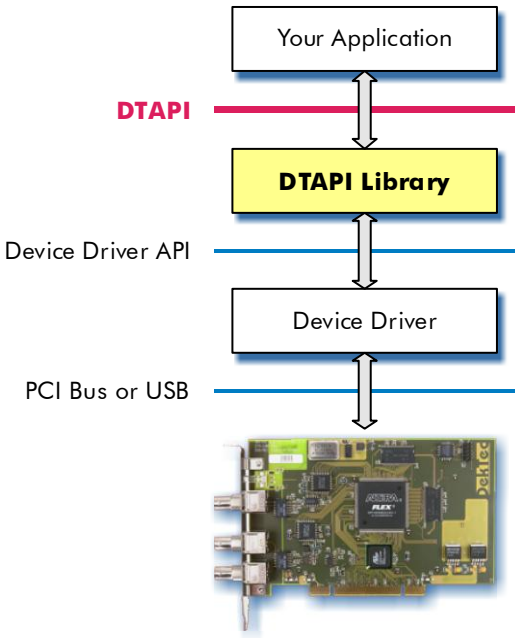
# C++ API FOR
# - DTA ADAPTERS FOR PCI
# - DTU ADAPTERS FOR USB

- Uniform access to DekTec hardware
- Abstracts from hardware details like DMA, USB, Interrupts, VPD
- Object oriented, easy to use

## FEATURES

- Common C++ interface to DekTec's line of digital-video devices
- Encapsulates the device-driver layer in an easy-to-use object-oriented interface
- Access to all hardware features from user-mode programs
- High efficiency; no need to resort to kernel-mode programming to achieve real-time operation
- Operates on top of the Windows WDM device driver for Windows 2000 / 2003 / XP
- Packaged in a C++ header file (to be included in your C++ project) and a library (to be linked to the application)

## LAYERING




## KEY ATTRIBUTES

| Parameter | Value |
|---|---|
| Maximum number of parallel hardware functions per PC | 75 |
| DTAPI Version | 4.6.0.130 |
| Dta1xx Device-Driver Version | 3.2.0.246 |
| Dtu2xx Device-Driver Version | 3.4.0.130 |

## SUPPORTED ADAPTERS

| INTERFACE TYPE | SUPPORTED ADAPTERS |
|---|---|
| PCI | DTA-100, DTA-102, DTA-105, DTA-107, DTA-110, DTA-110T, DTA-111, DTA-122, DTA-115, DTA-116, DTA-117, DTA-120, DTA-122, DTA-124, DTA-140, DTA-145, DTA-160 |
| PCI Express | DTA-2135, DTA-2137, DTA-2142, DTA-2144, DTA-2145, DTA-2160 |
| USB | DTU-205, DTU-215, DTU-225, DTU-234, DTU-235, DTU-245 |
| Ethernet | DTE-3100, DTE-3120 |

# Table of Contents

## DTAPI Revision History

| Version | Date | Change Description |
|---|---|---|
| V4.x.x.x | XXXX.XX.XX | • Add description for m_Mac field in DtDeviceDesc structure<br>• |
| V4.6.0.130 | 2009.11.03 | • Added DTAPI_IOCONFIG_INPUT_APSK IO-Config value for DTA-2137<br>• Add description for DtInpChannel::LnbEnable, DtInpChannel::LnbEnableTone, DtInpChannel::LnbSetVoltage and DtInpChannel::LnbSendDiseqcMessage methods<br>• Add description for DtOutpChannel::SetChannelModelling method |
| V4.5.1.129 | 2009.09.25 | • Fixed communication error between DTAPI and DtapiService, which resulted in failure to connect to DTA-2135 or DTA-2137<br>• Fixed issue with DTAPINET referencing multiple versions of the C/C++ runtime libraries |
| V4.5.0.128 | 2009.08.18 | • Support for IQ-Direct modulation mode<br>• Support for DVB-T2 modulation and channel modelling (i.e. AWGN, echo, etc)<br>• Supports DTA-2137 and includes preliminary support for DTU-215 |
| V4.4.1.121 | 2009.01.27 | • Updated library for 64-bit support<br>• Added support for DTA-2144<br>• Added support for Genlock / Blackburs tstuffing (DTA-(2)145 / DTA-2144)<br>• Add DtInpChannel::ReadSubCh method |
| V4.3.0.115 | 2008.07.25 | • Support for tuning DTU-235 and getting RF statistics (level, constellation, BER, etc) from DTU-235<br>• Add support for specifying sub-channel for 1-segment ISDB-T modulation |
| V4.2.1.114 | 2008.06.30 | • Fixed bug in DtOutpChannel::SetOutputLevel and DtOutpChannel::SetSNR for DTA-107<br>• Solved link conflicts between DTAPI and applications that uses gSOAP<br>• Fixed bug which prevented the Linux version of the DTAPI to attach to Dtu2xx devices<br>• Support for transparent-packet receive mode for the DTA-160 IP port (FOR NOW: only available on Windows) |
| V4.2.0.112 | 2008.05.21 | • Fixed bug in DtInpChannel::SetTunerFrequency resulting in a failure to set the tuner frequency for a DTU-234<br>• Support for new Dtu2xx Linux driver<br>• Add initial support for DTE-31XX devices (FOR NOW: only available on Windows) |
| V4.1.1.108 | 2008.02.27 | • Added section 2.5, with usage instruction for Linux, to document<br>• Support for DTA-2135<br>• Fixed bug in DtOutpChannel::AttachToPort: for DTA-145/2145 DTAPI_E_NO_DT_OUTPUT was returned if port 2 was configured in fail-safe mode |
| V4.0.4.104 | 2008.01.07 | • In DTAPI.h file: renamed DtDeviceDesc2String to DtapiDtDeviceDesc2String<br>• Add support for setting output level of a DTA-107 with firmware version 3 or higher<br>• New routine for DtOutpChannel class: SetSNR<br>• DTAPINET: signed with strong name<br>• DTA-160 IP on Linux: fixed failure to resolve the MAC address with ARP if multiple Ethernet devices are present in the Linux PC.<br>• Updated definition of DtDevice::VpdDelete, DtDevice::VpdRead and DtDevice::VpdWrite methods (changed keyword parameter from char* to const char* ) |
| V4.0.2.101 | 2007.12.13 | • Support for double-buffered and loop-through capabilities in DTA-145/160/2145<br>• Support for transparent-packet mode and SDI time-stamping<br>• Updated description of capabilities and supported capabilities per device in Table 7<br>• Updated description of DtDevice::GetIoConfig and DtDevice::SetIoConfig methods<br>• Updated behavior of IP transmit if the IP address assigned to the DTA-160 IP port, changes during transmission (i.e. automatically set new IP address in source IP address field of all IP packets generated) |

| | | |
|---|---|---|
| V4.0.0.99 | 2007.11.12 | • Merged Linux and Windows versions of DTAPI, so that both are based on the same source code. NOTE: In the Linux version the Dtu2xx devices are not supported. The Dtu2xx devices will be supported again from version 4.2.0.x |
| V3.8.0.91 | 2007.09.04 | • Add support for ADTB-T and ATSC modulation<br>• Bug fix for DVB-S2 modulation in 8-PSK mode with pilots on<br>• Support of modulation routines for DTA-115 firmware version 2<br>• Changed name of DtapiModulationPars2TsRate into DtapiModPars2TsRate; Added parameter SymRate; Generalise to any modulation mode<br>• Add global function DtapiModPars2SymRate<br>• Support of 1-segment and 3-segment ISDB-T modulation in broadcast TV mode<br>• Add member m_FilledOut to DtIsdbtPars: must be set to true for correct operation |
| V3.7.0.90 | 2007.06.05 | • New global routine: DtapiModulationPars2TsRate<br>• New routines for DtInpChannel class:<br>GetConstellationPoints, GetFecErrorCounters and GetRfLevel |
| V3.6.0.88 | 2007.05.16 | • Modified section 2.1 and added sections 2.2, 2.3 and 2.4, which provide details on using the different versions (static link library, .NET 2.0 assembly and DLL) of the DTAPI<br>• Add GetRefClkFreq method to DtDevice class<br>• Improved PCR handling algorithm in hierarchical ISDB-T multiplexing code<br>• Add overloaded version of DtInpChannel::Read method which includes a timeout parameter<br>• Add optional timeout parameter to DtInpChannel::ReadFrame<br>• Add support for ISDB-T 1-segment radio broadcast |
| V3.5.0.85 | 2007.03.30 | • Support for DTA-116<br>• Fixes initialised problem with ISDB-T modulation |
| V3.4.2.84 | 2007.03.29 | • Support for DTMB modulation<br>• DtIsdbtPars: Support for specifying a default layer in ISDB-T multiplexing<br>• Updated documentation of DtInpChannel::GetDemodStatus |
| V3.4.0.81 | 2007.02.06 | • Support for DTA-107S2, DTA-115, DTA-145, DTA-2145<br>• Support for hierarchical ISDB-T multiplexing<br>• New DtSdi class with SDI support functions<br>• New looping algorithm in DtLoop class. More robust against high jitter input streams (e.g. from IP)<br>• New global routine: DtapiDvbS2GetBitRate<br>• New routines for DtInpChannel class:<br>GetDemodControl, GetDemodStatus, GetTunerFrequency, ReadFrame, SetTunerFrequency, SetDemodControl, SetTunerFrequency and TuneChannel<br>• New routines for DtOutpChannel class:<br>GetFailsafeAlive, GetFailsafeConfig, GetOutputLevel, SetFailsafeAlive, SetFailsafeConfig and SetOutputLevel<br>• Add section describing the data formats by DekTec cards and in the DTAPI |
| V3.3.0.75 | 2006.10.06 | • Support for DTA-160 Rev4<br>• Several minor bug-fixes related to configurable I/O support<br>• Support for new VPD control interface of Dta1xx driver |
| V3.2.0.71 | 2006.08.29 | • Support for DTA-105<br>• Support for ISDB-T with the DTA-110T<br>• Performance enhancements for the DTA-160 IP transmit<br>• Support for RAW IP mode in the transmit-channel<br>• Several bug-fixes for IP FEC generation algorithm |
| V3.0.5.64 | 2006.05.22 | • New generic classes DtInpChannel and DtOutpChannel with SdiInpChannel, TsInpChannel, SdiOutpChannel and DtOutpChannel as derived classes<br>• New concept (physical) Port to identify a specific port of a device; Addition of port-related fields to DtDeviceDesc and DtHwFuncDesc; New member functions DtInpChannel::AttachToPort and DtOutpChannel::AttachToPort<br>• Redefinition of a number of fields in DtHwFuncDesc for improved description of hardware capabilities |

| | | |
|---|---|---|
| | | • New DtLoop class for looping Transport Streams from port to port<br>• New structure DtTsIpPars and function DtOutpChannel::SetTsIpPars for specifying TS-over-IP parameters<br>• Addition of several string conversion routines<br>• Support for 8-bit SDI on DTA-160, DTU-225 and DTU-245<br>• Support for DTA-110T, DTA-160, DTU-234, DTU-245 |
| V2.4.4.44 | 2005.07.11 | • Support for DTA-110<br>• Fixed several errors in the example code included in this document |
| V2.3.0.39 | 2004.12.29 | • New routines:<br>DtInpChannel::GetMaxFifoSize, DtInpChannel::GetReceiveByteCount,<br>DtOutpChannel::GetTransmitByteCount , DtDevice::I2Cread<br>and DtDevice::I2Cwrite |
| V2.1.2.36 | 2004.09.16 | • Support for DTA-107<br>• Support for DTU-205 |
| V2.0.0.30 | 2004.03.15 | • Added support for DTU-225<br>• Added DtDevice class |
| V1.3.1.25 | 2003.02.07 | • Support for time stamping on DTA-140, amongst others addition of time-stamp flag in DtInpChannell::SetRxMode<br>• Add support for receive mode DTAPI_RXMODE_STMP2<br>• Add support for transmit mode DTAPI_TXMODE_MIN16<br>• Change of DtInpChannel::Read, so that entire receive FIFO can be read, even without input signal<br>• New routines:<br>PciCard::GetRefClkCnt<br>DtInpChannel::ClearFifo, DtInpChannel::GetRxControl,<br>DtInpChannel::WriteLoopBackData |
| V1.2.0.20 | 2002.11.12 | • Added this change description section<br>• New routine ::DtapiCheckDeviceDriverVersion |
| V1.1.0.19 | 2002.11.11 | • Support for DTA-140 |
| V1.0.2.6 | 2002.03.22 | • New routine DtOutpChannel::ClearFifo to clear transmit FIFO without generation of a truncated packet |

# 1. General Description

DTAPI is an acronym for DekTec Application Programming Interface. The DTAPI enables application programs to access the functions of DekTec Devices at a higher level of abstraction than would be possible using direct device-driver calls. Still, the DTAPI allows access to nearly all hardware features.

The DTAPI is composed of a header file, to be included by the application source code, and a library file, to be linked to the application's executable.

## 1.1. Object Model

The DTAPI is a collection of C++ classes, each representing a generic hardware function. Instances of a DTAPI class refer to a specific hardware function on a particular device. The hardware is controlled indirectly by invoking methods on the DTAPI objects.

Figure 1 illustrates a number of instantiated DTAPI objects in action. The application interacts with the DTAPI objects. The library methods implementing the DTAPI classes communicate with the hardware through the WDM device driver.

Each DekTec device is represented by precisely one **`DtDevice`** object. This object is the starting point for all interaction with a particular DekTec device. The following functions are supported:

- Instantiating channels for streaming.
- Getting versioning information on the device driver and firmware installed on the hardware.
- Reading and writing Vital Product Data (VPD), used for storing product-identification data. VPD is divided in a read-only part (e.g. *part number*) and a read/write part for custom identification information.

The **`DtDevice`** class is supplemented by global function **`DtapiDtDeviceScan`** to scan the PCI and USB buses and build an inventory of DekTec devices in the system.

Streaming functions are represented by "channel" objects. For the purpose of streaming MPEG-2 Transport Streams, two channel classes are defined: **`DtInpChannel`** for reading a Transport Stream and **`DtOutpChannel`** for outputting a Transport Stream. A device may support multiple physical input and/or output streams, so in general a device can be represented by multiple channel objects.

Class **`DtOutpChannel`** supports the following functions:

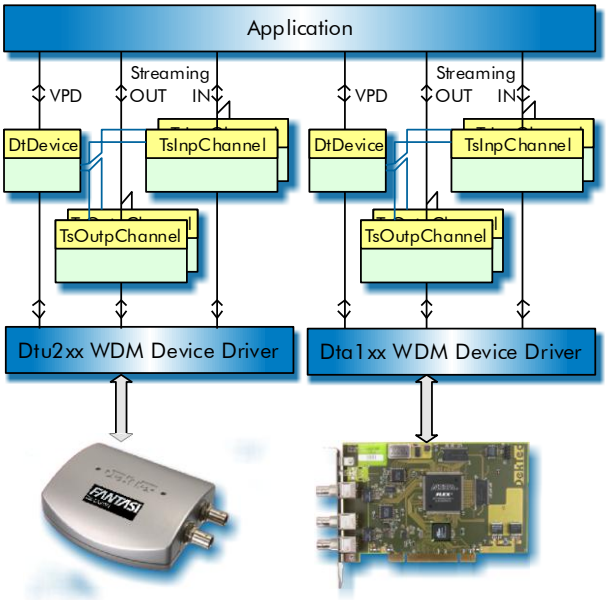



Figure 1. Example of DTAPI objects representing two devices.

- Attaching to (and detaching from) the hardware identified by a **`DtDevice`** object.
- Initialising and controlling the output channel, like setting bit rate and packet size, reading the load of the Transmit FIFO, etc.
- The core function: writing Transport-Stream data. This function encapsulates DMA details, so that the user is effectively shielded from the entire DMA process.
- Controlling special functions supported by the output channel, such as identification of the connected Target Adapter, applying power supply to the Target Adapter, measurement of external-clock frequency, etc.
- Functions to enable software testing of the Transmit FIFO on-board of the device.

Class **`DtInpChannel`** supports similar functions for an input stream:

- Attaching to (and detaching from) the hardware identified by a **`DtDevice`** object.
- Initialising and controlling the input channel, like setting packet size, reading bit rate,

reading the load of the Receive FIFO, etc.
- Reading incoming Transport-Stream data and storing it in a buffer in host memory.
- Controlling special functions supported by the input channel, such as identification of the connected Target Adapter, applying power supply to the Target Adapter, etc.
- Functions to enable software testing of the Receive FIFO on-board of the device.

**Note**
- There is no one to one mapping between DTAPI functions and system calls to the device driver: DTAPI method calls may lead to zero, one or more system calls to the device driver.

## 1.2. Terminology

**bslbf –** Bit string, left bit first, where "left" is the order in which bit strings are written in this document. Bit strings are written as a string of 1s and 0s within single quote marks, e.g. '1000 0001'. Blanks within a bit string are for ease of reading and have no significance.

**Bsrlb –** Bit string right-to-left in bytes.

**Channel object –** Instance of a C++ class representing a single physical input or output stream. The application manipulates input or output streams by invoking methods on the channel object.

**DtDevice –** DekTec Device, generic designator for either PCI card or USB adapter.

**DTA-xxx card –** Any DekTec PCI card in the DTA series.

**Dta1xx –** Name of the WDM device driver for Windows-2000 / XP / 2003. This device driver is generic for DekTec PCI Cards.

**DTAPI –** DekTec Application Programming Interface.

**DTU-xxx device –** Any DekTec USB adapter in the DTU series.

**Dtu2xx –** Name of the WDM device driver for Windows-2000 / XP / 2003. This device driver is generic for DekTec USB Adapters.

**(hardware) function –** An elementary "capability" of a PCI card, e.g. outputting a Transport Stream in DVB-ASI format. A device can support multiple functions. Note that the interpretation of *function* is not necessarily equivalent to the *PCI-function* concept in the PCI rev. 2.2 specifications.

**PCI card –** The hardware card that contains the interface-adaptation and/or other processing hardware.

**Target adapter –** External hardware device that translates the DVB-SPI signals on the DTA-102 and DTA-122 to another physical format.

**Uimsbf –** Unsigned integer, most significant bit first.

**USB Adapter –** The USB-compatible hardware that contains the interface-adaptation and/or other processing hardware.

**VPD –** "Vital Product Data." Information stored in a PCI device to uniquely identify the hardware and, potentially, software elements of the device. VPD is defined *in PCI Local Bus Specification Rev2.2*. DekTec devices store VPD in on-board serial EEPROMs. DTAPI supports methods to read and write VPD items.

## 1.3. References

- *ISO/IEC 13818-1, Information technology – Generic coding of moving pictures and associated audio information: Systems, April 27th, 1995*, also known as "MPEG-2 Systems" – Specification of the structure of a MPEG-2 Transport Stream.
- Recommendation ITU-R BT.656-4. Interfaces for digital component video signals in 525-line and 625-line television systems operating at the 4:2:2 level of recommendation ITU-R BT.601 (Part A), 1998
- *DTA-100, DVB-ASI Output Adapter for PCI Bus, Product Specification, DekTec Digital Video B.V., 2002.*
- *DTA-102, DVB-SPI Output Adapter for PCI Bus, Product Specification, DekTec Digital Video B.V., 2002.*
- *DTA-107, QPSK Modulator / Upconverter for PCI Bus, Product Specification, DekTec Digital Video B.V., 2004.*

- *DTA-120, DVB-ASI Input Adapter for PCI Bus, Product Specification, DekTec Digital Video B.V., 2002.*
- *DTA-122, DVB-SPI Input Adapter for PCI Bus, Product Specification, DekTec Digital Video B.V., 2002.*
- *DTA-124, Quad ASI/SDI Input Adapter for PCI Bus, Product Specification, DekTec Digital Video B.V., 2004.*
- *DTA-140, DVB-ASI Input+Output Adapter for PCI Bus, Product Specification, DekTec Digital Video B.V., 2003.*
- *DTA-2135, Dual/Diversity DVB-T Receiver for PCI Express, Product Specification, DekTec Digital Video B.V., 2008.*
- *DTU-205, DVB-ASI/SDI Output Adapter for USB, Product Specification, DekTec Digital Video B.V., 2004.*
- *DTU-225, DVB-ASI/SDI Input Adapter for USB, Product Specification, DekTec Digital Video B.V., 2004.*
- *PCI Local Bus Specification, Revision 2.2, December 18, 1998* – Formal specification of the protocol, electrical, and mechanical features of the PCI bus.

# 2. Using DTAPI

This section discusses the actual usage of the DTAPI library. Code snippets are provided to illustrate key methods.

## 2.1. Including and Linking DTAPI

All DTAPI declarations and definitions are contained in one C++ header file: "**DTAPI.h**". Each module that uses DTAPI functionality has to include this file.

The DTAPI implementation for Windows is available as static link library, a .NET 2.0 assembly or as a DLL.

See the following sections for more details on using the different version of the DTAPI on the Windows platform.

## 2.2. Using the Static Link Library

Two DTAPI versions are available for static linking: **DTAPI(d).lib** and **DTAPIMD(d).lib**.

NOTE: files with the lowercase 'd' at the end are the debug versions of the DTAPI library.

**DTAPI(d).lib** has been compiled with the C/C++ Code-Generation Options in VC++ set to: "Use run-time library: Multithreaded." On the compiler command line this corresponds to the **/MT** option.

**DTAPIMD(d).lib** has been compiled with the C/C++ Code-Generation Options in VC++ set to: "Use run-time library: Multithreaded DLL." On the compiler command line this corresponds to the **/MD** option.

The correct version of the DTAPI library file will automatically be linked, because of a **pragma** directive in **DTAPI.h**.

Automatic linking can be disabled by defining **_DTAPI_DISABLE_AUTO_LINK** (using #define or in the Pre-processor Definitions).

So, to use static link library of the DTAPI follow these steps:

1. Copy **DTAPI.h** and either **DTAPI(d).lib** or **DTAPIMD(d).lib** to your project or to a standard location visible to VC++.
2. Add **#include "DTAPI.h"** to each file using DTAPI functions.
3. Compile your application using the Multi-threaded DLL (compiler switch **/MD**) or static (compiler switch **/MT**) version of the C run-time library.

NOTE: the static library files are available for VC7, VC8 and VC9. Be sure to use the version matching your Visual Studio C++ version.

## 2.3. Using the .NET 2.0 Assembly

**DTAPINET.dll** is a .NET 2.0 compatible assembly of the DTAPI. To use it you should perform the following steps:

1. Make sure the .NET 2.0 SDK has been installed on your system.
2. Copy **DTAPINET.dll** to your project or to a standard location visible to VC# (or other .NET IDE).
3. Add a reference to the **DTAPINET.dll** assembly to your project.
4. Add a **#using DTAPINET** statement to the beginning of each source file that uses the classes, methods, and or constants which are exported by the **DTAPINET** assembly.

## 2.4. Using the DLL

**DTAPIDLL.dll** is a dynamic link library version of the DTAPI. The corresponding import library (to which your project should link) is **DTAPIDLL.lib**.

Before using the DLL you must first define the **_USE_DTAPIDLL** symbol in the "Preprocessor Definitions" of your project's compiler settings.

**DTAPIDLL.lib** will automatically be linked because of a **pragma** directive in **DTAPI.h**.

To use the DLL you should perform the following tasks:

1. Copy **DTAPI.h**, **DTAPIDLL.lib** and **DTAPIDLL.dll** to your project or to a standard location visible to VC++.
2. Add a definition of the **_USE_DTAPIDLL** symbol to the "Preprocessor Definitions" section in your project's compiler settings.
3. Add **#include "DTAPI.h"** to each file using DTAPI functions.

## 2.5. Using the Linux version

To use the DTAPI in a Linux application, please perform the following steps:

1. Make sure the **DTAPI.h** and **DTAPI.o** files are located in a path reachable for you project.
2. Add **#include "DTAPI.h"** to each file using DTAPI functions.
3. Make sure you project links to the **DTAPI.o** library file.
4. The DTAPI requires the **pthread** library, therefore also make sure your project links with **pthread** library.

For an example makefile please refer to the make files for the DtPlay and DtRecord projects as included in the LinuxSDK distribution.

NOTE: the DTAPI library file is available for different GCC versions Please refer too the "./LinuxSDK/DTAPI/Bin/" directory.

## 2.6. Attaching to a DtDevice

Programs based on DTAPI first have to instantiate a **DtDevice** object and "attach" it to a hardware card. This can be accomplished in several ways.

Method **AttachToType** is convenient when the DekTec device's type number is known and the system contains a single adapter of the given type[1].

```
DtDevice Dvc;
if (Dvc.AttachToType(122) != DTAPI_OK) {
  // No DTA-122 in the system ...
  // Error-handling code
}
```

Figure 2. Attaching a **DtDevice** object to the hardware PCI card based on type number.

Another, method **AttachToSerial** can be used if the unique serial number of the device is known.

```
DtDevice Dvc;
if (Dvc.AttachToSerial(410000001)
                              != DTAPI_OK) {
  // No card with serial# 410000001
  // Error-handling code
}
```

Figure 3. Attaching a **DtDevice** object to the hardware based on serial number.

Alternatively, method **AttachToSlot** can be used if the physical location (PCI Bus#, Slot#) of a PCI card in the system is known.

```
DtDevice Dvc;
if (Dvc.AttachToSlot(1, 3) != DTAPI_OK) {
  // No card in slot 3 on PCI bus 1 ...
  // Error-handling code
}
```

Figure 4. Attaching a **DtDevice** object to the hardware PCI card based on PCI-Bus and Slot number.

A more sophisticated application creates an inventory of available DTAPI-compatible PCI cards and USB Adapters and lets the user configure which device is to be used. Alternatively, the software applies an automatic selection criterion, e.g. the first device with a Transport-Stream output. Such schemes can be built with the help of global functions **DtapiHwFuncScan** and **DtapiDeviceScan**.

```
DtHwFuncDesc Fn[10];
int f, nFuncs;
::DtapiHwFuncScan(10, nFuncs, Fn);

for (f=0; f<nFuncs; f++) {
  if (Fn[f].m_ChanType & DTAPI_TS_OUTPUT)
    break;
}
if (f == nFuncs) { // No output card }

DtDevice Dvc;
Dvc.AttachToSerial(
                Fn[f].m_DvcDesc.m_Serial);
```

Figure 5. Selecting the first DtDevice with a Transport-Stream output on board.

After all operations have been completed, a DtDevice object should be detached from the hardware with method **Detach**.

[1] Or when usage of the first device of the given type is acceptable.

## 2.7. Attaching to a Channel

Before you can stream data into or out of a DekTec Device, two objects must have been instantiated and attached to the hardware:

- **DtDevice** object (§2.6);
- **DtOutpChannel** or **DtInpChannel** object.

A channel object can be attached to the hardware with the channel's **AttachToPort** member function. The first parameter of this function, a pointer to the **DtDevice** object, identifies the hardware device. The second parameter identifies the port number.

Example code to attach an output channel is shown in Figure 6. After attachment, the size of the channel's Transmit FIFO is initialised to its maximum value.

```
DtDevice Dvc;
// Code to attach to device goes here

DtOutpChannel TsOut;
if (TsOut.AttachToPort(&Dvc, 1) !=
                                DTAPI_OK) {
  // Error-handling code
}
TsOutp.SetFifoSizeMax();
```

Figure 6. Attaching a **DtOutpChannel** object to the hardware.

Input channels are attached to the hardware in precisely the same way, except that the size of the Receive FIFO cannot be programmed.

Just like a **DtDevice** object, a **DtOutpChannel** / **DtInpChannel** object should be detached from the hardware after all operations on the channel have been completed.

## 2.8. Initialising a Channel

A number of DTAPI methods are available to initialise a channel. Refer to the reference pages later in this document for a description of the semantics.

**DtOutpChannel**

Method **Reset** clears the contents of the Transmit FIFO and provides other initialisation services.

Method **SetTsRateBps** changes the output bit rate.

**SetTxMode** sets packet size, burst- or continuous mode, and other special modes.

**DtInpChannel**

Input channels also support a **Reset** method, which clears the Receive FIFO.

Method **SetRxMode** sets the packet size of packets stored in the Receive FIFO.

## 2.9. Streaming Data – Input

This section considers the actual streaming of data from an external source to a MPEG-2 Transport-Stream processing application. The core of an elementary input-streaming program is shown in Figure 7. This code assumes:

- **DtDevice** object **Dvc** and **DtInpChannel** object **TsIn** have been attached to the hardware;
- The Receive FIFO is empty and receive mode has been initialised;
- **ProcessTsData(Buf, NumBytes)** is the user-supplied function that processes **NumBytes** new Transport-Stream data bytes in **Buf**.
- **StopCondition()** is a user-supplied function that returns true if sufficient data has been read.

```
// PRE: Dvc and TsIn attached
char Buf[BUFSIZE];

// Start reading Transport Stream
TsIn.SetRxControl(DTAPI_RXCTRL_RCV);

// Main loop
while (!StopCondition()) {
  TsIn.Read(Buf, BUFSIZE);
  ProcessTsData(Buf, BUFSIZE);
}
```

Figure 7. Processing data from an external Transport-Stream source.

The code is straightforward. First receive mode is set to **Rcv**, which starts reading of incoming data into the Receive FIFO. Then the main loop alternates between reading a buffer load of data and processing the data, until the stop condition becomes true.

The following factors should be considered to achieve optimal results:

- The buffer size (constant **BUFSIZE**) should not be too small. Every data transfer from Receive FIFO to the buffer in host memory

incurs non-negligible overhead: a system call invokes the device driver, which for PCI cards, builds a DMA scatter/gather list for every transfer.
A reasonable minimum buffer/transfer size is 4096 bytes. No maximum size exists[2]; the buffer size may very well be a few Mbytes.

- The number of bytes returned by method **Read** always is a multiple of 4. It is not guaranteed that the data aligns to Transport-Packet boundaries, even if the buffer size is a multiple of the packet size. The processing software should always start with a synchronisation stage.

## 2.10. Auxiliary ADC Data – Input

Some cards provide optional access to auxiliary streaming data on some of the input channels. This auxiliary streaming data can be requested in parallel to the transport stream data by specifying the DTAPI_SUBCH_ADC as additional sub-channel parameter in the read related calls.

For the DTA-2135 the 10bit ADC samples use 2 bytes.

```
// PRE: Dvc and TsIn attached
//      Channel tuned to valid signal
char Buf[BUFSIZE];

// Start buffering ADC Samples
TsIn.SetRxControl(DTAPI_RXCTRL_RCV,
                  DTAPI_SUBCH_ADC);

// Main loop
while (!StopCondition()) {
  TsIn.ReadSubCh(Buf, BUFSIZE,
                 DTAPI_SUBCH_ADC);
  // Note: nSamples = BUFSIZE / 2;
  ProcessAdcData(Buf, BUFSIZE);
}
```

Figure 8. Processing ADC samples.

## 2.11. Streaming Data – Output

Streaming data to an output is somewhat more involved than inputting data. The core of an elementary output-streaming program is shown in Figure 9. The code assumes:

- **DtDevice** object **Dvc** and **DtOutpChannel** object **TsOut** have been attached to the hardware;
- Transmit mode has been initialised;
- **GetTsData(Buf, Max)** is the user-supplied function that writes maximally **Max** new Transport-Stream data bytes in **Buf**, and returns the number of bytes written.
  Note: The hardware uses 32-bit words internally. Therefore, number of bytes must be a multiple of four at all times.

The first part of the code builds an initial load in the Transmit FIFO before actual transmission begins. Hereto transmission control is set to **Hold**, which enables DMA but keeps transmission disabled.

```
// PRE: Dvc and TsOut attached
TsOut.SetTxControl(DTAPI_TXCTRL_HOLD);

// Build initial load in Transmit FIFO
char Buf[BUFSIZE];
int Load=0;
int NumBytes = GetTsData(Buf, BUFSIZE);
while (Load<INILOAD && NumBytes!=0) {
  TsOut.Write(Buf, NumBytes);
  Load += NumBytes;
  NumBytes = GetTsData(Buf, BUFSIZE);
}
TsOut.SetTxControl(DTAPI_TXCTRL_SEND);

// Main loop
while (NumBytes != 0) {
  TsOut.Write(Buf, NumBytes);
  NumBytes = GetTsData(Buf, BUFSIZE);
}
```

Figure 9. Streaming data to a Transport-Stream output.

When the Transmit FIFO contains its initial load, actual transmission is started by setting transmission control to **Send**. The main loop then supplies additional data to the Transmit FIFO until the data source is exhausted.

The following factors should be considered to achieve optimal results:

- The buffer size (constant **BUFSIZE**) should not be too small. Every data transfer to the Transmit FIFO incurs non-negligible overhead: a system call invokes the device

[2] However, to avoid swapping, the buffer size should not exceed the amount of physical RAM available to a process.

driver, which for PCI cards builds a DMA scatter/gather list for every transfer.
A reasonable minimum buffer/transfer size is 4096 bytes. No maximum size exists[3]; the buffer size may very well be a few Mbytes.

- The initial Transmit-FIFO load (**INILOAD**) should not be too small either, to prevent an early Transmit-FIFO underflow in the main loop. A value close to the maximum FIFO size is recommended.
  Warning. The initial load cannot be larger than the Transmit-FIFO size: when the Transmit FIFO is full, DMA will stall and the application "hangs."
- As far as DTAPI is concerned, the **GetTsData** function may return Transport-Stream data aligned at arbitrary 4-byte boundaries. However, for many data-generating algorithms, alignment on packet boundaries will be a natural choice. In such applications it is convenient and efficient to set the buffer size to a multiple of the packet size.

## 2.12. SDI GENLOCK SUPPORT

SDI I/O adapters with an on-board VCXO (DTA-145, DTA-2144 and DTA-2145) are capable of SDI genlock. To genlock an SDI output, an application shall do the following:

1. Set the I/O configuration for Port 1 to **DTAPI_IOCONFIG_GENREF** and specify the video standard the port should lock to. Once Port 1 is configured as **GENREF** input, the driver will extract the SDI timing from an SDI signal presented to the port.
2. Set the I/O configuration for the output port to **DTAPI_IOCONFIG_GENLOCKED**.
3. Attach to the output port and set the **TxMode** to match the configured reference video standard.

```
// Pre-condition: Dvc attached

// Configure Port 1 as
// Genlock reference input for SDI625
Dvc.SetIoConfig(1,
              DTAPI_IOCONFIG_GENREF,
              DTA1XX_GENLOCK_SDI625);
// Configure the Port 2
// as Genlocked output port
Dvc.SetIoConfig(2,
               DTAPI_IOCONFIG_GENLOCKED);

// Attach to the Port 2
DtOutp.AttachToPort(&DtDvc, 2);

// Init channel to initial 'safe' state
DtOutp.SetTxControl(DTAPI_TXCTRL_IDLE);

// Set the TxMode to match the configured
Genlock reference standard
DtOutp.SetTxMode(DTAPI_TXMODE_SDI |
              DTAPI_TXMODE_SDI_FULL |
              DTAPI_TXMODE_SDI_625,
              DTAPI_TXSTUFF_MODE_ON);
etc.
```

Figure 10. Configuring genlock.

Note: Although it is not necessary to open the genlock reference port #1, any application may still open the port as an input, with the limitation that port #1 must be operated in an SDI mode that matches the configured reference video standard.

## 2.13. Using VPD

Vital Product Data (VPD) is product identification information stored in an EEPROM onboard of DekTec Devices. The read-only part of VPD is loaded in the manufacturing process. The read/write part is used for licensing purposes and for storing customer-specific product information.

VPD is initialized as a collection of *items*, each identified by a *keyword*. Most keywords are 2-character strings (e.g. "PD" for Production Date), with the exception of the VPD ID String, which is identified by "VPDID".

Three member functions of **DtDevice** are defined to manipulate VPD:

- **VpdRead** – Read VPD-item, given a keyword.

[3] However, to avoid swapping, the buffer size should not exceed the amount of physical RAM available to a process.

- **`VpdWrite`** – Write VPD-item, given a keyword and item string. If the item existed, the item string is overwritten, unless the VPD item is read-only.
- **`VpdDelete`** – Delete VPD item. Read-only VPD item cannot be deleted.

## 2.14. Self-Test Support

The integrity of memory on DekTec Devices, as used for Input- and Transmit FIFOs, can be tested in *Loop-Back Mode*. In this mode, the FIFO is detached from the card's input or output and directly accessible to software. This enables construction of a simple memory test: a known pattern is written to the FIFO, after some time the data is read back and compared to the original.

DTAPI support for self-test is straightforward. Loop-back mode can be entered with method **`SetLoopBackMode`**. Data can be written to the Receive FIFO with **`WriteLoopBackData`**. Data can be read from the Transmit FIFO with **`ReadLoopBackData`**.

## 2.15. Complete Example

Figure 11 shows the code of a simple but fully functional command-line stream player that is capable of playing out a file. The file name and bit rate at which to play out the file can be specified as command-line arguments.

The example exploits good-old "**`stdio`**" functions for reading file data. By using a relatively large buffer, performance is more than adequate.

Obviously, this example is just a first step towards a production-quality streamer application. With respect to DTAPI, one obvious improvement would be to check the return code for every DTAPI-call, and add corresponding error-handling code.

```
// Command-line program TsOut
// Streams Transport-Stream file out of DTA-100

#define BUFSIZE (1<<16)
#define INILOAD (7*(1<<20))      // 7MB initial load

#include "DTAPI.h"
#include <stdio.h>

int main(int argc, char* argv[])
{
  if (argc != 3) { printf("Usage: TsOut bitrate tsfile\nQuitting...\n"); return -1; }
  // Open Transport-Stream file
  FILE* fp = fopen(argv[2], "rb");
  if (fp == NULL) {
     printf("Can't open '%s' for read\nQuitting...\n", argv[2]);
     return -2;
  }
  // Attach device and output channel objects to hardware
  DtDevice Dvc;
  if (Dvc.AttachToType(100) != DTAPI_OK) {
     printf("No DTA-100 in system. Quitting...\n");
     return -3;
  }
  DtOutpChannel TsOut;
  if (TsOut.AttachToPort(&Dvc, 1) != DTAPI_OK) {
     printf("Can't attach output channel.\nQuitting...\n");
     return -4;          // Detach is executed from DtDevice destructor
  }
  // Initialise bit rate and packet mode
  TsOut.SetTsRateBps(DTAPI_TXCLOCK_INTERNAL, atoi(argv[1]));
  TsOut.SetTxMode(DTAPI_TXMODE_188, 1);

  // Build initial load in Transmit FIFO
  TsOut.SetTxControl(DTAPI_TXCTRL_HOLD);
  char Buf[BUFSIZE];
  int Load = 0;
  int NumBytes = fread(Buf, 1, BUFSIZE, fp);
  while (Load<INILOAD && NumBytes!=0) {
     TsOut.Write(Buf, NumBytes);
     Load += NumBytes;
     NumBytes = fread(Buf, 1, BUFSIZE, fp);
  }
  // Start transmission
  TsOut.SetTxControl(DTAPI_TXCTRL_SEND);
  // Main loop
  while (NumBytes != 0) {
     TsOut.Write(Buf, NumBytes);
     NumBytes = fread(Buf, 1, BUFSIZE, fp);
  }
  TsOut.Detach (DTAPI_INSTANT_DETACH);
  return 0;              // Detach is executed from DtDevice destructor
}
```

Figure 11. Complete command-line application to stream a file with the DTA-100.

# 3. DTAPI Classes and Methods

## 3.1. Overview

Table 1. DTAPI – Global Functions

| API Function | Description |
|---|---|
| ::DtapiCheckDeviceDriverVersion | Check compatibility between Dta1xx and DTAPI |
| ::DtapiGetDeviceDriverVersion | Get version of DTA1xx device driver |
| ::DtapiGetVersion | Get version of DTAPI library |
| ::DtapiDeviceScan | Scan for DTAPI devices |
| ::DtapiDtDevice2String | Create descriptive string for a device |
| ::DtapiDtHwFuncDesc2String | Create descriptive string for a hardware function |
| ::DtapiHWFuncScan | Scan for DTAPI hardware functions |
| ::DtapiInitDtTsIpParsFromIpString | Initialise IP addresses in a DtTsIpPars structure |
| ::DtapiPciScan (obsolete) | Scan DTAPI hardware functions on PCI bus |
| ::DtapiModPars2SymRate | Compute symbol rate from TS rate and modulation parameters |
| ::DtapiModPars2TsRate | Compute TS rate from modulation parameters |
| ::DtapiResult2Str | Convert DTAPI_RESULT value to a string |

Table 2. DTAPI – `DtDevice` Functions

| API Function | Description |
|---|---|
| AttachToIpAddr | Attach DtDevice object to hardware, based on IP address |
| AttachToSerial | Attach DtDevice object to hardware, based on serial number |
| AttachToSlot | Attach DtDevice object to hardware, based on slot number |
| AttachToType | Attach DtDevice object to hardware, based on type number |
| Detach | Detach DtDevice object from hardware |
| GetDeviceDriverVersion | Get version of device driver for this DtDevice |
| GetDisplayName | Get current name on LCD status display |
| GetIoConfig | Get current I/O configuration |
| GetRefClkFreq | Get frequency of onboard reference clock |
| GetUsbSpeed | Get USB bus speed |
| GetFirmwareVersion | Get version of the firmware loaded on the device |
| I2Cread | Read data from the I2C bus |
| I2Cwrite | Write data to the I2C bus |
| LedControl | Control of general-status LED |
| SetDisplayName | Set name on LCD status display |
| SetIoConfig | Set I/O configuration |
| VpdDelete | Delete Vital-Product-Data item |
| VpdRead | Read Vital-Product-Data item |
| VpdWrite | Write Vital-Product-Data item |

Table 3. DTAPI – `DtInpChannel` Functions

| API Function | Description |
|---|---|
| Attach (obsolete) | Attach channel object to hardware |
| AttachToPort | Attach channel object to hardware |
| ClearFifo | Clear receive FIFO |
| ClearFlags | Clear latched status flag(s) |
| Detach | Detach channel object from hardware function |
| Equalise | Control DVB-ASI cable equalisation (DTA-120 Rev 1 only). |
| GetDemodControl | Get current (de)modulation parameters |
| GetDemodStatus | Get current demodulator/tuner status |
| GetFifoLoad | Get current load of the Receive FIFO |

| | |
|---|---|
| GetFlags | Get status flags |
| GetRxControl | Get receive-control state |
| GetStatistics | Get statistics information |
| GetStatus | Get status information |
| GetMaxFifoSize | Get the size of the Receive FIFO |
| GetReceive-ByteCount | Get a sample from the free running 32-bit received number of bytes counter |
| GetTargetId | Get target-adapter identifier (DTA-122 only) |
| GetTsRateBps | Get an estimate of the input Transport-Stream rate |
| GetTuner-Frequency | Get current tuner frequency |
| LedControl | Control of input-status LED |
| PolarityControl | Control polarity-detection circuitry of a DVB-ASI input |
| Read | Read input data |
| ReadDirect | Read input data without DMA |
| ReadFrame | Read one complete SDI frame from the input channel |
| Reset | Reset input channel |
| SetAdcSampleRate | Set sample-rate for ADC |
| SetAntPower | Enable power to active antennas |
| SetDemod-Control | Set (de)modulation parameters |
| SetIpPars | Setup IP parameters |
| SetLoopBack-Mode | Set loop-back mode |
| SetPower | Control power for target adapter (DTA-122) |
| SetRxControl | Set receive-control state |
| SetRxMode | Set receive mode |
| SetTuner-Frequency | Set the tuner frequency |
| TuneChannel | Tune to specific channel |
| WriteLoopBack Data | Write data to Receive FIFO via loop-back channel |

Table 4. DTAPI – `DtOutpChannel` Functions

| API Function | Description |
|---|---|
| Attach (obsolete) | Attach channel to hardware |
| AttachToPort | Attach channel to hardware |
| ClearFifo | Clear transmit FIFO |
| ClearFlags | Clear latched status flag(s) |
| Detach | Detach channel object from hardware function |
| GetExtClkFreq | Get external-clock frequency (DTA-102 only) |
| GetFailsafe-Config | Get current failsafe configuration |
| GetFailsafeAlive | Get status of failsafe relais |
| GetFifoLoad | Get current load of the Transmit FIFO |
| GetFlags | Get status flags |
| GetMaxFifoSize | Get maximum size of output FIFO |
| GetModControl | Get modulation parameters |
| GetOutputLevel | Get current output level in dBm |
| GetRfControl | Get RF parameters |
| GetTargetId | Get target-adapter identifier (DTA-102 only) |
| GetTransmitByte Count | Get a sample from the free running 32-bit transmitted number of bytes counter |
| GetTsRateBps | Get Transport-Stream rate |
| GetTxControl | Get transmit-control state (`Idle`/`Hold`/`Send`) |
| GetTxMode | Get transmit mode (packet size, packet-stuffing mode) |
| ReadLoopBack-Data | Read data from loop-back channel |
| Reset | Reset output channel |
| SetFailsafeAlive | Toggle failsafe watchdog timer |
| SetFailsafe-Config | Set failsafe configuration parameters |
| SetFifoSize | Set size of Transmit FIFO |
| SetFifoSizeMax | Set size of Transmit FIFO to its maximum value |
| SetFifoSize | Set size of Transmit FIFO to a specified value |
| SetIpPars | Set IP parameters |

| | |
|---|---|
| **SetLoopBack-Mode** | Set loop-back mode |
| **SetModControl** | Set modulation parameters |
| **SetOutputLevel** | Set output level in dBm |
| **SetPower** | Control power for target adapter (DTA-102) |
| **SetRfControl** | Set RF parameters |
| **SetRfMode** | Set special modes for devices with on-board RF up-converter |
| **SetSNR** | Set noise generation mode and SNR |
| **SetTsRateBps** | Set Transport-Stream rate |
| **SetTxControl** | Set transmit-control state (**`Idle`**/**`Hold`**/**`Send`**) |
| **SetTxMode** | Set transmit mode (packet size, …) and packet stuffing on/off |
| **Write** | Write data to the output channel |
| **WriteDirect** | Write data directly to the output channel without using DMA |

Table 5. DTAPI – **`DtLoop`** Functions

| API Function | Description |
|---|---|
| **AttachToInput** | Attach to an **`DtInpChannel`** object |
| **AttachToOutput** | Attach to an **`DtOutpChannel`** object |
| **Detach** | Detach from the associated **`DtInpChannel`** and **`DtOutpChannel`** objects |
| **DetachFrom-Input** | Detach from the associated **`DtInpChannel`** object |
| **DetachFrom-Output** | Detach from the associated **`DtOutpChannel`** object |
| **IsStarted** | Has looping started |
| **SetSuffingMode** | Set the NULL-packet stuffing parameters |
| **Start** | Start/Stop looping from input-to-output |

Table 6. DTAPI – **`DtSdi`** Functions

| API Function | Description |
|---|---|
| **ConvertFrame** | Convert between different SDI data formats |

# Struct DtConstelPoint

Structure describing a constellation point.

```
Struct DtDeviceDesc {
  int   m_X;                    // X-coordinate of the constellation point
  int   m_Y;                    // Y-coordinate of the constellation point
};
```

## Members

*m_X*
The X-coordinate of the described constellation point.

*m_Y*
The Y-coordinate of the described constellation point.

# Struct DtCmPars

Structure describing channel-modelling parameters.

```
Struct DtCmPars {
   bool   m_EnableAwgn;          // Enable noise injection
   double   m_Snr;               // Signal-to-noise ratio in dB
   bool   m_EnablePaths;         // Enable transmission paths simulation
   std::vector<DtCmPath>   m_Paths;       // Parameters per path
};
```

## Members

*m_EnableAwgn*
: Enable white noise injection.

*m_Snr*
: Signal-to-noise ratio. The noise power is defined relative to an imaginative 0dB output signal signal of the modulator. This means that *m_Snr* is the real signal-to-noise ratio only if the accumulated power of the paths in *m_Paths* is 0dB.

*m_EnablePaths*
: Enable multi-path simulation.

*m_Paths*
: Vector of path parameters.

## Struct DtCmPath

Channel-modelling parameters for a single path in a multipath simulation.

```
Struct DtCmPath {
   Type   m_Type;                // Type of path fading
   double  m_Attenuation;        // Attenuation in dB
   double  m_Delay;              // Delay in us
   double  m_Phase;              // Phase shift in degrees
   double  m_Doppler;            // Doppler frequency in Hz
};
```

### Members

*m_Type*

Type of path fading.

| Value | Meaning |
|---|---|
| **CONSTANT_DELAY** | Constant delay/phase |
| **CONSTANT_DOPPLER** | Constant frequency shift |
| **RAYLEIGH_JAKES** | Rayleigh fading with Jakes power spectral density (mobile path model) |
| **RAYLEIGH_GAUSSIAN** | Rayleigh fading with Gaussian power spectral density (ionospheric path model) |

*m_Attenuation*

Attenuation in dB. The total attenuation of all paths may not exceed 0dB to avoid overflow of the channel simulator.

*m_Delay*

Delay in us. The maximum delay for an 8MHz channel is 896us.

*m_Phase*

Constant phase shift in degrees. Used for **CONSTANT_DELAY** and **CONSTANT_DOPPLER**; Don't care for other path types.

*m_Doppler*

Doppler frequency shift for all paths except **CONSTANT_DELAY**. The corresponding Speed in m/s is: Speed = $f_{doppler} * 3.10^8/f_{RF}$.

# Struct DtDeviceDesc

Structure describing a DekTec device.

```
Struct DtDeviceDesc {
   int   m_Category;           // Device category
   __int64  m_Serial;          // Unique serial number of the device
   int   m_PciBusNumber;       // PCI-bus number
   int   m_SlotNumber;         // PCI-slot number
   int   m_UsbAddress;         // USB address
   int   m_TypeNumber;         // Device type number
   int   m_DeviceId;           // Device ID
   int   m_VendorId;           // Vendor ID
   int   m_SubsystemId;        // Subsystem
   int   m_SubVendorId;        // Subsystem Vendor ID
   int   m_NumHwFuncs;         // #Hardware funtions hosted by device
   int   m_FirmwareVersion;    // Firmware version
   int   m_FirmwareVariant;    // Firmware variant
   int   m_NumDtInpChan;       // Number of input channels
   int   m_NumDtOutpChan;      // Number of output channels
   int   m_NumPorts;           // Number of physical ports
   int   m_Ip[4];              // IP address
   int   m_Mac[6];             // MAC address
};
```

## Members

*m_Category*

Code indicating the device category.

| Value | Meaning |
|---|---|
| **DTAPI_CAT_PCI** | PCI Bus device |
| **DTAPI_CAT_USB** | USB device |
| **DTAPI_CAT_IP** | IP connected device |

*m_Serial*

The serial number that uniquely identifies a DekTec device.

*m_PciBusNumber, m_SlotNumber*

If the device belongs to category **DTAPI_CAT_PCI**, these integers identify the PCI bus and slot number in which the PCI card is installed. If the device belongs to another category, the values of these members are undefined.

*m_UsbAddress*

If the device belongs to category **DTAPI_CAT_USB**, this number identifies the USB address of the device. If the device belongs to another category, the value of this member is undefined.

*m_TypeNumber*

This integer corresponds to the number in the device's type string, e.g. 100 for the DTA-100.

*m_DeviceId, m_VendorId, m_SubsystemId, m_SubVendorId*

Device ID, Vendor ID, Subsystem ID and Subsystem Vendor ID. Identification information of the device, as read from its configuration-space registers.

*m_NumHwFuncs*
Number of hardware functions hosted by the device.

*m_FirmwareVersion*
Version number of the firmware loaded on the device.

*m_FirmwareVariant*
Variant of the firmware loaded on the device. Some devices may support multiple variants of the firmware each with different functionality.

*m_NumDtInpChan*
Number of input channels available on the device.
IP ports count as 1 input channel and 1 output channel.

*m_NumDtOutpChan*
Number of output channels available on the device.
IP ports count as 1 input channel and 1 output channel.

*m_NumPorts*
Number of physical ports available on the device.
Doubly-buffered outputs count as a single port.

*m_Ip*
If the device belongs to category **DTAPI_CAT_IP**, this member identifies the IP address of the device. If the device belongs to another category, the value of this member is undefined.

*m_Mac*
If the device belongs to category **DTAPI_CAT_IP**, this member identifies the MAC address of the device. If the device belongs to another category, the value of this member is undefined.

# Struct DtDvbT2ParamInfo

Structure containing the DVB-T2 "derived" parameters, which are set to a value by **DtDvbT2Pars::GetParamInfo** and **DtDvbT2Pars::OptimisePlpNumBlocks**.

```
struct DtDvbT2ParamInfo{
  bool m_TotalCellsPerFrame; // Total number of cells per frame
  bool m_L1CellsPerFrame;    // Number of L1 cells per frame
  bool m_DummyCellsPerFrame; // Number of dummy celss per frame
};
```

## Members

*m_TotalCellsPerFrame*
Total number of cells per frame.

*m_L1CellsPerFrame*
Total number of cells per frame used for L1 signaling.

*m_DummyCellsPerFrame*
Total number of cells lost per frame; dummy cells overhead = m_DummyCellsPerFrame / m_TotalCellsPerFrame. It is only computed for the first frame.

# Struct DtDvbT2PlpPars

Structure describing DVB-T2 modulation parameters for one physical layer pipe. This structure is used in class **DtDvbT2Pars**, in an array of **DTAPI_DVBT2_NUM_PLP_MAX** structs for the physical layer pipes.

```
struct DtDvbT2PlpPars {
  bool  m_Hem;                  // High Efficiency Mode (yes/no)
  bool  m_Npd;                  // Null Packet Deletetion (yes/no)
  bool  m_IssyEnabled;          // ISSY enabled (yes/no)
  int   m_Id;                   // PLP ID
  int   m_GroupId;              // PLP group ID
  int   m_Type;                 // PLP type
  int   m_CodeRate;             // Code rate
  int   m_Modulation;           // Modulation type
  bool  m_Rotation;             // Constellation rotation (yes/no)
  int   m_FecType;              // FEC type
  int   m_TimeIlLength;         // Time interleaving length
  int   m_TimeIlType;           // Timer interleaving type
  bool  m_InBandFlag;           // In band signalling information (yes/no)
  bool  m_NumBlocks;            // Number of FEC blocks per IL frame
};
```

## Members

*m_Hem*
If true, the PLP uses High Efficiency Mode (HEM); Otherwise Normal Mode (NM) is used.

*m_Npd*
If true, null-packet deletion is active, otherwise it is not active.

*m_Npd*
If true, the ISSY field is computed and inserted, otherwise no ISSY field is inserted.

*m_Id*
Unique identification of the PLP within a T2 system. The valid range is 0 … 255.

*m_GroupId*
Identifies the PLP group with which the PLP is associated. The valid range is 0 … 255.

*m_Type*
PLP type.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_PLP_TYPE_COMM** | Common PLP |
| **DTAPI_DVBT2_PLP_TYPE_1** | Data PLP type1 |
| **DTAPI_DVBT2_PLP_TYPE_2** | Data PLP type2 |

*m_CodeRate*

Convolutional coding rate used by the PLP.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_COD_1_2** | 1/2 |
| **DTAPI_DVBT2_COD_3_5** | 3/5 |
| **DTAPI_DVBT2_COD_2_3** | 2/3 |
| **DTAPI_DVBT2_COD_3_4** | 3/4 |
| **DTAPI_DVBT2_COD_4_5** | 4/5 |
| **DTAPI_DVBT2_COD_5_6** | 5/6 |

*m_Modulation*

Modulation used by the PLP.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_BPSK** | BPSK |
| **DTAPI_DVBT2_QPSK** | QPSK |
| **DTAPI_DVBT2_QAM16** | 16-QAM |
| **DTAPI_DVBT2_QAM64** | 64-QAM |
| **DTAPI_DVBT2_QAM256** | 256-QAM |

*m_Rotation*

If true, constellation rotation is used, otherwise not.

*m_FecType*

FEC type used by the PLP.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_LDPC_16K** | 16K LDPC |
| **DTAPI_DVBT2_LDPC_64K** | 64K LDPC |

*m_TimeIlLength*

Time interleaving length.
If *m_TimeIlType* is set to '0', this parameter specifies the number of TI-blocks per interleaving frame.
If *m_TimeIlType* is set to '1', this parameter specifies the number of T2 frames to which each interleaving frame is mapped.
The valid range is 0 … 255.

*m_TimeIlType*

Type of interleaving used by the PLP.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_IL_ONETOONE** | One interleaving frame corresponds to one T2 frame |
| **DTAPI_DVBT2_IL_MULTI** | One interleaving frame is carried in multiple T2 frames |

*m_InBandFlag*

If true, the in-band flag is set and in-band signalling information is inserted in this PLP.

*m_NumBlocks*

The number of FEC blocks contained in one interleaving frame for this PLP. The valid range is 0 ... 2047.

# Struct DtHwFuncDesc

Structure describing a hardware function.

```
Struct DtHwFuncDesc {
  DtDeviceDesc  m_DvcDesc;    // Device descriptor
  int   m_ChanType;           // Channel type (OR-able)
  int   m_StreamType;         // Stream type
  int   m_Flags;              // Capability flags (OR-able)
  int   m_IndexOnDvc;         // Relative index for this function
  int   m_Port;               // Physical port number
  int   m_Ip[4];              // IP address
  int   m_MacAddr[6];         // MAC address
};
```

## Members

*m_DvcDesc*

Structure describing the device that hosts this hardware function.

*m_ChanType*

This member variable identifies the channel type of the hardware function. Channel types **DTAPI_CHAN_INPUT** and **DTAPI_CHAN_OUTPUT** may be OR-ed together. The Channel-Object column identifies the channel object that can be attached to this hardware function for interaction with the hardware.

Channel types **DTAPI_CHAN_DBLBUF**, **DTAPI_CHAN_DISABLED** and **DTAPI_CHAN_LOOPTHR** have no associated Channel Object because no direct interaction is possible.

| Value | Channel Object | Meaning |
|---|---|---|
| **DTAPI_CHAN_INPUT** | **DtInpChannel** | Input channel |
| **DTAPI_CHAN_OUTPUT** | **DtOutpChannel** | Output channel |
| **DTAPI_CHAN_DBLBUF** | **n.a.** | The hardware function is a double-buffered copy of another hardware function |
| **DTAPI_CHAN_DISABLED** | **n.a.** | Channel is disabled |
| **DTAPI_CHAN_LOOPTHR** | **n.a.** | The hardware function is a loop-through copy of another hardware function |

For TS-over-IP channels both **DTAPI_CHAN_INPUT** and **DTAPI_CHAN_OUTPUT** are set.

On the DTA-2137 the hardware function for physical port #2 will be disabled if port #1 is configured for APSK operation. In the same way, the hardware function for port #1 is disabled when port #2 is configured for APSK operation.

*m_StreamType*

This member variable describes the type of stream type supported by the hardware function.

| Value | Meaning |
|---|---|
| **DTAPI_ASI_SDI** | DVB-ASI and/or SDI<br>Member variable *m_Flags* indicates whether the TS interface is capable of ASI, SDI or both |
| **DTAPI_TS_MOD** | Modulated signal<br>Member variable *m_Flags* provides details about the modulation standards that are supported |
| **DTAPI_TS_OVER_IP** | TS-over-IP |
| **DTAPI_TS_SPI** | DVB-SPI |

*m_Flags*

Extra flags that provide further information about the hardware function.
If *m_StreamType* is **DTAPI_ASI_SDI**, the following OR-able flags are supported:

| Value | Meaning |
|---|---|
| **DTAPI_CAP_ASI** | Interface can carry DVB-ASI |
| **DTAPI_CAP_BIDIR** | Port is bi-directional |
| **DTAPI_CAP_DBLBUF** | Port can act as a doubly-buffered copy of another port |
| **DTAPI_CAP_FAILSAFE** | Output that can fail-over from an input, for high-availability |
| **DTAPI_CAP_LOOPTHR** | Port can act as a loop-through copy of another port |
| **DTAPI_CAP_SDI** | Interface can carry SDI (Serial Digital Interface) |
| **DTAPI_CAP_SDITIME** | Support for time-stamping of SDI frames |
| **DTAPI_CAP_TRPMODE** | Input supports transparent-packet mode |

If *m_StreamType* is **DTAPI_TS_MOD**, the following OR-able flags specify the type(s) of modulation that are supported:

| Value | Meaning |
|---|---|
| *General capabilities* | |
| **DTAPI_CAP_DIGIQ** | Port has a digital IQ output |
| **DTAPI_CAP_IF** | Port has an IF output |
| **DTAPI_CAP_SHARED** | Port supports antenna-sharing mode |
| **DTAPI_CAP_DIVERSITY** | Port supports DVB-T diversity mode |

| *Modulation capabilities* | |
|---|---|
| **DTAPI_CAP_ATSC** | ATSC (VSB) |
| **DTAPI_CAP_CM** | Channel Modelling |
| **DTAPI_CAP_DTMB** | DTMB |
| **DTAPI_CAP_DVBS** | DVB-S |
| **DTAPI_CAP_DVBS2** | DVB-S.2 |
| **DTAPI_CAP_DVBT** | DVB-T, includes DVB-H |
| **DTAPI_CAP_ISDBT** | ISDB-T |
| **DTAPI_CAP_QAM_A** | QAM, ITU-T J.83 Annex A (DVB-C) |
| **DTAPI_CAP_QAM_B** | QAM, ITU-T J.83 Annex B (US) |
| **DTAPI_CAP_QAM_C** | QAM, ITU-T J.83 Annex C (Japan) |
| *Upconverter / downconverter capabilities* | |
| **DTAPI_CAP_LBAND** | L-Band 950 – 2150 MHz |
| **DTAPI_CAP_UHF** | UHF Band 400 – 862 MHz |
| **DTAPI_CAP_VHF** | VHF Band 47 – 470 MHz |
| **DTAPI_CAP_ADJLVL** | Port supports an adjustable output level |
| **DTAPI_CAP_IF_ADC** | Port supports an onboard ADC |

*m_IndexOnDvc*
This integer identifies a specific hardware function when the device hosts multiple hardware functions with the same channel type and stream type.
If the function occurs only once, *m_IndexOnDvc* = 0. If the device supports the function twice, indices are 0 and 1; etc.

*m_Port*
This integer identifies the physical port number associated with this function.
The general rule on PCI cards is that the top-most port is #1, the one below that #2, etc., with the following exceptions:
- The Ethernet port on the DTA-160 (the top-most port) has port #4;
- Doubly-buffered outputs like on the DTA-140 count as a single port.

Please refer to Section 5 for an overview of port numbers per DekTec device.

*m_Ip*
IP address of the hardware function. This field is only valid for functions for which *m_StreamType* is **DTAPI_TS_OVER_IP**.

*m_Mac*
MAC address of the hardware function. This field is only valid for functions for which *m_StreamType* is **DTAPI_TS_OVER_IP**.

## Remarks

This structure is used by ::**DtapiHwFuncScan** to return a description of a hardware function.

The channel type of bi-directional ASI/SDI ports (capability **DTAPI_CAP_BIDIR** is set) is *either* **DTAPI_TS_INPUT** *or* **DTAPI_TS_OUTPUT**. Method **DtDevice::SetIoConfig** can be used to change the direction. The next time ::**DtapiHwFuncScan** is called, the channel type in the hardware-function descriptor will be updated to reflect the last-programmed direction.

# Struct DtIsdbtLayerPars

Structure describing ISDB-T modulation for one hierarchical layer. This structure is used in class **DtIsdbtPars**, in an array of three structs for layer A, B and C.

```
struct DtIsdbtLayerPars {
   int   m_NumSegments;        // Number of segments
   int   m_Modulation;         // Modulation type
   int   m_CodeRate;           // Code rate
   int   m_TimeInterleave;     // Time interleaving

   // Derived:
   int   m_BitRate;            // Bit rate in bps
};
```

## Members

*m_NumSegments*

Number of segments used in this layer. The sum of *m_NumSegment* must be 13.

*m_Modulation*

Modulation type applied to the segments in this layer.

| Value | Meaning |
|---|---|
| **DTAPI_ISDBT_MOD_DQPSK** | DQPSK |
| **DTAPI_ISDBT_MOD_QPSK** | QPSK |
| **DTAPI_ISDBT_MOD_QAM16** | 16-QAM |
| **DTAPI_ISDBT_MOD_QAM64** | 64-QAM |

*m_CodeRate*

Convolutional coding rate applied to the segments in this layer.

| Value | Meaning |
|---|---|
| **DTAPI_ISDBT_RATE_1_2** | 1/2 |
| **DTAPI_ISDBT_RATE_2_3** | 2/3 |
| **DTAPI_ISDBT_RATE_3_4** | 3/4 |
| **DTAPI_ISDBT_RATE_5_6** | 5/6 |
| **DTAPI_ISDBT_RATE_7_8** | 7/8 |

*m_TimeInterleave*

Encoded length of time interleaving.

The table below defines the mapping of *m_TimeInterleave* to parameter I in the time-interleaving process.

| Value | Mode 1 | Mode 2 | Mode 3 |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 1 | 4 | 2 | 1 |
| 2 | 8 | 4 | 2 |
| 3 | 16 | 8 | 4 |

*m_BitRate*

Bit rate in bits-per-second, assuming this is a 6-MHz channel. This is a "derived" parameter, which is set to a value by calling **DtIsdbtPars::ComputeRates**.

## Remarks

The ISDB-T modulator uses the sum of m_NumSegments over layer A/B/C to set the total number of segments. This enables the usage of **BTYPE_TV** for 1-segment modulation.

# Struct DtapiHwFunc (Obsolete)

Structure that describes a hardware function on a PCI card.

```
Struct DtapiHwFunc {
   int   m_nPciBusNumber;      // PCI-bus number
   int   m_nSlotNumber;        // PCI-slot number
   int   m_nTypeNumber;        // PCI-card type number
   int   m_nDeviceId;          // Device ID of PCI card
   int   m_nVendorId;          // Vendor ID of PCI card
   int   m_nSubsystemId;       // Subsystem ID of PCI card
   int   m_nSubVendorId;       // Subsystem Vendor ID of PCI card
   int   m_nHwFuncType;        // Hardware-function type
   int   m_nHwFuncFlags;       // Hardware-function flags
   int   m_nIndexOnCard;       // Index of hardware function
};
```

## Members

*m_nPciBusNumber, m_nSlotNumber*
Integers identifying the PCI-bus and the slot number in which the PCI card hosting the hardware function is plugged.

*m_nTypeNumber*
This integer corresponds to the number in the PCI card's type string, e.g. 100 for the DTA-100.

*m_nDeviceId, m_nVendorId, m_nSubsystemId, m_nSubVendorId*
Device ID, Vendor ID, Subsystem ID and Subsystem Vendor ID. Identification information of the PCI card read from its PCI configuration-space registers.

*m_nHwFuncType*
Identifies the hardware function according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_TS_INPUT** | Transport-Stream input. |
| **DTAPI_TS_OUTPUT** | Transport-Stream output. |

*m_nHwFuncFlags*
Hardware-function dependent flags that provide further (static) information about the hardware function. Not used (yet) for any of the current DekTec boards.

*m_nIndexOnCard*
This number identifies a specific hardware function when the PCI card contains multiple instantiations of the same hardware function. If the function occurs only once, *m_nIndexOnCard* = 0. If the card contains a function twice, the indices are 0 and 1; etc.

## Remarks

This structure was targeted at PCI card. It has been superseded by **DtHwFuncDesc**, which supports the more generic notion of a (digital-video) "device".

# Struct DtRawIpHeader

Structure placed in front of all IP Packets when **DTAPI_RXMODE_IPRAW** mode is used (refer to **DtInpChannel::SetRxMode** on page 144).

```
Struct DtRawIpHeader {
  unsigned short m_Tag;        // 0x44A0h = 'D'160
  unsigned short m_Length;     // IP Packet Length
  unsigned int m_TimeStamp;    // IP Packet arrival/tranmit time
};
```

## Members

*m_Tag*
Marks the beginning of a **DtRawIpHeader** structure. The value of this field is fixed to: 0x44A0.

*m_Length*
Indicates the number of bytes (i.e. size of the IP packet) following directly after the **DtRawIpHeader** structure.

*m_TimeStamp*
A 32-bit time stamp, taken from the internal system clock on the device, indicating the arrival time of the IP packet following this structure.

# Struct DtTsIpPars

Structure for storing parameters related to the transmission of Transport Streams over IP.

The parameters in this structure are used when starting transmission of a Transport Stream over IP to a unicast or multicast destination (**Tx**), and when starting reception of a Transport Stream (**Rx**). This structure is also used for reading back parameters.

```
Struct DtTsIpPars {
  u_char  m_Ip[4];            // IP address
  u_short m_Port;             // Port number
  u_char  m_SrcFltIp[4];      // Source filter: IP address
  u_short m_SrcFltPort;       // Source filter: port number
  int   m_TimeToLive;         // TTL for Tx
  int   m_NumTpPerIp;         // #TPs per IP packet
  int   m_Protocol;           // Protocol: UDP/RTP
  int   m_DiffServ;           // Differentiated services
  int   m_FecMode;            // Error correction mode
  int   m_FecNumRows;         // 'D' = #rows in FEC matrix
  int   m_FecNumCols;         // 'L' = #columns in FEC matrix
  int   m_Flags;              // Optional controls/status flags
};
```

## Members (Rx)

*m_Ip*
Main IP Address. IP address from which to receive IP packets. If the IP address is in the multicast range, the DTAPI automatically joins and drops membership of the multicast group.

*m_Port*
Port number on which to receive IP packets. Destination port number 0 is not allowed.
When the protocol is RTP, the port number shall be even.

*m_SrcFltIp*
Source-Filter IP Address. Relevant for multicast reception only: In this case *m_SrcFltIp* can be set to a specific IP address for listening to a single source, or to 0.0.0.0 if the source may be any IP address.

*m_SrcFltPort*
Source-Filter Port number. Port number associated with *m_SrcFltIp*. *m_SrcPort* may be set to a specific source port number, or to 0 for accepting IP packets from any source port.

*m_TimeToLive*
Not used.

*m_NumTpPerTp*
Not used.
*Read back*: Number of Transport Packets (TPs) stored in one IP packet in the incoming stream.

*m_Protocol*
Protocol expected for encapsulation of Transport Packets.

*Read back*: set to the protocol that has been detected.

| Value | Meaning |
|---|---|
| **DTAPI_PROTO_UDP** | UDP |
| **DTAPI_PROTO_RTP** | RTP |
| **DTAPI_PROTO_AUTO** | Automatically detect UDP or RTP |

*m_DiffServ*
Not used.

*m_FecMode*
Error-correction mode.

| Value | Meaning |
|---|---|
| **DTAPI_FEC_DISABLE** | Don't try to apply error correction |
| **DTAPI_FEC_2D** | Try to apply error correction with the FEC streams received on port numbers *m_Port*+2 and *m_Port*+4 |

*m_FecNumRows, m_FecNumCols*
Not used.

*m_Flags*
Optional control/status flags field. Currently this field is not used and should be set to zero.

## Members (Tx)

*m_Ip, m_Port*
IP address used for transmission, specified as 4 bytes, and associated destination port number. When the protocol is RTP, the port number shall be even.

*m_SrcFltIp, m_SrcFltPort*
Not used for specifying Tx parameters.
*Read back*: The host's IP address is stored in *m_SrcFltIp* and the selected source port number in *m_SrcFltPort*.

*m_TimeToLive*
Time-To-Live (TTL) value to be used for transmission. When *m_TimeToLive* is 0, a default value is used.

*m_NumTpPerIp*
Number of Transport Packets (TPs) stored in one IP packet. The valid range is 1..7.

*m_Protocol*
Protocol expected for encapsulation of Transport Packets.

| Value | Meaning |
|---|---|
| **DTAPI_PROTO_UDP** | UDP |
| **DTAPI_PROTO_RTP** | RTP |

*m_DiffServ*
Value to be put in the *Differentiated Services* field (formerly *Service Type*) in the IP header.

*m_FecMode*

Error-correction mode.

| Value | Meaning |
|---|---|
| **DTAPI_FEC_DISABLE** | No FEC |
| **DTAPI_FEC_2D** | RFC2733 parity FEC with 2D extensions as described in *Code of Practice #3* |

*m_FecNumRows, m_FecNumCols*

Number of rows and columns in the FEC matrix. In the *COP #3* these parameters are called *D* and *L* respectively. The following restrictions apply to *L* and *D*:

$4 \leq D \leq 20, \quad 1 \leq L \leq 20 \quad \text{and} \quad L*D \leq 100$

*m_Flags*

Optional control/status flags field. Currently this field is not used and should be set to zero.

## Remarks

# ::DtapiCheckDeviceDriverVersion

Check whether the versions of the device drivers are compatible with the current version of the DTAPI library.

```
DTAPI_RESULT  ::DtapiCheckDeviceDriverVersion (void);
```

## Parameters

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| DTAPI_OK | The device drivers are compatible with the current version of the DTAPI library. |
| DTAPI_E_DRIVER_INCOMP | Version of at least one of the device drivers is incompatible with the DTAPI library. The device driver(s) needs to be upgraded. |
| DTAPI_E_NO_DEVICE | Device-driver version cannot be queried because no DekTec device is installed in the system. |

## Remarks

## ::DtapiGetDeviceDriverVersion

Get device-driver version information. Two overloaded variants of this function are provided. The first variant is compatible with DTAPI v1.3.x.x and returns the version of the PCI-card driver (*Dta1xx*). The second variant includes a parameter to specify the device-driver category, either PCI (device driver *Dta1xx*) or USB (device driver *Dtu2xx*).

```
DTAPI_RESULT  ::DtapiGetDeviceDriverVersion (
 [out] int&  DriverVersionMajor,
 [out] int&  DriverVersionMinor,
 [out] int&  DriverVersionBugFix,
 [out] int&  DriverVersionBuild
);
DTAPI_RESULT  ::DtapiGetDeviceDriverVersion (
  [in] int  DvcCategory,          // Device-driver category (PCI/USB)
 [out] int&  DriverVersionMajor,
 [out] int&  DriverVersionMinor,
 [out] int&  DriverVersionBugFix,
 [out] int&  DriverVersionBuild
);
```

### Parameters

*DvcCatagory*

Parameter specifying the device category:

| Value | Meaning |
|---|---|
| **DTAPI_CAT_PCI** | PCI-bus device; Query version of *Dta1xx* device driver. |
| **DTAPI_CAT_USB** | USB device; Query version of *Dtu1xx* device driver. |

*DriverVersionMajor*

Major version number of the device driver. This number is incremented for major functional upgrades of the device driver.

*DriverVersionMinor*

The minor version number is incremented for small functional increments of the device driver.

*DriverVersionBugFix*

The bug-fix version number is incremented when a bug in the device driver has been fixed, without further functional enhancements to the driver.

*DriverVersionBuild*

Build number.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Device-driver version has been retrieved successfully. |
| **DTAPI_E_NO_DEVICE** | Device-driver version cannot be queried because no DekTec device is installed in the system. |

### Remarks

## ::DtapiGetVersion

Get version of the DTAPI library. Two overloaded variants are defined. The first function prototype, which is defined for backward compatibility, returns the major and minor version number. The second variant also provides bug fix and build number.

```
DTAPI_RESULT ::DtapiGetVersion (
 [out] int&  LibVersionMajor,
 [out] int&  LibVersionMinor
);
DTAPI_RESULT ::DtapiGetVersion (
 [out] int&  LibVersionMajor,
 [out] int&  LibVersionMinor,
 [out] int&  LibVersionBugFix,
 [out] int&  LibVersionBuild
);
```

### Parameters

*LibVersionMajor*
Major version number of the DTAPI library. This number is incremented for major functional upgrades of the DTAPI.

*LibVersionMinor*
The minor version number is incremented for small functional increments of the DTAPI.

*LibVersionBugFix*
This number is incremented when a bug in the DTAPI library has been fixed, without functional enhancements.

*LibVersionBuild*
Build number.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| DTAPI_OK | Version numbers have been retrieved successfully. |

### Remarks

This function always succeeds.

The device drivers have their own version number(s), independent from the DTAPI library version.

## ::DtapiDeviceScan

Scan DekTec devices in the system.

```
DTAPI_RESULT ::DtapiDeviceScan (
  [in] int  NumEntries,           // #Device entries in DvcDescArr
 [out] int&  NumEntriesResult,    // #Devices found or #entries required
 [out] DtDeviceDesc*  DvcDescArr, // Device descriptor array
  [in] bool  InclIpDvcs=false     // Include DekTec IP devices
);
```

### Parameters

*NumEntries*

Specifies the size, in number of **DtDeviceDesc** entries, of the caller-supplied *pDvcDesc* array.

*NumEntriesResult*

Output parameter that receives the number of devices found and described in *pDvcDesc*. The value of this parameter can be greater than *NumEntries* (when **DtapiDeviceScan** returns **DTAPI_E_BUF_TOO_SMALL**).

*DvcDescArr*

Pointer to a caller-supplied array of **DtDeviceDesc** entries to receive the device descriptions.

*InclIpDvcs*

Include scan for DekTec IP devices in the network.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Scan has completed successfully and the *pDvcDesc* array was large enough to contain all device descriptions. |
| **DTAPI_E_BUF_TOO_SMALL** | The number of device-description entries in *pDvcDesc* is too small. The number of entries required is returned in *NumEntriesResult*. |

### Remarks

**DtapiDeviceScan** scans the PCI and USB bus(es) in the current system and returns all DekTec devices found.

In case *InclIpDvcs* is set to **true**, the **DtapiDeviceScan** also scans the network for DekTec IP devices and therefore it takes some extra time.

This function may have to be called twice. The first time, *NumEntries* should be set to a best-guess maximum value. If the result status is **DTAPI_E_BUF_TOO_SMALL**, the application should free the current array of **DtDvcDesc** entries, allocate a new array with the number of entries returned in *NumEntriesResult*, and call **DtapiDeviceScan** again.

## ::DtapiDtDeviceDesc2String

Creates a descriptive string, e.g. "DTA-100 in Slot 5" for a device.

```
DTAPI_RESULT ::DtapiDtDeviceDesc2String (
  [in] DtDeviceDesc*  pDvcDesc,    // Device descriptor
  [in] int  StringType,            // Type of string to create
 [out] char*  pString              // String buffer
  [in] int  StringLength           // Size of the string buffer
);
DTAPI_RESULT ::DtapiDtDeviceDesc2String (
  [in] DtDeviceDesc*  pDvcDesc,    // Device descriptor
  [in] int  StringType,            // Type of string to create
 [out] wchar_t*  pString           // String buffer
  [in] int  StringLength           // Size of the string buffer
);
```

### Parameters

*pDvcDesc*

Pointer to the hardware function descriptor used as input to create our string description.

*StringType*

Defines the type of string too create. Can be any of the values defined in the table below. The values should be prefixed by **DTAPI_DVC2STR_**.

| Value | Example | Meaning |
|---|---|---|
| **TYPE_NMB** | "DTA-100" | Device type number |
| **TYPE_AND_LOC** | "DTA-102 in Slot 5" | Device type number and location |

*pString*

Pointer to the buffer that receives the descriptive string

*StringLength*

Size of the provided buffer (including space for '\0' termination). If the size specified here is too short, the generated string will be clipped and no error is returned. A size of 64 characters should suffice for all strings created with this function.

### Results

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Successfully created a string |
| **DTAPI_E_INVALID_BUF** | An invalid buffer pointer is supplied for *pDvcDesc* or *pString* |

## ::DtapiDtHwFuncDesc2String

Creates a descriptive string, e.g. "DTA-100 in Slot 5" or "DVB-ASI", for a hardware function based on a DtHwFuncDesc structure.

```
DTAPI_RESULT ::DtapiDtHwFuncDesc2String (
  [in] DtHwFuncDesc*  pHwFunc,     // Hardware function descriptor
  [in] int  StringType,            // Type of string to create
 [out] char*  pString              // String buffer
  [in] int  StringLength           // Size of the string buffer
);
DTAPI_RESULT ::DtapiDtHwFuncDesc2String (
  [in] DtHwFuncDesc*  pHwFunc,     // Hardware function descriptor
  [in] int  StringType,            // Type of string to create
 [out] wchar_t*  pString           // String buffer
  [in] int  StringLength           // Size of the string buffer
);
```

### Parameters

*pHwFunc*

Pointer to the hardware function descriptor used as input to create our string description.

*StringType*

Defines the type of string too create. Can be any of the values defined in the table below. The values should be prefixed by **DTAPI_HWF2STR_**.

| Value | Example | Meaning |
|---|---|---|
| **TYPE_NMB** | "DTA-100" | Device type number |
| **TYPE_AND_PORT** | "DTA-124 port 1" | Device type number and port number |
| **TYPE_AND_LOC** | "DTA-102 in Slot 5" | Device type number and location |
| **ITF_TYPE** | "DVB-ASI" | Physical interface type |
| **ITF_TYPE_SHORT** | "ASI" | Physical interface type – short descriptive string |

*pString*

Pointer to the buffer that receives the descriptive string

*StringLength*

Size of the provided buffer (including space for '\0' termination). If the size specified here is too short, the generated string will be clipped and no error is returned. A size of 64 characters should suffice for all strings created with this function.

### Results

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Successfully created a string |
| **DTAPI_E_INVALID_BUF** | An invalid buffer pointer is supplied for *pHwFunc* or *pString* |

## ::DtapiHwFuncScan

Scan hardware functions hosted by DekTec devices.

```
DTAPI_RESULT ::DtapiHwFuncScan (
  [in] int  NumEntries,            // #Function entries in pHwFuncs
  [out]int&  NumEntriesResult,     // #Functions found or #entries required
  [out]DtHwFuncDesc*  pHwFuncs,    // Hardware-function descriptions
   [in] bool  InclIpDvcs=false     // Include functions on IP devices
devices
);
```

### Parameters

*NumEntries*

Specifies the size, in number of **DtHwFuncDesc** entries, of the caller-supplied *pHwFuncs* array. Specifying zero is not allowed.

*NumEntriesResult*

Output parameter that receives the number of hardware functions found and described in *pHwFuncs*. The value of this parameter can be greater than *NumEntries* (when **DtapiHwFuncScan** returns **DTAPI_E_BUFFER_TOO_SMALL**).

*pHwFuncs*

Pointer to a caller-supplied array of **DtHwFuncDesc** entries to receive the hardware-function descriptors. Do not supply a NULL pointer.

*InclIpDvcs*

Include scan for functions hosted by DekTec IP devices in the network.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Scan has completed successfully and the *pHwFuncs* array was large enough to contain all function descriptions. |
| **DTAPI_E_BUF_TOO_SMALL** | The number of function-description entries in *pHwFuncs* is too small. The number of entries required is returned in *NumEntriesResult*. |

### Remarks

**DtapiHwFuncScan** scans the PCI and USB bus(es) in the current system and returns all hardware functions hosted by DekTec devices. Each device may host multiple hardware functions.

In case *InclIpDvcs* is set to **true**, the **DtapiHwFuncScan** also scans the network for DekTec IP devices and the result includes the hardware functions hosted DekTec IP devices. In this case the **DtapiHwFuncScan** takes some extra time.

This function may have to be called twice. The first time, *NumEntries* should be set to a best-guess maximum value. If the result status is **DTAPI_E_BUF_TOO_SMALL**, the application should free the current array of **DtHwFuncDesc** entries, allocate a new array with the number of entries returned in *NumEntriesResult*, and call **DtapiHwFuncScan** again.

The hardware-function descriptors are always retrieved in the same order. Hardware functions hosted by the same device are grouped together. Within a group of hardware functions hosted by a particular device, functions of the same type are grouped together. These sequencing rules enable application programs to easily create function lists in a 'logical' order.

## ::DtapiInitDtTsIpParsFromIpString

Initialises the m_Ip and m_SrcIp members of a DtTsIpPars structure.

```
DTAPI_RESULT ::DtapiInitDtTsIpParsFromIpString (
 [out] DtTsIpPars&  TsIpPars,      // TsIpPars structure to initialise
  [in] const char*  pIp,           // String with destination IP
  [in] const char*  pSrcIp         // String with source IP
);
DTAPI_RESULT ::DtapiInitDtTsIpParsFromIpString (
 [out] DtTsIpPars&  TsIpPars,      // TsIpPars structure to initialise
  [in] const wchar_t*  pIp,   // String with destination IP
  [in] const wchar_t*  pSrcIp// String with source IP
);
```

### Parameters

*TsIpPars*

Ts-IP-Parameter structure to initialise.

*pIp*

Pointer to a string that holds the IP address (e.g. "127.0.0.1") to be used as destination IP address (m_Ip). If this pointer is NULL the IP address "0.0.0.0" will be used.

*pSrcIp*

Pointer to a string that holds the IP address (e.g. "192.168.0.1") to be used as source IP address (m_SrcIp). If this pointer is NULL the IP address "0.0.0.0" will be used.

### Results

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | This method cannot fail |

### Remarks

This method only initialises the m_DstIp and m_SrcIp members, it will leave the other members untouched.

# ::DtapiPciScan (Obsolete)

Scan hardware functions available on the DTA-xxx cards in the current system.

```
DTAPI_RESULT ::DtapiPciScan (
  [in] int  NumFuncEntries,        // #Function entries in pHwFuncs
 [out] int& NumFuncEntriesResult, // #Functions found or #entries required
  [in] DtapiHwFunc*  pHwFuncs      // Hardware-function descriptions
);
```

## Parameters

*NumFuncEntries*

Specifies the size, in number of **DtapiHwFunc** entries, of the caller-supplied *pHwFuncs* array.

*NumFuncEntriesResult*

Output parameter that receives the number of hardware functions found and described in *pHwFuncs*. The value of this parameter can be greater than *NumFuncEntries* (when **DtapiPciScan** returns **DTAPI_E_BUFFER_TOO_SMALL**).

*pHwFuncs*

Points to a caller-supplied array of **DtapiHwFunc** entries to receive descriptions of the hardware functions.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Scan has completed successfully and the *pHwFuncs* array was large enough to contain all function descriptions. |
| **DTAPI_E_BUF_TOO_SMALL** | The number of function-description entries in *pHwFuncs* is too small. The number of entries required is returned in *NumFuncEntriesResult*. |

## Remarks

This function still exists for backward compatibility. Use **DtDeviceScan** in new software.

**DtapiPciScan** scans the PCI bus in the current system and lists the hardware functions available on the detected DTA-xxx PCI cards. Each card may contain multiple hardware functions.

This function may have to be called two times. The first time, *NumFuncEntries* should be set to a best-guess maximum value. If the result status is **DTAPI_E_BUF_TOO_SMALL**, the application should free the current array of **DtapiHwFunc** entries, allocate a new array with the number of entries returned in *NumFuncEntriesResult*, and call **DtapiPciScan** again.

## ::DtapiModPars2SymRate

Compute symbol rate from Transport-Stream rate and modulation parameters.

```
DTAPI_RESULT ::DtapiModPars2TsRate(
 [out] int&  SymRate          // Computed symbol rate
  [in] int   ModType,         // Modulation type
  [in] int   ParXtra0,        // Extra parameter #0
  [in] int   ParXtra1,        // Extra parameter #1
  [in] int   ParXtra2,        // Extra parameter #2
  [in] int   TsRate           // Transport-Stream rate
);
```

### Parameters

*SymRate*

The symbol rate in baud computed from Transport-Stream rate and modulation parameters.

*ModType, ParXtra0, ParXtra1, ParXtra2*

Set of modulation parameters from which the symbol rate is computed. Refer to **DtOutpChannel::SetModControl** on page 187 for more details about these parameters.

*TsRate*

Transport-Stream rate in bps.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Symbol rate has been computed successfully |
| **Other result values** | Error in modulation parameters, please refer to **DtOutpChannel::SetModControl** |

### Remarks

## ::DtapiModPars2TsRate

Compute Transport-Stream rate from modulation parameters. There are two overloads:

**DtapiModPars2TsRate(int&, int, int, int, int, int)**
To be used for all modulation modes except DVB-T2.

**DtapiModPars2TsRate(int&, DtDvbT2Pars&)**
This second overload is specifically intended for DVB-T2 modulation. The modulation parameters are defined in **DtDvbT2Pars**.

```
DTAPI_RESULT ::DtapiModPars2TsRate(
 [out] int&  TsRate          // Computed Transport-Stream rate
  [in] int   ModType,        // Modulation type
  [in] int   ParXtra0,       // Extra parameter #0
  [in] int   ParXtra1,       // Extra parameter #1
  [in] int   ParXtra2,       // Extra parameter #2
  [in] int   SymRate = -1    // Optional symbol rate
);
DTAPI_RESULT ::DtapiModPars2TsRate(
 [out] int&  TsRate          // Computed Transport-Stream rate
  [in] DtDvbT2Pars  T2Pars   // DVB-T2 modulation parameters
);
```

### Parameters

*TsRate*
The Transport-Stream rate in bps computed from modulation parameters.

*ModType, ParXtra0, ParXtra1, ParXtra2*
Set of modulation parameters from which the Transport-Stream rate is computed. Refer to **DtOutpChannel::SetModControl** on page 187 for more details about these parameters.

*T2Pars*
DVB-T2 modulation parameters from which the Transport-Stream rate of PLP0 is computed; see description of **class DtDvbT2Pars**.

*SymRate*
Symbol rate in baud. This parameter is only required for modulation modes that are dependent on a symbol rate: DVB-C, DVB-S and DVB-S.2.
For other modulation modes the Transport-Stream rate is uniquely determined by *ModType*, *ParXtra0*, *ParXtra1* and *ParXtra2*.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Successfully derived a TS-rate from the modulation parameters |
| **DTAPI_E_SYMRATE_REQD** | Conversion requires a symbol rate but none is specified |
| **Other result values** | Error in modulation parameters, please refer to **DtOutpChannel::SetModControl** |

## Remarks

## ::DtapiResult2Str

Convert DTAPI_RESULT value to a string.

```
Const char* ::DtapiResult2Str(
  [in] DTAPI_RESULT  DtapiResult   // DTAPI_RESULT value to be converted
);
```

### Parameters

*DtapiResult*

**DTAPI_RESULT** value to be converted to a string.

### Result

### Remarks

For ease of use, this function doesn't return a **DTAPI_RESULT** but returns the string directly.

# DtDevice::AttachToIpAddr

Attach device object to the device hardware, based on the IP address of the device.

```
DTAPI_RESULT DtDevice::AttachToIpAddr (
  [in] unsigned char  Ip[4]  // IP address
);
```

## Parameters

*Ip*
IP address of the DekTec device to which the device object is to be attached.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Device object has been attached successfully to the hardware |
| **DTAPI_E_ATTACHED** | Device object is already attached to device hardware |
| **DTAPI_E_NO_DEVICE** | No DekTec devices found (at all) |
| **DTAPI_E_NO_SUCH_DEVICE** | The device with the IP address could not be found |

## Remarks

**AttachToIpAddr** is non-intrusive. No initialisation actions are performed.

This method can only be applied to DTE-31xx devices.

# DtDevice::AttachToSerial

Attach device object to the device hardware, based on the serial number of the device.

```
DTAPI_RESULT DtDevice::AttachToSerial (
  [in] __int64  Serial       // Serial number
);
```

## Parameters

*Serial*

Serial number of the DekTec device to which the device object is to be attached.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Device object has been attached successfully to the hardware |
| **DTAPI_E_ATTACHED** | Device object is already attached to device hardware |
| **DTAPI_E_NO_DEVICE** | No DekTec devices found (at all) |
| **DTAPI_E_NO_SUCH_DEVICE** | The device with the specified serial number could not be found |
| **DTAPI_E_DRIVER_INCOMP** | Version of device driver is incompatible with the DTAPI version, device driver needs to be upgraded |

## Remarks

**AttachToSerial** is non-intrusive. No initialisation actions are performed.

# DtDevice::AttachToSlot

Attach device object to a PCI Bus device, based on PCI-bus number and slot number.

```
DTAPI_RESULT DtDevice::AttachToSlot (
  [in] int  PciBusNumber,    // PCI-bus number
  [in] int  SlotNumber       // PCI-slot number
);
```

## Parameters

*PciBusNumber, SlotNumber*

PCI-bus number and slot number of the DekTec device to which the device object is to be attached.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Device object has been attached successfully to the hardware |
| **DTAPI_E_ATTACHED** | Device object is already attached to a PCI card |
| **DTAPI_E_NO_DTA_CARD** | No DekTec PCI cards found (at all) |
| **DTAPI_E_NO_SUCH_DEVICE** | No DekTec DTA-1xx PCI card found in the specified slot, or the slot is empty |
| **DTAPI_E_DRIVER_INCOMP** | Version of device driver is incompatible with the DTAPI version, device driver needs to be upgraded |

## Remarks

**AttachToSlot** is non-intrusive. No initialisation actions are performed.

This method cannot be applied to USB devices. Use **AttachToSerial** or **AttachToType** instead.

# DtDevice::AttachToType

Attach device object to the device hardware, based on the type number of the device.

```
DTAPI_RESULT DtDevice::AttachToType (
  [in] int  TypeNumber,      // Which device to look for
  [in] int  DeviceNo=0       // Relative device number
);
```

## Parameters

*TypeNumber*

Integer value representing the type number of the device to which the device object is to be attached. The integer corresponds to the number in the hardware's type string, e.g. 100 for the DTA-100 or 225 for DTU-225.

*DeviceNo*

If the system contains multiple devices of the same type, this number distinguishes between the various devices. *DeviceNo* of the first device is 0, the next device 1, and so on.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Device object has been attached successfully to the hardware |
| **DTAPI_E_ATTACHED** | Device object is already attached to device hardware |
| **DTAPI_E_INTERNAL** | Internal DTAPI error |
| **DTAPI_E_NO_DEVICE** | No DekTec devices found (at all) |
| **DTAPI_E_NO_SUCH_DEVICE** | No device with type *Typenumber* is found in this system, or the number of devices of this type is less-or-equal than *DeviceNo* |
| **DTAPI_E_DRIVER_INCOMP** | Version of device driver is incompatible with the DTAPI version, device driver needs to be upgraded |

## Remarks

**AttachToType** is non-intrusive. No initialisation actions are performed.

# DtDevice::Detach

Detach device object from device hardware.

```
DTAPI_RESULT DtDevice::Detach (
      void
);
```

## Parameters

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| DTAPI_OK | Device object has been detached successfully from the device hardware |
| DTAPI_E_NOT_ATTACHED | Device object is not attached to device hardware, so it cannot be detached |

## Remarks

# DtDevice::GetDescriptor

Get device descriptor.

```
DTAPI_RESULT DtDevice::GetDescriptor (
 [out] DtDeviceDesc&  DvcDesc      // Device descriptor
);
```

## Parameters

*DvcDesc*

Output parameter that receives the device descriptor.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Version numbers have been retrieved successfully |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |

## Remarks

# DtDevice::GetDeviceDriverVersion

Get device-driver version information. Two overloaded variants of this function are provided. The first function prototype, which is defined for backward compatibility, returns the major and minor version number. The second version also provides bug fix and build number.

```
DTAPI_RESULT DtDevice::GetDeviceDriverVersion (
 [out] int&  DriverVersionMajor,
 [out] int&  DriverVersionMinor
);
DTAPI_RESULT DtDevice::GetDeviceDriverVersion (
 [out] int&  DriverVersionMajor,
 [out] int&  DriverVersionMinor,
 [out] int&  DriverVersionBugFix,
 [out] int&  DriverVersionBuild
);
```

## Parameters

*DriverVersionMajor*
Major version number of the device driver used to access the device hardware. This number is incremented for major functional upgrades of the device driver.

*DriverVersionMinor*
The minor version number is incremented for small functional increments of the device driver.

*DriverVersionBugFix*
The bug-fix version number is incremented when a bug in the device driver is fixed, without functional enhancements.

*DriverVersionBuild*
Build number.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Version numbers have been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |

## Remarks

This function cannot be used to obtain hardware versioning information. Use **VpdRead** instead.

# DtDevice::GetDisplayName

Get the name displayed on the LCD status display of the device.

```
DTAPI_RESULT DtDevice::GetDisplayName (
 [out] char*  pName          // Displayed name
);
DTAPI_RESULT DtDevice::GetDisplayName (
 [out] wchar_t*  pName       // Displayed name
);
```

## Parameters

*pName*

Pointer to the character array that receives the displayed name. The character array must be allocated before calling **GetDisplayName**. The DTAPI limits the maximum length of a name including the null-terminator to 16 characters, so a 16-char array suffices.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Version numbers have been retrieved successfully |
| **DTAPI_E_NOT_SUPPORTED** | The device does not have a status display |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |

## Remarks

# DtDevice::GetFirmwareVersion

Get version number of the firmware loaded on the device.

```
DTAPI_RESULT DtDevice::GetFirmwareVersion (
 [out] int&  FirmwareVersion
);
```

## Parameters

*FirmwareVersion*

Single number that identifies the version of the FPGA- and/or embedded software on the device.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Firmware version has been retrieved successfully. |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver. |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware. |

## Remarks

# DtDevice::GetIoConfig

Get the channel type of a physical port.

```
DTAPI_RESULT DtDevice::GetIoConfig (
  [in] int  Port,             // Physical port
 [out] int&  IoConfig         // DTAPI_IOCONFIG_XXX
);
DTAPI_RESULT DtDevice::GetIoConfig (
  [in] int  Port,             // Physical port
 [out] int&  IoConfig         // DTAPI_IOCONFIG_XXX
 [out] int&  ParXtra          // Optional extra IO config option
);
```

## Parameters

*Port*

Physical port number.

*IoConfig*

Port configuration, see **DtDevice::SetIoConfig**

If the port doesn't support I/O configuration then *Config* is set to **DTAPI_IOCONFIG_NOTSUP**.

If the port is disabled then *Config* is set to **DTAPI_IOCONFIG_DISABLED**.

*ParXtra*

Optional extra parameter, see **DtDevice::SetIoConfig**.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | I/O configuration has been read successfully |
| **DTAPI_E_NO_SUCH_PORT** | Invalid port number for this device |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |

## Remarks

On the DTA-2137, a receiver port becomes disabled when the other receiver port is configured with **DTAPI_IOCONFIG_INPUT_APSK**.

# DtDevice::GetVcxoState

Get the state of the onboard VCXO.

```
DTAPI_RESULT DtDevice::GetVcxoState (
 [out]bool&  Enable
 [out]int&   Lock
 [out]int&   VcxoClkFreqHz
);
```

## Parameters

*Enable*

Indicates whether the VCXO is enabled or disabled.

*Lock*

Current Genlock state.

| Value | Meaning |
|---|---|
| **DTAPI_GENLOCK_INLOCK** | The Vcxo is genlocked to a SDI reference signal |
| **DTAPI_GENLOCK_NOLOCK** | The Vcxo is not genlocked to a SDI signal |

*VcxoClkFreqHz*

Measured Vcxo frequency in Hz.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | State has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_SUPPORTED** | The device does not support this function |

## Remarks

# DtDevice::GetRefClkCnt

Get a sample of the reference-clock counter on the device.

```
DTAPI_RESULT DtDevice::GetRefClkCnt (
 [out] int&  RefClkCnt       // Sample of reference-clock counter
);
DTAPI_RESULT DtDevice::GetRefClkCnt (
 [out] int&  RefClkCnt       // Sample of reference-clock counter
 [out] int&  RefClkFreqHz    // Clock frequency of the reference clock
);
```

## Parameters

*RefClkCnt*
Sample of the 32-bit reference clock counter.

*RefClkFreqHz*
Clock frequency of the reference clock in Hz.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Sample has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |
| **DTAPI_E_NOT_SUPPORTED** | The device does not support retrieval of a sample of the reference-clock counter |

## Remarks

This method is supported on the following devices:

| Device Type Number | Clock Frequency |
|---|---|
| DTA-105 | 54.0MHz |
| DTA-107(S2) | 25.0MHz |
| DTA-110(T) | 25.0MHz |
| DTA-115 | 54.0MHz |
| DTA-120 | 40.5MHz (FW Version ≥ 4) |
| DTA-122 | 27.0MHz (FW Version ≥ 4) |
| DTA-124 | 40.5Mhz (FW Version 0) / 54MHz (FW Version ≥ 1) |
| DTA-140 | 40.5MHz (FW Version ≥ 1) |
| DTA-145 | 54.0MHz |

| | |
|---|---|
| DTA-160 | 54.0MHz |
| DTA-545 | 40.5Mhz (FW Version 0) / 54MHz (FW Version ≥ 1) |
| DTA-2135 | 54.0MHz |
| DTA-2144 | 54.0MHz |
| DTA-2145 | 54.0MHz |
| DTE-3100 | 54.0MHz |
| DTE-3120 | 54.0MHz |

Some devices (e.g. DTU-225 and DTU-245) that have a reference-clock counter, do not allow access to their reference-clock counter (i.e. this method will return **`DTAPI_E_NOT_SUPPORTED`**). For these devices it is possible to determine the running frequency of their onboard reference-clock counter via the **`DtDevice::GetRefClkFreq`** method.

# DtDevice::GetRefClkFreq

Get the frequency of the onboard reference clock.

```
DTAPI_RESULT DtDevice::GetRefClkFreq (
 [out] int&  RefClkFreqHz     // Clock frequency of the reference clock
);
```

## Parameters

*RefClkFreqHz*

Clock frequency of the reference clock in Hz.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Sample has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |
| **DTAPI_E_NOT_SUPPORTED** | The device does not support getting of the reference-clock frequency |

## Remarks

Amongst other purposes the onboard reference-clock counter is used for assigning arrival time-stamps to the incoming data (see **DtInpChannel::SetRxMode**). By calling this method one can determine the running frequency of the reference-clock counter used for assigning the arrival time-stamps.

Next to the devices mentioned in the description of the **DtDevice::GetRefClkCnt** method, this method supports the following devices:

| Device Type Number | Clock Frequency |
|---|---|
| DTU-225 | 48Mhz (FW Version < 5) / 54MHz (FW Version ≥ 5) |
| DTU-245 | 48Mhz (FW Version < 5) / 54MHz (FW Version ≥ 5) |

# DtDevice::GetUsbSpeed

Get the speed (e.g. full or high speed) of the USB bus.

```
DTAPI_RESULT DtDevice::GetUsbSpeed (
 [out] int&  UsbSpeed
);
```

## Parameters

*UsbSpeed*

Current speed of the USB bus the device is connected to.

| Value | Meaning |
|---|---|
| **DTAPI_USB_FULL_SPEED** | USB bus operates at full speed (max. 12Mbps) |
| **DTAPI_USB_HIGH_SPEED** | USB bus operates at high speed (max. 480Mbps) |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | USB speed has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |
| **DTAPI_E_NOT_SUPPORTED** | The device does not support the getting of the USB speed |

## Remarks

Use this method to determine if the USB device is connected to a USB bus operating in full or high speed mode. A USB bus operating at full speed usually indicates that the DTU-2XX device is connected to a USB-1 bus[4]. High speed is only supported by USB-2 buses.

USB "full speed" limits the maximum input/output bit-rate supported by the DTU-2XX devices to 8Mbps. To be able to use the DTU-2XX for bit-rates higher than 8Mbps a USB-2 bus operating at high speed should be used.

This method is only supported by the DTU-2XX devices.

[4] USB-2 buses can operate in full-speed mode for backward compatibility reasons (support for USB-1 devices)

# DtDevice::HwFuncScan

Scan hardware functions hosted by this device.

```
DTAPI_RESULT DtDevice::HwFuncScan (
  [in] int  NumEntries,            // #Function entries in pHwFuncs
  [out]int&  NumEntriesResult,     // #Functions found or #entries required
  [out] DtHwFuncDesc*  pHwFuncs    // Hardware-function descriptions
);
```

## Parameters

*NumEntries*

Specifies the size, in number of **DtHwFuncDesc** entries, of the caller-supplied *pHwFuncs* array.

*NumEntriesResult*

Output parameter that receives the number of hardware functions found and described in *pHwFuncs*. The value of this parameter can be greater than *NumEntries* (when **DtapiHwFuncScan** returns **DTAPI_E_BUFFER_TOO_SMALL**).

*pHwFuncs*

Pointer to a caller-supplied array of **DtHwFuncDesc** entries to receive the hardware-function descriptors.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Scan has completed successfully and the *pHwFuncs* array was large enough to contain all function descriptions. |
| **DTAPI_E_BUF_TOO_SMALL** | The number of function-description entries in *pHwFuncs* is too small. The number of entries required is returned in *NumEntriesResult*. |

## Remarks

This function is the equivalent of **::DtapiHwFuncScan** for a single device.

**DtDevice::HwFuncScan** function may have to be called twice. The first time, *NumEntries* should be set to a best-guess maximum value. If the result status is **DTAPI_E_BUF_TOO_SMALL**, the application should free the current array of **DtHwFuncDesc** entries, allocate a new array with the number of entries returned in *NumEntriesResult*, and call **DtapiHwFuncScan** again.

# DtDevice::I2Cread

Read data from the I2C bus.

```
DTAPI_RESULT DtDevice::I2Cread (
  [in] int   DvcAddr,          // I2C device address
 [out] char*  pBuffer,         // Buffer for receiving the data
  [in] int   NumBytesToRead,  // #Bytes to read
);
```

## Parameters

*DvcAddr*

Device address of the targeted I2C device.

The I2C device address consists out of 1 transfer direction bit + 7 address bits. This method ignores the transfer bit (LSB) and only used the 7 address bits. Valid values for the device address are: 0x00h-0xFF

*pBuffer*

Pointer to a buffer for receiving the I2C bytes.

The buffer must be caller-allocated and have a size of at least `NumBytesToRead`.

*NumBytesToRead*

Number of bytes to read.

Maximum allowed number of bytes to read is 512.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Sample has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |
| **DTAPI_E_INVALID_BUF** | Invalid buffer pointer provided |
| **DTAPI_E_INVALID_SIZE** | Invalid number of bytes to read specified (i.e. >512 bytes) |
| **DTAPI_E_NOT_SUPPORTED** | The device does not support reading of the onboard I2C bus |

## Remarks

The I2Cread method is intended for direct low-level access to the onboard I2C resources.

# DtDevice::I2Cwrite

Write data to the I2C bus.

```
DTAPI_RESULT DtDevice::I2Cwrite (
  [in] int   DvcAddr,          // I2C device address
  [in] char*  pBuffer,         // Buffer with bytes to write
  [in] int   NumBytesToWrite, // #Bytes to write
);
```

## Parameters

*DvcAddr*

Device address of the targeted I2C device
The I2C device address consists out of 1 transfer direction bit + 7 address bits. This method ignores the transfer bit (LSB) and only used the 7 address bits. Valid values for the device address are: 0x00h-0xFF

*pBuffer*

Pointer to a buffer with the bytes to write.

The buffer must have a size of at least *NumBytesToWrite*.

*NumBytesToWrite*

Number of bytes to write.

Maximum allowed number of bytes to write is 512.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Sample has been retrieved successfully. |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver. |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware. |
| **DTAPI_E_INVALID_BUF** | Invalid buffer pointer provided |
| **DTAPI_E_INVALID_SIZE** | Invalid number of bytes to write specified (i.e. >512 bytes) |
| **DTAPI_E_NOT_SUPPORTED** | The device does not support writing to the onboard I2C bus. |

## Remarks

The I2C Write method is intended for direct low-level access to the onboard I2C resources.

# DtDevice::LedControl

Take direct control of the device's general-status LED, or let the hardware drive the LED.

```
DTAPI_RESULT DtDevice::LedControl (
  [in] int  LedControl       // DTAPI_LED_XXX
);
```

## Parameters

*LedControl*

Controls status of the LED.

| Value | Meaning |
|---|---|
| **DTAPI_LED_HARDWARE** | Hardware drives the LED (default after power up) |
| **DTAPI_LED_OFF** | LED is forced to off-state |
| **DTAPI_LED_GREEN** | LED is forced to green-state |
| **DTAPI_LED_RED** | LED is forced to red-state |
| **DTAPI_LED_YELLOW** | LED is forced to yellow-state |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | LED setting has been accepted |
| **DTAPI_E_INVALID_MODE** | The specified LED-control value is invalid |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |
| **DTAPI_E_NOT_SUPPORTED** | The device does not have a general-status LED |

## Remarks

When a device object is detached from the device hardware, all direct-control settings are released (LED control is reset to **DTAPI_LED_HARDWARE**).

The DTA-120, DTA-122 and DTA-140 each have a single LED, which can be controlled by either this method (**DtDevice::LedControl**) or by **DtInpChannel::LedControl**. If both methods are applied in parallel, **DtDevice::LedControl** has precedence over **DtInpChannel::LedControl**.

# DtDevice::SetDisplayName

Set the name on the LCD status display of the device.

```
DTAPI_RESULT DtDevice::SetDisplayName (
  [in] char*  pName           // Displayed name
);
DTAPI_RESULT DtDevice::SetDisplayName (
  [in] wchar_t*  pName        // Displayed name
);
```

## Parameters

*pName*

Null-terminated character string specifying the name to be displayed on the LCD status display of the device.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Version numbers have been retrieved successfully |
| **DTAPI_E_NOT_SUPPORTED** | The device does not have a status display |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |

## Remarks

# DtDevice::SetIoConfig

Configure a physical port. On Windows, the I/O configuration is persisted in the registry, and automatically reloaded after a reboot. On Linux, applications have to implement their own persistency.

```
DTAPI_RESULT DtDevice::SetIoConfig (
  [in] int  Port,             // Physical port number
  [in] int  IoConfig          // DTAPI_IOCONFIG_XXX
  [in] int  ParXtra=-1        // Optional extra configuration parameter
);
```

## Parameters

*Port*

Physical port number.

*IoConfig*

Specifies the configuration option to be set.

### Configuration Options for Input Ports

| Value | Meaning |
|---|---|
| **DTAPI_IOCONFIG_DISABLED** | Port is disabled. This option cannot be set, just read |
| **DTAPI_IOCONFIG_DIVERSITY** | Operate in diversity mode |
| **DTAPI_IOCONFIG_INPUT** | Use port as input |
| **DTAPI_IOCONFIG_INPUT_APSK** | Enable DVB-S2 reception in 16-APSK or 32-APSK mode. DTA-2137: If this option is enabled, the board will operate in single-channel mode; Without this option, two channels are available |
| **DTAPI_IOCONFIG_GENREF** | Genlock reference input for SDI signals |
| **DTAPI_IOCONFIG_SHARED** | Share antenna input with port *ParXtra* |

### Configuration Options for Output Ports

| | |
|---|---|
| **DTAPI_IOCONFIG_OUTPUT** | Use port as output<br>DTA-105, port #2: Port is an independent output |
| **DTAPI_IOCONFIG_GENLOCKED** | Genlocked SDI output<br>The port will lock the SDI output timing to the genlock input. If the application fails to write data to the channel in time, black frames are inserted to maintain synchronisation |
| **DTAPI_IOCONFIG_FAILSAFE** | Failsafe output<br>DTA-145/2145, port #2: If the watchdog triggers, the signal on port #1 will be connected to port #2 through a relais |
| **DTAPI_IOCONFIG_DBLBUF** | Doubly-buffered copy of another port |
| **DTAPI_IOCONFIG_LOOPTHR** | Loop-through copy of another port |

*ParXtra*

Extra parameter to the I/O configuration operation.

ParXtra for Input Ports

| IoConfig | Meaning of ParXtra |
|---|---|
| **DTAPI_IOCONFIG_INPUT**<br>**DTAPI_IOCONFIG_INPUT_APSK** | Not used. Set *ParXtra* to -1 |
| **DTAPI_IOCONFIG_GENREF** | Specifies expected SDI mode:<br>**DTA1XX_GENLOCK_SDI625** for 625-line SDI;<br>**DTA1XX_GENLOCK_SDI525** for 525-line SDI. |
| **DTAPI_IOCONFIG_DIVERSITY** | Port number to use as diversity 'buddy'.<br>DTA-2135: Port 2 can act as diversity buddy for port 1. |
| **DTAPI_IOCONFIG_SHARED** | Specifies the port number the antenna signal should be shared with |

ParXtra for Output Ports

| | |
|---|---|
| **DTAPI_IOCONFIG_FAILSAFE**<br>**DTAPI_IOCONFIG_GENLOCKED**<br>**DTAPI_IOCONFIG_OUTPUT** | Not used. Set *ParXtra* to -1 |
| **DTAPI_IOCONFIG_DBLBUF** | Specifies the source port number |
| **DTAPI_IOCONFIG_LOOPTHR** | Specifies the source port number |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Channel type has been set successfully |
| **DTAPI_E_ATTACHED** | Cannot change I/O configuration because a channel object is attached to this port |
| **DTAPI_E_DEV_DRIVER** | Driver was not able to set the I/O configuration |
| **DTAPI_E_INVALID_ARG** | *IoConfig* is DTAPI_IOCONFIG_DISABLED, or invalid value of *ParExtra* |
| **DTAPI_E_INVALID_MODE** | Invalid setting for I/O configuration |
| **DTAPI_E_NO_SUCH_PORT** | Invalid port number for this device |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |
| **DTAPI_E_NOT_SUPPORTED** | The I/O configuration option is not supported |

## Remarks

The I/O configuration of a port can only be changed when the underlying device is attached to a **DtDevice** object. However, the port may not be attached to a channel object.

**DTAPI_IOCONFIG_GENREF** cannot be set when one or more ports (the genlock reference input or one of the genlocked SDI output ports) of the device are in use (**DTAPI_E_ATTACHED**).

**DTAPI_IOCONFIG_INPUT_APSK** can only be set or unset when both ports 1 and 2 of the device are not in use (**DTAPI_E_ATTACHED**).

The DTAPI function **SetTxMode** will return **DTAPI_E_INVALID_MODE** when the I/O configuration of an SDI port is set to **DTAPI_IOCONFIG_GENLOCKED** and the requested SDI mode (number of lines) conflicts with the SDI genlock mode.

When an SDI port is opened as an input, the DTAPI function **SetRxMode** will return an error when the requested receive mode (number of lines) conflicts with the SDI genlock mode.

The new I/O configuration is persisted in the registry. The current I/O configuration of a port can be read back with **DtDevice::GetIoConfig**.

Setting a port to double-buffered mode will fail if the port specified in *ParXtra* is not an output. Similarly setting a port to loop-through mode will fail if the port specified in *ParXtra* is not an input.

# DtDevice::VpdDelete

Delete a Vital-Product Data (VPD) item from the VPD read/write section in the serial EEPROM on the device.

```
DTAPI_RESULT DtDevice::VpdDelete (
  [in] const char*  pKeyword // Keyword identifying VPD item, e.g. "Y0"
);
```

## Parameters

*pKeyword*

Null-terminated character string identifying the VPD item to be deleted.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | VPD item has been deleted successfully |
| **DTAPI_E_EEPROM_READ** | A read operation from the serial EEPROM did not succeed |
| **DTAPI_E_EEPROM_WRITE** | The write operation to the serial EEPROM did not succeed |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |
| **DTAPI_E_NOT_FOUND** | The VPD item could not be found |
| **DTAPI_E_READ_ONLY** | An attempt was made to delete a read-only VPD item |

## Remarks

If a VPD item with the specified keyword already exists, that item is overwritten, unless it is a read-only item. In the latter case, **DTAPI_E_READ_ONLY** is returned.

The size of the VPD read/write segment is 256 bytes. Writing to the serial EEPROM is a relatively slow operation.

# DtDevice::VpdRead

Read a Vital-Product Data (VPD) item from the EEPROM on the device.

```
DTAPI_RESULT DtOutpChannel::VpdRead (
  [in] const char* pKeyword, // Keyword identifying VPD item, e.g. "SN"
 [out] char*  pVpdItem       // String read from EEPROM
);
```

## Parameters

*pKeyword*

Null-terminated character string identifying the VPD item to be read. The keyword must consist of either two characters, or it should be the special string "VPDID".
The table below lists standard keywords supported by DekTec devices. Next to these standard keywords, custom VPD keywords can be created with **VpdWrite**.

| Value | Meaning |
|---|---|
| **"VPDID"** | Pseudo value to retrieve the *VPD ID String*, e.g. "DTA-100 DVB-ASI-C Output 0..150 Mbps". |
| **"CL"** | *Customer ID* |
| **"EC"** | *Engineering Change level*. Identifies the hardware revision level of the device, e.g. "Rev 1". |
| **"MN"** | *Manufacture ID* DekTec-internal code identifying the manufacturer of the hardware. |
| **"PD"** | *Production Date*, e.g. "2003.07" |
| **"PN"** | *Part Number*, e.g. "DTU-225" |
| **"SN"** | *Serial Number* E.g. "4225266001". |
| **"XT"** | *Crystal stability* E.g. "5ppm@25C;15ppm", which means a frequency stability of ±5 ppm at room temperature and a stability of ±15 ppm over the full temperature range and including aging. |

*pVpdItem*

String retrieved from the EEPROM. The character array must be allocated before calling **VpdRead**. The DTAPI limits the maximum length of a VPD item to 63 characters, so a 64-char array suffices.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| DTAPI_OK | VPD item has been read successfully |
| DTAPI_E_EEPROM_FORMAT | The data format in the serial EEPROM is not VPD compliant |
| DTAPI_E_EEPROM_READ | A read operation from the serial EEPROM did not succeed |
| DTAPI_E_KEYWORD | The keyword is neither two characters, nor "VPDID" |
| DTAPI_E_NOT_ATTACHED | Device object is not attached to device hardware |
| DTAPI_E_NOT_FOUND | The VPD item could not be found |

### Remarks

If one of the standard keywords ("CL", "EC", ...) has been specified and the method returns DTAPI_E_NOT_FOUND, the serial EEPROM has been tampered.

# DtDevice::VpdWrite

Write a Vital-Product Data (VPD) item to the VPD read/write section in the serial EEPROM on the device.

```
DTAPI_RESULT DtDevice::VpdWrite (
  [in] const char* pKeyword, // Keyword identifying VPD item, e.g. "Y1"
  [in] char*  pVpdItem       // String to be written to the EEPROM
);
```

## Parameters

*pKeyword*

Null-terminated character string identifying the VPD item to be written. The keyword must consist of two characters (the "VPDID" item cannot be written).

*pVpdItem*

String to be written to the EEPROM. The maximum size of a VPD item is 63 characters.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | VPD item has been written successfully |
| **DTAPI_E_EEPROM_FULL** | The serial EEPROM has not enough free space available for writing the new VPD item |
| **DTAPI_E_EEPROM_READ** | A read operation from the serial EEPROM did not succeed |
| **DTAPI_E_EEPROM_WRITE** | The write operation to the serial EEPROM did not succeed for another reason |
| **DTAPI_E_KEYWORD** | The keyword does not consist of two characters |
| **DTAPI_E_NOT_ATTACHED** | Device object is not attached to device hardware |
| **DTAPI_E_READ_ONLY** | An attempt was made to overwrite a read-only VPD item |
| **DTAPI_E_TOO_LONG** | The length of the VPD item is too long (>63 characters) |

## Remarks

If a VPD item with the specified keyword already exists, that item is overwritten, unless it is a read-only item. In the latter case, **DTAPI_E_READ_ONLY** is returned.

For system-specific use, the VPD specification in the *PCI Local Bus Specification Rev 2.2* recommends keywords of the form "Yx", with the second character one of '0' … '9', 'B' … 'Z'. Keyword "YA" is defined as the *system-asset identifier* provided by the system owner. Keywords of the form "Vx" are reserved for use by DekTec.

The size of the VPD read/write segment is 256 bytes. Write operations to the serial EEPROM are relatively slow.

# DtCmmbPars

Class describing parameters for CMMB modulation.

```
class DtCmmbPars {
  int   m_Bandwidth;          // CMMB channel bandwidth
  int   m_TsRate;             // CMMB TS rate in bps
  int   m_TsPid;              // PID of the CMMB stream.
  int   m_AreaId;             // Area ID
  int   m_TxId;               // Transmitter ID
};
```

## Public members

*m_Bandwidth*
The bandwidth of the channel.

| Value | Meaning |
|---|---|
| **DTAPI_CMMB_BW_2MHZ** | 2 MHz |
| **DTAPI_CMMB_BW_8MHZ** | 8 MHz |

*m_TsRate*
The rate in bits per second of the input Transport Stream.

*m_TsPid*
The PID of the CMMB stream in the Transport Stream.

*m_AreaId*
The area ID. The valid range is 0 … 127.

*m_TxId*
The transmitter ID. The valid range is 0 … 127.

## Remarks

If the CMMB modulation is selected, the data written to the Transmit FIFO shall be in the format of CMMB PMS data packets.

# DtCmmbPars::RetrieveTsRateFromTs

Retrieve the TS rate from a 188-byte Transport Stream with CMMB PMS data packets and store the results in the **DtCmmbPars** object calling this function.

```
DTAPI_RESULT DtCmmbPars::RetrieveTsRateFromTs (
 [in] char*  pBuffer,           // Buffer with Transport Stream
 [in] int  NumBytes,            // Number of bytes in buffer
);
```

## Parameters

*pBuffer*

Buffer containing CMMB PMS data packets from which to retrieve the TS rate.

*NumBytes*

Number of Transport-Stream bytes in the buffer (at least 3MB).

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | TS rate has be retrieved successfully |
| **DTAPI_E_INSUF_LOAD** | The buffer contains insufficient data to determine the TS rate. |
| **DTAPI_E_INVALID_TSTYPE** | The buffer does not contain a Transport Stream consisting of CMMB PMS data packets. |

## Remarks

# DtDvbT2Pars

Class describing parameters for DVB-T2 modulation.

```
class DtDvbT2Pars {
  int   m_Bandwidth;          // DVB-T2 channel bandwidth
  int   m_FftMode;            // FFT mode (or size)
  int   m_Miso;               // MISO mode
  int   m_GuardInterval;      // Guard interval
  int   m_Papr;               // PAPR reduction mode
  int   m_BwtExt;             // Bandwidth extension
  int   m_PilotPatern;        // Pilot pattern
  int   m_NumT2Frames;        // Number of T2 frames in a super frame
  int   m_NumDataSyms;        // Number of data OFDM symbols per T2 frame
  int   m_L1Modulation;       // L1 modulation type
  bool  m_FefEnable;          // Insert FEF (yes/no)
  int   m_FefType;            // FEF type
  int   m_FefLength;          // FEF length
  int   m_FefS1;              // FEF S1 field value
  int   m_FefS2;              // FEF S2 field value
  int   m_FefInterval;        // FEF interval
  int   m_FefSignal;          // Type of signal during FEF period
  int   m_CellId;             // Cell ID
  int   m_NetworkId;          // Network ID
  int   m_T2SystemId;         // T2 system ID
  int   m_Frequency;          // L1-post frequency field value
  int   m_NumPlps;            // Number of PLPs
  DtDvbT2PlpPars m_Plps[DTAPI_DVBT2_NUM_PLP_MAX];
                              // Array of PLP parameters
};
```

## Public members

*m_Bandwidth*

The bandwidth of the channel.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_1_7MHZ** | 1.7 MHz |
| **DTAPI_DVBT2_5MHZ** | 5 MHz |
| **DTAPI_DVBT2_6MHZ** | 6 MHz |
| **DTAPI_DVBT2_7MHZ** | 7 MHz |
| **DTAPI_DVBT2_8MHZ** | 8 MHz |
| **DTAPI_DVBT2_10MHZ** | 10 MHz |

*m_FftMode*

The FFT size used for computing OFDM symbols.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_FFT_1K** | 1K FFT |
| **DTAPI_DVBT2_FFT_2K** | 2K FFT |
| **DTAPI_DVBT2_FFT_4K** | 4K FFT |
| **DTAPI_DVBT2_FFT_8K** | 8K FFT |
| **DTAPI_DVBT2_FFT_16K** | 16K FFT |
| **DTAPI_DVBT2_FFT_32K** | 32K FFT |

*m_Miso*

MISO mode. This mode can be used to simulate antenna 1 (TX1), antenna 2 (TX2) or the average of antenna 1 and antenna 2 (TX1+TX2) to simulate reception halfway between the antennas.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_MISO_OFF** | No MISO |
| **DTAPI_DVBT2_MISO_TX1** | TX1 only |
| **DTAPI_DVBT2_MISO_TX2** | TX2 only |
| **DTAPI_DVBT2_MISO_TX1TX2** | TX1+ TX2 |

*m_GuardInterval*

The guard interval between OFMD symbols.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_GI_1_128** | 1/128 |
| **DTAPI_DVBT2_GI_1_32** | 1/32 |
| **DTAPI_DVBT2_GI_1_16** | 1/16 |
| **DTAPI_DVBT2_GI_19_256** | 19/256 |
| **DTAPI_DVBT2_GI_1_8** | 1/8 |
| **DTAPI_DVBT2_GI_19_128** | 19/128 |
| **DTAPI_DVBT2_GI_1_4** | 1/4 |

*m_Papr*

The peak to average power reduction method.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_PAPR_NONE** | None |
| **DTAPI_DVBT2_PAPR_ACE** | ACE - Active Constellation Extension |
| **DTAPI_DVBT2_PAPR_TR** | TR - Power reduction with reserved carriers |
| **DTAPI_DVBT2_PAPR_ACE_TR** | ACE and TR |

*m_BwtExt*

Indicates whether the extended carrier mode is used.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_BWTEXT_OFF** | Normal carrier mode is used |
| **DTAPI_DVBT2_BWTEXT_ON** | Extended carrier mode is used |

*m_PilotPattern*

The Pilot pattern used.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_PP_1** | PP1 |
| **DTAPI_DVBT2_PP_2** | PP2 |
| **DTAPI_DVBT2_PP_3** | PP3 |
| **DTAPI_DVBT2_PP_4** | PP4 |
| **DTAPI_DVBT2_PP_5** | PP5 |
| **DTAPI_DVBT2_PP_6** | PP6 |
| **DTAPI_DVBT2_PP_7** | PP7 |
| **DTAPI_DVBT2_PP_8** | PP8 |

*m_NumT2Frames*

The number of T2 frames in a super frame. The valid range is 1 … 255.

*m_NumDataSyms*

The number of data OFDM symbols per T2 frame, excluding P1 and P2.

*m_L1Modulation*
The modulation type used for the L1-post signalling block.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_BPSK** | BPSK |
| **DTAPI_DVBT2_QPSK** | QPSK |
| **DTAPI_DVBT2_QAM16** | 16-QAM |
| **DTAPI_DVBT2_QAM64** | 64-QAM |

*m_FefEnable*
If true, FEFs (Future Extension Frames) are inserted.

*m_FefType*
Specifies the FEF type. The valid range is 0 ... 15.

*m_FefLength*
The length of a FEF-part in number of T-units (= samples). The valid range is 0 … 0x3FFFFF.

*m_FefS1*
The S1-field value in the P1 signalling data. Valid values: 2, 3, 4, 5, 6 and 7.

*m_FefS2*
The S2-field value in the P1 signalling data. Valid values: 1, 3, 5, 7, 9, 11, 13 and 15.

*m_FefInterval*
The number of T2 frames between two FEF parts. The valid range is 1 … 255 and *m_NumT2Frames* shall be divisible by *m_FefInterval*.

*m_FefSignal*
The type of signal generated during the FEF period.

| Value | Meaning |
|---|---|
| **DTAPI_DVBT2_FEF_ZERO** | Zero I/Q samples |
| **DTAPI_DVBT2_FEF_1K_OFDM** | 1K OFDM symbols with 852 active carriers containing BPSK symbols |

*m_CellId*
Cell ID. Unique identification of a geographic cell in a DVB-T2 network. The valid range is 0 … 0xFFFF.

*m_NetworkId*
Network ID. Unique identification of the DVB-T2 network. The valid range is 0 … 0xFFFF.

*m_Frequency*
Frequency of the RF channel. This is only used to fill the L1-post frequency field. The valid range is 0 … 0xFFFFFFFF.

*m_NumPlps*
Specifies the number of physical layer pipes in the T2-System. The valid range is 1 … **DTAPI_DVBT2_NUM_PLP_MAX**.

*m_Plps*
Array that specifies the DVB-T2 modulation parameters for the physical layer pipes.

## Remarks

The modulation parameters of multiple PLPs can be specified; However the **`DtOutpChannel::Write`** method only writes the data related to PLP0 to the output channel. **`Therefore, the DVB-T2 modulation can be used for single-PLP mode only.`**

# DtDvbT2Pars::CheckValidity

Check DVB-T2 parameters for validity.

```
DTAPI_RESULT DtDvbT2Pars::CheckValidity (
      void
);
```

## Parameters

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| DTAPI_OK | Parameters are valid |
| DTAPI_E_FEF | Error in FEF parameters |
| DTAPI_E_FRAME_INTERVAL | Frame interval must divide number of T2 frames |
| DTAPI_E_INVALID_BWT_EXT | Invalid bandwidth extension |
| DTAPI_E_INVALID_FFTMODE | Invalid FFT mode |
| DTAPI_E_INVALID_GUARD | Invalid guard interval |
| DTAPI_E_INVALID_NUMDTSYM | Invalid number of data symbols |
| DTAPI_E_INVALID_NUMT2FRM | Invalid number of T2 frames |
| DTAPI_E_INVALID_PARS | Invalid parameter value (generic error) |
| DTAPI_E_INVALID_TIME_IL | Invalid time interleaver length |
| DTAPI_E_NUM_PLP | Too many PLPs (i.e. L1 data too large) |
| DTAPI_E_PILOT_PATTERN | Pilot pattern not allowed in combination with other parameters |
| DTAPI_E_PLP_NUM_BLOCKS | Invalid number of PLP blocks (not enough bandwidth) |
| DTAPI_E_SUBSLICES | Number of subslices and/or TIME_IL_LENGTH does not give an integer number of cells per subslice |
| DTAPI_E_TI_MEM_OVF | Too many cells in time interleaver |

# DtDvbT2Pars::GetParamInfo

Get the DVB-T2 "derived" parameters.

```
DTAPI_RESULT DtDvbT2Pars::GetParamInfo (
 [out] DtDvbT2ParamInfo&  ParamInfo    // DVB-T2 derived information
);
```

## Parameters

*ParamInfo*

Output parameter that receives the DVB-T2 "derived" parameters.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Derived parameters have been determined successfully |
| **DTAPI_E_FEF** | Error in FEF parameters |
| **DTAPI_E_FRAME_INTERVAL** | Frame interval must divide number of T2 frames |
| **DTAPI_E_INVALID_BWT_EXT** | Invalid bandwidth extension |
| **DTAPI_E_INVALID_FFTMODE** | Invalid FFT mode |
| **DTAPI_E_INVALID_GUARD** | Invalid guard interval |
| **DTAPI_E_INVALID_NUMDTSYM** | Invalid number of data symbols |
| **DTAPI_E_INVALID_NUMT2FRM** | Invalid number of T2 frames |
| **DTAPI_E_INVALID_PARS** | Invalid parameter value (generic error) |
| **DTAPI_E_INVALID_TIME_IL** | Invalid time interleaver length |
| **DTAPI_E_NUM_PLP** | Too many PLPs (i.e. L1 data too large) |
| **DTAPI_E_PILOT_PATTERN** | Pilot pattern not allowed in combination with other parameters |
| **DTAPI_E_PLP_NUM_BLOCKS** | Invalid number of PLP blocks (not enough bandwidth) |
| **DTAPI_E_SUBSLICES** | Number of subslices and/or TIME_IL_LENGTH does not give an integer number of cells per subslice |
| **DTAPI_E_TI_MEM_OVF** | Too many cells in time interleaver |

# DtDvbT2Pars::OptimisePlpNumBlocks

Compute the optimum value of DVB-T2 parameters to maximise the DVB-T2 channel's bitrate and compute the achieved efficiency.

```
// Overload #1 - Get optimum value for PLP_NUM_BLOCKS
DTAPI_RESULT DtDvbT2Pars::GetParamInfo (
 [out] DtDvbT2ParamInfo&  ParamInfo    // DVB-T2 efficiency information
 [out] Int&   OptPlpNumBlocks          // Optimum number of blocks
);
// Overload #2 - Get optimum value for PLP_NUM_BLOCKS and NUM_DATA_SYMBOLS
DTAPI_RESULT DtDvbT2Pars::GetParamInfo (
 [out] DtDvbT2ParamInfo&  ParamInfo    // DVB-T2 efficiency information
 [out] Int&   OptPlpNumBlocks          // Optimum number of blocks
 [out] Int&   OptNumDataSyms           // Optimum number data symbols
);
```

## Parameters

*ParamInfo*

Output parameter that receives the DVB-T2 "derived" parameters based on the optimum parameter values.

*OptPlpNumBlocks*

Output parameter that is set to the optimum value for the number of FEC blocks per IL frame for PLP0 to maximise the DVB-T2 channel's bitrate.

*OptNumDataSyms*

Output parameter that is set to the optimum value value for the number of data OFDM symbols per T2 frame to maximise the DVB-T2 channel's bitrate.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Optimised parameters have been computed successfully |
| **DTAPI_E_FEF** | Error in FEF parameters |
| **DTAPI_E_FRAME_INTERVAL** | Frame interval must divide number of T2 frames |
| **DTAPI_E_INVALID_BWT_EXT** | Invalid bandwidth extension |
| **DTAPI_E_INVALID_FFTMODE** | Invalid FFT mode |
| **DTAPI_E_INVALID_GUARD** | Invalid guard interval |
| **DTAPI_E_INVALID_NUMDTSYM** | Invalid number of data symbols |
| **DTAPI_E_INVALID_NUMT2FRM** | Invalid number of T2 frames |
| **DTAPI_E_INVALID_PARS** | Invalid parameter value (generic error) |
| **DTAPI_E_INVALID_TIME_IL** | Invalid time interleaver length |
| **DTAPI_E_NUM_PLP** | Too many PLPs (i.e. L1 data too large) |
| **DTAPI_E_PILOT_PATTERN** | Pilot pattern not allowed in combination with other parameters |
| **DTAPI_E_PLP_NUM_BLOCKS** | Invalid number of PLP blocks (not enough bandwidth) |
| **DTAPI_E_SUBSLICES** | Number of subslices and/or TIME_IL_LENGTH does not give an integer number of cells per subslice |
| **DTAPI_E_TI_MEM_OVF** | Too many cells in time interleaver |

### Remarks

**These methods can only be used in case of a single PLP (member variable** *m_NumPlps* **equals 1).**

# DtInpChannel

Class representing an input channel for receiving the following formats:
- MPEG-2 Transport Stream over ASI, SPI or IP
- Serial Digital Interface (SDI)

```
class DtInpChannel;
```

## Derived Classes

*SdiInpChannel*

Class representing an input channel for receiving SDI.
MPEG-2 TS-specific methods applied to this class will fail.

*TsInpChannel*

Class representing an input channel for receiving an MPEG-2 Transport Stream.
SDI-specific methods applied to this class will fail.

# DtInpChannel::Attach (obsolete)

This function is still supported for backward compatibility reasons. For new code, please use **DtInpChannel::AttachToPort**.

Attach the input-channel object to a hardware function hosted by a device.

```
DTAPI_RESULT DtInpChannel::Attach (
  [in] DtDevice*  pDtDvc,          // Device object
  [in] int  InpIndex=0,            // Relative index
  [in] bool  ProbeOnly=false       // Just check whether channel is in use
);
```

## Parameters

*pDtDvc*

Pointer to the device object that represents a DekTec device. The device object must have been attached to the device hardware using method **DtDevice::AttachToSerial**, **DtDevice::AttachToSlot** or **DtDevice::AttachToType**.

*InpIndex*

If the device hosts multiple hardware input functions, this index specifies to which hardware function, and therefore to which physical input, the channel object is to be attached. The first hardware input function has an input-index value of 0, the next function 1, and so on.

*ProbeOnly*

Probe whether the channel is in use, but do not actually attach.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Channel object has been attached successfully to the hardware function |
| **DTAPI_OK_FAILSAFE** | Channel object has been attached successfully to the hardware function. However the buddy output port has been configured in failsafe mode, this means that if the failsafe watchdog timer is not reset in time, by the application using the output, we might loose the input signal when the onboard relais switches to failsafe mode.<br><br>NOTE: this is not an error code; this result value is intended to make the user aware of failsafe mode |
| **DTAPI_E_ATTACHED** | Channel object is already attached to a hardware function |
| **DTAPI_E_DEVICE** | Pointer *pDtDvc* is not valid or the device object is not attached to a hardware device |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_IN_USE** | Another channel object is already attached to the hardware function |
| **DTAPI_E_NO_DT_INPUT** | No inputs on this device |
| **DTAPI_E_NO_SUCH_INPUT** | *InpIndex* refers to a non-existing hardware function |
| **DTAPI_E_OUT_OF_MEM** | TS-over-IP: Receive FIFO cannot be allocated |

### Remarks

On the DTA-160, this method cannot be used to attach to the TS-over-IP Ethernet port. Please use **DtInpChannel::AttachToPort** instead.

Next to establishing the link between input-channel object and hardware function, **Attach** also performs the following initialisation actions:

- The contents of the Receive FIFO are cleared
- Receive-control state is reset to **DTAPI_RXCTRL_IDLE**
- Loop-back mode is reset to **DTAPI_NOLOOPBACK**
- All *latched* status flags are cleared (refer to **ClearFlags**)

# DtInpChannel::AttachToPort

Attach the input-channel object to a specific physical port.

```
DTAPI_RESULT DtInpChannel::AttachToPort (
  [in] DtDevice*  pDtDvc,          // Device object
  [in] int  Port,                  // Port number
  [in] bool  ProbeOnly=false       // Just check whether channel is in use
);
```

## Parameters

*pDtDvc*

Pointer to the device object that represents a DekTec device. The device object must have been attached to the device hardware.

*Port*

Physical port number. The channel object is attached to this port. The port number of the top-most port is 1, except on the DTA-160, on which the top-most Ethernet port is port #4. Please refer to Section 4 for an overview of port numbers.

*ProbeOnly*

Probe whether the channel is in use, but do not actually attach.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Channel object has been attached successfully to the port |
| **DTAPI_OK_FAILSAFE** | Channel object has been attached successfully to the hardware function. However the buddy output port has been configured in failsafe mode, this means that if the failsafe watchdog timer is not reset in time, by the application using the output, we might loose the input signal when the onboard relais switches to failsafe mode.<br><br>NOTE: this is not an error code; this result value is intended to make the user aware of failsafe mode |
| **DTAPI_E_ATTACHED** | Channel object is already attached |
| **DTAPI_E_DEVICE** | Pointer *pDtDvc* is not valid or the device object is not attached to a hardware device |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_IN_USE** | Another channel object is already attached to this port |
| **DTAPI_E_NO_DT_INPUT** | *Port* is not an input |
| **DTAPI_E_NO_SUCH_PORT** | *Port* refers to a non-existing port number |
| **DTAPI_E_OUT_OF_MEM** | TS-over-IP: Receive FIFO cannot be allocated |

### Remarks

**AttachToPort** performs the same initialisation actions as **DtInpChannel::Attach**.

# DtInpChannel::ClearFifo

Clear contents of the Receive FIFO and set receive-control state to **DTAPI_RXCTRL_IDLE**. Clear the receive-FIFO-overflow flag (**DTAPI_RX_FIFO_OVF**).

```
DTAPI_RESULT DtInpChannel::ClearFifo (
  [in] int  SubCh            // Optional parameter to select sub-channel
);
```

## Parameters

*SubCh*

This parameter specifies which sub-channel to clear. The default value is **DTAPI_SUBCH_MAIN**. Please refer to **DtInpChannel::ReadSubCh** for list of possible sub-channel values.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Receive FIFO has been cleared |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_SUBCH** | Invalid sub-channel specified |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The effects of **ClearFifo** are equivalent to **Reset(DTAPI_FIFO_RESET)**.

Calling **ClearFifo()** will clear the receive-FIFO-overflow flag (**DTAPI_FIFO_OVF**) and set the receive-control state to **DTAPI_RXCTRL_IDLE**.

The effects of **ClearFifo(DTAPI_SUBCH_ADC)** on the ADC Subchannel are equivalent to **Reset(DTAPI_ADC_FIFO_RESET)**.

Calling **ClearFifo(DTAPI_SUBCH_ADC)** will clear the receive-FIFO-overflow flag for the ADC Fifo (**DTAPI_ADC_FIFO_OVF**) and set the receive-control state for the ADC Fifo to **DTAPI_RXCTRL_IDLE**.

# DtInpChannel::ClearFlags

Clear *latched* status flag(s).

```
DTAPI_RESULT DtInpChannel::ClearFlags (
  [in] int  Latched          // Latched status flags to be cleared
);
```

## Parameters

*Latched*

Latched status flag(s) to be cleared. Multiple flags can be cleared with one method call by OR-ing the bit positions to be cleared. The following flags are latched and can be cleared:

| Value | Meaning |
|---|---|
| **DTAPI_RX_FIFO_OVF** | See **GetFlags** |
| **DTAPI_RX_SYNC_ERR** | ,, ,, |
| **DTAPI_RX_RATE_OVF** | ,, ,, |
| **DTAPI_RX_TARGET_ERR** | ,, ,, |
| **DTAPI_ADC_FIFO_OVF** | ,, ,, |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Flag(s) have been cleared successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

Some status flags that are queried with **GetFlags** are not latched and therefore cannot be cleared.

The latched status flags are automatically reset after the DTAPI-calls: **DtDevice::AttachToSerial**, **DtDevice::AttachToSlot**, **DtDevice::AttachToType** and after **Reset**.

# DtInpChannel::Detach

Detach input-channel object from hardware function and free associated resources.

```
DTAPI_RESULT DtInpChannel::Detach (
  [in] int  DetachMode       // How to detach
);
```

## Parameters

*DetachMode*

Specifies how the channel object is detached from the hardware function.
If *DetachMode* is 0, the object is detached without further action. Other modes are defined below.

| Value | Meaning |
|---|---|
| **DTAPI_INSTANT_DETACH** | Clear the contents of the Receive FIFO and set the receive-control state to **DTAPI_RXCTRL_IDLE** |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Channel object has been detached successfully from the hardware function |
| **DTAPI_E_INVALID_FLAGS** | An invalid detach flag was specified |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function, so it cannot be detached |

## Remarks

# DtInpChannel::GetConstellationPoints

Get a set of constellation points for receiver devices with RF-measurement capabilities, like the DTU-234, DTU-235, DTA-2135 and DTA-2137.

```
DTAPI_RESULT DtInpChannel::GetConstellationPoints (
  [in] int  NumPoints,            // Number of points to get
 [out] DtConstelPoint*  pPoints   // Array with constellation points
);
```

## Parameters

*NumPoints*

Specifies the number of constellation points to be read. The caller-supplied *pPoints* array must be able to accommodate at least *NumPoints* entries. A typical number of constellation points to read are 32.

*pPoints*

Pointer to a caller-supplied array of **DtConstelPoint** entries to receive the constellation points. The table below indicates the valid ranges for the constellation point x- and y-axis per device.

| Device | Valid Range for X, Y | # Bits used |
|---|---|---|
| DTU-234 | 0 ... 255 | 8 |
| DTU-235 | 0 ... 1023 | 10 |
| DTA-2135 | 0 ... 1023 | 10 |
| DTA-2137 | 0 ... 255 | 8 |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | A valid set of constellation points has been returned |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_INVALID_BUF** | The *pPoints* pointer is invalid |

## Remarks

# DtInpChannel::Equalise

*Obsolete*.
Turn DVB-ASI cable equalizer on or off (DTA-120 Rev 1 only).

```
DTAPI_RESULT DtInpChannel::Equalise (
  [in] int  EqualiserSetting      // Equaliser on/off
);
```

## Parameters

*EqualiserSetting*

This parameter specifies the equalization setting, according to the following table.

| Value | Meaning |
|---|---|
| **DTAPI_EQUALISER_OFF** | No equalization; for short cable lengths (<10m) |
| **DTAPI_EQUALISER_ON** | Provide 100m of coaxial cable equalisation |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Equaliser setting has been successfully applied |
| **DTAPI_E_INVALID_MODE** | The specified equalisation setting is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The DTA-120 Rev 2, DTA-124, DTA-140 and DTU-225 contain auto-equalisation circuitry. For these devices, **Equalise** returns **DTAPI_E_INVALID_MODE**.

# DtInpChannel::GetDemodControl

Get modulation-control parameters for Transport-Stream input channels with a built-in demodulator.

```
DTAPI_RESULT DtInpChannel::GetDemodControl (
 [out] int&  ModType,        // Modulation type
 [out] int&  ParXtra0,       // Extra parameter #0
 [out] int&  ParXtra1,       // Extra parameter #1
 [out] int&  ParXtra2        // Extra parameter #2
);
```

## Parameters:

*ModType*

Output parameter that is set to the modulation type. See **SetDemodControl** for a list of applicable values.

*ParXtra0, ParXtra1, ParXtra2*

Extra modulation parameters. See **SetDemodControl** for a list of applicable values.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The modulation parameters have been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not include a demodulator |

## Remarks

# DtInpChannel::GetDemodControl (DVB-S/DVB-S2)

Get modulation-control parameters for Transport-Stream input channels with a built-in DVB-S / DVB-S2 demodulator.

```
DTAPI_RESULT DtInpChannel::GetDemodControl (
 [out] int&  ModType,        // Modulation type
 [out] int&  ParXtra0,       // Extra parameter #0
 [out] int&  ParXtra1,       // Extra parameter #1
 [out] int&  ParXtra2        // Extra parameter #2
);
```

## Parameters:

*ModType*

Modulation type:

| ModType | Meaning | Available on |
|---|---|---|
| **DTAPI_MOD_DVBS_QPSK** | DVB-S, QPSK | DTA-2137 |
| **DTAPI_MOD_DVBS2_QPSK** | DVB-S.2, QPSK | DTA-2137 |
| **DTAPI_MOD_DVBS2_8PSK** | DVB-S.2, 8-PSK | DTA-2137 |
| **DTAPI_MOD_DVBS2_16APSK** | DVB-S.2, 16-APSK | DTA-2137 (see remark) |
| **DTAPI_MOD_DVBS2_32APSK** | DVB-S.2, 32-APSK | DTA-2137 (see remark) |

*ParXtra0*

DVB-S code rate:

| ParXtra0 | Meaning |
|---|---|
| **DTAPI_MOD_1_2** | Code rate 1/2 |
| **DTAPI_MOD_2_3** | Code rate 2/3 |
| **DTAPI_MOD_3_4** | Code rate 3/4 |
| **DTAPI_MOD_4_5** | Code rate 4/5 |
| **DTAPI_MOD_5_6** | Code rate 5/6 |
| **DTAPI_MOD_6_7** | Code rate 6/7 |
| **DTAPI_MOD_7_8** | Code rate 7/8 |

DVB-S2 code rate:

| ParXtra0 | Meaning |
|---|---|
| DTAPI_MOD_1_2 | Code rate 1/2 |
| DTAPI_MOD_1_3 | Code rate 1/3 |
| DTAPI_MOD_1_4 | Code rate 1/4 |
| DTAPI_MOD_2_3 | Code rate 2/3 |
| DTAPI_MOD_2_5 | Code rate 2/5 |
| DTAPI_MOD_3_4 | Code rate 3/4 |
| DTAPI_MOD_3_5 | Code rate 3/5 |
| DTAPI_MOD_4_5 | Code rate 4/5 |
| DTAPI_MOD_5_6 | Code rate 5/6 |
| DTAPI_MOD_6_7 | Code rate 6/7 |
| DTAPI_MOD_7_8 | Code rate 7/8 |
| DTAPI_MOD_8_9 | Code rate 8/9 |
| DTAPI_MOD_9_10 | Code rate 9/10 |

*ParXtra1*

DVB-S2 flags indicating pilots detected, long/short FEC frame and spectrum inversion

Pilots

| Value | Meaning |
|---|---|
| DTAPI_MOD_S2_NOPILOTS | Pilots disabled |
| DTAPI_MOD_S2_PILOTS | Pilots enabled |
| DTAPI_MOD_S2_PILOTS_MSK | AND-mask for this field |

Long or Short FECFRAME

| Value | Meaning |
|---|---|
| DTAPI_MOD_S2_SHORTFRM | Short FECFRAME (16.200 bits). See remark below |
| DTAPI_MOD_S2_LONGFRM | Long FECFRAME (64.800 bits) |
| DTAPI_MOD_S2_FRM_MSK | AND-mask for this field |

Spectrum inversion

| Value | Meaning |
|---|---|
| DTAPI_MOD_SPECINV | Spectrum inversion detected |
| DTAPI_MOD_SPECNONINV | No spectrum inversion detected |
| DTAPI_MOD_SPECINV_MSK | AND-mask for this field |

*ParXtra2*
Symbol rate

**Result**

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The modulation parameters have been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not include a demodulator |

**Remarks**

16-APSK and 32-APSK is only avaible when the DTA-2137 is configured in APSK mode.

Short FECFRAME (16.200 bits) is only availabe when the DTA-2137 is configured in APSK mode (a.k.a. single input mode)

# DtInpChannel::GetDemodStatus

Gets the demodulator Receiver- and FEC lock status, and Modulation Error Rate (MER).

```
DTAPI_RESULT DtInpChannel::GetDemodStatus (
 [out] int&  FLock,          // FEC lock
 [out] int&  RLock,          // Receiver lock
 [out] int&  MER             // Estimated MER in units of 0.1dB
);
```

## Parameters

*FLock*

FEC lock status.

| Value | Meaning |
|---|---|
| **DTAPI_DEMOD_FECLOCK_FAIL** | The demodulator failed to obtain FEC lock |
| **DTAPI_DEMOD_FECLOCK_OK** | The receiver obtained FEC lock |

*RLock*

Receiver lock status.

| Value | Meaning |
|---|---|
| **DTAPI_DEMOD_RCVLOCK_FAIL** | The demodulator failed to obtain receiver lock |
| **DTAPI_DEMOD_RCVLOCK_OK** | The demodulator obtained receiver lock |

*MER*

Estimated modulation error ratio (MER) in units of 0.1dB (i.e. 301 → 301×0.1 = 30.1dB).

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The modulation parameters have been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not include a demodulator |

## Remarks

For the DTA-2137 the MER is not (yet) supported and will return -1.

# DtInpChannel::GetFecErrorCounters

Get FEC related error counters receiver devices with RF-measurement capabilities, like the DTU-234.

```
DTAPI_RESULT DtInpChannel::GetFecErrorCounters (
 [out] int&  NumUncorrectedErrors,    // Number of uncorrected errors
 [out] int&  NumCorrectedErrors,      // Number of corrected errors
 [out] int&  NumBurstErrors,          // Number of burst errors
);
```

## Parameters

*NumUncorrectedErrors*
Number of uncorrected errors (in bits) after FEC.

*NumCorrectedErrors*
Number of errors corrected (in bits) using FEC.

*NumBurstErrors*
Number of burst errors detected.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Error counter have been retrieved successfully |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The input channel does not support the FEC error counters |

## Remarks

The error counters will be cleared after each call to this method i.e. the values returned by this method indicate the number of errors since the method was last called.

# DtInpChannel::GetFifoLoad

Get the current load of the input-channel's Receive FIFO.

```
DTAPI_RESULT DtInpChannel::GetFifoLoad (
 [out]int& FifoLoad          // Load of Receive FIFO
 [in] int  SubCh             // Optional parameter to select sub-channel
);
```

## Parameters

*FifoLoad*

Number of bytes in the Receive FIFO.

*SubCh (optional)*

This parameter specifies for which sub-channel to get the load. The default value is **DTAPI_SUBCH_MAIN**. Please refer to **DtInpChannel::ReadSubCh** for list of possible sub-channel values.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | FIFO load has been retrieved successfully |
| **DTAPI_E_INVALID_SUBCH** | Invalid sub-channel specified |
| **DTAPI_E_not_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The value retrieved with this method call approximates the load of the Receive FIFO. Some additional data bytes may be buffered on the device.

If a transfer is in progress and/or the device receives data, then every call to **GetFifoLoad** may return a different value.

# DtInpChannel::GetFlags

Get status flags for the input channel.

```
DTAPI_RESULT DtInpChannel::GetFlags (
 [out] int&  Flags,          // Status flags
 [out] int&  Latched         // Latched status flags
);
```

## Parameters

*Flags*

Output parameter that is set to the current values of the input-channel status flags. Each status flag is represented by one bit. Multiple status flags can be true simultaneously. If none of the status flags is true, *Status* is set to zero.

| Value | Meaning |
|---|---|
| **DTAPI_RX_FIFO_OVF** | A Receive-FIFO overflow condition has occurred. The data in the Receive FIFO could not be transferred fast enough to a system buffer. |
| **DTAPI_ADC_FIFO_OVF** | An ADC FIFO overflow condition has occurred. The data in the ADC FIFO could not be transferred fast enough to a system buffer |
| **DTAPI_RX_SYNC_ERR** | A synchronisation error has occurred in the packet-synchronisation logic of the input channel.<br>**Note**: A synchronisation error cannot occur in packet mode **DTAPI_RXMODE_RAW**. |
| **DTAPI_RX_RATE_OVF** | Data is entering the system faster than the input channel can process the data (applies to DTA-122 only).<br>When the input rate on the DTA-122 remains below 150 Mbit/s, this error cannot occur. |
| **DTAPI_RX_TARGET_ERR** | The target adapter signals a fault (DTA-122 only) |
| **DTAPI_RX_LINK_ERR** | The communication link with the device is broken (DTE-31xx devices only) |
| **DTAPI_RX_DATA_ERR** | Data is lost during transfer to a system buffer (DTE-31xx devices only) |

*Latched*

Output parameter that is set to the latched values of the status flags: On a '0' to '1' transition of a status flag, the corresponding bit in *Latched* is set to '1'. The bit remains set until cleared explicitly by one of the following DTAPI-calls: **ClearFlags**, **DtDevice::AttachToSerial**, **DtDevice::AttachToSlot**, **DtDevice::AttachToType** or **Reset**.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Status flags have been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

# DtInpChannel::GetMaxFifoSize

Get the maximum size of the Receive FIFO on the device.

```
DTAPI_RESULT DtInpChannel::GetMaxFifoSize (
 [out]int&  MaxFifoSize     // Maximum size of FIFO in bytes
 [in] int   SubCh           // Optional parameter to select sub-channel
);
```

## Parameters

*MaxFifoSize*

Maximum size of the receive FIFO in number of bytes.

*SubCh*

This parameter specifies for which sub-channel to get the maximum size. The default value is **DTAPI_SUBCH_MAIN**. Please refer to **DtInpChannel::ReadSubCh** for list of possible sub-channel values.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Maximum size of FIFO has been read successfully |
| **DTAPI_E_INVALID_SUBCH** | Invalid sub-channel specified |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The DTA-120, DTA-122, DTA-124, DTA-140, DTU-225 and DTU-234 support a maximum Receive-FIFO size of 8.388.608 bytes. Later revisions of these devices support at least this size, but potentially the maximum FIFO size may become larger.

At the present the FIFO size for an input channel cannot be modified. However future DekTec devices might support the setting the maximum Receive-FIFO size.

# DtInpChannel::GetReceiveByteCount

This function is not available yet in the current version of the DTAPI.

Get a sample from the free running 32-bit received-number-of-bytes counter.

```
DTAPI_RESULT DtInpChannel::GetReceiveByteCount (
 [out] int&  ByteCount       // Sample of #received-bytes counter
);
```

## Parameters

*ByteCount*

Sample of the 32-bit received number of bytes counter. For SDI 10-bit words are counted.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | A valid sample of the counter was returned |
| **DTAPI_E_NOT_SUPPORTED** | The received number of bytes counter is not supported by the current input channel |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

This method is supported on the following devices:

| Device Type Number | Firmware Version |
|---|---|
| DTA-120 | V4 or higher |
| DTA-122 | V4 or higher |
| DTA-124 | V0 or higher |
| DTA-140 | V0 or higher |
| DTU-225 | V2 or higher |

# DtInpChannel::GetRfLevel

Get the current RF signal level for the specified bandwidth.

```
DTAPI_RESULT DtInpChannel::GetRfLevel (
 [out] int&  LeveldBmV,      // Signal level in units of 0.1 dBmV
  [in] int   Bandwidth,      // Measurement bandwidth
);
```

## Parameters

*LeveldBmV*

The input signal level expressed in 0.1dBmV units (e.g. 95 → 95×0.1 = 9.5dBmV).

*Bandwidth*

The bandwidth over which the level should be measured.

| Value | Meaning |
|---|---|
| **DTAPI_RFLVL_CHANNEL** | Measure the signal level across the complete channel bandwidth |
| **DTAPI_RFLVL_NARROWBAND** | Measure the signal level across a narrow bandwidth (see also remarks section) |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The RF level has been retrieved successfully |
| **DTAPI_E_NOT_SUPPORTED** | The channel does not support measuring of the signal level |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The bandwidth used for the narrow-band level measurement depends on the RF receiver device used. The table below lists the used bandwidth per device type.

| Device | Narrow Bandwidth |
|---|---|
| DTU-234 | 280kHz[5] |
| DTU-235 | 280kHz[5] |
| DTA-2135 | Not Applicable |
| DTA-2137 | Not Applicable |

[5] The narrow-band level measurement will be taken 2.695MHz lower than the centre frequency of the current channel. In case of the DTU-234 this allows for the measurement of the ATSC (VSB) pilot level.

# DtInpChannel::GetRxControl

Get the current value of the channel's receive-control state.

```
DTAPI_RESULT DtInpChannel::GetRxControl (
 [out] int&  RxControl       // Receive-control state
);
```

## Parameters

*RxControl*

This parameter is set to the current value of the receive-control state: **DTAPI_RXCTRL_IDLE** or **DTAPI_RXCTRL_RCV**.
Refer to **SetRxControl** for a description of these states.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Receive-control state has been successfully retrieved |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

Transport Streams

In receive modes **DTAPI_RXMODE_ST188**, **DTAPI_RXMODE_STMP2** and **DTAPI_RXMODE_ST204**, receive-control state is synchronised to packet boundaries. For example, if **SetRxControl** is used to change the control state from **DTAPI_RXCTRL_RCV** to **DTAPI_RXCTRL_IDLE**, and **GetRxControl** is called immediately thereafter, then **DTAPI_RXCTRL_RCV** may be returned. Only when a new packet enters the Receive FIFO, the value returned by **GetRxControl** becomes **DTAPI_RXCTRL_IDLE**.

## SDI

Receive-control state is synchronised to the vertical sync.

In receive mode **DTAPI_RXMODE_STRAW**, method **GetRxControl** always returns the receive-control state set by **SetRxControl**.

# DtInpChannel::GetStatistics

Get statistics information from the input channel.

```
DTAPI_RESULT DtInpChannel::GetStatistics (
 [out] int&  ViolCount       // Code-violation counter (ASI inputs only)
);
DTAPI_RESULT DtInpChannel::GetStatistics (
 [in]  int  Type,
 [out] int& Statistic,
 [in]  bool UseCache=false
);
DTAPI_RESULT DtInpChannel::GetStatistics (
 [in]  int  Type,
 [out] double& Statistic,
 [in]  bool UseCache=false
);
```

## Parameters

*ViolCount*

Total number of DVB-ASI code violations since power-up of a DVB-ASI input channel (DTA-120, DTA-124, DTA-140, DTU-225). A code violation is a bit error that leads to an illegal 8B/10B code (the line code used by DVB-ASI). Bit errors may be caused by poor cable quality, or by an input cable that is too long.

The value of this counter is updated about 20 times per second. The counter is only incremented and never reset. When the largest positive int value ($2^{31-1}$) has been reached, the counter wraps around to the largest negative int value ($-2^{31}$).

Note: Connecting or disconnecting the cable to/from a DVB-ASI input channel may cause a massive amount of code violations. This is “normal” behaviour, caused by the locking process of the DVB-ASI input circuitry.

*Type*

Specifies the type of statistic to get:

| Statistic Type | Return Type | Description | Supported |
|---|---|---|---|
| **DTAPI_STAT_ASI_VIOLCNT** | int | Total number of DVB-ASI code violations since power-up of the DVB-ASI input channel | All cards with an ASI input |
| **DTAPI_STAT_BADPCKCNT** | int | Count of uncorrected packets since last call.<br>NOTE: returns 0 if receiver not locked. | DTU-235, DTA-2135 |
| **DTAPI_STAT_BER_PREVIT** | double | Pre-Viterbi Bit error rate. | DTU-235, DTA-2135, DTA-2137 |
| **DTAPI_STAT_BER_POSTVIT**<br>**DTAPI_STAT_BER_PRERS** | double | PostViterbi bit error rate. | DTU-235, DTA-2135 DTA-2137 |
| **DTAPI_STAT_SNR** | Int | Signal-to-Noise ratio of random carrier in dB in units of 0.1dB. | DTU-235, DTA-2135, DTA-2137 |
| | double | Signal-to-Noise ratio of random carrier in dB. | |
| **DTAPI_STAT_MER** | int | Estimated MER in units of 0.1dB | DTU-235, DTA-2135 |
| | double | Estimated MER in units of dB | |

*Statistic*

The integer or double value of the requested statistic

*UseCache*

An optional flag to indicate the function may return cached values. Some statistics are delivered in groups by the board to the driver. Setting this flag to **true** may increase performance when consecutive statistics are requested. When the flag is omitted or set to **false**, the driver is forced to issue a separate request for the requested statistic. This will result in the most up-to-date version of the requested statistic, but this may slow down consecutive statistic requests.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Statistics information has been read successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORT** | Requested statistic is not supported by the hardware<br>*(this error is also returned when you requested an unsupported return type)* |

# DtInpChannel::GetStatus

Get status information from the input channel. If a device does not support a certain feature, the corresponding status variable is set to **DTAPI_NOT_SUPPORTED**.

```
DTAPI_RESULT DtInpChannel::GetStatus (
 [out] int&  PacketSize,     // Packet size
 [out] int&  NumInv,         // #Invalid bytes per packet (DTA-122)
 [out] int&  ClkDet,         // Clock- or carrier detected
 [out] int&  AsiLock,        // DVB-ASI PLL locked (ASI inputs)
                             // SDI genlocked (SDI genlock inputs)
 [out] int&  RateOk,         // Input rate above minimum
 [out] int&  AsiInv          // Input-invert status (ASI inputs)
);
```

## Parameters

*PacketSize*

MPEG mode: Size of incoming MPEG-2 transport packets.

| Value | Meaning |
|---|---|
| **DTAPI_PCKSIZE_188** | 188-byte packets at the Transport-Stream input |
| **DTAPI_PCKSIZE_204** | 204-byte packets at the Transport-Stream input |
| **DTAPI_PCKSIZE_INV** | No MPEG-2 compliant packets found at the Transport-Stream input |

SDI mode: SDI video standard of incoming stream

| Value | Meaning |
|---|---|
| **DTAPI_SDIMODE_525** | 525-line video mode input |
| **DTAPI_SDIMODE_625** | 625-line video mode input |
| **DTAPI_SDIMODE_INV** | No valid SDI signal detected on the input |

*NumInv*

Defined for DVB-SPI input channels (DTA-122) only: Number of “invalid” bytes (DVALID input signal is ‘0’) per packet.

| Value | Meaning |
|---|---|
| **DTAPI_NUMINV_NONE** | No invalid bytes |
| **DTAPI_NUMINV_16** | 16 invalid bytes per packet |
| **DTAPI_NUMINV_OTHER** | Other number of invalid bytes per packet |
| **DTAPI_NOT_SUPPORTED** | Device does not support this parameter (not DTA-122) |

*ClkDet*

For DVB-SPI input channels, this output parameter indicates whether a receive clock of sufficient frequency is detected at the SPI input;

For DVB-ASI and SDI input channels, this output parameter acts as a *Carrier Detect* signal.

| Value | Meaning |
|---|---|
| **DTAPI_CLKDET_OK** | DVB-SPI : Receive clock detected<br>DVB-ASI, SDI : Carrier detected<br>TS-over-IP : IP traffic detected in the last second |
| **DTAPI_CLKDET_FAIL** | DVB-SPI : No receive clock detected, or receive-clock rate is too low<br>DVB-ASI, SDI : No carrier detected<br>TS-over-IP : No IP traffic in the last second |

*AsiLock*

For DVB-ASI input channels, this output parameter indicates whether the DVB-ASI clock signal can be recovered reliably.

| Value | Meaning |
|---|---|
| **DTAPI_ASI_INLOCK** | PLL is locked to the incoming DVB-ASI input signal |
| **DTAPI_ASI_NOLOCK** | Clock signal cannot be recovered from the input signal |
| **DTAPI_NOT_SUPPORTED** | Hardware function does not support this parameter |

For ports configured as SDI Genlock input port, this output parameter indicates whether the genlock circuitry is locked to the provided SDI Genlock signal.

| Value | Meaning |
|---|---|
| **DTAPI_GENLOCK_INLOCK** | The SDI Genlock circuitry is locked to the incoming SDI input signal |
| **DTAPI_GENLOCK_NOLOCK** | The SDI Genlock circuitry is NOT locked to the incoming SDI input signal |
| **DTAPI_NOT_SUPPORTED** | Hardware function does not support this parameter |

*RateOk*

Defined for DVB-ASI input channels only: Output parameter that indicates whether the transport rate at the DVB-ASI input is sufficiently high for further processing. When this parameter is set to **DTAPI_INPRATE_LOW**, the most likely cause is an "empty" DVB-ASI signal (stuffing symbols only).

| Value | Meaning |
|---|---|
| **DTAPI_INPRATE_OK** | The DVB-ASI input rate is sufficient |
| **DTAPI_INPRATE_LOW** | The DVB-ASI input rate is too low (<900 bps) |
| **DTAPI_NOT_SUPPORTED** | Hardware function does not support this parameter |

*AsiInv*

Defined for DVB-ASI input channels only: This parameter indicates whether the input circuitry is currently inverting the DVB-ASI input signal. This is most useful when polarity control has been

set to **DTAPI_POLARITY_AUTO**; In the other polarity-control settings, *AsiInv* just echoes the value of parameter *PolarityControl* in the call to **PolarityControl**.

| Value | Meaning |
|---|---|
| **DTAPI_ASIINV_NORMAL** | Polarity of DVB-ASI input signal is normal (not inverted) |
| **DTAPI_ASIINV_INVERT** | Polarity of DVB-ASI signal is inverted |
| **DTAPI_NOT_SUPPORTED** | Device does not support this parameter (DTA-122) |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Status information has been read successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

If no input signal is applied, output parameter *PacketSize* is set to **DTAPI_PCKSIZE_INV**.

# DtInpChannel::GetTargetId

Get the target-adapter identifier (DTA-122 only).

```
DTAPI_RESULT DtInpChannel::GetTargetId (
 [out] int&   Present,         // Target adapter present?
 [out] int&   TargetId         // Target-adapter identifier
);
```

## Parameters

*Present*

Output parameter that indicates whether a target adapter has been detected.

| Value | Meaning |
|---|---|
| **DTAPI_NO_CONNECTION** | Nothing is connected to the input connector of the DTA-122. |
| **DTAPI_DVB_SPI_SOURCE** | A standard DVB-SPI source is connected to the DTA-122. |
| **DTAPI_TARGET_PRESENT** | A target adapter is present. |
| **DTAPI_TARGET_UNKNOWN** | The device is busy assessing the situation on the input connector. |

*TargetId*

Output parameter that is set to an integer value that uniquely identifies the target adapter. Please refer to the DTA-122 documentation for a list of available target adapters.
*TargetId* is assigned a value only if *Present* is **DTAPI_TARGET_PRESENT**.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Target ID has been retrieved successfully. |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver. |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function. |
| **DTAPI_E_NOT_SUPPORTED** | The input channel does not support target adapters (DVB-ASI input channels: DTA-120/140, DTU-225). |

## Remarks

The DTA-122 does not recognize the DTA-102 as a standard DVB-SPI source (*Present* is set to **DTAPI_NO_CONNECTION**), unless the ground pins on the DVB-SPI cable are connected together. This is due to the target-adapter detection circuitry.

# DtInpChannel::GetTsRateBps

Get an estimate of the input Transport-Stream rate.

```
DTAPI_RESULT DtInpChannel::GetTsRateBps (
 [out] int&  TsRate          // Transport-Stream rate in bps
);
```

## Parameters

*TsRate*

Estimate of the current Transport-Stream rate, expressed in bits per second. This rate does not take into account 'extra' bytes beyond the 188 MPEG-2 defined bytes.
If the channel's receive mode is **DTAPI_RXMODE_STRAW**, the value returned by this method is equal to the raw input bit rate, this is the rate at which valid data enters the device.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Transport-Stream rate has been read successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

In all receive modes except **DTAPI_RXMODE_STRAW** this method strictly applies the definition of Transport-Stream rate in the MPEG-2 Systems specification. This rate is based on 188-byte packets. If the packet size is not 188 bytes, a conversion factor is used.

Example: When 204-byte packets enter the system, the raw input rate is divided by 204/188.

# DtInpChannel::GetTunerFrequency

Get tuner frequency from input devices with an onboard tuner.

```
DTAPI_RESULT DtOutpChannel::GetTunerFrequency (
 [out] __int64&  FreqHz      // Frequency in hertz
);
```

## Parameters

*FreqHz*

Current tuning frequency (in Hz)

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The tuner frequency has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not include a tuner |

## Remarks

# DtInpChannel::LedControl

Take direct control of input-status LED, or let hardware drive the LED.

```
DTAPI_RESULT DtInpChannel::LedControl (
  [in] int  LedControl       // DTAPI_LED_XXX
);
```

## Parameters

*LedControl*

Controls the LED.

| Value | Meaning |
|---|---|
| **DTAPI_LED_HARDWARE** | Hardware drives the LED (default after power-up) |
| **DTAPI_LED_OFF** | LED is forced to off-state |
| **DTAPI_LED_GREEN** | LED is forced to green-state |
| **DTAPI_LED_RED** | LED is forced to red-state |
| **DTAPI_LED_YELLOW** | LED is forced to yellow-state |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | LED setting has been accepted |
| **DTAPI_E_INVALID_MODE** | The specified LED-control value is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

Detaching the input channel releases any direct-control setting that might have been applied to the LEDs (LED control is reset to **DTAPI_LED_HARDWARE**).

The DTA-120, DTA-122 and DTA-140 each have a single LED, which can be controlled by either this method (**DtDevice::LedControl**) or by **DtInpChannel::LedControl**. If both methods are used at the same time, then **DtDevice::LedControl** takes precedence over **DtInpChannel::LedControl**.

# DtInpChannel::LnbEnable

Enable the LNB controller.

```
DTAPI_RESULT DtInpChannel::LnbEnable (
  [in] bool  Enable          // Enable/disable controller
);
```

## Parameters

*Enable*

If set true, the LNB controller will be enabled. If false the LNB controller is disabled.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | LNB controller has successfully been enabled or disabled |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INTERNAL** | Unexpected internal DTAPI error encountered |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | This method is not supported by the underlying hardware |

## Remarks

# DtInpChannel::LnbEnableTone

Enable the 22 kHz tone.

```
DTAPI_RESULT DtInpChannel::LnbEnableTone (
  [in] bool  Enable          // Enable/disable 22kHz tone
);
```

## Parameters

*Enable*

Enable (=true) or disable (=false) generation of 22 kHz tone.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The 22kHz tone has successfully been enabled or disabled |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INTERNAL** | Unexpected internal DTAPI error encountered |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | This method is not supported by the underlying hardware |

## Remarks

Before calling this method the onboard LNB controller must have been enabled using **DtInpChannel::LnbEnable** method. If the LNB controller is disabled this method will fail.

# DtInpChannel::LnbSetVoltage

Set the LNB voltage.

```
DTAPI_RESULT DtInpChannel::LnbSetVoltage (
  [in] int  Level            // Voltage level
);
```

## Parameters

*Level*

Controls the LNB voltage.

| Value | Meaning |
|---|---|
| **DTAPI_LNB_13V** | LNB voltage is 13V |
| **DTAPI_LNB_14V** | LNB voltage is 14V |
| **DTAPI_LNB_18V** | LNB voltage is 18V |
| **DTAPI_LNB_19V** | LNB voltage is 19V |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | LNB voltage has successfully been set |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INTERNAL** | Unexpected internal DTAPI error encountered |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | This method is not supported by the underlying hardware |

## Remarks

The LNB voltage settings will only have effect if the LNB controller has been enabled using **DtInpChannel::LnbEnable** method.

# DtInpChannel::LnbSendBurst

Transmit a tone burst of type A or B.

```
DTAPI_RESULT DtInpChannel::LnbSendBurst (
  [in] int  BurstType        // Burst type
);
```

## Parameters

*BurstType*

Controls the burst type.

| Value | Meaning |
|---|---|
| **DTAPI_LNB_BURST_A** | Burst type A |
| **DTAPI_LNB_BURST_A** | Burst type B |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | LNB burst has successfully been sent |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INTERNAL** | Unexpected internal DTAPI error encountered |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | This method is not supported by the underlying hardware |

## Remarks

Before calling this method the onboard LNB controller must have been enabled using **DtInpChannel::LnbEnable** method. If the LNB controller is disabled this method will fail.

# DtInpChannel::LnbSendDiseqcMessage

Send a DiSeqc message.

```
DTAPI_RESULT DtInpChannel::LnbSendDiseqcMessage (
 [in] const unsigned char*  pMsgOut     // The message
 [in] int  NumBytesOut        // Size of output message
);
DTAPI_RESULT DtInpChannel::LnbSendDiseqcMessage (
 [in] const unsigned char*  pMsgOut
                              // Buffer with message
 [in] int  NumBytesOut        // Size of output buffer
 [in] unsigned char* pMsgIn   // Buffer for reply
 [in/out] int&  NumBytesIn    // Size of reply buffer / reply message
);
```

## Parameters

*pMsgOut*

Pointer to buffer with the message too sent.
NOTE: the maximum allowed message size is 8.

*NumBytesOut*

Number of bytes in the message buffer.

*pMsgIn*

Pointer to buffer in which the reply message should be stored.
NOTE: the maximum reply size is 8 bytes.

*NumBytesIn*

As input parameter this parameter specifies the size of the reply buffer. As output parameter this parameter returns the number of bytes in the reply message.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | LNB message was successfully sent |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INTERNAL** | Unexpected internal DTAPI error encountered |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | This method is not supported by the underlying hardware |

## Remarks

Before calling this method the onboard LNB controller must have been enabled using **DtInpChannel::LnbEnable** method. If the LNB controller is disabled this method will fail.

# DtInpChannel::PolarityControl

Control the automatic polarity-detection circuitry of a DVB-ASI Transport-Stream input channel.

```
DTAPI_RESULT DtInpChannel::PolarityControl (
  [in] int  PolarityControl // Polarity-control setting
);
```

## Parameters

*PolarityControl*

This parameter controls inversion of the DVB-ASI signal.

| Value | Meaning |
|---|---|
| **DTAPI_POLARITY_AUTO** | Automatically detect and correct polarity of DVB-ASI signal |
| **DTAPI_POLARITY_NORMAL** | 'Normal' operation: do not invert DVB-ASI signal |
| **DTAPI_POLARITY_INVERT** | Invert DVB-ASI signal |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Polarity setting has been accepted |
| **DTAPI_E_INVALID_MODE** | The specified polarity-control value is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | Device is not a DVB-ASI device, or hardware does not support control of the polarity-detection process (DTU-225) |

## Remarks

The DVB-ASI signal is sensitive to signal polarity. Without corrective measures, an inverted DVB-ASI signal – which may be caused by e.g. inverting distribution amplifiers – may be decoded incorrectly by a standard DVB-ASI receiver.

Automatic detection of DVB-ASI signal polarity (setting **DTAPI_POLARITY_AUTO**) can be successfully applied only when it is known a priori that the input signal is DVB/MPEG-2 compliant. For non MPEG-2 applications, *PolarityControl* should be set to **DTAPI_POLARITY_NORMAL**, or the input signal may be distorted badly due to periodic inversion.

Old revisions of the DTU-225 do not support these functions: These devices always operate as if *PolarityControl* is set to **DTAPI_POLARITY_NORMAL**.

# DtInpChannel::Read

Read data bytes from the input channel.

```
DTAPI_RESULT DtInpChannel::Read (
  [in] char*  pBuffer,       // Buffer to store data
  [in] int  NumBytesToRead   // #Bytes to be read (must be multiple of 4!)
);
DTAPI_RESULT DtInpChannel::Read (
  [in] char*  pBuffer,       // Buffer to store data
  [in] int  NumBytesToRead   // #Bytes to be read (must be multiple of 4!)
  [in] int  Timeout          // Optional Max. Time to wait for data
);
```

## Parameters

*pBuffer*

Pointer to the buffer into which the data bytes from the input channel will be written.
The pointer must be aligned to a 4-byte address boundary.

*NumBytesToRead*

Transfer size: Number of bytes to be read from the input channel.
The value of this parameter must be positive and a multiple of four.

*Timeout (optional)*

Transfer timeout: specifies the maximum time (in ms) too wait for the requested amount of data. This method will fail if the data cannot be read within the specified period.
The value of this parameter must larger than 0 or -1 to specify an infinite timeout. The default value is -1.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Read operation has been completed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_BUF** | The buffer is not aligned to a 32-bit word boundary |
| **DTAPI_E_INVALID_SIZE** | The specified transfer size is negative or not a multiple of 4 |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_TIMEOUT** | Read operation failed. Requested number of bytes could not be returned within the specified timeout period |
| **DTAPI_E_INVALID_SUBCH** | Invalid sub-channel selected |
| **DTAPI_E_INVALID_TIMEOUT** | Invalid timeout period specified |

## Remarks

**Read** returns when *NumBytesToRead* bytes have been transferred into the buffer. The transfer size may be greater than the initial number of bytes available in the Receive FIFO. The thread executing **Read** sleeps until sufficient data has entered the Receive FIFO to complete the transfer.

If the transfer size is greater than the initial Receive-FIFO load, and either the input signal disappears or Receive Control is **DTAPI_RXCTRL_IDLE**, then the Read call may sleep for an indefinite period of time (the thread 'hangs'). To avoid this situation, it is recommended to use the overloaded version of **Read** and specify a timeout other than infinite (-1) or alternatively first check the FIFO load and then read an amount of data less than or equal to the FIFO load.

For PCI-card devices, the DTAPI applies DMA to directly transfer the data from PCI card to the buffer in user space. Hereto, the device driver locks the physical pages of the buffer in memory. A scatter/gather list is created and the DMA transfer is initiated.

For USB-devices, the data has to pass the USB device-driver stack. DMA may, or may not, be applied.

# DtInpChannel::ReadDirect

This function is for diagnostics purposes only, please use method Read for 'ordinary' reading

PCI cards only: Read data bytes from the input channel using "direct" read-cycles over the PCI bus.

```
DTAPI_RESULT DtInpChannel::ReadDirect (
 [out] char*  pBuffer,        // Buffer to store data
  [in] int  NumBytesToRead,   // Number of bytes to be read
 [out] int&  NumBytesRead     // Number of bytes read
);
```

## Parameters

*pBuffer*

Pointer to the buffer to which the data from the input channel will be written. The pointer must be aligned to a 32-bit word boundary.

*NumBytesToRead*

Size of the read buffer, and as such the maximum number of bytes read from the input channel. The buffer size must be positive and a multiple of four.

*NumBytesRead*

Number of bytes actually read. *NumBytesRead* is always a multiple of four.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Read operation has been completed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_BUF** | The buffer is not aligned to a 32-bit word boundary |
| **DTAPI_E_INVALID_SIZE** | The specified transfer size is negative or not a multiple of four |
| **DTAPI_E_FIFO_EMPTY** | The operation timed out because the Receive FIFO is empty |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

Method **ReadDirect** is very similar to **Read**. For PCI cards (DTA-1XX), **ReadDirect** is considerably slower then **Read** because the processor reads the data bytes directly via the PCI bus, instead of using DMA. **ReadDirect** should only be used for special purposes, e.g. for PCI-card validation.

The data buffer can be any buffer in user space that is aligned to a 4-byte boundary.

**ReadDirect** returns when the read buffer is full or when the Receive FIFO is empty.

Unlike **Read**, this function cannot block forever. If the read operation takes too long, error code **DTAPI_E_FIFO_EMPTY** is returned.

For USB devices, **ReadDirect** is equivalent to **Read**.

# DtInpChannel::ReadFrame

Reads one SDI frame from the input channel.

```
DTAPI_RESULT DtInpChannel::ReadFrame (
  [in] unsigned int*  pFrame,     // Buffer to receive the frame
[in/out] int&  FrameSize,         // [in] Size of frame buffer
                                  // [out] number of bytes returned
  [in] int  Timeout               // Max. Time to wait for a frame
);
```

## Parameters

*pFrame*

Buffer to receive the SDI frame. Must be 32-bit aligned. NOTE: the format (e.g. 8-bit/10-bit, compressed/uncompressed, etc) of the data returned in the frame buffer depends on the active receive-mode

*FrameSize*

As an input parameter this parameter indicates the size of the frame buffer. The frame buffer should be large enough to receive a complete frame and is must 32-bit aligned. As an output parameter this parameter indicates the number of bytes returned in the frame buffer. NOTE: The returned number of bytes includes any stuff-bytes added to the end of the frame to achieve 32-bit alignment.

*Timeout*

Maximum amount of time (in ms) too wait for a complete frame. This method will fail if a frame cannot be returned within the specified period.
The value of this parameter must larger than 0 or -1 to specify an infinite timeout. The default value is -1 (i.e. Infinite).

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Read operation has been completed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_BUF** | The buffer is not aligned to a 32-bit word boundary |
| **DTAPI_E_BUF_TOO_SMALL** | The frame buffer is to small for receiving a complete frame |
| **DTAPI_E_NOT_SDI_MODE** | The channel is not in SDI mode (see **SetRxMode** page 144) |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_TIMEOUT** | Read operation failed. Could not return a complete frame within the specified timeout period |
| **DTAPI_E_INVALID_TIMEOUT** | Invalid timeout period specified |

## Remarks

If an infinite timeout has been specified, this method will block until a complete frame has been received from the hardware.

# DtInpChannel::ReadSubCh

Read data bytes from a specific input sub-channel.

```
DTAPI_RESULT DtInpChannel::ReadSubCh (
  [in] char*  pBuffer,        // Buffer to store data
  [in] int    NumBytesToRead  // #Bytes to be read (must be multiple of 4!)
  [in] int    SubCh           // Subchannel to read from
);
```

## Parameters

*pBuffer*

Pointer to the buffer into which the data bytes from the input channel will be written.
The pointer must be aligned to a 4-byte address boundary.

*NumBytesToRead*

Transfer size: Number of bytes to be read from the input channel.
The value of this parameter must be positive and a multiple of four.

*SubCh*

This parameter the sub-channel from which to read.

| Value | Meaning |
|---|---|
| **DTAPI_SUBCH_MAIN** | Main data channel |
| **DTAPI_SUBCH_ADC** | ADC sub-channel<br>NOTE: Only supported on DTA-2135 |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Read operation has been completed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_BUF** | The buffer is not aligned to a 32-bit word boundary |
| **DTAPI_E_INVALID_SIZE** | The specified transfer size is negative or not a multiple of 4 |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_TIMEOUT** | Read operation failed. Requested number of bytes could not be returned within the specified timeout period |
| **DTAPI_E_INVALID_SUBCH** | Invalid sub-channel selected |

## Remarks

# DtInpChannel::Reset

Reset input channel.

```
DTAPI_RESULT DtInpChannel::Reset (
  [in] int  ResetMode
);
```

## Parameters

*ResetMode*

Specifies which part of the hardware and software stack is reset. The following values are defined (values cannot be OR-ed together):

| Value | Meaning |
|---|---|
| **DTAPI_FIFO_RESET** | Reset (clear) the Receive FIFO:<br>• Data transfers are halted instantaneously<br>• All data pending in the Receive FIFO is discarded<br>• Receive-control state is reset to **DTAPI_RXCTRL_IDLE**<br>• Receive-FIFO overflow flag is cleared |
| **DTAPI_ADC_FIFO_RESET** | Reset (clear) the ADC FIFO:<br>• Data transfers are halted instantaneously<br>• All data pending in the ADC Receive FIFO is discarded<br>• ADC Receive-control state is reset to DTAPI_RXCTRL_IDLE<br>• ADC Receive-FIFO overflow flag is cleared |
| **DTAPI_FULL_RESET** | Full input-channel reset:<br>• All actions for **DTAPI_FIFO_RESET**, plus:<br>• Synchronisation-error flag (**DTAPI_RX_SYNC_ERR**) is cleared<br>• State machines in the device hardware are reset |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Input channel has been reset |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_MODE** | The value specified for *ResetMode* is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

An input-channel reset operation does not affect the following settings:
- Receive mode and insert-time-stamp flag (refer to **DtInpChannel::SetRxMode**)
- Polarity control of DVB-ASI inputs (refer to **DtInpChannel::PolarityControl**)
- ADC sample rate (refer to **DtInpChannel::AdcSetSampleRate)**

# DtInpChannel::SetAdcSampleRate

Set the channel's ADC sample rate. The ADC sample-rate determines the rate samples are taken from the down converted RF signal.

```
DTAPI_RESULT DtInpChannel::SetAdcSampleRate (
  [in] int  SampleRate       // ADC Samplerate in Hz
);
```

## Parameters

*RxMode*

ADC sample-rate according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_ADCCLK_OFF** | *Clock is off* |
| **DTAPI_ADCCLK_27M** | *27Mhz Clock* |
| **DTAPI_ADCCLK_20M647** | *20.647059 Clock*[6] |
| **DTAPI_ADCCLK_13M5** | *13.5Mhz Clock* |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | ADC sample-rate has been changed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_MODE** | The specified receive mode is invalid or incompatible with the input channel |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | Current device is not supported by this function |

## Remarks

- Only the first channel of the DTA-2135 provides access the down converted RF signal
- The immediate frequency (IF) of the DTA-2135 is 36.167Mhz. Since the available sample-rates are all well below the Nyquist rate the signal is under sampled. Please refer to the sampling theory on details how to recover the signal.

[6] The exact frequency is 27 * 13 / 17 =20.647059 Mhz

# DtInpChannel::SetAntPower

Turn power to external antenna on/off.

```
DTAPI_RESULT DtInpChannel::SetAntPower (
  [in] int  AntPower          // Antenna Power state
);
```

## Parameters

*AntPower*

Power state according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_POWER_OFF** | No power is applied. Connected antenna needs to be self-powered |
| **DTAPI_POWER_ON** | Power (+5V, 30mA) is applied to the external antenna through the antenna connector(s) of the channel |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Power state has been changed successfully |
| **DTAPI_E_INVALID_MODE** | The specified power-mode value is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not support a power connection for the connector |

## Remarks

- After **Attach** and after **Reset**, antenna power is turned off.

- When the DTA-2135 operates in diversity mode, the antenna power for both antenna connectors is turned on or off simultaneously, i.e. both connected antenna's are powered from the DTA-2135 antenna connectors or both connected antenna's must be self powered.

# DtInpChannel::SetDemodControl

Set modulation-control parameters for input channels with a built-in demodulator.

```
DTAPI_RESULT DtOutpChannel::SetDemodControl (
  [in] int  ModType,          // Modulation type
  [in] int  ParXtra0,         // Extra parameter #0
  [in] int  ParXtra1,         // Extra parameter #1
  [in] int  ParXtra2          // Extra parameter #2
);
```

## Parameters

*ModType*

Modulation type.

| Device | ModType | Meaning |
|---|---|---|
| DTU-234 | **DTAPI_MOD_QAM64** | 64-QAM modulation |
| | **DTAPI_MOD_QAM256** | 256-QAM modulation |
| | **DTAPI_MOD_VSB8** | 8-VSB modulation |
| | **DTAPI_MOD_VSB16** | 16-VSB modulation |
| DTU-235, DTA-2135 | **DTAPI_MOD_DVBT** | DVB-T modulation |

*ParXtra0*

Extra modulation parameter #0

For VSB mode this parameter is not used and should be set to 0.

ParXtra0 – DTU-234 in QAM mode

| Device | ParXtra0 | Meaning |
|---|---|---|
| DTU-234 | **DTAPI_MOD_J83_B** | J.83 annex B (“American QAM”) Channel filter roll-off factor: 12% (64-QAM) or 18% (256-QAM) |

*ParXtra1*

Extra modulation parameter #1

| Device | ParXtra0 | Meaning |
|---|---|---|
| DTU-235, DTA-2135 | **DTAPI_MOD_DVBT_6MHZ** | 6 MHz |
| | **DTAPI_MOD_DVBT_7MHZ** | 7 MHz |
| | **DTAPI_MOD_DVBT_8MHZ** | 8 MHz |

*ParXtra2*

Extra modulation parameter #2
At the moment this parameter is not used and should be set to 0.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The modulation parameters have been set successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_J83ANNEX** | Invalid value for J.83 annex in *ParXtra0* |
| **DTAPI_E_INVALID_MODE** | Modulation type is incompatible with modulator |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not include a modulator |

## Remarks

# DtInpChannel::SetIpPars

Set parameters for the reception of a Transport Stream over IP and start listening.

```
DTAPI_RESULT DtInpChannel::SetIpPars (
  [in] DtTsIpPars*  pTsIpPars   // TS-over-IP parameters
);
```

## Parameters

*SetIpPars*

New parameter set to be applied. Please refer to the **DtTsIpPars** page for a description of the parameters.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | TS-over-IP parameters have been applied successfully |
| **DTAPI_E_IN_USE** | Parameters cannot be changed because the channel is busy. The receive-control state should be switched back to idle first |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

**SetIpPars** should be called at least once after attaching to the hardware but before setting the receive-control state to **DTAPI_RXCTRL_RCV**.

After the initial call to **SetIpPars**, parameters can be changed again, but only when the receive-control state is **DTAPI_RXCTRL_IDLE**.

When the destination IP address is a multicast IP address the DTAPI automatically joins the multicast group upon the first invocation of **SetIpPars**. When this method is called again, membership of the old multicast group is first dropped and a new multicast group is joined if required.

# DtInpChannel::SetLoopBackMode

This function is for diagnostics purposes only

Set the input-channel's loop-back mode.

```
DTAPI_RESULT DtInpChannel::SetLoopBackMode (
  [in] int  Mode              // Loop-back mode
);
```

## Parameters

*Mode*

Loop-back mode according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_NO_LOOPBACK** | Normal operation, no loop-back of data |
| **DTAPI_LOOPBACK_MODE** | Loop-back mode. The physical input circuitry is disconnected from the Receive FIFO. Data can be written directly into the Receive FIFO using **WriteLoopBackData**. |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Loop-back state has been successfully changed |
| **DTAPI_E_INVALID_MODE** | The value specified for loop-back mode is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

- After **Attach** and after **Reset**, loop-back mode is turned off.

- DTA-2135 Only. When this function is called on an input-channel with an Receive and an ADC FIFO, both FIFO's are set to loop-back mode.

# DtInpChannel::SetPower

DTA-122 only. Turn on/off power for a target adapter attached to the DTA-122.

```
DTAPI_RESULT DtInpChannel::SetPower (
  [in] int  Power            // Power state
);
```

## Parameters

*Power*

Power state according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_POWER_OFF** | No power is applied. The 25-pin sub-D connector is compatible with DVB-SPI |
| **DTAPI_POWER_ON** | Apply power (+5V) to pin 12 and 25 of the 25-pin sub-D connector |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Power state has been changed successfully |
| **DTAPI_E_INVALID_MODE** | The specified power-mode value is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not support a power connection for target adapters |

## Remarks

After **Attach** and after **Reset**, power is turned off.

# DtInpChannel::SetRxControl

Set the channel's receive-control state.

```
DTAPI_RESULT DtInpChannel::SetRxControl (
  [in]int  RxControl        // Receive-control state
  [in]int  SubCh            // Optional parameter to select sub-channel
);
```

## Parameters

*RxControl*

New receive-control state according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_RXCTRL_IDLE** | The input stream input is "disconnected" from the Receive FIFO: Incoming transport packets are not stored in the Receive FIFO. |
| **DTAPI_RXCTRL_RCV** | Normal operation. Incoming transport packets are stored in the Receive FIFO. |

*SubCh*

This parameter specifies for which sub-channel to set the receive-control state. The default value is **DTAPI_SUBCH_MAIN**. Please refer to **DtInpChannel::ReadSubCh** for list of possible sub-channel values.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Receive-control state has been changed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_MODE** | The specified receive-control state is invalid or incompatible with the attached hardware function |
| **DTAPI_E_INVALID_SUBCH** | Invalid sub-channel specified |
| **DTAPI_E_NO_IP_PARS** | For TS-over-IP channels: receive-control state cannot be set to **DTAPI_RXCTRL_RCV** because TS-over-IP parameters have not been specified |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

If the receive-control state is set to **DTAPI_RXCTRL_RCV**, but the application does not read any data from the Receive FIFO, then the Receive FIFO will quickly overflow.

Receive-control state is initialised to **DTAPI_RXCTRL_IDLE** by calling **AttachToSlot**, **AttachToType** or **AttachtoSerial** (all in **DtDevice**), or **Reset** or **ClearFifo** (in **DtInpChannel**).

# DtInpChannel::SetRxMode

Set the channel's receive mode. The receive mode determines the (hardware) processing that is applied to the incoming stream.

```
DTAPI_RESULT DtInpChannel::SetRxMode (
  [in] int  RxMode            // Receive mode
);
```

## Parameters

*RxMode*

Receive mode according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_RXMODE_ST188** | *188-byte mode*<br>Always store 188-byte packets in the Receive FIFO.<br>When the input contains 204-byte packets, the 16 trailing bytes are dropped. Input data without 188- or 204-byte packet structure is dropped. |
| **DTAPI_RXMODE_ST204** | *204-byte mode*<br>Always store 204-byte packets in the Receive FIFO.<br>When the input contains 188-byte packets, 16 zero bytes are appended. Input data without 188- or 204-byte packet structure is dropped. |
| **DTAPI_RXMODE_STMP2** | *MPEG-2 mode*<br>Store 188- or 204-byte packets in the Receive FIFO without modification. Input data without 188- or 204-byte packet structure is dropped. |
| **DTAPI_RXMODE_STRAW** | *Raw mode*<br>No notion of packets. All incoming valid data bytes are stored in the Receive FIFO.<br>**NOTE**: This mode is incompatible with **DTAPI_POLARITY_AUTO**! Please refer to the Remarks section. |
| **DTAPI_RXMODE_STTRP** | *Transparent mode*<br>All incoming data bytes are stored in the Receive FIFO. The data is aligned to packet boundaries if valid packets are detected. This format includes a trailer that contains information about the detected packet size, sync status and valid data bytes within the packet. Refer to section 4.4 for details about the format of transparent-mode-packets. |
| **DTAPI_RXMODE_STL3** | *L.3 Baseband frame mode*<br>(DTA-2137 only). No notion of transport stream packets. The entire DVB-S2 baseband frame is passed with the addition of an L.3 Header. Refer to section 4.5 for details about the format of the L.3 Baseband frames. |

The following modes are valid for SDI capable channels only.

| Value | Meaning |
|---|---|
| **DTAPI_RXMODE_SDI_FULL** | *Full SDI mode*<br>Store all SDI data (i.e. complete frames). |
| **DTAPI_RXMODE_SDI_ACTVID** | *Active Video SDI mode*<br>Store only the active video part of each SDI frame<br>**NOTE**: This mode should only be used in combination with Huffman compression (i.e. with **DTAPI_RXMODE_SDI_HUFFMAN** flag)! When using this mode with Huffman compression disabled the format of the data, provided by the input channel, will be undefined. |

The following mode is valid for TS-over-IP reception only.

| Value | Meaning |
|---|---|
| **DTAPI_RXMODE_IPRAW** | *Raw IP mode*<br>Store unprocessed IP packets in the buffer. If error correction is requested, store FEC streams too.<br>NOTE: each IP packet returned by a call the **DtInpChannel::Read** will be preceded by a **DtRawIpHeader** structure. |

The receive mode can be optionally combined (OR-ed) with the following flag:

| Value | Meaning |
|---|---|
| **DTAPI_RX_TIMESTAMP** | *Time-stamped mode*<br>Insert a 32-bit time stamp before each packet. The time stamp is a sample of the system clock counter on the device. |
| **DTAPI_RXMODE_SDI** | *SDI mode*<br>Indicates the input channel should operate in SDI mode. If not used the channel operates in ASI mode.<br><br>NOTE: this flag is already OR-ed into the SDI related receive-mode mention in the table above. |
| **DTAPI_RXMODE_SDI_10B** | *10-bit SDI samples*<br>Indicates 10-bit SDI samples should be provided. If this flag is omitted the SDI data will be delivered as 8-bit samples. |
| **DTAPI_RXMODE_SDI_HUFFMAN** | Huffman compression<br>Indicated the SDI frame should be compressed using a Huffman compression algorithm. |

The **DTAPI_RX_TIMESTAMP** flag cannot be specified in raw mode (**DTAPI_RXMODE_STRAW**) or any of the SDI modes.

Please refer to section 4 for more details about the SDI data formats.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Receive mode has been changed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_MODE** | The specified receive mode is invalid or incompatible with the input channel |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | Current device is not supported by this function |

### Remarks

In receive mode **DTAPI_RXMODE_STRAW** ("raw" mode), the input channel does not care about the packet structure of the incoming data: All data bytes are stored in the input buffer. For DVB-ASI input channels, raw mode can only work reliably if *polarity control* is set to **DTAPI_POLARITY_NORMAL** or **DTAPI_POLARITY_INVERT**. If polarity control is set to **DTAPI_POLARITY_AUTO**, disaster may be the result: Automatic polarity detection assumes that the input has a valid packet structure. If such a structure cannot be found, the device tries again with the input signal inverted. In raw mode, such inversion may occur periodically and severely corrupt the input data!

For the DTA-122 DVB-SPI Input Adapter, packet synchronisation in modes **DTAPI_RXMODE_ST188** and **DTAPI_RXMODE_ST204** is based on the PSYNC signal, not on the value of the first byte of the packet: The value of DATA at a PSYNC pulse is stored in the input buffer, even if the value is not 0x47.

Time stamps are stored in Little Endian format: the first byte contains the least significant 8 bits, the fourth byte the most significant 8 bits. On 32-bit platforms that use the Little-Endian convention (a.o. Intel IA-32), the time stamp can be read by code like:

```
unsigned int TimeStamp = *(unsigned int*) PtrInCharBuffer;
```

# DtInpChannel::SetTunerFrequency

Set tuner frequency for input devices with an onboard tuner.

```
DTAPI_RESULT DtOutpChannel::SetTunerFrequency (
 [out] __int64&  FreqHz      // Frequency in hertz
);
```

## Parameters

*FreqHz*

Desired tuning frequency (in Hz). The table below specifies the valid range and the step size with which the RF rate can be specified. *FreqHz* is rounded to the nearest RF frequency compatible with the frequency resolution.

| Device | Valid Range | Step Size |
|---|---|---|
| DTU-234 | 53,000,000 – 865,000,000 Hz | - |
| DTU-235 | 50,000,000 - 860,000,000 Hz | - |
| DTA-2135 | 50,000,000 - 860,000,000 Hz | - |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The tuner frequency has been set successfully |
| **DTAPI_E_INVALID_RATE** | The specified frequency is incompatible (too low or too high) with the tuner |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The channel does not include a tuner |

## Remarks

# DtInpChannel::TuneChannel

(DTU-234 only)

Sets the tuner to the frequency of the specified channel.

```
DTAPI_RESULT DtOutpChannel::TuneChannel (
  [in] int  Band,              // Band
  [in] int  Channel,           // Channel number
 [out] int&  FreqHz            // Frequency of the channel in hertz
);
```

## Parameters

*Band*

Frequency Band.

| Value | Meaning |
|---|---|
| **DTAPI_BAND_BROADCAST_ONAIR** | Broadcast / On-Air |
| **DTAPI_BAND_FCC_CABLE** | FCC / Cable |
| **DTAPI_BAND_IRC** | IRC |
| **DTAPI_BAND_HRC** | HRC |

*Channel*

Channel number.

*FreqHz*

Frequency of the channel in hertz.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The channel has been set successfully |
| **DTAPI_E_INVALID_ARG** | Invalid frequency band |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The channel does not include a tuner |

## Remarks

# DtInpChannel::WriteLoopBackData

This function is for diagnostics purposes only

Write data bytes to the channel's Receive FIFO via the loop-back channel. The loop-back mode must be **DTAPI_LOOPBACK_MODE**.

```
DTAPI_RESULT DtInpChannel::WriteLoopBackData (
  [in] char*  pBuffer,        // Data written to Receive FIFO
  [in] int    NumBytesToWrite,// Number of bytes to be written
  [in] int    SubCh           // Optional parameter to select sub-channel
);
```

## Parameters

*pBuffer*

Pointer to the buffer that will supply the data written to the Receive FIFO. The size of the buffer must be at least *NumBytesToWrite*.

*NumBytesToWrite*

Number of bytes to be written to the Receive FIFO. *NumBytesToWrite* must be positive.

*SubCh*

This parameter specifies to which sub-channel should be written. The default value is **DTAPI_SUBCH_MAIN**.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Write operation has been completed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_SIZE** | The specified transfer size is negative |
| **DTAPI_E_INVALID_SUBCH** | Invalid sub-channel specified |
| **DTAPI_E_NO_LOOPBACK** | Channel is not in loop-back mode |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

This method can be used for writing a Receive-FIFO memory test.

Data can only be written to the Receive FIFO if the loop-back mode is **DTAPI_LOOPBACK_MODE**. This method does not check for Receive-FIFO overflow.

# DtIsdbtPars

Class describing parameters for ISDB-T modulation.

```
class DtIsdbtPars {

public:
  bool  m_DoMux;              // Hierarchical multiplexing yes/no
  bool  m_FilledOut;          // Members have been given a value
  int   m_BType;              // Broadcast type
  int   m_Mode;               // Transmission mode
  int   m_Guard;              // Guard interval
  int   m_PartialRx;          // Partial reception
  int   m_Emergency;          // Switch-on control for emergency broadcast
  int   m_IipPid;             // PID used for multiplexing IIP packet
  DtIsdbtLayerPars  m_LayerPars[3];    // Layer-A/B/C parameters
  std::map<int, int>  m_Pid2Layer;     // PID-to-layer map
  int   m_LayerOther;         // Other PIDs are mapped to this layer
  int   m_ParXtra0;           // Extra parameters
  int   m_Virtual13Segm;      // Virtual 13-segment mode

  // Derived:
  bool  m_Valid;              // The parameter set is valid
  int   m_TotalBitrate;       // Bitrate of entire stream
};
```

## Public Members

*m_DoMux*

If true, perform hierarchical multiplexing in accordance with the ISDB-T parameters as defined explicitly in this class.
If false, the ISDB-T modulation parameters are specified indirectly by the TMCC information in the 16 extra bytes of the 204-byte packets.

*m_FilledOut*

This member has significance only if hierarchical multiplexing is on. In that case it indicates whether member variables *m_BType*, *m_Mode*, ... up to and including *m_LayerOther* have been given a value.
Method **RetrieveParsFromTs** will set *m_FilledOut* to true if it has succeeded in finding a valid set of parameters in the Transport Stream. Alternatively, an application can set *m_FilledOut* to true itself if it has filled out the ISDB-T parameters in the **DtIsdbtPars** object.

*m_BType*

Broadcast type.

| Value | Meaning |
|---|---|
| **DTAPI_ISDBT_BTYPE_TV** | TV broadcast; Can be used with any number of segments |
| **DTAPI_ISDBT_BTYPE_RAD1** | 1-segment radio broadcast; Total #segments must be 1 |
| **DTAPI_ISDBT_BTYPE_RAD3** | 3-segment radio broadcast; Total #segments must be 3 |

*m_Mode*

Transmission mode.

| Value | Meaning |
|---|---|
| **1** | Mode 1: 2k |
| **2** | Mode 2: 4k |
| **3** | Mode 3: 8k |

*m_Guard*

Guard-interval length.

| Value | Meaning |
|---|---|
| **DTAPI_ISDBT_GUARD_1_32** | 1/32 |
| **DTAPI_ISDBT_GUARD_1_16** | 1/16 |
| **DTAPI_ISDBT_GUARD_1_8** | 1/8 |
| **DTAPI_ISDBT_GUARD_1_4** | 1/4 |

*m_PartialRx*

Flag that indicates whether layer A is used for partial reception: 0 = no partial reception, 1 = partial reception on.

*m_Emergency*

Flag that indicates whether the switch-on control flag for emergency broadcast should be turned on: 0 = off, 1 = on.

*m_IipPid*

PID value used for multiplexing the IIP packet.

*m_LayerPars*

Modulation parameters for hierarchical layers A (element 0), B (1) and C (2).

*m_Pid2Layer*

Map that specifies the hierarchical layer, or layers, to which an elementary stream is to be mapped. The key in the map is the PID of the elementary stream. The value stored in the map is an OR of one or more flags listed in the table below. A value of 0 indicates that the elementary stream is to be dropped.

| Value | Meaning |
|---|---|
| **DTAPI_ISDBT_LAYER_A** | Map elementary stream to layer A |
| **DTAPI_ISDBT_LAYER_B** | Map elementary stream to layer B |
| **DTAPI_ISDBT_LAYER_C** | Map elementary stream to layer C |

*m_LayerOther*

Map streams with PIDs not in *m_Pid2Layer* to this layer.

*m_ParXtra0*

Extra parameter encoding bandwidth, sample rate and number of segments. This parameter is encoded like ParXtra0 in **SetModControl** with *ModType* **DTAPI_MOD_ISDBT**.

*m_Valid*
The ISDB-T parameter set is valid. This is a "derived" parameter, which is set to a value by **DtIsdbtPars::CheckValidity**.

*m_Virtual13Segm*
Use virtual 13 segment mode. The number of segments in layer B is "faked" to be 12.

*m_TotalBitrate*
Bitrate in bps of the entire stream. The bitrate includes the 16 dummy bytes per packet that contain the ISDB-T information.

*m_SampleRate*
Sample rate used by hardware to clock out I and Q samples.

| Value | Meaning | Number of segments |
|---|---|---|
| 0 | 512/63 MHz | 1, 3 or 13 |
| 1 | 64/63 MHz | 1-segment only (not supported by the hardware yet) |
| 2 | 128/63 MHz | 3-segment only (not supported by the hardware yet) |

## Remarks

# DtIsdbtPars::CheckValidity

Check ISDB-T parameters for validity. A boolean result (valid/not valid) is stored in the invoking object, in flag *m_Valid*.

```
DTAPI_RESULT DtIsdbtPars::CheckValidity (
 [out] int&  ResultCode          // Result of validity check
);
```

## Parameters

*ResultCode*

| Value | Meaning |
|---|---|
| **DTAPI_ISDBT_OK** | ISDB-T parameters are valid |
| **DTAPI_ISDBT_E_NSEGM** | Number of segments is not equal to 13 |
| **DTAPI_ISDBT_E_PARTIAL** | 'Partial Reception' is selected but number of segments in layer A is not 1 |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | ISDB-T modulation parameters have been found valid |
| **DTAPI_E_INVALID_PARS** | ISDB-T parameters are invalid. *ResultCode* is set to a value indicating the reason why the ISDB-T parameters are not valid |

## Remarks

This routine assumes that **DtIsdbtPars::ComputeRates** has been called so that the rate variables in the **DtIsdbtPars** object have been set to the correct value.

# DtIsdbtPars::ComputeRates

Compute the bit rate per hierarchical layer and store the results in the object calling this function.

```
DTAPI_RESULT DtIsdbtPars::ComputeRates ();
```

## Parameters

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | ISDB-T rates have been computed successfully |
| **DTAPI_E_INVALID_ARG** | One of the ISDB-T parameters, or the combination of parameters is invalid. |

## Remarks

# DtIsdbtPars::RetrieveParsFromTs

Retrieve modulation parameters from a 204-byte Transport Stream with TMCC information and store the results in the **DtIsdbtPars** object calling this function.

```
DTAPI_RESULT DtIsdbtPars::RetrieveParsFromTs (
 [in] char*  pBuffer,            // Buffer with Transport Stream
 [in] int  NumBytes,             // Number of bytes in buffer
);
```

## Parameters

*pBuffer*

Buffer containing Transport-Stream packets from which to retrieve the ISDB-T parameters.

*NumBytes*

Number of Transport-Stream bytes in the buffer.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | ISDB-T modulation parameters have been recovered successfully |
| **DTAPI_E_INVALID_TSTYPE** | The buffer does not contain a Transport Stream consisting of 204-byte packets with TMCC information |
| **DTAPI_E_INSUF_LOAD** | The buffer contains insufficient data to recover all ISB-T modulation parameters |

## Remarks

# DtOutpChannel

Class representing an output channel for transmitting the following formats:
- MPEG-2 Transport Stream over ASI, SPI or IP
- Serial Digital Interface (SDI)

```
class DtOutpChannel;
```

## Derived Classes

*SdiOutpChannel*

Class representing an output channel for transmitting SDI.
MPEG-2 TS-specific methods applied to this class will fail.

*TsOutpChannel*

Class representing an output channel for transmitting an MPEG-2 Transport Stream.
SDI-specific methods applied to this class will fail.

# DtOutpChannel::Attach

This function is still supported for backward compatibility reasons. For new code, please use **DtOutpChannel::AttachToPort**.

Attach the output-channel object to a hardware function hosted by a particular device. Two overloaded variants are defined.

- The first variant attaches to a hardware function of a DtDevice object and should be used in new software.
- The second – obsolete – function prototype, which is defined for backward compatibility with DTAPI version 1.3.x.xxx, attaches the output-channel object to a hardware function of a PCI Card object.

```
DTAPI_RESULT DtOutpChannel::Attach (
  [in] DtDevice*  pDtDevice,       // Object representing device
  [in] int  OutpIndex=0,           // Output index
  [in] bool  ProbeOnly=false       // Just check whether channel is in use
);
DTAPI_RESULT DtOutpChannel::Attach (       // Obsolete
  [in] PciCard*  pPciCard,         // Object representing PCI card
  [in] int  OutpIndex=0            // Output index on PCI card
);
```

## Parameters

*pDtDvc*

Pointer to object that represents a DekTec device. The **DtDevice** object must be attached to the device hardware.

*OutpIndex*

If the device has multiple hardware output functions, this number specifies to which hardware function, and therefore to which physical output, the channel object is attached. The *OutpIndex* of the first hardware output function is 0.

*ProbeOnly*

Probe whether the channel is in use, but do not actually attach.

*pPciCard*

Pointer to object that represents a PCI-card. The **PciCard** object must be attached to the device hardware.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Channel object has been attached successfully to the hardware function |
| **DTAPI_OK_FAILSAFE** | Channel object has been attached successfully to the hardware function. However output port has been configured in failsafe mode, this means the application should call the **SetFailsafeAlive** method on a regular basis to prevent the failsafe relais to enter fails safe mode.<br><br>NOTE: this is not an error code; this result value is intended to make the application aware of failsafe mode |
| **DTAPI_E_ATTACHED** | The channel object is already attached a hardware function |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_IN_USE** | The output is already in use by another channel object |
| **DTAPI_E_NO_DT_OUTPUT** | The device does not contain hardware output functions |
| **DTAPI_E_NO_SUCH_OUTPUT** | *OutpIndex* refers to a non-existing output |
| **DTAPI_E_DEVICE**<br>**DTAPI_E_PCICARD** | The **DtDevice** pointer is not valid or the **DtDevice** object is not attached to the device hardware |

### Remarks

On the DTA-160, this method cannot be used to attach to the TS-over-IP Ethernet port. Please use **DtOutpChannel::AttachToPort** instead.

Next to establishing the link with the hardware, **Attach** also performs the following initialisation:

- The contents of the Transmit FIFO are cleared.
- The size of the Transmit FIFO is set to the maximum value.
- Transmit-control state is reset to **DTAPI_TXCTRL_IDLE**.
- Loop-back mode is reset to “no loop-back”.
- All *latched* status flags are cleared (refer to **ClearFlags**).
- Enable LVDS output signals (DTA-102 only).

For Transport-Stream outputs, **Attach** does not reset the Transport-Stream rate to zero. This enables switching between applications that use the same output, without causing a dip in the Transport-Stream.

# DtOutpChannel::AttachToPort

Attach the output-channel object to a specific physical port.

```
DTAPI_RESULT DtOutpChannel::AttachToPort (
  [in] DtDevice*  pDtDvc,          // Device object
  [in] int  Port,                  // Port number
  [in] bool  ProbeOnly=false       // Just check whether channel is in use
);
```

## Parameters

*pDtDvc*

Pointer to the device object that represents a DekTec device. The device object must have been attached to the device hardware.

*Port*

Physical port number. The channel object is attached to this port. The port number of the top-most port is 1, except on the DTA-160, on which the top-most Ethernet port is port #4. Please refer to Section 4 for an overview of port numbers.

*ProbeOnly*

Probe whether the channel is in use, but do not actually attach.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Channel object has been attached successfully to the port |
| **DTAPI_OK_FAILSAFE** | Channel object has been attached successfully to the hardware function. However output port has been configured in failsafe mode, this means the application should call the **SetFailsafeAlive** method on a regular basis to prevent the failsafe relais to enter fails safe mode.<br><br>NOTE: this is not an error code; this result value is intended to make the application aware of failsafe mode |
| **DTAPI_E_ATTACHED** | Channel object is already attached |
| **DTAPI_E_DEVICE** | Pointer *pDtDvc* is not valid or the device object is not attached to a hardware device |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_IN_USE** | Another channel object is already attached to this port |
| **DTAPI_E_NO_DT_OUTPUT** | *Port* is not an output |
| **DTAPI_E_NO_SUCH_PORT** | *Port* refers to a non-existing port number |
| **DTAPI_E_OUT_OF_MEM** | TS-over-IP: Receive FIFO cannot be allocated |

## Remarks

**AttachToPort** performs the same initialisation actions as **DtOutpChannel::Attach**.

# DtOutpChannel::ClearFifo

Clear contents of the Transmit FIFO and set transmit-control state to **DTAPI_TXCTRL_IDLE**. Furthermore, clear the output channel's status flags: the transmit-FIFO-underflow flag (**DTAPI_TX_FIFO_UFL**) and the transmit-synchronisation-error flag (**DTAPI_TX_SYNC_ERR**).

```
DTAPI_RESULT DtOutpChannel::ClearFifo (
      void
);
```

## Parameters

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Transmit FIFO has been cleared |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The effects of **ClearFifo** are equivalent to **Reset(DTAPI_FIFO_RESET)**.

**ClearFifo** does not reset the last part of the hardware pipeline, so that packets are not truncated (unless transmit mode is **DTAPI_TXMODE_RAW**.)

Method **ClearFifo** is available on all DekTec output cards, except on DTA-100 firmware versions prior to V3, and on DTA-102 firmware versions prior to V5. On these elder PCI cards, **ClearFifo** has the same effect as **Reset(DTAPI_FULL_RESET)**.

# DtOutpChannel::ClearFlags

Clear *latched* status flag(s).

```
DTAPI_RESULT DtOutpChannel::ClearFlags (
 [int] int  Latched          // Latched status flags to be cleared
);
```

## Parameters

*Latched*

Latched status flag(s) to be cleared. Multiple flags can be cleared with one function call by OR-ing the bit positions to be cleared. The following flags are latched and can be cleared:

| Value | Meaning |
|---|---|
| **DTAPI_TX_FIFO_UFL** | See **GetFlags** |
| **DTAPI_TX_READBACK_ERR** | ,, ,, |
| **DTAPI_TX_SYNC_ERR** | ,, ,, |
| **DTAPI_TX_TARGET_ERR** | ,, ,, |
| **DTAPI_TX_LINK_ERR** | ,, ,, |
| **DTAPI_TX_DATA_ERR** | ,, ,, |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Flag(s) have been successfully cleared |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

Some status flags that are queried with **GetFlags** are not latched and therefore cannot be cleared.

The latched status flags are also automatically reset after calling **AttachToSlot**, **AttachToType** and after **Reset**. A call to **ClearFifo** clears **DTAPI_TX_FIFO_UFL** and **DTAPI_TX_SYNC_ERR**.

# DtOutpChannel::Detach

Detach output channel object from a hardware function. Free resources allocated for the output channel, such as DMA buffers.

```
DTAPI_RESULT DtOutpChannel::Detach (
  [in] int  DetachMode       // How to detach
);
```

## Parameters

*DetachMode*

Specifies how the channel object should detach from the hardware function. If *DetachMode* is 0, the object is detached without further action. A number of flags listed below are defined to detach from the hardware function in a specific way. The flags can be OR-ed together to their combine behaviour, with some exceptions as listed in the table.

| Value | Meaning |
|---|---|
| **DTAPI_INSTANT_DETACH** | Clear the contents of the Transmit FIFO and detach without waiting until pending data in the FIFO has been transmitted. This flag may not be combined with **DTAPI_WAIT_UNTIL_SENT**. |
| **DTAPI_TRISTATE_OUTPUT** | Put all output signals in tri-state (DTA-102 only). |
| **DTAPI_WAIT_UNTIL_SENT** | Sleep until all pending data in the Transmit FIFO has been transmitted. If this flag is combined with other flags, the wait is executed before the action associated with the other flags. This flag may not be combined with **DTAPI_INSTANT_DETACH**. |
| **DTAPI_ZERO_OUTPUT** | Set the Transport-Stream rate to zero.<br>On the DTA-100/140, only stuffing symbols are generated.<br>On the DTA-102, all output signals are reset to constant '0'. |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Channel object has been detached successfully from the hard-ware function |
| **DTAPI_E_INVALID_FLAGS** | An invalid combination of detach flags was specified |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function, so it cannot be detached |

## Remarks

If the client does not specify **DTAPI_ZERO_OUTPUT** and/or **DTAPI_TRISTATE_OUTPUT**, and packet stuffing is turned on, the output channel keeps transmitting null packets after detaching.

If the hardware does not support tri-stating of the output, specifying **DTAPI_TRISTATE_OUTPUT** acts as a no-op. No error result is generated.

In certain circumstances **Detach** may "hang", e.g. if **DTAPI_WAIT_UNTIL_SENT** is specified while the FIFO still contains data and the transmit-control state is **DTAPI_TXCTRL_IDLE**.

# DtOutpChannel::GetExtClkFreq

Get an estimate of the frequency of the external clock (DTA-102 only).

```
DTAPI_RESULT DtOutpChannel::GetTsRateBpsExtClk (
 [out] int&  ExtClkFreq      // Measurement of external-clock frequency
);
```

## Parameters

*TsRate*

Output parameter that is set to a measurement of the frequency of the signal applied to the external-clock input. For an accurate estimate, the external clock signal must be present and stable for at least one second.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | External-clock frequency has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The frequency returned is a *byte* rate that must be multiplied by 8 or 8*204/188 to obtain the corresponding Transport-Stream rate.

# DtOutpChannel::GetFailsafeAlive

Get current alive (relais) status.

```
DTAPI_RESULT DtOutpChannel::GetFailsafeAlive (
[out] bool& Alive
);
```

## Parameters

*Alive*

Indicates the current alive (relais) status.
If false the failsafe timeout has expired before the user called the **SetFailsafeAlive** method, the relais will be in failsafe mode (i.e. output = input). If true the failsafe time has not expired yet and the relais is not in failsafe mode (i.e. input =input and output=output).

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Alive status has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_CONFIG** | The channel is not configured as failsafe output |
| **DTAPI_E_NOT_SUPPORTED** | The channel is not failsafe capable |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

# DtOutpChannel::GetFailsafeConfig

Get failsafe configuration.

```
DTAPI_RESULT DtOutpChannel::GetFailsafeConfig (
 [out] bool&  Enable,        // Failsafe configuration Enabled/Disabled
 [out] int&   Timeout        // Watchdog timeout (in ms)
);
```

## Parameters

*Enable*

Failsafe configuration has been enabled or disabled (see also **SetFailsafeConfig**).

*Timeout*

Current failsafe timeout period (in ms)

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Failsafe configuration has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_CONFIG** | The channel is not configured as failsafe output |
| **DTAPI_E_NOT_SUPPORTED** | The channel is not failsafe capable |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

# DtOutpChannel::GetFifoLoad

Get the current load of the channel's Transmit FIFO.

```
DTAPI_RESULT DtOutpChannel::GetFifoLoad (
 [out] int&  FifoLoad        // Load of Transmit FIFO
);
```

## Parameters

*FifoLoad*
Number of bytes in the Transmit FIFO.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | FIFO load has been retrieved successfully |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The value retrieved with this method call *approximates* the load of the Transmit FIFO. The actual number of bytes buffered on the card may be up to 2180 bytes higher. *FifoLoad* cannot be less than the Transmit-FIFO load.

If a Data transfer is in progress and/or the transmit-control state is **DTAPI_TXCTRL_SEND**, then every call to **GetFifoLoad** may return a different value.

# DtOutpChannel::GetFifoSize

Get the current size of the channel's Transmit FIFO.

```
DTAPI_RESULT DtOutpChannel::GetFifoSize (
 [out] int&  FifoSize        // Size of Transmit FIFO in bytes
);
```

## Parameters

*FifoSize*

Size of the Transmit FIFO in number of bytes.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | FIFO size has been retrieved successfully |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

# DtOutpChannel::GetFlags

Get status flags of the output channel.

```
DTAPI_RESULT DtOutpChannel::GetFlags (
 [out] int&  Status,          // Status flags
 [out] int&  Latched          // Latched status flags
);
```

## Parameters

*Status*

Output parameter that is set to a value describing the current status of the output channel. Each status flag is represented by one bit. Multiple status flags can be set at the same time. If none of the status flags is asserted, *Status* is set to zero.

| Value | Meaning |
|---|---|
| **DTAPI_TX_DMA_PENDING**<br>**DTAPI_TX_PENDING** | A data transfer is pending. No latched version of this flag is available. |
| **DTAPI_TX_FIFO_UFL** | A Transmit-FIFO underflow condition has occurred. Underflow detection is available in all transmit modes, including modes with null-packet stuffing switched on. |
| **DTAPI_TX_MUX_OVF** | An overflow has been detected in hierarchical multiplexing for ISDB-T |
| **DTAPI_TX_READBACK_ERR** | The hardware has detected that an output pin is forced to an erroneous signal level, e.g. because of a short-circuit (DTA-102 only). |
| **DTAPI_TX_SYNC_ERR** | A Transmit-FIFO synchronisation-error has occurred. The size of one or more packets in the output mode does not match the Transmit Mode.<br>This status flag is not used in Transmit Mode **DTAPI_TXMODE_RAW**. |
| **DTAPI_TX_TARGET_ERR** | The target adapter signals a fault (DTA-102 only). |
| **DTAPI_RX_LINK_ERR** | The communication link with the device is broken (DTE-31xx devices only) |
| **DTAPI_RX_DATA_ERR** | Data is lost during transfer to the device (DTE-31xx devices only) |

*Latched*

Output parameter that *latches* the value of the status flags: If a status flag has become '1', even for a very short moment, the corresponding bit in *Latched* is set to '1'. The bit remains set until cleared explicitly by **ClearFlag**, or implicitly by one of the following DTAPI-calls: **ClearFifo**, **AttachToSlot**, **AttachToType** or **Reset**.

The following flag is not latched: **DTAPI_TX_PENDING**; the corresponding bit position is always set to '0'.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Status flags have been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The **DTAPI_TX_PENDING** flag can be used to poll whether a Data transfer is complete. However, it is discouraged to create a polling loop that waits until DMA is done. Instead, use **DmaWaitForDone** to suspend the thread until DMA is done.

# DtOutpChannel::GetMaxFifoSize

Get the maximum size of the Transmit FIFO on the device.

```
DTAPI_RESULT DtOutpChannel::GetMaxFifoSize (
 [out] int&  MaxFifoSize     // Maximum size of FIFO in bytes
);
```

## Parameters

*MaxFifoSize*

Maximum size of the Transmit FIFO in number of bytes.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Maximum size of Transmit FIFO has been read successfully |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The actual size of the Transmit-FIFO is adjustable in software with **SetFifoSize**.

The DTA-100, DTA-102 and DTA-140 support a maximum Transmit-FIFO size of 8.388.608 bytes. Later revisions of these boards support at least this size, but potentially the maximum FIFO size may become larger.

# DtOutpChannel::GetModControl

Get modulation-control parameters for Transport-Stream output channels with a built-in modulator.

```
DTAPI_RESULT DtOutpChannel::GetModControl (
 [out] int&  ModType,        // Modulation type
 [out] int&  ParXtra0,       // Extra parameter #0
 [out] int&  ParXtra1,       // Extra parameter #1
 [out] int&  ParXtra2        // Extra parameter #2
);
```

## Parameters

*ModType*

Output parameter that is set to the modulation type. See **SetModControl** for a list of applicable values.

*ParXtra0, ParXtra1, ParXtra2*

Extra modulation parameters. See **SetModControl** for a list of applicable values.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The modulation parameters have been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not include a modulator |

## Remarks

# DtOutpChannel::GetOutputLevel

Get current level (in dBm) for outputs with an adjustable output level.

```
DTAPI_RESULT DtOutpChannel::GetOutputLevel (
 [out] int&  LeveldBm);      // Current level in units of 0.1dBm
```

## Parameters

*LeveldBm*

Output level expressed in units of 0.1 dBm (e.g. -30 → -30×0.1 = -3dBm).

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The output level has been retrieved successfully |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The channel does not support a controllable output level |

## Remarks

# DtOutpChannel::GetRfControl

Get up-converter parameters for devices with on-board RF up-converter.

```
DTAPI_RESULT DtOutpChannel::GetRfControl (
  [in] __int64&  RfRate,      // RF frequency in Hz
 [out] int&  LockStatus       // Lock status of RF PLL
);
```

## Parameters

*RfRate*

Output parameters that is set to the current carrier frequency as programmed into the RF up-converter, expressed Hertz.
The RF frequency returned in *RfRate* may be different from the frequency programmed with **SetRfControl** because of rounding to the RF step size (see **SetRfControl** for a list of step sizes).

*LockStatus*

Output parameter that is set to the status of the RF up-converter PLL.

| Value | Meaning |
|---|---|
| **DTAPI_RFPLL_LOCK** | The RF PLL is in lock. This is the normal state in which the up-converter is generating a stable carrier frequency. |
| **DTAPI_RFPLL_NO_LOCK** | The RF PLL is out of lock. This status may occur temporarily when the RF rate is changed to another value. The no-lock status may occur permanently when the RF rate has been programmed (outside DTAPI) to a value that is incompatible with the output channel. |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The up-converter parameters have been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not have an RF up-converter |

## Remarks

# DtOutpChannel::GetTargetId

Get the target-adapter identifier (DTA-102 only).

```
DTAPI_RESULT DtOutpChannel::GetTargetId (
 [out] int&   Present,        // Target adapter present?
 [out] int&   TargetId        // Target-adapter identifier
);
```

## Parameters

*Present*

Output parameter that indicates whether a target adapter has been detected.

| Value | Meaning |
|---|---|
| **DTAPI_NO_CONNECTION** | Nothing is connected to the output connector of the DTA-102 |
| **DTAPI_DVB_SPI_SINK** | A standard DVB-SPI sink is connected to the DTA-102 |
| **DTAPI_TARGET_PRESENT** | A target adapter is present |
| **DTAPI_TARGET_UNKNOWN** | The system is busy assessing the situation on the output connector |

*TargetId*

Output parameter that is set to an integer value that uniquely identifies the target adapter. Refer to the DTA-102 documentation for a list of available target adapters.

A value is assigned to *TargetId* only if *Present* is **DTAPI_TARGET_PRESENT**.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Data has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The output channel does not support target adapters |

## Remarks

# DtOutpChannel::GetTransmitByteCount

This function is not available yet in the current version of the DTAPI

Get a sample from the free running 32-bit transmitted-number-of-bytes counter.

```
DTAPI_RESULT DtOutpChannel::GetTransmitByteCount (
 [out] int&  ByteCount       // Sample of #transmitted-bytes counter
);
```

## Parameters

*ByteCount*
Sample of the 32-bit transmitted-number-of-bytes counter.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | A valid sample of the counter was returned |
| **DTAPI_E_NOT_SUPPORTED** | The counter is not supported by the current output channel |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

This method is supported on the following devices:

| Device Type Number | Firmware Version |
|---|---|
| DTA-100 | V7 or higher |
| DTA-102 | V9 or higher |
| DTA-107(S2) | V1 or higher |
| DTA-140 | V3 or higher |
| DTU-205 | V1 or higher |

# DtOutpChannel::GetTsRateBps

Get the channel's current clock-generator mode and Transport-Stream rate.

```
DTAPI_RESULT DtOutpChannel::GetTsRateBps (
 [out] int&  ClockGenMode,   // Internal or external clock
 [out] int&  TsRate          // Transport-Stream rate in bps
);
DTAPI_RESULT DtOutpChannel::GetTsRateBps (
 [out] int&  TsRate          // Transport-Stream rate in bps
);
```

## Parameters

*ClockGenMode*

Output parameter that is set to the current clock-generator mode.

| Value | Meaning |
|---|---|
| **DTAPI_TXCLOCK_INTERNAL** | Internal clock generator |
| **DTAPI_TXCLOCK_EXTERNAL** | External clock input (DTA-102 only) |

*TsRate*

Output parameter that is set to the current Transport-Stream rate expressed in bits per second. If an external clock generator is used, *TsRate* is set to a measurement of the Transport-Stream rate corresponding to the signal on the external clock input. For an accurate estimate, the external clock signal must be present and stable for also at least one second.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Transport-Stream rate has been read successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The same remarks regarding Transport-Stream rate vs. transmit-clock rate apply as listed for **SetTsRateBps**.

# DtOutpChannel::GetTxControl

Get the channel's current transmit-control state.

```
DTAPI_RESULT DtOutpChannel::GetTxControl (
 [out] int&  TxControl       // Transmit-control state
);
```

## Parameters

*TxControl*

Refer to **SetTxControl** for a description of transmit-control states.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Transmit-control state has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

# DtOutpChannel::GetTxMode

Get the channel's current transmit mode.

```
DTAPI_RESULT DtOutpChannel::GetTxMode (
 [out] int&  TxMode,          // Transmit mode
 [out] int&  StuffMode        // Null-packet stuffing on/off
);
```

## Parameters

*TxMode, StuffMode*

Refer to **SetTxMode** for a description of transmit-control modes.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Transmit mode has been retrieved successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

# DtOutpChannel::ReadLoopBackData

This function is for diagnostics purposes only

Read data bytes from the channel's Transmit FIFO via the loop-back channel. The loop-back mode must be **DTAPI_LOOPBACK_MODE**.

```
DTAPI_RESULT DtOutpChannel::ReadLoopBackData (
 [out] char*  pBuffer,       // Data read back from Transmit FIFO
  [in] int  NumBytesToRead   // Number of bytes to be read
);
```

## Parameters

*pBuffer*

Pointer to the buffer that will receive the data read from the Transmit FIFO. The size of the buffer must be at least *NumBytesToRead*. The buffer pointer must be aligned to a 32-bit word boundary.

*NumBytesToRead*

Number of bytes to be read from the Transmit FIFO. *NumBytesToRead* must be positive and a multiple of four.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Read operation has been completed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_BUF** | The buffer is not aligned to a 32-bit word boundary |
| **DTAPI_E_INVALID_SIZE** | The specified transfer size is negative or not a multiple of four |
| **DTAPI_E_NO_LOOPBACK** | Channel is not in loop-back mode |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_UNDERFLOW** | Transmit FIFO contains less than *NumBytesToRead* bytes |

## Remarks

This method can be used for writing a Transmit-FIFO memory test.

Data from the Transmit FIFO can only be read back if the loop-back mode is **DTAPI_LOOPBACK_MODE**.

# DtOutpChannel::Reset

Reset output channel.

```
DTAPI_RESULT DtOutpChannel::Reset (
  [in] int  ResetMode
);
```

## Parameters

*ResetMode*

Specifies which part of the hardware and software should be reset. The following values are defined (values cannot be OR-ed together):

| Value | Meaning |
|---|---|
| **DTAPI_FIFO_RESET** | Reset the Transmit FIFO:<br>• Data transfers and packet transmission are halted instantaneously.<br>• All data pending in the Transmit FIFO is discarded.<br>• Transmit-control state is reset to **DTAPI_TXCTRL_IDLE**.<br>• Transmit-FIFO underflow flag is cleared. |
| **DTAPI_FULL_RESET** | Full reset:<br>• All actions for **DTAPI_FIFO_RESET**, plus:<br>• Transport-Stream rate is reset to zero (except for ISDB-T and OFDM modulation on DTA-110T) |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Output channel has been reset |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_MODE** | The specified value for *ResetMode* is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

A potential side-effect of calling **Reset** is that the packet currently being transmitted is truncated. For one packet, the number of bytes between two consecutive SYNC bytes is less than the packet size. To avoid such a truncation, **ClearFifo** may be used.

# DtOutpChannel::SetChannelModelling

Set channel-modelling parameters. This function may only be called while the transmit-control state is **DTAPI_TXCTRL_IDLE**.

```
DTAPI_RESULT DtOutpChannel::SetChannelModelling (
  [in] Bool   CmEnable,          // Enable/disable channel modelling
  [in] DtCmPars&   CmPars        // Channel modelling parameters
);
```

## Parameters

*CmEnable*

Enable channel modelling. This parameter provides an easy way to turn off channel modelling entirely.

*CmPars*

Channel-modelling parameters. See description of struct **DtCmPars**.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Channel-modelling parameters have been applied successfully |
| **DTAPI_E_CM_NUMPATHS** | The number of paths specified in **CmPars** exceeds the maximum number of paths |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The channel has no license for channel-modelling, or channel modelling is not supported for this type of channel |

## Remarks

# DtOutpChannel::SetFailsafeAlive

Reset the failsafe watchdog timer.

```
DTAPI_RESULT DtOutpChannel::SetFailsafeAlive ();
```

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Output channel has been reset |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_CONFIG** | The channel is not configured as failsafe output |
| **DTAPI_E_NOT_SUPPORTED** | The channel is not failsafe capable |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

Failing to call this method within the time-out set with **SetFailsafeConfig** will result in the onboard relais to switch to failsafe mode (i.e. output = input).

# DtOutpChannel::SetFailsafeConfig

Set failsafe configuration.

```
DTAPI_RESULT DtOutpChannel::SetFailsafeConfig (
  [in] bool  Enable,          // Enable/Disable failsafe configuration
  [in] int   Timeout=0        // Watchdog timeout (in ms)
);
```

## Parameters

*Enable*

Enables/disables the failsafe configuration.
When set to false, failsafe configuration is disabled and the relais will be permanently set to failsafe mode (i.e. output=input). Setting this parameter to true indicates the user application is ready to start the failsafe configuration. When enabled the user application should call the **SetFailsafeAlive** method once within the failsafe timeout period.

*Timeout*

Specifies the failsafe timeout period (in ms).
The timeout value must a multiple of 20 ms, if the value is not a multiple of 20ms it will be rounded downwards the closest multiple of 20ms. Setting the *Timeout* to zero indicates the parameter should be ignored (i.e. only the *Enable* parameter has a meaning)

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Output channel has been reset |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_CONFIG** | The channel is not configured as failsafe output |
| **DTAPI_E_NOT_SUPPORTED** | The channel is not failsafe capable |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

# DtOutpChannel::SetFifoSize

Set the size the Transmit FIFO on the device to a specified value (**SetFifoSize**) or to the maximum value supported by the channel (**SetFifoSizeMax**).

```
DTAPI_RESULT DtOutpChannel::SetFifoSize (
  [in] int  FifoSize          // Size of FIFO in bytes
);
DTAPI_RESULT DtOutpChannel::SetFifoSizeMax ( void );
```

## Parameters

*FifoSize*

Size of the Transmit FIFO in number of bytes.
*FifoSize* must be a multiple of 16 and may not exceed the maximum physical size of the Transmit FIFO (DTA-100, DTA-102 and DTA-140: 8.388.608 bytes).

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Size of the Transmit FIFO has been set successfully |
| **DTAPI_E_IN_USE** | The FIFO size cannot be changed because transmission-control state is **DTAPI_TXCTRL_HOLD** or **DTAPI_TXCTRL_SEND** |
| **DTAPI_E_INVALID_SIZE** | The specified FIFO size is negative, zero, not a multiple of 16 or greater than the maximum size |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The size of the Transmit FIFO determines the amount of packet data that is buffered on the device. It also determines the delay between transferring data to the device (with **DmaStartTransfer**) and transmission of that data.

A large value for *FifoSize* creates headroom for *jitter* in the supply of data. Jitter is caused by other processes that also need processor cycles, or e.g. by a disk that is seeking a new disk-head position. For applications in which the output data does not depend on any input – e.g. in a disk streamer application – it is recommended to set *FifoSize* to the largest possible value.

A small value for *FifoSize* enables a short end-to-end delay, which is suitable for data-only applications in which an occasional underflow of the Transmit FIFO may occur, e.g. IP gateway. For such applications, *FifoSize* may be set, for example, to twice the size of the DMA buffer. In the extreme the Transmit-FIFO size may even be set to 16 (the minimum), but then occasional null-packet stuffing is almost guaranteed.

For real-time applications that cannot tolerate buffer underflow – e.g. in a real-time encoder – a careful assessment must be made to find a suitable buffer size, involving both real-time analysis and a bit of experimentation.

# DtOutpChannel::SetIpPars

Set parameters for the transmission of a Transport Stream over IP.

```
DTAPI_RESULT DtOutpChannel::SetIpPars (
  [in] DtTsIpPars*  pTsIpPars   // TS-over-IP parameters
);
```

## Parameters

*SetIpPars*

New parameter set to be applied. Please refer to the **DtTsIpPars** page for a description of the parameters.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | TS-over-IP parameters have been applied successfully |
| **DTAPI_E_IN_USE** | Parameters cannot be changed because the channel is busy. The transmit-control state should be switched back to idle first |
| **DTAPI_E_INVALID_ARG** | The value of one of the TS-over-IP parameters is invalid |
| **DTAPI_E_NO_LINK** | IP parameters cannot be applied because the link is down |
| **DTAPI_E_DST_MAC_ADDR** | IP parameters cannot be applied because MAC address of destination cannot be determined. Most likely the destination address currently is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

**SetIpPars** should be called at least once after attaching to the hardware but before setting the transmit-control state to **DTAPI_TXCTRL_HOLD** or **DTAPI_TXCTRL_SEND**.

After the initial call to **SetIpPars**, parameters can be changed again, but only when the transmit-control state is **DTAPI_TXCTRL_IDLE**.

# DtOutpChannel::SetLoopBackMode

This function is for diagnostics purposes only.

Set the channel's loop-back mode.

```
DTAPI_RESULT DtOutpChannel::SetLoopBackMode (
  [in] int  Mode              // New loop-back mode
);
```

## Parameters

*Mode*

New loop-back mode according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_NO_LOOPBACK** | Normal operation.  No loop-back of data. |
| **DTAPI_LOOPBACK_MODE** | Loop-back mode. The physical output circuitry is disconnected from the Transmit FIFO. The data in the Transmit FIFO can be read using **ReadLoopBackData**. |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Loop-back state has been changed successfully |
| **DTAPI_E_INVALID_MODE** | The specified loop-back mode value is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

After **Attach** and after **Reset**, loop-back is turned off.

# DtOutpChannel::SetModControl

Set modulation-control parameters for modulator channels. There are four overloads. For ISDB-T without hierarchical multiplexing the first overload can be used. In this case the input of the modulator shall already be multiplexed and consist of 204-byte TMCC encoded packets.

```
// Overload #1 - To be used for all modulation modes except CMMB,
//               DVB-T2 and ISDB-T with hierarchical multiplexing
DTAPI_RESULT DtOutpChannel::SetModControl (
  [in] int  ModType,          // Modulation type: DTAPI_MOD_XXX
  [in] int  ParXtra0,         // Extra parameter #0
  [in] int  ParXtra1,         // Extra parameter #1
  [in] int  ParXtra2          // Extra parameter #2
);

// Overload #2 - To be used for CMMB
DTAPI_RESULT DtOutpChannel::SetModControl (
  [in] DtCmmbPars&  CmmbPars       // CMMB modulation parameters
);

// Overload #3 - To be used for DVB-T2
DTAPI_RESULT DtOutpChannel::SetModControl (
  [in] DtDvbT2Pars&  DvbT2Pars     // DVB-T2 modulation parameters
);

// Overload #4 - To be used for ISDB-T with hierarchical multiplexing
DTAPI_RESULT DtOutpChannel::SetModControl (
  [in] DtIsdbtPars&  IsdbtPars     // ISDB-T modulation parameters
                                   // for hierarchical multiplexing
);
```

## Parameters

*ModType, ParXtra0, ParXtra1, ParXtra2*

Modulation parameters. See the tables on the following pages for a detailed specification of each parameter, per DekTec board type and firmware version.

*CmmbPars*

CMMB modulation parameters; see description of **class DtCmmbPars**.

*DvbT2Pars*

DVB-T2 modulation parameters; see description of **class DtDvbT2Pars**.

*IsdbtPars*

ISDB-T modulation parameters for hierarchical multiplexing; see description of **class DtIsdbtPars**.

## Detailed Parameter Descriptions

| Page | Modulation Type |
|---|---|
| 189 | Overview |
| 190 | ADTB-T |
| 192 | ATSC |
| 81 | CMMB |
| 193 | DTMB |
| 195 | DVB-S |
| 196 | DVB-S.2 |

| Page | Modulation Type |
|---|---|
| 197 | DVB-T / DVB-H |
| 83 | DVB-T2 |
| 199 | IQ-DIRECT |
| 150, 200 | ISDB-T |
| 202 | QAM |
| | |
| | |

## Modulation Types

*ModType*

Modulation type:

L-Band

| ModType | Meaning | Available on |
|---|---|---|
| **DTAPI_MOD_DVBS_BPSK** | DVB-S, BPSK | DTA-107 |
| **DTAPI_MOD_DVBS_QPSK** | DVB-S, QPSK | DTA-107 |
| **DTAPI_MOD_DVBS2_8PSK** | DVB-S.2, 8-PSK | DTA-107, DTA-107S2 |
| **DTAPI_MOD_DVBS2_QPSK** | DVB-S.2, QPSK | DTA-107, DTA-107S2 |

VHF* / UHF

| ModType | Meaning | Available on |
|---|---|---|
| **DTAPI_MOD_ADTBT** | ADTB-T | DTA-110T, DTA-115<br>(DTMB option must be installed) |
| **DTAPI_MOD_ATSC** | ATSC VSB | DTA-110T Fw > 4<br>DTA-115 Fw > 0 |
| **DTAPI_MOD_DMBTH** | DMB-T/H | DTA-110T, DTA-115<br>(DTMB option must be installed) |
| **DTAPI_MOD_DVBT** | DVB-T / DVB-H | DTA-110T, DTA-115 |
| **DTAPI_MOD_IQDIRECT** | Direct I/Q-samples transmission | DTA-112, DTA-117<br>DTA-115 Fw > 1<br>DTA-116 Fw > 0 |
| **DTAPI_MOD_QAM16** | 16-QAM | ITU-T J.83 Annex A/C:<br>DTA-110, DTA-110T, DTA-115<br><br>ITU-T J.83 Annex B:<br>DTA-110, DTA-110T Fw > 3<br>DTA-115 Fw > 0 |
| **DTAPI_MOD_QAM32** | 32-QAM | |
| **DTAPI_MOD_QAM64** | 64-QAM | |
| **DTAPI_MOD_QAM128** | 128-QAM | |
| **DTAPI_MOD_QAM256** | 256-QAM | |

* VHF available on DTA-115 only

### Modulation Mode : ADTB-T

*ParXtra0*

Extra modulation parameter #1 is the OR of values for the following fields: Bandwidth, Constellation, FEC Code Rate, Frame Header Mode, Interleaver Mode, Pilots and Use Frame Numbering.

Bandwidth

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DTMB_5MHZ** | 5 MHz |
| **DTAPI_MOD_DTMB_6MHZ** | 6 MHz |
| **DTAPI_MOD_DTMB_7MHZ** | 7 MHz |
| **DTAPI_MOD_DTMB_8MHZ** | 8 MHz |
| **DTAPI_MOD_DTMB_BW_MSK** | AND mask |

Constellation

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DTMB_QAM4NR** | 4-QAM-NR; can only be used with FEC code rate 0.8 |
| **DTAPI_MOD_DTMB_QAM4** | 4-QAM |
| **DTAPI_MOD_DTMB_QAM16** | 16-QAM |
| **DTAPI_MOD_DTMB_QAM32** | 32-QAM; can only be used with FEC code rate 0.8 |
| **DTAPI_MOD_DTMB_QAM64** | 64-QAM |
| **DTAPI_MOD_DTMB_CO_MSK** | AND mask |

FEC Code Rate

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DTMB_0_4** | FEC code rate 0.4: FEC(7488, 3008) |
| **DTAPI_MOD_DTMB_0_6** | FEC code rate 0.6: FEC(7488, 4512) |
| **DTAPI_MOD_DTMB_0_8** | FEC code rate 0.8: FEC(7488, 6016) |
| **DTAPI_MOD_DTMB_RATE_MSK** | AND mask |

Frame Header Mode

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DTMB_PN420** | PN420: Frame header 1 (420 symbols 55.6$\mu$s) |
| **DTAPI_MOD_DTMB_PN595** | PN595: Frame header 2 (595 symbols 78.7$\mu$s) |
| **DTAPI_MOD_DTMB_PN945** | PN945: Frame header 3 (945 symbols 125$\mu$s) |
| **DTAPI_MOD_DTMB_PN_MSK** | AND mask |

Interleaver Mode

| Value | Meaning |
|---|---|
| DTAPI_MOD_DTMB_IL_1 | Interleaver mode 1: B=54, M=240 |
| DTAPI_MOD_DTMB_IL_2 | Interleaver mode 2: B=54, M=720 |
| DTAPI_MOD_DTMB_IL_MSK | AND mask |

Pilots

| Value | Meaning |
|---|---|
| DTAPI_MOD_DTMB_NO_PILOTS | No pilots |
| DTAPI_MOD_DTMB_PILOTS | Add pilots; Can be used in single-carrier mode only |
| DTAPI_MOD_DTMB_PIL_MSK | AND mask |

Use Frame Numbering

| Value | Meaning |
|---|---|
| DTAPI_MOD_DTMB_NO_FRM_NO | No frame numbering |
| DTAPI_MOD_DTMB_USE_FRM_NO | Use frame numbering |
| DTAPI_MOD_DTMB_UFRM_MSK | AND mask |

### Modulation Mode : ATSC

*ModType*

| ModType | Meaning | Available on | |
|---|---|---|---|
| **DTAPI_MOD_ATSC** | ATSC | DTA-110T<br>DTA-115 | Fw > 4<br>Fw > 0 |

*ParXtra0*

Extra modulation parameter #0 specifies the VSB constellation.

| ParXtra0 | Meaning | Symbol Rate (bd) | TS Rate (bps) |
|---|---|---|---|
| **DTAPI_MOD_ATSC_VSB8** | 8-VSB | 10,762,238 | 19,392,658 |
| **DTAPI_MOD_ATSC_VSB16** | 16-VSB | 10,762,238 | 38,785,317 |
| **DTAPI_MOD_ATSC_VSB_MSK** | AND-mask for ATSC constellation field | | |

*ParXtra1*

This parameter specifies the number of taps of each phase of the root-raised cosine filter that is used to shape the spectrum of the output signal. The number of taps can have any value between 2 and 256 (the implementation is optimized for powers of 2). Specifying more taps improves the spectrum, but increases processor overhead.
The recommend number of taps is 64 taps; If insufficient CPU power is available, 32 taps produces acceptable results, too.

*ParXtra2*

Not used in ATSC modulation.

### Modulation Mode : DTMB

*ParXtra0*

Extra modulation parameter #1 is the OR of values for the following fields: Bandwidth, Constellation, FEC Code Rate, Frame Header Mode, Interleaver Mode and Use Frame Numbering.

Bandwidth

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DTMB_5MHZ** | 5 MHz |
| **DTAPI_MOD_DTMB_6MHZ** | 6 MHz |
| **DTAPI_MOD_DTMB_7MHZ** | 7 MHz |
| **DTAPI_MOD_DTMB_8MHZ** | 8 MHz |
| **DTAPI_MOD_DTMB_BW_MSK** | AND mask |

Constellation

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DTMB_QAM4NR** | 4-QAM-NR; can only be used with FEC code rate 0.8 |
| **DTAPI_MOD_DTMB_QAM4** | 4-QAM |
| **DTAPI_MOD_DTMB_QAM16** | 16-QAM |
| **DTAPI_MOD_DTMB_QAM32** | 32-QAM; can only be used with FEC code rate 0.8 |
| **DTAPI_MOD_DTMB_QAM64** | 64-QAM |
| **DTAPI_MOD_DTMB_CO_MSK** | AND mask |

FEC Code Rate

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DTMB_0_4** | FEC code rate 0.4: FEC(7488, 3008) |
| **DTAPI_MOD_DTMB_0_6** | FEC code rate 0.6: FEC(7488, 4512) |
| **DTAPI_MOD_DTMB_0_8** | FEC code rate 0.8: FEC(7488, 6016) |
| **DTAPI_MOD_DTMB_RATE_MSK** | AND mask |

Frame Header Mode

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DTMB_PN420** | PN420: Frame header 1 (420 symbols 55.6$\mu$s) |
| **DTAPI_MOD_DTMB_PN945** | PN945: Frame header 3 (945 symbols 125$\mu$s) |
| **DTAPI_MOD_DTMB_PN_MSK** | AND mask |

Interleaver Mode

| Value | Meaning |
|---|---|
| DTAPI_MOD_DTMB_IL_1 | Interleaver mode 1: B=54, M=240 |
| DTAPI_MOD_DTMB_IL_2 | Interleaver mode 2: B=54, M=720 |
| DTAPI_MOD_DTMB_IL_MSK | AND mask |

Use Frame Numbering

| Value | Meaning |
|---|---|
| DTAPI_MOD_DTMB_NO_FRM_NO | No frame numbering |
| DTAPI_MOD_DTMB_USE_FRM_NO | Use frame numbering |
| DTAPI_MOD_DTMB_UFRM_MSK | AND mask |

### Modulation Mode : DVB-S

*ParXtra0*

Extra modulation parameter #0

| ParXtra0 | Meaning |
|---|---|
| **DTAPI_MOD_1_2** | Code rate 1/2 |
| **DTAPI_MOD_2_3** | Code rate 2/3 |
| **DTAPI_MOD_3_4** | Code rate 3/4 |
| **DTAPI_MOD_4_5** | Code rate 4/5 |
| **DTAPI_MOD_5_6** | Code rate 5/6 |
| **DTAPI_MOD_6_7** | Code rate 6/7 |
| **DTAPI_MOD_7_8** | Code rate 7/8 |

### Modulation Mode : DVB-S.2

*ParXtra0*

Extra modulation parameter #0 encodes the code rate.

| ParXtra0 | Meaning |
|---|---|
| **DTAPI_MOD_1_2** | Code rate 1/2 |
| **DTAPI_MOD_1_3** | Code rate 1/3 |
| **DTAPI_MOD_1_4** | Code rate 1/4 |
| **DTAPI_MOD_2_3** | Code rate 2/3 |
| **DTAPI_MOD_2_5** | Code rate 2/5 |
| **DTAPI_MOD_3_4** | Code rate 3/4 |
| **DTAPI_MOD_3_5** | Code rate 3/5 |
| **DTAPI_MOD_4_5** | Code rate 4/5 |
| **DTAPI_MOD_5_6** | Code rate 5/6 |
| **DTAPI_MOD_6_7** | Code rate 6/7 |
| **DTAPI_MOD_7_8** | Code rate 7/8 |
| **DTAPI_MOD_8_9** | Code rate 8/9 |
| **DTAPI_MOD_9_10** | Code rate 9/10 |

*ParXtra1*

Extra modulation parameter #1 encodes pilots yes/no and long/short FEC frame.

Pilots

| Value | Meaning |
|---|---|
| **DTAPI_MOD_S2_NOPILOTS** | Pilots disabled |
| **DTAPI_MOD_S2_PILOTS** | Pilots enabled |
| **DTAPI_MOD_S2_PILOTS_MSK** | AND-mask for this field |

Long or Short FECFRAME

| Value | Meaning |
|---|---|
| **DTAPI_MOD_S2_SHORTFRM** | Short FECFRAME (16.200 bits) |
| **DTAPI_MOD_S2_LONGFRM** | Long FECFRAME (64.800 bits) |
| **DTAPI_MOD_S2_FRM_MSK** | AND-mask for this field |

*ParXtra2*

Physical layer scrambling initialization sequence “n”, aka “Gold code”.

### Modulation Mode : DVB-T/DVB-H

*ParXtra0*

Extra modulation parameter #0 is the code rate.

| | |
|---|---|
| **DTAPI_MOD_1_2** | Code rate 1/2 |
| **DTAPI_MOD_2_3** | Code rate 2/3 |
| **DTAPI_MOD_3_4** | Code rate 3/4 |
| **DTAPI_MOD_5_6** | Code rate 5/6 |
| **DTAPI_MOD_7_8** | Code rate 7/8 |

*ParXtra1*

Extra modulation parameter #1 is the OR of values for the following fields: Bandwidth, Constellation, Guard Interval, Interleaving, Transmission Mode and DVB-H-Signalling.

Bandwidth

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DVBT_5MHZ** | 5 MHz |
| **DTAPI_MOD_DVBT_6MHZ** | 6 MHz |
| **DTAPI_MOD_DVBT_7MHZ** | 7 MHz |
| **DTAPI_MOD_DVBT_8MHZ** | 8 MHz |
| **DTAPI_MOD_DVBT_BW_MSK** | AND mask |

Constellation

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DVBT_QPSK** | QPSK |
| **DTAPI_MOD_DVBT_QAM16** | 16-QAM |
| **DTAPI_MOD_DVBT_QAM64** | 64-QAM |
| **DTAPI_MOD_DVBT_CO_MSK** | AND mask |

Guard Interval

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DVBT_G_1_32** | 1/32 |
| **DTAPI_MOD_DVBT_G_1_16** | 1/16 |
| **DTAPI_MOD_DVBT_G_1_8** | 1/8 |
| **DTAPI_MOD_DVBT_G_1_4** | ¼ |
| **DTAPI_MOD_DVBT_GU_MSK** | AND mask |

Interleaving

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DVBT_INDEPTH** | In-depth interleaver (2k, 4k) |
| **DTAPI_MOD_DVBT_NATIVE** | Native interleaver |
| **DTAPI_MOD_DVBT_IL_MSK** | AND mask |

Transmission Mode

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DVBT_2K** | 2k mode |
| **DTAPI_MOD_DVBT_4K** | 4k mode (DVB-H) |
| **DTAPI_MOD_DVBT_8K** | 8k mode |
| **DTAPI_MOD_DVBT_MD_MSK** | AND mask |

Disable DVB-H Signalling Service Indication

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DVBT_ENA4849** | Enable DVB-H signalling indication bits s48 and s49. *Note*: If *ParXtra2* is set to -1, s48 and s49 are disabled, too |
| **DTAPI_MOD_DVBT_DIS4849** | Disable DVB-H signalling bits by setting TPS length field to 31, or 23 when *ParXtra2* is set to -1 |
| **DTAPI_MOD_DVBT_4849_MSK** | AND mask |

DVB-H Signalling – Service Indication s48

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DVBT_S48_OFF** | Time slicing is not used |
| **DTAPI_MOD_DVBT_S48** | At least one elementary stream uses Time Slicing |
| **DTAPI_MOD_DVBT_S48_MSK** | AND mask |

DVB-H Signalling – Service Indication s49

| Value | Meaning |
|---|---|
| **DTAPI_MOD_DVBT_S49_OFF** | MPE-FEC is not used |
| **DTAPI_MOD_DVBT_S49** | At least one elementary stream uses MPE-FEC |
| **DTAPI_MOD_DVBT_S49_MSK** | AND mask |

*ParXtra2*

16-bit cell identifier (cell_id). If *ParXtra2* is set to -1, the cell identifier is disabled by setting the TPS length field to 23 (this disables the DVB-H Service Indication bits s48 and s49, too).

### Modulation Mode : IQ-DIRECT

*ParXtra0*

Extra modulation parameter #0 specifies which interpolation method is used.

Interpolation Method

| Value | Meaning |
|---|---|
| **DTAPI_MOD_INTERPOL_OFDM** | Use OFDM interpolation |
| **DTAPI_MOD_INTERPOL_QAM** | Use QAM interpolation |

*ParXtra1*

Extra modulation parameter #1 specifies the sample rate used by hardware to clock out I and Q samples. The valid range is 5,000,000 .. 9,200,000 samples per second.

## Remarks

If the modulation mode IQ-DIRECT is selected, the data written to the Transmit FIFO shall be an array of I/Q sample pairs. The samples are signed 16-bit integer in I, Q order.

### Modulation Mode : ISDB-T

*ParXtra0*

Extra modulation parameter #0 is the OR of values for the following fields: Initial Total Number of Segments, Bandwidth, Sample Rate and Sub Channel.

#### Initial Total Number of Segments

| Value | Meaning |
|---|---|
| **DTAPI_ISDBT_SEGM_1** | 1 segment |
| **DTAPI_ISDBT_SEGM_3** | 3 segments |
| **DTAPI_ISDBT_SEGM_13** | 13 segments |

The DTAPI needs the number of segments to initialise the modulator and to compute bit rates. When in operation, the ISDB-T modulator dynamically follows the number of segments encoded in the TMCC information.

#### Bandwidth

| Value | Meaning |
|---|---|
| **DTAPI_ISDBT_BW_5MHZ** | 5 MHz |
| **DTAPI_ISDBT_BW_6MHZ** | 6 MHz |
| **DTAPI_ISDBT_BW_7MHZ** | 7 MHz |
| **DTAPI_ISDBT_BW_8MHZ** | 8 MHz |
| **DTAPI_ISDBT_BW_MSK** | AND mask |

#### Sample Rate

| Value | Meaning |
|---|---|
| **DTAPI_ISDBT_SRATE_1_1** | Use nominal sample rate (512/63 MHz for 6MHz) |
| **DTAPI_ISDBT_SRATE_1_2** | Use nominal sample rate divided by 2 (at most 6 segments) |
| **DTAPI_ISDBT_SRATE_1_4** | Use nominal sample rate divided by 4 (at most 3 segments) |
| **DTAPI_ISDBT_SRATE_1_8** | Use nominal sample rate divided by 8 (at most 1 segment) |
| **DTAPI_ISDBT_SRATE_MSK** | AND mask |

This is the sample rate used by the hardware.

#### Sub Channel

Sub-channel number (0 .. 41) of the center segment of the spectrum.
WARNING: This parameter is only used for PRBS generation, not for actual frequency translation.

| Value | Meaning |
|---|---|
| **DTAPI_ISDBT_SUBCH_SHIFT** | Bit position of bit 0 of sub-channel number |
| **DTAPI_ISDBT_SUBCH_MSK** | AND mask for encoded sub-channel field |

*ParXtra1, ParXtra2*
Not used.

## Remarks

**SetModControl(DTAPI_MOD_ISDBT, int, int, int)** can be used only for modulation of "TMCC-encoded" streams with 204-byte packets (last 16 bytes containing the TMCC information). The DTAPI is capable of hierarchical multiplexing too, but for using that the overload **SetModControl(DtIsdbtPars&)** is to be used.

The ISDB-T modulator does not use the Broadcast Type parameter to set the number of segments. This enables the usage of **BTYPE_TV** for 1-segment modulation.

### Modulation Mode : QAM

*ModType*

The QAM constellation is encoded in *ModType* according to the following table.

| ModType | Meaning | Available on |
|---|---|---|
| **DTAPI_MOD_QAM16** | 16-QAM | ITU-T J.83 Annex A/C:<br>DTA-110, DTA-110T, DTA-115<br><br>ITU-T J.83 Annex B:<br>DTA-110, DTA-110T Fw > 3<br>DTA-115 Fw > 0 |
| **DTAPI_MOD_QAM32** | 32-QAM | |
| **DTAPI_MOD_QAM64** | 64-QAM | |
| **DTAPI_MOD_QAM128** | 128-QAM | |
| **DTAPI_MOD_QAM256** | 256-QAM | |

*ParXtra0*

Extra modulation parameter #0 is the ITU-T J.83 Annex.

| ITU-T J.83 Annex | Meaning | Available on |
|---|---|---|
| **DTAPI_MOD_J83_A** | J.83 annex A (DVB-C) | DTA-110, DTA-110T, DTA-115 |
| **DTAPI_MOD_J83_B** | J.83 annex B<br>("American QAM") | DTA-110, DTA-110T Fw > 3<br>DTA-115 Fw > 0 |
| **DTAPI_MOD_J83_C** | J.83 annex C<br>("Japanese QAM") | DTA-110, DTA-110T, DTA-115 |

*ParXtra1*

For J.83 Annex B, this parameter specifies the interleaving mode used as specified in the table below. For Annex A and C this parameter is not used.

| Value | CW | I | J | Burst protection 64-/256-QAM |
|---|---|---|---|---|
| **DTAPI_MOD_QAMB_I128_J1D** | 0001 | 128 | 1 | 95 µs / 66 µs |
| **DTAPI_MOD_QAMB_I64_J2** | 0011 | 64 | 2 | 47 µs / 33 µs |
| **DTAPI_MOD_QAMB_I32_J4** | 0101 | 32 | 4 | 24 µs / 16 µs |
| **DTAPI_MOD_QAMB_I16_J8** | 0111 | 16 | 8 | 12 µs / 8.2 µs |
| **DTAPI_MOD_QAMB_I8_J16** | 1001 | 8 | 16 | 5.9 µs / 4.1 µs |
| **DTAPI_MOD_QAMB_I128_J1** | 0000 | 128 | 1 | 95 µs / 66 µs |
| **DTAPI_MOD_QAMB_I128_J2** | 0010 | 128 | 2 | 190 µs / 132 µs |
| **DTAPI_MOD_QAMB_I128_J3** | 0100 | 128 | 3 | 285 µs / 198 µs |
| **DTAPI_MOD_QAMB_I128_J4** | 0110 | 128 | 4 | 379 µs / 264 µs |
| **DTAPI_MOD_QAMB_I128_J5** | 1000 | 128 | 5 | 474 µs / 330 µs |
| **DTAPI_MOD_QAMB_I128_J6** | 1010 | 128 | 6 | 569 µs / 396 µs |
| **DTAPI_MOD_QAMB_I128_J7** | 1100 | 128 | 7 | 664 µs / 462 µs |
| **DTAPI_MOD_QAMB_I128_J8** | 1110 | 128 | 8 | 759 µs / 528 µs |

*ParXtra2*

Not used.

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The modulation parameters have been set successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_BANDWIDTH** | Invalid value for bandwidth field |
| **DTAPI_E_INVALID_CONSTEL** | Invalid value for constellation field |
| **DTAPI_E_INVALID_FHMODE** | Invalid value for frame-header mode field |
| **DTAPI_E_INVALID_GUARD** | Invalid value for guard-interval field |
| **DTAPI_E_INVALID_INTERLVNG** | Invalid value for interleaving field |
| **DTAPI_E_INVALID_J83ANNEX**<br>**DTAPI_E_INVALID_ROLLOFF** | Invalid value for J.83 annex |
| **DTAPI_E_INVALID_MODE** | Modulation type is incompatible with modulator |
| **DTAPI_E_INVALID_PILOTS** | Pilots cannot be specified in C=1 mode |
| **DTAPI_E_INVALID_RATE** | Invalid value for convolutional rate or FEC code rate |
| **DTAPI_E_INVALID_TRANSMODE** | Invalid value for transmission-mode field |
| **DTAPI_E_INVALID_USEFRAMENO** | Invalid value for use-frame-numbering field |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not include a modulator |

### Remarks

Changing the modulation parameters may change the symbol rate!
This is because DTAPI automatically computes the symbol rate from the Transport-Stream rate (as set with **SetTsRateBps**) and the modulation parameters.

# DtOutpChannel::SetOutputLevel

Set current level (in dBm) for outputs with an adjustable output level.

```
DTAPI_RESULT DtOutpChannel::SetOutputLevel (
  [in] int  LeveldBm);       // Level in units of 0.1dBm
```

## Parameters

*LeveldBm*

Output level expressed in units of 0.1 dBm (e.g. -30 → -30×0.1 = -3 dBm). The table below specifies the valid range and the step size with which the output level can be specified. *LeveldBm* is rounded to the nearest level compatible with the supported step size.

| Device | Valid Range | | Step Size |
|---|---|---|---|
| DTA-107(S2) | DVB-S(2) | -47.0 .. -27.0 dBm | 0.1 dB |
| DTA-115(-ISDB) | QAM | -35.0 .. 0.0 dBm | 0.5 dB |
| | OFDM, ISDB-T | -38.0 .. -3.0 dBm | |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The output level has been set successfully |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The channel does not support a controllable output level |

## Remarks

# DtOutpChannel::SetPower

DTA-102 only. Turn on/off power for a target adapter attached to the DTA-102.

```
DTAPI_RESULT DtOutpChannel::SetPower(
  [in] int  Power            // New power state
);
```

## Parameters

*Power*

New power state according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_POWER_OFF** | No power is applied. The 25-pin sub_D connector is compatible with DVB-SPI |
| **DTAPI_POWER_ON** | Apply power (+5V) to pin 12 and 25 of the 25-pin sub-D connector |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Power state has been changed successfully |
| **DTAPI_E_INVALID_MODE** | The specified power-mode value is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The hardware function does not support a power connection for target adapters (DTA-100, DTA-140) |

## Remarks

After **Attach** and after **Reset**, power is turned off.

# DtOutpChannel::SetRfControl

Set up-converter parameters for devices with on-board RF up-converter.

```
DTAPI_RESULT DtOutpChannel::SetRfControl (
  [in] __int64  RfRate       // RF frequency in Hz
);
```

## Parameters

*RfRate*

New carrier frequency for RF up-converter, specified in Hertz. The table below specifies the valid range and the step size with which the RF rate can be specified. *RfRate* is rounded to the nearest RF frequency compatible with the frequency resolution.

| Device | Valid Range | Step Size |
|---|---|---|
| DTA-107(S2) | 950,000,000 – 2,150,000,000 Hz | 200,000 Hz |
| DTA-110(T)(-ISDB) | 400,000,000 – 862,000,000 Hz | 250,000 Hz |
| DTA-115(-ISDB) | 47,000,000 – 862,000,000 Hz | 100,000 Hz |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The carrier frequency has been changed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_RATE** | The specified carrier frequency is incompatible (too low or too high) with the up-converter |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The device does not have an RF up-converter |

## Remarks

Changing the RF frequency takes some time to let the PLL settle at the new frequency. The lock status of the PLL may be checked with **GetRfControl**.

# DtOutpChannel::SetRfMode

Set special modes for devices with on-board RF up-converter.

```
DTAPI_RESULT DtOutpChannel::SetRfMode (
  [in] int  RfMode           // Special up-converter mode
);
```

## Parameters

*RfMode*

New RF up-converter mode according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_UPCONV_CW** | Generate carrier only |
| **DTAPI_UPCONV_MUTE** | Mute RF output signal |
| **DTAPI_UPCONV_NORMAL** | Normal mode |

The RF-modes mentioned above can be OR-ed with the values specified in the table below:

| Value | Meaning |
|---|---|
| **DTAPI_UPCONV_SPECINV** | Enable spectral inversion |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The new mode has been set successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_MODE** | The specified up-converter mode is invalid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | The channel does not support the requested operation |

## Remarks

# DtOutpChannel::SetSNR

Sets noise generation mode and signal-to-noise ratio.

```
DTAPI_RESULT DtOutpChannel::SetSNR (
  [in] int  Mode,              // Noise generation mode
  [in] int  SNR                // desired SNR
);
```

## Parameters

*Mode*

Noise generation mode too use.

| Value | Meaning |
|---|---|
| **DTAPI_NOISE_DISABLED** | No noise generation |
| **DTAPI_NOISE_WNG_HW** | Use build-in hardware white noise generator |

*SNR*

Desired signal-to-noise ratio, expressed in units of 0.1 dB (e.g. 250 = 250×0.1 = 25 dB). The table below specifies the valid range for SNR, based on the used hardware and noise generation mode.

| Device | Noise mode | Valid SNR range |
|---|---|---|
| DTA-107 | DTAPI_NOISE_WNG_HW | 0.0 .. 35.9 dB |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Noise mode and SNR have been set successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_ARG** | SNR value is invalid |
| **DTAPI_E_INVALID_MODE** | The specified noise generation mode is not valid |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | Setting the SNR not supported |

## Remarks

# DtOutpChannel::SetTsRateBps

Set the channel's *Transport-Stream* rate. Please note that the Transport-Stream rate is always based on 188-byte packets, as defined in the MPEG-2 Systems specification. Therefore, the Transport-Stream rate will be different from the transmit clock for 204-byte transmit modes.

```
DTAPI_RESULT DtOutpChannel::SetTsRateBps (
  [in] int  ClockGenMode,    // Internal or external clock
  [in] int  TsRate           // Transport-Stream rate in bps
);
DTAPI_RESULT DtOutpChannel::SetTsRateBps (
  [in] int  TsRate           // Transport-Stream rate in bps
);
```

## Parameters

*ClockGenMode*

Clock generator mode.

| Value | Meaning |
|---|---|
| **DTAPI_TXCLOCK_INTERNAL** | Use internal clock generator |
| **DTAPI_TXCLOCK_EXTERNAL** | Use external clock input (DTA-102 only) |

*TsRate*

New Transport-Stream rate specified in bits per second. This parameter is ignored if *ClockGenMode* is **DTAPI_CLOCK_EXTERNAL**.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | The Transport-Stream rate has been changed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_CGMODE** | The specified clock-generator mode is invalid or incompatible with the attached hardware function |
| **DTAPI_E_INVALID_RATE** | The specified transport-rate is invalid (negative) or incompatible (too high) with the attached hardware function |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORTED** | Setting the TS rate is not allowed (ISDB-T) |

## Remarks

In modes **DTAPI_TXMODE_204** and **DTAPI_TXMODE_ADD16** the transmit-clock rate is set to 204/188 times the specified Transport-Stream clock.

The Transport-Stream rate is usually set in the initialisation phase just after **AttachToSlot**, **AttachToType** or **Reset**. It is recommended to first set the transmit mode with **SetTxMode** before setting the bit rate so that all packets, including the initial ones, are sent in the same format.

`SetTsRateBps` may also be used while packets are being transmitted. The DTA/U series of devices imposes no constraints on the bit-rate step size or on the number of changes per second. Note however that bit-rate changes may lead to a (temporary) violation of the MPEG-2 Systems requirements on Transport-Streams.

The Transport-Stream rate may be set to zero. This effectively disables packet transmission.

# DtOutpChannel::SetTxControl

Set the channel's transmit-control state.

```
DTAPI_RESULT DtOutpChannel::SetTxControl (
  [in] int  TxControl        // Transmit-control state
);
```

## Parameters

*TxControl*

New transmit-control state according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_TXCTRL_IDLE** | Execution of data transfers is disabled.<br>No packets from the Transmit FIFO are transmitted. However, the output is stuffed with null packets, except if transmit *mode* is **DTAPI_TXMODE_RAW**, in which case no packets are transmitted at all. |
| **DTAPI_TXCTRL_HOLD** | Data transfers are enabled. Data can be transferred until the Transmit FIFO is fully loaded.<br>Packet transmission is disabled, in the same way as in state **DTAPI_TXCLTRL_IDLE**. |
| **DTAPI_TXCTRL_SEND** | Normal operation. Both data transfers and packet transmission are enabled. |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Transmit-control state has been changed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INSUF_LOAD** | For modulators: FIFO load is insufficient to start modulation |
| **DTAPI_E_INVALID_MODE** | The specified transmit-control state is invalid or incompatible with the attached hardware function |
| **DTAPI_E_NO_IPPARS** | For TS-over-IP channels: cannot set transmission state because IP parameters have not been specified yet |
| **DTAPI_E_NO_TSRATE** | For modulators: TS rate has not been set but is required for starting modulation |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

### Remarks

Setting the transmit-control state can be used for controlled start-up and shutdown of the data-streaming process. In state **DTAPI_TXCTRL_HOLD**, the Transmit FIFO can be loaded with packets (using DMA transfers), while no packets are transmitted yet. Then, if enough *credit* has been built up in the Transmit FIFO, state **DTAPI_TXCTRL_SEND** is entered. This procedure prevents accidental Transmit-FIFO underflow in the start-up phase.

For TS-over-IP channels, state **DTAPI_TXCTRL_HOLD** or **DTAPI_TXCTRL_SEND** can only be entered if the IP transmission parameters have been specified using **SetIpPars**.

After **AttachToSlot**, **AttachToType** and after **Reset** the transmit-control state is initialised to **DTAPI_TXCTRL_IDLE**.

# DtOutpChannel::SetTxMode

Set the channel's transmit mode.

```
DTAPI_RESULT DtOutpChannel::SetTxMode (
  [in] int  TxMode,           // Transmit mode
  [in] int  StuffMode         // Null-packet stuffing on/off
                              // SDI: Black-frame stuffing on/off
);
```

## Parameters

*TxMode*

New transmit mode according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_TXMODE_188** | *188-byte mode*<br>Packets in the Transmit FIFO are assumed to be 188-bytes long. Packets are transmitted without modification. |
| **DTAPI_TXMODE_192** | *192-byte mode* (DTA-102 only)<br>Packets in the Transmit FIFO are assumed to be 192-bytes long. The SYNC byte of every second packet may be modified (not 0x47). PSYNC is pulsed at the start of every 192-byte packet. |
| **DTAPI_TXMODE_204** | *204-byte mode*<br>Packets in the Transmit FIFO are assumed to be 204-bytes long. Packets are transmitted without modification. |
| **DTAPI_TXMODE_ADD16** | *Add-16 bytes mode*<br>Packets in the Transmit FIFO are assumed to be 188-bytes long. The device adds 16 placeholder bytes (0) to every packet. |
| **DTAPI_TXMODE_RAW** | *Raw mode*<br>No assumptions are made on packet structure. Bytes in the buffer are transmitted unmodified. Null-packet stuffing cannot be applied.<br>This mode is not allowed for TS-over-IP channels. |

The following modes are valid for SDI-capable channels only.

| Value | Meaning |
|---|---|
| **DTAPI_TXMODE_SDI_FULL** | *Full SDI mode*<br>The data in the Transmit FIFO is assumed to be complete SDI frames, including all synchronisation information. |
| **DTAPI_TXMODE_SDI_ACTVID** | *Active Video SDI mode*<br>The data in the Transmit FIFO is assumed to be the active video part of SDI frames. The hardware adds blanking information to create a complete frame.<br>This mode can only be used in combination with Huffman compression (i.e. with **DTAPI_TXMODE_SDI_HUFFMAN** flag). |

| | |
|---|---|
| | When using this mode with Huffman compression disabled, the behaviour of the output channel is undefined. |

The following mode is valid for TS-over-IP transmission only.

| Value | Meaning |
|---|---|
| **DTAPI_TXMODE_IPRAW** | *Raw IP mode*<br>The Transmit FIFO is assumed to contain time-stamped IP packets that are transmitted unmodified.<br>Each IP packet provided to **DtOutpChannel::Write** shall be preceded by a **DtRawIpHeader** structure. |

For DVB-ASI output channels, *TxMode* can be OR-ed with **DTAPI_TXMODE_BURST**, which indicates that packets should be sent in bursts. If this flag is not specified, transmission of packet data is "continuous" (linear over time).

For SDI-capable output channels *TxMode* can be OR-ed with the values specified in the table below:

| Value | Meaning |
|---|---|
| **DTAPI_TXMODE_SDI** | *SDI mode*<br>Indicates that the output channel shall operate in SDI mode. If this flag is not used the channel operates in ASI mode. This flag is already OR-ed into the SDI-related transmit modes mentioned in the table above. |
| **DTAPI_TXMODE_SDI_10B** | *10-bit SDI samples*<br>Indicates that SDI data in the Transmit FIFO is assumed to consist of 10-bit SDI samples. If this flag is omitted, the 8-bit samples SDI samples are assumed. |
| **DTAPI_TXMODE_SDI_525** | *525-line mode*<br>Indicates that the SDI data in the Transmit FIFO is assumed to be 525-lines SDI. |
| **DTAPI_TXMODE_SDI_625** | *625-line mode*<br>Indicates that the SDI data in the Transmit FIFO is assumed to be 625-lines SDI. |
| **DTAPI_TXMODE_SDI_HUFFMAN** | *Huffman compression*<br>Indicated that the SDI frame in the Transmit FIFO is assumed to be Huffman compressed. |

For genlock-capable cards the output channel can be configured to operate in genlock mode (see **SetIOConfig**). When the genlock mode and the requested transmit mode conflict, **DTAPI_E_INVALID_MODE** error will be returned.
Please refer to section 4 for more details about the SDI data formats.

*StuffMode*

This parameter controls the behaviour of the output when there is no packet data available for transmission from the Transmit FIFO.

For channels in ASI transmission mode:

If *StuffMode* is '1' (On), the output is stuffed with null packets. The size of inserted null packets is matched to *TxMode*. Packet Stuffing is not supported if *TxMode* is **DTAPI_TXMODE_RAW**, because both packet size and packet boundaries are unknown (**DTAPI_E_MODE** error is returned.)

If *StuffMode* is '0' (Off), null-packet stuffing is not applied. If the Transmit FIFO underflows:
- For DVB-ASI outputs (DTA-100, DTA-140), the output is stuffed with K28.5 characters;
- For DVB-SPI outputs (DTA-102), DVALID is de-asserted.

For channels in SDI transmission mode (e.g. **DTAPI_TXMODE_SDI_FULL**) this parameter is ignored for non-genlock capable channels.

When the card is SDI genlock capable but the output channel is not configured to operate in genlock mode this parameter can be used to manually enable *black-frame stuffing*. When black-frame stuffing is enabled, the SDI output is stuffed with black frames when there is no packet data available in the Transmit FIFO.

Note that this parameter is ignored when the TX Channel is in SDI genlock mode, since the driver will automatically enable black-frame stuffing in this case.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Transmit mode has been changed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_MODE** | The specified transmit mode is invalid or incompatible with the output channel |
| **DTAPI_E_NO_GENREF** | No genlock reference port has been configured |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_IDLE** | For DTA-110T and DTA-160 only: transmit mode can only be changed when transmit-control state is **DTAPI_TXCLTRL_IDLE** |

## Remarks

Changing the transmit mode may change the transmit-clock rate!

E.g. if transmit mode is changed from **DTAPI_TXMODE_ADD16** to **DTAPI_TXMODE_188** the transmit-clock is multiplied by 188/204. The DTAPI keeps the Transport-Stream rate constant.

The transmit mode is usually set in the initialisation phase just after **AttachToSerial**, **AttachToSlot**, **AttachToType** or **Reset**. It is recommended to set the transmit mode before setting the Transport-Stream rate.

**SetTxMode** may also be used while packets are being transmitted; no hardware constraints apply. However, an uncontrolled transition effect in the Transport Stream may occur. It is recommended to stop transmission and clear the Transmit FIFO with **ClearFifo** before changing transmit mode.

# DtOutpChannel::SetTxPolarity

Set polarity of DVB-ASI output signal.

```
DTAPI_RESULT DtOutpChannel::SetTxPolarity (
  [in] int  TxPolarity       // Polarity (normal or inverted)
);
```

## Parameters

*TxPolarity*

New polarity according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_TXPOL_NORMAL** | Generate a 'normal' ASI signal |
| **DTAPI_TXPOL_INVERTED** | Generate an inverted ASI signal |

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Polarity has been changed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_MODE** | The specified polarity mode is invalid or incompatible with the output channel |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |
| **DTAPI_E_NOT_SUPPORT** | Setting the polarity is not support by this channel |

## Remarks

Use this method to test if your ASI receiver is available of receiving both normal and inverted ASI signals.

NOTE: many ASI receivers do not support an inverted ASI signal.

# DtOutpChannel::Write

Write data bytes to the output channel.

```
DTAPI_RESULT DtOutpChannel::Write (
  [in] char*  pBuffer,       // Pointer to data to be written to hardware
  [in] int  NumBytesToWrite  // Number of bytes to be written to hardware
);
```

## Parameters

*pBuffer*

Pointer to the buffer containing the data to be written to the output channel. The pointer must be aligned to a 32-bit word boundary.

*NumBytesToWrite*

Number of bytes to be to be written to the output channel. The buffer size must be positive and a multiple of four.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Write operation has been completed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_BUF** | The buffer is not aligned to a 32-bit word boundary |
| **DTAPI_E_INVALID_SIZE** | The specified transfer size is negative or not a multiple of four |
| **DTAPI_E_IDLE** | For TS-over-IP channels: cannot write data because transmission-control state is **DTAPI_TXCTRL_IDLE** |
| **DTAPI_E_NO_TSRATE** | For TS-over-IP channels: cannot write data because Transport-Stream rate has not been specified, or is too low |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The data buffer can be any buffer in user space that is aligned to a 4-byte boundary. The device driver locks the physical pages of the buffer in memory. If the pages were swapped to disk, they are read back into memory. Then for PCI Cards a scatter/gather list is created and the DMA transfer is initiated.

**Write** returns when all data has been transferred to the Transmit FIFO. Note that data is only transferred when the transmit-control state is **DTAPI_TXCTRL_HOLD** or **DTAPI_TXCTRL_SEND** (see SetTxControl), *and* if sufficient space is available in the Transmit FIFO.

The thread executing **Write** sleeps if one of the following conditions is true:

- Transmit-control state is **DTAPI_TXCTRL_IDLE** (except for TS-over-IP channels; in this case, **Write** returns **DTAPI_E_IDLE**).
- Transmit-control state is **DTAPI_TXCTRL_HOLD**, and the number of bytes to be written is greater then the size of the Transmit FIFO.
- Transmit-control state is **DTAPI_TXCTRL_SEND**, and the transmit rate is zero.

The call will be completed if the blocking condition is removed (from another thread).

The old name of this function is **`WriteUsingDma`**. This latter function name is still defined for backward compatibility.

# DtOutpChannel::WriteDirect

This function is for diagnostics purposes only, please use method Write for 'ordinary' writing

Write data bytes to the output channel using "direct" write-cycles to the PCI bus.

```
DTAPI_RESULT DtOutpChannel::WriteDirect (
  [in] char*  pBuffer,       // Pointer to data to be written to hardware
  [in] int  NumBytesToWrite // Number of bytes to be written to hardware
);
```

## Parameters

*pBuffer*

Pointer to the buffer containing the data to be written to the output channel. The pointer must be aligned to a 32-bit word boundary.

*NumBytesToWrite*

Number of bytes to be written to the output channel. The buffer size must be positive and a multiple of four.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Write operation has been completed successfully |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_INVALID_BUF** | The buffer is not aligned to a 32-bit word boundary |
| **DTAPI_E_INVALID_SIZE** | The specified transfer size is negative or not a multiple of four |
| **DTAPI_E_FIFO_FULL** | The operation timed out because the Transmit FIFO is full |
| **DTAPI_E_NOT_ATTACHED** | Channel object is not attached to a hardware function |

## Remarks

The data buffer can be any buffer in user space that is aligned to a 4-byte boundary.

For USB Devices **WriteDirect** has exactly the same function as **Write**, but for PCI cards **WriteDirect** is considerably slower because the processor writes the data bytes directly to the PCI bus instead of using DMA. **WriteDirect** should only be used for special purposes, e.g. for PCI-card validation.

Unlike **Write**, this function cannot block. If the write operation takes too long, error code **DTAPI_E_FIFO_FULL** is returned.

# TsInpChannel

Class representing an input channel for receiving an MPEG-2 Transport Stream.

```
class TsInpChannel : public DtInpChannel {
  :       :       :
};
```

## Description

Class **TsInpChannel** is a specialisation of the generic **DtInpChannel** class. **TsInpChannel** supports the Transport-Stream functions of **DtInpChannel**. Methods dedicated to SDI will fail.

# TsOutpChannel

Class representing an output channel for transmitting an MPEG-2 Transport Stream.

```
class TsOutpChannel : public DtOutpChannel {
  :       :       :
};
```

## Description

Class **TsOutpChannel** is a specialisation of the generic **DtOutpChannel** class. **TsOutpChannel** supports the Transport-Stream functions of **DtOutpChannel**. Methods dedicated to SDI will fail.

# DtLoop

**DtLoop** class represents an object that provides functionality to loop MPEG-2 transport-streams from a DtInpChannel to a DtOutpChannel object.

```
class DtLoop;
```

# DtLoop::AttachToInput

Attach a **DtInpChannel** object to the loop object.

```
DTAPI_RESULT DtLoop::AttachToInput (
  [in] DtInpChannel*  pDtInp       // Input channel to attach
);
```

## Parameters

*pDtInp*

Pointer to the **DtInpChannel** object to be used as input by the **DtLoop** object. The **DtInpChannel** object, passed here, must stay in scope until the object is detached from the **DtLoop** object.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Loop object has been attached successfully to input channel |
| **DTAPI_E_ATTACHED** | Loop object is already attached to a other input channel |
| **DTAPI_E_INVALID_ARG** | Invalid *pDtInp* pointer (i.e. NULL-pointer) |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHTED** | The *pDtInp* object has not been attached to any hardware input function |

## Remarks

After attaching a **DtInpChannel** object to a **DtLoop** object the **DtInpChannel** object may still be used to apply certain settings like setting the IP-over-TS parameters (**DtInpChannel::SetTsIpPars**) or getting the Ts-Rate (**DtInpChannel::GetTsRateBps**). However note that certain methods on the **DtInpChannel** object will have limited functionality or may not be called while the object is attached to a **DtLoop** object. For example the **DtInpChannel::Read** method may not be called while attached to a **DtLoop** object.

# DtLoop::AttachToOutput

Attach a **DtOutpChannel** object to the loop object.

```
DTAPI_RESULT DtLoop::AttachToOutput (
  [in] DtOutpChannel*  pDtOutp         // Output channel to attach
);
```

## Parameters

*pDtOutp*

Pointer to the **DtOutpChannel** object to be used as input by the **DtLoop** object. The **DtOutpChannel** object, passed here, should stay in scope until the object is detached from the **DtLoop** object.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Loop object has been attached successfully to input channel |
| **DTAPI_E_ATTACHED** | Loop object is already attached to a other input channel |
| **DTAPI_E_INVALID_ARG** | Invalid *pDtOutp* pointer (i.e. NULL-pointer) |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |
| **DTAPI_E_NOT_ATTACHTED** | The *pDtOutp* object has not been attached to any hardware input function |

## Remarks

After attaching a **DtOutpChannel** object to a **DtLoop** object the **DtOutpChannel** object may still be used to apply certain settings like setting the IP-over-TS parameters (**DtOutpChannel::SetTsIpPars**). However note that certain methods on the **DtOutpChannel** object will have limited functionality or may not be called while the object is attached to a **DtLoop** object. For example the **DtOutpChannel::Write** method may not be called while attached to a **DtLoop** object.

## DtLoop::Detach

Detaches the loop object from the associated **DtInpChannel** and **DtOutpChannel** objects.

```
DTAPI_RESULT DtLoop::Detach();
```

### Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Loop object has been detached successfully |
| **DTAPI_E_NOT_ATTACHED** | Loop object was not attached to any input or output |
| **DTAPI_E_NOT_IDLE** | Cannot detach while the loop object is started |

### Remarks

# DtLoop::DetachFromInput

Detaches the loop object from the associated **DtInpChannel** object

```
DTAPI_RESULT DtLoop::DetachFromInput ();
```

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Loop object has been detached successfully |
| **DTAPI_E_NOT_ATTACHED** | Loop object was not attached to any input |
| **DTAPI_E_NOT_IDLE** | Cannot detach while the loop object is started |

## Remarks

# DtLoop::DetachFromOutput

Detaches the loop object from the associated **DtOutpChannel** object

```
DTAPI_RESULT DtLoop::DetachFromOutput ();
```

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Loop object has been detached successfully |
| **DTAPI_E_NOT_ATTACHED** | Loop object was not attached to any output |
| **DTAPI_E_NOT_IDLE** | Cannot detach while the loop object is started |

## Remarks

# DtLoop::IsStarted

Returns true if looping from input-to-output has started.

```
bool DtLoop::IsStarted ();
```

## Result

| Result | Meaning |
|---|---|
| `true` | Looping has started |
| `false` | Looping has not started |

## Remarks

# DtLoop::SetStuffingMode

Set NULL-packet stuffing mode parameters.

```
DTAPI_RESULT DtLoop::SetStuffingMode (
  [in] int  Mode,              // Stuffing mode
  [in] int  TsRate             // Output rate
);
```

## Parameters

*Mode*

New stuffing mode according to the table below.

| Value | Meaning |
|---|---|
| **DTAPI_STUFFMODE_OFF** | Stuffing mode should be disabled |
| **DTAPI_STUFFMODE_ON** | Stuffing mode should be enabled |

*TsRate*

Specifies the desired output Transport-Stream rate. The **DtLoop** object will automatically add/remove NULL-packets to/from the received transport-stream to reach the rate specified here.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Stuffing mode has been set successfully |
| **DTAPI_E_INVALID_MODE** | The specified stuffing mode is invalid |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |

# DtLoop::Start

Start/Stop looping from input-to-output.

```
DTAPI_RESULT DtLoop::Start (
  [in] bool  Start=true      // Start looping
);
```

## Parameters

*Start*
Set to true too start looping. Set to false stop looping.

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Looping has started successfully |
| **DTAPI_E_NOT_ATTACHED** | Loop-controller object has not been attached to an input and/or output |
| **DTAPI_E_DEV_DRIVER** | Unclassified failure in device driver |

## Remarks

Before calling this method the loop-controller object must have been attached to an input and output through successful calls to **DtLoop::AttachToInput** and **DtLoop::AttachToOutput**

# DtSdi

The `DtSdi` class contains helper methods for processing SDI data.

```
class DtSdi;
```

# DtSdi::ConvertFrame

This method can be used to convert an SDI frame from one data format to another, e.g. from 10-bit uncompressed to Huffman compressed.

```
DTAPI_RESULT DtSdi::ConvertFrame (
     [in] unsigned int*  pInFrame,     // Buffer with input frame
 [in/out] int&   InFrameSize,          // [in] Size of input frame
                                       // [out] Number of bytes used
     [in] int   InFrameFormat,         // Format of input frame
     [in] unsigned int*  pOutFrame,    // Buffer for output frame
 [in/out] int&   OutFrameSize,         // [in] Size of output frame
                                       // [out] Number of bytes returned
     [in] int   OutFrameFormat         // Format of output frame
);
```

## Parameters

*pInFrame*

Buffer containing the frame to be converted. The buffer address shall be 32-bit aligned.

*InFrameSize*

As an input parameter this parameter indicates the number of bytes in the input frame buffer. The input buffer should comprise at least one complete frame, including any stuff-bytes required to achieve 32-bit alignment. Furthermore, *InFrameSize* must be a multiple of 4.
As an output parameter this parameter indicates how many bytes of the input frame buffer have been used.

*InFrameFormat*

Specifies the format of the frame-data in the input frame buffer.

| Value | Meaning |
|---|---|
| **DTAPI_SDI_FULL** | Complete SDI frame, including SAV/ EAV, horizontal and vertical blanking periods |
| **DTAPI_SDI_ACTVID** | Only the active video part of the SDI frame |

The format can optionally be combined (OR-ed) with the following flags:

| Value | Meaning |
|---|---|
| **DTAPI_SDI_HUFFMAN** | The frame is compressed with lossless Huffman compression |
| **DTAPI_SDI_625** | The frame contains 625 lines |
| **DTAPI_SDI_525** | The frame contains 525 lines |
| **DTAPI_SDI_8B** | 8-bit data samples: every 32-bit word contains four 8-bit samples |
| **DTAPI_SDI_10B** | Packed 10-bit samples: eight 10-bit samples are encoded in ten bytes |
| **DTAPI_SDI_16B** | One 10-bit sample per 16-bit word. Every 32-bit word in the frame buffer contains two 10-bit samples |

*pOutFrame*

Buffer to receive the converted frame. The buffer address shall be 32-bit aligned

*OutFrameSize*

As an input parameter this parameter indicates the size of the output frame buffer. The output buffer should be large enough to receive one complete frame and should be 32-bit aligned.
As an output parameter this parameter indicates the size of the converted output frame (i.e. number of bytes returned). The returned size includes any stuffing bytes added to the end of the frame to achieve 32-bit alignment.

*OutFrameFormat*

Specifies the desired format of the data format for the output frame (please refer to the *InFrameFormat* parameter for a description of the available formats).
NOTE: not every input format can be converted to every output format (e.g. it is not possible to convert between 525-line and 625-line frames)

## Result

| DTAPI_RESULT | Meaning |
|---|---|
| **DTAPI_OK** | Frame has successfully been converted |
| **DTAPI_E_INVALID_BUF** | The frame input or output buffer pointer is invalid (e.g. NULL pointer or not 32-bit aligned) |
| **DTAPI_E_INCOMP_FRAME** | The input buffer does not contain a complete frame |
| **DTAPI_E_OUTBUF_TOO_SMALL** | The output buffer is too small for receiving the converted frame |
| **DTAPI_E_UNSUP_CONV** | The requested conversion is not supported |

## Remarks

Please refer to section 4 for more details about the different SDI data formats.

# 4. Definition of data formats

This section provides details about the different data formats used by the DTAPI input and output channels.

## 4.1. 10-bit SDI format

In 10-bit SDI format, all 10 bits of the SDI samples are stored. The first sample that is stored is the EAV code of the first line of a frame. The first line of a frame is considered to be the first line in which the Field bit in the EAV code is '0', indicating the first field: line 1 in 625-line mode or line 4 in 525-line mode. The first sample of a frame is always stored on a 32-bit boundary. Data stuffing of three bytes is needed in 525-line video mode, since the number of bytes in such a 10-bit frame is not a multiple of four.

| Syntax | #bits | Mnemonic |
|---|---|---|
| sdi_10bit_stream() { | | |
| if (timestamp_flag) { | | |
| **timestamp[7..0]** | **8** | **uimsbf** |
| **timestamp[15..8]** | **8** | **uimsbf** |
| **timestamp[23..16]** | **8** | **uimsbf** |
| **timestamp[31..24]** | **8** | **uimsbf** |
| } | | |
| do { | | |
| for (line=1; line <= num_lines; line++) { | | |
| **sync_code** /* '1111 1111 11' */ | **10** | **bsrtlb** |
| **sync_code** /* '0000 0000 00' */ | **10** | **bsrtlb** |
| **sync_code** /* '0000 0000 00' */ | **10** | **bsrtlb** |
| **eav_code**(line) | **10** | **bsrtlb** |
| for (samp=1; samp<=hsyncs_per_line; samp++) { | | |
| **sample_data** | **10** | **bsrtlb** |
| } | | |
| **sync_code** /* '1111 1111 11' */ | **10** | **bsrtlb** |
| **sync_code** /* '0000 0000 00' */ | **10** | **bsrtlb** |
| **sync_code** /* '0000 0000 00' */ | **10** | **bsrtlb** |
| **sav_code**(line) | **10** | **bsrtlb** |
| for (samp=1; samp<=samps_per_line; samp++) { | | |
| **sample_data** | **10** | **bsrtlb** |
| } | | |
| } | | |
| if (sdi_std==Mode525) { | | |
| for (i=0; i<3; i++) { | | |
| **stuffing_byte** /* '0000 0000' */ | **8** | **bslbf** |
| } | | |
| } | | |
| } | | |
| } | | |

*timestamp*

The *timestamp* is a 32-bit field that indicates the value of the reference clock at the moment the first SDI sample of the payload enters the input channel.

*sync_code*
Synchronisation byte as defined in BT-656 specification.

*eav_code*
End of Active Video code as defined in BT-656 specification. This code depends on the line number.

*sav_code*
Start of Active Video code as defined in BT-656 specification. This code depends on the line number.

*sample_data*
The 10-bit SDI samples.

*stuffing_byte*
Byte that is produced at the end of a 525-line mode frame only, with the purpose of aligning the first sample of the next frame to a 32-bit boundary

## 4.2. 8-bit SDI format

In 8-bit SDI format, only the most significant eight bits of each SDI sample are stored. The first byte is the EAV code of the first line of a frame. The first line of a frame is considered to be the first line in which the Field bit in the EAV code is '0', indicating the first field: line 1 in 625-line mode or line 4 in 525 line mode. The first sample of a frame is always stored on a 32-bit boundary. No data stuffing is needed since in all video modes the number of bytes in an 8-bit frame is divisible by four.

| Syntax | #bits | Mnemonic |
|---|---|---|
| sdi_8bit_stream() { | | |
| if (timestamp_flag) { | | |
| **timestamp[7..0]** | **8** | **uimsbf** |
| **timestamp[15..8]** | **8** | **uimsbf** |
| **timestamp[23..16]** | **8** | **uimsbf** |
| **timestamp[31..24]** | **8** | **uimsbf** |
| } | | |
| do { | | |
| for (line=1; line <= num_lines; line++) { | | |
| **sync_code** /* '1111 1111' */ | **8** | **bslbf** |
| **sync_code** /* '0000 0000' */ | **8** | **bslbf** |
| **sync_code** /* '0000 0000' */ | **8** | **bslbf** |
| **eav_code**(line) | **8** | **bslbf** |
| for (samp=1; samp<=hsyncs_per_line; samp++) { | | |
| **sample_byte** | **8** | **bslbf** |
| } | | |
| **sync_code** /* '1111 1111' */ | **8** | **bslbf** |
| **sync_code** /* '0000 0000' */ | **8** | **bslbf** |
| **sync_code** /* '0000 0000' */ | **8** | **bslbf** |
| **sav_code**(line) | **8** | **bslbf** |
| for (samp=1; samp<=samps_per_line; samp++) { | | |
| **sample_byte** | **8** | **bslbf** |
| } | | |
| } | | |
| } | | |
| } | | |

*timestamp*
The *timestamp* is a 32-bit field that indicates the value of the reference clock at the moment the first SDI sample of the payload enters the input channel.

*sync_code*
Synchronisation byte as defined in BT-656 specification.

*eav_code*
End of Active Video code as defined in BT-656 specification. This code depends on the line number.

*sav_code*
Start of Active Video code as defined in BT-656 specification. This code depends on the line number.

*sample_byte*
The SDI video data with the two least significant bits removed.

## 4.3. Huffman-Compressed SDI format

DekTec's SDI capable input and output channels support a custom Huffman encoding scheme for compressing of SDI frames. Using the compressed format can be useful to reduce the size of recorded SDI files. The using compression can also be used too reduce PCI or USB bandwidth requirements, leaving more bandwidth for additional traffic.

The table below provides the syntax of a compressed SDI frame.

| Syntax | #bits | Mnemonic |
|---|---|---|
| sdi_compressed_stream_with_blanking () { | | |
| if (timestamp_flag) { | | |
| **timestamp[7..0]** | **8** | **uimsbf** |
| **timestamp[15..8]** | **8** | **uimsbf** |
| **timestamp[23..16]** | **8** | **uimsbf** |
| **timestamp[31..24]** | **8** | **uimsbf** |
| } | | |
| do { | | |
| **sync_word** /* '11 1111 1111 1111 1111' */ | **18** | **bsrtlb** |
| for (line=1; line <= num_lines; line++) { | | |
| skip_samples(4); /* skip EAV */ | | |
| prev_data = blanking_level | | |
| for (samp=1; samp<=hsyncs_per_line; samp++) { | | |
| huffman(**sample_data** - **prev_data**) | **2-16** | **bsrtlb** |
| **prev_data** = **sample_data** | | |
| } | | |
| skip_samples(4); /* skip SAV */ | | |
| prev_data = blanking_level | | |
| for (samp=1; samp<=samps_per_line; samp++) { | | |
| huffman(**sample_data** - **prev_data**) | **2-16** | **bsrtlb** |
| **prev_data** = **sample_data** | | |
| } | | |
| } | | |
| if (alignment()!=32) { | | |
| **stuffing_data** /* '0' */ | **2-30** | **bsrtlb** |
| } | | |
| } | | |
| } | | |

*timestamp*
The *timestamp* is a 32-bit field that indicates the value of the reference clock at the moment the first SDI sample of the payload enters the input channel.

*sync_word*
The synchronisation code.

*sample_data*
The SDI video data.

*prev_data*
The previous sample of the SDI video data of the same type (Cb, Y, or Cr) as the current sample.

*stuffing_data*
Data that is produced at the end of a frame only, with the purpose of aligning the **sync_word** of the next frame to a 32-bit boundary

The table below provides the syntax of a compressed frame with only the active video part.

| Syntax | #bits | Mnemonic |
|---|---|---|
| sdi_compressed_stream_with_blanking () { | | |
| if (timestamp_flag) { | | |
| **timestamp[7..0]** | **8** | **uimsbf** |
| **timestamp[15..8]** | **8** | **uimsbf** |
| **timestamp[23..16]** | **8** | **uimsbf** |
| **timestamp[31..24]** | **8** | **uimsbf** |
| } | | |
| do { | | |
| **sync_word** /* '11 1111 1111 1111 1111' */ | **18** | **bsrtlb** |
| for (line=1; line <= num_lines; line++) { | | |
| skip_samples(4); /* skip EAV */ | | |
| prev_data = blanking_level | | |
| for (samp=1; samp<=hsyncs_per_line; samp++) { | | |
| huffman(**sample_data** - **prev_data**) | **2-16** | **bsrtlb** |
| **prev_data** = **sample_data** | | |
| } | | |
| skip_samples(4); /* skip SAV */ | | |
| prev_data = blanking_level | | |
| for (samp=1; samp<=samps_per_line; samp++) { | | |
| huffman(**sample_data** - **prev_data**) | **2-16** | **bsrtlb** |
| **prev_data** = **sample_data** | | |
| } | | |
| } | | |
| if (alignment()!=32) { | | |
| **stuffing_data** /* '0' */ | **2-30** | **bsrtlb** |
| } | | |
| } | | |
| } | | |

*timestamp*
The *timestamp* is a 32-bit field that indicates the value of the reference clock at the moment the first SDI sample of the payload enters the input channel.

*sync_word*
The synchronisation code.

*sample_data*
The SDI video data.

*prev_data*
The previous sample of the SDI video data of the same type (Cb, Y, or Cr) as the current sample.

*stuffing_data*
Data that is produced at the end of a frame only, with the purpose of aligning the **sync_word** of the next frame to a 32-bit boundary

To convert between the compressed Huffman format and one of the uncompressed SDI formats the **DtSdi::ConvertFrame** function (see page **233**) can be used.

## 4.4. Transparent Mode Packets

Transparent mode is a combination of a tagged packet-oriented mode and raw mode. The tag stores for each packet a sequence-count number (required with PID filtering) and optionally a time stamp. The combination with raw mode enables detection of sync errors in parallel with performing timing analysis.

Transparent mode packets are generated by an input channel if the **DTAPI_RXMODE_STTRP** receive-mode is used (see **DtInpChannel::SetRxMode** page 144).

| Syntax | #bits | Mnemonic |
|---|---|---|
| transparent_packet() { | | |
| if (timestamp_flag) { | | |
| **timestamp[7..0]** | **8** | **uimsbf** |
| **timestamp[15..8]** | **8** | **uimsbf** |
| **timestamp[23..16]** | **8** | **uimsbf** |
| **timestamp[31..24]** | **8** | **uimsbf** |
| } | | |
| for (i=0; i<204; i++) { | | |
| **payload_byte** | **8** | **bslbf** |
| } | | |
| **sync_nibble** /* '0101' */ | **4** | **bslbf** |
| **packet_sync** | **1** | **bslbf** |
| **reserved** | **3** | **bslbf** |
| **valid_count** | **8** | **uimsbf** |
| **sequence_count[7..0]** | **8** | **uimsbf** |
| **sequence_count[15..8]** | **8** | **uimsbf** |
| } | | |

*timestamp*

The *timestamp* is a 32-bit field that indicates the value of the reference clock at the moment the first byte of the payload enters the input channel.

*payload_byte*

The packet's payload. The number of valid bytes in the payload is indicated by the *valid_count* field. When *packet_sync* is '1' (packet synchronisation is achieved) the first payload byte will usually be 47h, but not necessarily! This is because an incidental error in the sync byte will not cause loss of synchronisation.

*sync_nibble*

The *sync_nibble* is a fixed 4-bit field whose value is '0101' (5).

*packet_sync*

When set to '1' this flag indicates that packet synchronisation has been achieved.

*reserved*

These bits are reserved for future use.

*valid_count*

This field indicates the number of valid payload bytes. If the *packet_sync* flag is set this field would indicate 188 or 204. If the *packet_sync* flag is not set the value can be anything between 1 and 204.

NOTE: if the number of bytes is less than 204 the value of remaining bytes is undefined.

*sequence_count*

The *sequence_count* is a 16-bit field that contains the original sequence number of the packet in the Transport Stream. The value of the sequence counter is only valid if *packet_sync* is '1'. Without PID filtering, *sequence_count* will be incremented with each received packet. When PID filtering is used, *sequence_count* can be used to retrieve the number of packets that has been skipped.

## 4.5. L.3 Baseband frame format

L.3 Baseband frames are generated by an input channel if the **DTAPI_RXMODE_STL3** receive-mode is used (see **DtInpChannel::SetRxMode** page 144). Refer to the SatLabs L.3 document for more details on the L3 fields.

| Syntax | #bits | Mnemonic |
|---|---|---|
| L3_frame() { | | |
| if (timestamp_flag) { | | |
| **timestamp[7..0]** | **8** | **uimsbf** |
| **timestamp[15..8]** | **8** | **uimsbf** |
| **timestamp[23..16]** | **8** | **uimsbf** |
| **timestamp[31..24]** | **8** | **uimsbf** |
| } | | |
| **frameid** | **8** | **uimsbf** |
| **L3_Sync** | **8** | **uimsbf** |
| **L3_ACM_Command** | **8** | **uimsbf** |
| **L3_CNI (SNR)** | **8** | **uimsbf** |
| **L3_PL_FRAMEID** | **8** | **uimsbf** |
| for (i=0; i<10; i++) { | | |
| **bbheader_byte** | **8** | **uimsbf** |
| } | | |
| for (i=0; i<n; i++) { | | |
| **payload_byte** | **8** | **uimsbf** |
| } | | |
| } | | |

*timestamp*

The *timestamp* is a 32-bit field that indicates the value of the reference clock at the moment the first byte of the payload enters the input channel.

*frameid*

A Modulo-256 frame counter generated by the firmware. The counter is incremented for each baseband frame that is stored in the fifo.

*L3_Sync*

0xB8, For BBFrame Synchronisation

*L3_ACM_Command*

Received MODCOD and frame type
Bit 7..3 MODCOD
Bit 2..1 TYPE
Bit 0 Not used (set to 0)

*L3_CNI (SNR)*

8 Bit Carrier to Noise plus interference ratio.
Calculated over all received data bytes, updated every 500ms.

*L3_PL_FRAMEID*

A Modulo-256 frame counter generated by the demodulator.
The counter is incremented for each baseband frame detected by the demodulator.

*bbheader_byte*
The DVB-S2 bbheader. Refer to the DVB-S2 specification.

*payload_byte*
The baseband frame payload. Refer to the DVB-S2 specification.

# 5. Ports and Hardware Functions per Device

Table 7. DekTec PCI Devices – Ports and Hardware Functions

| Device | Port | Index | ChanType | StreamType | Capabilities | Remark |
|---|---|---|---|---|---|---|
| DTA-100 | 1 | 0 | OUTPUT | ASI_SDI | CAP_ASI | Doubly buffered |
| DTA-102 | 1 | 0 | OUTPUT | TS_SPI | | |
| DTA-105 | 1 | 0 | OUTPUT | ASI_SDI | CAP_ASI | |
| | 2 | 1 | OUTPUT | ASI_SDI | CAP_ASI \| CAP_DBLBUF | |
| DTA-107 | 1 | 0 | OUTPUT | TS_MOD | CAP_DVBS \| CAP_LBAND | Doubly buffered |
| DTA-107S2 | 1 | 0 | OUTPUT | TS_MOD | CAP_DVBS \| CAP_DVBS2 \| CAP_LBAND | Doubly buffered |
| DTA-110 | 1 | 0 | OUTPUT | TS_MOD | CAP_QAM \| CAP_UHF | Doubly buffered |
| DTA-110T | 1 | 0 | OUTPUT | TS_MOD | CAP_ATSC \| CAP_DVBT \| CAP_QAM \| CAP_UHF | CAP_DTMB is added when DTMB license is present CAP_ISDBT is added when ISDB-T license is present |
| DTA-112 | 1 | 0 | INPUT | ASI_SDI | CAP_ASI \| CAP_BIDIR \| CAP_TRPMODE | Programmable input/output |
| | 1 | 0 | OUTPUT | | | |
| | 2 | 0/1 | OUTPUT | TS_MOD | CAP_QAM \| CAP_VHF \| CAP_UHF \| CAP_ADJLVL | |
| DTA-115 | 1 | 0 | INPUT | ASI_SDI | CAP_ASI \| CAP_BIDIR | Programmable input/output |
| | 1 | 0 | OUTPUT | | | |
| | 2 | 0/1 | OUTPUT | TS_MOD | CAP_ATSC \| CAP_DVBT \| CAP_QAM \| CAP_VHF \| CAP_UHF \| CAP_ADJLVL | CAP_DTMB is added when DTMB license is present CAP_ISDBT is added when ISDB-T license is present |
| DTA-116 | 1 | 0 | INPUT | ASI_SDI | CAP_ASI \| CAP_BIDIR | Programmable input/output |
| | 1 | 0 | OUTPUT | | | |
| | 2 | 0/1 | OUTPUT | TS_MOD | CAP_ATSC \| CAP_DVBT \| CAP_QAM \| CAP_VHF \| CAP_UHF \| CAP_IF \| | CAP_DTMB is added when DTMB license is present CAP_ISDBT is added when ISDB-T license is present |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | CAP_DIGIQ | |
| DTA-117 | 1 | 0 | INPUT | ASI_SDI | CAP_ASI \| CAP_BIDIR | Programmable input/output |
| | 1 | 0 | OUTPUT | | | |
| | 2 | 0/1 | OUTPUT | TS_MOD | CAP_ATSC \| CAP_DVBT \| CAP_QAM \| CAP_VHF \| CAP_UHF \| CAP_IF \| CAP_DIGIQ | CAP_DTMB is added when DTMB license is present CAP_ISDBT is added when ISDB-T license is present |
| DTA-120 | 1 | 0 | INPUT | ASI_SDI | CAP_ASI | |
| DTA-122 | 1 | 0 | INPUT | TS_SPI | | |
| DTA-124 | 1..4 | 0..3 | INPUT | ASI_SDI | CAP_ASI \| CAP_SDI \| CAP_SDITIME | SDI time-stamping capability is supported in firmware version 2 or higher |
| DTA-140 | 1 | 0 | INPUT | ASI_SDI | CAP_ASI | |
| | 2 | 0 | OUTPUT | ASI_SDI | CAP_ASI | Doubly buffered |
| DTA-145 | 1 | 0 | INPUT | ASI_SDI | CAP_ASI \| CAP_BIDIR \| CAP_SDI \| CAP_SDITIME \| CAP_TRPMODE \| CAP_GENREF | Programmable input/output Transparent-packet-mode and SDI time-stamping capabilities are supported in firmware version 2 or higher |
| | | 0 | OUTPUT | | | |
| | 2 | 0/1 | OUTPUT | ASI_SDI | CAP_ASI \| CAP_SDI \| CAP_DBLBUF \| CAP_LOOPTHR \| CAP_FAILSAFE\| CAP_GENLOCKED | Double-buffered and loop-through capabilities are available in firmware version 2 or higher |
| DTA-160 | 1..3 | 0..2 | INPUT | ASI_SDI | CAP_ASI \| CAP_BIDIR \| CAP_SDI \| CAP_SDITIME \| CAP_TRPMODE \| CAP_DBLBUF \| CAP_LOOPTHR | Programmable input/output Transparent-packet, SDI time-stamping, double-buffered and loop-through mode are supported in firmware version 2 or higher |
| | | 0..2 | OUTPUT | | | |
| | 4 | 0 | INPUT \| OUTPUT | TS_OVER_IP | | Virtually unlimited number of parallel streams |

Table 8. DekTec PCIE Devices – Ports and Hardware Functions

| Device | Port | Index | ChanType | StreamType | Capabilities | Remark |
|---|---|---|---|---|---|---|
| DTA-2135 | 1 | 0 | INPUT | TS_MOD | CAP_DVBT \| CAP_TRPMODE \| CAP_IF_ADC \| CAP_DIVERSITY \| DTAPI_CAP_UHF \| DTAPI_CAP_VHF | Programmable as normal receiver or as diversity receiver. In normal mode this channel provides additional access to the sampled down-converted IF. |
| | 2 | 0 | INPUT | TS_MOD | CAP_DVBT \| CAP_TRPMODE \| CAP_SHARED \| DTAPI_CAP_UHF \| DTAPI_CAP_VHF | Programmable as additional independent receiver or as an additional receiver connected to the antenna of channel 1. This port is unavailable when port 1 is configured in diversity mode. |
| DTA-2137 | 1 | 0 | INPUT | TS_MOD | CAP_DVBS \| CAP_DVBS2 \| CAP_LBAND \| CAP_TRPMODE | Programmable as normal input or as APSK supporting input. |
| | 2 | 0 | INPUT | TS_MOD | CAP_DVBS \| CAP_DVBS2 \| CAP_LBAND \| CAP_TRPMODE \| CAP_SHARED | Programmable as APSK input, additional independent receiver or as an additional receiver connected to the antenna of channel 1. |
| | 3..4 | 0 | OUTPUT | ASI_SDI | CAP_ASI \| CAP_TRPMODE \| CAP_DBLBUF \| CAP_LOOPTHR | Programmable as independent ASI output, or as double buffered output or as loop-through of the demodulated transport stream(s). |
| DTA-2144 | 1..4 | 0..3 | INPUT<br>OUTPUT | ASI_SDI | CAP_ASI \| CAP_BIDIR \| CAP_SDI \| CAP_SDITIME \| CAP_TRPMODE \| CAP_GENREF \| CAP_GENLOCKED | Programmable input/output Transparent-packet-mode and SDI time-stamping capabilities supported |
| DTA-2145 | 1 | 0<br>0 | INPUT<br>OUTPUT | ASI_SDI | CAP_ASI \| CAP_BIDIR \| CAP_SDI \| CAP_SDITIME \| CAP_TRPMODE \| CAP_GENREF | Programmable input/output Transparent-packet-mode and SDI time-stamping capabilities are supported in firmware version 2 or higher |
| | 2 | 0/1 | OUTPUT | ASI_SDI | CAP_ASI \| CAP_SDI \| CAP_DBLBUF \| | Double-buffered and loop-through capabilities are available in firmware version |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | CAP_LOOPTHR \| CAP_FAILSAFE \| CAP_GENLOCKED | 2 or higher |

Table 9. DekTec DTE Devices – Ports and Hardware Functions

| Device | Port | Index | ChanType | StreamType | Capabilities | Remark |
|---|---|---|---|---|---|---|
| DTE-3100 | 1 | 0 | OUTPUT | ASI_SDI | CAP_ASI | Doubly buffered |
| DTE-3120 | 1 | 0 | INPUT | ASI_SDI | CAP_ASI | |