

### 5.89.2 Macro Definition Documentation

#### 5.89.2.1 MXCSR\_DAZ

```
#define MXCSR_DAZ (1 << 6) /* Enable denormals are zero mode */
```

#### 5.89.2.2 MXCSR\_FTZ

```
#define MXCSR_FTZ (1 << 15) /* Enable flush to zero mode */
```

#### 5.89.2.3 check\_alignment

```
#define check_alignment(
 ptr,
 alignment)
```

Checks alignment of pointer address.

**Parameters**

|                  |                    |
|------------------|--------------------|
| <i>ptr</i>       | pointer to check   |
| <i>alignment</i> | required alignment |

**Exceptions**

|                                                   |                                    |
|---------------------------------------------------|------------------------------------|
| <b><i>MHA_Error</i></b> (p. <a href="#">707</a> ) | if ptr is not aligned as required. |
|---------------------------------------------------|------------------------------------|

**5.89.2.4 add4f**

```
#define add4f(
 a,
 b) __builtin_ia32_addps(a,b)
```

**5.89.2.5 sub4f**

```
#define sub4f(
 a,
 b) __builtin_ia32_subps(a,b)
```

**5.89.2.6 mul4f**

```
#define mul4f(
 a,
 b) __builtin_ia32_mulps(a,b)
```

**5.89.3 Function Documentation**

## 5.89.3.1 filter\_sisd\_complex()

```
void filter_sisd_complex (
 const unsigned bands,
 const unsigned order,
 const mha_complex_t * inputs,
 mha_complex_t * outputs,
 const mha_complex_t * coefficients,
 mha_complex_t * states)
```

Filters one sample per band, using SISD operations and the mha\_complex operations.

To process more than one sample, the function must be called repeatedly in correct order (from oldest sample to newest sample), and the calling function must preserve the filter state (parameter states).

This function is not actually used in this plugin, but can be used for testing. It implements the Hohmann 2002 filtering in the most readable form, and is translated towards a SIMD implementation in the following functions.

## Parameters

|                     |                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>bands</i>        | Number of total bands to compute (i.e. input_channels * num_frequencies)                                                                                                                                                                                                                                                                                                                                |
| <i>order</i>        | Gammatone filter order                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>inputs</i>       | Pointer to array of complex input samples, only 1 sample per band                                                                                                                                                                                                                                                                                                                                       |
| <i>outputs</i>      | Pointer to array with space for output samples, 1 complex sample per band                                                                                                                                                                                                                                                                                                                               |
| <i>coefficients</i> | Pointer to array of recursive filter coefficient, 1 coefficient per band. The same coefficient is reused for all filter orders.                                                                                                                                                                                                                                                                         |
| <i>states</i>       | Pointer to array of complex filter states. Array size is bands*order. Initialize all elements with zeros before filtering the first sample. Filter state values will be modified by the function. For filtering the next sample, this function needs the filter state array from filtering the previous sample again, unmodified. The filter state of band b, order o can be found at index [b+o*bands] |

## 5.89.3.2 filter\_sisd\_real()

```
void filter_sisd_real (
 const unsigned bands,
 const unsigned order,
 const mha_complex_t * inputs,
 mha_complex_t * outputs,
 const mha_complex_t * coefficients,
 mha_complex_t * states) [inline]
```

Filters one sample per band, using SISD operations and real operations (operating on real and imaginary part as necessary).

To process more than one sample, the function must be called repeatedly in correct order (from oldest sample to newest sample), and the calling function must preserve the filter state (parameter states).

This function is not actually used in this plugin, but can be used for testing. It reimplements `filter_sisd_complex`, but expands the complex operations into real arithmetics.

#### Parameters

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>bands</i>        | Number of total bands to compute (i.e. <code>input_channels * num_frequencies</code> )                                                                                                                                                                                                                                                                                                                                                                        |
| <i>order</i>        | Gammatone filter order                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>inputs</i>       | Pointer to array of complex input samples, only 1 sample per band                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>outputs</i>      | Pointer to array with space for output samples, 1 complex sample per band                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>coefficients</i> | Pointer to array of recursive filter coefficient, 1 coefficient per band. The same coefficient is reused for all filter orders.                                                                                                                                                                                                                                                                                                                               |
| <i>states</i>       | Pointer to array of complex filter states. Array size is <code>bands*order</code> . Initialize all elements with zeros before filtering the first sample. Filter state values will be modified by the function. For filtering the next sample, this function needs the filter state array from filtering the previous sample again, unmodified. The filter state of band <code>b</code> , order <code>o</code> can be found at index <code>[b+o*bands]</code> |

#### 5.89.3.3 `filter_simd()`

```
void filter_simd (
 const unsigned bands,
 const unsigned order,
 const mha_real_t * rinputs,
 const mha_real_t * iinputs,
 mha_real_t * routputs,
 mha_real_t * ioutputs,
 const mha_real_t * rcoefficients,
 const mha_real_t * icoefficients,
 mha_real_t * rstates,
 mha_real_t * istates) [inline]
```

Filters one sample per band, using simd operations on float32 To process more than one sample, the function must be called repeatedly in correct order (from oldest sample to newest sample), and the calling function must preserve the filter state (parameters `rstates` and `istates`).

This reimplements `filter_sisd_real`, but uses the CPU's vector registers for the arithmetics, and is actually used by this plugin.

#### Parameters

|              |                                                                                                                                                                                                                                                                                                      |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>bands</i> | Number of total bands to compute (i.e. <code>input_channels * num_frequencies</code> )<br>bands is also the size of the arrays pointed to by <code>rinputs</code> , <code>iinputs</code> , <code>routputs</code> , <code>ioutputs</code> , <code>rcoefficients</code> , <code>icoefficients</code> . |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## Parameters

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>order</i>         | Gammatone filter order                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>rinputs</i>       | Pointer to array of the real part of input samples                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>iinputs</i>       | Pointer to array of the imaginary part of input samples                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>rouputs</i>       | Pointer to array with space for the real parts of the output samples                                                                                                                                                                                                                                                                                                                                                                      |
| <i>rouputs</i>       | Pointer to array with space for the real parts of the output samples                                                                                                                                                                                                                                                                                                                                                                      |
| <i>rcoefficients</i> | Pointer to array of the real parts of the recursive filter coefficients                                                                                                                                                                                                                                                                                                                                                                   |
| <i>icoefficients</i> | Pointer to array of the imaginary parts of the filter coefficients                                                                                                                                                                                                                                                                                                                                                                        |
| <i>rstates</i>       | Pointer to array of real parts of filter states. Array size is bands*order. Initialize all elements with zeros before filtering the first sample. Filter state values will be modified by the function. For filtering the next sample, this function needs the filter state arrays from filtering the previous sample again, unmodified. The real part of the filter state of band b, order o can be found at index [b+o*bands]           |
| <i>istates</i>       | Pointer to array of imaginary parts of filter states. Array size is bands*order. Initialize all elements with zeros before filtering the first sample. Filter state values will be modified by the function. For filtering the next sample, this function needs the filter state arrays from filtering the previous sample again, unmodified. The imaginary part of the filter state of band b, order o can be found at index [b+o*bands] |

## 5.90 gtfb\_simple\_bridge.cpp File Reference

## Classes

- class **gtfb\_simple\_rt\_t**  
*Runtime configuration class of gtfb\_simple\_bridge plugin.*
- class **gtfb\_simple\_t**  
*Interface class of gtfb\_simple\_bridge plugin.*

## 5.91 hann.cpp File Reference

## Macros

- #define **PI** 3.14159265358979323846

## Functions

- float \* **hannf** (const unsigned int N)
- double \* **hann** (const unsigned int N)

## 5.91.1 Macro Definition Documentation

### 5.91.1.1 PI

```
#define PI 3.14159265358979323846
```

## 5.91.2 Function Documentation

### 5.91.2.1 hannf()

```
float* hannf (
 const unsigned int N)
```

### 5.91.2.2 hann()

```
double* hann (
 const unsigned int N)
```

## 5.92 hann.h File Reference

### Functions

- float \* **hannf** (const unsigned int N)
- double \* **hann** (const unsigned int N)

## 5.92.1 Function Documentation

### 5.92.1.1 hannf()

```
float* hannf (
 const unsigned int N)
```

## 5.92.1.2 hann()

```
double* hann (
 const unsigned int N)
```

## 5.93 identity.cpp File Reference

## Classes

- class **identity\_t**

## 5.94 ifftshift.cpp File Reference

## Functions

- void **ifftshift** ( **mha\_wave\_t** \*spec)

## 5.94.1 Function Documentation

## 5.94.1.1 ifftshift()

```
void ifftshift (
 mha_wave_t * spec)
```

## 5.95 ifftshift.h File Reference

## Functions

- void **ifftshift** ( **mha\_wave\_t** \*spec)

## 5.95.1 Function Documentation

## 5.95.1.1 ifftshift()

```
void ifftshift (
 mha_wave_t * spec)
```

## 5.96 iirfilter.cpp File Reference

### Classes

- class **iirfilter\_t**

## 5.97 level\_matching.cpp File Reference

### Macros

- **#define PATCH\_VAR(var) patchbay.connect(&var.valuechanged, this, & level\_matching::level\_matching\_t::update\_cfg)**
- **#define INSERT\_PATCH(var) insert\_member(var); PATCH\_VAR(var)**

### 5.97.1 Macro Definition Documentation

#### 5.97.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & level_matching::level_
_matching_t::update_cfg)
```

#### 5.97.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

## 5.98 level\_matching.hh File Reference

### Classes

- class **level\_matching::channel\_pair**
- class **level\_matching::level\_matching\_config\_t**
- class **level\_matching::level\_matching\_t**

### Namespaces

- **level\_matching**

## 5.99 levelmeter.cpp File Reference

### Classes

- class **levelmeter\_t**

### Macros

- #define **PASCALE** 93.979400086720374929

### 5.99.1 Macro Definition Documentation

#### 5.99.1.1 PASCALE

```
#define PASCALE 93.979400086720374929
```

## 5.100 ipc.cpp File Reference

### Macros

- #define **PATCH\_VAR**(var) patchbay.connect(&var.valuechanged, this, & **lpc::update\_↵  
cfg**)
- #define **INSERT\_PATCH**(var) **insert\_member**(var); **PATCH\_VAR**(var)

### Functions

- void **Levinson2** (unsigned int P, const std::vector< **mha\_real\_t** > &R, std::vector< **mha\_real\_t** > &A)

### 5.100.1 Macro Definition Documentation

#### 5.100.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & lpc::update_cfg)
```

### 5.100.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

## 5.100.2 Function Documentation

### 5.100.2.1 Levinson2()

```
void Levinson2 (
 unsigned int P,
 const std::vector< mha_real_t > & R,
 std::vector< mha_real_t > & A)
```

## 5.101 ipc.h File Reference

### Classes

- class **ipc\_config**
- class **ipc**

## 5.102 ipc\_bl\_predictor.cpp File Reference

### Macros

- #define **PATCH\_VAR**(var) patchbay.connect(&var.valuechanged, this, & **ipc\_bl\_predictor::update\_cfg**)
- #define **INSERT\_PATCH**(var) insert\_member(var); **PATCH\_VAR**(var)

### 5.102.1 Macro Definition Documentation

#### 5.102.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & ipc_bl_predictor
::update_cfg)
```

5.102.1.2 `INSERT_PATCH`

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

5.103 `lpc_bl_predictor.h` File Reference

## Classes

- class `lpc_bl_predictor_config`
- class `lpc_bl_predictor`

## Macros

- `#define EPSILON 1e-10`

## 5.103.1 Macro Definition Documentation

5.103.1.1 `EPSILON`

```
#define EPSILON 1e-10
```

5.104 `lpc_burg-lattice.cpp` File Reference

## Macros

- `#define PATCH_VAR(var) patchbay.connect(&var.valuechanged, this, & lpc_burglattice::update_cfg)`
- `#define INSERT_PATCH(var) insert_member(var); PATCH_VAR(var)`

## 5.104.1 Macro Definition Documentation

5.104.1.1 `PATCH_VAR`

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & lpc_burglattice
::update_cfg)
```

### 5.104.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

## 5.105 ipc\_burg-lattice.h File Reference

### Classes

- class **ipc\_burglattice\_config**
- class **ipc\_burglattice**

### Macros

- #define **EPSILON** 1e-10

### 5.105.1 Macro Definition Documentation

#### 5.105.1.1 EPSILON

```
#define EPSILON 1e-10
```

## 5.106 Isl2ac.cpp File Reference

### Classes

- class **Isl2ac::save\_var\_t**  
*LSL to AC bridge variable.*
- class **Isl2ac::cfg\_t**  
*Runtime configuration class of the **Isl2ac** (p. 98) plugin.*
- class **Isl2ac::Isl2ac\_t**  
*Plugin class of **Isl2ac** (p. 98).*

### Namespaces

- **Isl2ac**  
*All types for the **Isl2ac** (p. 98) plugins live in this namespace.*



## Enumerations

- enum **Isl2ac::underrun\_behavior** { **Isl2ac::underrun\_behavior::Zero** =0, **Isl2ac::underrun\_behavior::Copy**, **Isl2ac::underrun\_behavior::Abort** }

## 5.107 matrixmixer.cpp File Reference

### Classes

- class **matrixmixer::cfg\_t**
- class **matrixmixer::matmix\_t**

### Namespaces

- **matrixmixer**

## 5.108 mconv.cpp File Reference

### Classes

- class **mconv::MConv**

### Namespaces

- **mconv**

## 5.109 mha.cpp File Reference

### Functions

- int **mhamain** (int argc, char \*argv[])
- int **main** (int argc, char \*argv[])

### 5.109.1 Function Documentation

### 5.109.1.1 mhamain()

```
int mhamain (
 int argc,
 char * argv[])
```

### 5.109.1.2 main()

```
int main (
 int argc,
 char * argv[])
```

## 5.110 mha.hh File Reference

common types for MHA kernel, MHA framework applications and external plugins

### Classes

- struct **mha\_complex\_t**  
*Type for complex floating point values.*
- struct **mha\_complex\_test\_array\_t**  
*Several places in MHA rely on the fact that you can cast an array of **mha\_complex\_t** (p. [688](#)) **c[]** to an array of **mha\_real\_t r[]** with  $r[0] == c[0].re$   $r[1] == c[0].im$   $r[2] == c[1].re$  ...*
- struct **mha\_real\_test\_array\_t**
- struct **mha\_direction\_t**  
*Channel source direction structure.*
- struct **mha\_channel\_info\_t**  
*Channel information structure.*
- struct **mha\_wave\_t**  
*Waveform signal structure.*
- struct **mha\_spec\_t**  
*Spectrum signal structure.*
- struct **mha\_audio\_descriptor\_t**  
*Description of an audio fragment (planned as a replacement of **mhaconfig\_t** (p. [792](#))).*
- struct **mha\_audio\_t**  
*An audio fragment in the openMHA (planned as a replacement of **mha\_wave\_t** (p. [780](#)) and **mha\_spec\_t** (p. [732](#))).*
- struct **mhaconfig\_t**  
*MHA prepare configuration structure.*
- struct **comm\_var\_t**  
*Algorithm communication variable structure.*
- struct **algo\_comm\_t**  
*A reference handle for algorithm communication variables.*

## Macros

- **#define MHA\_CALLBACK\_TEST(x)**  
*Test macro to compare function type definition and declaration.*
- **#define MHA\_CALLBACK\_TEST\_PREFIX(prefix, x)**
- **#define MHA\_XSTRF(x) MHA\_STRF( x )**
- **#define MHA\_STRF(x) #x**
- **#define MHA\_VERSION\_MAJOR 4**  
*Major version number of MHA.*
- **#define MHA\_VERSION\_MINOR 12**  
*Minor version number of MHA.*
- **#define MHA\_VERSION\_RELEASE 0**  
*Release number of MHA.*
- **#define MHA\_VERSION\_BUILD 0**  
*Build number of MHA (currently unused)*
- **#define MHA\_STRUCT\_SIZEMATCH (unsigned int)((sizeof( mha\_real\_t)==4)+2\*(sizeof( mha\_complex\_t)==8)+4\*(sizeof( mha\_wave\_t)==8+2\*sizeof(void\*)))+8\*(sizeof( mha\_spec\_t)==8+2\*sizeof(void\*)))+16\*(sizeof( mhaconfig\_t)==24))**  
*Test number for structure sizes.*
- **#define MHA\_VERSION (unsigned int)(( MHA\_STRUCT\_SIZEMATCH | ( MHA\_VERSION\_RELEASE << 8) | ( MHA\_VERSION\_MINOR << 16) | ( MHA\_VERSION\_MAJOR << 24)))**  
*Full version number of MHA kernel.*
- **#define MHA\_VERSION\_STRING MHA\_XSTRF( MHA\_VERSION\_MAJOR) "." MHA\_XSTRF( MHA\_VERSION\_MINOR)**  
*Version string of MHA kernel (major.minor)*
- **#define MHA\_RELEASE\_VERSION\_STRING MHA\_XSTRF( MHA\_VERSION\_MAJOR) "." MHA\_XSTRF( MHA\_VERSION\_MINOR) "." MHA\_XSTRF( MHA\_VERSION\_RELEASE)**  
*Version string of MHA kernel (major.minor.release)*
- **#define MHA\_WAVEFORM 0**
- **#define MHA\_SPECTRUM 1**
- **#define MHA\_DOMAIN\_MAX 2**
- **#define MHA\_DOMAIN\_UNKNOWN MHA\_DOMAIN\_MAX**
- **#define MHA\_AC\_UNKNOWN 0**
- **#define MHA\_AC\_CHAR 1**
- **#define MHA\_AC\_INT 2**
- **#define MHA\_AC\_MHAREAL 3**
- **#define MHA\_AC\_FLOAT 4**
- **#define MHA\_AC\_DOUBLE 5**
- **#define MHA\_AC\_MHACOMPLEX 6**
- **#define MHA\_AC\_VEC\_FLOAT 51**
- **#define MHA\_AC\_USER 1000**

## Typedefs

- typedef unsigned int **mha\_domain\_t**
- typedef float **mha\_real\_t**  
*openMHA type for real numbers*
- typedef void \* **mha\_fft\_t**  
*Handle for an FFT object.*
- typedef struct **algo\_comm\_t** **algo\_comm\_t**
- typedef unsigned int(\* **MHAGetVersion\_t**) (void)
- typedef int(\* **MHAInit\_t**) ( **algo\_comm\_t** algo\_comm, const char \*chain, const char \*algo, void \*\*h)
- typedef int(\* **MHAPrepare\_t**) (void \*h, **mhaconfig\_t** \*cfg)
- typedef int(\* **MHARelease\_t**) (void \*h)
- typedef void(\* **MHADestroy\_t**) (void \*h)
- typedef int(\* **MHASET\_t**) (void \*h, const char \*cmd, char \*retval, unsigned int len)
- typedef std::string(\* **MHASEtcpp\_t**) (void \*h, const std::string &command)
- typedef const char \*(\* **MHAStrError\_t**) (void \*h, int err)
- typedef int(\* **MHAProc\_wave2wave\_t**) (void \*h, **mha\_wave\_t** \*sIn, **mha\_wave\_t** \*\*sOut)
- typedef int(\* **MHAProc\_wave2spec\_t**) (void \*h, **mha\_wave\_t** \*sIn, **mha\_spec\_t** \*\*sOut)
- typedef int(\* **MHAProc\_spec2wave\_t**) (void \*h, **mha\_spec\_t** \*sIn, **mha\_wave\_t** \*\*sOut)
- typedef int(\* **MHAProc\_spec2spec\_t**) (void \*h, **mha\_spec\_t** \*sIn, **mha\_spec\_t** \*\*sOut)
- typedef const char \*(\* **MHAPluginDocumentation\_t**) (void)
- typedef const char \*(\* **MHAPluginCategory\_t**) (void)

### 5.110.1 Detailed Description

common types for MHA kernel, MHA framework applications and external plugins

### 5.110.2 Macro Definition Documentation

#### 5.110.2.1 MHA\_CALLBACK\_TEST

```
#define MHA_CALLBACK_TEST (
 x)
```

Test macro to compare function type definition and declaration.

### 5.110.2.2 MHA\_CALLBACK\_TEST\_PREFIX

```
#define MHA_CALLBACK_TEST_PREFIX(
 prefix,
 x)
```

### 5.110.2.3 MHA\_XSTRF

```
#define MHA_XSTRF(
 x) MHA_STRF(x)
```

### 5.110.2.4 MHA\_STRF

```
#define MHA_STRF(
 x) #x
```

### 5.110.2.5 MHA\_VERSION\_MAJOR

```
#define MHA_VERSION_MAJOR 4
```

Major version number of MHA.

### 5.110.2.6 MHA\_VERSION\_MINOR

```
#define MHA_VERSION_MINOR 12
```

Minor version number of MHA.

### 5.110.2.7 MHA\_VERSION\_RELEASE

```
#define MHA_VERSION_RELEASE 0
```

Release number of MHA.

### 5.110.2.8 MHA\_VERSION\_BUILD

```
#define MHA_VERSION_BUILD 0
```

Build number of MHA (currently unused)

### 5.110.2.9 MHA\_STRUCT\_SIZEMATCH

```
#define MHA_STRUCT_SIZEMATCH (unsigned int)((sizeof(mha_real_t)==4)+2*(sizeof(mha_↵
_complex_t)==8)+4*(sizeof(mha_wave_t)==8+2*sizeof(void*)))+8*(sizeof(mha_spec_↵
_t)==8+2*sizeof(void*)))+16*(sizeof(mhaconfig_t)==24))
```

Test number for structure sizes.

### 5.110.2.10 MHA\_VERSION

```
#define MHA_VERSION (unsigned int)((MHA_STRUCT_SIZEMATCH | (MHA_VERSION_RELEASE <<
8) | (MHA_VERSION_MINOR << 16) | (MHA_VERSION_MAJOR << 24)))
```

Full version number of MHA kernel.

### 5.110.2.11 MHA\_VERSION\_STRING

```
#define MHA_VERSION_STRING MHA_XSTRF(MHA_VERSION_MAJOR) "." MHA_XSTRF(MHA_VERS↵
ION_MINOR)
```

Version string of MHA kernel (major.minor)

### 5.110.2.12 MHA\_RELEASE\_VERSION\_STRING

```
#define MHA_RELEASE_VERSION_STRING MHA_XSTRF(MHA_VERSION_MAJOR) "." MHA_XSTRF(
MHA_VERSION_MINOR) "." MHA_XSTRF(MHA_VERSION_RELEASE)
```

Version string of MHA kernel (major.minor.release)

### 5.110.2.13 MHA\_WAVEFORM

```
#define MHA_WAVEFORM 0
```

**5.110.2.14 MHA\_SPECTRUM**

```
#define MHA_SPECTRUM 1
```

**5.110.2.15 MHA\_DOMAIN\_MAX**

```
#define MHA_DOMAIN_MAX 2
```

**5.110.2.16 MHA\_DOMAIN\_UNKNOWN**

```
#define MHA_DOMAIN_UNKNOWN MHA_DOMAIN_MAX
```

**5.110.2.17 MHA\_AC\_UNKNOWN**

```
#define MHA_AC_UNKNOWN 0
```

**5.110.2.18 MHA\_AC\_CHAR**

```
#define MHA_AC_CHAR 1
```

**5.110.2.19 MHA\_AC\_INT**

```
#define MHA_AC_INT 2
```

**5.110.2.20 MHA\_AC\_MHAREAL**

```
#define MHA_AC_MHAREAL 3
```

**5.110.2.21 MHA\_AC\_FLOAT**

```
#define MHA_AC_FLOAT 4
```

**5.110.2.22 MHA\_AC\_DOUBLE**

```
#define MHA_AC_DOUBLE 5
```

**5.110.2.23 MHA\_AC\_MHACOMPLEX**

```
#define MHA_AC_MHACOMPLEX 6
```

**5.110.2.24 MHA\_AC\_VEC\_FLOAT**

```
#define MHA_AC_VEC_FLOAT 51
```

**5.110.2.25 MHA\_AC\_USER**

```
#define MHA_AC_USER 1000
```

**5.110.3 Typedef Documentation****5.110.3.1 mha\_domain\_t**

```
typedef unsigned int mha_domain_t
```

**5.110.3.2 algo\_comm\_t**

```
typedef struct algo_comm_t algo_comm_t
```

**5.110.3.3 MHAGetVersion\_t**

```
typedef unsigned int(* MHAGetVersion_t) (void)
```



#### 5.110.3.4 MHAInit\_t

```
typedef int(* MHAInit_t) (algo_comm_t algo_comm, const char *chain, const char *algo,
void **h)
```

#### 5.110.3.5 MHAPrepare\_t

```
typedef int(* MHAPrepare_t) (void *h, mhaconfig_t *cfg)
```

#### 5.110.3.6 MHARelease\_t

```
typedef int(* MHARelease_t) (void *h)
```

#### 5.110.3.7 MHADestroy\_t

```
typedef void(* MHADestroy_t) (void *h)
```

#### 5.110.3.8 MHASet\_t

```
typedef int(* MHASet_t) (void *h, const char *cmd, char *retval, unsigned int len)
```

#### 5.110.3.9 MHASetcpp\_t

```
typedef std::string(* MHASetcpp_t) (void *h, const std::string &command)
```

#### 5.110.3.10 MHAStrError\_t

```
typedef const char*(MHAStrError_t) (void *h, int err)
```

#### 5.110.3.11 MHAProc\_wave2wave\_t

```
typedef int(* MHAProc_wave2wave_t) (void *h, mha_wave_t *sIn, mha_wave_t **sOut)
```

**5.110.3.12 MHAProc\_wave2spec\_t**

```
typedef int(* MHAProc_wave2spec_t) (void *h, mha_wave_t *sIn, mha_spec_t **sOut)
```

**5.110.3.13 MHAProc\_spec2wave\_t**

```
typedef int(* MHAProc_spec2wave_t) (void *h, mha_spec_t *sIn, mha_wave_t **sOut)
```

**5.110.3.14 MHAProc\_spec2spec\_t**

```
typedef int(* MHAProc_spec2spec_t) (void *h, mha_spec_t *sIn, mha_spec_t **sOut)
```

**5.110.3.15 MHAPuginDocumentation\_t**

```
typedef const char*(* MHAPuginDocumentation_t) (void)
```

**5.110.3.16 MHAPuginCategory\_t**

```
typedef const char*(* MHAPuginCategory_t) (void)
```

**5.111 mha\_algo\_comm.cpp File Reference****Macros**

- **#define AC\_SUCCESS 0**
- **#define AC\_INVALID\_HANDLE -1**
- **#define AC\_INVALID\_NAME -2**
- **#define AC\_STRING\_TRUNCATED -3**
- **#define AC\_INVALID\_OUTPTR -4**
- **#define AC\_TYPE\_MISMATCH -5**
- **#define AC\_DIM\_MISMATCH -6**

**Variables**

- **algo\_comm\_t algo\_comm\_default**

### 5.111.1 Macro Definition Documentation

#### 5.111.1.1 AC\_SUCCESS

```
#define AC_SUCCESS 0
```

#### 5.111.1.2 AC\_INVALID\_HANDLE

```
#define AC_INVALID_HANDLE -1
```

#### 5.111.1.3 AC\_INVALID\_NAME

```
#define AC_INVALID_NAME -2
```

#### 5.111.1.4 AC\_STRING\_TRUNCATED

```
#define AC_STRING_TRUNCATED -3
```

#### 5.111.1.5 AC\_INVALID\_OUTPTR

```
#define AC_INVALID_OUTPTR -4
```

#### 5.111.1.6 AC\_TYPE\_MISMATCH

```
#define AC_TYPE_MISMATCH -5
```

#### 5.111.1.7 AC\_DIM\_MISMATCH

```
#define AC_DIM_MISMATCH -6
```

### 5.111.2 Variable Documentation

#### 5.111.2.1 algo\_comm\_default

`algo_comm_t` `algo_comm_default`

### 5.112 mha\_algo\_comm.h File Reference

Header file for Algorithm Communication.

#### Classes

- class **MHA\_AC::spectrum\_t**  
*Insert a **MHASignal::spectrum\_t** (p. 1197) class into the AC space.*
- class **MHA\_AC::waveform\_t**  
*Insert a **MHASignal::waveform\_t** (p. 1212) class into the AC space.*
- class **MHA\_AC::int\_t**  
*Insert a integer variable into the AC space.*
- class **MHA\_AC::float\_t**  
*Insert a float point variable into the AC space.*
- class **MHA\_AC::double\_t**  
*Insert a double precision floating point variable into the AC space.*
- class **MHA\_AC::stat\_t**
- class **MHA\_AC::ac2matrix\_helper\_t**
- class **MHA\_AC::ac2matrix\_t**  
*Copy AC variable to a matrix.*
- class **MHA\_AC::acspace2matrix\_t**  
*Copy all or a subset of all numeric AC variables into an array of matrixes.*

#### Namespaces

- **MHA\_AC**  
*Functions and classes for Algorithm Communication (AC) support.*

## Functions

- **mha\_spec\_t MHA\_AC::get\_var\_spectrum** ( **algo\_comm\_t** ac, const std::string &name)  
*Convert an AC variable into a spectrum.*
- **mha\_wave\_t MHA\_AC::get\_var\_waveform** ( **algo\_comm\_t** ac, const std::string &name)  
*Convert an AC variable into a waveform.*
- **int MHA\_AC::get\_var\_int** ( **algo\_comm\_t** ac, const std::string &name)  
*Return value of an integer scalar AC variable.*
- **float MHA\_AC::get\_var\_float** ( **algo\_comm\_t** ac, const std::string &name)  
*Return value of an floating point scalar AC variable.*
- **std::vector< float > MHA\_AC::get\_var\_vfloat** ( **algo\_comm\_t** ac, const std::string &name)  
*Return value of an floating point vector AC variable as standard vector of floats.*

### 5.112.1 Detailed Description

Header file for Algorithm Communication.

## 5.113 mha\_algo\_comm.hh File Reference

### Classes

- class **MHAKernel::comm\_var\_map\_t**
- class **MHAKernel::algo\_comm\_class\_t**

### Namespaces

- **MHAKernel**

### Macros

- **#define ALGO\_COMM\_ID\_STR** "MFVK3jL5rmeus1XtggEI971aXCR/GU7RRehKz4k↵  
 Qtrg="

### Functions

- **algo\_comm\_class\_t \* MHAKernel::algo\_comm\_safe\_cast** (void \*)

## Variables

- **algo\_comm\_t algo\_comm\_default**

### 5.113.1 Macro Definition Documentation

#### 5.113.1.1 ALGO\_COMM\_ID\_STR

```
#define ALGO_COMM_ID_STR "MFVK3jL5rmeus1XtggEI971aXCR/GU7RRehKz4kQtrg="
```

### 5.113.2 Variable Documentation

#### 5.113.2.1 algo\_comm\_default

```
algo_comm_t algo_comm_default
```

## 5.114 mha\_defs.h File Reference

Preprocessor definitions common to all MHA components.

## Macros

- `#define __MHA_FUN__ __FUNC__`
- `#define CHECK_EXPR(x) {if(!(x)){throw MHA_Error(__FILE__, __LINE__, "The expression \"\" #x \"\" is invalid.");}}`
- `#define CHECK_VAR(x) {if(!(x)){throw MHA_Error(__FILE__, __LINE__, "The variable \"\" #x \"\" is not defined.");}}`
- `#define __declspec(p)`
- `#define M_PI 3.14159265358979323846`  
*Define pi if it is not defined yet.*
- `#define MIN(a, b) (((a)<(b))? (a):(b))`  
*Macro for minimum function.*
- `#define MAX(a, b) (((a)>(b))? (a):(b))`  
*Macro for maximum function.*
- `#define MHA_EAR_LEFT 0`
- `#define MHA_EAR_RIGHT 1`
- `#define MHA_EAR_MAX 2`

### 5.114.1 Detailed Description

Preprocessor definitions common to all MHA components.

This file contains all preprocessor and type definitions which are common to all Master Hearing Aid components.

### 5.114.2 Macro Definition Documentation

#### 5.114.2.1 \_\_MHA\_FUN\_\_

```
#define __MHA_FUN__ __FUNC__
```

#### 5.114.2.2 CHECK\_EXPR

```
#define CHECK_EXPR(
 x) {if(!(x)){throw MHA_Error(__FILE__, __LINE__, "The expression \"" #x
 "\" is invalid.");}}
```

#### 5.114.2.3 CHECK\_VAR

```
#define CHECK_VAR(
 x) {if(!(x)){throw MHA_Error(__FILE__, __LINE__, "The variable \"" #x
 "\" is not defined.");}}
```

#### 5.114.2.4 \_\_declspec

```
#define __declspec(
 p)
```

#### 5.114.2.5 M\_PI

```
#define M_PI 3.14159265358979323846
```

Define pi if it is not defined yet.

#### 5.114.2.6 MIN

```
#define MIN(
 a,
 b) ((a)<(b))?(a):(b))
```

Macro for minimum function.

#### 5.114.2.7 MAX

```
#define MAX(
 a,
 b) ((a)>(b))?(a):(b))
```

Macro for maximum function.

#### 5.114.2.8 MHA\_EAR\_LEFT

```
#define MHA_EAR_LEFT 0
```

#### 5.114.2.9 MHA\_EAR\_RIGHT

```
#define MHA_EAR_RIGHT 1
```

#### 5.114.2.10 MHA\_EAR\_MAX

```
#define MHA_EAR_MAX 2
```

### 5.115 mha\_errno.c File Reference

#### Macros

- `#define STRLEN 0x1000`

#### Functions

- `const char * mha_strerror (int mhaerrno)`
- `void mha_set_user_error (const char *str)`



## Variables

- char **next\_except\_str** [ **STRLEN** ] = ""
- const char \* **cstr\_strerror** [ **MHA\_ERR\_USER**]

## 5.115.1 Macro Definition Documentation

### 5.115.1.1 STRLEN

```
#define STRLEN 0x1000
```

## 5.115.2 Function Documentation

### 5.115.2.1 mha\_strerror()

```
const char* mha_strerror (
 int mhaerrno)
```

### 5.115.2.2 mha\_set\_user\_error()

```
void mha_set_user_error (
 const char * str)
```

## 5.115.3 Variable Documentation

### 5.115.3.1 next\_except\_str

```
char next_except_str[STRLEN] = ""
```

### 5.115.3.2 cstr\_strerror

```
const char* cstr_strerror[MHA_ERR_USER]
```

## 5.116 mha\_errno.h File Reference

### Macros

- `#define MHA_ERR_SUCCESS 0`
- `#define MHA_ERR_UNKNOWN 1`
- `#define MHA_ERR_INVALID_HANDLE 2`
- `#define MHA_ERR_NULL 3`
- `#define MHA_ERR_VARRANGE 4`
- `#define MHA_ERR_VARFMT 5`
- `#define MHA_ERR_USER 10000`

### Functions

- `const char * mha_strerror (int mhaerrno)`
- `void mha_set_user_error (const char *str)`

### 5.116.1 Macro Definition Documentation

#### 5.116.1.1 MHA\_ERR\_SUCCESS

```
#define MHA_ERR_SUCCESS 0
```

#### 5.116.1.2 MHA\_ERR\_UNKNOWN

```
#define MHA_ERR_UNKNOWN 1
```

#### 5.116.1.3 MHA\_ERR\_INVALID\_HANDLE

```
#define MHA_ERR_INVALID_HANDLE 2
```

#### 5.116.1.4 MHA\_ERR\_NULL

```
#define MHA_ERR_NULL 3
```

### 5.116.1.5 MHA\_ERR\_VARRANGE

```
#define MHA_ERR_VARRANGE 4
```

### 5.116.1.6 MHA\_ERR\_VARFMT

```
#define MHA_ERR_VARFMT 5
```

### 5.116.1.7 MHA\_ERR\_USER

```
#define MHA_ERR_USER 10000
```

## 5.116.2 Function Documentation

### 5.116.2.1 mha\_strerror()

```
const char* mha_strerror (
 int mhaerrno)
```

### 5.116.2.2 mha\_set\_user\_error()

```
void mha_set_user_error (
 const char * str)
```

## 5.117 mha\_error.cpp File Reference

Implementation of openMHA error handling.

### Namespaces

- **mha\_error\_helpers**

## Functions

- unsigned **mha\_error\_helpers::digits** (unsigned n)  
*Compute number of decimal digits required to represent an unsigned integer.*
- unsigned **mha\_error\_helpers::snprintf\_required\_length** (const char \*formatstring,...)  
*snprintf\_required\_length Compute the number of bytes (excluding the terminating nul) required to store the result of an snprintf.*
- void **mha\_debug** (const char \*fmt,...)

### 5.117.1 Detailed Description

Implementation of openMHA error handling.

This file forms a separate library.

### 5.117.2 Function Documentation

#### 5.117.2.1 mha\_debug()

```
void mha_debug (
 const char * fmt,
 ...)
```

### 5.118 mha\_error.hh File Reference

#### Classes

- class **MHA\_Error**  
*Error reporting exception class.*

#### Namespaces

- **mha\_error\_helpers**

#### Macros

- #define **Getmsg**(e) ((e).get\_msg())
- #define **MHA\_ErrorMsg**(x) **MHA\_Error**(\_\_FILE\_\_, \_\_LINE\_\_, "%s", x)  
*Throw an openMHA error with a text message.*
- #define **MHA\_assert**(x) if(! (x)) throw **MHA\_Error**(\_\_FILE\_\_, \_\_LINE\_\_, "\"%s\" is false.", #x)  
*Assertion macro, which throws an **MHA\_Error** (p. 707).*
- #define **MHA\_assert\_equal**(a, b) if( a != b ) throw **MHA\_Error**(\_\_FILE\_\_, \_\_LINE\_\_, "\"%s == %s\" is false (%s = %g, %s = %g).", #a, #b, #a, (double)(a), #b, (double)(b))  
*Equality assertion macro, which throws an **MHA\_Error** (p. 707) with the values.*

## Functions

- void **mha\_debug** (const char \*fmt,...) `__attribute__((__format__(printf, 1, 2)))`  
*Print an info message (stderr on Linux, OutputDebugString in Windows).*
- unsigned **mha\_error\_helpers::digits** (unsigned n)  
*Compute number of decimal digits required to represent an unsigned integer.*
- unsigned **mha\_error\_helpers::snprintf\_required\_length** (const char \*formatstring,...)  
*snprintf\_required\_length Compute the number of bytes (excluding the terminating nul) required to store the result of an snprintf.*

## 5.118.1 Macro Definition Documentation

### 5.118.1.1 Getmsg

```
#define Getmsg(
 e) ((e).get_msg())
```

## 5.119 mha\_event\_emitter.h File Reference

## Classes

- class **MHAEvents::connector\_base\_t**
- class **MHAEvents::emitter\_t**  
*Class for emitting openMHA events.*

## Namespaces

- **MHAEvents**  
*Collection of event handling classes.*

## 5.120 mha\_events.cpp File Reference

## 5.121 mha\_events.h File Reference

## Classes

- class **MHAEvents::connector\_t< receiver\_t >**
- class **MHAEvents::patchbay\_t< receiver\_t >**  
*Patchbay which connects any event emitter with any member function of the parameter class.*

## Namespaces

- **MHAEvents**

*Collection of event handling classes.*

## 5.122 mha\_fftfb.cpp File Reference

## Classes

- class **MHAOvIFilter::barkscale::hz2bark\_t**
- class **MHAOvIFilter::barkscale::bark2hz\_t**

## Namespaces

- **MHAOvIFilter**

*Namespace for overlapping FFT based filter bank classes and functions.*

- **MHAOvIFilter::barkscale**
- **MHAOvIFilter::FreqScaleFun**

*Transform functions from linear scale in Hz to new frequency scales.*

- **MHAOvIFilter::ShapeFun**

*Shape functions for overlapping filters.*

## Macros

- **#define BARKSCALE\_ENTRIES 50**

## Functions

- **mha\_real\_t MHAOvIFilter::FreqScaleFun::hz2hz ( mha\_real\_t x)**  
*Dummy scale transformation Hz to Hz.*
- **mha\_real\_t MHAOvIFilter::FreqScaleFun::hz2khz ( mha\_real\_t x)**
- **mha\_real\_t MHAOvIFilter::FreqScaleFun::hz2octave ( mha\_real\_t x)**
- **mha\_real\_t MHAOvIFilter::FreqScaleFun::hz2third\_octave ( mha\_real\_t x)**
- **mha\_real\_t MHAOvIFilter::FreqScaleFun::hz2bark ( mha\_real\_t x)**  
*Transformation to bark scale.*
- **mha\_real\_t MHAOvIFilter::FreqScaleFun::hz2bark\_analytic ( mha\_real\_t)**
- **mha\_real\_t MHAOvIFilter::FreqScaleFun::hz2erb ( mha\_real\_t)**
- **mha\_real\_t MHAOvIFilter::FreqScaleFun::hz2erb\_glasberg1990 ( mha\_real\_t)**
- **mha\_real\_t MHAOvIFilter::FreqScaleFun::hz2log ( mha\_real\_t x)**  
*Third octave frequency scale.*
- **mha\_real\_t MHAOvIFilter::FreqScaleFun::inv\_scale ( mha\_real\_t, mha\_real\_t(\*) ( mha\_real\_t))**
- **mha\_real\_t MHAOvIFilter::ShapeFun::rect ( mha\_real\_t x)**

*Filter shape function for rectangular filters.*

- **mha\_real\_t MHAOvFilter::ShapeFun::linear** ( mha\_real\_t x)

*Filter shape function for sawtooth filters.*

- **mha\_real\_t MHAOvFilter::ShapeFun::hann** ( mha\_real\_t x)

*Filter shape function for hanning shaped filters.*

- **mha\_real\_t MHAOvFilter::ShapeFun::expflt** ( mha\_real\_t)

- **mha\_real\_t MHAOvFilter::ShapeFun::gauss** ( mha\_real\_t)

- **mha\_real\_t filtershapefun** ( mha\_real\_t f, MHAOvFilter::band\_descriptor\_t b, mha\_real\_t plateau)

*Transform the test frequency into the relative position on the filter flank of the given frequency band.*

## Variables

- **mha\_real\_t MHAOvFilter::barkscale::vfreq** [ BARKSCALE\_ENTRIES]
- **mha\_real\_t MHAOvFilter::barkscale::vbark** [ BARKSCALE\_ENTRIES]

## 5.122.1 Macro Definition Documentation

### 5.122.1.1 BARKSCALE\_ENTRIES

```
#define BARKSCALE_ENTRIES 50
```

## 5.122.2 Function Documentation

### 5.122.2.1 filtershapefun()

```
mha_real_t filtershapefun (
 mha_real_t f,
 MHAOvFilter::band_descriptor_t b,
 mha_real_t plateau)
```

Transform the test frequency into the relative position on the filter flank of the given frequency band.

## Parameters

|                |                                                                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>f</i>       | Test frequency in units corresponding to the chosen frequency scale                                                                                                |
| <i>b</i>       | Descriptor of a single filter bank band: E.g. contains center frequencies of this and the two adjacent bands, and the crossover ("edge") frequencies of this band. |
| <i>plateau</i> | For non-rectangular filter shapes, specifies what frequency portion of the band around its center frequency should have no attenuation applied.                    |

**Precondition**

$0 \leq \text{plateau} \leq 1$

**Returns**

The position of frequency  $f$  on the filter flank as follows: A returned position of 0 means that  $f$  is equal to the band's center frequency, or should be treated the same as the center frequency (i.e. is within the band's plateau). A returned position of -1 means that  $f$  is  $\leq$  the lowest frequency of the filter flank (or is an even lower frequency). A returned value of -0.5 means that  $f$  is equal to the lower edge frequency. Positive returned values have equivalent meanings for the high half of the filter flank.

**5.123 mha\_fftfb.hh File Reference****Classes**

- class **MHAOvIFilter::band\_descriptor\_t**
- class **MHAOvIFilter::scale\_var\_t**
- class **MHAOvIFilter::fscale\_t**
- class **MHAOvIFilter::fscale\_bw\_t**
- class **MHAOvIFilter::fftfb\_vars\_t**  
*Set of configuration variables for FFT-based overlapping filters.*
- class **MHAOvIFilter::fspacing\_t**  
*Class for frequency spacing, used by filterbank shape generator class.*
- class **MHAOvIFilter::fftfb\_t**  
*FFT based overlapping filter bank.*
- class **MHAOvIFilter::overlap\_save\_filterbank\_t**  
*A time-domain minimal phase filter bank with frequency shapes from **MHAOvIFilter::fftfb\_t** (p. 947).*
- class **MHAOvIFilter::overlap\_save\_filterbank\_t::vars\_t**
- class **MHAOvIFilter::overlap\_save\_filterbank\_analytic\_t**
- class **MHAOvIFilter::fftfb\_ac\_info\_t**

**Namespaces**

- **MHAOvIFilter**  
*Namespace for overlapping FFT based filter bank classes and functions.*

**Typedefs**

- typedef **mha\_real\_t()** **MHAOvIFilter::scale\_fun\_t(mha\_real\_t)**



## 5.124 mha\_fifo.cpp File Reference

## 5.125 mha\_fifo.h File Reference

## Classes

- class **mha\_fifo\_t**< T >  
*A FIFO class for blocksize adaptation Synchronization: None.*
- class **mha\_drifter\_fifo\_t**< T >  
*A FIFO class for blocksize adaptation without Synchronization.*
- class **mha\_fifo\_thread\_platform\_t**  
*Abstract base class for synchronizing multithreaded (producer/consumer) fifo operations.*
- class **mha\_fifo\_posix\_threads\_t**
- class **mha\_fifo\_thread\_guard\_t**  
*Simple Mutex Guard Class.*
- class **mha\_fifo\_lw\_t**< T >  
*This FIFO uses locks to synchronize access.*
- class **mha\_dblbuf\_t**< FIFO >  
*The doublebuffer adapts blocksizes between an outer process, which provides input data and takes output data, and an inner process, which processes the input signal and generates output data using a different block size than the outer process.*
- class **mha\_rt\_fifo\_element\_t**< T >  
*Object wrapper for **mha\_rt\_fifo\_t** (p. 728).*
- class **mha\_rt\_fifo\_t**< T >  
*Template class for thread safe, half real time safe fifo without explicit locks.*

## Macros

- **#define mha\_fifo\_thread\_platform\_implementation\_t mha\_fifo\_posix\_threads\_t**

## 5.125.1 Macro Definition Documentation

## 5.125.1.1 mha\_fifo\_thread\_platform\_implementation\_t

```
#define mha_fifo_thread_platform_implementation_t mha_fifo_posix_threads_t
```

## 5.126 mha\_filter.cpp File Reference

## Functions

- **std::vector< mha\_real\_t > diff\_coeffs ()**

### 5.126.1 Function Documentation

#### 5.126.1.1 diff\_coeffs()

```
std::vector< mha_real_t> diff_coeffs ()
```

### 5.127 mha\_filter.hh File Reference

Header file for IIR filter classes.

#### Classes

- class **MHAFilter::filter\_t**  
*Generic IIR filter class.*
- class **MHAFilter::diff\_t**  
*Differentiator class (non-normalized)*
- class **MHAFilter::o1\_ar\_filter\_t**  
*First order attack-release lowpass filter.*
- class **MHAFilter::o1flt\_lowpass\_t**  
*First order low pass filter.*
- class **MHAFilter::o1flt\_maxtrack\_t**  
*First order maximum tracker.*
- class **MHAFilter::o1flt\_mintrack\_t**  
*First order minimum tracker.*
- class **MHAFilter::iir\_filter\_state\_t**
- class **MHAFilter::iir\_filter\_t**  
*IIR filter class wrapper for integration into parser structure.*
- class **MHAFilter::adapt\_filter\_state\_t**
- class **MHAFilter::adapt\_filter\_param\_t**
- class **MHAFilter::adapt\_filter\_t**  
*Adaptive filter.*
- class **MHAFilter::fftfilter\_t**  
*FFT based FIR filter implementation.*
- class **MHAFilter::fftfilterbank\_t**  
*FFT based FIR filterbank implementation.*
- struct **MHAFilter::transfer\_function\_t**  
*a structure containing a source channel number, a target channel number, and an impulse response.*
- struct **MHAFilter::transfer\_matrix\_t**  
*A sparse matrix of transfer function partitionss.*
- class **MHAFilter::partitioned\_convolution\_t**

*A filter class for partitioned convolution.*

- struct **MHAFilter::partitioned\_convolution\_t::index\_t**  
*Bookkeeping class.*
- class **MHAFilter::smoothspec\_t**  
*Smooth spectral gains, create a windowed impulse response.*
- class **MHAFilter::resampling\_filter\_t**  
*Hann shaped low pass filter for resampling.*
- class **MHAFilter::polyphase\_resampling\_t**  
*A class that performs polyphase resampling.*
- class **MHAFilter::blockprocessing\_polyphase\_resampling\_t**  
*A class that does polyphase resampling and takes into account block processing.*
- class **MHAFilter::iir\_ord1\_real\_t**  
*First order recursive filter.*

## Namespaces

- **MHAFilter**  
*Namespace for IIR and FIR filter classes.*

## Functions

- template<typename T, typename std::enable\_if< std::is\_floating\_point< T >::value, T >::type \* = nullptr>  
void **MHAFilter::make\_friendly\_number** (T &x)
- void **MHAFilter::o1\_lp\_coeffs** (const **mha\_real\_t** tau, const **mha\_real\_t** fs, **mha\_real\_t** &c1, **mha\_real\_t** &c2)  
*Set first order filter coefficients from time constant and sampling rate.*
- void **MHAFilter::butter\_stop\_ord1** (double \*A, double \*B, double f1, double f2, double fs)  
*Setup a first order butterworth band stop filter.*
- std::vector< float > **MHAFilter::fir\_lp** (float f\_pass\_, float f\_stop\_, float fs\_, unsigned order\_)  
*Setup a nth order fir low pass filter.*
- **MHASignal::waveform\_t** \* **MHAFilter::spec2fir** (const **mha\_spec\_t** \*spec, const unsigned int fftlen, const **MHAWindow::base\_t** &window, const bool minphase)  
*Create a windowed impulse response/FIR filter coefficients from a spectrum.*
- unsigned **MHAFilter::gcd** (unsigned a, unsigned b)  
*greatest common divisor*
- double **MHAFilter::sinc** (double x)  
*sin(x)/x function, coping with x=0.*
- std::pair< unsigned, unsigned > **MHAFilter::resampling\_factors** (float source\_sampling\_rate, float target\_sampling\_rate, float factor=1.0f)  
*Computes rational resampling factor from two sampling rates.*

### 5.127.1 Detailed Description

Header file for IIR filter classes.

## 5.128 mha\_generic\_chain.cpp File Reference

### Functions

- void **mhaconfig\_compare** ( **mhaconfig\_t** req, **mhaconfig\_t** avail, const char \*cpref)

### 5.128.1 Function Documentation

#### 5.128.1.1 mhaconfig\_compare()

```
void mhaconfig_compare (
 mhaconfig_t req,
 mhaconfig_t avail,
 const char * cpref)
```

## 5.129 mha\_generic\_chain.h File Reference

### Classes

- class **mhachain::plugs\_t**
- class **mhachain::chain\_base\_t**

### Namespaces

- **mhachain**

### Macros

- **#define MHAPLUGIN\_OVERLOAD\_OUTDOMAIN**

### 5.129.1 Macro Definition Documentation

## 5.129.1.1 MHAPLUGIN\_OVERLOAD\_OUTDOMAIN

```
#define MHAPLUGIN_OVERLOAD_OUTDOMAIN
```

## 5.130 mha\_git\_commit\_hash.cpp File Reference

## Macros

- `#define GITCOMMITHASH "independent-plugin-build"`

## Variables

- `const char * mha_git_commit_hash`  
*store git commit hash in every binary plgin to support reproducible research*

## 5.130.1 Macro Definition Documentation

## 5.130.1.1 GITCOMMITHASH

```
#define GITCOMMITHASH "independent-plugin-build"
```

## 5.130.2 Variable Documentation

## 5.130.2.1 mha\_git\_commit\_hash

```
const char* mha_git_commit_hash
```

store git commit hash in every binary plgin to support reproducible research

## 5.131 mha\_git\_commit\_hash.hh File Reference

## Variables

- `const char * mha_git_commit_hash`  
*store git commit hash in every binary plgin to support reproducible research*

### 5.131.1 Variable Documentation

#### 5.131.1.1 mha\_git\_commit\_hash

```
const char* mha_git_commit_hash
```

store git commit hash in every binary plugin to support reproducible research

### 5.132 mha\_io\_ifc.h File Reference

#### Typedefs

- typedef int(\* **IOProcessEvent\_t**) (void \*handle, **mha\_wave\_t** \*sIn, **mha\_wave\_t** \*\*sOut)  
*Event handler for signal stream.*
- typedef void(\* **IStoppedEvent\_t**) (void \*handle, int proc\_err, int io\_err)  
*Event handler for stop event.*
- typedef void(\* **IStartedEvent\_t**) (void \*handle)  
*Event handler for start event.*
- typedef int(\* **IOInit\_t**) (int fragsize, float samplerate, **IOProcessEvent\_t** proc\_event, void \*proc\_handle, **IStartedEvent\_t** start\_event, void \*start\_handle, **IStoppedEvent\_t** stop\_event, void \*stop\_handle, void \*\*handle)
- typedef int(\* **IOPrepare\_t**) (void \*handle, int num\_inchannels, int num\_outchannels)
- typedef int(\* **IOStart\_t**) (void \*handle)
- typedef int(\* **IOWStop\_t**) (void \*handle)
- typedef int(\* **IORelease\_t**) (void \*handle)
- typedef int(\* **IOSetVar\_t**) (void \*handle, const char \*cmd, char \*retval, unsigned int len)
- typedef const char \*(\* **IOStrError\_t**) (void \*handle, int err)
- typedef void(\* **IODestroy\_t**) (void \*handle)

### 5.132.1 Typedef Documentation

#### 5.132.1.1 IOProcessEvent\_t

```
typedef int(* IOProcessEvent_t) (void *handle, mha_wave_t *sIn, mha_wave_t **sOut)
```

Event handler for signal stream.

This event handler needs to be realtime compatible. All signal path processing will be performed in this callback.

### 5.132.1.2 IOStoppedEvent\_t

```
typedef void(* IOStoppedEvent_t) (void *handle, int proc_err, int io_err)
```

Event handler for stop event.

This event handler needs to be realtime compatible. The function must return immediatly.

### 5.132.1.3 IOStartedEvent\_t

```
typedef void(* IOStartedEvent_t) (void *handle)
```

Event handler for start event.

This event handler needs to be realtime compatible. The function must return immediatly.

### 5.132.1.4 IOInit\_t

```
typedef int(* IOInit_t) (int fragsize, float samplerate, IOProcessEvent_t proc_↔
event, void *proc_handle, IOStartedEvent_t start_event, void *start_handle, IO↔
StoppedEvent_t stop_event, void *stop_handle, void **handle)
```

### 5.132.1.5 IOPrepare\_t

```
typedef int(* IOPrepare_t) (void *handle, int num_inchannels, int num_outchannels)
```

### 5.132.1.6 IOStart\_t

```
typedef int(* IOStart_t) (void *handle)
```

### 5.132.1.7 IOStop\_t

```
typedef int(* IOStop_t) (void *handle)
```

### 5.132.1.8 IORelease\_t

```
typedef int(* IORelease_t) (void *handle)
```

### 5.132.1.9 IOSetVar\_t

```
typedef int(* IOSetVar_t) (void *handle, const char *cmd, char *retval, unsigned int len)
```

### 5.132.1.10 IOStrError\_t

```
typedef const char*(IOStrError_t) (void *handle, int err)
```

### 5.132.1.11 IODestroy\_t

```
typedef void(* IODestroy_t) (void *handle)
```

## 5.133 mha\_multisrc.cpp File Reference

### Namespaces

- **MHAMultiSrc**

*Collection of classes for selecting audio chunks from multiple sources.*

## 5.134 mha\_multisrc.h File Reference

### Classes

- class **MHAMultiSrc::channel\_t**
- class **MHAMultiSrc::channels\_t**
- class **MHAMultiSrc::base\_t**  
*Base class for source selection.*
- class **MHAMultiSrc::waveform\_t**
- class **MHAMultiSrc::spectrum\_t**

### Namespaces

- **MHAMultiSrc**

*Collection of classes for selecting audio chunks from multiple sources.*



## 5.135 mha\_os.cpp File Reference

### Functions

- bool **mha\_hasenv** (const std::string &envvar)  
*Checks if environment variable exists.*
- std::string **mha\_getenv** (const std::string &envvar)  
*Get value of environment variable.*
- void **mha\_delenv** (const std::string &envvar)  
*Deletes environment variable from process environment if it exists.*
- int **mha\_setenv** (const std::string &envvar, const std::string &value)  
*Set value of environment variable.*
- std::list< std::string > **mha\_library\_paths** ()
- std::list< std::string > **list\_dir** (const std::string &path, const std::string &pattern)

### 5.135.1 Function Documentation

#### 5.135.1.1 mha\_hasenv()

```
bool mha_hasenv (
 const std::string & envvar)
```

Checks if environment variable exists.

#### Parameters

|               |                                       |
|---------------|---------------------------------------|
| <i>envvar</i> | Name of environment variable to check |
|---------------|---------------------------------------|

#### Returns

true if the environment has a variable of this name

#### 5.135.1.2 mha\_getenv()

```
std::string mha_getenv (
 const std::string & envvar)
```

Get value of environment variable.

**Parameters**

|               |                                          |
|---------------|------------------------------------------|
| <i>envvar</i> | Name of environment variable to retrieve |
|---------------|------------------------------------------|

**Returns**

content of environment variable if it exists, empty string if the environment variable does not exist

**5.135.1.3 mha\_delenv()**

```
void mha_delenv (
 const std::string & envvar)
```

Deletes environment variable from process environment if it exists.

**Parameters**

|               |                                        |
|---------------|----------------------------------------|
| <i>envvar</i> | Name of environment variable to delete |
|---------------|----------------------------------------|

**5.135.1.4 mha\_setenv()**

```
int mha_setenv (
 const std::string & envvar,
 const std::string & value)
```

Set value of environment variable.

**Parameters**

|               |                                      |
|---------------|--------------------------------------|
| <i>envvar</i> | Name of environment variable to set  |
| <i>value</i>  | New content for environment variable |

**Returns**

error code: 0 on success, OS dependent error code on failure

**5.135.1.5 mha\_library\_paths()**

```
std::list<std::string> mha_library_paths ()
```

## 5.135.1.6 list\_dir()

```
std::list<std::string> list_dir (
 const std::string & path,
 const std::string & pattern)
```

## 5.136 mha\_os.h File Reference

## Classes

- class **mha\_stash\_environment\_variable\_t**

*This class changes the value of an environment variable when constructed and restores the original state of the environment variable when destroyed.*

- class **dynamiclib\_t**

## Macros

- #define **mha\_loadlib**(x) dlopen(x,RTLD\_NOW)
- #define **mha\_freelib**(x) dlclose(x)
- #define **mha\_freelib\_success**(x) (x == 0)
- #define **mha\_getlibfun**(h, x) x ## \_cb = (x ## \_t)dlsym(h,#x)
- #define **mha\_getlibfun\_checked**(h, x) x ## \_cb = (x ## \_t)dlsym(h,#x);if(! x ## \_cb) throw **MHA\_Error**(\_\_FILE\_\_,\_\_LINE\_\_,"Function " #x " is undefined.")
- #define **mha\_loadlib\_error**(x) dlerror()
- #define **mha\_lib\_extension** ".so"
- #define **mha\_msleep**(milliseconds) usleep((milliseconds)\*1000)
- #define **FMTsz** "%zu"
- *printf modifier to print integers of type size\_t*
- #define **MHA\_RESOLVE**(h, t) t ## \_cb = (t ## \_t)(h->resolve(#t))
- #define **MHA\_RESOLVE\_CHECKED**(h, t) t ## \_cb = (t ## \_t)(h->resolve\_checked(#t))

## Typedefs

- typedef void \* **mha\_libhandle\_t**

## Functions

- `std::string mha_getenv` (const `std::string` &envvar)  
*Get value of environment variable.*
- `bool mha_hasenv` (const `std::string` &envvar)  
*Checks if environment variable exists.*
- `int mha_setenv` (const `std::string` &envvar, const `std::string` &value)  
*Set value of environment variable.*
- `void mha_delenv` (const `std::string` &envvar)  
*Deletes environment variable from process environment if it exists.*
- `std::list< std::string > mha_library_paths` ()
- `std::list< std::string > list_dir` (const `std::string` &path, const `std::string` &pattern)
- `void mha_hton` (float \*data, unsigned int len)
- `void mha_ntoh` (float \*data, unsigned int len)
- `void mha_hton` (uint32\_t \*data, unsigned int len)
- `void mha_ntoh` (uint32\_t \*data, unsigned int len)
- `void mha_hton` (int32\_t \*data, unsigned int len)
- `void mha_ntoh` (int32\_t \*data, unsigned int len)

### 5.136.1 Macro Definition Documentation

#### 5.136.1.1 mha\_loadlib

```
#define mha_loadlib(
 x) dlopen(x, RTLD_NOW)
```

#### 5.136.1.2 mha\_freelib

```
#define mha_freelib(
 x) dlclose(x)
```

#### 5.136.1.3 mha\_freelib\_success

```
#define mha_freelib_success(
 x) (x == 0)
```

#### 5.136.1.4 mha\_getlibfun

```
#define mha_getlibfun(
 h,
 x) x ## _cb = (x ## _t)dlsym(h,#x)
```

#### 5.136.1.5 mha\_getlibfun\_checked

```
#define mha_getlibfun_checked(
 h,
 x) x ## _cb = (x ## _t)dlsym(h,#x);if(! x ## _cb) throw MHA_Error(_↵
_FILE__, __LINE__, "Function " #x " is undefined.")
```

#### 5.136.1.6 mha\_loadlib\_error

```
#define mha_loadlib_error(
 x) dlerror()
```

#### 5.136.1.7 mha\_lib\_extension

```
#define mha_lib_extension ".so"
```

#### 5.136.1.8 mha\_msleep

```
#define mha_msleep(
 milliseconds) usleep((milliseconds)*1000)
```

#### 5.136.1.9 FMTsz

```
#define FMTsz "%zu"
```

printf modifier to print integers of type size\_t

### 5.136.1.10 MHA\_RESOLVE

```
#define MHA_RESOLVE(
 h,
 t) t ## _cb = (t ## _t) (h->resolve(#t))
```

### 5.136.1.11 MHA\_RESOLVE\_CHECKED

```
#define MHA_RESOLVE_CHECKED(
 h,
 t) t ## _cb = (t ## _t) (h->resolve_checked(#t))
```

## 5.136.2 Typedef Documentation

### 5.136.2.1 mha\_libhandle\_t

```
typedef void* mha_libhandle_t
```

## 5.136.3 Function Documentation

### 5.136.3.1 mha\_getenv()

```
std::string mha_getenv (
 const std::string & envvar)
```

Get value of environment variable.

#### Parameters

|               |                                          |
|---------------|------------------------------------------|
| <i>envvar</i> | Name of environment variable to retrieve |
|---------------|------------------------------------------|

#### Returns

content of environment variable if it exists, empty string if the environment variable does not exist

### 5.136.3.2 mha\_hasenv()

```
bool mha_hasenv (
 const std::string & envvar)
```

Checks if environment variable exists.

#### Parameters

|               |                                       |
|---------------|---------------------------------------|
| <i>envvar</i> | Name of environment variable to check |
|---------------|---------------------------------------|

#### Returns

true if the environment has a variable of this name

### 5.136.3.3 mha\_setenv()

```
int mha_setenv (
 const std::string & envvar,
 const std::string & value)
```

Set value of environment variable.

#### Parameters

|               |                                      |
|---------------|--------------------------------------|
| <i>envvar</i> | Name of environment variable to set  |
| <i>value</i>  | New content for environment variable |

#### Returns

error code: 0 on success, OS dependent error code on failure

### 5.136.3.4 mha\_delenv()

```
void mha_delenv (
 const std::string & envvar)
```

Deletes environment variable from process environment if it exists.

#### Parameters

|               |                                        |
|---------------|----------------------------------------|
| <i>envvar</i> | Name of environment variable to delete |
|---------------|----------------------------------------|

**5.136.3.5 mha\_library\_paths()**

```
std::list<std::string> mha_library_paths ()
```

**5.136.3.6 list\_dir()**

```
std::list<std::string> list_dir (
 const std::string & path,
 const std::string & pattern)
```

**5.136.3.7 mha\_hton()** [1/3]

```
void mha_hton (
 float * data,
 unsigned int len) [inline]
```

**5.136.3.8 mha\_ntoh()** [1/3]

```
void mha_ntoh (
 float * data,
 unsigned int len) [inline]
```

**5.136.3.9 mha\_hton()** [2/3]

```
void mha_hton (
 uint32_t * data,
 unsigned int len) [inline]
```

**5.136.3.10 mha\_ntoh()** [2/3]

```
void mha_ntoh (
 uint32_t * data,
 unsigned int len) [inline]
```



## 5.136.3.11 mha\_hton() [3/3]

```
void mha_hton (
 int32_t * data,
 unsigned int len) [inline]
```

## 5.136.3.12 mha\_ntoh() [3/3]

```
void mha_ntoh (
 int32_t * data,
 unsigned int len) [inline]
```

## 5.137 mha\_parser.cpp File Reference

## Namespaces

- **MHAParser**  
*Name space for the openMHA-Parser configuration language.*
- **MHAParser::StrCnv**  
*String converter namespace.*

## Macros

- `#define MHAPLATFORM "undefined-linux"`

## Functions

- int **MHAParser::get\_precision** ()
- int **MHAParser::StrCnv::num\_brackets** (const std::string &s)  
*count number of brackets*
- int **MHAParser::StrCnv::bracket\_balance** (const std::string &s)
- static std::ostream & **write\_float** (std::ostream &o, const float &f)
- static std::string **parse\_1\_float** (const std::string &s, **mha\_real\_t** &v)  
*This internal function parses a floating point number from the beginning of a string.*
- static std::string **parse\_1\_complex** (const std::string &s, **mha\_complex\_t** &v)  
*This internal function parses a complex number from the beginning of a string.*

## 5.137.1 Macro Definition Documentation

### 5.137.1.1 MHAPLATFORM

```
#define MHAPLATFORM "undefined-linux"
```

### 5.137.2 Function Documentation

#### 5.137.2.1 write\_float()

```
static std::ostream& write_float (
 std::ostream & o,
 const float & f) [inline], [static]
```

#### 5.137.2.2 parse\_1\_float()

```
static std::string parse_1_float (
 const std::string & s,
 mha_real_t & v) [static]
```

This internal function parses a floating point number from the beginning of a string.

#### Parameters

|          |                                         |
|----------|-----------------------------------------|
| <i>s</i> | The string to parse                     |
| <i>v</i> | The float variable to fill with a value |

#### Returns

The rest of the string.

#### 5.137.2.3 parse\_1\_complex()

```
static std::string parse_1_complex (
 const std::string & s,
 mha_complex_t & v) [static]
```

This internal function parses a complex number from the beginning of a string.

## Parameters

|          |                                           |
|----------|-------------------------------------------|
| <b>s</b> | The string to parse                       |
| <b>v</b> | The complex variable to fill with a value |

## Returns

The rest of the string.

## 5.138 mha\_parser.hh File Reference

Header file for the MHA-Parser script language.

## Classes

- class **MHAParser::keyword\_list\_t**  
*Keyword list class.*
- class **MHAParser::expression\_t**
- class **MHAParser::entry\_t**
- class **MHAParser::base\_t**  
*Base class for all parser items.*
- class **MHAParser::base\_t::replace\_t**
- class **MHAParser::parser\_t**  
*Parser node class.*
- class **MHAParser::c\_ifc\_parser\_t**
- class **MHAParser::monitor\_t**  
*Base class for monitors and variable nodes.*
- class **MHAParser::variable\_t**  
*Base class for variable nodes.*
- class **MHAParser::range\_var\_t**  
*Base class for all variables with a numeric value range.*
- class **MHAParser::kw\_t**  
*Variable with keyword list value.*
- class **MHAParser::string\_t**  
*Variable with a string value.*
- class **MHAParser::vstring\_t**  
*Vector variable with string values.*
- class **MHAParser::bool\_t**  
*Variable with a boolean value ("yes"/"no")*
- class **MHAParser::int\_t**  
*Variable with integer value.*
- class **MHAParser::float\_t**  
*Variable with float value.*

- class **MHAParser::complex\_t**  
*Variable with complex value.*
- class **MHAParser::vint\_t**  
*Variable with vector<int> value.*
- class **MHAParser::vfloat\_t**  
*Vector variable with float value.*
- class **MHAParser::vcomplex\_t**  
*Vector variable with complex value.*
- class **MHAParser::mint\_t**  
*Matrix variable with int value.*
- class **MHAParser::mfloat\_t**  
*Matrix variable with float value.*
- class **MHAParser::mcomplex\_t**  
*Matrix variable with complex value.*
- class **MHAParser::int\_mon\_t**  
*Monitor variable with int value.*
- class **MHAParser::bool\_mon\_t**  
*Monitor with string value.*
- class **MHAParser::string\_mon\_t**  
*Monitor with string value.*
- class **MHAParser::vstring\_mon\_t**  
*Vector of monitors with string value.*
- class **MHAParser::vint\_mon\_t**  
*Vector of ints monitor.*
- class **MHAParser::mint\_mon\_t**  
*Matrix of ints monitor.*
- class **MHAParser::vfloat\_mon\_t**  
*Vector of floats monitor.*
- class **MHAParser::mfloat\_mon\_t**  
*Matrix of floats monitor.*
- class **MHAParser::float\_mon\_t**  
*Monitor with float value.*
- class **MHAParser::complex\_mon\_t**  
*Monitor with complex value.*
- class **MHAParser::vcomplex\_mon\_t**  
*Monitor with vector of complex values.*
- class **MHAParser::mcomplex\_mon\_t**  
*Matrix of complex numbers monitor.*
- class **MHAParser::commit\_t< receiver\_t >**  
*Parser variable with event-emission functionality.*
- class **MHAParser::mhaconfig\_mon\_t**

## Namespaces

- **MHAParser**  
*Name space for the openMHA-Parser configuration language.*
- **MHAParser::StrCnv**  
*String converter namespace.*

## Macros

- **#define DEFAULT\_RETSIZE** 0x100000
- **#define insert\_member(x)** insert\_item(#x,&x)  
*Macro to insert a member variable into a parser.*

## Typedefs

- **typedef std::string(base\_t::\* MHAParser::opact\_t) ( expression\_t &)**
- **typedef std::string(base\_t::\* MHAParser::query\_t) (const std::string &)**
- **typedef std::map< std::string, opact\_t > MHAParser::opact\_map\_t**
- **typedef std::map< std::string, query\_t > MHAParser::query\_map\_t**
- **typedef std::list< entry\_t > MHAParser::entry\_map\_t**
- **typedef int(\* MHAParser::c\_parse\_cmd\_t) (void \*, const char \*, char \*, unsigned int)**
- **typedef const char \*(\* MHAParser::c\_parse\_err\_t) (void \*, int)**

## Functions

- **std::string MHAParser::commentate** (const std::string &s)
- **void MHAParser::trim** (std::string &s)
- **std::string MHAParser::cfg\_dump** (base\_t \*, const std::string &)
- **std::string MHAParser::cfg\_dump\_short** (base\_t \*, const std::string &)
- **std::string MHAParser::all\_dump** (base\_t \*, const std::string &)
- **std::string MHAParser::mon\_dump** (base\_t \*, const std::string &)
- **std::string MHAParser::all\_ids** (base\_t \*, const std::string &, const std::string &= "")
- **void MHAParser::strreplace** (std::string &, const std::string &, const std::string &)  
*string replace function*
- **void MHAParser::envreplace** (std::string &s)
- **void MHAParser::StrCnv::str2val** (const std::string &, bool &)  
*Convert from string.*
- **void MHAParser::StrCnv::str2val** (const std::string &, float &)  
*Convert from string.*
- **void MHAParser::StrCnv::str2val** (const std::string &, mha\_complex\_t &)  
*Convert from string.*
- **void MHAParser::StrCnv::str2val** (const std::string &, int &)  
*Convert from string.*
- **void MHAParser::StrCnv::str2val** (const std::string &, keyword\_list\_t &)

*Convert from string.*

- void **MHAParser::StrCnv::str2val** (const std::string &, std::string &)

*Convert from string.*

- template<class arg\_t >  
void **MHAParser::StrCnv::str2val** (const std::string &s, std::vector< arg\_t > &val)

*Converter for vector types.*

- template<>  
void **MHAParser::StrCnv::str2val**< mha\_real\_t > (const std::string &s, std::vector< mha\_real\_t > &v)

*Converter for vector<mha\_real\_t> with Matlab-style expansion.*

- template<class arg\_t >  
void **MHAParser::StrCnv::str2val** (const std::string &s, std::vector< std::vector< arg\_t > > &val)

*Converter for matrix types.*

- std::string **MHAParser::StrCnv::val2str** (const bool &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const float &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const mha\_complex\_t &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const int &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const keyword\_list\_t &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const std::string &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const std::vector< float > &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const std::vector< mha\_complex\_t > &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const std::vector< int > &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const std::vector< std::vector< int > > &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const std::vector< std::string > &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const std::vector< std::vector< float > > &)

*Convert to string.*

- std::string **MHAParser::StrCnv::val2str** (const std::vector< std::vector< mha\_complex\_t > > &)

*Convert to string.*

- int **MHAParser::StrCnv::num\_brackets** (const std::string &s)

*count number of brackets*

### 5.138.1 Detailed Description

Header file for the MHA-Parser script language.

### 5.138.2 Macro Definition Documentation

#### 5.138.2.1 DEFAULT\_RETSIZE

```
#define DEFAULT_RETSIZE 0x100000
```

#### 5.138.2.2 insert\_member

```
#define insert_member(
 x) insert_item(#x,&x)
```

Macro to insert a member variable into a parser.

#### Parameters

|   |                                                                                             |
|---|---------------------------------------------------------------------------------------------|
| x | Member variable to be inserted. Name of member variable will be used as configuration name. |
|---|---------------------------------------------------------------------------------------------|

See also **MHAParser::parser\_t::insert\_item()** (p. [1047](#)).

## 5.139 mha\_plugin.hh File Reference

Header file for MHA C++ plugin class templates.

### Classes

- class **MHAPLugin::cfg\_node\_t< runtime\_cfg\_t >**  
*A node class for storing MHA plugin runtime configurations as a singly linked list, where the nodes store besides the usual "next" and "data" pointers also a flag that indicates whether this node can be deleted.*
- class **MHAPLugin::config\_t< runtime\_cfg\_t >**  
*Template class for thread safe configuration.*
- class **MHAPLugin::plugin\_t< runtime\_cfg\_t >**  
*The template class for C++ openMHA plugins.*

## Namespaces

- **MHAPugin**

*Namespace for openMHA plugin class templates and thread-safe runtime configurations.*

## Macros

- **#define \_\_declspec(p)**
- **#define WINAPI**
- **#define HINSTANCE** int
- **#define MHAPLUGIN\_PROC\_CALLBACK\_PREFIX**(prefix, classname, indom, outdom)
- **#define MHAPLUGIN\_SETCPP\_CALLBACK\_PREFIX**(prefix, classname)
- **#define MHAPLUGIN\_INIT\_CALLBACKS\_PREFIX**(prefix, classname)
- **#define MHAPLUGIN\_CALLBACKS\_PREFIX**(prefix, classname, indom, outdom)  
*C++ wrapper macro for the plugin interface.*
- **#define MHAPLUGIN\_DOCUMENTATION\_PREFIX**(prefix, cat, doc)
- **#define MHAPLUGIN\_PROC\_CALLBACK**(plugname, classname, indom, outdom) **MHAPLUGIN\_PROC\_CALLBACK\_PREFIX**(MHA\_STATIC\_ ## plugname ## \_,classname,indom,outdom)
- **#define MHAPLUGIN\_INIT\_CALLBACKS**(plugname, classname) **MHAPLUGIN\_INIT\_CALLBACKS\_PREFIX**(MHA\_STATIC\_ ## plugname ## \_,classname)
- **#define MHAPLUGIN\_CALLBACKS**(plugname, classname, indom, outdom) **MHAPLUGIN\_CALLBACKS\_PREFIX**(MHA\_STATIC\_ ## plugname ## \_,classname,indom,outdom)  
*C++ wrapper macro for the plugin interface.*
- **#define MHAPLUGIN\_DOCUMENTATION**(plugname, cat, doc) **MHAPLUGIN\_DOCUMENTATION\_PREFIX**(MHA\_STATIC\_ ## plugname ## \_,cat,doc)  
*Wrapper macro for the plugin documentation interface.*

### 5.139.1 Detailed Description

Header file for MHA C++ plugin class templates.

This file defines useful macros and template classes for the development of MHA plugins. A set of macros wraps a C++ interface around the ANSI-C plugin interface. The plugin\_t template class defines a corresponding C++ class with all required members. This class can make use of thread safe configurations (config\_t).

### 5.139.2 Macro Definition Documentation

#### 5.139.2.1 \_\_declspec

```
#define __declspec(
 p)
```



### 5.139.2.2 WINAPI

```
#define WINAPI
```

### 5.139.2.3 HINSTANCE

```
#define HINSTANCE int
```

### 5.139.2.4 MHAPLUGIN\_PROC\_CALLBACK\_PREFIX

```
#define MHAPLUGIN_PROC_CALLBACK_PREFIX(
 prefix,
 classname,
 indom,
 outdom)
```

### 5.139.2.5 MHAPLUGIN\_SETCPP\_CALLBACK\_PREFIX

```
#define MHAPLUGIN_SETCPP_CALLBACK_PREFIX(
 prefix,
 classname)
```

### 5.139.2.6 MHAPLUGIN\_INIT\_CALLBACKS\_PREFIX

```
#define MHAPLUGIN_INIT_CALLBACKS_PREFIX(
 prefix,
 classname)
```

### 5.139.2.7 MHAPLUGIN\_CALLBACKS\_PREFIX

```
#define MHAPLUGIN_CALLBACKS_PREFIX(
 prefix,
 classname,
 indom,
 outdom)
```

C++ wrapper macro for the plugin interface.

## Parameters

|                  |                                              |
|------------------|----------------------------------------------|
| <i>classname</i> | The name of the plugin class                 |
| <i>indom</i>     | Input domain ( <i>wave</i> or <i>spec</i> )  |
| <i>outdom</i>    | Output domain ( <i>wave</i> or <i>spec</i> ) |

This macro defines all required openMHA Plugin interface functions and passes calls of these functions to the corresponding member functions of the class '*classname*'. The parameters '*indom*' and '*outdom*' specify the input and output domain of the processing method. The `MHAInit()` and `MHADestroy()` functions will create or destroy an instance of the class. The appropriate member functions have to be defined in the class. It is suggested to make usage of the **MHAPlugin::plugin\_t** (p. 1097) template class. Exceptions of type **MHA\_Error** (p. 707) are caught and transformed into appropriate error codes with their corresponding error messages.

### 5.139.2.8 MHAPLUGIN\_DOCUMENTATION\_PREFIX

```
#define MHAPLUGIN_DOCUMENTATION_PREFIX(
 prefix,
 cat,
 doc)
```

### 5.139.2.9 MHAPLUGIN\_PROC\_CALLBACK

```
#define MHAPLUGIN_PROC_CALLBACK(
 plugname,
 classname,
 indom,
 outdom) MHAPLUGIN_PROC_CALLBACK_PREFIX(MHA_STATIC_ ## plugname ## _↵
,classname,indom,outdom)
```

### 5.139.2.10 MHAPLUGIN\_INIT\_CALLBACKS

```
#define MHAPLUGIN_INIT_CALLBACKS(
 plugname,
 classname) MHAPLUGIN_INIT_CALLBACKS_PREFIX(MHA_STATIC_ ## plugname ##
_,classname)
```

### 5.139.2.11 MHAPLUGIN\_CALLBACKS

```
#define MHAPLUGIN_CALLBACKS(
 plugname,
 classname,
 indom,
 outdom) MHAPLUGIN_CALLBACKS_PREFIX(MHA_STATIC_ ## plugname ## _↵
,classname,indom,outdom)
```

C++ wrapper macro for the plugin interface.

## Parameters

|                  |                                                               |
|------------------|---------------------------------------------------------------|
| <i>plugname</i>  | The file name of the plugin without the .so or .dll extension |
| <i>classname</i> | The name of the plugin class                                  |
| <i>indom</i>     | Input domain ( <i>wave</i> or <i>spec</i> )                   |
| <i>outdom</i>    | Output domain ( <i>wave</i> or <i>spec</i> )                  |

This macro defines all required openMHA Plugin interface functions and passes calls of these functions to the corresponding member functions of the class 'classname'. The parameters 'indom' and 'outdom' specify the input and output domain of the processing method. The `MHA_Init()` and `MHA_Destroy()` functions will create or destroy an instance of the class. The appropriate member functions have to be defined in the class. It is suggested to make usage of the `MHA_Plugin::plugin_t` (p. 1097) template class. Exceptions of type `MHA_Error` (p. 707) are caught and transformed into appropriate error codes with their corresponding error messages.

## 5.139.2.12 MHAPLUGIN\_DOCUMENTATION

```
#define MHAPLUGIN_DOCUMENTATION(
 plugname,
 cat,
 doc) MHAPLUGIN_DOCUMENTATION_PREFIX(MHA_STATIC_ ## plugname ## _↔
, cat, doc)
```

Wrapper macro for the plugin documentation interface.

## Parameters

|               |                                                                                |
|---------------|--------------------------------------------------------------------------------|
| <i>plugin</i> | The file name of the plugin without the .so or .dll extension                  |
| <i>cat</i>    | Space separated list of categories to which belong the plugin (as const char*) |
| <i>doc</i>    | Documentation of the plugin (as const char*)                                   |

This macro defines the openMHA Plugin interface function for the documentation. The categories can be any space separated list of category names. An empty string will categorize the plugin in the category 'other'.

The documentation should contain a description of the plugin including a description of the underlying models, and a paragraph containing hints for usage. The text should be LaTeX compatible (e.g., avoid or quote underscores in the text part); equations should be formatted as LaTeX.

## 5.140 mha\_profiling.c File Reference

## Functions

- void `mha_tic` ( `mha_tictoc_t` \*t)
- void `mha_platform_tic` ( `mha_platform_tictoc_t` \*t)
- float `mha_toc` ( `mha_tictoc_t` \*t)
- float `mha_platform_toc` ( `mha_platform_tictoc_t` \*t)

### 5.140.1 Function Documentation

#### 5.140.1.1 mha\_tic()

```
void mha_tic (
 mha_tictoc_t * t)
```

#### 5.140.1.2 mha\_platform\_tic()

```
void mha_platform_tic (
 mha_platform_tictoc_t * t)
```

#### 5.140.1.3 mha\_toc()

```
float mha_toc (
 mha_tictoc_t * t)
```

#### 5.140.1.4 mha\_platform\_toc()

```
float mha_platform_toc (
 mha_platform_tictoc_t * t)
```

### 5.141 mha\_profiling.h File Reference

#### Classes

- struct **mha\_tictoc\_t**

#### Typedefs

- typedef **mha\_tictoc\_t** **mha\_platform\_tictoc\_t**

#### Functions

- void **mha\_platform\_tic** ( **mha\_platform\_tictoc\_t** \*t)
- float **mha\_platform\_toc** ( **mha\_platform\_tictoc\_t** \*t)

### 5.141.1 Typedef Documentation

#### 5.141.1.1 mha\_platform\_tictoc\_t

```
typedef mha_tictoc_t mha_platform_tictoc_t
```

### 5.141.2 Function Documentation

#### 5.141.2.1 mha\_platform\_tic()

```
void mha_platform_tic (
 mha_platform_tictoc_t * t)
```

#### 5.141.2.2 mha\_platform\_toc()

```
float mha_platform_toc (
 mha_platform_tictoc_t * t)
```

## 5.142 mha\_ruby.cpp File Reference

### Typedefs

- typedef VALUE(\* **rb\_f\_t**) (...)

### Functions

- static void **mha\_free** (void \*mha)
- static VALUE **mha\_alloc** (VALUE klass)
- static VALUE **mha\_exit\_request** (VALUE self)
- static VALUE **mha\_parse** (VALUE self, VALUE request)
- void **Init\_mha\_ruby** ()

### 5.142.1 Typedef Documentation

### 5.142.1.1 `rb_f_t`

```
typedef VALUE(* rb_f_t) (...)
```

## 5.142.2 Function Documentation

### 5.142.2.1 `mha_free()`

```
static void mha_free (
 void * mha) [static]
```

### 5.142.2.2 `mha_alloc()`

```
static VALUE mha_alloc (
 VALUE klass) [static]
```

### 5.142.2.3 `mha_exit_request()`

```
static VALUE mha_exit_request (
 VALUE self) [static]
```

### 5.142.2.4 `mha_parse()`

```
static VALUE mha_parse (
 VALUE self,
 VALUE request) [static]
```

### 5.142.2.5 `Init_mha_ruby()`

```
void Init_mha_ruby ()
```

## 5.143 `mha_signal.cpp` File Reference

### Classes

- class **MHASignal::hilbert\_fftw\_t**

## Namespaces

- **MHASignal**

*Namespace for audio signal handling and processing classes.*

## Macros

- **#define MHA\_ID\_UINT\_VECTOR** "MHASignal::uint\_vector\_t"
- **#define MHA\_ID\_MATRIX** "MHASignal::matrix\_t"
- **#define ASSERT\_EQUAL\_DIM**(a, b)
- **#define ASSERT\_EQUAL\_DIM\_PTR**(a, b)

## Functions

- void **set\_minabs** ( mha\_spec\_t &self, const mha\_real\_t &m)
- mha\_wave\_t & **operator+=** ( mha\_wave\_t &self, const mha\_real\_t &v)  
*Addition operator.*
- mha\_wave\_t & **operator\*=** ( mha\_wave\_t &self, const mha\_real\_t &v)  
*Element-wise multiplication operator.*
- mha\_spec\_t & **operator\*=** ( mha\_spec\_t &self, const mha\_real\_t &v)  
*Element-wise multiplication operator.*
- mha\_wave\_t & **operator\*=** ( mha\_wave\_t &self, const mha\_wave\_t &v)  
*Element-wise multiplication operator.*
- mha\_spec\_t & **operator\*=** ( mha\_spec\_t &self, const mha\_wave\_t &v)  
*Element-wise multiplication operator.*
- mha\_spec\_t & **operator\*=** ( mha\_spec\_t &self, const mha\_spec\_t &v)  
*Element-wise multiplication operator.*
- mha\_spec\_t & **safe\_div** ( mha\_spec\_t &self, const mha\_spec\_t &v, mha\_real\_t eps)  
*In-Place division with lower limit on divisor.*
- mha\_spec\_t & **operator/=** ( mha\_spec\_t &self, const mha\_spec\_t &v)  
*Element-wise division operator.*
- mha\_wave\_t & **operator/=** ( mha\_wave\_t &self, const mha\_wave\_t &v)  
*Element-wise division operator.*
- mha\_spec\_t & **operator+=** ( mha\_spec\_t &self, const mha\_spec\_t &v)  
*Addition operator.*
- mha\_spec\_t & **operator+=** ( mha\_spec\_t &self, const mha\_real\_t &v)  
*Addition operator.*
- mha\_wave\_t & **operator+=** ( mha\_wave\_t &self, const mha\_wave\_t &v)  
*Addition operator.*
- mha\_wave\_t & **operator-=** ( mha\_wave\_t &self, const mha\_wave\_t &v)  
*Subtraction operator.*
- mha\_spec\_t & **operator-=** ( mha\_spec\_t &self, const mha\_spec\_t &v)  
*Subtraction operator.*
- mha\_fft\_t **mha\_fft\_new** (unsigned int n)

- Create a new instance of an FFT object.*

  - void **mha\_fft\_free** ( **mha\_fft\_t** h)

*Remove an FFT object.*
- void **mha\_fft\_wave2spec** ( **mha\_fft\_t** h, const **mha\_wave\_t** \*in, **mha\_spec\_t** \*out)

*Perform an FFT on each channel of input waveform signal.*
- void **mha\_fft\_wave2spec** ( **mha\_fft\_t** h, const **mha\_wave\_t** \*in, **mha\_spec\_t** \*out, bool swap)

*Tranform waveform segment into spectrum.*
- void **mha\_fft\_spec2wave** ( **mha\_fft\_t** h, const **mha\_spec\_t** \*in, **mha\_wave\_t** \*out)

*Perform an inverse FFT on each channel of input spectrum.*
- void **mha\_fft\_spec2wave** ( **mha\_fft\_t** h, const **mha\_spec\_t** \*in, **mha\_wave\_t** \*out, unsigned int offset)

*Perform an inverse FFT on each channel of input spectrum.*
- void **mha\_fft\_forward** ( **mha\_fft\_t** h, **mha\_spec\_t** \*sIn, **mha\_spec\_t** \*sOut)

*Complex to complex FFT (forward).*
- void **mha\_fft\_backward** ( **mha\_fft\_t** h, **mha\_spec\_t** \*sIn, **mha\_spec\_t** \*sOut)

*Complex to complex FFT (backward).*
- void **mha\_fft\_forward\_scale** ( **mha\_fft\_t** h, **mha\_spec\_t** \*sIn, **mha\_spec\_t** \*sOut)

*Complex to complex FFT (forward).*
- void **mha\_fft\_backward\_scale** ( **mha\_fft\_t** h, **mha\_spec\_t** \*sIn, **mha\_spec\_t** \*sOut)

*Complex to complex FFT (backward).*
- void **mha\_fft\_wave2spec\_scale** ( **mha\_fft\_t** h, const **mha\_wave\_t** \*in, **mha\_spec\_t** \*out)

*Tranform waveform segment into spectrum.*
- void **mha\_fft\_spec2wave\_scale** ( **mha\_fft\_t** h, const **mha\_spec\_t** \*in, **mha\_wave\_t** \*out)

*Tranform spectrum into waveform segment.*
- std::vector< float > **std\_vector\_float** (const **mha\_wave\_t** &w)

*Converts a **mha\_wave\_t** (p. 780) structure into a std::vector<float> (interleaved order).*
- std::vector< std::vector< float > > **std\_vector\_vector\_float** (const **mha\_wave\_t** &w)

*Converts a **mha\_wave\_t** (p. 780) structure into a std::vector< std::vector<float> > (outer vector represents channels).*
- std::vector< std::vector< **mha\_complex\_t** > > **std\_vector\_vector\_complex** (const **mha\_spec\_t** &w)

*Converts a **mha\_spec\_t** (p. 732) structure into a std::vector< std::vector<mha\_complex\_t> > (outer vector represents channels).*
- static **mha\_real\_t** **intensity** (const **mha\_spec\_t** &s, unsigned int channel, unsigned int fftlen, **mha\_real\_t** \*sqfreq\_response=0)
- void **integrate** ( **mha\_wave\_t** &s)

*Numeric integration of a signal vector (real values)*
- void **integrate** ( **mha\_spec\_t** &s)

*Numeric integration of a signal vector (complex values)*
- **mha\_wave\_t** & **operator^**= ( **mha\_wave\_t** &self, const **mha\_real\_t** &arg)

*Exponent operator.*
- **mha\_wave\_t** **range** ( **mha\_wave\_t** s, unsigned int k0, unsigned int len)

*Return a time interval from a waveform chunk.*



- **mha\_spec\_t channels** ( **mha\_spec\_t** s, unsigned int ch\_start, unsigned int nch)  
*Return a channel interval from a spectrum.*
- void **assign** ( **mha\_wave\_t** self, const **mha\_wave\_t** &val)  
*Set all values of waveform 'self' to 'val'.*
- void **assign** ( **mha\_spec\_t** self, const **mha\_spec\_t** &val)  
*Set all values of spectrum 'self' to 'val'.*
- void **timeshift** ( **mha\_wave\_t** &self, int shift)  
*Time shift of waveform chunk.*

### 5.143.1 Macro Definition Documentation

#### 5.143.1.1 MHA\_ID\_UINT\_VECTOR

```
#define MHA_ID_UINT_VECTOR "MHASignal::uint_vector_t"
```

#### 5.143.1.2 MHA\_ID\_MATRIX

```
#define MHA_ID_MATRIX "MHASignal::matrix_t"
```

#### 5.143.1.3 ASSERT\_EQUAL\_DIM

```
#define ASSERT_EQUAL_DIM(
 a,
 b)
```

#### 5.143.1.4 ASSERT\_EQUAL\_DIM\_PTR

```
#define ASSERT_EQUAL_DIM_PTR(
 a,
 b)
```

### 5.143.2 Function Documentation

### 5.143.2.1 set\_minabs()

```
void set_minabs (
 mha_spec_t & self,
 const mha_real_t & m)
```

### 5.143.2.2 safe\_div()

```
mha_spec_t& safe_div (
 mha_spec_t & self,
 const mha_spec_t & v,
 mha_real_t eps)
```

In-Place division with lower limit on divisor.

### 5.143.2.3 intensity()

```
static mha_real_t intensity (
 const mha_spec_t & s,
 unsigned int channel,
 unsigned int fftlen,
 mha_real_t * sqfreq_response = 0) [static]
```

## 5.144 mha\_signal.hh File Reference

Header file for audio signal handling and processing classes.

### Classes

- class **MHASignal::spectrum\_t**  
*a signal processing class for spectral data (based on **mha\_spec\_t** (p. 732))*
- class **MHASignal::waveform\_t**  
*signal processing class for waveform data (based on **mha\_wave\_t** (p. 780))*
- class **MHASignal::doublebuffer\_t**  
*Double-buffering class.*
- class **MHASignal::ringbuffer\_t**  
*A ringbuffer class for time domain audio signal, which makes no assumptions with respect to fragment size.*
- class **MHASignal::hilbert\_t**  
*Hilbert transformation of a waveform segment.*
- class **MHASignal::minphase\_t**

*Minimal phase function.*

- class **MHASignal::stat\_t**
- class **MHASignal::delay\_wave\_t**

*Delayline containing wave fragments.*

- class **MHASignal::delay\_spec\_t**
- class **MHASignal::async\_rmslevel\_t**

*Class for asynchronous level metering.*

- class **MHASignal::uint\_vector\_t**

*Vector of unsigned values, used for size and index description of n-dimensional matrixes.*

- class **MHASignal::matrix\_t**

*n-dimensional matrix with real or complex floating point values.*

- class **MHASignal::schroeder\_t**

*Schroeder tone complex class.*

- class **MHASignal::quantizer\_t**

*Simple simulation of fixpoint quantization.*

- class **MHASignal::loop\_wavefragment\_t**

*Copy a fixed waveform fragment to a series of waveform fragments of other size.*

- class **MHASignal::delay\_t**

*Class to realize a simple delay of waveform streams.*

- class **MHASignal::subsample\_delay\_t**

*implements subsample delay in spectral domain.*

## Namespaces

- **MHASignal**

*Namespace for audio signal handling and processing classes.*

## Macros

- **#define M\_PI** 3.14159265358979323846
- **#define mha\_round(x)** (int)((float)x+0.5)

## Functions

- void **MHASignal::for\_each** ( mha\_wave\_t \*s, mha\_real\_t(\*fun)( mha\_real\_t))  
*Apply a function to each element of a mha\_wave\_t (p. 780).*
- mha\_real\_t **MHASignal::lin2db** ( mha\_real\_t x, mha\_real\_t eps)  
*Conversion from linear scale to dB (no SPL reference)*
- mha\_real\_t **MHASignal::lin2db** ( mha\_real\_t x)  
*Conversion from linear scale to dB (no SPL reference)*
- mha\_real\_t **MHASignal::db2lin** ( mha\_real\_t x)  
*Conversion from dB scale to linear (no SPL reference)*
- mha\_real\_t **MHASignal::sq2db** ( mha\_real\_t x, mha\_real\_t eps=0.0f)

- conversion from squared values to dB (no SPL reference)*
- **mha\_real\_t MHASignal::db2sq ( mha\_real\_t x)**  
*conversion from dB to squared values (no SPL reference)*
- **mha\_real\_t MHASignal::pa2dbspl ( mha\_real\_t x, mha\_real\_t eps=0.0f)**  
*Conversion from linear Pascal scale to dB SPL.*
- **mha\_real\_t MHASignal::dbspl2pa ( mha\_real\_t x)**  
*Conversion from dB SPL to linear Pascal scale.*
- **mha\_real\_t MHASignal::pa22dbspl ( mha\_real\_t x, mha\_real\_t eps=0.0f)**  
*Conversion from squared Pascal scale to dB SPL.*
- **mha\_real\_t MHASignal::dbspl2pa2 ( mha\_real\_t x)**  
*conversion from dB SPL to squared Pascal scale*
- **mha\_real\_t MHASignal::smp2sec ( mha\_real\_t n, mha\_real\_t srate)**  
*conversion from samples to seconds*
- **mha\_real\_t MHASignal::sec2smp ( mha\_real\_t sec, mha\_real\_t srate)**  
*conversion from seconds to samples*
- **mha\_real\_t MHASignal::bin2freq ( mha\_real\_t bin, unsigned fftlen, mha\_real\_t srate)**  
*conversion from fft bin index to frequency*
- **mha\_real\_t MHASignal::freq2bin ( mha\_real\_t freq, unsigned fftlen, mha\_real\_t srate)**  
*conversion from frequency to fft bin index*
- **mha\_real\_t MHASignal::smp2rad ( mha\_real\_t samples, unsigned bin, unsigned fftlen)**  
*conversion from delay in samples to phase shift*
- **mha\_real\_t MHASignal::rad2smp ( mha\_real\_t phase\_shift, unsigned bin, unsigned fftlen)**  
*conversion from phase shift to delay in samples*
- **template<class elem\_type > std::vector< elem\_type > MHASignal::dupvec (std::vector< elem\_type > vec, unsigned n)**  
*Duplicate last vector element to match desired size.*
- **template<class elem\_type > std::vector< elem\_type > MHASignal::dupvec\_chk (std::vector< elem\_type > vec, unsigned n)**  
*Duplicate last vector element to match desired size, check for dimension.*
- **bool equal\_dim (const mha\_wave\_t &a, const mha\_wave\_t &b)**  
*Test for equal dimension of waveform structures.*
- **bool equal\_dim (const mha\_wave\_t &a, const mhaconfig\_t &b)**  
*Test for match of waveform dimension with mhaconfig structure.*
- **bool equal\_dim (const mha\_spec\_t &a, const mha\_spec\_t &b)**  
*Test for equal dimension of spectrum structures.*
- **bool equal\_dim (const mha\_spec\_t &a, const mhaconfig\_t &b)**  
*Test for match of spectrum dimension with mhaconfig structure.*
- **bool equal\_dim (const mha\_wave\_t &a, const mha\_spec\_t &b)**  
*Test for equal dimension of waveform/spectrum structures.*
- **bool equal\_dim (const mha\_spec\_t &a, const mha\_wave\_t &b)**

*Test for equal dimension of waveform/spectrum structures.*

- void **integrate** ( **mha\_wave\_t** &s)  
*Numeric integration of a signal vector (real values)*
- void **integrate** ( **mha\_spec\_t** &s)  
*Numeric integration of a signal vector (complex values)*
- unsigned int **mha\_min\_1** (unsigned int a)
- unsigned int **size** (const **mha\_wave\_t** &s)  
*Return size of a waveform structure.*
- unsigned int **size** (const **mha\_spec\_t** &s)  
*Return size of a spectrum structure.*
- unsigned int **size** (const **mha\_wave\_t** \*s)  
*Return size of a waveform structure.*
- unsigned int **size** (const **mha\_spec\_t** \*s)  
*Return size of a spectrum structure.*
- void **clear** ( **mha\_wave\_t** &s)  
*Set all values of waveform to zero.*
- void **clear** ( **mha\_wave\_t** \*s)  
*Set all values of waveform to zero.*
- void **clear** ( **mha\_spec\_t** &s)  
*Set all values of spectrum to zero.*
- void **clear** ( **mha\_spec\_t** \*s)  
*Set all values of spectrum to zero.*
- void **assign** ( **mha\_wave\_t** self, **mha\_real\_t** val)  
*Set all values of waveform 'self' to 'val'.*
- void **assign** ( **mha\_wave\_t** self, const **mha\_wave\_t** &val)  
*Set all values of waveform 'self' to 'val'.*
- void **assign** ( **mha\_spec\_t** self, const **mha\_spec\_t** &val)  
*Set all values of spectrum 'self' to 'val'.*
- void **timeshift** ( **mha\_wave\_t** &self, int shift)  
*Time shift of waveform chunk.*
- **mha\_wave\_t** **range** ( **mha\_wave\_t** s, unsigned int k0, unsigned int len)  
*Return a time interval from a waveform chunk.*
- **mha\_spec\_t** **channels** ( **mha\_spec\_t** s, unsigned int ch\_start, unsigned int nch)  
*Return a channel interval from a spectrum.*
- **mha\_real\_t** & **value** ( **mha\_wave\_t** \*s, unsigned int fr, unsigned int ch)  
*Access an element of a waveform structure.*
- const **mha\_real\_t** & **value** (const **mha\_wave\_t** \*s, unsigned int fr, unsigned int ch)  
*Constant access to an element of a waveform structure.*
- **mha\_real\_t** & **value** ( **mha\_wave\_t** \*s, unsigned int k)
- **mha\_complex\_t** & **value** ( **mha\_spec\_t** \*s, unsigned int k)
- **mha\_complex\_t** & **value** ( **mha\_spec\_t** \*s, unsigned int fr, unsigned int ch)  
*Access to an element of a spectrum.*
- const **mha\_complex\_t** & **value** (const **mha\_spec\_t** \*s, unsigned int fr, unsigned int ch)  
*Constant access to an element of a spectrum.*
- **mha\_real\_t** & **value** ( **mha\_wave\_t** &s, unsigned int fr, unsigned int ch)

*Access to an element of a waveform structure.*

- `const mha_real_t & value` (`const mha_wave_t &s`, unsigned int `fr`, unsigned int `ch`)

*Constant access to an element of a waveform structure.*

- `mha_complex_t & value` (`mha_spec_t &s`, unsigned int `fr`, unsigned int `ch`)

*Access to an element of a spectrum.*

- `const mha_complex_t & value` (`const mha_spec_t &s`, unsigned int `fr`, unsigned int `ch`)

*Constant access to an element of a spectrum.*

- `std::vector< float > std_vector_float` (`const mha_wave_t &`)

*Converts a `mha_wave_t` (p. 780) structure into a `std::vector<float>` (interleaved order).*

- `std::vector< std::vector< float > > std_vector_vector_float` (`const mha_wave_t &`)

*Converts a `mha_wave_t` (p. 780) structure into a `std::vector< std::vector<float> >` (outer vector represents channels).*

- `std::vector< std::vector< mha_complex_t > > std_vector_vector_complex` (`const mha_spec_t &`)

*Converts a `mha_spec_t` (p. 732) structure into a `std::vector< std::vector<mha_complex_t> >` (outer vector represents channels).*

- `mha_wave_t & operator+=` (`mha_wave_t &`, `const mha_real_t &`)

*Addition operator.*

- `mha_wave_t & operator+=` (`mha_wave_t &`, `const mha_wave_t &`)

*Addition operator.*

- `mha_wave_t & operator-=` (`mha_wave_t &`, `const mha_wave_t &`)

*Subtraction operator.*

- `mha_spec_t & operator-=` (`mha_spec_t &`, `const mha_spec_t &`)

*Subtraction operator.*

- `mha_wave_t & operator*=` (`mha_wave_t &`, `const mha_real_t &`)

*Element-wise multiplication operator.*

- `mha_wave_t & operator*=` (`mha_wave_t &`, `const mha_wave_t &`)

*Element-wise multiplication operator.*

- `mha_spec_t & operator*=` (`mha_spec_t &`, `const mha_real_t &`)

*Element-wise multiplication operator.*

- `mha_spec_t & operator*=` (`mha_spec_t &`, `const mha_wave_t &`)

*Element-wise multiplication operator.*

- `mha_spec_t & operator*=` (`mha_spec_t &`, `const mha_spec_t &`)

*Element-wise multiplication operator.*

- `mha_spec_t & operator/=` (`mha_spec_t &`, `const mha_spec_t &`)

*Element-wise division operator.*

- `mha_wave_t & operator/=` (`mha_wave_t &`, `const mha_wave_t &`)

*Element-wise division operator.*

- `mha_spec_t & operator+=` (`mha_spec_t &`, `const mha_spec_t &`)

*Addition operator.*

- `mha_spec_t & operator+=` (`mha_spec_t &`, `const mha_real_t &`)

*Addition operator.*

- `void set_minabs` (`mha_spec_t &`, `const mha_real_t &`)

- `mha_spec_t & safe_div` (`mha_spec_t &self`, `const mha_spec_t &v`, `mha_real_t eps`)

*In-Place division with lower limit on divisor.*

- **mha\_wave\_t & operator^=** ( **mha\_wave\_t** &self, const **mha\_real\_t** &arg)  
*Exponent operator.*
- void **MHASignal::copy\_channel** ( **mha\_spec\_t** &self, const **mha\_spec\_t** &src, unsigned sch, unsigned dch)  
*Copy one channel of a source signal.*
- void **MHASignal::copy\_channel** ( **mha\_wave\_t** &self, const **mha\_wave\_t** &src, unsigned src\_channel, unsigned dest\_channel)  
*Copy one channel of a source signal.*
- **mha\_real\_t MHASignal::rmslevel** (const **mha\_spec\_t** &s, unsigned int channel, unsigned int fftlen)  
*Return RMS level of a spectrum channel.*
- **mha\_real\_t MHASignal::colored\_intensity** (const **mha\_spec\_t** &s, unsigned int channel, unsigned int fftlen, **mha\_real\_t** \*sqfreq\_response=nullptr)  
*Colored spectrum intensity.*
- **mha\_real\_t MHASignal::maxabs** (const **mha\_spec\_t** &s, unsigned int channel)  
*Find maximal absolute value.*
- **mha\_real\_t MHASignal::rmslevel** (const **mha\_wave\_t** &s, unsigned int channel)  
*Return RMS level of a waveform channel.*
- **mha\_real\_t MHASignal::maxabs** (const **mha\_wave\_t** &s, unsigned int channel)  
*Find maximal absolute value.*
- **mha\_real\_t MHASignal::maxabs** (const **mha\_wave\_t** &s)  
*Find maximal absolute value.*
- **mha\_real\_t MHASignal::max** (const **mha\_wave\_t** &s)  
*Find maximal value.*
- **mha\_real\_t MHASignal::min** (const **mha\_wave\_t** &s)  
*Find minimal value.*
- **mha\_real\_t MHASignal::sumsq\_channel** (const **mha\_wave\_t** &s, unsigned int channel)  
*Calculate sum of squared values in one channel.*
- **mha\_real\_t MHASignal::sumsq\_frame** (const **mha\_wave\_t** &s, unsigned int frame)  
*Calculate sum over all channels of squared values.*
- void **MHASignal::scale** ( **mha\_spec\_t** \*dest, const **mha\_wave\_t** \*src)
- void **MHASignal::limit** ( **mha\_wave\_t** &s, const **mha\_real\_t** &min, const **mha\_real\_t** &max)  
*Limit the signal in the waveform buffer to the range [min, max].*
- **mha\_complex\_t & set** ( **mha\_complex\_t** &self, **mha\_real\_t** real, **mha\_real\_t** imag=0)  
*Assign real and imaginary parts to a **mha\_complex\_t** (p. 688) variable.*
- **mha\_complex\_t mha\_complex** ( **mha\_real\_t** real, **mha\_real\_t** imag=0)  
*Create a new **mha\_complex\_t** (p. 688) with specified real and imaginary parts.*
- **mha\_complex\_t & set** ( **mha\_complex\_t** &self, const std::complex< **mha\_real\_t** > &stdcomplex)  
*Assign a **mha\_complex\_t** (p. 688) variable from a std::complex.*
- std::complex< **mha\_real\_t** > **stdcomplex** (const **mha\_complex\_t** &self)  
*Create a std::complex from **mha\_complex\_t** (p. 688).*
- **mha\_complex\_t & expi** ( **mha\_complex\_t** &self, **mha\_real\_t** angle)  
*replaces the value of the given **mha\_complex\_t** (p. 688) with  $\exp(i*b)$ .*

- **double angle** (const **mha\_complex\_t** &self)  
*Computes the angle of a complex number in the complex plane.*
- **mha\_complex\_t & operator+=** ( **mha\_complex\_t** &self, const **mha\_complex\_t** &other)  
*Addition of two complex numbers, overwriting the first.*
- **mha\_complex\_t operator+** (const **mha\_complex\_t** &self, const **mha\_complex\_t** &other)  
*Addition of two complex numbers, result is a temporary object.*
- **mha\_complex\_t & operator+=** ( **mha\_complex\_t** &self, **mha\_real\_t** other\_real)  
*Addition of a complex and a real number, overwriting the complex.*
- **mha\_complex\_t operator+** (const **mha\_complex\_t** &self, **mha\_real\_t** other\_real)  
*Addition of a complex and a real number, result is a temporary object.*
- **mha\_complex\_t & operator-=** ( **mha\_complex\_t** &self, const **mha\_complex\_t** &other)  
*Subtraction of two complex numbers, overwriting the first.*
- **mha\_complex\_t operator-** (const **mha\_complex\_t** &self, const **mha\_complex\_t** &other)  
*Subtraction of two complex numbers, result is a temporary object.*
- **mha\_complex\_t & operator-=** ( **mha\_complex\_t** &self, **mha\_real\_t** other\_real)  
*Subtraction of a complex and a real number, overwriting the complex.*
- **mha\_complex\_t operator-** (const **mha\_complex\_t** &self, **mha\_real\_t** other\_real)  
*Subtraction of a complex and a real number, result is a temporary object.*
- **mha\_complex\_t & operator\*=** ( **mha\_complex\_t** &self, const **mha\_complex\_t** &other)  
*Multiplication of two complex numbers, overwriting the first.*
- **mha\_complex\_t operator\*** (const **mha\_complex\_t** &self, const **mha\_complex\_t** &other)  
*Multiplication of two complex numbers, result is a temporary object.*
- **mha\_complex\_t & operator\*=** ( **mha\_complex\_t** &self, **mha\_real\_t** other\_real)  
*Multiplication of a complex and a real number, overwriting the complex.*
- **mha\_complex\_t & expi** ( **mha\_complex\_t** &self, **mha\_real\_t** angle, **mha\_real\_t** factor)  
*replaces (!) the value of the given **mha\_complex\_t** (p. 688) with  $a * \exp(i*b)$*
- **mha\_complex\_t operator\*** (const **mha\_complex\_t** &self, **mha\_real\_t** other\_real)  
*Multiplication of a complex and a real number, result is a temporary object.*
- **mha\_real\_t abs2** (const **mha\_complex\_t** &self)  
*Compute the square of the absolute value of a complex value.*
- **mha\_real\_t abs** (const **mha\_complex\_t** &self)  
*Compute the absolute value of a complex value.*
- **mha\_complex\_t & operator/=** ( **mha\_complex\_t** &self, **mha\_real\_t** other\_real)  
*Division of a complex and a real number, overwriting the complex.*
- **mha\_complex\_t operator/** (const **mha\_complex\_t** &self, **mha\_real\_t** other\_real)  
*Division of a complex and a real number, result is a temporary object.*
- **mha\_complex\_t & safe\_div** ( **mha\_complex\_t** &self, const **mha\_complex\_t** &other, **mha\_real\_t** eps, **mha\_real\_t** eps2)  
*Safe division of two complex numbers, overwriting the first.*
- **mha\_complex\_t & operator/=** ( **mha\_complex\_t** &self, const **mha\_complex\_t** &other)



*Division of two complex numbers, overwriting the first.*

- **mha\_complex\_t operator/** (const **mha\_complex\_t** &self, const **mha\_complex\_t** &other)

*Division of two complex numbers, result is a temporary object.*

- **mha\_complex\_t operator-** (const **mha\_complex\_t** &self)

*Unary minus on a complex results in a negative temporary object.*

- bool **operator==** (const **mha\_complex\_t** &x, const **mha\_complex\_t** &y)

*Compare two complex numbers for equality.*

- bool **operator!=** (const **mha\_complex\_t** &x, const **mha\_complex\_t** &y)

*Compare two complex numbers for inequality.*

- void **conjugate** (**mha\_complex\_t** &self)

*Replace (!) the value of this **mha\_complex\_t** (p. 688) with its conjugate.*

- void **conjugate** (**mha\_spec\_t** &self)

*Replace (!) the value of this **mha\_spec\_t** (p. 732) with its conjugate.*

- **mha\_complex\_t \_conjugate** (const **mha\_complex\_t** &self)

*Compute the conjugate of this complex value.*

- void **reciprocal** (**mha\_complex\_t** &self)

*Replace the value of this complex with its reciprocal.*

- **mha\_complex\_t \_reciprocal** (const **mha\_complex\_t** &self)

*compute the reciprocal of this complex value.*

- void **normalize** (**mha\_complex\_t** &self)

*Divide a complex by its absolute value, thereby normalizing it (projecting onto the unit circle).*

- void **normalize** (**mha\_complex\_t** &self, **mha\_real\_t** margin)

*Divide a complex by its absolute value, thereby normalizing it (projecting onto the unit circle), with a safety margin.*

- bool **almost** (const **mha\_complex\_t** &self, const **mha\_complex\_t** &other, **mha\_real\_t** times\_epsilon=1e2)

*Compare two complex numbers for equality except for a small relative error.*

- bool **operator<** (const **mha\_complex\_t** &x, const **mha\_complex\_t** &y)

*Compares the absolute values of two complex numbers.*

- std::ostream & **operator<<** (std::ostream &o, const **mha\_complex\_t** &c)

*ostream operator for **mha\_complex\_t** (p. 688)*

- std::istream & **operator>>** (std::istream &i, **mha\_complex\_t** &c)

*preliminary istream operator for **mha\_complex\_t** (p. 688) without error checking*

- **mha\_fft\_t mha\_fft\_new** (unsigned int n)

*Create a new FFT handle.*

- void **mha\_fft\_free** (**mha\_fft\_t** h)

*Destroy an FFT handle.*

- void **mha\_fft\_wave2spec** (**mha\_fft\_t** h, const **mha\_wave\_t** \*in, **mha\_spec\_t** \*out)

*Tranform waveform segment into spectrum.*

- void **mha\_fft\_wave2spec** (**mha\_fft\_t** h, const **mha\_wave\_t** \*in, **mha\_spec\_t** \*out, bool swaps)

*Tranform waveform segment into spectrum.*

- void **mha\_fft\_spec2wave** (**mha\_fft\_t** h, const **mha\_spec\_t** \*in, **mha\_wave\_t** \*out)

*Tranform spectrum into waveform segment.*

- void **mha\_fft\_spec2wave** ( **mha\_fft\_t** h, const **mha\_spec\_t** \*in, **mha\_wave\_t** \*out, unsigned int offset)  
*Tranform spectrum into waveform segment.*
- void **mha\_fft\_forward** ( **mha\_fft\_t** h, **mha\_spec\_t** \*sIn, **mha\_spec\_t** \*sOut)  
*Complex to complex FFT (forward).*
- void **mha\_fft\_backward** ( **mha\_fft\_t** h, **mha\_spec\_t** \*sIn, **mha\_spec\_t** \*sOut)  
*Complex to complex FFT (backward).*
- void **mha\_fft\_forward\_scale** ( **mha\_fft\_t** h, **mha\_spec\_t** \*sIn, **mha\_spec\_t** \*sOut)  
*Complex to complex FFT (forward).*
- void **mha\_fft\_backward\_scale** ( **mha\_fft\_t** h, **mha\_spec\_t** \*sIn, **mha\_spec\_t** \*sOut)  
*Complex to complex FFT (backward).*
- void **mha\_fft\_wave2spec\_scale** ( **mha\_fft\_t** h, const **mha\_wave\_t** \*in, **mha\_spec\_t** \*out)  
*Tranform waveform segment into spectrum.*
- void **mha\_fft\_spec2wave\_scale** ( **mha\_fft\_t** h, const **mha\_spec\_t** \*in, **mha\_wave\_t** \*out)  
*Tranform spectrum into waveform segment.*
- template<class elem\_type >  
elem\_type **MHASignal::kth\_smallest** (elem\_type array[], unsigned n, unsigned k)  
*Fast search for the kth smallest element of an array.*
- template<class elem\_type >  
elem\_type **MHASignal::median** (elem\_type array[], unsigned n)  
*Fast median search.*
- template<class elem\_type >  
elem\_type **MHASignal::mean** (const std::vector< elem\_type > &data, elem\_type start←\_val)  
*Calculate average of elements in a vector.*
- template<class elem\_type >  
std::vector< elem\_type > **MHASignal::quantile** (std::vector< elem\_type > data, const std::vector< elem\_type > &p)  
*Calculate quantile of elements in a vector.*
- void **MHASignal::saveas\_mat4** (const **mha\_spec\_t** &data, const std::string &varname, FILE \*fh)  
*Save a openMHA spectrum as a variable in a Matlab4 file.*
- void **MHASignal::saveas\_mat4** (const **mha\_wave\_t** &data, const std::string &varname, FILE \*fh)  
*Save a openMHA waveform as a variable in a Matlab4 file.*
- void **MHASignal::saveas\_mat4** (const std::vector< **mha\_real\_t** > &data, const std::string &varname, FILE \*fh)  
*Save a float vector as a variable in a Matlab4 file.*
- void **MHASignal::copy\_permuted** ( **mha\_wave\_t** \*dest, const **mha\_wave\_t** \*src)  
*Copy contents of a waveform to a permuted waveform.*

## Variables

- unsigned long int **MHASignal::signal\_counter** = 0  
*Signal counter to produce signal ID strings.*

### 5.144.1 Detailed Description

Header file for audio signal handling and processing classes.

The classes for waveform, spectrum and filterbank signals defined in this file are "intelligent" versions of the basic waveform, spectrum and filterbank structures used in the C function calls.

### 5.144.2 Macro Definition Documentation

#### 5.144.2.1 M\_PI

```
#define M_PI 3.14159265358979323846
```

#### 5.144.2.2 mha\_round

```
#define mha_round(
 x) (int)((float)x+0.5)
```

### 5.144.3 Function Documentation

#### 5.144.3.1 mha\_min\_1()

```
unsigned int mha_min_1 (
 unsigned int a) [inline]
```

#### 5.144.3.2 value() [1/2]

```
mha_real_t& value (
 mha_wave_t * s,
 unsigned int k) [inline]
```

### 5.144.3.3 value() [2/2]

```
mha_complex_t& value (
 mha_spec_t * s,
 unsigned int k) [inline]
```

### 5.144.3.4 set\_minabs()

```
void set_minabs (
 mha_spec_t & ,
 const mha_real_t &)
```

### 5.144.3.5 safe\_div()

```
mha_spec_t& safe_div (
 mha_spec_t & self,
 const mha_spec_t & v,
 mha_real_t eps)
```

In-Place division with lower limit on divisor.

### 5.144.3.6 operator<<()

```
std::ostream& operator<< (
 std::ostream & o,
 const mha_complex_t & c) [inline]
```

ostream operator for **mha\_complex\_t** (p. [688](#))

### 5.144.3.7 operator>>()

```
std::istream& operator>> (
 std::istream & i,
 mha_complex_t & c) [inline]
```

preliminary istream operator for **mha\_complex\_t** (p. [688](#)) without error checking

## 5.145 mha\_signal\_fft.h File Reference

## Classes

- class **MHASignal::fft\_t**

## Namespaces

- **MHASignal**  
*Namespace for audio signal handling and processing classes.*

## 5.146 mha\_tablelookup.cpp File Reference

## 5.147 mha\_tablelookup.hh File Reference

Header file for table lookup classes.

## Classes

- class **MHATableLookup::table\_t**
- class **MHATableLookup::linear\_table\_t**  
*Class for interpolation with equidistant x values.*
- class **MHATableLookup::xy\_table\_t**  
*Class for interpolation with non-equidistant x values.*

## Namespaces

- **MHATableLookup**  
*Namespace for table lookup classes.*

## 5.147.1 Detailed Description

Header file for table lookup classes.

## 5.148 mha\_tcp.cpp File Reference

## Classes

- class **MHA\_TCP::sock\_init\_t**

## Namespaces

- **MHA\_TCP**

*A Namespace for TCP helper classes.*

## Macros

- **#define INVALID\_SOCKET** (-1)
- **#define SOCKET\_ERROR** (-1)
- **#define closesocket**(fd) (close((fd)))
- **#define ASYNC\_CONNECT\_STARTED** EINPROGRESS

## Typedefs

- **typedef int SOCKET**

## Functions

- **std::string MHA\_TCP::STRError** (int err)  
*Portable conversion from error number to error string.*
- **std::string MHA\_TCP::HSTRError** (int err)  
*Portable conversion from hostname error number to error string.*
- **int MHA\_TCP::N\_ERRNO** ()  
*Portable access to last network error number.*
- **int MHA\_TCP::H\_ERRNO** ()  
*Portable access to last hostname error number.*
- **int MHA\_TCP::G\_ERRNO** ()  
*Portable access to last non-network error number.*
- **static sockaddr\_in host\_port\_to\_sock\_addr** (const std::string &host, unsigned short port)
- **static SOCKET tcp\_connect\_to** (const std::string &host, unsigned short port)
- **static SOCKET tcp\_connect\_to\_with\_timeout** (const std::string &host, unsigned short port, **Timeout\_Watcher** &timeout\_watcher)
- **static void \* thread\_start\_func** (void \*thread)

## Variables

- **class MHA\_TCP::sock\_init\_t MHA\_TCP::sock\_initializer**

### 5.148.1 Macro Definition Documentation

### 5.148.1.1 INVALID\_SOCKET

```
#define INVALID_SOCKET (-1)
```

### 5.148.1.2 SOCKET\_ERROR

```
#define SOCKET_ERROR (-1)
```

### 5.148.1.3 closesocket

```
#define closesocket(
 fd) (close((fd)))
```

### 5.148.1.4 ASYNC\_CONNECT\_STARTED

```
#define ASYNC_CONNECT_STARTED EINPROGRESS
```

## 5.148.2 Typedef Documentation

### 5.148.2.1 SOCKET

```
typedef int SOCKET
```

## 5.148.3 Function Documentation

### 5.148.3.1 host\_port\_to\_sock\_addr()

```
static sockaddr_in host_port_to_sock_addr (
 const std::string & host,
 unsigned short port) [static]
```

### 5.148.3.2 tcp\_connect\_to()

```
static SOCKET tcp_connect_to (
 const std::string & host,
 unsigned short port) [static]
```

### 5.148.3.3 tcp\_connect\_to\_with\_timeout()

```
static SOCKET tcp_connect_to_with_timeout (
 const std::string & host,
 unsigned short port,
 Timeout_Watcher & timeout_watcher) [static]
```

### 5.148.3.4 thread\_start\_func()

```
static void* thread_start_func (
 void * thread) [static]
```

## 5.149 mha\_tcp.hh File Reference

### Classes

- struct **MHA\_TCP::OS\_EVENT\_TYPE**
- class **MHA\_TCP::Wakeup\_Event**  
*A base class for asynchronous wakeup events.*
- class **MHA\_TCP::Async\_Notify**  
*Portable Multiplexable cross-thread notification.*
- class **MHA\_TCP::Event\_Watcher**  
*OS-independent event watcher, uses select on Unix and WaitForMultipleObjects on Windows.*
- class **MHA\_TCP::Timeout\_Event**
- class **MHA\_TCP::Timeout\_Watcher**  
*OS-independent event watcher with internal fixed-end-time timeout.*
- class **MHA\_TCP::Sockread\_Event**  
*Watch socket for incoming data.*
- class **MHA\_TCP::Sockwrite\_Event**
- class **MHA\_TCP::Sockaccept\_Event**
- class **MHA\_TCP::Connection**  
***Connection** (p. 741) handles Communication between client and server, is used on both sides.*
- class **MHA\_TCP::Server**
- class **MHA\_TCP::Client**  
*A portable class for a tcp client connections.*
- class **MHA\_TCP::Thread**  
*A very simple class for portable threads.*



## Namespaces

- **MHA\_TCP**

*A Namespace for TCP helper classes.*

## Macros

- **#define Sleep(x)** `usleep((x)*1000);`

## Typedefs

- `typedef int MHA_TCP::SOCKET`

## Functions

- `std::string MHA_TCP::STRERROR (int err)`  
*Portable conversion from error number to error string.*
- `std::string MHA_TCP::HSTRERROR (int err)`  
*Portable conversion from hostname error number to error string.*
- `int MHA_TCP::N_ERRNO ()`  
*Portable access to last network error number.*
- `int MHA_TCP::H_ERRNO ()`  
*Portable access to last hostname error number.*
- `int MHA_TCP::G_ERRNO ()`  
*Portable access to last non-network error number.*
- `double MHA_TCP::dtime ()`  
*Time access function for system's high resolution time, retrieve current time as double.*
- `double MHA_TCP::dtime (const struct timeval &tv)`  
*Time access function for unix' high resolution time, converts struct timeval to double.*
- `struct timeval MHA_TCP::stime (double d)`  
*Time access function for unix' high resolution time, converts time from double to struct timeval.*

### 5.149.1 Macro Definition Documentation

#### 5.149.1.1 Sleep

```
#define Sleep(
 x) usleep((x)*1000);
```

## 5.150 mha\_tcp\_server.cpp File Reference

### Namespaces

- **mha\_tcp**  
*namespace for network communication classes of MHA*

## 5.151 mha\_tcp\_server.hh File Reference

### Classes

- class **mha\_tcp::buffered\_socket\_t**  
*An asio TCP socket with an associated streambuf buffer for receiving lines of text, as well as string buffers for sending responses.*
- class **mha\_tcp::server\_t**  
*Class for accepting TCP connections from clients.*

### Namespaces

- **mha\_tcp**  
*namespace for network communication classes of MHA*

## 5.152 mha\_toolbox.h File Reference

## 5.153 mha\_utils.cpp File Reference

## 5.154 mha\_utils.hh File Reference

### Namespaces

- **MHAUtils**

### Functions

- bool **MHAUtils::is\_multiple\_of** (const unsigned big, const unsigned small)
- bool **MHAUtils::is\_power\_of\_two** (const unsigned n)
- bool **MHAUtils::is\_multiple\_of\_by\_power\_of\_two** (const unsigned big, const unsigned small)
- std::string **MHAUtils::strip** (const std::string &line)
- std::string **MHAUtils::remove** (const std::string &str\_, char c)
- bool **MHAUtils::is\_denormal** ( mha\_real\_t x)  
*Get the normal-ness of a mha\_real\_t.*
- bool **MHAUtils::is\_denormal** (const mha\_complex\_t &x)  
*Get the normal-ness of a complex number.*
- bool **MHAUtils::is\_denormal** (const std::complex< mha\_real\_t > &x)  
*Get the normal-ness of a complex number.*
- mha\_real\_t **MHAUtils::spl2hl** ( mha\_real\_t f)  
*Get the offset of between dB(SPL) and dB(HL) for a given frequency according to ISO 389-7↵:2005 (freefield); e.g.*

## 5.155 mha\_windowparser.cpp File Reference

### Variables

- `float(* wnd_funs [ ])(float)`

### 5.155.1 Variable Documentation

#### 5.155.1.1 `wnd_funs`

`float(* wnd_funs[ ])(float)`

## 5.156 mha\_windowparser.h File Reference

### Classes

- class **MHAWindow::base\_t**  
*Common base for window types.*
- class **MHAWindow::fun\_t**  
*Generic window based on a generator function.*
- class **MHAWindow::rect\_t**  
*Rectangular window.*
- class **MHAWindow::bartlett\_t**  
*Bartlett window.*
- class **MHAWindow::hanning\_t**  
*von-Hann window*
- class **MHAWindow::hamming\_t**  
*Hamming window.*
- class **MHAWindow::blackman\_t**  
*Blackman window.*
- class **MHAWindow::user\_t**  
*User defined window.*
- class **MHAParser::window\_t**  
*MHA configuration interface for a window function generator.*

### Namespaces

- **MHAWindow**  
*Collection of Window types.*
- **MHAParser**  
*Name space for the openMHA-Parser configuration language.*

## Functions

- float **MHAWindow::rect** (float)  
*Rectangular window function.*
- float **MHAWindow::bartlett** (float)  
*Bartlett window function.*
- float **MHAWindow::hanning** (float)  
*Hanning window function.*
- float **MHAWindow::hamming** (float)  
*Hamming window function.*
- float **MHAWindow::blackman** (float)  
*Blackman window function.*

## 5.157 mhachain.cpp File Reference

### Classes

- class **mhachain::mhachain\_t**

### Namespaces

- **mhachain**

## 5.158 mhafw\_lib.cpp File Reference

## 5.159 mhafw\_lib.h File Reference

### Classes

- class **io\_lib\_t**  
*Class for loading MHA sound IO module.*
- class **fw\_vars\_t**
- class **fw\_t**

## 5.160 MHAIOalsa.cpp File Reference

### Classes

- class **alsa\_base\_t**
- class **alsa\_dev\_par\_parser\_t**  
*Parser variables corresponding to one alsa device.*
- class **alsa\_t< T >**  
*Our representation of one alsa device.*
- class **io\_alsa\_t**  
*MHA IO interface class for ALSA IO.*

## Macros

- **#define DBG(x)** fprintf(stderr,"%s:%d\n",\_\_FILE\_\_,\_\_LINE\_\_)
- **#define ERR\_SUCCESS** 0
- **#define ERR\_IHANDLE** -1
- **#define ERR\_USER** -1000
- **#define MAX\_USER\_ERR** 0x500
- **#define IOInit** MHA\_STATIC\_MHAIOalsa\_IOInit
- **#define IOPrepare** MHA\_STATIC\_MHAIOalsa\_IOPrepare
- **#define IOStart** MHA\_STATIC\_MHAIOalsa\_IOStart
- **#define IOSTop** MHA\_STATIC\_MHAIOalsa\_IOStop
- **#define IORelease** MHA\_STATIC\_MHAIOalsa\_IORelease
- **#define IOSetVar** MHA\_STATIC\_MHAIOalsa\_IOSetVar
- **#define IOStrError** MHA\_STATIC\_MHAIOalsa\_IOStrError
- **#define IODestroy** MHA\_STATIC\_MHAIOalsa\_IODestroy
- **#define dummy\_interface\_test** MHA\_STATIC\_MHAIOalsa\_dummy\_interface\_test

## Functions

- int **IOInit** (int fragsize, float samplerate, **IOProcessEvent\_t** proc\_event, void \*proc\_↔  
handle, **IOStartedEvent\_t** start\_event, void \*start\_handle, **IOStoppedEvent\_t** stop\_↔  
event, void \*stop\_handle, void \*\*handle)  
*IO library initialization function, called by framework after loading this IO library into the MHA process.*
- int **IOPrepare** (void \*handle, int nch\_in, int nch\_out)  
*IO library prepare function, called after the MHA prepared the processing plugins.*
- int **IOStart** (void \*handle)
- int **IOStop** (void \*handle)
- int **IORelease** (void \*handle)
- int **IOSetVar** (void \*handle, const char \*command, char \*retval, unsigned int maxretlen)
- const char \* **IOStrError** (void \*handle, int err)
- void **IODestroy** (void \*handle)
- void **dummy\_interface\_test** (void)

## Variables

- static char **user\_err\_msg** [ **MAX\_USER\_ERR**]

### 5.160.1 Macro Definition Documentation

**5.160.1.1 DBG**

```
#define DBG(
 x) fprintf(stderr, "%s:%d\n", __FILE__, __LINE__)
```

**5.160.1.2 ERR\_SUCCESS**

```
#define ERR_SUCCESS 0
```

**5.160.1.3 ERR\_IHANDLE**

```
#define ERR_IHANDLE -1
```

**5.160.1.4 ERR\_USER**

```
#define ERR_USER -1000
```

**5.160.1.5 MAX\_USER\_ERR**

```
#define MAX_USER_ERR 0x500
```

**5.160.1.6 IOInit**

```
#define IOInit MHA_STATIC_MHAIOalsa_IOInit
```

**5.160.1.7 IOPrepare**

```
#define IOPrepare MHA_STATIC_MHAIOalsa_IOPrepare
```

**5.160.1.8 IOStart**

```
#define IOStart MHA_STATIC_MHAIOalsa_IOStart
```

### 5.160.1.9 IOStop

```
#define IOStop MHA_STATIC_MHAIOalsa_IOStop
```

### 5.160.1.10 IORelease

```
#define IORelease MHA_STATIC_MHAIOalsa_IORelease
```

### 5.160.1.11 IOSetVar

```
#define IOSetVar MHA_STATIC_MHAIOalsa_IOSetVar
```

### 5.160.1.12 IOStrError

```
#define IOStrError MHA_STATIC_MHAIOalsa_IOStrError
```

### 5.160.1.13 IODestroy

```
#define IODestroy MHA_STATIC_MHAIOalsa_IODestroy
```

### 5.160.1.14 dummy\_interface\_test

```
#define dummy_interface_test MHA_STATIC_MHAIOalsa_dummy_interface_test
```

## 5.160.2 Function Documentation

### 5.160.2.1 IOInit()

```
int IOInit (
 int fragsize,
 float samplerate,
 IOProcessEvent_t proc_event,
 void * proc_handle,
 IOStartedEvent_t start_event,
 void * start_handle,
 IOStoppedEvent_t stop_event,
 void * stop_handle,
 void ** handle)
```

IO library initialization function, called by framework after loading this IO library into the MHA process.

Gives plugin callback functions and callback handles to interact with the MHA framework.

**Parameters**

|               |                                                                                                                                                              |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>handle</i> | output parameter. IO library returns pointer to void to the caller via this parameter. All other function calls from the MHA framework will use this handle. |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|

**5.160.2.2 IOPrepare()**

```
int IOPrepare (
 void * handle,
 int nch_in,
 int nch_out)
```

IO library prepare function, called after the MHA prepared the processing plugins.

**5.160.2.3 IOStart()**

```
int IOStart (
 void * handle)
```

**5.160.2.4 IOStop()**

```
int IOStop (
 void * handle)
```

**5.160.2.5 IORelease()**

```
int IORelease (
 void * handle)
```

**5.160.2.6 IOSetVar()**

```
int IOSetVar (
 void * handle,
 const char * command,
 char * retval,
 unsigned int maxretlen)
```



## 5.160.2.7 IOStrError()

```
const char* IOStrError (
 void * handle,
 int err)
```

## 5.160.2.8 IODestroy()

```
void IODestroy (
 void * handle)
```

## 5.160.2.9 dummy\_interface\_test()

```
void dummy_interface_test (
 void)
```

## 5.160.3 Variable Documentation

## 5.160.3.1 user\_err\_msg

```
char user_err_msg[MAX_USER_ERR] [static]
```

## 5.161 MHAIOFile.cpp File Reference

## Classes

- class **io\_file\_t**  
*File IO.*

## Macros

- #define **DEBUG(x)** std::cerr << \_\_FILE\_\_ << ":" << \_\_LINE\_\_ << " " << #x " = " << x << std::endl
- #define **ERR\_SUCCESS** 0
- #define **ERR\_IHANDLE** -1
- #define **ERR\_USER** -1000
- #define **MAX\_USER\_ERR** 0x500
- #define **IOInit** MHA\_STATIC\_MHAIOFile\_IOInit
- #define **IOPrepare** MHA\_STATIC\_MHAIOFile\_IOPrepare
- #define **IOStart** MHA\_STATIC\_MHAIOFile\_IOStart
- #define **IOStop** MHA\_STATIC\_MHAIOFile\_IOStop
- #define **IORelease** MHA\_STATIC\_MHAIOFile\_IORelease
- #define **IOSetVar** MHA\_STATIC\_MHAIOFile\_IOSetVar
- #define **IOStrError** MHA\_STATIC\_MHAIOFile\_IOStrError
- #define **IODestroy** MHA\_STATIC\_MHAIOFile\_IODestroy
- #define **dummy\_interface\_test** MHA\_STATIC\_MHAIOFile\_dummy\_interface\_test

## Functions

- int **IOInit** (int fragsize, float samplerate, **IOProcessEvent\_t** proc\_event, void \*proc\_↔ handle, **IOStartedEvent\_t** start\_event, void \*start\_handle, **IOStoppedEvent\_t** stop\_↔ event, void \*stop\_handle, void \*\*handle)
- int **IOPrepare** (void \*handle, int nch\_in, int nch\_out)
- int **IOStart** (void \*handle)
- int **IOStop** (void \*handle)
- int **IORelease** (void \*handle)
- int **IOSetVar** (void \*handle, const char \*command, char \*retval, unsigned int maxretlen)
- const char \* **IOStrError** (void \*handle, int err)
- void **IODestroy** (void \*handle)
- void **dummy\_interface\_test** (void)

## Variables

- static char **user\_err\_msg** [ **MAX\_USER\_ERR**]

### 5.161.1 Macro Definition Documentation

#### 5.161.1.1 DEBUG

```
#define DEBUG(
 x) std::cerr << __FILE__ << ":" << __LINE__ << " " << #x " = " <<
x << std::endl
```

#### 5.161.1.2 ERR\_SUCCESS

```
#define ERR_SUCCESS 0
```

#### 5.161.1.3 ERR\_IHANDLE

```
#define ERR_IHANDLE -1
```

#### 5.161.1.4 ERR\_USER

```
#define ERR_USER -1000
```

**5.161.1.5 MAX\_USER\_ERR**

```
#define MAX_USER_ERR 0x500
```

**5.161.1.6 IOInit**

```
#define IOInit MHA_STATIC_MHAIOFile_IOInit
```

**5.161.1.7 IOPrepare**

```
#define IOPrepare MHA_STATIC_MHAIOFile_IOPrepare
```

**5.161.1.8 IOStart**

```
#define IOStart MHA_STATIC_MHAIOFile_IOStart
```

**5.161.1.9 IOSTop**

```
#define IOSTop MHA_STATIC_MHAIOFile_IOStop
```

**5.161.1.10 IORelease**

```
#define IORelease MHA_STATIC_MHAIOFile_IORelease
```

**5.161.1.11 IOSetVar**

```
#define IOSetVar MHA_STATIC_MHAIOFile_IOSetVar
```

**5.161.1.12 IOStrError**

```
#define IOStrError MHA_STATIC_MHAIOFile_IOStrError
```

### 5.161.1.13 IODestroy

```
#define IODestroy MHA_STATIC_MHAIOFile_IODestroy
```

### 5.161.1.14 dummy\_interface\_test

```
#define dummy_interface_test MHA_STATIC_MHAIOFile_dummy_interface_test
```

## 5.161.2 Function Documentation

### 5.161.2.1 IOInit()

```
int IOInit (
 int fragsize,
 float samplerate,
 IOProcessEvent_t proc_event,
 void * proc_handle,
 IOStartedEvent_t start_event,
 void * start_handle,
 IOStoppedEvent_t stop_event,
 void * stop_handle,
 void ** handle)
```

### 5.161.2.2 IOPrepare()

```
int IOPrepare (
 void * handle,
 int nch_in,
 int nch_out)
```

### 5.161.2.3 IOStart()

```
int IOStart (
 void * handle)
```

#### 5.161.2.4 IOStop()

```
int IOStop (
 void * handle)
```

#### 5.161.2.5 IORelease()

```
int IORelease (
 void * handle)
```

#### 5.161.2.6 IOSetVar()

```
int IOSetVar (
 void * handle,
 const char * command,
 char * retval,
 unsigned int maxretlen)
```

#### 5.161.2.7 IOStrError()

```
const char* IOStrError (
 void * handle,
 int err)
```

#### 5.161.2.8 IODestroy()

```
void IODestroy (
 void * handle)
```

#### 5.161.2.9 dummy\_interface\_test()

```
void dummy_interface_test (
 void)
```

### 5.161.3 Variable Documentation

### 5.161.3.1 user\_err\_msg

```
char user_err_msg[MAX_USER_ERR] [static]
```

## 5.162 MHAIOJack.cpp File Reference

### Classes

- class **MHAIOJack::io\_jack\_t**  
*Main class for JACK IO.*

### Namespaces

- **MHAIOJack**  
*JACK IO.*

### Macros

- **#define ERR\_SUCCESS** 0
- **#define ERR\_IHANDLE** -1
- **#define ERR\_USER** -1000
- **#define MAX\_USER\_ERR** 0x500
- **#define IOInit** MHA\_STATIC\_MHAIOJack\_IOInit
- **#define IOPrepare** MHA\_STATIC\_MHAIOJack\_IOPrepare
- **#define IOStart** MHA\_STATIC\_MHAIOJack\_IOStart
- **#define IOSTop** MHA\_STATIC\_MHAIOJack\_IOStop
- **#define IORelease** MHA\_STATIC\_MHAIOJack\_IORelease
- **#define IOSetVar** MHA\_STATIC\_MHAIOJack\_IOSetVar
- **#define IOStrError** MHA\_STATIC\_MHAIOJack\_IOStrError
- **#define IODestroy** MHA\_STATIC\_MHAIOJack\_IDestroy
- **#define dummy\_interface\_test** MHA\_STATIC\_MHAIOJack\_dummy\_interface\_test

### Functions

- int **IOInit** (int fragsize, float samplerate, **IOProcessEvent\_t** proc\_event, void \*proc\_↵  
handle, **IOStartedEvent\_t** start\_event, void \*start\_handle, **IOStoppedEvent\_t** stop\_↵  
event, void \*stop\_handle, void \*\*handle)
- int **IOPrepare** (void \*handle, int nch\_in, int nch\_out)
- int **IOStart** (void \*handle)
- int **IOStop** (void \*handle)
- int **IORelease** (void \*handle)
- int **IOSetVar** (void \*handle, const char \*command, char \*retval, unsigned int maxretlen)
- const char \* **IOStrError** (void \*handle, int err)
- void **IODestroy** (void \*handle)
- void **dummy\_interface\_test** (void)

## Variables

- static char **user\_err\_msg** [ **MAX\_USER\_ERR**] = ""

### 5.162.1 Macro Definition Documentation

#### 5.162.1.1 ERR\_SUCCESS

```
#define ERR_SUCCESS 0
```

#### 5.162.1.2 ERR\_IHANDLE

```
#define ERR_IHANDLE -1
```

#### 5.162.1.3 ERR\_USER

```
#define ERR_USER -1000
```

#### 5.162.1.4 MAX\_USER\_ERR

```
#define MAX_USER_ERR 0x500
```

#### 5.162.1.5 IOInit

```
#define IOInit MHA_STATIC_MHAIOJack_IOInit
```

#### 5.162.1.6 IOPrepare

```
#define IOPrepare MHA_STATIC_MHAIOJack_IOPrepare
```

**5.162.1.7 IOStart**

```
#define IOStart MHA_STATIC_MHAIOJack_IOStart
```

**5.162.1.8 IOSTop**

```
#define IOSTop MHA_STATIC_MHAIOJack_IOStop
```

**5.162.1.9 IORelease**

```
#define IORelease MHA_STATIC_MHAIOJack_IORelease
```

**5.162.1.10 IOSetVar**

```
#define IOSetVar MHA_STATIC_MHAIOJack_IOSetVar
```

**5.162.1.11 IOStrError**

```
#define IOStrError MHA_STATIC_MHAIOJack_IOStrError
```

**5.162.1.12 IODestroy**

```
#define IODestroy MHA_STATIC_MHAIOJack_IODestroy
```

**5.162.1.13 dummy\_interface\_test**

```
#define dummy_interface_test MHA_STATIC_MHAIOJack_dummy_interface_test
```

**5.162.2 Function Documentation**



### 5.162.2.1 IOInit()

```
int IOInit (
 int fragsize,
 float samplerate,
 IOProcessEvent_t proc_event,
 void * proc_handle,
 IOStartedEvent_t start_event,
 void * start_handle,
 IOStoppedEvent_t stop_event,
 void * stop_handle,
 void ** handle)
```

### 5.162.2.2 IOPrepare()

```
int IOPrepare (
 void * handle,
 int nch_in,
 int nch_out)
```

### 5.162.2.3 IOStart()

```
int IOStart (
 void * handle)
```

### 5.162.2.4 IOStop()

```
int IOStop (
 void * handle)
```

### 5.162.2.5 IORelease()

```
int IORelease (
 void * handle)
```

#### 5.162.2.6 IOSetVar()

```
int IOSetVar (
 void * handle,
 const char * command,
 char * retval,
 unsigned int maxretlen)
```

#### 5.162.2.7 IOStrError()

```
const char* IOStrError (
 void * handle,
 int err)
```

#### 5.162.2.8 IODestroy()

```
void IODestroy (
 void * handle)
```

#### 5.162.2.9 dummy\_interface\_test()

```
void dummy_interface_test (
 void)
```

### 5.162.3 Variable Documentation

#### 5.162.3.1 user\_err\_msg

```
char user_err_msg[MAX_USER_ERR] = "" [static]
```

## 5.163 MHAIOJackdb.cpp File Reference

### Classes

- class **MHAIOJackdb::io\_jack\_t**  
*Main class for JACK IO.*

## Namespaces

- **MHAIOJackdb**

## Macros

- **#define ERR\_SUCCESS** 0
- **#define ERR\_IHANDLE** -1
- **#define ERR\_USER** -1000
- **#define MAX\_USER\_ERR** 0x500
- **#define IOInit** MHA\_STATIC\_MHAIOJackdb\_IOInit
- **#define IOPrepare** MHA\_STATIC\_MHAIOJackdb\_IOPrepare
- **#define IOStart** MHA\_STATIC\_MHAIOJackdb\_IOStart
- **#define IOSTop** MHA\_STATIC\_MHAIOJackdb\_IOStop
- **#define IORelease** MHA\_STATIC\_MHAIOJackdb\_IORelease
- **#define IOSetVar** MHA\_STATIC\_MHAIOJackdb\_IOSetVar
- **#define IOStrError** MHA\_STATIC\_MHAIOJackdb\_IOStrError
- **#define IODestroy** MHA\_STATIC\_MHAIOJackdb\_IDestroy
- **#define dummy\_interface\_test** MHA\_STATIC\_MHAIOJackdb\_dummy\_interface\_test

## Functions

- int **IOInit** (int fragsize, float samplerate, **IOProcessEvent\_t** proc\_event, void \*proc\_↵  
handle, **IOStartedEvent\_t** start\_event, void \*start\_handle, **IOStoppedEvent\_t** stop\_↵  
event, void \*stop\_handle, void \*\*handle)
- int **IOPrepare** (void \*handle, int nch\_in, int nch\_out)
- int **IOStart** (void \*handle)
- int **IOStop** (void \*handle)
- int **IORelease** (void \*handle)
- int **IOSetVar** (void \*handle, const char \*command, char \*retval, unsigned int maxretlen)
- const char \* **IOStrError** (void \*handle, int err)
- void **IODestroy** (void \*handle)
- void **dummy\_interface\_test** (void)

## Variables

- static char **user\_err\_msg** [ **MAX\_USER\_ERR**] = ""

### 5.163.1 Macro Definition Documentation

**5.163.1.1 ERR\_SUCCESS**

```
#define ERR_SUCCESS 0
```

**5.163.1.2 ERR\_IHANDLE**

```
#define ERR_IHANDLE -1
```

**5.163.1.3 ERR\_USER**

```
#define ERR_USER -1000
```

**5.163.1.4 MAX\_USER\_ERR**

```
#define MAX_USER_ERR 0x500
```

**5.163.1.5 IOInit**

```
#define IOInit MHA_STATIC_MHAIOJackdb_IOInit
```

**5.163.1.6 IOPrepare**

```
#define IOPrepare MHA_STATIC_MHAIOJackdb_IOPrepare
```

**5.163.1.7 IOStart**

```
#define IOStart MHA_STATIC_MHAIOJackdb_IOStart
```

**5.163.1.8 IOStop**

```
#define IOStop MHA_STATIC_MHAIOJackdb_IOStop
```

### 5.163.1.9 IORelease

```
#define IORelease MHA_STATIC_MHAIOJackdb_IORelease
```

### 5.163.1.10 IOSetVar

```
#define IOSetVar MHA_STATIC_MHAIOJackdb_IOSetVar
```

### 5.163.1.11 IOStrError

```
#define IOStrError MHA_STATIC_MHAIOJackdb_IOStrError
```

### 5.163.1.12 IODestroy

```
#define IODestroy MHA_STATIC_MHAIOJackdb_IODestroy
```

### 5.163.1.13 dummy\_interface\_test

```
#define dummy_interface_test MHA_STATIC_MHAIOJackdb_dummy_interface_test
```

## 5.163.2 Function Documentation

### 5.163.2.1 IOInit()

```
int IOInit (
 int fragsize,
 float samplerate,
 IOProcessEvent_t proc_event,
 void * proc_handle,
 IOStartedEvent_t start_event,
 void * start_handle,
 IOStoppedEvent_t stop_event,
 void * stop_handle,
 void ** handle)
```

**5.163.2.2 IOPrepare()**

```
int IOPrepare (
 void * handle,
 int nch_in,
 int nch_out)
```

**5.163.2.3 IOStart()**

```
int IOStart (
 void * handle)
```

**5.163.2.4 IOSTop()**

```
int IOSTop (
 void * handle)
```

**5.163.2.5 IORelease()**

```
int IORelease (
 void * handle)
```

**5.163.2.6 IOSetVar()**

```
int IOSetVar (
 void * handle,
 const char * command,
 char * retval,
 unsigned int maxretlen)
```

**5.163.2.7 IOStrError()**

```
const char* IOStrError (
 void * handle,
 int err)
```

## 5.163.2.8 IODestroy()

```
void IODestroy (
 void * handle)
```

## 5.163.2.9 dummy\_interface\_test()

```
void dummy_interface_test (
 void)
```

## 5.163.3 Variable Documentation

## 5.163.3.1 user\_err\_msg

```
char user_err_msg[MAX_USER_ERR] = "" [static]
```

## 5.164 MHAIOParser.cpp File Reference

## Classes

- class **io\_parser\_t**  
*Main class for Parser IO.*

## Macros

- **#define ERR\_SUCCESS** 0
- **#define ERR\_IHANDLE** -1
- **#define ERR\_USER** -1000
- **#define MAX\_USER\_ERR** 0x500
- **#define IOInit** MHA\_STATIC\_MHAIOParser\_IOInit
- **#define IOPrepare** MHA\_STATIC\_MHAIOParser\_IOPrepare
- **#define IOStart** MHA\_STATIC\_MHAIOParser\_IOStart
- **#define IOSTop** MHA\_STATIC\_MHAIOParser\_IOStop
- **#define IORelease** MHA\_STATIC\_MHAIOParser\_IORelease
- **#define IOSetVar** MHA\_STATIC\_MHAIOParser\_IOSetVar
- **#define IOStrError** MHA\_STATIC\_MHAIOParser\_IOStrError
- **#define IODestroy** MHA\_STATIC\_MHAIOParser\_IODestroy
- **#define dummy\_interface\_test** MHA\_STATIC\_MHAIOParser\_dummy\_interface\_test

## Functions

- int **IOInit** (int fragsize, float, **IOProcessEvent\_t** proc\_event, void \*proc\_handle, **IOStartedEvent\_t** start\_event, void \*start\_handle, **IOStoppedEvent\_t** stop\_event, void \*stop\_handle, void \*\*handle)
- int **IOPrepare** (void \*handle, int nch\_in, int nch\_out)
- int **IOStart** (void \*handle)
- int **IOStop** (void \*handle)
- int **IORelease** (void \*handle)
- int **IOSetVar** (void \*handle, const char \*command, char \*retval, unsigned int maxretlen)
- const char \* **IOStrError** (void \*handle, int err)
- void **IODestroy** (void \*handle)
- void **dummy\_interface\_test** (void)

## Variables

- static char **user\_err\_msg** [ **MAX\_USER\_ERR**]

### 5.164.1 Macro Definition Documentation

#### 5.164.1.1 ERR\_SUCCESS

```
#define ERR_SUCCESS 0
```

#### 5.164.1.2 ERR\_IHANDLE

```
#define ERR_IHANDLE -1
```

#### 5.164.1.3 ERR\_USER

```
#define ERR_USER -1000
```

#### 5.164.1.4 MAX\_USER\_ERR

```
#define MAX_USER_ERR 0x500
```



**5.164.1.5 IOInit**

```
#define IOInit MHA_STATIC_MHAIOParser_IOInit
```

**5.164.1.6 IOPrepare**

```
#define IOPrepare MHA_STATIC_MHAIOParser_IOPrepare
```

**5.164.1.7 IOStart**

```
#define IOStart MHA_STATIC_MHAIOParser_IOStart
```

**5.164.1.8 IOStop**

```
#define IOStop MHA_STATIC_MHAIOParser_IOStop
```

**5.164.1.9 IORelease**

```
#define IORelease MHA_STATIC_MHAIOParser_IORelease
```

**5.164.1.10 IOSetVar**

```
#define IOSetVar MHA_STATIC_MHAIOParser_IOSetVar
```

**5.164.1.11 IOStrError**

```
#define IOStrError MHA_STATIC_MHAIOParser_IOStrError
```

**5.164.1.12 IODestroy**

```
#define IODestroy MHA_STATIC_MHAIOParser_IODestroy
```

### 5.164.1.13 dummy\_interface\_test

```
#define dummy_interface_test MHA_STATIC_MHAIOParser_dummy_interface_test
```

## 5.164.2 Function Documentation

### 5.164.2.1 IOInit()

```
int IOInit (
 int fragsize,
 float ,
 IOProcessEvent_t proc_event,
 void * proc_handle,
 IOStartedEvent_t start_event,
 void * start_handle,
 IOStoppedEvent_t stop_event,
 void * stop_handle,
 void ** handle)
```

### 5.164.2.2 IOPrepare()

```
int IOPrepare (
 void * handle,
 int nch_in,
 int nch_out)
```

### 5.164.2.3 IOStart()

```
int IOStart (
 void * handle)
```

### 5.164.2.4 IOStop()

```
int IOStop (
 void * handle)
```

### 5.164.2.5 IORelease()

```
int IORelease (
 void * handle)
```

### 5.164.2.6 IOSetVar()

```
int IOSetVar (
 void * handle,
 const char * command,
 char * retval,
 unsigned int maxretlen)
```

### 5.164.2.7 IOStrError()

```
const char* IOStrError (
 void * handle,
 int err)
```

### 5.164.2.8 IODestroy()

```
void IODestroy (
 void * handle)
```

### 5.164.2.9 dummy\_interface\_test()

```
void dummy_interface_test (
 void)
```

## 5.164.3 Variable Documentation

### 5.164.3.1 user\_err\_msg

```
char user_err_msg[MAX_USER_ERR] [static]
```

## 5.165 MHAIOPortAudio.cpp File Reference

### Classes

- class **MHAIOPortAudio::device\_info\_t**
- class **MHAIOPortAudio::io\_portaudio\_t**

*Main class for Portaudio sound IO.*

### Namespaces

- **MHAIOPortAudio**

### Macros

- #define **ERR\_SUCCESS** 0
- #define **ERR\_IHANDLE** -1
- #define **ERR\_USER** -1000
- #define **MAX\_USER\_ERR** 0x500
- #define **IOInit** MHA\_STATIC\_MHAIOPortAudio\_IOInit
- #define **IOPrepare** MHA\_STATIC\_MHAIOPortAudio\_IOPrepare
- #define **IOStart** MHA\_STATIC\_MHAIOPortAudio\_IOStart
- #define **IOStop** MHA\_STATIC\_MHAIOPortAudio\_IOStop
- #define **IORelease** MHA\_STATIC\_MHAIOPortAudio\_IORelease
- #define **IOSetVar** MHA\_STATIC\_MHAIOPortAudio\_IOSetVar
- #define **IOStrError** MHA\_STATIC\_MHAIOPortAudio\_IOStrError
- #define **IODestroy** MHA\_STATIC\_MHAIOPortAudio\_IODestroy
- #define **dummy\_interface\_test** MHA\_STATIC\_MHAIOPortAudio\_dummy\_interface\_↵  
test

### Functions

- static std::string **MHAIOPortAudio::parserFriendlyName** (const std::string &in)
- int **portaudio\_callback** (const void \*input, void \*output, unsigned long frameCount, const PaStreamCallbackTimeInfo \*timeInfo, PaStreamCallbackFlags statusFlags, void \*userData)
- int **IOInit** (int fragsize, float samplerate, **IOProcessEvent\_t** proc\_event, void \*proc\_↵  
handle, **IOStartedEvent\_t** start\_event, void \*start\_handle, **IOStoppedEvent\_t** stop\_↵  
event, void \*stop\_handle, void \*\*handle)
- int **IOPrepare** (void \*handle, int nch\_in, int nch\_out)
- int **IOStart** (void \*handle)
- int **IOStop** (void \*handle)
- int **IORelease** (void \*handle)
- int **IOSetVar** (void \*handle, const char \*command, char \*retval, unsigned int maxretlen)
- const char \* **IOStrError** (void \*handle, int err)
- void **IODestroy** (void \*handle)
- void **dummy\_interface\_test** (void)

## Variables

- static char **user\_err\_msg** [ **MAX\_USER\_ERR**] = ""
- PaStreamCallback **portaudio\_callback**

## 5.165.1 Macro Definition Documentation

### 5.165.1.1 ERR\_SUCCESS

```
#define ERR_SUCCESS 0
```

### 5.165.1.2 ERR\_IHANDLE

```
#define ERR_IHANDLE -1
```

### 5.165.1.3 ERR\_USER

```
#define ERR_USER -1000
```

### 5.165.1.4 MAX\_USER\_ERR

```
#define MAX_USER_ERR 0x500
```

### 5.165.1.5 IOInit

```
#define IOInit MHA_STATIC_MHAIOPortAudio_IOInit
```

### 5.165.1.6 IOPrepare

```
#define IOPrepare MHA_STATIC_MHAIOPortAudio_IOPrepare
```

**5.165.1.7 IOStart**

```
#define IOStart MHA_STATIC_MHAIOPortAudio_IOStart
```

**5.165.1.8 IOStop**

```
#define IOStop MHA_STATIC_MHAIOPortAudio_IOStop
```

**5.165.1.9 IORelease**

```
#define IORelease MHA_STATIC_MHAIOPortAudio_IORelease
```

**5.165.1.10 IOSetVar**

```
#define IOSetVar MHA_STATIC_MHAIOPortAudio_IOSetVar
```

**5.165.1.11 IOStrError**

```
#define IOStrError MHA_STATIC_MHAIOPortAudio_IOStrError
```

**5.165.1.12 IODestroy**

```
#define IODestroy MHA_STATIC_MHAIOPortAudio_IODestroy
```

**5.165.1.13 dummy\_interface\_test**

```
#define dummy_interface_test MHA_STATIC_MHAIOPortAudio_dummy_interface_test
```

**5.165.2 Function Documentation**

### 5.165.2.1 portaudio\_callback()

```
int portaudio_callback (
 const void * input,
 void * output,
 unsigned long frameCount,
 const PaStreamCallbackTimeInfo * timeInfo,
 PaStreamCallbackFlags statusFlags,
 void * userData)
```

### 5.165.2.2 IOInit()

```
int IOInit (
 int fragsize,
 float samplerate,
 IOProcessEvent_t proc_event,
 void * proc_handle,
 IOStartedEvent_t start_event,
 void * start_handle,
 IOStoppedEvent_t stop_event,
 void * stop_handle,
 void ** handle)
```

### 5.165.2.3 IOPrepare()

```
int IOPrepare (
 void * handle,
 int nch_in,
 int nch_out)
```

### 5.165.2.4 IOStart()

```
int IOStart (
 void * handle)
```

### 5.165.2.5 IOSTop()

```
int IOSTop (
 void * handle)
```

**5.165.2.6 IORelease()**

```
int IORelease (
 void * handle)
```

**5.165.2.7 IOSetVar()**

```
int IOSetVar (
 void * handle,
 const char * command,
 char * retval,
 unsigned int maxretlen)
```

**5.165.2.8 IOStrError()**

```
const char* IOStrError (
 void * handle,
 int err)
```

**5.165.2.9 IODestroy()**

```
void IODestroy (
 void * handle)
```

**5.165.2.10 dummy\_interface\_test()**

```
void dummy_interface_test (
 void)
```

**5.165.3 Variable Documentation****5.165.3.1 user\_err\_msg**

```
char user_err_msg[MAX_USER_ERR] = "" [static]
```



## 5.165.3.2 portaudio\_callback

PaStreamCallback portaudio\_callback

## 5.166 MHAOTCP.cpp File Reference

## Classes

- class **io\_tcp\_parser\_t**  
*The parser interface of the IOTCP library.*
- class **io\_tcp\_sound\_t**  
*Sound data handling of io tcp library.*
- union **io\_tcp\_sound\_t::float\_union**  
*This union helps in conversion of floats from host byte order to network byte order and back again.*
- class **io\_tcp\_fwcb\_t**  
*TCP sound-io library's interface to the framework callbacks.*
- class **io\_tcp\_t**  
*The tcp sound io library.*

## Macros

- #define **ERR\_SUCCESS** 0
- #define **ERR\_IHANDLE** -1
- #define **ERR\_USER** -1000
- #define **MAX\_USER\_ERR** 0x2000
- #define **MHA\_ErrorMsg2**(x, y) **MHA\_Error**(\_\_FILE\_\_, \_\_LINE\_\_, (x), (y))
- #define **MHA\_ErrorMsg3**(x, y, z) **MHA\_Error**(\_\_FILE\_\_, \_\_LINE\_\_, (x), (y), (z))
- #define **MIN\_TCP\_PORT** 0
- #define **MIN\_TCP\_PORT\_STR** "0"
- #define **MAX\_TCP\_PORT** 65535
- #define **MAX\_TCP\_PORT\_STR** "65535"
- #define **IOInit** MHA\_STATIC\_MHAOTCP\_IOInit
- #define **IOPrepare** MHA\_STATIC\_MHAOTCP\_IOPrepare
- #define **IOStart** MHA\_STATIC\_MHAOTCP\_IOStart
- #define **IOStop** MHA\_STATIC\_MHAOTCP\_IOStop
- #define **IORelease** MHA\_STATIC\_MHAOTCP\_IORelease
- #define **IOSetVar** MHA\_STATIC\_MHAOTCP\_IOSetVar
- #define **IOStrError** MHA\_STATIC\_MHAOTCP\_IOStrError
- #define **IODestroy** MHA\_STATIC\_MHAOTCP\_IODestroy
- #define **dummy\_interface\_test** MHA\_STATIC\_MHAOTCP\_dummy\_interface\_test

## Functions

- static int **copy\_error** ( **MHA\_Error** &e)
- static void \* **thread\_startup\_function** (void \*parameter)
- int **IOInit** (int fragsize, float samplerate, **IOProcessEvent\_t** proc\_event, void \*proc\_↵  
handle, **IOStartedEvent\_t** start\_event, void \*start\_handle, **IOStoppedEvent\_t** stop\_↵  
event, void \*stop\_handle, void \*\*handle)
- int **IOPrepare** (void \*handle, int num\_inchannels, int num\_outchannels)
- int **IOStart** (void \*handle)
- int **IOStop** (void \*handle)
- int **IORelease** (void \*handle)
- int **IOSetVar** (void \*handle, const char \*cmd, char \*retval, unsigned int len)
- const char \* **IOStrError** (void \*handle, int err)
- void **IODestroy** (void \*handle)
- void **dummy\_interface\_test** (void)

## Variables

- static char **user\_err\_msg** [ **MAX\_USER\_ERR**]

### 5.166.1 Macro Definition Documentation

#### 5.166.1.1 ERR\_SUCCESS

```
#define ERR_SUCCESS 0
```

#### 5.166.1.2 ERR\_IHANDLE

```
#define ERR_IHANDLE -1
```

#### 5.166.1.3 ERR\_USER

```
#define ERR_USER -1000
```

#### 5.166.1.4 MAX\_USER\_ERR

```
#define MAX_USER_ERR 0x2000
```

### 5.166.1.5 MHA\_ErrorMsg2

```
#define MHA_ErrorMsg2(
 x,
 y) MHA_Error(__FILE__, __LINE__, (x), (y))
```

### 5.166.1.6 MHA\_ErrorMsg3

```
#define MHA_ErrorMsg3(
 x,
 y,
 z) MHA_Error(__FILE__, __LINE__, (x), (y), (z))
```

### 5.166.1.7 MIN\_TCP\_PORT

```
#define MIN_TCP_PORT 0
```

### 5.166.1.8 MIN\_TCP\_PORT\_STR

```
#define MIN_TCP_PORT_STR "0"
```

### 5.166.1.9 MAX\_TCP\_PORT

```
#define MAX_TCP_PORT 65535
```

### 5.166.1.10 MAX\_TCP\_PORT\_STR

```
#define MAX_TCP_PORT_STR "65535"
```

### 5.166.1.11 IOInit

```
#define IOInit MHA_STATIC_MHA_IOTCP_IOInit
```

**5.166.1.12 IOPrepare**

```
#define IOPrepare MHA_STATIC_MHAIOTCP_IOPrepare
```

**5.166.1.13 IOStart**

```
#define IOStart MHA_STATIC_MHAIOTCP_IOStart
```

**5.166.1.14 IOSTop**

```
#define IOSTop MHA_STATIC_MHAIOTCP_IOStop
```

**5.166.1.15 IORelease**

```
#define IORelease MHA_STATIC_MHAIOTCP_IORelease
```

**5.166.1.16 IOSetVar**

```
#define IOSetVar MHA_STATIC_MHAIOTCP_IOSetVar
```

**5.166.1.17 IOStrError**

```
#define IOStrError MHA_STATIC_MHAIOTCP_IOStrError
```

**5.166.1.18 IODestroy**

```
#define IODestroy MHA_STATIC_MHAIOTCP_IODestroy
```

**5.166.1.19 dummy\_interface\_test**

```
#define dummy_interface_test MHA_STATIC_MHAIOTCP_dummy_interface_test
```

## 5.166.2 Function Documentation

### 5.166.2.1 copy\_error()

```
static int copy_error (
 MHA_Error & e) [static]
```

### 5.166.2.2 thread\_startup\_function()

```
static void* thread_startup_function (
 void * parameter) [static]
```

### 5.166.2.3 IOInit()

```
int IOInit (
 int fragsize,
 float samplerate,
 IOProcessEvent_t proc_event,
 void * proc_handle,
 IOStartedEvent_t start_event,
 void * start_handle,
 IOStoppedEvent_t stop_event,
 void * stop_handle,
 void ** handle)
```

### 5.166.2.4 IOPrepare()

```
int IOPrepare (
 void * handle,
 int num_inchannels,
 int num_outchannels)
```

### 5.166.2.5 IOStart()

```
int IOStart (
 void * handle)
```

**5.166.2.6 IOStop()**

```
int IOStop (
 void * handle)
```

**5.166.2.7 IORelease()**

```
int IORelease (
 void * handle)
```

**5.166.2.8 IOSetVar()**

```
int IOSetVar (
 void * handle,
 const char * cmd,
 char * retval,
 unsigned int len)
```

**5.166.2.9 IOStrError()**

```
const char* IOStrError (
 void * handle,
 int err)
```

**5.166.2.10 IODestroy()**

```
void IODestroy (
 void * handle)
```

**5.166.2.11 dummy\_interface\_test()**

```
void dummy_interface_test (
 void)
```

**5.166.3 Variable Documentation**

## 5.166.3.1 user\_err\_msg

```
char user_err_msg[MAX_USER_ERR] [static]
```

## 5.167 mhajack.cpp File Reference

## Functions

- static void **jack\_error\_handler** (const char \*msg)
- static int **dummy\_jack\_proc\_cb** (jack\_nframes\_t, void \*)
- void **make\_friendly\_number** (jack\_default\_audio\_sample\_t &x)

## Variables

- char **last\_jack\_err\_msg** [ MAX\_USER\_ERR] = ""
- int **last\_jack\_err** = 0

## 5.167.1 Function Documentation

## 5.167.1.1 jack\_error\_handler()

```
static void jack_error_handler (
 const char * msg) [static]
```

## 5.167.1.2 dummy\_jack\_proc\_cb()

```
static int dummy_jack_proc_cb (
 jack_nframes_t ,
 void *) [static]
```

## 5.167.1.3 make\_friendly\_number()

```
void make_friendly_number (
 jack_default_audio_sample_t & x) [inline]
```

## 5.167.2 Variable Documentation

### 5.167.2.1 last\_jack\_err\_msg

```
char last_jack_err_msg[MAX_USER_ERR] = ""
```

### 5.167.2.2 last\_jack\_err

```
int last_jack_err = 0
```

## 5.168 mhajack.h File Reference

### Classes

- class **MHAJack::port\_t**  
*Class for one channel/port.*
- class **MHAJack::client\_t**  
*Generic asynchronous JACK client.*
- class **MHAJack::client\_noncont\_t**  
*Generic client for synchronous playback and recording of waveform fragments.*
- class **MHAJack::client\_avg\_t**  
*Generic JACK client for averaging a system response across time.*

### Namespaces

- **MHAJack**  
*Classes and functions for openMHA and JACK interaction.*

### Macros

- #define **MHAJACK\_FW\_STARTED** 1
- #define **MHAJACK\_STOPPED** 2
- #define **MHAJACK\_STARTING** 8
- #define **IO\_ERROR\_JACK** 11
- #define **IO\_ERROR\_MHAJACKLIB** 12
- #define **MAX\_USER\_ERR** 0x500



## Functions

- void **MHAJack::io** ( **mha\_wave\_t** \*s\_out, **mha\_wave\_t** \*s\_in, const std::string &name, const std::vector< std::string > &p\_out, const std::vector< std::string > &p\_in, float \*srate=NULL, unsigned int \*fragsize=NULL, bool use\_jack\_transport=false)  
*Functional form of generic client for synchronous playback and recording of waveform fragments.*
- std::vector< unsigned int > **MHAJack::get\_port\_capture\_latency** (const std::vector< std::string > &ports)  
*Return the JACK port latency of ports.*
- std::vector< int > **MHAJack::get\_port\_capture\_latency\_int** (const std::vector< std::string > &ports)  
*Return the JACK port latency of ports.*
- std::vector< unsigned int > **MHAJack::get\_port\_playback\_latency** (const std::vector< std::string > &ports)  
*Return the JACK port latency of ports.*
- std::vector< int > **MHAJack::get\_port\_playback\_latency\_int** (const std::vector< std::string > &ports)

## Variables

- char **last\_jack\_err\_msg** [ **MAX\_USER\_ERR**]

### 5.168.1 Macro Definition Documentation

#### 5.168.1.1 MHAJACK\_FW\_STARTED

```
#define MHAJACK_FW_STARTED 1
```

#### 5.168.1.2 MHAJACK\_STOPPED

```
#define MHAJACK_STOPPED 2
```

#### 5.168.1.3 MHAJACK\_STARTING

```
#define MHAJACK_STARTING 8
```

#### 5.168.1.4 IO\_ERROR\_JACK

```
#define IO_ERROR_JACK 11
```

#### 5.168.1.5 IO\_ERROR\_MHAJACKLIB

```
#define IO_ERROR_MHAJACKLIB 12
```

#### 5.168.1.6 MAX\_USER\_ERR

```
#define MAX_USER_ERR 0x500
```

### 5.168.2 Variable Documentation

#### 5.168.2.1 last\_jack\_err\_msg

```
char last_jack_err_msg[MAX_USER_ERR]
```

## 5.169 mhamain.cpp File Reference

### Classes

- class **mhaserver\_t**  
*MHA Framework listening on TCP port for commands.*
- class **mhaserver\_t::tcp\_server\_t**

### Macros

- #define **HELP\_TEXT**
- #define **NORELEASE\_WARNING**
- #define **VERSION\_EXTENSION** "+"
- #define **GREETING\_TEXT**

### Functions

- void **create\_lock** (unsigned int p, const std::string &s)
- void **remove\_lock** (unsigned int p)
- int **mhamain** (int argc, char \*argv[])

## 5.169.1 Macro Definition Documentation

### 5.169.1.1 HELP\_TEXT

```
#define HELP_TEXT
```

### 5.169.1.2 NORELEASE\_WARNING

```
#define NORELEASE_WARNING
```

### 5.169.1.3 VERSION\_EXTENSION

```
#define VERSION_EXTENSION "+"
```

### 5.169.1.4 GREETING\_TEXT

```
#define GREETING_TEXT
```

## 5.169.2 Function Documentation

### 5.169.2.1 create\_lock()

```
void create_lock (
 unsigned int p,
 const std::string & s)
```

### 5.169.2.2 remove\_lock()

```
void remove_lock (
 unsigned int p)
```

### 5.169.2.3 mhamain()

```
int mhamain (
 int argc,
 char * argv[])
```

## 5.170 mhapluginloader.cpp File Reference

## 5.171 mhapluginloader.h File Reference

### Classes

- class **PluginLoader::config\_file\_splitter\_t**
- class **PluginLoader::fourway\_processor\_t**

*This abstract class defines the interface for classes that implement all types of signal domain processing supported by the MHA: wave2wave, spec2spec, wave2spec, and spec2wave.*
- class **PluginLoader::mhapluginloader\_t**
- class **MHAParser::mhapluginloader\_t**

*Class to create a plugin loader in a parser, including the load logic.*

### Namespaces

- **PluginLoader**
- **MHAParser**

*Name space for the openMHA-Parser configuration language.*

### Functions

- const char \* **PluginLoader::mhastrdomain** ( **mha\_domain\_t**)
- void **PluginLoader::mhaconfig\_compare** (const **mhaconfig\_t** &req, const **mhaconfig\_t** &avail, const std::string &pref="")

*Compare two **mhaconfig\_t** (p. 792) structures, and report differences as an error.*

## 5.172 mhasndfile.cpp File Reference

### Functions

- void **write\_wave** (const **mha\_wave\_t** &sig, const char \*fname, const float &srates, const int &format)
- unsigned int **validator\_channels** (std::vector< int > channel\_map, unsigned int **channels**)
- unsigned int **validator\_length** (unsigned int maxlen, unsigned int frames, unsigned int startpos)

### 5.172.1 Function Documentation

#### 5.172.1.1 write\_wave()

```
void write_wave (
 const mha_wave_t & sig,
 const char * fname,
 const float & srate,
 const int & format)
```

#### 5.172.1.2 validator\_channels()

```
unsigned int validator_channels (
 std::vector< int > channel_map,
 unsigned int channels)
```

#### 5.172.1.3 validator\_length()

```
unsigned int validator_length (
 unsigned int maxlen,
 unsigned int frames,
 unsigned int startpos)
```

## 5.173 mhasndfile.h File Reference

### Classes

- class **MHASndFile::sf\_t**
- class **MHASndFile::sf\_wave\_t**

### Namespaces

- **MHASndFile**

### Functions

- void **write\_wave** (const **mha\_wave\_t** &sig, const char \*fname, const float &srate=44100, const int &format=SF\_FORMAT\_WAV|SF\_FORMAT\_FLOAT|SF\_ENDIAN\_FILE)

### 5.173.1 Function Documentation

#### 5.173.1.1 write\_wave()

```
void write_wave (
 const mha_wave_t & sig,
 const char * fname,
 const float & srate = 44100,
 const int & format = SF_FORMAT_WAV|SF_FORMAT_FLOAT|SF_ENDIAN_FILE)
```

### 5.174 multibandcompressor.cpp File Reference

#### Classes

- class **multibandcompressor::plugin\_signals\_t**
- class **multibandcompressor::fftfb\_plug\_t**
- class **multibandcompressor::interface\_t**

#### Namespaces

- **multibandcompressor**

### 5.175 nlms\_wave.cpp File Reference

#### Classes

- class **rt\_nlms\_t**
- class **nlms\_t**

#### Macros

- #define **NORMALIZATION\_TYPES** "[none default sum]"
- #define **NORM\_NONE** 0
- #define **NORM\_DEFAULT** 1
- #define **NORM\_SUM** 2
- #define **ESTIMATION\_TYPES** "[previous current]"
- #define **ESTIM\_PREV** 0
- #define **ESTIM\_CUR** 1

## Functions

- void **make\_friendly\_number\_by\_limiting** ( mha\_real\_t &x)

### 5.175.1 Macro Definition Documentation

#### 5.175.1.1 NORMALIZATION\_TYPES

```
#define NORMALIZATION_TYPES "[none default sum]"
```

#### 5.175.1.2 NORM\_NONE

```
#define NORM_NONE 0
```

#### 5.175.1.3 NORM\_DEFAULT

```
#define NORM_DEFAULT 1
```

#### 5.175.1.4 NORM\_SUM

```
#define NORM_SUM 2
```

#### 5.175.1.5 ESTIMATION\_TYPES

```
#define ESTIMATION_TYPES "[previous current]"
```

#### 5.175.1.6 ESTIM\_PREV

```
#define ESTIM_PREV 0
```

### 5.175.1.7 ESTIM\_CUR

```
#define ESTIM_CUR 1
```

## 5.175.2 Function Documentation

### 5.175.2.1 make\_friendly\_number\_by\_limiting()

```
void make_friendly_number_by_limiting (
 mha_real_t & x) [inline]
```

## 5.176 noise.cpp File Reference

### Classes

- class **cfg\_t**
- class **noise\_t**

## 5.177 noise\_psd\_estimator.cpp File Reference

### Classes

- class **noise\_psd\_estimator::noise\_psd\_estimator\_t**
- class **noise\_psd\_estimator::noise\_psd\_estimator\_if\_t**

### Namespaces

- **noise\_psd\_estimator**

### Macros

- **#define POWSPEC\_FACTOR 0.0025**

### 5.177.1 Macro Definition Documentation



## 5.177.1.1 POWSPEC\_FACTOR

```
#define POWSPEC_FACTOR 0.0025
```

## 5.178 osc2ac.cpp File Reference

## Classes

- class **osc\_variable\_t**  
*Class for converting messages received at a single osc address to a single AC variable.*
- class **osc\_server\_t**  
*OSC receiver implemented using liblo.*
- class **osc2ac\_t**

## 5.179 overlapadd.cpp File Reference

## Namespaces

- **overlapadd**

## 5.180 overlapadd.hh File Reference

## Classes

- class **overlapadd::overlapadd\_t**
- class **overlapadd::overlapadd\_if\_t**

## Namespaces

- **overlapadd**

## 5.181 plingploing.cpp File Reference

## Classes

- class **plingploing::plingploing\_t**  
*Run-time configuration of the plingploing music generator.*
- class **plingploing::if\_t**  
*Plugin class of the plingploing music generator.*

## Namespaces

- **plingploing**

*All classes for the plingploing music generator live in this namespace.*

## Functions

- double **plingploing::drand** (double a, double b)

## 5.182 pluginbrowser.cpp File Reference

## 5.183 pluginbrowser.h File Reference

## Classes

- class **plugindescription\_t**
- class **pluginloader\_t**
- class **pluginbrowser\_t**

## 5.184 prediction\_error.cpp File Reference

## Macros

- **#define PATCH\_VAR**(var) patchbay.connect(&var.valuechanged, this, & **prediction\_error::update\_cfg**)
- **#define INSERT\_PATCH**(var) **insert\_member**(var); **PATCH\_VAR**(var)

## Functions

- void **make\_friendly\_number\_by\_limiting** ( mha\_real\_t &x)

### 5.184.1 Macro Definition Documentation

#### 5.184.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & prediction_error
::update_cfg)
```

## 5.184.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

## 5.184.2 Function Documentation

## 5.184.2.1 make\_friendly\_number\_by\_limiting()

```
void make_friendly_number_by_limiting (
 mha_real_t & x) [inline]
```

## 5.185 prediction\_error.h File Reference

## Classes

- class **prediction\_error\_config**
- class **prediction\_error**

## 5.186 resampling.cpp File Reference

## Classes

- class **MHAPLugin\_Resampling::resampling\_t**
- class **MHAPLugin\_Resampling::resampling\_if\_t**

## Namespaces

- **MHAPLugin\_Resampling**

## 5.187 rmslevel.cpp File Reference

## Classes

- class **rmslevel::mon\_t**
- class **rmslevel::rmslevel\_t**  
*Run-time configuration class of the rmslevel plugin.*
- class **rmslevel::rmslevel\_if\_t**  
*Interface class of the rmslevel plugin.*

## Namespaces

- **rmslevel**

## Enumerations

- enum **rmslevel::UNIT** { **rmslevel::UNIT::SPL** =0, **rmslevel::UNIT::HL** =1 }

## 5.188 rohBeam.cpp File Reference

## Namespaces

- **rohBeam**

## 5.189 rohBeam.hh File Reference

## Classes

- struct **rohBeam::configOptions**
- class **rohBeam::rohConfig**
- class **rohBeam::rohBeam**

## Namespaces

- **rohBeam**

## Macros

- **#define NDEBUG**

## Functions

- double **rohBeam::j0** (double x)  
*Cylindrical bessel function of the first kind of order 0.*

## Variables

- constexpr float **rohBeam::CONST\_C** = 343.0115f
- constexpr int **rohBeam::refL** = 0
- constexpr int **rohBeam::refR** = 3
- auto **rohBeam::scalarify** =[ ](auto t){return t(0);}

## 5.189.1 Macro Definition Documentation

## 5.189.1.1 NDEBUG

```
#define NDEBUG
```

## 5.190 route.cpp File Reference

## Classes

- class **route::process\_t**
- class **route::interface\_t**

## Namespaces

- **route**

## 5.191 save\_spec.cpp File Reference

## Classes

- class **save\_spec\_t**

## 5.192 save\_wave.cpp File Reference

## Classes

- class **save\_wave\_t**

## 5.193 shadowfilter\_begin.cpp File Reference

## Classes

- class **shadowfilter\_begin::cfg\_t**
- class **shadowfilter\_begin::shadowfilter\_begin\_t**

## Namespaces

- **shadowfilter\_begin**

## 5.194 shadowfilter\_end.cpp File Reference

### Classes

- class **shadowfilter\_end::cfg\_t**
- class **shadowfilter\_end::shadowfilter\_end\_t**

### Namespaces

- **shadowfilter\_end**

## 5.195 sine.cpp File Reference

### Classes

- struct **sine\_cfg\_t**
- class **sine\_t**

## 5.196 smooth\_cepstrum.cpp File Reference

### Macros

- **#define INSERT\_VAR(var) insert\_item(#var, &var)**
- **#define PATCH\_VAR(var)**
- **#define INSERT\_PATCH(var) INSERT\_VAR(var); PATCH\_VAR(var)**

### 5.196.1 Macro Definition Documentation

#### 5.196.1.1 INSERT\_VAR

```
#define INSERT_VAR(
 var) insert_item(#var, &var)
```

#### 5.196.1.2 PATCH\_VAR

```
#define PATCH_VAR(
 var)
```

## 5.196.1.3 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) INSERT_VAR(var); PATCH_VAR(var)
```

## 5.197 smooth\_cepstrum.hh File Reference

## Classes

- class **smooth\_cepstrum::smooth\_params**
- class **smooth\_cepstrum::smooth\_cepstrum\_t**
- class **smooth\_cepstrum::smooth\_cepstrum\_if\_t**

## Namespaces

- **smooth\_cepstrum**

## 5.198 smoothgains\_bridge.cpp File Reference

## Classes

- class **smoothgains\_bridge::smoothspec\_wrap\_t**
- class **smoothgains\_bridge::overlapadd\_if\_t**

## Namespaces

- **smoothgains\_bridge**

## 5.199 softclip.cpp File Reference

## Classes

- class **cfg\_t**
- class **softclip\_t**

## 5.200 spec2wave.cpp File Reference

## Classes

- class **hanning\_ramps\_t**
- class **spec2wave\_t**
- class **spec2wave\_if\_t**

## Functions

- unsigned int **max** (unsigned int a, unsigned int b)
- unsigned int **min** (unsigned int a, unsigned int b)

### 5.200.1 Function Documentation

#### 5.200.1.1 max()

```
unsigned int max (
 unsigned int a,
 unsigned int b) [inline]
```

#### 5.200.1.2 min()

```
unsigned int min (
 unsigned int a,
 unsigned int b) [inline]
```

### 5.201 speechoise.cpp File Reference

## Macros

- #define **NUM\_ENTR\_MHAORIG** 76
- #define **NUM\_ENTR\_LTASS** 25
- #define **NUM\_ENTR\_OLNOISE** 49

## Functions

- float **fhz2bandno** (float x)
- float **erb\_hz\_f\_hz** (float f\_hz)
- float **hz2hz** (float x)  
*Dummy scale transformation Hz to Hz.*
- float **bandw\_correction** (float f, float ldb)



## Variables

- float **vmHAOrigSpec** [ **NUM\_ENTR\_MHAORIG**] = {-1.473, 0, -4.939, -10.14, -13.94, -14.83, -14.27, -15.66, -16.16, -18.22, -20.5, -21.23, -22.13, -22.58, -23.98, -26.58, -26.4, -25.15, -23.89, -25.54, -27, -30.15, -31.68, -30.14, -27.55, -25.79, -25.89, -26.11, -27.↵  
48, -30.37, -33.13, -36.23, -36.64, -36.35, -35.03, -35.48, -36.35, -37.95, -40.53, -42.37, -41.29, -38.49, -36.32, -34.85, -34.05, -33.81, -33.48, -34.1, -35.19, -36.29, -36.94, -37.↵  
53, -38.71, -38.7, -38.92, -40.36, -41.26, -42.19, -43.65, -44.37, -43.95, -43.15, -42.57, -41.57, -41.86, -42.34, -42.87, -42.35, -42.71, -42.85, -43.47, -47.43, -67.54, -76.3, -77.↵  
43, -77.43}
- float **vmHAOrigFreq** [ **NUM\_ENTR\_MHAORIG**] = {172.266,344.532,516.797,689.↵  
063,861.329,1033.59,1205.86,1378.13,1550.39,1722.66,1894.92,2067.19,2239.↵  
46,2411.72,2583.99,2756.25,2928.52,3100.78,3273.05,3445.32,3617.58,3789.85,3962.↵  
11,4134.38,4306.64,4478.91,4651.18,4823.44,4995.71,5167.97,5340.24,5512.51,5684.↵  
77,5857.04,6029.3,6201.57,6373.83,6546.1,6718.37,6890.63,7062.9,7235.16,7407.↵  
43,7579.69,7751.96,7924.23,8096.49,8268.76,8441.02,8613.29,8785.56,8957.82,9130.↵  
09,9302.35,9474.62,9646.88,9819.15,9991.42,10163.7,10335.9,10508.2,10680.↵  
5,10852.7,11025,11197.3,11369.5,11541.8,11714.1,11886.3,12058.6,12230.9,12403.↵  
1,12575.4,12747.7,12919.9,13092.2}
- float **vLTASS\_freq** [ **NUM\_ENTR\_LTASS**] = {63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12500, 16000}
- float **vLTASS\_combined\_lev** [ **NUM\_ENTR\_LTASS**] = {38.6, 43.5, 54.4, 57.7, 56.8, 60.2, 60.3, 59.0, 62.1, 62.1, 60.5, 56.8, 53.7, 53.0, 52.0, 48.7, 48.1, 46.8, 45.6, 44.5, 44.3, 43.7, 43.4, 41.3, 40.7}
- float **vLTASS\_female\_lev** [ **NUM\_ENTR\_LTASS**] = {37.0,36.0,37.5,40.1,53.4,62.↵  
2,60.9,58.1,61.7,61.7,60.4,58,54.3,52.3,51.7,48.8,47.3,46.7,45.3,44.6,45.2,44.9,45.↵  
0,42.8,41.1}
- float **vLTASS\_male\_lev** [ **NUM\_ENTR\_LTASS**] = {38.6,43.5,54.4,57.7,56.8,58.2,59.↵  
7,60.0,62.4,62.6,60.6,55.7,53.1,53.7,52.3,48.7,48.9,47.0,46.0,44.4,43.3,42.4,41.9,39.↵  
8,40.4}
- float **vOlnoiseFreq** [ **NUM\_ENTR\_OLNOISE**] = {62.5,70.1539,78.7451,88.3884,99.↵  
2126,111.362,125,140.308,157.49,176.777,198.425,222.725,250,280.616,314.98,353.↵  
553,396.85,445.449,500,561.231,629.961,707.107,793.701,890.899,1000,1122.↵  
46,1259.92,1414.21,1587.4,1781.8,2000,2244.92,2519.84,2828.43,3174.8,3563.↵  
59,4000,4489.85,5039.68,5656.85,6349.6,7127.19,8000,8979.7,10079.4,11313.↵  
7,12699.2,14254.4,16000}
- float **vOlnoiseLev** [ **NUM\_ENTR\_OLNOISE**] = {45.9042,38.044,48.9444,61.3697,67.↵  
6953,69.7451,71.6201,71.2431,65.2754,63.2547,70.2264,72.1434,73.4433,73.2659,69.↵  
8424,71.0132,70.9577,70.3492,68.691,64.8436,64.0435,64.2879,60.5889,60.6596,60.↵  
3727,61.2003,61.8477,61.1478,61.2312,58.6584,57.2892,56.8299,56.0191,53.3018,56.↵  
0525,54.3592,50.8823,55.992,54.6768,47.2616,46.9914,45.209,50.413,47.5848,43.↵  
3215,43.754,38.5773,-0.39427,5.74224}

## 5.201.1 Macro Definition Documentation

**5.201.1.1 NUM\_ENTR\_MHAORIG**

```
#define NUM_ENTR_MHAORIG 76
```

**5.201.1.2 NUM\_ENTR\_LTASS**

```
#define NUM_ENTR_LTASS 25
```

**5.201.1.3 NUM\_ENTR\_OLNOISE**

```
#define NUM_ENTR_OLNOISE 49
```

**5.201.2 Function Documentation****5.201.2.1 fhz2bandno()**

```
float fhz2bandno (
 float x)
```

**5.201.2.2 erb\_hz\_f\_hz()**

```
float erb_hz_f_hz (
 float f_hz)
```

**5.201.2.3 hz2hz()**

```
float hz2hz (
 float x)
```

Dummy scale transformation Hz to Hz.

This function implements a dummy scale transformation (linear frequency scale).

## Parameters

|          |                       |
|----------|-----------------------|
| <i>x</i> | Input frequency in Hz |
|----------|-----------------------|

## Returns

Frequency in Hz

### 5.201.2.4 bandw\_correction()

```
float bandw_correction (
 float f,
 float ldb)
```

### 5.201.3 Variable Documentation

#### 5.201.3.1 vMHAOrigSpec

```
float vMHAOrigSpec[NUM_ENTR_MHAORIG] = {-1.473, 0, -4.939, -10.14, -13.94, -14.↵
83, -14.27, -15.66, -16.16, -18.22, -20.5, -21.23, -22.13, -22.58, -23.98, -26.58,
-26.4, -25.15, -23.89, -25.54, -27, -30.15, -31.68, -30.14, -27.55, -25.79, -25.↵
89, -26.11, -27.48, -30.37, -33.13, -36.23, -36.64, -36.35, -35.03, -35.48, -36.↵
35, -37.95, -40.53, -42.37, -41.29, -38.49, -36.32, -34.85, -34.05, -33.81, -33.48,
-34.1, -35.19, -36.29, -36.94, -37.53, -38.71, -38.7, -38.92, -40.36, -41.26, -42.↵
19, -43.65, -44.37, -43.95, -43.15, -42.57, -41.57, -41.86, -42.34, -42.87, -42.35,
-42.71, -42.85, -43.47, -47.43, -67.54, -76.3, -77.43, -77.43}
```

#### 5.201.3.2 vMHAOrigFreq

```
float vMHAOrigFreq[NUM_ENTR_MHAORIG] = {172.266, 344.532, 516.797, 689.063, 861.329, 1033.↵
59, 1205.86, 1378.13, 1550.39, 1722.66, 1894.92, 2067.19, 2239.46, 2411.72, 2583.99, 2756.↵
25, 2928.52, 3100.78, 3273.05, 3445.32, 3617.58, 3789.85, 3962.11, 4134.38, 4306.64, 4478.↵
91, 4651.18, 4823.44, 4995.71, 5167.97, 5340.24, 5512.51, 5684.77, 5857.04, 6029.3, 6201.↵
57, 6373.83, 6546.1, 6718.37, 6890.63, 7062.9, 7235.16, 7407.43, 7579.69, 7751.96, 7924.↵
23, 8096.49, 8268.76, 8441.02, 8613.29, 8785.56, 8957.82, 9130.09, 9302.35, 9474.62, 9646.↵
88, 9819.15, 9991.42, 10163.7, 10335.9, 10508.2, 10680.5, 10852.7, 11025, 11197.3, 11369.↵
5, 11541.8, 11714.1, 11886.3, 12058.6, 12230.9, 12403.1, 12575.4, 12747.7, 12919.9, 13092.2}
```

### 5.201.3.3 vLTASS\_freq

```
float vLTASS_freq[NUM_ENTR_LTASS] = {63, 80, 100, 125, 160, 200, 250, 315, 400,
500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000,
12500, 16000}
```

### 5.201.3.4 vLTASS\_combined\_lev

```
float vLTASS_combined_lev[NUM_ENTR_LTASS] = {38.6, 43.5, 54.4, 57.7, 56.8, 60.2,
60.3, 59.0, 62.1, 62.1, 60.5, 56.8, 53.7, 53.0, 52.0, 48.7, 48.1, 46.8, 45.6, 44.↵
5, 44.3, 43.7, 43.4, 41.3, 40.7}
```

### 5.201.3.5 vLTASS\_female\_lev

```
float vLTASS_female_lev[NUM_ENTR_LTASS] = {37.0, 36.0, 37.5, 40.1, 53.4, 62.2, 60.9, 58.↵
1, 61.7, 61.7, 60.4, 58, 54.3, 52.3, 51.7, 48.8, 47.3, 46.7, 45.3, 44.6, 45.2, 44.9, 45.0, 42.↵
8, 41.1}
```

### 5.201.3.6 vLTASS\_male\_lev

```
float vLTASS_male_lev[NUM_ENTR_LTASS] = {38.6, 43.5, 54.4, 57.7, 56.8, 58.2, 59.7, 60.↵
0, 62.4, 62.6, 60.6, 55.7, 53.1, 53.7, 52.3, 48.7, 48.9, 47.0, 46.0, 44.4, 43.3, 42.4, 41.9, 39.↵
8, 40.4}
```

### 5.201.3.7 vOlnoiseFreq

```
float vOlnoiseFreq[NUM_ENTR_OLNOISE] = {62.5, 70.1539, 78.7451, 88.3884, 99.2126, 111.↵
362, 125, 140.308, 157.49, 176.777, 198.425, 222.725, 250, 280.616, 314.98, 353.553, 396.↵
85, 445.449, 500, 561.231, 629.961, 707.107, 793.701, 890.899, 1000, 1122.46, 1259.92, 1414.↵
21, 1587.4, 1781.8, 2000, 2244.92, 2519.84, 2828.43, 3174.8, 3563.59, 4000, 4489.85, 5039.↵
68, 5656.85, 6349.6, 7127.19, 8000, 8979.7, 10079.4, 11313.7, 12699.2, 14254.4, 16000}
```

### 5.201.3.8 vOlnoiseLev

```
float vOlnoiseLev[NUM_ENTR_OLNOISE] = {45.9042, 38.044, 48.9444, 61.3697, 67.6953, 69.↵
7451, 71.6201, 71.2431, 65.2754, 63.2547, 70.2264, 72.1434, 73.4433, 73.2659, 69.8424, 71.↵
0132, 70.9577, 70.3492, 68.691, 64.8436, 64.0435, 64.2879, 60.5889, 60.6596, 60.3727, 61.↵
2003, 61.8477, 61.1478, 61.2312, 58.6584, 57.2892, 56.8299, 56.0191, 53.3018, 56.0525, 54.↵
3592, 50.8823, 55.992, 54.6768, 47.2616, 46.9914, 45.209, 50.413, 47.5848, 43.3215, 43.754, 38.↵
5773, -0.39427, 5.74224}
```

## 5.202 speechnoise.h File Reference

## Classes

- class **speechnoise\_t**

## 5.203 split.cpp File Reference

## Classes

- class **MHAPLugin\_Split::uni\_processor\_t**  
*An interface to a class that sports a process method with no parameters and no return value.*
- class **MHAPLugin\_Split::thread\_platform\_t**  
*Basic interface for encapsulating thread creation, thread priority setting, and synchronization on any threading platform (i.e., pthreads or win32threads).*
- class **MHAPLugin\_Split::dummy\_threads\_t**  
*Dummy specification of a thread platform: This class implements everything in a single thread.*
- class **MHAPLugin\_Split::posix\_threads\_t**  
*Posix threads specification of thread platform.*
- class **MHAPLugin\_Split::domain\_handler\_t**  
*Handles domain-specific partial input and output signal.*
- class **MHAPLugin\_Split::splitted\_part\_t**  
*The **splitted\_part\_t** (p. 1129) instance manages the plugin that performs processing on the reduced set of channels.*
- class **MHAPLugin\_Split::split\_t**  
*Implements split plugin.*

## Namespaces

- **MHAPLugin\_Split**

## Macros

- #define **MHAPLUGIN\_OVERLOAD\_OUTDOMAIN**  
*This define modifies the definition of MHAPLUGIN\_CALLBACKS and friends.*
- #define **posixthreads** 1
- #define **native\_thread\_platform\_type** posix\_threads\_t

## Enumerations

- enum { **MHAPLugin\_Split::INVALID\_THREAD\_PRIORITY** = 999999999 }  
*Invalid thread priority.*

### 5.203.1 Detailed Description

Source code for the split plugin. The split plugin splits the audio signal by channel. The splitted paths execute in parallel.

### 5.203.2 Macro Definition Documentation

#### 5.203.2.1 MHAPLUGIN\_OVERLOAD\_OUTDOMAIN

```
#define MHAPLUGIN_OVERLOAD_OUTDOMAIN
```

This define modifies the definition of MHAPLUGIN\_CALLBACKS and friends.

The output signal is transferred through a second parameter to the process method, enabling all four domain transformations in a single plugin.

#### 5.203.2.2 posixthreads

```
#define posixthreads 1
```

#### 5.203.2.3 native\_thread\_platform\_type

```
#define native_thread_platform_type posix_threads_t
```

## 5.204 steerbf.cpp File Reference

### Macros

- `#define PATCH_VAR(var) patchbay.connect(&var.valuechanged, this, & steerbf↵  
::update_cfg)`
- `#define INSERT_PATCH(var) insert_member(var); PATCH_VAR(var)`

### 5.204.1 Macro Definition Documentation

### 5.204.1.1 PATCH\_VAR

```
#define PATCH_VAR(
 var) patchbay.connect(&var.valuechanged, this, & steerbf::update_cfg)
```

### 5.204.1.2 INSERT\_PATCH

```
#define INSERT_PATCH(
 var) insert_member(var); PATCH_VAR(var)
```

## 5.205 steerbf.h File Reference

### Classes

- class **parser\_int\_dyn**
- class **steerbf\_config**
- class **steerbf**

## 5.206 testalsadevice.c File Reference

### Functions

- int **main** (int argc, char \*\*argv)

### 5.206.1 Function Documentation

#### 5.206.1.1 main()

```
int main (
 int argc,
 char ** argv)
```

## 5.207 testplugin.cpp File Reference

### Classes

- class **testplugin::config\_parser\_t**
- class **testplugin::ac\_parser\_t**
- class **testplugin::signal\_parser\_t**
- class **testplugin::if\_t**

## Namespaces

- **testplugin**

## 5.208 transducers.cpp File Reference

### Classes

- class **softclipper\_variables\_t**
- class **softclipper\_t**
- class **calibrator\_variables\_t**
- class **calibrator\_runtime\_layer\_t**
- class **calibrator\_t**
- class **bbcalib\_interface\_t**

### Typedefs

- typedef **MHAPLugin::config\_t< MHASignal::async\_rmslevel\_t > rmslevelmeter**
- typedef **MHAPLugin::plugin\_t< calibrator\_runtime\_layer\_t > rtcalibrator**

### Functions

- **speechnoise\_t::noise\_type\_t kw\_index2type** (unsigned int idx)
- **std::vector< int > vint\_0123n1** (unsigned int n)

### 5.208.1 Typedef Documentation

#### 5.208.1.1 rmslevelmeter

```
typedef MHAPLugin::config_t< MHASignal::async_rmslevel_t > rmslevelmeter
```

#### 5.208.1.2 rtcalibrator

```
typedef MHAPLugin::plugin_t< calibrator_runtime_layer_t > rtcalibrator
```

### 5.208.2 Function Documentation



## 5.208.2.1 kw\_index2type()

```
speechnoise_t::noise_type_t kw_index2type (
 unsigned int idx)
```

## 5.208.2.2 vint\_0123n1()

```
std::vector<int> vint_0123n1 (
 unsigned int n)
```

## 5.209 upsample.cpp File Reference

## Classes

- class **us\_t**

## 5.210 wave2spec.cpp File Reference

## 5.211 wave2spec.hh File Reference

## Classes

- class **wave2spec\_t**  
*Runtime configuration class for plugin wave2spec.*
- class **wave2spec\_if\_t**  
*Plugin wave2spec interface class, uses **wave2spec\_t** (p. [1448](#)) as runtime configuration.*

## Macros

- #define **MHAPLUGIN\_OVERLOAD\_OUTDOMAIN**

## 5.211.1 Macro Definition Documentation

## 5.211.1.1 MHAPLUGIN\_OVERLOAD\_OUTDOMAIN

```
#define MHAPLUGIN_OVERLOAD_OUTDOMAIN
```

## 5.212 wavrec.cpp File Reference

### Classes

- class **wavwriter\_t**
- class **wavrec\_t**

## 5.213 windnoise.cpp File Reference

### Namespaces

- **windnoise**  
*namespace for plugin windnoise which detects and cancels wind noise*

### Macros

- **#define register\_configuration\_variable(v)**

### 5.213.1 Macro Definition Documentation

#### 5.213.1.1 register\_configuration\_variable

```
#define register_configuration_variable(
 v)
```

## 5.214 windnoise.hh File Reference

### Classes

- class **windnoise::cfg\_t**  
*Runtime config class for windnoise plugin.*
- class **windnoise::if\_t**  
*interface class for windnoise plugin*

### Namespaces

- **windnoise**  
*namespace for plugin windnoise which detects and cancels wind noise*

## 5.215 windowselector.cpp File Reference

## 5.216 windowselector.h File Reference

### Classes

- class **windowselector\_t**  
*A combination of mha parser variables to describe an overlapadd analysis window.*

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