# 2015 Test beam Run Control

Generated by Doxygen 1.8.9.1

Thu Apr 23 2015 17:51:29

# Contents

# Chapter 1

# Module Index

## 1.1 Modules

Here is a list of all modules:

# Chapter 2

# Hierarchical Index

## 2.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

# Chapter 3

# Data Structure Index

## 3.1 Data Structures

Here are the data structures with brief descriptions:

# Chapter 4

# Module Documentation

## 4.1 Socket communication objects

### Data Structures

- class Client

  *Base client object for the socket.*
- class HTTPMessage

  *Message to be transmitted through a WebSocket protocol.*
- struct ListenerInfo

  *Information on a socket's listener.*
- class Messenger

  *Base master object for the socket.*
- class Socket

  *Base socket object from which clients/master from a socket inherit.*
- class SocketMessage

  *Socket-passed message type.*

### Enumerations

- enum Socket::SocketType {
  Socket::INVALID =-1, Socket::MASTER =0, Socket::WEBSOCKET_CLIENT, Socket::CLIENT,
  Socket::DETECTOR }

  *Type of actor playing a role on the socket.*

### 4.1.1 Detailed Description

### 4.1.2 Enumeration Type Documentation

#### 4.1.2.1 enum **Socket::SocketType**

Type of actor playing a role on the socket.

**Enumerator**

***INVALID***

***MASTER***

***WEBSOCKET_CLIENT***

***CLIENT***

***DETECTOR***

## 4.2 HPTDC chip control

### Data Structures

- class TDCConfiguration

  *Setup word to be sent to the HPTDC chip.*
- class TDCEvent

  *HPTDC event parser.*

### Enumerations

- enum TDCConfiguration::EdgeResolution {
  TDCConfiguration::E_100ps =0, TDCConfiguration::E_200ps, TDCConfiguration::E_400ps, TDC↩Configuration::E_800ps,
  TDCConfiguration::E_1p6ns, TDCConfiguration::E_3p12ns, TDCConfiguration::E_6p25ns, TDCConfiguration↩::E_12p5ns }
- enum TDCConfiguration::DeadTime { TDCConfiguration::DT_5ns =0, TDCConfiguration::DT_10ns, TDC↩Configuration::DT_30ns, TDCConfiguration::DT_100ns }
- enum TDCConfiguration::WidthResolution {
  TDCConfiguration::W_100ps =0, TDCConfiguration::W_200ps, TDCConfiguration::W_400ps, TDC↩Configuration::W_800ps,
  TDCConfiguration::W_1p6ns, TDCConfiguration::W_3p2ns, TDCConfiguration::W_6p25ns, TDC↩Configuration::W_12p5ns,
  TDCConfiguration::W_25ns, TDCConfiguration::W_50ns, TDCConfiguration::W_100ns, TDCConfiguration↩::W_200ns,
  TDCConfiguration::W_400ns, TDCConfiguration::W_800ns }
- enum TDCConfiguration::EnabledError {
  TDCConfiguration::VernierError =0x1, TDCConfiguration::CoarseError =0x2, TDCConfiguration::Channel↩SelectError =0x4, TDCConfiguration::L1BufferParityError =0x8,
  TDCConfiguration::TriggerFIFOParityError =0x10, TDCConfiguration::TriggerMatchingError =0x20, TDC↩Configuration::ReadoutFIFOParityError =0x40, TDCConfiguration::ReadoutStateError =0x80,
  TDCConfiguration::SetupParityError =0x100, TDCConfiguration::ControlParityError =0x200, TDC↩Configuration::JTAGInstructionParityError =0x400 }
- enum TDCConfiguration::DLLSpeedMode { TDCConfiguration::DLL_40MHz =0x0, TDCConfiguration::DLL↩_160MHz =0x1, TDCConfiguration::DLL_320MHz =0x2, TDCConfiguration::DLL_Illegal =0x3 }
- enum TDCConfiguration::SerialClockSource { TDCConfiguration::Serial_pll_clock_80 =0x0, TDC↩Configuration::Serial_pll_clock_160 =0x1, TDCConfiguration::Serial_pll_clock_40 =0x2, TDCConfiguration↩::Serial_aux_clock =0x3 }
- enum TDCConfiguration::IOClockSource { TDCConfiguration::IO_clock_40 =0x0, TDCConfiguration::IO_↩pll_clock_80 =0x1, TDCConfiguration::IO_pll_clock_160 =0x2, TDCConfiguration::IO_aux_clock =0x3 }
- enum TDCConfiguration::CoreClockSource { TDCConfiguration::Core_clock_40 =0x0, TDCConfiguration↩::Core_pll_clock_80 =0x1, TDCConfiguration::Core_pll_clock_160 =0x2, TDCConfiguration::Core_aux_clock =0x3 }
- enum TDCConfiguration::DLLClockSource {
  TDCConfiguration::DLL_clock_40 =0x0, TDCConfiguration::DLL_pll_clock_40 =0x1, TDCConfiguration::D↩LL_pll_clock_160 =0x2, TDCConfiguration::DLL_pll_clock_320 =0x3,
  TDCConfiguration::DLL_aux_clock =0x4 }
- enum TDCEvent::EventType {
  TDCEvent::Invalid =-1, TDCEvent::GroupHeader =0, TDCEvent::GroupTrailer, TDCEvent::TDCHeader,
  TDCEvent::TDCTrailer, TDCEvent::LeadingEdge, TDCEvent::TrailingEdge, TDCEvent::Error,
  TDCEvent::Debug }

### 4.2.1 Detailed Description

### 4.2.2 Enumeration Type Documentation

#### 4.2.2.1 enum TDCConfiguration::CoreClockSource

**Enumerator**

***Core_clock_40***
***Core_pll_clock_80***
***Core_pll_clock_160***
***Core_aux_clock***

#### 4.2.2.2 enum TDCConfiguration::DeadTime

**Enumerator**

***DT_5ns***
***DT_10ns***
***DT_30ns***
***DT_100ns***

#### 4.2.2.3 enum TDCConfiguration::DLLClockSource

**Enumerator**

***DLL_clock_40***
***DLL_pll_clock_40***
***DLL_pll_clock_160***
***DLL_pll_clock_320***
***DLL_aux_clock***

#### 4.2.2.4 enum TDCConfiguration::DLLSpeedMode

**Enumerator**

***DLL_40MHz***
***DLL_160MHz***
***DLL_320MHz***
***DLL_Illegal***

#### 4.2.2.5 enum TDCConfiguration::EdgeResolution

**Enumerator**

***E_100ps***
***E_200ps***
***E_400ps***
***E_800ps***
***E_1p6ns***
***E_3p12ns***
***E_6p25ns***
***E_12p5ns***

#### 4.2.2.6 enum TDCConfiguration::EnabledError

**Enumerator**

***VernierError***

***CoarseError***

***ChannelSelectError***

***L1BufferParityError***

***TriggerFIFOParityError***

***TriggerMatchingError***

***ReadoutFIFOParityError***

***ReadoutStateError***

***SetupParityError***

***ControlParityError***

***JTAGInstructionParityError***

#### 4.2.2.7 enum TDCEvent::EventType

**Enumerator**

***Invalid***

***GroupHeader***

***GroupTrailer***

***TDCHeader***

***TDCTrailer***

***LeadingEdge***

***TrailingEdge***

***Error***

***Debug***

#### 4.2.2.8 enum TDCConfiguration::IOClockSource

**Enumerator**

***IO_clock_40***

***IO_pll_clock_80***

***IO_pll_clock_160***

***IO_aux_clock***

#### 4.2.2.9 enum TDCConfiguration::SerialClockSource

**Enumerator**

***Serial_pll_clock_80***

***Serial_pll_clock_160***

***Serial_pll_clock_40***

***Serial_aux_clock***

#### 4.2.2.10 enum TDCConfiguration::WidthResolution

**Enumerator**

- ***W_100ps***
- ***W_200ps***
- ***W_400ps***
- ***W_800ps***
- ***W_1p6ns***
- ***W_3p2ns***
- ***W_6p25ns***
- ***W_12p5ns***
- ***W_25ns***
- ***W_50ns***
- ***W_100ns***
- ***W_200ns***
- ***W_400ns***
- ***W_800ns***

# Chapter 5

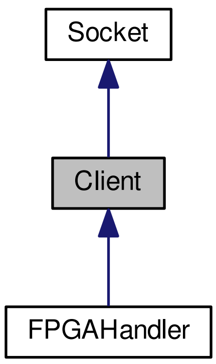
# Data Structure Documentation

## 5.1 Client Class Reference

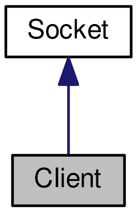
Base client object for the socket.

```
#include <Client.h>
```

Inheritance diagram for Client:



Collaboration diagram for Client:



### Public Member Functions

- Client ()

  *General void client constructor.*
- Client (int port)

  *Bind a socket client to a given port.*
- virtual ∼Client ()
- bool Connect ()

  *Bind this client to the socket.*
- void Disconnect ()

  *Unbind this client from the socket.*
- void Send (const Message &m) const

  *Send a message to the master through the socket.*
- void Receive ()

  *Receive a socket message from the master.*
- virtual void ParseMessage (const SocketMessage &m)

  *Parse a SocketMessage received from the master.*
- virtual SocketType GetType () const

  *Socket actor type retrieval method.*

### Additional Inherited Members

## 5.1.1 Detailed Description

Base client object for the socket.

Client object used by the server to send/receive commands from the messenger/broadcaster.

**Author**

Laurent Forthomme `laurent.forthomme@cern.ch`

**Date**

24 Mar 2015

### 5.1.2 Constructor & Destructor Documentation

#### 5.1.2.1 Client::Client ( ) `[inline]`

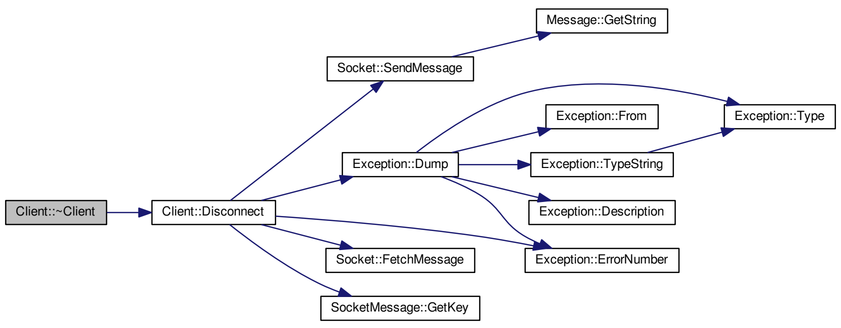
General void client constructor.

#### 5.1.2.2 Client::Client ( int *port* )

Bind a socket client to a given port.

#### 5.1.2.3 Client::∼Client ( ) `[virtual]`

Here is the call graph for this function:

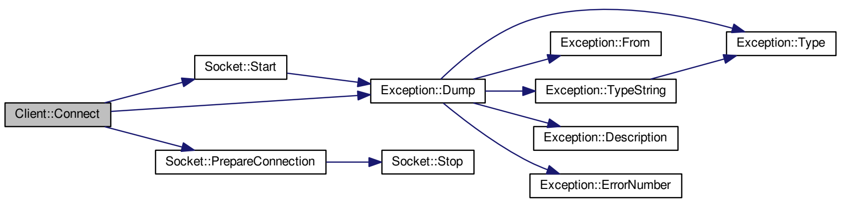


### 5.1.3 Member Function Documentation

#### 5.1.3.1 bool Client::Connect ( )

Bind this client to the socket.

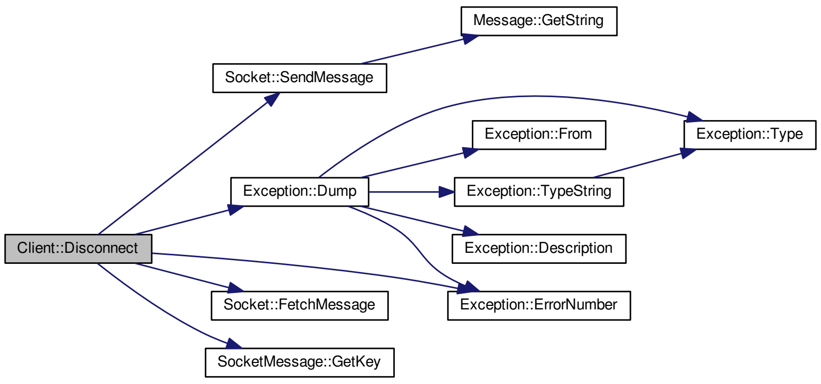
Here is the call graph for this function:



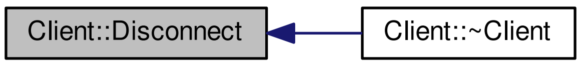
#### 5.1.3.2 void Client::Disconnect ( )

Unbind this client from the socket.

Here is the call graph for this function:



Here is the caller graph for this function:

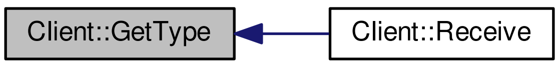


#### 5.1.3.3 virtual SocketType Client::GetType ( ) const [inline], [virtual]

Socket actor type retrieval method.

Reimplemented in FPGAHandler.

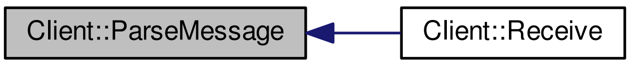
Here is the caller graph for this function:



#### 5.1.3.4 virtual void Client::ParseMessage ( const SocketMessage & *m* ) [inline], [virtual]

Parse a SocketMessage received from the master.

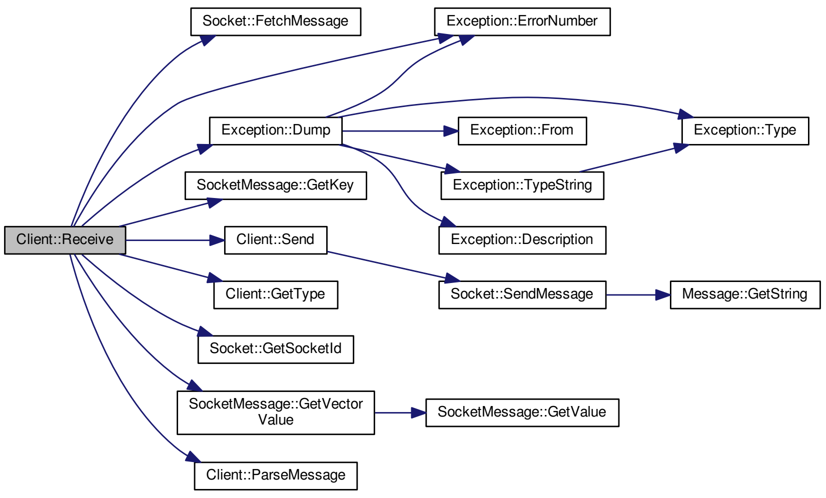
Here is the caller graph for this function:



#### 5.1.3.5 void Client::Receive ( )

Receive a socket message from the master.

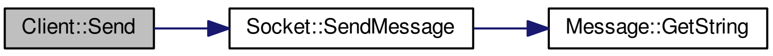
Here is the call graph for this function:



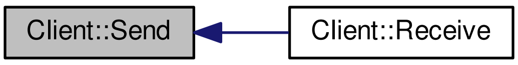
#### 5.1.3.6 void Client::Send ( const Message & *m* ) const [inline]

Send a message to the master through the socket.

Here is the call graph for this function:



Here is the caller graph for this function:



The documentation for this class was generated from the following files:

- include/Client.h
- src/Client.cpp

## 5.2 Exception Class Reference

A simple exception handler.

`#include <Exception.h>`

### Public Member Functions

- Exception (const char ∗from, std::string desc, ExceptionType type=Undefined, const int id=0)
- Exception (const char ∗from, const char ∗desc, ExceptionType type=Undefined, const int id=0)
- ∼Exception ()
- std::string From () const
- int ErrorNumber () const
- std::string Description () const
- ExceptionType Type () const
- std::string TypeString () const
- void Dump (std::ostream &os=std::cerr) const

### 5.2.1 Detailed Description

A simple exception handler.

**Author**

Laurent Forthomme `laurent.forthomme@cern.ch`

**Date**

24 Mar 2015

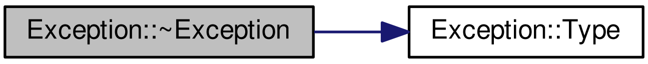
### 5.2.2 Constructor & Destructor Documentation

#### 5.2.2.1 Exception::Exception ( const char ∗ *from*, std::string *desc*, ExceptionType *type* = `Undefined`, const int *id* = `0` ) `[inline]`

#### 5.2.2.2 Exception::Exception ( const char ∗ *from*, const char ∗ *desc*, ExceptionType *type* = `Undefined`, const int *id* = `0` ) `[inline]`

#### 5.2.2.3 Exception::∼Exception ( ) `[inline]`

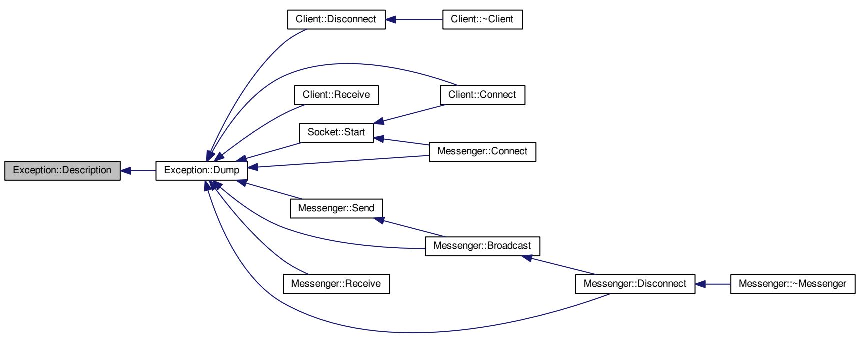
Here is the call graph for this function:



### 5.2.3 Member Function Documentation

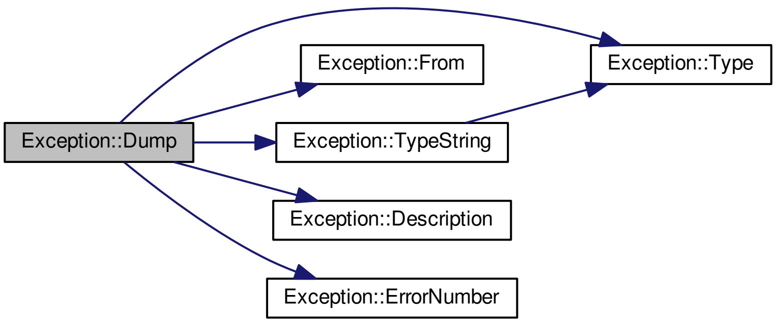
#### 5.2.3.1 std::string Exception::Description ( ) const `[inline]`

Here is the caller graph for this function:

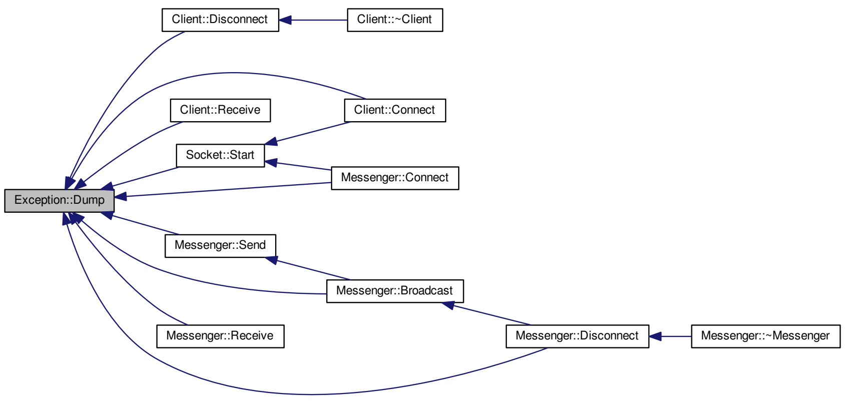


#### 5.2.3.2 void Exception::Dump ( std::ostream & *os* = `std::cerr` ) const `[inline]`

Here is the call graph for this function:

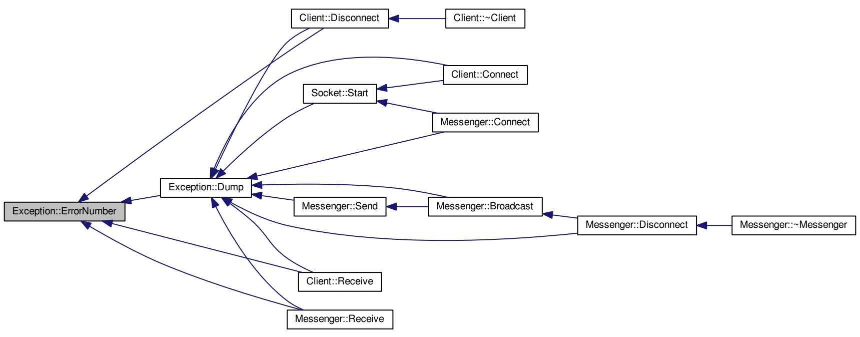


Here is the caller graph for this function:



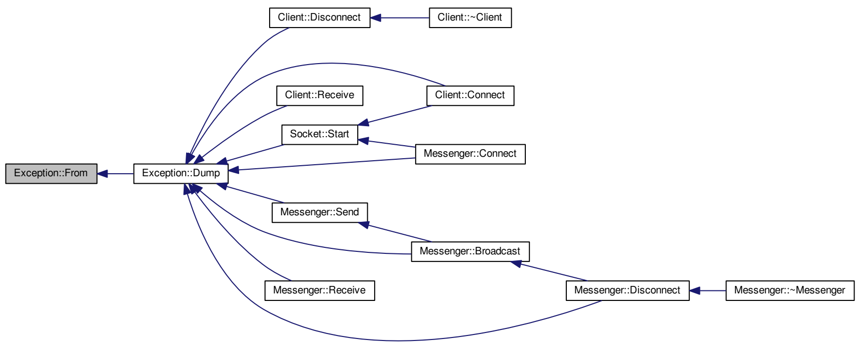
#### 5.2.3.3 int Exception::ErrorNumber ( ) const [inline]

Here is the caller graph for this function:



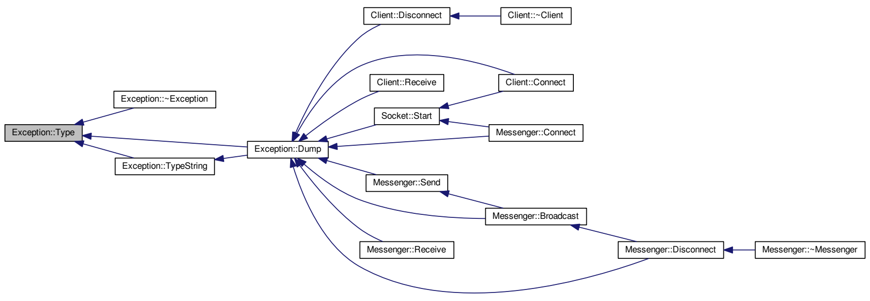
#### 5.2.3.4 std::string Exception::From ( ) const [inline]

Here is the caller graph for this function:



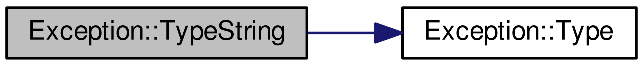
#### 5.2.3.5 ExceptionType Exception::Type ( ) const [inline]

Here is the caller graph for this function:

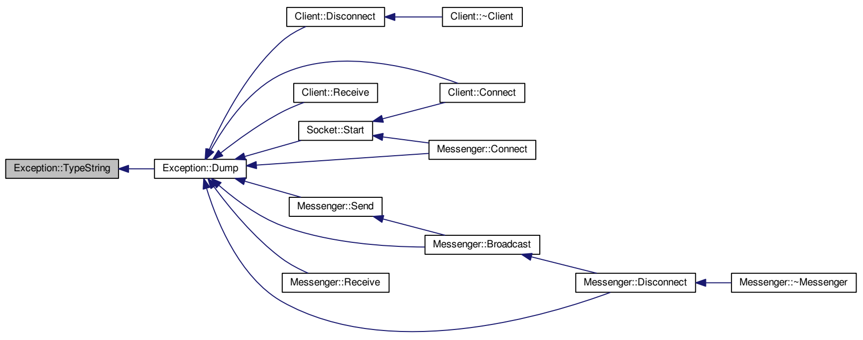


#### 5.2.3.6 std::string Exception::TypeString ( ) const [inline]

Here is the call graph for this function:



Here is the caller graph for this function:



The documentation for this class was generated from the following file:

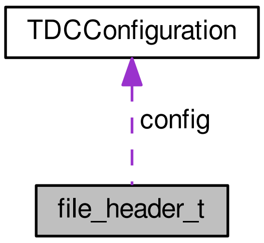
- include/Exception.h

## 5.3 file_header_t Struct Reference

Header to the output files.

`#include <FPGAHandler.h>`

Collaboration diagram for file_header_t:



### Data Fields

- uint32_t magic
- uint32_t run_id
- uint32_t spill_id
- TDCConfiguration config

### 5.3.1 Detailed Description

Header to the output files.

General header to store in each collected data file for offline readout. It enable any reader to retrieve the run/spill number, as well as the HPTDC configuration during data collection.

**Author**

Laurent Forthomme `laurent.forthomme@cern.ch`

**Date**

14 Apr 2015

### 5.3.2 Field Documentation

#### 5.3.2.1 TDCConfiguration file_header_t::config

#### 5.3.2.2 uint32_t file_header_t::magic

#### 5.3.2.3 uint32_t file_header_t::run_id

#### 5.3.2.4 uint32_t file_header_t::spill_id

The documentation for this struct was generated from the following file:

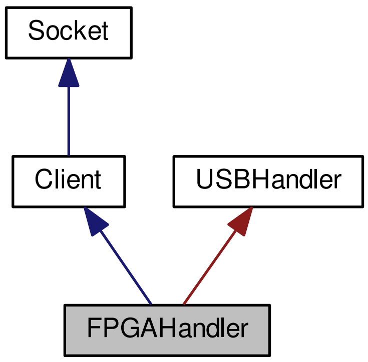
- include/FPGAHandler.h

## 5.4 FPGAHandler Class Reference

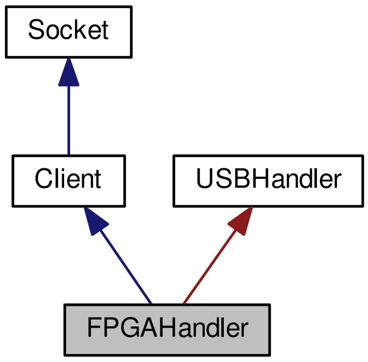
Driver for timing detectors' FPGA readout.

```
#include <FPGAHandler.h>
```

Inheritance diagram for FPGAHandler:



Collaboration diagram for FPGAHandler:



### Public Member Functions

- FPGAHandler (int port, const char ∗dev)

  *Bind to a FPGA through the USB protocol, and to the socket.*
- virtual ∼FPGAHandler ()
- void OpenFile ()

  *Open an output file to store header/HPTDC events.*
- void CloseFile ()

*Close a previously opened output file used to store header/HPTDC events.*
- std::string GetFilename () const

  *Retrieve the file name used to store data collected from the FPGA.*
- void SetConfiguration (const TDCConfiguration &c)

  *Submit the HPTDC setup word as a TDCConfiguration object.*
- TDCConfiguration GetConfiguration ()

  *Retrieve the HPTDC setup word as a TDCConfiguration object.*
- void ReadBuffer ()
- SocketType GetType () const

  *Socket actor type retrieval method.*

## Additional Inherited Members

### 5.4.1 Detailed Description

Driver for timing detectors' FPGA readout.

Main driver for a homebrew FPGA designed for the timing detectors' HPTDC chip readout.

**Author**

Laurent Forthomme `laurent.forthomme@cern.ch`

**Date**

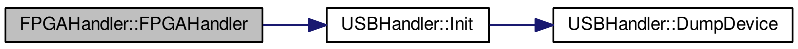
14 Apr 2015

### 5.4.2 Constructor & Destructor Documentation

#### 5.4.2.1 FPGAHandler::FPGAHandler ( int *port*, const char ∗ *dev* )

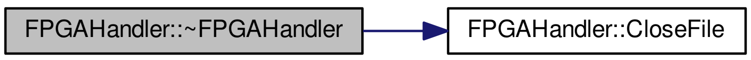
Bind to a FPGA through the USB protocol, and to the socket.

Here is the call graph for this function:



#### 5.4.2.2 FPGAHandler::∼FPGAHandler ( ) `[virtual]`

Here is the call graph for this function:

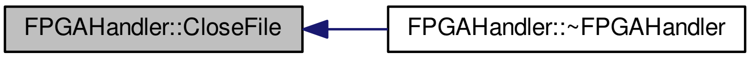


### 5.4.3 Member Function Documentation

#### 5.4.3.1 void FPGAHandler::CloseFile ( )

Close a previously opened output file used to store header/HPTDC events.

Here is the caller graph for this function:



#### 5.4.3.2 TDCConfiguration FPGAHandler::GetConfiguration ( ) `[inline]`

Retrieve the HPTDC setup word as a TDCConfiguration object.

#### 5.4.3.3 std::string FPGAHandler::GetFilename ( ) const `[inline]`

Retrieve the file name used to store data collected from the FPGA.

#### 5.4.3.4 SocketType FPGAHandler::GetType ( ) const `[inline], [virtual]`

Socket actor type retrieval method.

Reimplemented from Client.

#### 5.4.3.5 void FPGAHandler::OpenFile ( )

Open an output file to store header/HPTDC events.

#### 5.4.3.6 void FPGAHandler::ReadBuffer ( )

#### 5.4.3.7 void FPGAHandler::SetConfiguration ( const TDCConfiguration & *c* ) `[inline]`

Submit the HPTDC setup word as a TDCConfiguration object.

The documentation for this class was generated from the following files:

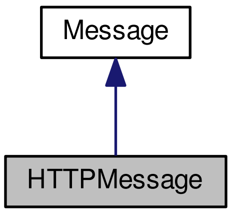
- include/FPGAHandler.h
- src/FPGAHandler.cpp

## 5.5 HTTPMessage Class Reference

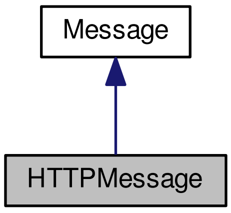
Message to be transmitted through a WebSocket protocol.

`#include <HTTPMessage.h>`

Inheritance diagram for HTTPMessage:



Collaboration diagram for HTTPMessage:



### Public Member Functions

- HTTPMessage (WebSocket ∗ws, Message m, MessageAction a)
- HTTPMessage (WebSocket ∗ws, const char ∗msg, MessageAction a)
- void Decode ()
- void Encode ()
- MessageKey GetKey () const
- void Dump (std::ostream &os=std::cout) const

### Additional Inherited Members

### 5.5.1 Detailed Description

Message to be transmitted through a WebSocket protocol.

Type of message compatible to the transmission through a WebSocket protocol. It enables a direct conversion of standards from any socket message format used elsewhere in this code using the *MessageAction* statement.

**Author**

Laurent Forthomme `laurent.forthomme@cern.ch`

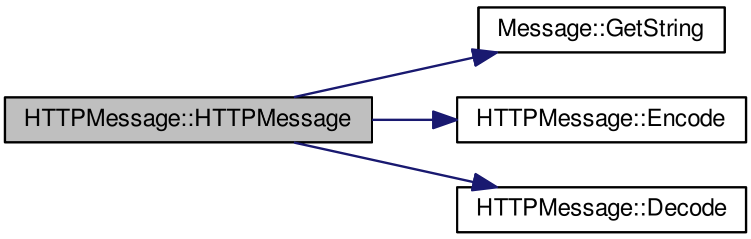
**Date**

1 Apr 2015

### 5.5.2 Constructor & Destructor Documentation

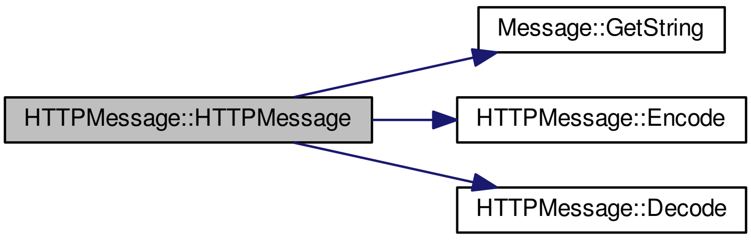
#### 5.5.2.1 HTTPMessage::HTTPMessage ( WebSocket ∗ *ws,* Message *m,* MessageAction *a* ) `[inline]`

Here is the call graph for this function:



#### 5.5.2.2 HTTPMessage::HTTPMessage ( WebSocket ∗ *ws,* const char ∗ *msg,* MessageAction *a* ) `[inline]`

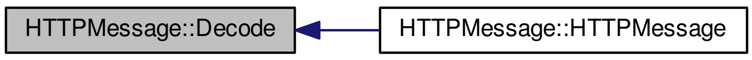
Here is the call graph for this function:



### 5.5.3 Member Function Documentation

#### 5.5.3.1 void HTTPMessage::Decode ( ) `[inline]`

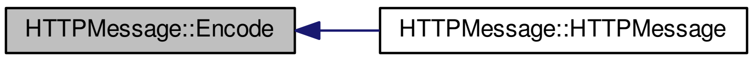
Here is the caller graph for this function:



#### 5.5.3.2 void HTTPMessage::Dump ( std::ostream & *os* = `std::cout` ) const `[inline]`

#### 5.5.3.3 void HTTPMessage::Encode ( ) `[inline]`

Here is the caller graph for this function:



#### 5.5.3.4 MessageKey HTTPMessage::GetKey ( ) const `[inline]`

The documentation for this class was generated from the following file:

- include/HTTPMessage.h

## 5.6 ListenerInfo Struct Reference

Information on a socket's listener.

`#include <Messenger.h>`

### Data Fields

- std::string name
- Socket::SocketType type

### 5.6.1 Detailed Description

Information on a socket's listener.

Structure handling its name and type for any listener/client to be used in the socket management parts of this code.

### 5.6.2 Field Documentation

#### 5.6.2.1 std::string ListenerInfo::name

#### 5.6.2.2 Socket::SocketType ListenerInfo::type

The documentation for this struct was generated from the following file:

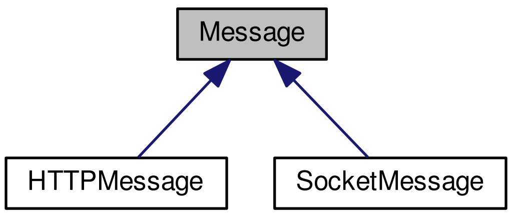
- include/Messenger.h

## 5.7 Message Class Reference

Base socket message type.

```
#include <Message.h>
```

Inheritance diagram for Message:



### Public Member Functions

- Message ()

  *Void message constructor.*
- Message (const char ∗msg)

  *Construct a message from a string.*
- Message (std::string msg)

  *Construct a message from a string.*
- virtual ∼Message ()
- MessageKey GetKey () const

  *Placeholder for the MessageKey retrieval method.*
- std::string GetString () const

  *Retrieve the string carried by this message as a whole.*
- bool IsFromWeb () const

  *Extract from any message its potential arrival from a WebSocket protocol.*
- void Dump (std::ostream &os=std::cout) const

### Protected Attributes

- std::string fString

### 5.7.1 Detailed Description

Base socket message type.

Base handler for messages to be transmitted through the socket

**Author**

Laurent Forthomme `laurent.forthomme@cern.ch`

**Date**

6 Apr 2015

### 5.7.2 Constructor & Destructor Documentation

#### 5.7.2.1 Message::Message ( ) `[inline]`

Void message constructor.

#### 5.7.2.2 Message::Message ( const char ∗ *msg* ) `[inline]`

Construct a message from a string.

#### 5.7.2.3 Message::Message ( std::string *msg* ) `[inline]`

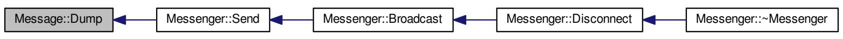
Construct a message from a string.

#### 5.7.2.4 virtual Message::∼Message ( ) `[inline], [virtual]`

### 5.7.3 Member Function Documentation

#### 5.7.3.1 void Message::Dump ( std::ostream & *os* = `std::cout` ) const `[inline]`

Here is the caller graph for this function:



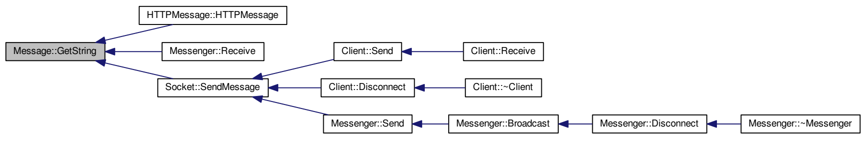
#### 5.7.3.2 MessageKey Message::GetKey ( ) const `[inline]`

Placeholder for the MessageKey retrieval method.

#### 5.7.3.3 std::string Message::GetString ( ) const `[inline]`

Retrieve the string carried by this message as a whole.

Here is the caller graph for this function:



#### 5.7.3.4 bool Message::IsFromWeb ( ) const [inline]

Extract from any message its potential arrival from a WebSocket protocol.

### 5.7.4 Field Documentation

#### 5.7.4.1 std::string Message::fString [protected]

The documentation for this class was generated from the following file:

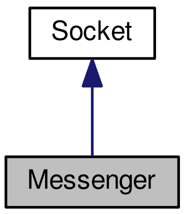
- include/Message.h

## 5.8 Messenger Class Reference

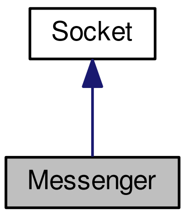
Base master object for the socket.

`#include <Messenger.h>`

Inheritance diagram for Messenger:



Collaboration diagram for Messenger:



### Public Member Functions

- Messenger ()

  *Build a void master object or socket actor.*
- Messenger (int port)

  *Build a master object to control the socket.*
- ∼Messenger ()
- bool Connect ()

  *Connect the master to the socket.*
- void Disconnect ()

  *Remove the master and destroy the socket.*
- void Send (const Message &m, int sid) const

  *Send any type of message to any client.*
- void Receive ()

  *Handle a message reception from a client.*
- void Broadcast (const Message &m) const

  *Emit a message to all clients connected through the socket.*
- SocketType GetType () const

  *Socket actor type retrieval method.*

### Additional Inherited Members

### 5.8.1 Detailed Description

Base master object for the socket.

Messenger/broadcaster object used by the server to send/receive commands from the clients/listeners.

**Author**

Laurent Forthomme `laurent.forthomme@cern.ch`

**Date**

23 Mar 2015

## 5.8.2 Constructor & Destructor Documentation

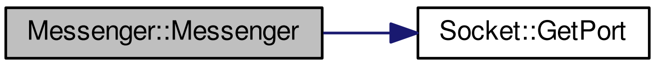
### 5.8.2.1 Messenger::Messenger ( )

Build a void master object or socket actor.

### 5.8.2.2 Messenger::Messenger ( int *port* )

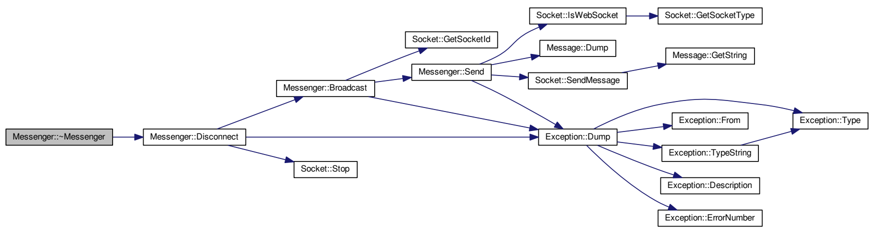
Build a master object to control the socket.

Here is the call graph for this function:



### 5.8.2.3 Messenger::∼Messenger ( )

Here is the call graph for this function:



## 5.8.3 Member Function Documentation

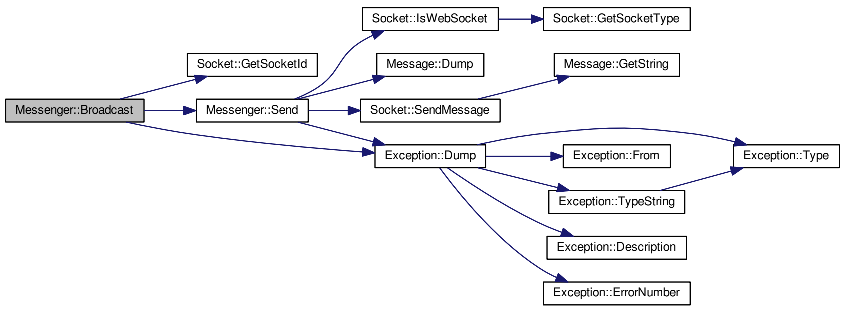
### 5.8.3.1 void Messenger::Broadcast ( const Message & *m* ) const

Emit a message to all clients connected through the socket.

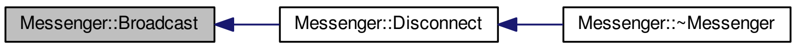
**Parameters**

| | | |
|---|---|---|
| `in` | *m* | Message to transmit |

Here is the call graph for this function:



Here is the caller graph for this function:

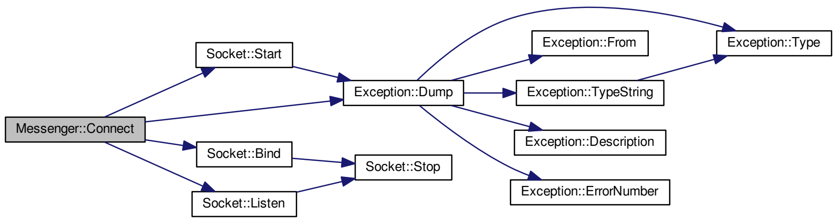


### 5.8.3.2 bool Messenger::Connect ( )

Connect the master to the socket.

Connect this master to the socket for clients to be able to bind.

Here is the call graph for this function:

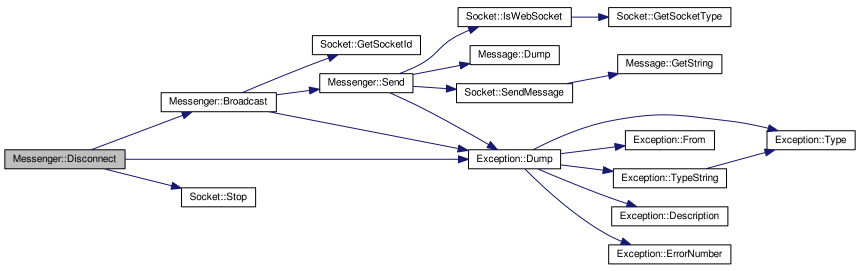


### 5.8.3.3 void Messenger::Disconnect ( )

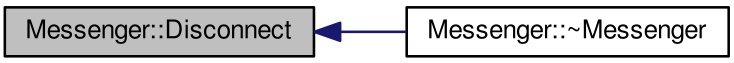
Remove the master and destroy the socket.

Remove this master from the socket, thus disconnecting automatically the clients connected.

Here is the call graph for this function:



Here is the caller graph for this function:



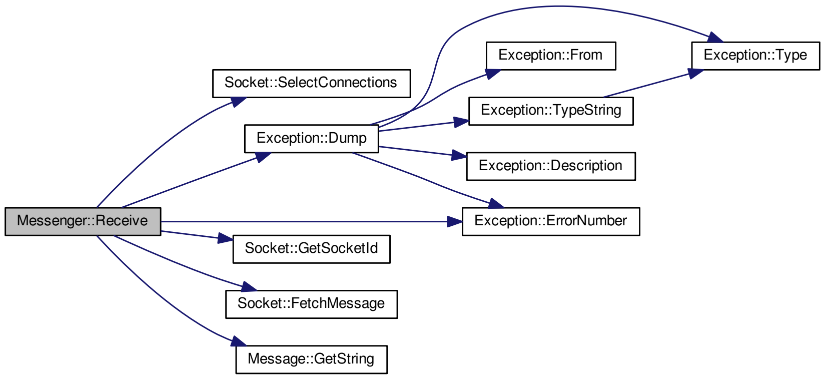
### 5.8.3.4 SocketType Messenger::GetType ( ) const [inline]

Socket actor type retrieval method.

### 5.8.3.5 void Messenger::Receive ( )

Handle a message reception from a client.

Here is the call graph for this function:



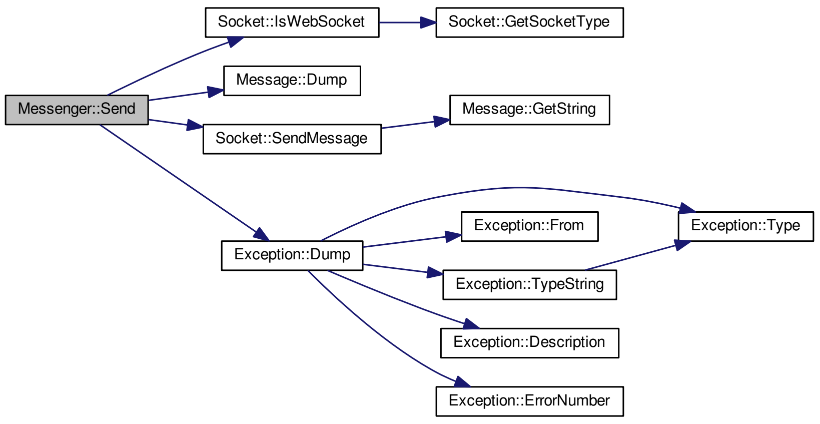
#### 5.8.3.6 void Messenger::Send ( const Message & *m*, int *sid* ) const [inline]

Send any type of message to any client.

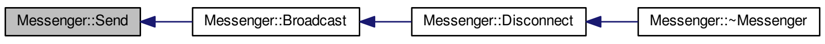
**Parameters**

| | | |
|---|---|---|
| `in` | *m* | Message to transmit |
| `in` | *sid* | Unique identifier of the client on this socket |

Here is the call graph for this function:



Here is the caller graph for this function:



The documentation for this class was generated from the following files:

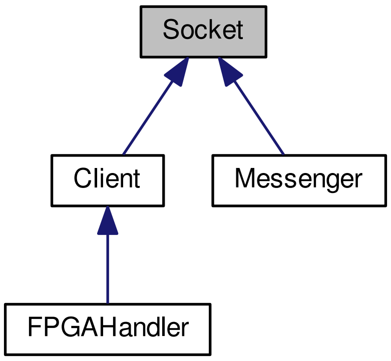
- include/Messenger.h
- src/Messenger.cpp

## 5.9 Socket Class Reference

Base socket object from which clients/master from a socket inherit.

`#include <Socket.h>`

Inheritance diagram for Socket:



### Public Types

- enum SocketType {
  INVALID =-1, MASTER =0, WEBSOCKET_CLIENT, CLIENT,
  DETECTOR }

  *Type of actor playing a role on the socket.*
- typedef std::set< std::pair< int, SocketType > > SocketCollection

### Public Member Functions

- Socket ()
- Socket (int port)
- virtual ~Socket ()
- void Stop ()

  *Terminates the socket and all attached communications.*
- void SetPort (int port)
- int GetPort () const

  *Retrieve the port used for this socket.*
- void AcceptConnections (Socket &socket)

  *Accept connection from a client.*
- void SelectConnections ()
- void SetSocketId (int sid)
- int GetSocketId () const
- SocketType GetSocketType (int sid) const
- bool IsWebSocket (int sid) const
- void DumpConnected () const

### Protected Member Functions

- bool Start ()

  *Start the socket.*
- void Bind ()

*Bind a name to a socket.*

- void PrepareConnection ()
- void Listen (int maxconn)

  *Listen to incoming messages.*
- void SendMessage (Message message, int id=-1) const

  *Send a message on a socket.*
- Message FetchMessage (int id=-1) const

  *Receive a message from a socket.*

## Protected Attributes

- int fPort
- char fBuffer [MAX_WORD_LENGTH]
- SocketCollection fSocketsConnected
- fd_set fMaster

  *Master file descriptor list.*
- fd_set fReadFds

  *Temp file descriptor list for select()*

### 5.9.1 Detailed Description

Base socket object from which clients/master from a socket inherit.

General object providing all useful method to connect/bind/send/receive information through system sockets.

**Author**

Laurent Forthomme `laurent.forthomme@cern.ch`

**Date**

23 Mar 2015

### 5.9.2 Member Typedef Documentation

#### 5.9.2.1 typedef std::set< std::pair<int,SocketType> > Socket::SocketCollection

### 5.9.3 Constructor & Destructor Documentation

#### 5.9.3.1 Socket::Socket ( ) `[inline]`

#### 5.9.3.2 Socket::Socket ( int *port* )

#### 5.9.3.3 Socket::~Socket ( ) `[virtual]`

### 5.9.4 Member Function Documentation

#### 5.9.4.1 void Socket::AcceptConnections ( Socket & *socket* )

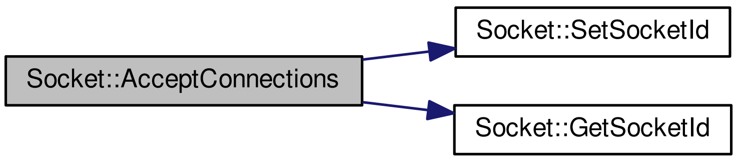
Accept connection from a client.

Set the socket to accept connections any client transmitting through the socket

**Parameters**

| | | |
|---|---|---|
| `in,out` | *socket* | Master/client object to enable on the socket |

Here is the call graph for this function:



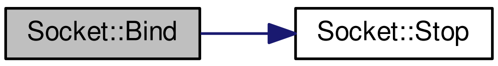
#### 5.9.4.2 void Socket::Bind ( ) `[protected]`

Bind a name to a socket.

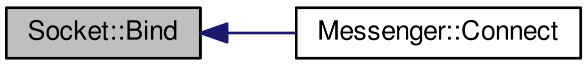
**Returns**

Success of the operation

Here is the call graph for this function:



Here is the caller graph for this function:



#### 5.9.4.3 void Socket::DumpConnected ( ) const

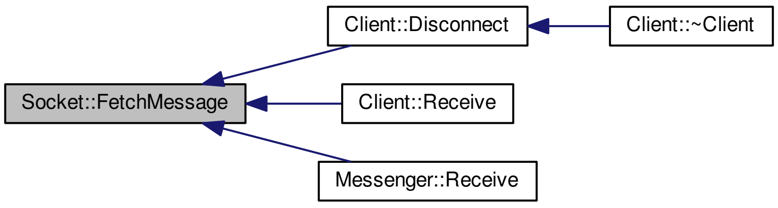
#### 5.9.4.4 Message Socket::FetchMessage ( int *id* = `-1` ) const `[protected]`

Receive a message from a socket.

**Returns**

Received message as a std::string

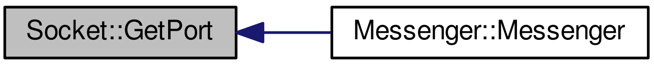
Here is the caller graph for this function:



#### 5.9.4.5 int Socket::GetPort ( ) const [inline]

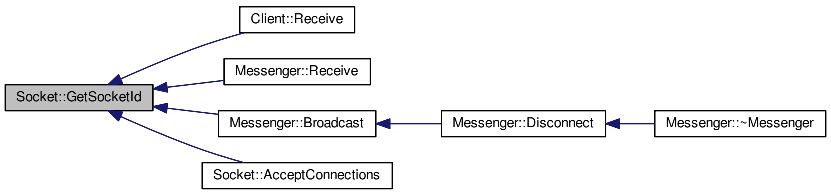
Retrieve the port used for this socket.

Here is the caller graph for this function:



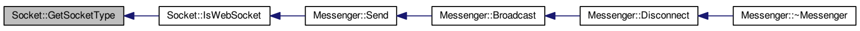
#### 5.9.4.6 int Socket::GetSocketId ( ) const [inline]

Here is the caller graph for this function:



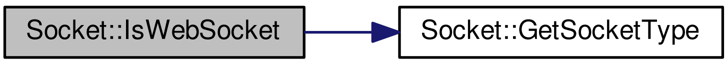
#### 5.9.4.7 SocketType Socket::GetSocketType ( int *sid* ) const [inline]

Here is the caller graph for this function:

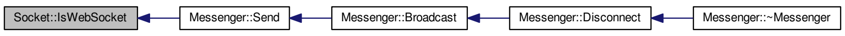


#### 5.9.4.8 bool Socket::IsWebSocket ( int *sid* ) const [inline]

Here is the call graph for this function:



Here is the caller graph for this function:

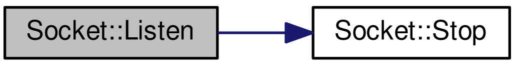


#### 5.9.4.9 void Socket::Listen ( int *maxconn* ) [protected]

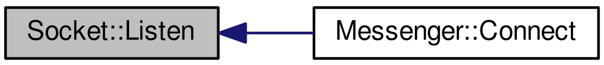
Listen to incoming messages.

Set the socket to listen to any message coming from outside

Here is the call graph for this function:

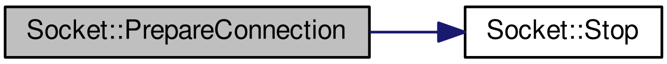


Here is the caller graph for this function:

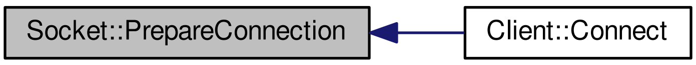


#### 5.9.4.10 void Socket::PrepareConnection ( ) `[protected]`

Here is the call graph for this function:



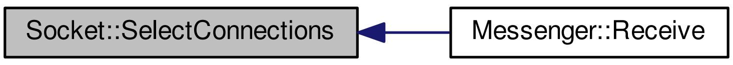
Here is the caller graph for this function:



#### 5.9.4.11 void Socket::SelectConnections ( )

Register all open file descriptors to read their communication through the socket

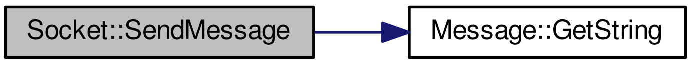
Here is the caller graph for this function:



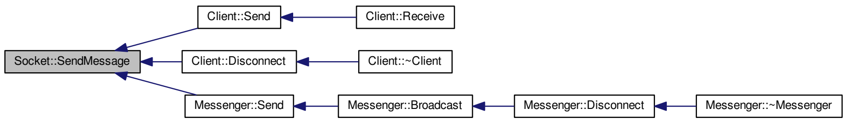
#### 5.9.4.12 void Socket::SendMessage ( Message *message*, int *id* = `-1` ) const `[protected]`

Send a message on a socket.

Here is the call graph for this function:



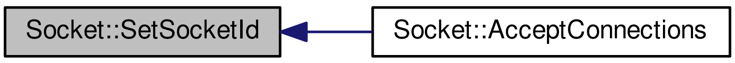
Here is the caller graph for this function:



#### 5.9.4.13 void Socket::SetPort ( int *port* ) `[inline]`

#### 5.9.4.14 void Socket::SetSocketId ( int *sid* ) `[inline]`

Here is the caller graph for this function:



#### 5.9.4.15 bool Socket::Start ( ) `[protected]`

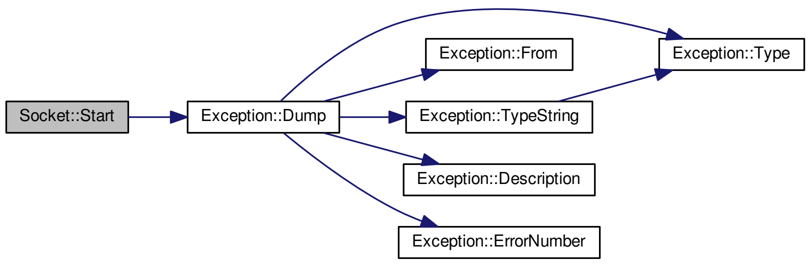
Start the socket.

Launch all mandatory operations to set the socket to be used

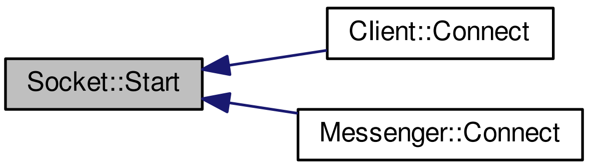
**Returns**

Success of the operation

Here is the call graph for this function:



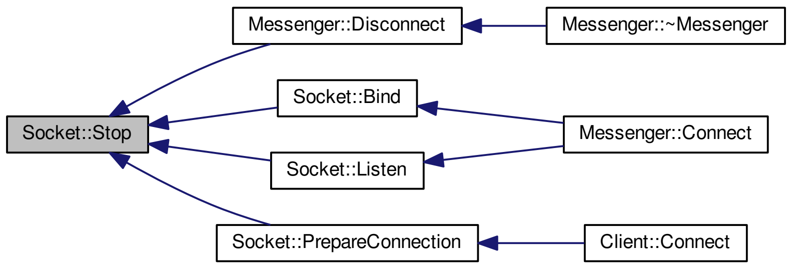
Here is the caller graph for this function:



#### 5.9.4.16 void Socket::Stop ( )

Terminates the socket and all attached communications.

Here is the caller graph for this function:



### 5.9.5 Field Documentation

#### 5.9.5.1 char Socket::fBuffer[MAX_WORD_LENGTH] `[protected]`

#### 5.9.5.2 fd_set Socket::fMaster `[protected]`

Master file descriptor list.

#### 5.9.5.3 int Socket::fPort `[protected]`

#### 5.9.5.4 fd_set Socket::fReadFds `[protected]`

Temp file descriptor list for select()

#### 5.9.5.5 SocketCollection Socket::fSocketsConnected `[protected]`

The documentation for this class was generated from the following files:

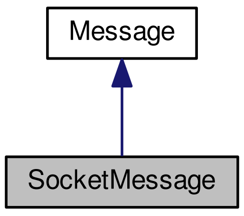
- include/Socket.h
- src/Socket.cpp

## 5.10 SocketMessage Class Reference

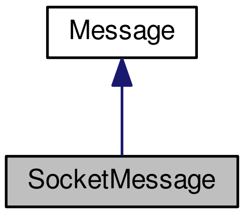
Socket-passed message type.

`#include <SocketMessage.h>`

Inheritance diagram for SocketMessage:



Collaboration diagram for SocketMessage:



## Public Member Functions

- SocketMessage ()
- SocketMessage (const Message &msg)
- SocketMessage (const char ∗msg_s)
- SocketMessage (std::string msg_s)
- SocketMessage (const MessageKey &key)

  *Construct a socket message out of a key.*
- SocketMessage (const MessageKey &key, const char ∗value)

  *Construct a socket message out of a key and a string-type value.*
- SocketMessage (const MessageKey &key, std::string value)

  *Construct a socket message out of a key and a string-type value.*
- SocketMessage (const MessageKey &key, const int value)

  *Construct a socket message out of a key and an integer-type value.*
- SocketMessage (const MessageKey &key, const float value)

  *Construct a socket message out of a key and a float-type value.*
- SocketMessage (const MessageKey &key, const double value)

  *Construct a socket message out of a key and a double precision-type value.*
- SocketMessage (MessageMap msg_m)

  *Construct a socket message out of a map of key/string-type value.*
- ∼SocketMessage ()
- void SetKeyValue (const MessageKey &key, const char ∗value)

  *String-valued message.*
- void SetKeyValue (const MessageKey &key, int int_value)

  *Send an integer-valued message.*
- void SetKeyValue (const MessageKey &key, float float_value)

  *Float-valued message.*
- void SetKeyValue (const MessageKey &key, double double_value)

  *Double-valued message.*
- std::string GetString () const

  *Extract the whole key:value message.*
- MessageKey GetKey () const

  *Extract the message's key.*
- std::string GetValue () const

  *Extract the message's string value.*
- int GetIntValue () const

*Extract the message's integer value.*

- VectorValue GetVectorValue () const

  *Extract the message's vector of string value.*

- void Dump (std::ostream &os=std::cout) const

## Additional Inherited Members

### 5.10.1 Detailed Description

Socket-passed message type.

**Author**

Laurent Forthomme `laurent.forthomme@cern.ch`

**Date**

26 Mar 2015

### 5.10.2 Constructor & Destructor Documentation

#### 5.10.2.1 SocketMessage::SocketMessage ( ) `[inline]`

#### 5.10.2.2 SocketMessage::SocketMessage ( const Message & *msg* ) `[inline]`

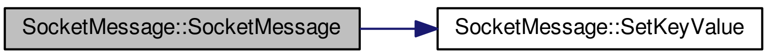
#### 5.10.2.3 SocketMessage::SocketMessage ( const char ∗ *msg_s* ) `[inline]`

#### 5.10.2.4 SocketMessage::SocketMessage ( std::string *msg_s* ) `[inline]`

#### 5.10.2.5 SocketMessage::SocketMessage ( const MessageKey & *key* ) `[inline]`

Construct a socket message out of a key.

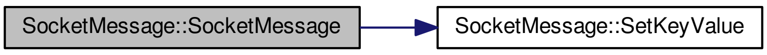
Here is the call graph for this function:



#### 5.10.2.6 SocketMessage::SocketMessage ( const MessageKey & *key,* const char ∗ *value* ) `[inline]`

Construct a socket message out of a key and a string-type value.

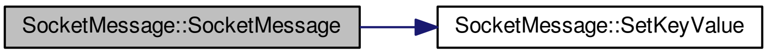
Here is the call graph for this function:



#### 5.10.2.7 SocketMessage::SocketMessage ( const MessageKey & *key*, std::string *value* ) `[inline]`

Construct a socket message out of a key and a string-type value.

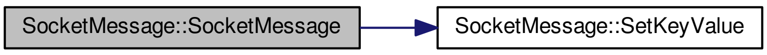
Here is the call graph for this function:



#### 5.10.2.8 SocketMessage::SocketMessage ( const MessageKey & *key*, const int *value* ) `[inline]`

Construct a socket message out of a key and an integer-type value.

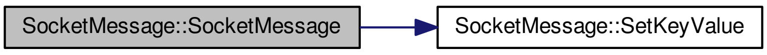
Here is the call graph for this function:



#### 5.10.2.9 SocketMessage::SocketMessage ( const MessageKey & *key*, const float *value* ) `[inline]`

Construct a socket message out of a key and a float-type value.

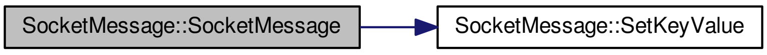
Here is the call graph for this function:



#### 5.10.2.10 SocketMessage::SocketMessage ( const MessageKey & *key*, const double *value* ) `[inline]`

Construct a socket message out of a key and a double precision-type value.

Here is the call graph for this function:



#### 5.10.2.11 SocketMessage::SocketMessage ( MessageMap *msg_m* ) `[inline]`

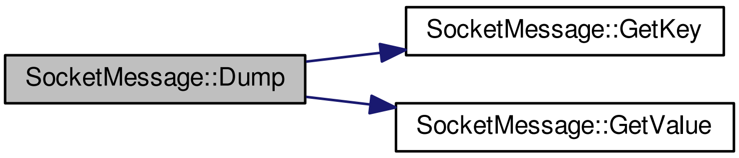
Construct a socket message out of a map of key/string-type value.

#### 5.10.2.12 SocketMessage::∼SocketMessage ( ) `[inline]`

### 5.10.3 Member Function Documentation

#### 5.10.3.1 void SocketMessage::Dump ( std::ostream & *os* = `std::cout` ) const `[inline]`

Here is the call graph for this function:



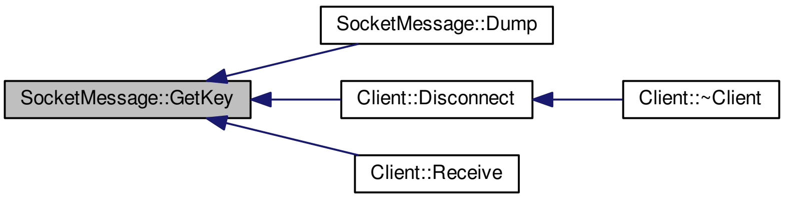
#### 5.10.3.2 int SocketMessage::GetIntValue ( ) const `[inline]`

Extract the message's integer value.

#### 5.10.3.3 MessageKey SocketMessage::GetKey ( ) const `[inline]`

Extract the message's key.

Here is the caller graph for this function:



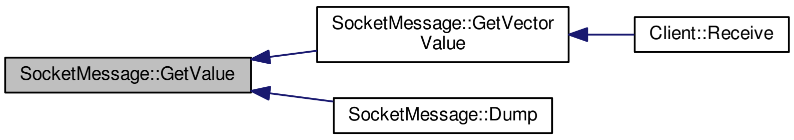
#### 5.10.3.4 std::string SocketMessage::GetString ( ) const [inline]

Extract the whole key:value message.

#### 5.10.3.5 std::string SocketMessage::GetValue ( ) const [inline]

Extract the message's string value.

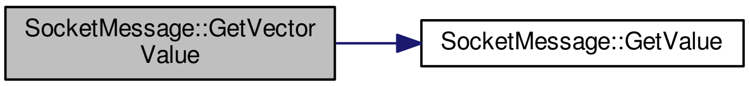
Here is the caller graph for this function:



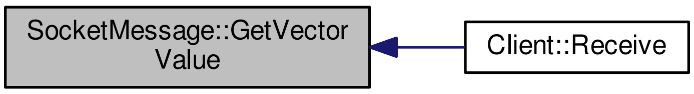
#### 5.10.3.6 VectorValue SocketMessage::GetVectorValue ( ) const [inline]

Extract the message's vector of string value.

Here is the call graph for this function:



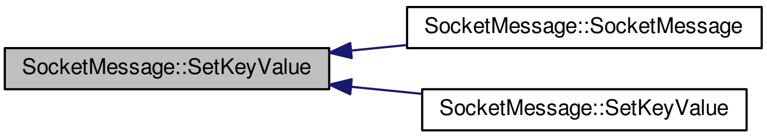
Here is the caller graph for this function:



#### 5.10.3.7 void SocketMessage::SetKeyValue ( const MessageKey & *key,* const char ∗ *value* ) [inline]

String-valued message.

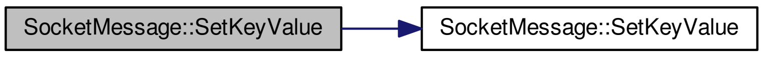
Here is the caller graph for this function:


SocketMessage::SetKeyValue
SocketMessage::SocketMessage
SocketMessage::SetKeyValue

#### 5.10.3.8 void SocketMessage::SetKeyValue ( const MessageKey & *key,* int *int_value* ) [inline]

Send an integer-valued message.

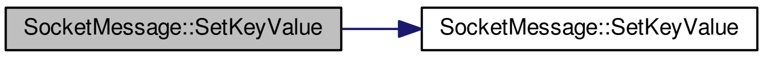
Here is the call graph for this function:



#### 5.10.3.9 void SocketMessage::SetKeyValue ( const MessageKey & *key,* float *float_value* ) [inline]

Float-valued message.

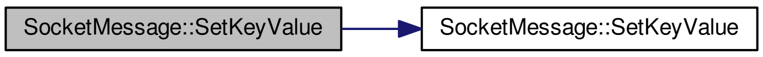
Here is the call graph for this function:



#### 5.10.3.10 void SocketMessage::SetKeyValue ( const MessageKey & *key,* double *double_value* ) `[inline]`

Double-valued message.

Here is the call graph for this function:



The documentation for this class was generated from the following file:

- include/SocketMessage.h

## 5.11 TDCConfiguration Class Reference

Setup word to be sent to the HPTDC chip.

`#include <TDCConfiguration.h>`

### Public Types

- enum EdgeResolution {
  E_100ps =0, E_200ps, E_400ps, E_800ps,
  E_1p6ns, E_3p12ns, E_6p25ns, E_12p5ns }
- enum DeadTime { DT_5ns =0, DT_10ns, DT_30ns, DT_100ns }
- enum WidthResolution {
  W_100ps =0, W_200ps, W_400ps, W_800ps,
  W_1p6ns, W_3p2ns, W_6p25ns, W_12p5ns,
  W_25ns, W_50ns, W_100ns, W_200ns,
  W_400ns, W_800ns }
- enum EnabledError {
  VernierError =0x1, CoarseError =0x2, ChannelSelectError =0x4, L1BufferParityError =0x8,
  TriggerFIFOParityError =0x10, TriggerMatchingError =0x20, ReadoutFIFOParityError =0x40, ReadoutState↩
  Error =0x80,
  SetupParityError =0x100, ControlParityError =0x200, JTAGInstructionParityError =0x400 }
- enum DLLSpeedMode { DLL_40MHz =0x0, DLL_160MHz =0x1, DLL_320MHz =0x2, DLL_Illegal =0x3 }

- enum SerialClockSource { Serial_pll_clock_80 =0x0, Serial_pll_clock_160 =0x1, Serial_pll_clock_40 =0x2, Serial_aux_clock =0x3 }
- enum IOClockSource { IO_clock_40 =0x0, IO_pll_clock_80 =0x1, IO_pll_clock_160 =0x2, IO_aux_clock =0x3 }
- enum CoreClockSource { Core_clock_40 =0x0, Core_pll_clock_80 =0x1, Core_pll_clock_160 =0x2, Core_↩ aux_clock =0x3 }
- enum DLLClockSource {
  DLL_clock_40 =0x0, DLL_pll_clock_40 =0x1, DLL_pll_clock_160 =0x2, DLL_pll_clock_320 =0x3,
  DLL_aux_clock =0x4 }

## Public Member Functions

- TDCConfiguration ()
- TDCConfiguration (const TDCConfiguration &c)
- virtual ∼TDCConfiguration ()
- void SetWord (const unsigned int i, const word_t word)

  *Set one bit(s) subset in the setup word.*
- word_t GetWord (const unsigned int i) const

  *Retrieve one subset from the setup word.*
- uint8_t GetNumWords () const

  *Number of words in the configuration.*
- void SetEnableErrorMark (bool em)

  *Mark events with error if global error signal is set.*
- bool GetEnableErrorMark () const
- void SetEnableErrorBypass (bool eb)

  *Bypass TDC chip if global error signal is set.*
- bool GetEnableErrorBypass () const
- void SetEnableError (const uint16_t &err)

  *Enable internal error types for generation of global error signals.*
- uint16_t GetEnableError () const
- void SetEnableSerial (bool es)

  *Enable of serial read-out (otherwise parallel read-out)*
- bool GetEnableSerial () const
- void SetEnableJTAGReadout (bool jr)

  *Enable of read-out via JTAG.*
- bool GetEnableJTAGReadout () const
- void SetEdgeResolution (const EdgeResolution r)
- EdgeResolution GetEdgeResolution () const
- void SetMaxEventSize (int sz)

  *Set the maximum number of hits per event.*
- uint8_t GetMaxEventSize () const

  *Extract the maximum number of hits per event.*
- void SetRejectFIFOFull (bool rej=true)

  *Reject hits when readout FIFO full.*
- bool GetRejectFIFOFull () const

  *Are hits rejected when readout FIFO is full?*
- void SetEnableReadoutOccupancy (const bool ro=true)

  *Enable the readout of buffer occupancies for each event (for debugging purposes)*
- bool GetEnableReadoutOccupancy () const
- void SetEnableReadoutSeparator (const bool ro=true)

  *Enable the readout of separators for each event (for debugging purposes, valid if readout of occupancies is enabled)*
- bool GetEnableReadoutSeparator () const

- void SetTriggerCountOffset (uint16_t tco)

  *Set offset for the trigger time tag counter.*
- uint16_t GetTriggerCountOffset () const

  *Extract trigger time tag count offset.*
- void SetChannelOffset (int channel, uint16_t offset)
- uint16_t GetChannelOffset (int channel) const
- void SetAllChannelsOffset (uint16_t offset)
- void SetCoarseCountOffset (uint16_t cco)

  *Set offset for the coarse time counter.*
- uint16_t GetCoarseCountOffset () const

  *Extract offset for the coarse time counter.*
- void SetDLLAdjustment (int tap, uint8_t adj)

  *Set the DLL taps adjustments with a resolution of* $\sim$*10 ps.*
- uint8_t GetDLLAdjustment (int tap) const
- void SetAllTapsDLLAdjustment (uint8_t adj)
- void SetRCAdjustment (int tap, uint8_t adj)
- uint8_t GetRCAdjustment (int tap)
- void SetWidthResolution (const WidthResolution r)
- WidthResolution GetWidthResolution () const
- void SetVernierOffset (const uint8_t vo)

  *Set the offset in vernier decoding.*
- uint8_t GetVernierOffset () const

  *Extract the offset in vernier decoding.*
- void SetDeadTime (const DeadTime dt)
- DeadTime GetDeadTime () const
- void SetTestInvert (const bool ti=true)

  *Automatic inversion of test pattern. Only used during production testing.*
- bool GetTestInvert () const
- void SetTestMode (const bool tm=true)

  *Test mode where hit data are taken from coretest. Only used during production testing.*
- bool GetTestMode () const
- void SetTrailingMode (const bool trail=true)

  *Enable/disable the detection of trailing edges.*
- bool GetTrailingMode () const

  *Extract the status for the detection of trailing edges.*
- void SetLeadingMode (const bool lead=true)

  *Enable the detection of leading edges.*
- bool GetLeadingMode () const

  *Extract the status for the detection of leading edges.*
- void SetTriggerMatchingMode (const bool trig=true)

  *Set the enable status of trigger matching mode.*
- bool GetTriggerMatchingMode () const

  *Extract the enable status of trigger matching mode.*
- void SetEdgesPairing (const bool pair=true)

  *Enable the pairing of leading and trailing edges (overrides individual enable of leading/trailing edges)*
- bool GetEdgesPairing () const
- void SetSetupParity (const bool sp=true)

  *Set the parity of setup data (should be an even parity)*
- bool GetSetupParity () const

  *Extract the parity of setup data (should be an even parity)*
- void SetConstantValues ()

  *Ensure that the critical constant values are properly set in the setup word.*
- uint16_t GetTriggerLatency () const

  *Effective trigger latency in number of clock cycles (when no counter roll-over is used)*
- void Dump (int verb=1, std::ostream &os=std::cout) const

### 5.11.1 Detailed Description

Setup word to be sent to the HPTDC chip.

Object handling the configuration word provided by/to the HPTDC chip

**Author**

Laurent Forthomme `laurent.forthomme@cern.ch`

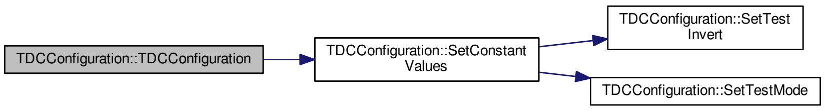
**Date**

16 Apr 2015

### 5.11.2 Constructor & Destructor Documentation

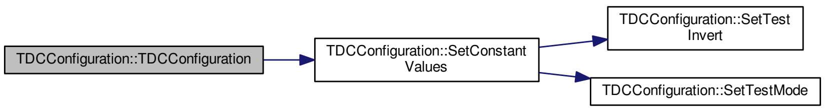
#### 5.11.2.1 TDCConfiguration::TDCConfiguration ( )

Here is the call graph for this function:


TDCConfiguration::TDCConfiguration
TDCConfiguration::SetConstant Values
TDCConfiguration::SetTest Invert
TDCConfiguration::SetTestMode

#### 5.11.2.2 TDCConfiguration::TDCConfiguration ( const TDCConfiguration & *c* )

Here is the call graph for this function:

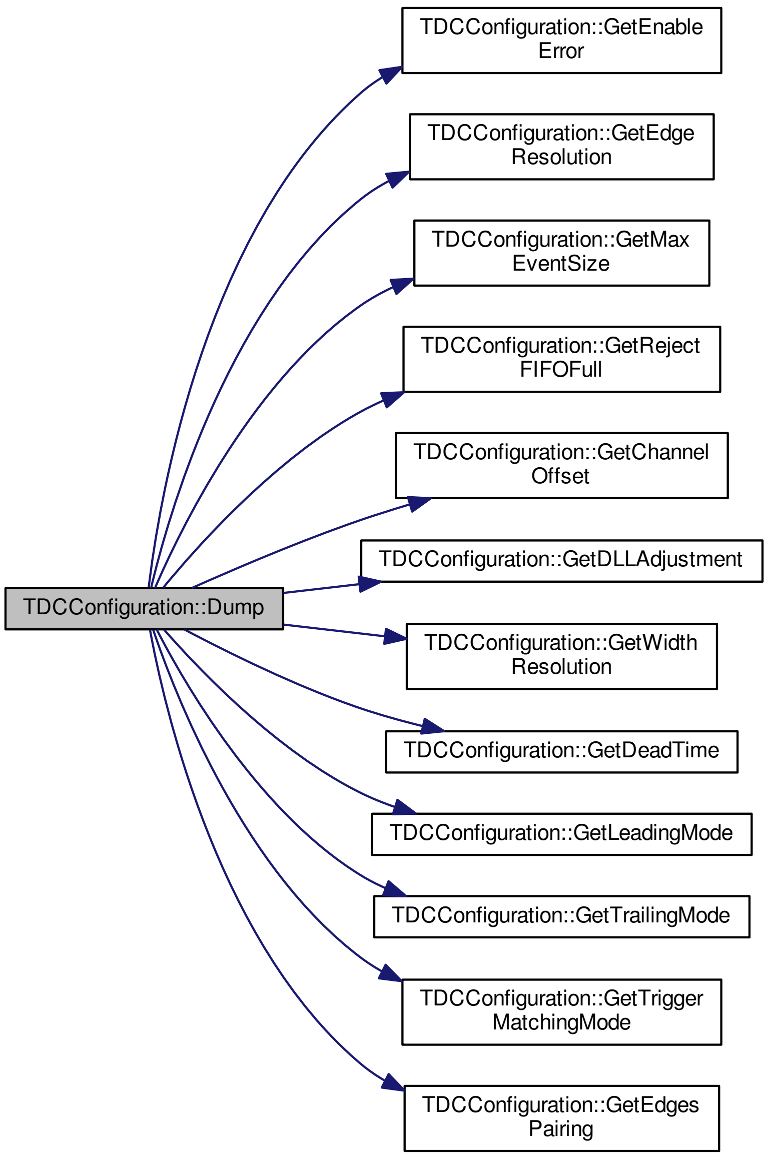

TDCConfiguration::TDCConfiguration
TDCConfiguration::SetConstant Values
TDCConfiguration::SetTest Invert
TDCConfiguration::SetTestMode

#### 5.11.2.3 virtual TDCConfiguration::∼TDCConfiguration ( ) `[inline]`, `[virtual]`

### 5.11.3 Member Function Documentation

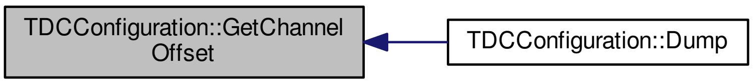
#### 5.11.3.1 void TDCConfiguration::Dump ( int *verb* = `1`, std::ostream & *os* = `std::cout` ) const

Here is the call graph for this function:


TDCConfiguration::Dump
TDCConfiguration::GetEnable Error
TDCConfiguration::GetEdge Resolution
TDCConfiguration::GetMax EventSize
TDCConfiguration::GetReject FIFOFull
TDCConfiguration::GetChannel Offset
TDCConfiguration::GetDLLAdjustment
TDCConfiguration::GetWidth Resolution
TDCConfiguration::GetDeadTime
TDCConfiguration::GetLeadingMode
TDCConfiguration::GetTrailingMode
TDCConfiguration::GetTrigger MatchingMode
TDCConfiguration::GetEdges Pairing

#### 5.11.3.2 uint16_t TDCConfiguration::GetChannelOffset ( int *channel* ) const [inline]

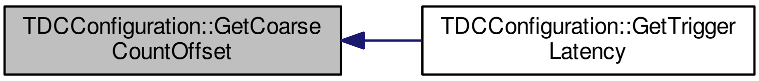
Here is the caller graph for this function:



#### 5.11.3.3 uint16_t TDCConfiguration::GetCoarseCountOffset ( ) const [inline]

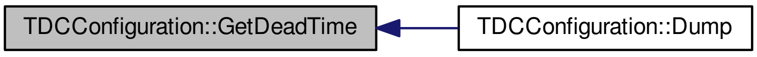
Extract offset for the coarse time counter.

Here is the caller graph for this function:


TDCConfiguration::GetCoarse CountOffset
TDCConfiguration::GetTrigger Latency

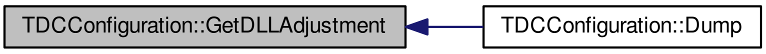
#### 5.11.3.4 DeadTime TDCConfiguration::GetDeadTime ( ) const [inline]

Here is the caller graph for this function:



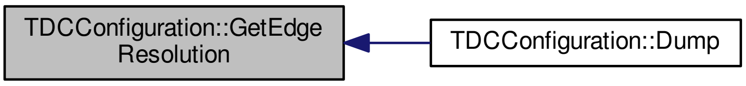
#### 5.11.3.5 uint8_t TDCConfiguration::GetDLLAdjustment ( int *tap* ) const [inline]

Here is the caller graph for this function:



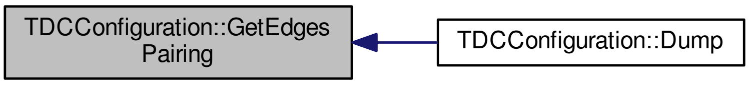
#### 5.11.3.6 EdgeResolution TDCConfiguration::GetEdgeResolution ( ) const [inline]

Here is the caller graph for this function:



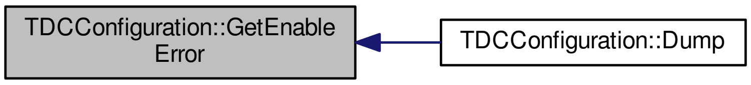
#### 5.11.3.7 bool TDCConfiguration::GetEdgesPairing ( ) const [inline]

Here is the caller graph for this function:



#### 5.11.3.8 uint16_t TDCConfiguration::GetEnableError ( ) const [inline]

Here is the caller graph for this function:



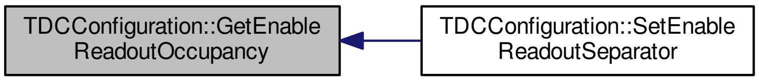
#### 5.11.3.9 bool TDCConfiguration::GetEnableErrorBypass ( ) const [inline]

#### 5.11.3.10 bool TDCConfiguration::GetEnableErrorMark ( ) const [inline]

#### 5.11.3.11 bool TDCConfiguration::GetEnableJTAGReadout ( ) const [inline]

#### 5.11.3.12 bool TDCConfiguration::GetEnableReadoutOccupancy ( ) const [inline]

Here is the caller graph for this function:


TDCConfiguration::GetEnable ReadoutOccupancy
TDCConfiguration::SetEnable ReadoutSeparator

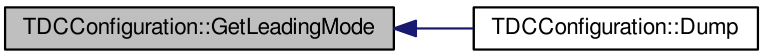
#### 5.11.3.13 bool TDCConfiguration::GetEnableReadoutSeparator ( ) const [inline]

#### 5.11.3.14 bool TDCConfiguration::GetEnableSerial ( ) const [inline]

#### 5.11.3.15 bool TDCConfiguration::GetLeadingMode ( ) const [inline]

Extract the status for the detection of leading edges.

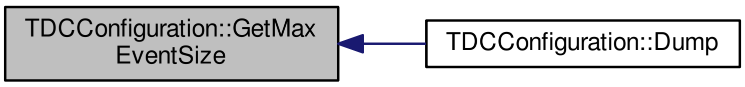
Here is the caller graph for this function:



#### 5.11.3.16 uint8_t TDCConfiguration::GetMaxEventSize ( ) const [inline]

Extract the maximum number of hits per event.

Here is the caller graph for this function:



#### 5.11.3.17 uint8_t TDCConfiguration::GetNumWords ( ) const [inline]

Number of words in the configuration.

Return the number of words making up the full configuration word.

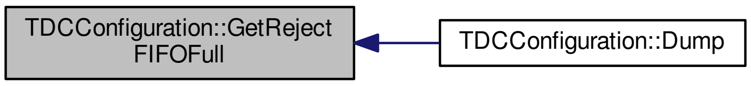
#### 5.11.3.18 uint8_t TDCConfiguration::GetRCAdjustment ( int *tap* ) [inline]

#### 5.11.3.19 bool TDCConfiguration::GetRejectFIFOFull ( ) const [inline]

Are hits rejected when readout FIFO is full?

Extract whether or not hits are rejected once FIFO is full.

Here is the caller graph for this function:



#### 5.11.3.20 bool TDCConfiguration::GetSetupParity ( ) const [inline]

Extract the parity of setup data (should be an even parity)

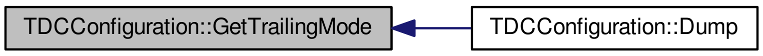
#### 5.11.3.21 bool TDCConfiguration::GetTestInvert ( ) const [inline]

#### 5.11.3.22 bool TDCConfiguration::GetTestMode ( ) const [inline]

#### 5.11.3.23 bool TDCConfiguration::GetTrailingMode ( ) const [inline]

Extract the status for the detection of trailing edges.

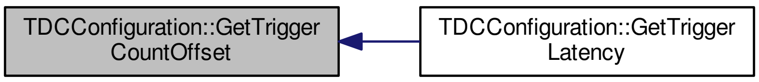
Here is the caller graph for this function:



#### 5.11.3.24 uint16_t TDCConfiguration::GetTriggerCountOffset ( ) const [inline]

Extract trigger time tag count offset.

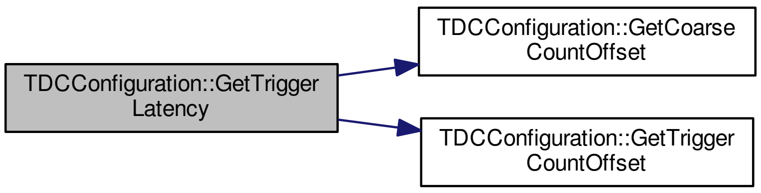
Here is the caller graph for this function:


TDCConfiguration::GetTrigger CountOffset
TDCConfiguration::GetTrigger Latency

#### 5.11.3.25 uint16_t TDCConfiguration::GetTriggerLatency ( ) const [inline]

Effective trigger latency in number of clock cycles (when no counter roll-over is used)

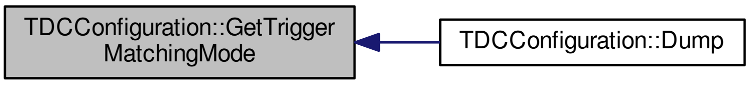
Here is the call graph for this function:


TDCConfiguration::GetTrigger Latency
TDCConfiguration::GetCoarse CountOffset
TDCConfiguration::GetTrigger CountOffset

#### 5.11.3.26 bool TDCConfiguration::GetTriggerMatchingMode ( ) const [inline]

Extract the enable status of trigger matching mode.

Here is the caller graph for this function:

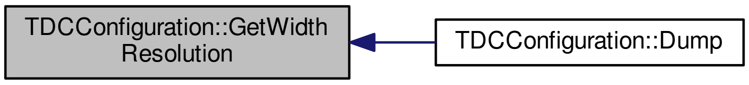


#### 5.11.3.27 uint8_t TDCConfiguration::GetVernierOffset ( ) const [inline]

Extract the offset in vernier decoding.

#### 5.11.3.28 WidthResolution TDCConfiguration::GetWidthResolution ( ) const [inline]

Here is the caller graph for this function:

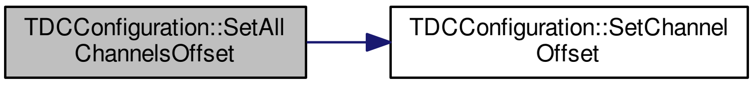


#### 5.11.3.29 word_t TDCConfiguration::GetWord ( const unsigned int *i* ) const [inline]

Retrieve one subset from the setup word.

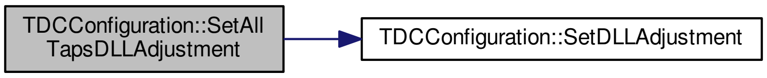
#### 5.11.3.30 void TDCConfiguration::SetAllChannelsOffset ( uint16_t *offset* ) [inline]

Here is the call graph for this function:


TDCConfiguration::SetAll ChannelsOffset
TDCConfiguration::SetChannel Offset

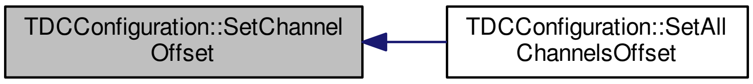
#### 5.11.3.31 void TDCConfiguration::SetAllTapsDLLAdjustment ( uint8_t *adj* ) [inline]

Here is the call graph for this function:


TDCConfiguration::SetAll TapsDLLAdjustment
TDCConfiguration::SetDLLAdjustment

#### 5.11.3.32 void TDCConfiguration::SetChannelOffset ( int *channel,* uint16_t *offset* ) [inline]

Here is the caller graph for this function:


TDCConfiguration::SetChannel Offset
TDCConfiguration::SetAll ChannelsOffset

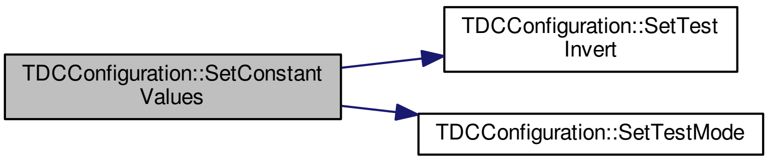
#### 5.11.3.33 void TDCConfiguration::SetCoarseCountOffset ( uint16_t *cco* ) [inline]

Set offset for the coarse time counter.

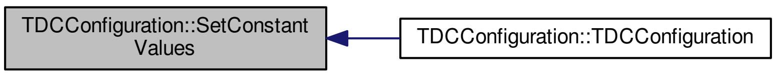
#### 5.11.3.34 void TDCConfiguration::SetConstantValues ( )

Ensure that the critical constant values are properly set in the setup word.

Here is the call graph for this function:


TDCConfiguration::SetConstant Values
TDCConfiguration::SetTest Invert
TDCConfiguration::SetTestMode

Here is the caller graph for this function:

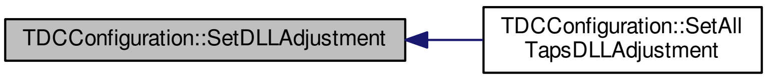

TDCConfiguration::SetConstant Values
TDCConfiguration::TDCConfiguration

#### 5.11.3.35 void TDCConfiguration::SetDeadTime ( const DeadTime *dt* ) [inline]

#### 5.11.3.36 void TDCConfiguration::SetDLLAdjustment ( int *tap,* uint8_t *adj* ) [inline]

Set the DLL taps adjustments with a resolution of $\sim$10 ps.

Here is the caller graph for this function:


TDCConfiguration::SetDLLAdjustment
TDCConfiguration::SetAll TapsDLLAdjustment

#### 5.11.3.37 void TDCConfiguration::SetEdgeResolution ( const EdgeResolution *r* ) [inline]

#### 5.11.3.38 void TDCConfiguration::SetEdgesPairing ( const bool *pair* = true ) [inline]

Enable the pairing of leading and trailing edges (overrides individual enable of leading/trailing edges)

#### 5.11.3.39 void TDCConfiguration::SetEnableError ( const uint16_t & *err* ) [inline]

Enable internal error types for generation of global error signals.

#### 5.11.3.40 void TDCConfiguration::SetEnableErrorBypass ( bool *eb* ) [inline]

Bypass TDC chip if global error signal is set.

#### 5.11.3.41 void TDCConfiguration::SetEnableErrorMark ( bool *em* ) [inline]

Mark events with error if global error signal is set.

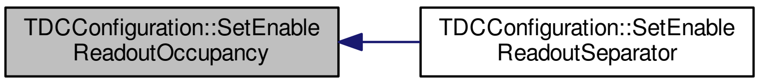
#### 5.11.3.42 void TDCConfiguration::SetEnableJTAGReadout ( bool *jr* ) [inline]

Enable of read-out via JTAG.

#### 5.11.3.43 void TDCConfiguration::SetEnableReadoutOccupancy ( const bool *ro* = `true` ) `[inline]`

Enable the readout of buffer occupancies for each event (for debugging purposes)

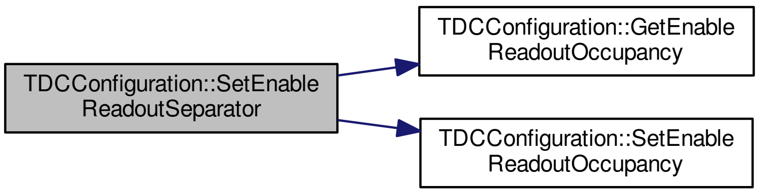
Here is the caller graph for this function:


TDCConfiguration::SetEnable ReadoutOccupancy
TDCConfiguration::SetEnable ReadoutSeparator

#### 5.11.3.44 void TDCConfiguration::SetEnableReadoutSeparator ( const bool *ro* = `true` ) `[inline]`

Enable the readout of separators for each event (for debugging purposes, valid if readout of occupancies is enabled)

Here is the call graph for this function:


TDCConfiguration::SetEnable ReadoutSeparator
TDCConfiguration::GetEnable ReadoutOccupancy
TDCConfiguration::SetEnable ReadoutOccupancy

#### 5.11.3.45 void TDCConfiguration::SetEnableSerial ( bool *es* ) `[inline]`

Enable of serial read-out (otherwise parallel read-out)

#### 5.11.3.46 void TDCConfiguration::SetLeadingMode ( const bool *lead* = `true` ) `[inline]`

Enable the detection of leading edges.

#### 5.11.3.47 void TDCConfiguration::SetMaxEventSize ( int *sz* ) `[inline]`

Set the maximum number of hits per event.

Set the maximum number of hits that can be recorded for each event. It is always rounded to the next power of 2 (in the range 0-128), and if lower than 0 or bigger than 128 then set to unimited.

#### 5.11.3.48 void TDCConfiguration::SetRCAdjustment ( int *tap,* uint8_t *adj* ) `[inline]`

#### 5.11.3.49 void TDCConfiguration::SetRejectFIFOFull ( bool *rej* = `true` ) `[inline]`

Reject hits when readout FIFO full.

Set whether or not hits are rejected once FIFO is full.

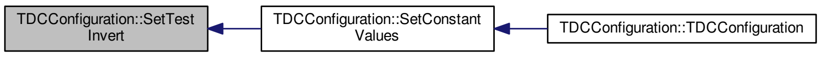
#### 5.11.3.50 void TDCConfiguration::SetSetupParity ( const bool *sp* = `true` ) `[inline]`

Set the parity of setup data (should be an even parity)

#### 5.11.3.51 void TDCConfiguration::SetTestInvert ( const bool *ti* = `true` ) `[inline]`

Automatic inversion of test pattern. Only used during production testing.

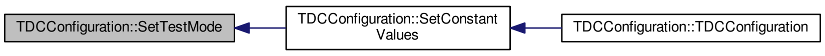
Here is the caller graph for this function:


TDCConfiguration::SetTest Invert
TDCConfiguration::SetConstant Values
TDCConfiguration::TDCConfiguration

#### 5.11.3.52 void TDCConfiguration::SetTestMode ( const bool *tm* = `true` ) `[inline]`

Test mode where hit data are taken from coretest. Only used during production testing.

Here is the caller graph for this function:


TDCConfiguration::SetTestMode
TDCConfiguration::SetConstant Values
TDCConfiguration::TDCConfiguration

#### 5.11.3.53 void TDCConfiguration::SetTrailingMode ( const bool *trail* = `true` ) `[inline]`

Enable/disable the detection of trailing edges.

#### 5.11.3.54 void TDCConfiguration::SetTriggerCountOffset ( uint16_t *tco* ) `[inline]`

Set offset for the trigger time tag counter.

#### 5.11.3.55 void TDCConfiguration::SetTriggerMatchingMode ( const bool *trig* = `true` ) `[inline]`

Set the enable status of trigger matching mode.

#### 5.11.3.56 void TDCConfiguration::SetVernierOffset ( const uint8_t *vo* ) `[inline]`

Set the offset in vernier decoding.

#### 5.11.3.57 void TDCConfiguration::SetWidthResolution ( const WidthResolution *r* ) `[inline]`

#### 5.11.3.58 void TDCConfiguration::SetWord ( const unsigned int *i*, const word_t *word* ) `[inline]`

Set one bit(s) subset in the setup word.

The documentation for this class was generated from the following files:

- include/TDCConfiguration.h
- src/TDCConfiguration.cpp

## 5.12 TDCEvent Class Reference

HPTDC event parser.

`#include <TDCEvent.h>`

### Public Types

- enum EventType {
  Invalid =-1, GroupHeader =0, GroupTrailer, TDCHeader,
  TDCTrailer, LeadingEdge, TrailingEdge, Error,
  Debug }

### Public Member Functions

- TDCEvent (const uint32_t &word)
- virtual ~TDCEvent ()
- EventType GetType () const

  *Type of packet read out from the TDC.*
- unsigned int GetTDCId () const

  *Programmed identifier of master TDC.*
- uint16_t GetEventId () const

  *Event identifier from event counter.*
- uint16_t GetWordCount () const

  *Total number of words in event (including headers and trailers)*
- uint16_t GetBunchId () const

  *Bunch identifier of trigger (or trigger time tag)*
- uint32_t GetLeadingTime (bool pair=false) const

  *Leading edge measurement in programmed time resolution.*
- uint8_t GetWidth () const

  *Width of pulse in programmed time resolution.*
- uint32_t GetTrailingTime () const

  *Trailing edge measurement in programmed time resolution.*
- uint16_t GetErrorFlags () const

  *Return error flags if an error condition has been detected.*

### 5.12.1 Detailed Description

HPTDC event parser.

Object enabling to decipher any measurement/error/debug event returned by the HPTDC chip

**Author**

Laurent Forthomme laurent.forthomme@cern.ch

**Date**

20 Apr 2015

### 5.12.2 Constructor & Destructor Documentation

#### 5.12.2.1 TDCEvent::TDCEvent ( const uint32_t & *word* ) [inline]

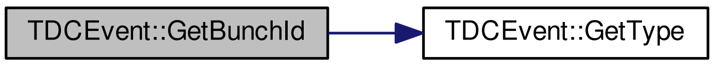
#### 5.12.2.2 virtual TDCEvent::∼TDCEvent ( ) [inline], [virtual]

### 5.12.3 Member Function Documentation

#### 5.12.3.1 uint16_t TDCEvent::GetBunchId ( ) const [inline]

Bunch identifier of trigger (or trigger time tag)

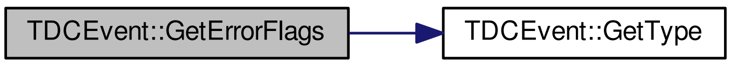
Here is the call graph for this function:



#### 5.12.3.2 uint16_t TDCEvent::GetErrorFlags ( ) const [inline]

Return error flags if an error condition has been detected.

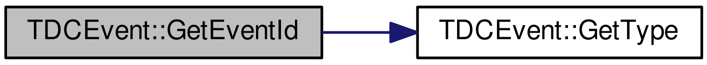
Here is the call graph for this function:



#### 5.12.3.3 uint16_t TDCEvent::GetEventId ( ) const [inline]

Event identifier from event counter.

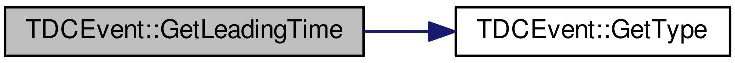
Here is the call graph for this function:



#### 5.12.3.4 uint32_t TDCEvent::GetLeadingTime ( bool *pair* = false ) const [inline]

Leading edge measurement in programmed time resolution.

Here is the call graph for this function:



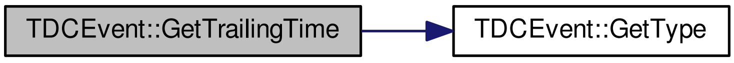
#### 5.12.3.5 unsigned int TDCEvent::GetTDCId ( ) const [inline]

Programmed identifier of master TDC.

#### 5.12.3.6 uint32_t TDCEvent::GetTrailingTime ( ) const [inline]

Trailing edge measurement in programmed time resolution.

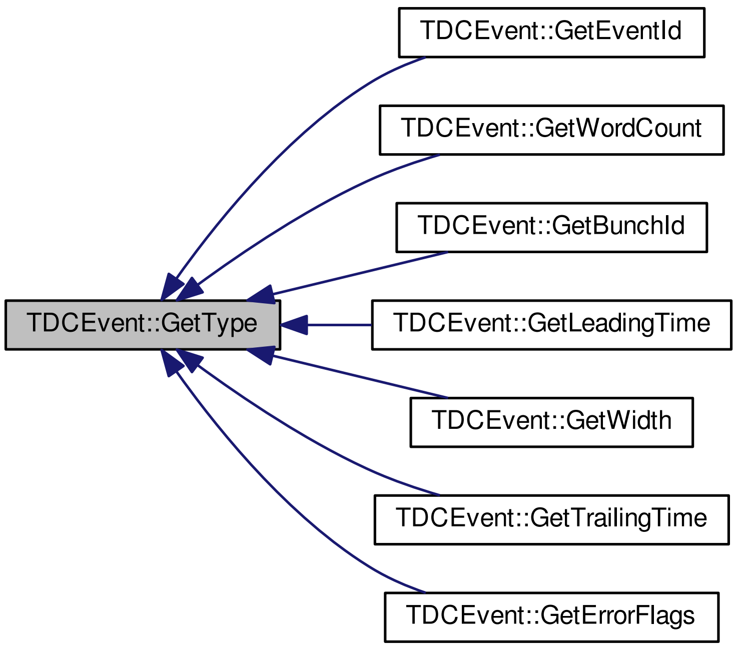
Here is the call graph for this function:



#### 5.12.3.7 EventType TDCEvent::GetType ( ) const [inline]

Type of packet read out from the TDC.

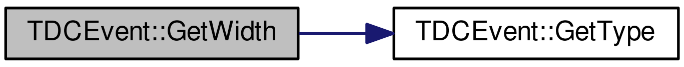
Here is the caller graph for this function:



#### 5.12.3.8 uint8_t TDCEvent::GetWidth ( ) const [inline]

Width of pulse in programmed time resolution.

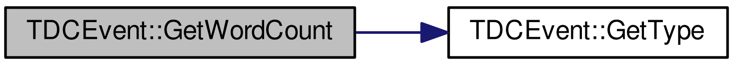
Here is the call graph for this function:



#### 5.12.3.9 uint16_t TDCEvent::GetWordCount ( ) const [inline]

Total number of words in event (including headers and trailers)

Here is the call graph for this function:



The documentation for this class was generated from the following file:

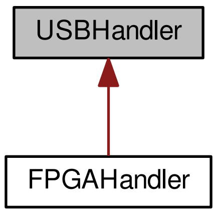
- include/TDCEvent.h

## 5.13 USBHandler Class Reference

Generic USB communication handler.

```
#include <USBHandler.h>
```

Inheritance diagram for USBHandler:



### Public Member Functions

- USBHandler (const char ∗dev)
- virtual ∼USBHandler ()
- void Init ()
- void DumpDevice (libusb_device ∗dev, int verb=1, std::ostream &out=std::cout)

### Protected Member Functions

- void Write (uint32_t word, uint8_t size) const

  *Write a word to the USB device.*
- uint32_t Fetch (uint8_t size) const

  *Receive a word from the USB device.*

### 5.13.1 Detailed Description

Generic USB communication handler.

**Date**

21 Apr 2015

**Author**

Laurent Forthomme laurent.forthomme@cern.ch

### 5.13.2 Constructor & Destructor Documentation

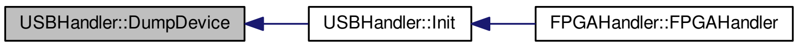
#### 5.13.2.1 USBHandler::USBHandler ( const char $*$ *dev* )

#### 5.13.2.2 virtual USBHandler::∼USBHandler ( ) [inline], [virtual]

### 5.13.3 Member Function Documentation

#### 5.13.3.1 void USBHandler::DumpDevice ( libusb_device $*$ *dev*, int *verb* = 1, std::ostream & *out* = std::cout )

Here is the caller graph for this function:



#### 5.13.3.2 uint32_t USBHandler::Fetch ( uint8_t *size* ) const [inline], [protected]

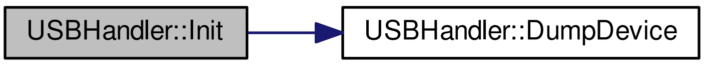
Receive a word from the USB device.

#### 5.13.3.3 void USBHandler::Init ( )

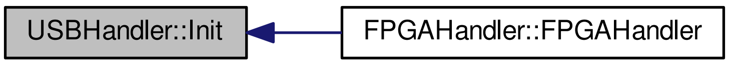
Pointer to a pointer of devices used to retrieve a list of them

A libusb session

Here is the call graph for this function:



Here is the caller graph for this function:



#### 5.13.3.4 void USBHandler::Write ( uint32_t *word,* uint8_t *size* ) const [inline], [protected]

Write a word to the USB device.

The documentation for this class was generated from the following files:

- include/USBHandler.h
- src/USBHandler.cpp

# Index