

# DTAPI

## | CORE DTAPI CLASSES

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## REFERENCE

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## Structures

### struct DtAtsc3DemodL1Data

This structure specifies the ATSC layer-1 signaling data.

```
struct DtAtsc3DemodL1Data
{
    DtAtsc3DemodBootstrapData m_Bootstrap;    // Bootstrap data
    DtAtsc3DemodL1BasicData m_L1Basic;        // L1-Basic data
    DtAtsc3DemodL1DetailData m_L1Detail;      // L1-Detail data
};
```

#### Members

*m\_Bootstrap*

Structure specifying the ATSC 3.0 bootstrap data. See **DtAtsc3DemodBootstrapData** for details.

*m\_L1Basic*

Structure specifying the ATSC 3.0 L1-Basic signaling data. See **DtAtsc3DemodL1BasicData** for details.

*m\_L1Detail*

Structure specifying the ATSC 3.0 L1-Detail signaling data. See **DtAtsc3DemodL1DetailData** for details.

## struct DtAtsc3DemodBootstrapData

This structure specifies the ATSC 3.0 bootstrap signaling data.

```

struct DtAtsc3DemodBootstrapData
{
    int m_MinorVersion;           // Bootstrap minor version
    int m_NumSymbols;            // Number of bootstrap symbols
    int m_EasWakeup;             // Emergency alert signal wake-up
    int m_MinTimeToNext;        // Minimum time interval to next frame
    int m_SystemBandwidth;       // Bandwidth of the post bootstrap signal
    int m_BsrCoefficient;        // Sample rate post-bootstrap
    int m_PreambleStructure;     // The structure of post-bootstrap symbols
    // Parameters derived from m_PreambleStructure
    int m_L1BasicFecMode;        // L1-Basic FEC type mode
    int m_PreambleFftSize;      // Preamble FFT size
    int m_PreambleGuardInterval; // Preamble guard interval
    int m_PreamblePilotDx;      // Preamble pilot pattern Dx
};

```

### Members

*m\_MinorVersion*

Minor version. Minor version number signaled in the bootstrap. The valid range is 0 .. 7.

*m\_NumSymbols*

Number of bootstrap symbols.

*m\_EasWakeup*

Emergency alert signal wake-up. The valid range is 0 ..3.

*m\_MinTimeToNext*

Minimum time interval to next frame. The valid range is 0 .. 31.

*m\_SystemBandwidth*

System bandwidth used for the post-bootstrap portion of the current frame.

Value	Meaning
DTAPI_ATSC3_6MHZ	6 MHz
DTAPI_ATSC3_7MHZ	7 MHz
DTAPI_ATSC3_8MHZ	8 MHz
DTAPI_ATSC3_GT8MHZ	Greater than 8 MHz

*m\_BsrCoefficient*

Sample rate post-bootstrap of the current frame =  $(N+16) * 0.384\text{MHz}$ . The valid range is 0 .. 127.

*m\_PreambleStructure*

Signaling the structure of post-bootstrap symbols. Its value specifies the preamble FFT-size, preamble guard interval, preamble pilot and L1-Basic FEC mode according Annex H of ATSC 3.0 Physical Layer Protocol.

*m\_L1BasicFecMode*

The FEC-type mode used for L1-Basic, derived from *m\_PreambleStructure*. The valid range is 1 .. 5.

*m\_PreambleFftSize*

The FFT-size used for the preamble symbols, derived from *m\_PreambleStructure*.

Value	Meaning
DTAPI_ATSC3_FFT_8K	8K FFT
DTAPI_ATSC3_FFT_16K	16K FFT
DTAPI_ATSC3_FFT_32K	32K FFT

*m\_PreambleGuardInterval*

The guard interval between the preamble symbols, derived from *m\_PreambleStructure*.

Value	Meaning
DTAPI_ATSC3_GI_1_192	GI1_192
DTAPI_ATSC3_GI_2_384	GI2_384
DTAPI_ATSC3_GI_3_512	GI3_512
DTAPI_ATSC3_GI_4_768	GI4_768
DTAPI_ATSC3_GI_5_1024	GI5_1024
DTAPI_ATSC3_GI_6_1536	GI6_1536
DTAPI_ATSC3_GI_7_2048	GI7_2048
DTAPI_ATSC3_GI_8_2432	GI8_2432
DTAPI_ATSC3_GI_9_3072	GI9_3072
DTAPI_ATSC3_GI_10_3648	GI10_3648
DTAPI_ATSC3_GI_11_4096	GI11_4096
DTAPI_ATSC3_GI_12_4864	GI12_4864

*m\_PreamblePilotDx*

The DX value of the preamble pilot pattern, derived from *m\_PreambleStructure*.

Value	Meaning
DTAPI_ATSC3_PP_DX_3	DX=3
DTAPI_ATSC3_PP_DX_4	DX=4
DTAPI_ATSC3_PP_DX_6	DX=6
DTAPI_ATSC3_PP_DX_8	DX=8
DTAPI_ATSC3_PP_DX_12	DX=12
DTAPI_ATSC3_PP_DX_16	DX=16
DTAPI_ATSC3_PP_DX_24	DX=24
DTAPI_ATSC3_PP_DX_32	DX=32

## struct DtAtsc3DemodL1BasicData

This structure specifies the ATSC 3.0 L1-Basic signaling data.

```

struct DtAtsc3DemodL1BasicData
{
    int m_Version; // L1-Basic structure version
    int m_MimoScatPilotEnc; // MIMO pilot encoding scheme
    bool m_LlsFlag; // Low level signaling present(yes/no)
    int m_TimeInfoFlag; // Time information
    bool m_ReturnChannelFlag; // Dedicated return channel present(yes/no)
    int m_Papr; // PAPR reduction mode
    int m_FrameLengthMode; // Frame length mode (time/symbol aligned)
    int m_FrameLength; // Frame length in units of 5 milliseconds
    int m_ExcessSamples; // Number of excess samples included
    int m_TimeOffset; // Time offset
    int m_AdditionalSamples; // Number of additional samples
    int m_NumSubframes; // Number of subframes

    // L1-Basic parameters for L1-Detail
    int m_PreambleNumSymbols; // Number of preamble OFDM symbols
    int m_PreambleReducedCarriers; // Preamble carrier reduction coeff
    int m_L1DetailSize; // Size of L1-Detail in number of bytes
    int m_L1DetailFecMode; // L1-Detail FEC-type mode
    int m_L1DetailAddParity; // L1-Detail additional parity mode
    int m_L1DetailNumCells; // Size of L1-Detail in number of OFDM cells

    // L1-Basic parameters for first subframe
    bool m_FirstSubMimo; // MIMO
    int m_FirstSubMiso; // MISO
    int m_FirstSubFftSize; // FFT-size
    int m_FirstSubReducedCarriers; // Carrier reduction coefficient
    int m_FirstSubGuardInterval; // Guard interval
    int m_FirstSubNumOfdmSymbols; // Number of payload OFDM symbol
    int m_FirstSubPilotPattern; // Pilot pattern
    int m_FirstSubPilotBoost; // Pilot power boost
    bool m_FirstSubSbsFirst; // First symbol is a boundary symbol(yes/no)
    bool m_FirstSubSbsLast; // Last symbol is a boundary symbol(yes/no)
};

```

### Members

*m\_Version*

L1-Basic structure version, shall be 0.

*m\_MimoScatPilotEnc*

MIMO pilot encoding scheme.

Value	Meaning
0	Walsh-Hadamard pilots or no MIMO subframes
1	Null pilots

*m\_LlsFlag*

If true, indicates one or more PLPs carry low level signaling information.

*m\_TimeInfoFlag*

Specifies the presence or absence of the timing information in the current frame.

Value	Meaning
DTAPI_ATSC3_TIME_NONE	No time information is included
DTAPI_ATSC3_TIME_MS	Time information in millisecond precision is included
DTAPI_ATSC3_TIME_US	Time information in microsecond precision is included
DTAPI_ATSC3_TIME_NS	Time information in nanosecond precision is included

*m\_ReturnChannelFlag*

If true, a dedicated return channel (DRC) is present.

*m\_Papr*

The peak to average power reduction method.

Value	Meaning
DTAPI_ATSC3_PAPR_NONE	None
DTAPI_ATSC3_PAPR_ACE	ACE - Active Constellation Extension
DTAPI_ATSC3_PAPR_TR	TR - Power reduction with reserved carriers
DTAPI_ATSC3_PAPR_ACE_TR	ACE and TR

*m\_FrameLengthMode*

Specifies the frame length alignment mode.

Value	Meaning
DTAPI_ATSC3_ALIGN_TIME	Time-aligned frames
DTAPI_ATSC3_ALIGN_SYMBOL	Symbol-aligned frames

*m\_FrameLength*

If *m\_FrameLengthMode*==DTAPI\_ATSC3\_ALIGN\_TIME, it specifies the length of a frame in units of 5 milliseconds. The valid values are 0 and 10 .. 1000.

*m\_ExcessSamples*

If *m\_FrameLengthMode*==DTAPI\_ATSC3\_ALIGN\_TIME, it specifies the additional number of excess samples included in the guard interval of each non-preamble OFDM symbol.

*m\_TimeOffset*

If *m\_FrameLengthMode*==DTAPI\_ATSC3\_ALIGN\_SYMBOL, it specifies the number of sample periods between the nearest preceding or coincident millisecond boundary and the leading edge of the frame.

*m\_AdditionalSamples*

If *m\_FrameLengthMode*==DTAPI\_ATSC3\_ALIGN\_SYMBOL, it specifies the number of additional samples added at the end of a frame.

*m\_NumSubframes*

Number of subframes. The valid range is 1 .. 256.

*m\_PreambleNumSymbols*

Number of preamble OFDM symbols. The valid range is 1 .. 8.

*m\_PreambleReducedCarriers*

Specifies the preamble carrier reduction. The valid range is 0 .. 4.

*m\_L1DetailSize*

Specifies the size (in bytes) of the L1-Detail information.

*m\_L1DetailFecMode*

The FEC-type mode used for L1-Detail. The valid range is 1 .. 7.

*m\_L1DetailAddParity*

L1-Detail additional parity mode, specifying the ratio (K) of the number of additional parity bits. The valid range is 0 .. 2.

*m\_L1DetailNumCells*

Specifies the size (in OFDM cells) of the coded and modulated L1-Detail + additional parity bits of the next frame.

*m\_FirstSubMimo*

If true, MIMO is used for the first subframe.

*m\_FirstSubMiso*

The MISO option used for the first subframe.

Value	Meaning
DTAPI_ATSC3_MISO_NONE	No MISO
DTAPI_ATSC3_MISO_64	MISO with 64 coefficients
DTAPI_ATSC3_MISO_256	MISO with 256 coefficients

*m\_FirstSubFftSize*

FFT-size for the first subframe.

Value	Meaning
DTAPI_ATSC3_FFT_8K	8K FFT
DTAPI_ATSC3_FFT_16K	16K FFT
DTAPI_ATSC3_FFT_32K	32K FFT

*m\_FirstSubReducedCarriers*

Specifies the carrier reduction for the first subframe. The valid range is 0 .. 4.

*m\_FirstSubGuardInterval*

The guard interval between data symbols for the first subframe.

Value	Meaning
DTAPI_ATSC3_GI_1_192	GI1_192
DTAPI_ATSC3_GI_2_384	GI2_384
DTAPI_ATSC3_GI_3_512	GI3_512
DTAPI_ATSC3_GI_4_768	GI4_768
DTAPI_ATSC3_GI_5_1024	GI5_1024
DTAPI_ATSC3_GI_6_1536	GI6_1536
DTAPI_ATSC3_GI_7_2048	GI7_2048
DTAPI_ATSC3_GI_8_2432	GI8_2432
DTAPI_ATSC3_GI_9_3072	GI9_3072
DTAPI_ATSC3_GI_10_3648	GI10_3648
DTAPI_ATSC3_GI_11_4096	GI11_4096
DTAPI_ATSC3_GI_12_4864	GI12_4864

*m\_FirstSubNumOfdmSymbols*

Specifies the total number of data payload OFDM symbols, including any subframe-boundary symbol(s) within the first subframe. The valid range is 1 .. 2048.

*m\_FirstSubPilotPattern*

The scattered pilot pattern for the first subframe.

Value	Meaning
DTAPI_ATSC3_PP_3_2	SP3_2 / MP3_2
DTAPI_ATSC3_PP_3_4	SP3_4 / MP3_4
DTAPI_ATSC3_PP_4_2	SP4_2 / MP4_2
DTAPI_ATSC3_PP_4_4	SP4_4 / MP4_4
DTAPI_ATSC3_PP_6_2	SP6_2 / MP6_2
DTAPI_ATSC3_PP_6_4	SP6_4 / MP6_4
DTAPI_ATSC3_PP_8_2	SP8_2 / MP8_2
DTAPI_ATSC3_PP_8_4	SP8_4 / MP8_4
DTAPI_ATSC3_PP_12_2	SP12_2 / MP12_2
DTAPI_ATSC3_PP_12_4	SP12_4 / MP12_4
DTAPI_ATSC3_PP_16_2	SP16_2 / MP16_2
DTAPI_ATSC3_PP_16_4	SP16_4 / MP16_4
DTAPI_ATSC3_PP_24_2	SP24_2 / MP24_2
DTAPI_ATSC3_PP_24_4	SP24_4 / MP24_4
DTAPI_ATSC3_PP_32_2	SP32_2 / MP32_2
DTAPI_ATSC3_PP_32_4	SP32_4 / MP32_4

*m\_FirstSubPilotBoost*

Specifies the power of the scattered pilots for the first subframe. The valid range is 0.. 4.

*m\_FirstSubSbsFirst*

If true, the first symbol of the first subframe is a subframe boundary symbol.

*m\_FirstSubSbsLast*

If true, the last symbol of the first subframe is a subframe boundary symbol.

## struct DtAtsc3DemodL1DetailData

This structure specifies the ATSC 3.0 L1-Detail signaling data.

```
struct DtAtsc3DemodL1DetailData
{
    int m_Version;           // L1-details structure version
    int m_NumRf;            // Number of frequencies in channel bonding
    int m_RfFrequency[7];  // Other RF-channels in units of 10kHz
    // Time elapsed since the PTP epoch on 1st January 1970
    int m_TimeSec;         // Seconds component
    int m_TimeMillisec;   // Milliseconds component
    int m_TimeMicrosec;   // Microseconds component
    int m_TimeNanosec;    // Nanoseconds component
    int64 m_AgeOfTimeInfo; // The age of the time info in nanoseconds
    // Subframe data
    std::vector<DtAtsc3DemodL1SubframeData> m_Subframes;
};
```

### Members

*m\_Version*

L1-details structure version, shall be 0.

*m\_NumRf*

Specifies the number of frequencies involved in channel bonding, not including the frequency of the present channel.

*m\_RfFrequency*

An array, specifying the center frequencies (in 10kHz) of the other RF channels involved in channel bonding.

*m\_TimeSec*

If *DtAtsc3DemodL1DetailData::m\_FrameLengthMode* != **DTAPI\_ATSC3\_TIME\_NONE**, it specifies the seconds component of the time information.

*m\_TimeMillisec*

If *DtAtsc3DemodL1DetailData::m\_FrameLengthMode* == **DTAPI\_ATSC3\_TIME\_MS**, it specifies the milliseconds component of the time information.

*m\_TimeMicrosec*

If *DtAtsc3DemodL1DetailData::m\_FrameLengthMode* == **DTAPI\_ATSC3\_TIME\_US**, it specifies the microseconds component of the time information.

*m\_TimeNanosec*

If *DtAtsc3DemodL1DetailData::m\_FrameLengthMode* == **DTAPI\_ATSC3\_TIME\_NS**, it specifies the nanoseconds component of the time information.

*m\_AgeOfTimeInfo*

Specifies the age of the last time information in nanoseconds.

*m\_Subframes*

A vector specifying the ATSC 3.0 modulation parameters for the subframes.

**Note:** The L1-Basic first-subframe parameters are copied in the first element of the vector.

## struct DtAtsc3DemodL1SubframeData

This structure specifies the ATSC 3.0 L1-Detail subframe signaling data.

```

struct DtAtsc3DemodL1SubframeData
{
    bool m_Mimo;                // MIMO
    int m_Miso;                // MISO
    int m_FftSize;            // FFT-size
    int m_ReducedCarriers;    // Carrier reduction coefficient
    int m_GuardInterval;     // Guard interval
    int m_NumOfdmSymbols;    // Number of payload OFDM symbol
    int m_PilotPattern;     // Pilot pattern
    int m_PilotBoost;       // Pilot power boost
    bool m_SbsFirst;        // First symbol is a boundary symbol(yes/no)
    bool m_SbsLast;        // Last symbol is a boundary symbol(yes/no)
    int m_Multiplex;        // Subframe multiplex mode
    bool m_FreqInterleaver; // Frequency interleaver enabled
    int m_SbsNumNullCells; // Number of null cells in SBS
    // PLP data
    std::vector<DtAtsc3DemodL1PlpData> m_Plps;
};

```

### Members

*m\_Mimo*

If true, MIMO is used.

*m\_Miso*

The MISO option used.

Value	Meaning
DTAPI_ATSC3_MISO_NONE	No MISO
DTAPI_ATSC3_MISO_64	MISO with 64 coefficients
DTAPI_ATSC3_MISO_256	MISO with 256 coefficients

*m\_FftSize*

FFT-size.

Value	Meaning
DTAPI_ATSC3_FFT_8K	8K FFT
DTAPI_ATSC3_FFT_16K	16K FFT
DTAPI_ATSC3_FFT_32K	32K FFT

*m\_ReducedCarriers*

Specifies the carrier reduction. The valid range is 0 .. 4.

*m\_GuardInterval*

The guard interval between data symbols.

Value	Meaning
DTAPI_ATSC3_GI_1_192	1/192
DTAPI_ATSC3_GI_2_384	2/384
DTAPI_ATSC3_GI_3_512	3/512
DTAPI_ATSC3_GI_4_768	4/768
DTAPI_ATSC3_GI_5_1024	5/1024
DTAPI_ATSC3_GI_6_1536	6/1536
DTAPI_ATSC3_GI_7_2048	7/2048
DTAPI_ATSC3_GI_8_2432	8/2432
DTAPI_ATSC3_GI_9_3072	9/3072
DTAPI_ATSC3_GI_10_3648	10/3648
DTAPI_ATSC3_GI_11_4096	11/4096
DTAPI_ATSC3_GI_12_4864	12/4864

*m\_NumOfdmSymbols*

Specifies the total number of data payload OFDM symbols, including any subframe-boundary symbol(s) within the subframe. The valid range is 1 .. 2048.

*m\_PilotPattern*

The scattered pilot pattern.

Value	Meaning
DTAPI_ATSC3_PP_3_2	SP3_2 / MP3_2
DTAPI_ATSC3_PP_3_4	SP3_4 / MP3_4
DTAPI_ATSC3_PP_4_2	SP4_2 / MP4_2
DTAPI_ATSC3_PP_4_4	SP4_4 / MP4_4
DTAPI_ATSC3_PP_6_2	SP6_2 / MP6_2
DTAPI_ATSC3_PP_6_4	SP6_4 / MP6_4
DTAPI_ATSC3_PP_8_2	SP8_2 / MP8_2
DTAPI_ATSC3_PP_8_4	SP8_4 / MP8_4
DTAPI_ATSC3_PP_12_2	SP12_2 / MP12_2
DTAPI_ATSC3_PP_12_4	SP12_4 / MP12_4
DTAPI_ATSC3_PP_16_2	SP16_2 / MP16_2
DTAPI_ATSC3_PP_16_4	SP16_4 / MP16_4
DTAPI_ATSC3_PP_24_2	SP24_2 / MP24_2
DTAPI_ATSC3_PP_24_4	SP24_4 / MP24_4
DTAPI_ATSC3_PP_32_2	SP32_2 / MP32_2
DTAPI_ATSC3_PP_32_4	SP32_4 / MP32_4

*m\_PilotBoost*

Specifies the power of the scattered pilots for the subframe. The valid range is 0.. 4.

*m\_SbsFirst*

If true, the first symbol of the subframe is a subframe boundary symbol.

*m\_SbsLast*

If true, the last symbol of the subframe is a subframe boundary symbol.

*m\_Multiplex*

Specifies the current subframe is time-division multiplexed/concatenated in time with adjacent subframes, shall be 0.

*m\_FreqInterleaver*

If true, the frequency interleaver is enabled and used, otherwise the frequency interleaver is bypassed and not used.

*m\_SbsNumNullCells*

Specifies the number of null cells in the subframe boundary symbol(s) of the current subframe.

*m\_Plps*

A vector specifying the ATSC 3.0 modulation parameters for the PLPs within the subframe.

## struct DtAtsc3DemodL1PlpData

This structure specifies the ATSC 3.0 L1-Detail PLP signaling data.

```

struct DtAtsc3DemodL1PlpData
{
    int m_Id; // PLP ID
    bool m_LlsFlag; // Low level signaling present (yes/no)
    int m_Layer; // Layer (core/enhanced)
    int m_Start; // PLP's first data cel
    int m_Size; // Number of data cells allocated
    int m_ScramblerType; // Scrambler type
    int m_FecCodeLength; // FEC code length
    int m_FecOuterCode; // FEC outer code type
    int m_Modulation; // Modulation type
    int m_CodeRate; // Code rate
    int m_TiMode; // Time interleaver mode
    int m_FecFrameStart; // FEC frame start position
    int m_CtiFecFrameStart; // CTI FEC frame start position
    int m_PlpType; // PLP type
    int m_NumSubslices; // Number of subslices
    int m_SubsliceInterval; // Subslice interval
    bool m_TiExtInterleaving; // Extended interleaving enabled
    int m_CtiDepth; // Convolutional time interleaver depth
    int m_CtiStartRow; // Start position of the interleaver
    bool m_HtiInterSubframe; // HTI inter-subframe interleaving is used
    int m_HtiNumTiBlocks; // Number of TI blocks
    int m_HtiNumFecBlocksMax; // Maximum number of FEC blocks per
    // interleaving frame
    int m_HtiNumFecBlocks[16]; // Number of FEC blocks per contained in
    // interleaving frames for the current PLP
    int m_HtiCellInterleaver; // The cell interleaver is used
    int m_LdmInjectLevel; // LDM injection level
};

```

### Members

*m\_Id*

Unique identification of the PLP within an ATSC-system. The valid range is 0 .. 63.

*m\_LlsFlag*

If true, indicates the PLP carries low level signaling information.

*m\_Layer*

Specifies whether the PLP belongs to the core or to the enhanced layer.

Value	Meaning
DTAPI_ATSC3_LAYER_CORE	Core layer
DTAPI_ATSC3_LAYER_ENHANCED	Enhanced layer

*m\_Start*

Specifies the index of the data cell that holds the first data cell of the current PLP in the current sub-frame.

*m\_Size*

Specifies the number of data cells allocated to the current PLP within the current subframe.

*m\_ScramblerType*

Specifies the choice of scrambler type, shall be 0.

*m\_FecCodeLength*

The LDPC FEC coding used by the PLP.

Value	Meaning
DTAPI_ATSC3_LDPC_16K	16K LDPC
DTAPI_ATSC3_LDPC_64K	64K LDPC

*m\_FecOuterCode*

The outer code type used by the PLP.

Value	Meaning
DTAPI_ATSC3_OUTER_BCH	BCH outer code
DTAPI_ATSC3_OUTER_CRC	CRC outer code
DTAPI_ATSC3_OUTER_NONE	No outer code

*m\_Modulation*

Modulation used by the PLP.

Value	Meaning
DTAPI_ATSC3_QPSK	QPSK
DTAPI_ATSC3_QAM16	16-QAM
DTAPI_ATSC3_QAM64	64-QAM
DTAPI_ATSC3_QAM256	256-QAM
DTAPI_ATSC3_QAM1024	1024-QAM
DTAPI_ATSC3_QAM4096	4096-QAM

*m\_CodeRate*

Convolutional coding rate used by the PLP.

Value	Meaning
DTAPI_ATSC3_COD_2_15	2/15
DTAPI_ATSC3_COD_3_15	3/15
DTAPI_ATSC3_COD_4_15	4/15
DTAPI_ATSC3_COD_5_15	5/15
DTAPI_ATSC3_COD_6_15	6/15
DTAPI_ATSC3_COD_7_15	7/15
DTAPI_ATSC3_COD_8_15	8/15
DTAPI_ATSC3_COD_9_15	9/15
DTAPI_ATSC3_COD_10_15	10/15
DTAPI_ATSC3_COD_11_15	11/15
DTAPI_ATSC3_COD_12_15	12/15
DTAPI_ATSC3_COD_13_15	13/15

*m\_TiMode*

Time interleaver mode.

Value	Meaning
DTAPI_ATSC3_TIMODE_NONE	No time interleaving
DTAPI_ATSC3_TIMODE_CTI	Convolutional time interleaver (CTI) mode
DTAPI_ATSC3_TIMODE_HTI	Hybrid time interleaver (HTI) mode

*m\_FecFrameStart*

Specifies the start position of the first FEC frame that begins within the current PLP during the current subframe.

*m\_CtiFecFrameStart*

Specifies the start position of the first complete FEC frame for the current PLP leaving the CTI in the current or subsequent subframes.

*m\_PlpType*

PLP type.

Value	Meaning
DTAPI_ATSC3_PLPTYPE_NONDISP	Non-dispersed
DTAPI_ATSC3_PLPTYPE_DISP	Dispersed

*m\_TiExtInterleaving*

If true, extended interleaving is used for this PLP.

*m\_CtiDepth*

If *m\_TiMode*==DTAPI\_ATSC3\_TIMODE\_CTI, it specifies the convolutional time interleaver (CTI) depth.

Value	Meaning
DTAPI_ATSC3_CTIDEPH_512	512 rows
DTAPI_ATSC3_CTIDEPH_724	724 rows
DTAPI_ATSC3_CTIDEPH_887	887 rows (1254 rows if extended interleaving is used)
DTAPI_ATSC3_CTIDEPH_1024	1024 rows (1448 rows if extended interleaving is used)

*m\_CtiStartRow*

If *m\_TiMode* == **DTAPI\_ATSC3\_TIMODE\_CTI**, it specifies the position of the interleaver selector at the start of the subframe.

*m\_HtiInterSubframe*

If true, enable the HTI inter-subframe interleaving is used.

*m\_HtiNumTiBlocks*

If the HTI inter-subframe interleaving is disabled: the number of time interleaver blocks per interleaving frame. If HTI inter-subframe interleaving is enabled: the number of subframes over which cells from one time interleaver block are carried.

*m\_HtiNumFecBlocksMax*

The maximum number of FEC blocks per interleaving frame for the current PLP.

*m\_HtiNumFecBlocks[16]*

The number of FEC blocks contained in the interleaving frames for the current PLP.

*m\_HtiCellInterleaver*

If true, the HTI cell interleaving is used.

*m\_LdmInjectLevel*

If *m\_Layer* != **DTAPI\_ATSC3\_LAYER\_CORE**, it specifies the enhanced layer injection level relative to the core PLP.

Values 0..9 give an injection level:  $m\_LdmInjectLevel / 2.0dB$ .

Values 10..30 give an injection level:  $m\_LdmInjectLevel - 5.0dB$ .

## struct DtAtsc3StreamSelPars

This structure specifies the criteria to select a PLP from an ATSC 3.0 stream.

```
struct DtAtsc3StreamSelPars
{
    int m_PlpId;           // Data PLP ID
};
```

### Members

*m\_PlpId*

Unique identification of the data PLP within the ATSC 3.0 stream. The valid range is 0 .. 63 and **DTAPI\_ATSC3\_PLP\_ID\_AUTO**. The latter value specifies automatic selection of the data PLP.

## struct DtAudChanStatus

Struct for retrieving the status of an audio channel (single stream of audio samples).

```

struct DtAudChanStatus
{
    int m_ChanIdx;           // Index in underlying A/V stream
    bool m_IsAsynchronous;  // Is channel asynchronous wrt video?
    int m_SampleRate;       // Audio sample rate
    DtAudChanContent m_Content; // Channel content
    int m_StatusWordNumValid; // #valid bytes in m_ChanStat
    unsigned char m_ChanStat[24]; // Raw channel-status word data
};
    
```

### Members

*m\_ChanIdx*

Channel index in the underlying physical audio/video stream, e.g. an audio channel index in SDI. The index of the first audio channel is zero by convention.

*m\_IsAsynchronous*

Asserted if the audio samples are asynchronous with respect to the video clock.

*m\_SampleRate*

Audio sample rate in number of samples per second.

*m\_Content*

Enumeration of the Audio Channel.

Value	Meaning
<b>DT_AUDCHANCONT_UNKNOWN</b>	Channel content is unknown or not defined yet
<b>DT_AUDCHANCONT_PCM</b>	Channel carries PCM samples
<b>DT_AUDCHANCONT_DATA</b>	Channel carries data
<b>DT_AUDCHANCONT_UNSUPPORTED</b>	Content detection is not supported

*m\_StatusWordNumValid*

The number of valid bytes in the raw audio-channel status word in *m\_ChanStat*.

*m\_ChanStat*

The audio channel status word.

## struct DtBsProgress

This structure describes the progress of an asynchronous blind scan. Used by `DtInpChannel::BlindScan` to return the current state and the transmitters found by scanning a frequency band using the `DtBsProgressFunc` callback.

```

struct DtBsProgress
{
    int64 m_FreqHz;           // Center frequency found
    DtDemodPars m_DemodPars; // Demodulator parameters found
    BsEvent m_ProgressEvent; // Progress event
    bool m_ChannelFound;    // Channel is found
    DTAPI_RESULT m_Result;  // Result of the blindscan
};
    
```

### Members

*m\_FreqHz*

The center frequency that was found for this transmitter.

*m\_DemodPars*

The demodulator parameters found for this transmitter.

*m\_ProgressEvent*

Enumeration defining the type of progress event.

Value	Meaning
<b>BS_STEP</b>	One frequency step is completed
<b>BS_CANCELLED</b>	Blind scan is cancelled due to execution of <code>DtInpChannel::CancelBlindscan</code> or due to execution of a tuning function.
<b>BS_DONE</b>	The blind scan is completed

*m\_ChannelFound*

If set, the channel is found on the transmitter frequency.

*m\_Result*

The result code of the blind scan.

## struct DtCmPars

This structure specifies channel-modelling parameters. It's used to simulate the transmission distortions that may occur in the channel between a transmitter and a receiver.

```
struct DtCmPars
{
    bool m_EnableAwgn;           // Enable white Gaussian noise injection
    double m_Snr;                // Signal-to-noise ratio in dB
    bool m_EnablePaths;         // Enable multi-path simulation
    std::vector<DtCmPath> m_Paths;
};
```

### Members

*m\_EnableAwgn*

Enable Additive White Gaussian Noise (AWGN) injection.

*m\_Snr*

Signal-to-noise ratio. The noise power is defined relative to an imaginative 0dB output 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 the simulation of multiple transmission fading paths ("multi-path"). The common usage is to define one main path and several auxiliary paths for simulating echoes. If no paths are defined, a single 0dB path is used.

*m\_Paths*

Vector of path parameters.

## struct DtCmPath

This structure specifies the fading parameters for a single path in a multi-path 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*

Enumeration defining the 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 should not exceed 0dB to avoid overflow of the channel simulator.

*m\_Delay*

Delay in  $\mu\text{s}$ . The maximum delay for an 8MHz channel is  $896\mu\text{s}$ .

*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 in Hz for all paths except **CONSTANT\_DELAY**. The corresponding Speed in m/s is:  
 $\text{Speed} = f_{\text{doppler}} * 3.10^8 / f_{\text{RF}}$ .

## struct DtConstelPoint

This structure describes a constellation point in a receiver constellation diagram.

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

### Members

*m\_X, m\_Y*

The X- and Y-coordinate of the described constellation point.

## struct DtDabEnsembleInfo

This structure describes the DAB ensemble information used for the statistic `DTAPI_STAT_DAB_ENSEM_INFO`.

```
struct DtDabEnsembleInfo
{
    int m_CountryId;           // Country identifier
    int m_EnsembleReference;   // Identifier of the ensemble
    int m_ExtCountryCode;     // Extended country code
    int m_InterTableId;       // International table identifier
    std::wstring m_Label;     // Label identifying this ensemble
    int m_LocalTimeOffset;    // Local time offset in half hours from UTC
    int m_LtoUnique;          // Covers one(=0) or several(=1) time zones
    int m_TransmissionMode;   // Transmission mode: 1..4
    std::vector< DtDabService> m_Services; // Services in this ensemble
    std::map<int, DtDabSubChannel> m_SubChannels; // Sub-channels
};
```

### Members

*m\_CountryId*

Country identification as defined in TS 101 756.

*m\_EnsembleReference*

The number of the ensemble allocated for use within a national area.

*m\_ExtCountryCode*

Extended country code as defined in TS 101 756.

*m\_InterTableId*

International table identifier as defined in TS 101 756.

*m\_Label*

Label associated with this ensemble.

*m\_LocalTimeOffset*

The Local Time Offset (LTO) for the ensemble. It is expressed in multiples of half hours in the range -12 hours to +12 hours.

*m\_TransmissionMode*

DAB transmission mode: 1..4.

*m\_Services*

A vector specifying the services in this ensemble.

*m\_SubChannels*

A map specifying the sub-channels in this ensemble. The key in the map is the sub-channel identifier.

## struct DtDabService

This structure describes a single service in the DAB ensemble. It is used in struct `DtDabEnsembleInfo`.

```
struct DtDabService
{
    int m_CondAccessId;           // Conditional access identifier
    int m_CountryId;            // Country identifier
    int m_ExtCountryCode;       // Extended country code
    bool m_IsLocal;             // True if local
    std::wstring m_Label;       // Label identifying this service
    int m_ServiceReference;      // Identifier of the service
    std::vector<DtDabServiceComp> m_Components; // Service components
};
```

### Members

*m\_CondAccessId*

Access Control System (ACS) identifier used for the service.

*m\_CountryId*

Country identification as defined in TS 101 756.

*m\_ExtCountryCode*

Extended country code as defined in TS 101 756.

*m\_IsLocal*

Indicates whether the service is available over the whole, or only a partial area served by the ensemble, **false**: whole ensemble service area; **true**: partial ensemble service area.

*m\_Label*

Label associated with this service.

*m\_ServiceReference*

Indicates the number of the service.

*m\_Components*

A vector specifying the service components in this service.

## struct DtDabServiceComp

This structure describes a single DAB service component. It is used in struct `DtDabService`.

```

struct DtDabServiceComp
{
    int m_AudioServiceCompType; // Audio service component type
    int m_DataServiceCompType; // Data service component type
    int m_FidChannelId; // Fast information data channel identifier
    bool m_HasCondAccess; // True if access control applies
    int m_IsPrimary; // True if this is the primary component
    std::wstring m_Label; // Label identifying this service component
    int m_Language; // Service component language
    int m_SubChannelId; // Subchannel identifier
    int m_ServiceCompId; // Service component identifier
    int m_TransportMechanismId; // Transport mechanism identifier
};
    
```

### Members

*m\_AudioServiceCompType*

Type of the audio component if the transport mechanism is "MSC stream audio" else -1.

Value	Meaning
0	Foreground sound (MPEG 1/2 layer 2)
1	Background sound (MPEG 1/2 layer 2)
2	Multi-channel audio extension (MPEG 2 layer 2)
63	AAC audio (DAB+) (MPEG 4 HE AAC v2)
Other	Reserved

*m\_DataServiceCompType*

Type of the data service component as defined in TS 101 756 if the transport mechanism is "MSC stream data" else -1.

Value	Meaning
24	MPEG-2 Transport Stream (DMB)
Other	Specified in TS 101 756

*m\_FidChannelId*

Identifies the service component carried in the Fast Information Data Channel (FIDC) if the transport mechanism is "FIDC" else -1.

*m\_HasCondAccess*

Indicates whether access control applies to the service component. **false**: no access control or access control applies only to a part of the service component; **true**: access control applies to the whole of the service component.

*m\_IsPrimary*

Indicates whether the service component is the primary one, **false**: not primary (secondary); **true**: primary.

*m\_Label*

Label associated with this service component.

*m\_Language*

Indicates the language of the audio or data service component as defined in TS 101 756 or -1 if not available.

*m\_SubChannelId*

Identifies the sub-channel in which the service component is carried if the transport mechanism is “MSC stream audio” or “MSC stream data” else -1.

*m\_ServiceCompId*

Uniquely identifies the service component within the ensemble if the transport mechanism is “MSC packet data” else -1.

*m\_TransportMechanismId*

The transport mechanism used.

Value	Meaning
0	Main Service Channel (MSC) - Stream mode - audio
1	Main Service Channel (MSC) - Stream mode - data
2	Fast Information Data Channel (FIDC)
3	Main Service Channel (MSC) - Packet mode - data

## struct DtDabEtiStreamSelPars

This structure specifies the selection parameters for a DAB Ensemble Transport Interface (ETI) stream.

```
struct DtDabEtiStreamSelPars
{
    // No parameters required
};
```

### Members

`DtDabEtiStreamSelPars` structure has no members

### Remark

All DAB sub-channels are selected and output in a DAB Ensemble Transport Interface (ETI) stream.

## struct DtDabStreamSelPars

This structure specifies the criteria to select a sub-channel from a DAB stream.

```

struct DtDabStreamSelPars
{
    int m_BitrateKbps;           // Bitrate in kbps
    int m_ErrProtLevel;        // Error protection level
    int m_ErrProtMode;         // Error protection mode
    int m_ErrProtOption;       // Error protection option
    int m_StartAddress;        // Start address in capacity units
    DtDabExtractionMode m_ExtractionMode; // DAB data extraction mode
};
    
```

### Members

*m\_BitrateKbps*

Specifies the bitrate of the channel in kbps. For UEP profile the valid range is: 32 ... 384 kbps and the bitrate must be a multiple of 8 kbps. For EEP profile the valid range is: 8 ... 2048 kbps and the bitrate must be a multiple of 8 kbps.

*m\_ErrProtLevel*

Error protection level, the valid range for the UEP profile is: 1 ... 4; the valid range for the EEP profile is: 1 ... 5.

*m\_ErrProtMode*

Error protection mode.

Value	Meaning
DTAPI_DAB_UEP	Unequal Error Protection (UEP)
DTAPI_DAB_EEP	Equal Error Protection (EEP)

*m\_ErrProtOption*

Protection level option for EEP: 0 or 1. Only meaningful for EEP profile.

*m\_StartAddress*

Specifies the address of the first capacity unit (CU) of the sub-channel. The valid range is: 0 ... 863.

*m\_ExtractionMode*

Value	Meaning
DAB_RAW	Raw DAB stream
DAB_EXTRACTION_AAC	AAC/DAB+ stream extraction
DAB_EXTRACTION_DMB	DMB stream extraction

## struct DtDabSubChannel

This structure describes a single DAB sub-channel. A DAB sub-channel contains the data for a single audio or data stream. Multiple service components can refer to the same sub-channel. `DtDabSubChannel` is used in struct `DtDabEnsembleInfo`.

```

struct DtDabSubChannel
{
    int m_BitrateKbps;           // Bitrate in kbps
    int m_ErrProtLevel;        // Error protection level
    int m_ErrProtMode;         // Error protection mode
    int m_ErrProtOption;       // Error protection option
    int m_FecScheme;           // FEC scheme
    int m_StartAddress;        // Start address in capacity units
    int m_SubChannelId;        // Subchannel identifier
    int m_SubChannelSize;      // Size of subchannel in capacity units
    int m_UepTableIndex;       // Index in UEP table
    int m_UepTableSwitch;     // UEP table switch
};

```

### Members

`m_BitrateKbps`

The bitrate of the channel in kbps.

`m_ErrProtLevel`

Error protection level, for UEP profile: 1 ... 4; for EEP profile: 1 ... 5.

`m_ErrProtMode`

Error protection mode.

Value	Meaning
<code>DTAPI_DAB_UEP</code>	Unequal Error Protection (UEP)
<code>DTAPI_DAB_EEP</code>	Equal Error Protection (EEP)

`m_ErrProtOption`

Protection level option, for EEP: 0 or 1. For UEP: -1.

`m_FecScheme`

Indicates the forward error correction (FEC) scheme in use, 0: no FEC scheme applied; 1: FEC for MSC packet mode; other values are reserved for future use.

`m_StartAddress`

The address of the first capacity unit (CU) of the sub-channel, range: 0 ... 863.

`m_SubChannelId`

Identifies the sub-channel.

`m_SubChannelSize`

The number of capacity units occupied by the sub-channel.

`m_UepTableIndex`

Index which identifies one of the 64 options available for the sub-channel size and protection level as defined in EN 300 401 table 6.

`m_UepTableSwitch`

Indicates whether the table index refers to table 6 or some other use, 0: table 6 is used; 1: reserved.

## struct DtDabTransmitterId

This structure describes the DAB transmitter identification for a single transmitter, it is used in struct **DtDabTransmitterIdInfo**.

```
struct DtDabTransmitterId
{
    int m_TxMainId;           // Transmitter main identifier
    int m_TxSubId;           // Transmitter sub-identifier
    double m_RelativePowerdB; // Relative transmitter power
};
```

### Members

*m\_TxMainId*

Transmitter main identifier; 0..5 for DAB transmission mode 3, otherwise 0..69.

*m\_TxSubId*

Transmitter sub-identifier; 0..23

*m\_RelativePowerdB*

Transmitter power, relative to total power in dB.

## struct DtDabTransmitterIdInfo

This structure describes the DAB transmitter identification information (DAB-TII), used for the statistic `DTAPI_STAT_DAB_TXID_INFO`.

```
struct DtDabTransmitterIdInfo
{
    std::vector<DtDabTransmitterId> m_Transmitters;
};
```

### Members

*m\_Transmitters*

A vector specifying the identification information of all received transmitter signals.

## struct DtDemodDvbS2ModCodSettings

This structure can be applied for a certain MODCOD.

```
struct DtDvbS2ModCodSettings
{
    bool m_Enable;           // Demodulation of this MODCOD
    int m_SnrThreshold;     // SNR threshold for automute algorithm
};
```

### Members

*m\_Enable*

Control if this MODCOD should be demodulated at all.

*m\_SnrThreshold*

The SNR threshold to be used by the auto-mute algorithm for this MODCOD, in units of 0.1dB.

## struct DtDemodLdpcStats

This structure describes the LDPC information used for the statistic `DTAPI_STAT_LDPC_STATS`.

```

struct DtDemodLdpcStats
{
    __int64 m_FecBlocksCount;           // Total number of FEC blocks
    __int64 m_UncorrFecBlocksCount;    // Number of uncorrected FEC blocks
    __int64 m_FecBlocksCount1;        // Number of FEC blocks since last read
    __int64 m_FecBlocksItCount;       // Total number of LDPC iterations
    int m_FecBlocksItMin;              // Maximum number of LDPC iteration
    int m_FecBlocksItMax;              // Maximum number of LDPC iteration
    __int64 m_BchBitCount;            // Total number of decoded data bits
    __int64 m_BchBitErrorCount;       // Bit error count before LDPC
};

```

### Members

`m_FecBlocksCount`

The total number of decoded FEC-blocks.

`m_UncorrFecBlocksCount`

The total number of uncorrected FEC-blocks (not exact).

`m_FecBlocksCount1`

The number of decoded FEC-blocks, reset when the statistic is read.

`m_FecBlocksItCount`

The number of LDPC iterations, the average number of LDPC-iterations =  $m\_FecBlocksItCount / m\_FecBlocksCount1$ .

`m_FecBlockCountItMin`

The minimum number of LDPC-iterations for a FEC-block, reset when the statistic is read.

`m_FecBlockCountItMax`

The maximum number of LDPC-iterations for a FEC-block, reset when the statistic is read.

`m_BchBitCount`

The total number of decoded data bits, including BCH bits.

`m_BchBitErrorCount`

The bit error count before LDPC.

The BER before LDPC is approximately:  $m\_BchBitErrorCount / m\_BchBitCount$ , this is accurate if there are no uncorrected blocks ( $m\_UncorrFecBlocksCount = 0$ ).

## struct DtDemodMaLayerData

This structure describes the DVB-C2/T2 mode adaptation layer information used for the statistic **DTAPI\_STAT\_MA\_DATA**.

```

struct DtDemodMaLayerData
{
    bool m_Hem;           // High Efficiency Mode: yes/no
    bool m_Npd;          // Null Packet Deletion: yes/no
    int m_Issy;           // ISSY mode. See DTAPI_DVBX2_ISSY_XXX
    int m_IssyBufs;      // Current ISSY BUFS value
    int m_IssyTto;       // Last ISSY TTO value (DVB-T2 only)
    int m_IssyBufStat;   // Last ISSY BUFSTAT value (DVB-C2/S2 only)
};
    
```

### 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 (NPD) is active, otherwise it is not active.

*m\_Issy*

ISSY mode.

Value	Meaning
DTAPI_DVBC2_ISSY_NONE / DTAPI_DVBT2_ISSY_NONE	No ISSY field is used
DTAPI_DVBC2_ISSY_SHORT/ DTAPI_DVBT2_ISSY_SHORT	2-byte ISSY field is used
DTAPI_DVBC2_ISSY_LONG / DTAPI_DVBT2_ISSY_LONG	3-byte ISSY field is used

*m\_IssyBufs*

Value of the ISSY BUFS parameter.

*m\_IssyTto*

Last value of ISSY TTO, DVB-T2 only.

*m\_IssyBufStat*

Last value of ISSY BUFSTAT, DVB-C2/S2 only.

## struct DtDemodMaLayerStat

This structure describes the DVB-C2/T2 mode adaptation layer statistics used for the statistic `DTAPI_STAT_MA_STATS`.

```
struct DtDemodMaLayerStats
{
    __int64 m_HdrCrc8ErrorCount; // Number BBframe header CRC8 errors
    __int64 m_PckCrc8ErrorCount; // Number packet CRC8 errors (m_Hem=0)
    __int64 m_FramingErrorCount; // SYNCD/DFL/UPD consistency errors
    __int64 m_CommonPlpResyncCount; // Number data-PLP common-PLP resyncs
};
```

### Members

*m\_HdrCrc8ErrorCount*

Number of CRC8 errors for BB-frame headers.

*m\_PckCrc8ErrorCount*

Number of CRC8 errors for packets, only for HEM=0.

*m\_FramingErrorCount*

Number of consistency errors found in SYNCD, DFL and UPD fields.

*m\_CommonPlpResyncCount*

Number of times a resynchronization between data and common PLP was needed. It normally happens only in case of receive errors. This field is only updated in the corresponding data PLP.

## struct DtDemodParsAtsc

This structure describes the demodulation parameters for ATSC.

```
struct DtDemodParsAtsc
{
    int m_Constellation;           // VSB constellation
};
```

### Members

*m\_Constellation*  
The VSB constellation.

Value	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

## struct DtDemodParsAtsc3

This structure describes the demodulation parameters for ATSC 3.0.

```
struct DtDemodParsDvbC2
{
    int m_Bandwidth;           // Bandwidth
    bool m_AlpNetIncludesAhSi; // ALP payload length includes additional
                               // header of signaling information
};
```

### Members

*m\_Bandwidth*  
Bandwidth.

Value	Meaning
DTAPI_ATSC3_6MHZ	6 MHz
DTAPI_ATSC3_7MHZ	7 MHz
DTAPI_ATSC3_8MHZ	8 MHz

*m\_AlpNetIncludesAhSi*

If true, the ALP payload length includes the additional header for signaling information. 2016 spec, Korean mode, nonstandard This can be used to receive signaling information according the 2016 specification, used in Korea, nonstandard; default false.

## struct DtDemodParsDab

This structure describes the demodulation parameters for DAB.

```
struct DtDemodParsDab
{
    // Empty
};
```

### Members

**DtDemodParsDab** structure has no members.

## struct DtDemodParsDvbC2

This structure describes the demodulation parameters for DVB-C2.

```
struct DtDemodParsDvbC2
{
    int m_Bandwidth;           // DVB-C2 Bandwidth (channel raster)
    bool m_ScanL1Part2Data    // Scan for full L1Part2Data
};
```

### Members

*m\_Bandwidth*

Channel raster of the network.

Value	Meaning
DTAPI_DVBC2_6MHZ	6 MHz
DTAPI_DVBC2_8MHZ	8 MHz

*m\_ScanL1Part2Data*

Scan and cache the full L1Part2Data after each DVBC2 tune. If this flag is set, the statistic **DTAPI\_STAT\_DVBC2\_L1P2DATA** returns all data slices including PLPs for the tuned channel instead of only the active. Setting this flag increases the time needed for tuning and locking.

## struct DtDemodParsDvbS

This structure describes the demodulation parameters for DVB-S.

```

struct DtDemodParsDvbS
{
    int m_CodeRate;           // DVB-S code rate
    int m_SpecInv;           // Spectral inversion (yes/no)
    int m_SymRate;           // Symbol rate in baud
};
    
```

### Members

*m\_CodeRate*

DVB-S code rate

Value	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
DTAPI_MOD_CR_AUTO	Autodetect code rate
DTAPI_MOD_CR_UNK	Code rate is unknown

*m\_SpecInv*

Spectral inversion

Value	Meaning
DTAPI_MOD_S_S2_SPECNONINV	No spectrum inversion detected
DTAPI_MOD_S_S2_SPECINV	Spectrum inversion detected
DTAPI_MOD_S_S2_SPECINV_AUTO	Autodetect spectrum inversion
DTAPI_MOD_S_S2_SPECINV_UNK	Spectrum inversion status is unknown

*m\_SymRate*

The symbol rate (in bd). The value `DTAPI_MOD_SYMRATE_AUTO` specifies automatic detection of the symbol rate. The value `DTAPI_MOD_SYMRATE_UNK` indicates the symbol rate could not be detected.

## struct DtDemodParsDvbS2

This structure describes the demodulation parameters for DVB-S2.

```

struct DtDemodParsDvbS2
{
    int m_CodeRate;           // DVB-S.2 code rate
    int m_FecFrame;         // Long or short FEC-frames
    int m_Pilots;           // Pilots (yes/no)
    int m_SpecInv;          // Spectral inversion (yes/no)
    int m_SymRate;          // Symbol rate in baud
};
    
```

### Members

*m\_CodeRate*

DVB-S.2X code rate

Value	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
DTAPI_MOD_CR_AUTO	Autodetect code rate
DTAPI_MOD_CR_UNK	Code rate is unknown
	DVB-S2X specific code rates.
DTAPI_MOD_1_5	Code rate 1/5
DTAPI_MOD_2_9	Code rate 2/9
DTAPI_MOD_11_45	Code rate 11/45
DTAPI_MOD_4_15	Code rate 4/15
DTAPI_MOD_13_45	Code rate 13/45
DTAPI_MOD_14_45	Code rate 14/45
DTAPI_MOD_9_20	Code rate 9/20
DTAPI_MOD_7_15	Code rate 7/15
DTAPI_MOD_8_15	Code rate 8/15

DTAPI_MOD_11_20	Code rate 11/20
DTAPI_MOD_5_9	Code rate 5/9
DTAPI_MOD_26_45	Code rate 26/45
DTAPI_MOD_28_45	Code rate 28/45
DTAPI_MOD_23_36	Code rate 23/36
DTAPI_MOD_29_45	Code rate 29/45
DTAPI_MOD_31_45	Code rate 31/45
DTAPI_MOD_25_36	Code rate 25/36
DTAPI_MOD_32_45	Code rate 32/45
DTAPI_MOD_13_18	Code rate 13/18
DTAPI_MOD_11_15	Code rate 11/15
DTAPI_MOD_7_9	Code rate 7/9
DTAPI_MOD_77_90	Code rate 77/90

*m\_FecFrame*

FEC-frame length

Value	Meaning
DTAPI_MOD_S2_SHORTFRM	Short FEC-frame
DTAPI_MOD_S2_LONGFRM	Long FEC-frame
DTAPI_MOD_S2_FRM_AUTO	Autodetect FEC-frame length
DTAPI_MOD_S2_FRM_UNK	FEC-frame length is unknown

*m\_Pilots*

DVB-S.2 pilots

Value	Meaning
DTAPI_MOD_S2_NOPILOTS	Pilots disabled
DTAPI_MOD_S2_PILOTS	Pilots enabled
DTAPI_MOD_S2_PILOTS_AUTO	Autodetect pilots status
DTAPI_MOD_S2_PILOTS_UNK	Pilots status is unknown

*m\_SpecInv*

Spectral inversion

Value	Meaning
DTAPI_MOD_S_S2_SPECNONINV	No spectrum inversion detected
DTAPI_MOD_S_S2_SPECINV	Spectrum inversion detected
DTAPI_MOD_S_S2_SPECINV_AUTO	Autodetect spectrum inversion
DTAPI_MOD_S_S2_SPECINV_UNK	Spectrum inversion status is unknown

*m\_SymRate*

The symbol rate (in bd). The value **DTAPI\_MOD\_SYMRATE\_AUTO** specifies automatic detection of the symbol rate. The value **DTAPI\_MOD\_SYMRATE\_UNK** indicates the symbol rate could not be detected.

## Remarks

The DTA-2132 does not support automatic symbol rate detection.

## struct DtDemodParsDvbS2Adv

This structure describes the advanced demodulation parameters for DVB-S2. This structure is a derived class from `DtDemodParsDvbS2`. This structure should be used to control the demodulation of each individual MODCODs in case of VCM streams.

```

struct DtDemodParsDvbS2Adv : DtDemodParsDvbS2
{
    bool m_AutoMuteModCods;           // Enable AutoMute algorithm. MODCODs with
                                     // a SNR threshold above the current SNR
                                     // will not be demodulated.
    int m_HysteresisMargin;          // Margin to add on top of the SNR threshold
                                     // before re-enabling a certain MODCOD,
                                     // in units of 0.1 dB
    std::map<DtDvbS2ModCod, DtDemodDvbS2ModCodSettings> m_ModCods;
                                     // List with supported MODCODs

    // Methods
    DTAPI_RESULT DeleteModCod(DtDvbS2ModCod ModCod);
    DTAPI_RESULT InitSnrThreshold(int TypeNumber);
    DTAPI_RESULT SetModCod(DtDvbS2ModCod ModCod,
                            DtDemodDvbS2ModCodSettings &Settings);
};

```

### Members

*m\_AutoMuteModCods*

Enable for the auto-mute algorithm. When enabled, MODCODs with a SNR below the configured threshold will not be demodulated, in order to robustly demodulate the other MODCODs in the stream.

*m\_HysteresisMargin*

The margin which is added on top of the SNR threshold before re-enabling a certain MODCOD, in units of 0.1 dB.

*m\_ModCods*

List of MODCODs which are supported by the device, which contains the settings for each MODCOD. `DtDemodParsDvbS2Adv::InitSnrThreshold` set the list with MODCODs.

### Methods

*DeleteModCod(DtDvbS2ModCod ModCod)*

Delete a member from the MODCOD list, in order to exclude this MODCOD from the auto-mute algorithm.

*InitSnrThreshold(int TypeNumber)*

Init the list of MODCODs *m\_ModCods* for a certain device type, e.g. 2137 from DTA-2137(C).

*SetModCod(DtDvbS2ModCod ModCod, DtDemodDvbS2ModCodSettings &Settings)*

Change the settings for a certain MODCOD, e.g. the SNR threshold to be used by the auto-mute algorithm or control if this MODCOD should be demodulated at all.

## struct DtDemodParsDvbT

This structure describes the demodulation parameters for DVB-T.

```

struct DtDemodParsDvbT
{
    int m_Bandwidth;           // Bandwidth
    int m_CodeRate;           // Code rate
    int m_Constellation;      // Constellation
    int m_Guard;              // Guard interval
    int m_Interleaving;      // Interleaving
    int m_Mode;               // Transmission mode
};
    
```

### Members

*m\_Bandwidth*  
Bandwidth.

Value	Meaning
DTAPI_DVBT_6MHZ	6 MHz
DTAPI_DVBT_7MHZ	7 MHz
DTAPI_DVBT_8MHZ	8 MHz

*m\_CodeRate*  
DVB-T code rate

Value	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_5_6	Code rate 5/6
DTAPI_MOD_7_8	Code rate 7/8
DTAPI_MOD_CR_AUTO	Autodetect code rate
DTAPI_MOD_CR_UNK	Code rate is unknown

*m\_Constellation*  
Constellation

Value	Meaning
DTAPI_MOD_DVBT_QPSK	QPSK
DTAPI_MOD_DVBT_QAM16	16-QAM
DTAPI_MOD_DVBT_QAM64	64-QAM
DTAPI_MOD_DVBT_CO_AUTO	Autodetect constellation
DTAPI_MOD_DVBT_CO_UNK	Constellation is unknown

*m\_Guard*  
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	1/4
DTAPI_MOD_DVBT_GU_AUTO	Autodetect guard interval
DTAPI_MOD_DVBT_G_UNK	Guard interval is unknown

*m\_Interleaving*

Interleaving

Value	Meaning
DTAPI_MOD_DVBT_INDEPTH	In-depth interleaver (2k, 4k)
DTAPI_MOD_DVBT_NATIVE	Native interleaver
DTAPI_MOD_DVBT_IL_AUTO	Autodetect interleaving
DTAPI_MOD_DVBT_IL_UNK	Interleaving is unknown

*m\_Mode*

Transmission mode

Value	Meaning
DTAPI_MOD_DVBT_2K	2k mode
DTAPI_MOD_DVBT_8K	8k mode
DTAPI_MOD_DVBT_MD_AUTO	Autodetect transmission mode
DTAPI_MOD_DVBT_MD_UNK	Transmission mode is unknown

## struct DtDemodParsDvbT2

This structure describes the demodulation parameters for DVB-T2.

```

struct DtDemodParsDvbT2
{
    int m_Bandwidth;           // Bandwidth
    int m_T2Profile;         // DVB-T2 profile
};
    
```

### Members

*m\_Bandwidth*  
Bandwidth.

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\_T2Profile*  
DVB-T2 profile

Value	Meaning
DTAPI_DVBT2_PROFILE_BASE	Base profile
DTAPI_DVBT2_PROFILE_LITE	Lite profile

## struct DtDemodParsIq

This structure describes the parameters for reception of I/Q samples.

```

Struct DtDemodParsIq
{
    int m_Bandwidth;           // Signal bandwidth in Hz
    int m_IqDemodType;        // Modulation type
    int m_SampleRate;         // Sample rate in Hz
};
    
```

### Members

*m\_Bandwidth*

Bandwidth in Hz. The valid bandwidth values for DTA-2131 are: 1700000, 5000000, 6000000, 7000000, 8000000 and 10000000 Hz. The valid bandwidth values for DTA-2132 is -1 and a range of 80000000-248000000 Hz.

*m\_IqDemodType*

The input signal's modulation type.

Value	Meaning
DTAPI_DEMOD_OFDM	OFDM modulated signal
DTAPI_DEMOD_QAM	QAM modulated signal

*m\_SampleRate*

Sample rate in Hz. For DTA-2131 the valid sample range is 1250000.. 40000000.

For DTA-2132 the valid sample rates are: 5000000, 10000000, 20000000, 40000000, 80000000, and 160000000 Hz.

### Remarks

For DTA-2132 use a value of -1 for the bandwidth when setting the IQ channel to skip tuning.

This allows monitoring of the main demodulator channel. In case the main demodulator channel is attached, and another value than -1 is used, error **DTAPI\_E\_IN\_USE** is returned.

## struct DtDemodParsIsdbt

This structure describes the demodulation parameters for ISDB-T.

```

struct DtDemodParsIsdbt
{
    int m_Bandwidth;           // Bandwidth
    int m_SubChannel;         // Sub-channel number
    int m_NumberOfSegments;   // Initial total number of segments
};
    
```

### Members

*m\_Bandwidth*

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

*m\_SubChannel*

Sub-channel number (0 .. 41) of the center segment of the spectrum. The default is 22.

*m\_NumberOfSegments*

Number of Segments

Value	Meaning
DTAPI_ISDBT_SEGM_1	1 ISDB-T segment
DTAPI_ISDBT_SEGM_3	3 ISDB-T segments
DTAPI_ISDBT_SEGM_13	13 ISDB-T segments

## struct DtDemodParsQam

This structure describes the demodulation parameters for QAM-A, B and C.

```

struct DtDemodParsQam
{
    int m_Annex;           // ITU-T J.83 annex
    int m_Interleaving;   // Interleaving; ignored vor Annex A and C
    int m_SymRate;       // Symbol rate in baud
};
    
```

### Members

*m\_Annex*

ITU-T J.83 Annex.

Value	Meaning
DTAPI_MOD_J83_A	J.83 annex A (DVB-C)
DTAPI_MOD_J83_B	J.83 annex B ("American QAM")
DTAPI_MOD_J83_C	J.83 annex C ("Japanese QAM")

*m\_Interleaving*

For J.83 Annex B, this parameter specifies the interleaving mode detected 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 $\mu$ s / 66 $\mu$ s
DTAPI_MOD_QAMB_I64_J2	0011	64	2	47 $\mu$ s / 33 $\mu$ s
DTAPI_MOD_QAMB_I32_J4	0101	32	4	24 $\mu$ s / 16 $\mu$ s
DTAPI_MOD_QAMB_I16_J8	0111	16	8	12 $\mu$ s / 8.2 $\mu$ s
DTAPI_MOD_QAMB_I8_J16	1001	8	16	5.9 $\mu$ s / 4.1 $\mu$ s
DTAPI_MOD_QAMB_I128_J1	0000	128	1	95 $\mu$ s / 66 $\mu$ s
DTAPI_MOD_QAMB_I128_J2	0010	128	2	190 $\mu$ s / 132 $\mu$ s
DTAPI_MOD_QAMB_I128_J3	0100	128	3	285 $\mu$ s / 198 $\mu$ s
DTAPI_MOD_QAMB_I128_J4	0110	128	4	379 $\mu$ s / 264 $\mu$ s
DTAPI_MOD_QAMB_I128_J5	1000	128	5	474 $\mu$ s / 330 $\mu$ s
DTAPI_MOD_QAMB_I128_J6	1010	128	6	569 $\mu$ s / 396 $\mu$ s
DTAPI_MOD_QAMB_I128_J7	1100	128	7	664 $\mu$ s / 462 $\mu$ s
DTAPI_MOD_QAMB_I128_J8	1110	128	8	759 $\mu$ s / 528 $\mu$ s
DTAPI_MOD_QAMB_IL_AUTO	-	-	-	Autodetect interleaving mode
DTAPI_MOD_QAMB_IL_UNK	-	-	-	Interleaving mode is unknown

*m\_SymRate*

The symbol rate (in bd). The value **DTAPI\_MOD\_SYMRATE\_AUTO** specifies automatic detection of the symbol rate. The value **DTAPI\_MOD\_SYMRATE\_UNK** indicates the symbol rate could not be detected.

## Remarks

For DTA-2136 and DTA-2139 J.83 annex A (DVB-C) QAM-128 is not supported

## struct DtDemodPlpBlocks

This structure describes the number of FEC-blocks for DVB-C2/T2 used for the statistic **DTAPI\_STAT\_PLP\_BLOCKS**.

```
struct DtDemodMaLayerStats
{
    int m_NumBlocks;           // Last plp_num_blocks value
    int m_NumBlocksMin;       // Minimum plp_num_blocks value
    int m_NumBlocksMax;       // Maximum plp_num_blocks value
};
```

### Members

*m\_NumBlocks*

Last plp\_num\_blocks value.

*m\_NumBlocksMin*

Minimum plp\_num\_blocks value, set to -1 when the statistic is read.

*m\_NumBlocksMax*

Maximum plp\_num\_blocks value, reset when the statistic is read.

## struct DtDetVidStd

This structure describes the video standard as detected on an input port.

```
struct DtDetVidStd
{
    int m_VidStd;           // Detected video standard
    int m_LinkStd;         // Detected link standard
    int m_LinkNr;          // Link nr for multi-link standards
    unsigned int m_Vpid;   // Raw VPID extracted from the SDI stream
    unsigned int m_Vpid2;  // Raw VPID from link 2, only for 3G lvl B
};
```

### Members

*m\_VidStd*

DTAPI\_VIDSTD\_XXX, the video standard detected at the input.

*m\_LinkStd*

DTAPI\_VIDLNK\_\* for video standards with multiple mappings, otherwise -1.

*m\_LinkNr*

Link number for multi-link standards, otherwise -1.

*m\_Vpid*

Raw VPID as extracted from the SDI stream.

*m\_Vpid2*

For 3G level B signals, the raw VPID as extracted from stream 2.

## struct DtDeviceDesc

This structure describes a DekTec device.

```

struct DtDeviceDesc
{
    int m_Category; // Device category (DTAPI_CAT_XXX)
    __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_SubType; // Device subtype (0=none, 1=A, ...)
    int m_DeviceId; // Device ID
    int m_VendorId; // Vendor ID
    int m_SubsystemId; // Subsystem ID
    int m_SubVendorId; // Subsystem Vendor ID
    int m_NumHwFuncs; // #Hardware functions hosted by device
    int m_HardwareRevision; // Hardware revision (e.g. 302 = 3.2)
    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
    unsigned char m_Ip[4]; // IPv4 address
    unsigned char m_IpV6[3][16]; // 3x IPv6 address
    unsigned char m_MacAddr[6]; // MAC address
};

```

### Members

*m\_Category*

Code indicating the device category.

Value	Meaning
DTAPI_CAT_PCI	PCI or PCI-Express device
DTAPI_CAT_USB	USB-2 or USB-3 device
DTAPI_CAT_NW	Pseudo category that is used to refer to the network aspect of a device. This category value is used for getting the device driver version of the network driver and to refer to network related events.
DTAPI_CAT_IP	Network appliance: DTE-31xx
DTAPI_CAT_NIC	Non-DekTec network card (local NIC)

*m\_Serial*

The serial number that uniquely identifies the device.

*m\_PciBusNumber, m\_SlotNumber*

For devices in category **DTAPI\_CAT\_PCI**, these integers identify the PCI bus and slot number in which the PCI card is installed. For other categories, the values are undefined.

*m\_UsbAddress*

For devices in category **DTAPI\_CAT\_USB**, this number identifies the USB address of the device. For other categories, the value is undefined.

*m\_TypeNumber*

This integer corresponds to the integer in the DekTec type identifier for the device, e.g. 2144 for the DTA-2144.

*m\_SubType*

This integer identifies the subtype of the device.

Value	Meaning
-1	The driver could not establish a value for subtype <sup>1</sup> .
0	Subtype is not applicable (no suffix to type number)
1	The type number is suffixed by 'A'
2	The type number is suffixed by 'B'
::	etc.

*Example:* If *m\_TypeNumber* is 2137 and *m\_SubType* is 3, the full type number is DTA-2137C.

*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 PCI configuration-space registers.

*m\_NumHwFuncs*

Number of hardware functions hosted by the device.

*m\_HardwareRevision*

Hardware revision of the device, encoded as major hardware revision times 100 plus minor hardware revision. For example, *m\_HardwareRevision*=102 corresponds to hardware revision r1.2, while *m\_HardwareRevision*=310 corresponds to r3.10.

*m\_FirmwareVersion*

Version number of the firmware loaded in the device.

*m\_FirmwareVariant*

Variant of the firmware loaded on the device. This is not used in the current set of DekTec devices, but future devices may support multiple variants of the firmware each with different functionality.

*m\_NumDtInpChan*

Number of input channels available on the device. For devices that have ports that are software programmable as input or output, the maximum number of input channels is used. IP ports count as 1 input channel and 1 output channel.

*m\_NumDtOutpChan*

Number of output channels available on the device. For devices that have ports that are software programmable as input or output, the maximum number of output channels is used. 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*

For devices in category **DTAPI\_CAT\_IP** and **DTAPI\_CAT\_NIC**, this member identifies the IPv4 address of the device. Otherwise, the value of this member is undefined.

*m\_IpV6[3]*

For devices in category **DTAPI\_CAT\_IP** and **DTAPI\_CAT\_NIC**, this member identifies the IPv6 addresses of the device (if the device supports IPv6 and IPv6 is enabled). Otherwise, the values of this member are undefined.

*m\_Mac*

For devices in category **DTAPI\_CAT\_IP** and **DTAPI\_CAT\_NIC**, this member identifies the MAC address of the device. Otherwise, the value of this member is undefined.

<sup>1</sup> This is an error condition that cannot occur for a correctly working board.

## struct DtDolbyDigitalCompleteMetadata

The members in this struct specify the “complete” Dolby metadata.

```

struct DtDolbyDigitalCompleteMetadata
{
    int m_CMixLev;           // Center downmix level
    int m_SurMixLev;       // Surround downmix level
    int m_DSurMod;         // Dolby surround mode
    bool m_AudProdie;      // Audio production info exists
    int m_MixLevel;        // Mixing level
    int m_RoomTyp;         // Room type

    bool m_Dynrnge;        // Enable normal compression
    bool m_DynRangeCtrl2;  // Enable secondary compression
    bool m_LfeChannel;     // Enable LFE channel
    bool m_LfeFilter;     // Enable LFE lowpass filter
    bool m_SurroundDelay;  // Enable surround channel delay

    // Dolby metadata
    int m_DialNorm;        // Dialog normalisation
    bool m_DcFilter;       // Enable DC filter
    int m_CompChar;        // Global compression profile
    int m_DComp;           // Line mode profile
    int m_D2Comp;          // Line mode profile second channel
    int m_CComp;           // RF mode profile
    int m_C2Comp;          // RF mode profile second channel
    bool m_Deemphasis;    // Enable digital deemphasis
    bool m_BwFilter;       // Enable bandwidth filter
    bool m_Phase90;        // 90-degree surround phase shift
    bool m_Xbsi2Ex;       // Enable extended bitstream ind
    int m_HeadphoneMode;   // Dolby headphone mode
    int m_AdConvType;      // A/D converter type
    bool m_Copyright;     // Copyright flag
    bool m_OriginalBs;     // Original bitstream flag
    int m_BitstreamMode;   // Bitstream mode
    bool m_Xbsi1Ex;       // Enable extended bitstream ind.
    bool m_AdvDrc;        // Enable advanced DRC
    int m_DownMixMode;     // Preferred stereo downmix mode
    int m_LtRtCenterMixLevel; // Lt/Rt center mix level
    int m_LtRtSurroundMixLevel; // Lt/Rt surround mix level
    int m_LoRoCenterMixLevel; // Lo/Ro center mix level
    int m_LoRoSurroundMixLevel; // Lo/Ro surround mix level
    int m_SurroundExMode; // Dolby surround EX mode
    bool m_SurroundAttn;  // 3dB surround attenuation flag
};

```

### Members

*m\_Dynrnge*

Enable (default) or disable normal dynamic-range reduction.

*m\_DynRangeCtrl2*

Enable or disable (default) large dynamic-range reduction.

*m\_LfeChannel*

Enable or disable (default) the low frequency effects (LFE) channel. This is an optional low frequency channel (<120Hz) intended to be reproduced at a level +10dB with respect to the base audio signal. The LFE channel allows high sound pressure level to be provided for low frequency sounds.

The audio service type (`DtEncAudPars::m_SvcType`) determines whether the LFE channel is allowed. At least three channels are required to enable the LFE channel.

LFE Channel Allowed	Meaning
LFE channel not allowed	SVC_MONO, SVC_STEREO, SVC_DUAL_MONO
LFE channel allowed	SVC_SURROUND_5_1

*m\_LfeFilter*

Enable or disable (default) the LE low-pass filter (120Hz).

*m\_SurroundDelay*

Enable or disable (default) additional delay of the surround channel.

*m\_DcFilter*

Enable (default) or disable DC filter.

*m\_CompChar*

Global compression profile.

Value	Meaning
0	No compression.
1 (default)	Film standard compression.
2	Film light compression.
3	Music standard compression.
4	Music light compression.
5	Speech compression.

*m\_DComp*

Line mode profile.

Value	Meaning
0	No compression.
1	Film standard compression.
2	Film light compression.
3	Music standard compression.
4	Music light compression.
5	Speech compression.
7 (default)	Unspecified

*m\_D2Comp*

Line mode profile for second channel.

Value	Meaning
0	No compression.
1	Film standard compression.
2	Film light compression.
3	Music standard compression.
4	Music light compression.
5	Speech compression.
7 (default)	Unspecified

*m\_C2Comp*

RF mode profile for second channel.

Value	Meaning
0	No compression.
1	Film standard compression.
2	Film light compression.
3	Music standard compression.
4	Music light compression.

5	Speech compression.
7 (default)	Unspecified

*m\_Deemphasis*

Enable or disable (default) digital deemphasis.

*m\_BwFilter*

Enable or disable (default) bandwidth filter.

*m\_Phase90*

Enable (default) or disable 90-degree phase shift for surround.

*m\_Xbsi2Ex*

Enable (default) or disable extended bitstream syntax.

*m\_HeadphoneMode*

*m\_AdConvType*

*m\_MixingLevel*

Mixing level in dB. The valid range is 0=80dB through 31=111dB and the default value is 25=105dB.

*m\_Copyright*

*m\_OriginalBs*

*m\_BitstreamMode*

The bitstream mode parameter (Dolby metadata: bsmod) describes the audio service contained within the (E-)AC-3 bitstream.

Value	Meaning
0 (default)	Main audio service: complete main (CM). CM flags the bitstream as the main audio service for the program and indicates that all elements are present to form a complete audio program. Currently, this is the most common default setting. The CM service may contain from one (mono) to six (5.1) channels.
1	Main audio service: music and effects (ME). The bitstream is the main audio service for the program, minus a dialogue channel. The dialogue channel, if any, is intended to be carried by an associated dialogue service. Different dialogue services can be associated with a single ME service to support multiple languages.
2	Associated audio service: visually impaired (VI). This is typically a single-channel program intended to provide a narrative description of the picture content to be decoded along with the main audio service. The VI service may also be a complete mix of all program channels, comprising up to six channels.
3	Associated audio service: hearing impaired (HI). This is typically a single-channel program intended to convey audio that has been processed for increased intelligibility and decoded along with the main audio service. The HI service may also be a complete mix of all program channels, comprising up to six channels.
4	Associated audio service: dialogue (D). This is typically a single-channel program intended to provide a dialogue channel for an ME service. If the ME service contains more than two channels, the D service is limited to only one channel; if the ME service is two channels, the D service can be a stereo pair. The ap-

	propriate channels of each service are mixed together. (This requires special decoders.)
5	Associated audio service: commentary (C). This is typically a single-channel program intended to convey additional commentary that can be optionally decoded along with the main audio service. This service differs from a dialogue service because it contains an optional, rather than a required, dialogue channel. The C service may also be a complete mix of all program channels, comprising up to six channels.
6	Associated audio service: emergency (E). This is a single-channel service that is given priority in reproduction. When the E service appears in the bitstream, it is given priority in the decoder and the main service is muted.
7	Associated audio service: voice over (VO). This is a single-channel service intended to be decoded and mixed to the C channel (requires special decoders).

*m\_Xbs1Ex*

*m\_AdvDrc*

Value of the “Advanced DRC in use” flag. The default is **false**.

*m\_DownMixMode*

Preferred stereo downmix mode.

Value	Meaning
0	Not indicated.
1	Lt/Rt downmix preferred.
2	Lo/Ro downmix preferred.
3 (default)	Reserved

*m\_LtRtCenterMixLevel*

Lt/Rt center mix level.

Value	Meaning
0	1.414 (+3.0dB)
1	1.189 (+1.5dB)
2	1.000 (0.0dB)
3	0.841 (-1.5dB)
4	0.707 (-3.0dB)
5	0.595 (-4.5dB)
6	0.500 (-6.0dB)
7	0.000 (-inf dB)
8 (default)	Reserved

*m\_LtRtSurroundMixLevel*

Lt/Rt surround mix level.

Value	Meaning
3	0.841 (-1.5dB)
4	0.707 (-3.0dB)
5	0.595 (-4.5dB)
6	0.500 (-6.0dB)
7	0.000 (-inf dB)
8 (default)	Reserved

*m\_LoRoCenterMixLevel*

Lo/Ro center mix level.

Value	Meaning
0	1.414 (+3.0dB)
1	1.189 (+1.5dB)
2	1.000 (0.0dB)
3	0.841 (-1.5dB)
4	0.707 (-3.0dB)
5	0.595 (-4.5dB)
6	0.500 (-6.0dB)

7	0.000 (-inf dB)
8 (default)	Reserved

*m\_LoRoSurroundMixLevel*

Lt/Rt surroundmix level.

Value	Meaning
3	0.841 (-1.5dB)
4	0.707 (-3.0dB)
5	0.595 (-4.5dB)
6	0.500 (-6.0dB)
7	0.000 (-inf dB)
8 (default)	Reserved

*m\_SurroundExMode*

Dolby surround EX mode.

Value	Meaning
0	Not indicated.
1 (default)	Dolby surround EX disabled.
2	Dolby surround EX enabled.

*m\_SurroundAttn*

3dB surround attenuation flag.

Value	Meaning
false (default)	3dB surround attenuation disabled.
true	3dB surround attenuation enabled.

*m\_AudioProdInfo*

Audio production information present yes/no.

Value	Meaning
false (default)	No audio production info present.
true	Audio production information present.

## struct DtDriverVersionInfo

This structure specifies the driver version information.

```

struct DtDriverVersionInfo
{
    int m_Category;           // Device category
    DtDriverId m_Id;         // Driver Id; category DTAPI_CAT_PCI could
                            // return Dta and DtPcie driver versions
    std::wstring m_Name;    // Driver name; Dta, DtPcie, Dtu, etc
    int m_Major;            // Major version
    int m_Minor;           // Minor version
    int m_BugFix;         // Bugfix version
    int m_Build;          // Build version
};

```

### Members

*m\_Category*

Device category:

Value	Meaning
DTAPI_CAT_PCI	PCI-bus device; version of <i>Dta32</i> , <i>Dta64</i> or <i>DtPcie64</i> device driver.
DTAPI_CAT_USB	USB device; version of <i>Dtu32</i> or <i>Dtu64</i> device driver.
DTAPI_CAT_NW	Network device; version of <i>DtaNw32</i> or <i>DtaNw64</i> device driver
DTAPI_CAT_NWAP	VLAN device; version of <i>DtaNwAp32</i> or <i>DtaNwAp64</i> device driver

*m\_Id*

Driver Identifier:

Value	Meaning
DRV_ID_DTA	Dta driver
DRV_ID_DTPCIE	DtPcie driver
DRV_ID_DTU	Dtu driver
DRV_ID_DTANW	DtaNw driver
DRV_ID_DTANWAP	DtaNwAp driver

*m\_Name*

Driver name string.

*m\_Major*

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

*m\_Minor*

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

*m\_BugFix*

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

*m\_Build*

Build number.

## Remarks

## struct DtDvbC2DemodPlpSigDataPlp

This structure specifies the DVB-C2 layer-1 signaling data for one physical layer pipe (PLP).

```

struct DtDvbC2DemodPlpSigDataPlp
{
    int m_Id;                // PLP ID: 0..255
    int m_FecType;          // FEC type
    int m_CodeRate;         // Code rate
    int m_Modulation;      // Modulation type
    int m_HdrCntr;         // Header counter
};
    
```

### Members

*m\_Id*

Unique identification of the PLP within a C2 system. The valid range is 0 .. 255.

*m\_FecType*

FEC type used by the PLP.

Value	Meaning
DTAPI_DVBC2_LDPC_16K	16K LDPC
DTAPI_DVBC2_LDPC_64K	64K LDPC

*m\_CodeRate*

Convolutional coding rate used by the PLP.

Value	Meaning
DTAPI_DVBC2_COD_2_3	2/3
DTAPI_DVBC2_COD_3_4	3/4
DTAPI_DVBC2_COD_4_5	4/5
DTAPI_DVBC2_COD_5_6	5/6
DTAPI_DVBC2_COD_8_9	8/9 (for 16K FEC)
DTAPI_DVBC2_COD_9_10	9/10 (for 64K FEC)

*m\_Modulation*

Modulation used by the PLP.

Value	Meaning
DTAPI_DVBC2_QAM16	16-QAM
DTAPI_DVBC2_QAM64	64-QAM
DTAPI_DVBC2_QAM256	256-QAM
DTAPI_DVBC2_QAM1024	1024-QAM
DTAPI_DVBC2_QAM4096	4096-QAM
DTAPI_DVBC2_QAM16384	16384-QAM
DTAPI_DVBC2_QAM65536	65536-QAM

*m\_HdrCtr*

Header counter field, number of FEC-frames following the FEC-frame header.

Value	Meaning
0	1 FEC frame
1	2 FEC frames

## Remarks

For type-1 data slices this structure contains the PLP signaling information from the layer-1 part-2 signaling data. For type-2 data slices this structure contains the PLP signaling information from the layer-1 part-1 signaling data (=FEC-frame header).

Unsupported fields are set to `DTAPI_STAT_UNSUP_INTITEM`.

## struct DtDvbC2DemodPlpSigData

This structure specifies the DVB-C2 layer-1 signaling information for the physical layer pipes.

```
struct DtDvbC2DemodPlpSigData
{
    int m_NumPlps;           // Number of PLPs
    std::vector<DtDvbC2DemodPlpSigDataPlp> m_Plps;
};
```

### Members

*m\_NumPlps*

Specifies the number of physical layer pipes signaled in the DVB-C2 layer-1 signaling data.

*m\_Plps*

A vector specifying the DVB-C2 layer-1 signaling data for the physical layer pipes (not necessarily for each detected PLP).

## struct DtDvbC2DemodL1Part2Plp

This structure specifies the DVB-C2 layer-1 part 2 signaling information for one physical layer pipe (PLP).

```

struct DtDvbC2DemodL1Part2Plp
{
    int m_Id; // PLP ID: 0..255
    int m_Bundled; // PLP bundled (yes/no)
    int m_Type; // PLP type
    int m_PayloadType; // PLP payload type
    int m_GroupId; // PLP group ID
    int m_Start; // Start of first complete XFEC-frame
    int m_FecType; // FEC type
    int m_Modulation; // Modulation type
    int m_CodeRate; // Code rate
    int m_PsiSiReproc; // PSI/SI reprocessing is performed (yes/no)
    int m_TsId; // Transport stream ID
    int m_OnwId; // Original network ID
};
    
```

### Members

*m\_Id*

Unique identification of the PLP within a C2 system. The valid range is 0 .. 255.

*m\_Bundled*

If '1', the associated PLP is bundled with other PLP(s) within the current C2 system. All the bundled PLPs have the same PLP ID.

*m\_Type*

PLP type.

Value	Meaning
DTAPI_DVBC2_PLP_TYPE_COMMON	Common PLP
DTAPI_DVBC2_PLP_TYPE_GROUPED	Grouped data PLP
DTAPI_DVBC2_PLP_TYPE_NORMAL	Normal data PLP

*m\_PayloadType*

PLP payload type.

Value	Meaning
DTAPI_DVBC2_PAYLOAD_GFPS	Generic Fixed-length Packetized Stream
DTAPI_DVBC2_PAYLOAD_GCS	Generic Continuous Stream
DTAPI_DVBC2_PAYLOAD_GSE	Generic Stream Encapsulation
DTAPI_DVBC2_PAYLOAD_TS	Transport Stream

*m\_GroupId*

Identifies the PLP group with which the PLP is associated.

*m\_Start*

Start position of the first complete XFEC-frame of the PLP. Not set for type 2 data slices.

*m\_FecType*

FEC type used by the PLP. Not set for type 2 data slices.

Value	Meaning
DTAPI_DVBC2_LDPC_16K	16K LDPC
DTAPI_DVBC2_LDPC_64K	64K LDPC

*m\_Modulation*

Modulation used by the PLP. Not set for type 2 data slices.

Value	Meaning
DTAPI_DVBC2_QAM16	16-QAM
DTAPI_DVBC2_QAM64	64-QAM
DTAPI_DVBC2_QAM256	256-QAM
DTAPI_DVBC2_QAM1024	1024-QAM
DTAPI_DVBC2_QAM4096	4096-QAM
DTAPI_DVBC2_QAM16384	16384-QAM
DTAPI_DVBC2_QAM65536	65536-QAM

*m\_CodeRate*

Convolutional coding rate used by the PLP. Not set for type 2 data slices.

Value	Meaning
DTAPI_DVBC2_COD_2_3	2/3
DTAPI_DVBC2_COD_3_4	3/4
DTAPI_DVBC2_COD_4_5	4/5
DTAPI_DVBC2_COD_5_6	5/6
DTAPI_DVBC2_COD_8_9	8/9 (for 16K FEC)
DTAPI_DVBC2_COD_9_10	9/10 (for 64K FEC)

*m\_PsiSiReproc*

If '1', indicates that PSI/SI has been reprocessed.

*m\_TsId, m\_OnwId*

If *m\_PsiSiReproc* is set to '1', these members specify the transport stream ID and original network ID of the transport stream in the PLP. A receiver will use these fields if it can't rely on the PSI/SI.

## Remarks

Unsupported fields are set to `DTAPI_STAT_UNSUP_INTITEM`.

## struct DtDvbC2DemodL1Part2DSlice

This structure specifies the DVB-C2 layer-1 part-2 signaling information for one data slice.

```
struct DtDvbC2DemodL1Part2DSlice
{
    int m_Id; // Data slice ID
    int m_TunePosition; // Tune position
    int m_OffsetLeft; // Data slice left offset (start position)
    int m_OffsetRight; // Data slice right offset (end position)
    int m_TiDepth; // Time interleaving depth
    int m_Type; // Data slice type
    int m_FecHdrType; // FEC header type
    int m_ConstConfig; // Constant data slice configuration (yes/no)
    int m_LeftNotch; // Left notch present (yes/no)
    int m_NumPlps; // Number of PLPs
    std::vector<DtDvbC2DemodL1Part2Plp> m_Plps;
};
```

### Members

*m\_Id*

Unique identification of the data slice within a C2 system.

*m\_TunePosition*

Tune position of the associated data slice relative to the start frequency of the C2 system, in multiples of pilot carrier spacing.

*m\_OffsetLeft*

Start position of the associated data slice by means of the distance to the left from the tuning position, in multiples of the pilot carrier spacing.

*m\_OffsetRight*

End position of the associated data slice by means of the distance to the right from the tuning position, in multiples of the pilot carrier spacing.

*m\_TiDepth*

Time interleaving depth within the associated data slice.

Value	Meaning
DTAPI_DVBC2_TIDEPH_NONE	No time interleaving
DTAPI_DVBC2_TIDEPH_4	4 OFDM symbols
DTAPI_DVBC2_TIDEPH_8	8 OFDM symbols
DTAPI_DVBC2_TIDEPH_16	16 OFDM symbols

*m\_Type*

Data slice type.

Value	Meaning
DTAPI_DVBC2_DSLICE_TYPE_1	Data slice type 1
DTAPI_DVBC2_DSLICE_TYPE_2	Data slice type 2

*m\_FecHdrType*

FEC frame header type.

Value	Meaning
DTAPI_DVBC2_FECHDR_TYPE_ROBUST	Robust mode
DTAPI_DVBC2_FECHDR_TYPE_HEM	High efficiency mode

*m\_ConstConfig*

If '1', indicates that the configuration of the associated data slice shall not change; otherwise, the configuration is assumed to be variable.

*m\_LeftNotch*

If '1', indicates the presence of a left neighboured notch band.

*m\_NumPlps*

Specifies the number of physical layer pipes signaled in the layer 1 signaling part 2 data.

*m\_Plps*

A vector specifying the DVB-C2 layer 1 signaling part 2 data for the physical layer pipes (not necessarily for each detected PLP).

## Remarks

Unsupported fields are set to DTAPI\_STAT\_UNSUP\_INTITEM.

## struct DtDvbC2DemodL1Part2

This structure specifies the DVB-C2 layer-1 part-2 signaling information.

```

struct DtDvbC2DemodL1Part2
{
    int m_NetworkId;           // Network ID
    int m_C2SystemId;         // C2 system ID
    int m_StartFrequency;     // Start frequency
    int m_C2Bandwidth;       // Bandwidth of the generated signal
    int m_GuardInterval;     // Guard interval
    int m_C2FrameLength;     // Number of symbols per C2 frame
    int m_L1P2ChangeCtr;     // Value of L1_PART2_CHANGE_COUNTER field
    int m_ReservedTone;     // Reserved tones present (yes/no)

    // Data-slice parameters
    int m_NumDSlices;        // Number of data slices
    std::vector< DtDvbC2DemodL1Part2DSlice> m_DSlices;
    // Notches
    int m_NumNotches;       // Number of notches
    std::vector< DtDvbC2NotchPars> m_Notches;
};

```

### Members

*m\_NetworkId*

Network ID. Unique identification of the DVB-C2 network.

*m\_C2SystemId*

C2 system ID. Unique identification of a C2 system.

*m\_StartFrequency*

Start frequency of the C2 system by means of the distance from 0Hz in multiples of the carrier spacing ( $D_x$ ). ( $D_x=24$  for guard interval 1/128 and  $D_x=12$  for guard interval 1/64).

*m\_C2Bandwidth*

Bandwidth of the generated signal in multiples of pilot carrier spacing.

*m\_GuardInterval*

The guard interval between OFDM symbols.

Value	Meaning
DTAPI_DVBC2_GI_1_128	1/128
DTAPI_DVBC2_GI_1_64	1/64

*m\_C2FrameLength*

The number of data symbols per C2 frame.

*m\_L1P2ChangeCtr*

The value of the L1\_PART2\_CHANGE\_COUNTER field, indicating the number of C2 frames ahead where the configuration will change.

*m\_ReservedTone*

If '1', indicates one or more reserved tones (carriers) are used.

*m\_NumDSlices*

Specifies the number of data slices signaled in the layer-1 signaling part-2 data.

*m\_DSlices*

A vector specifying the layer-1 signaling part-2 data for the data slices (not necessarily for each detected data slice).

*m\_NumNotches*

Specifies the number of notch bands signaled in the layer-1 signaling part-2 data.

*m\_Notches*

A vector specifying the layer-1 signaling part-2 data for the notches (not necessarily for each detected notch).

## Remarks

Unsupported fields are set to `DTAPI_STAT_UNSUP_INTITEM`.

## struct DtDvbC2NotchPars

This structure specifies a DVB-C2 notch band. It is used in class `DtDvbC2Pars` and in structure `DtDvbC2DemodL1Part2Data`.

```
struct DtDvbC2NotchPars
{
    int m_Start;           // Notch start
    int m_Width;          // Notch width
};
```

### Members

*m\_Start*

Start position of the notch band relative to the start frequency of the C2 system. The start position is indicated in multiples of the pilot carrier spacing.

The valid range is 0 .. 8191 if the guard interval is 1/128.

The valid range is 0 .. 16383 if the guard interval is 1/64.

*m\_Width*

Width of the notch band indicated in multiples of the pilot carrier spacing.

The valid range is 0 .. 255 if the guard interval is 1/128.

The valid range is 0 .. 511 if the guard interval is 1/64.

## struct DtDvbC2StreamSelPars

This structure specifies the criteria to select a PLP from a DVB-C2 stream.

```
struct DtDvbC2StreamSelPars
{
    int m_DSliceId;           // Data slice ID
    int m_PlpId;             // Data PLP ID
    int m_CommonPlpId;      // Common PLP ID
};
```

### Members

*m\_DSliceId*

Unique identification of the data slice within the DVB-C2 stream. Valid values are: 0 .. 255 and **DTAPI\_DVBC2\_DSLICE\_ID\_AUTO**. The latter value specifies automatic selection of the data slice. In this case the first PLP is selected.

*m\_PlpId*

Unique identification of the data PLP within the DVB-C2 stream. The valid range is 0 .. 255 and **DTAPI\_DVBC2\_PLP\_ID\_AUTO**. The latter value specifies automatic selection of the data PLP.

*m\_CommonPlpId*

Unique identification of the -common PLP within the DVB-C2 stream. It will be combined with the selected data PLP. The valid values are: 0 .. 255, **DTAPI\_DVBC2\_PLP\_ID\_NONE** and **DTAPI\_DVBC2\_PLP\_ID\_AUTO**.

The value **DTAPI\_DVBC2\_PLP\_ID\_NONE** indicates that no common PLP is selected. The value **DTAPI\_DVBC2\_PLP\_ID\_AUTO** indicates automatic selection of the common PLP.

## struct DtDvbCidPars

This structure specifies the DVB channel identification for satellite (DVB-S2) signals, ETSI TS 103 129.

```
struct DtDvbCidPars
{
    bool m_Enable;           // Enable DVB-CID signaling
    unsigned int m_GuidHigh; // DVB-CID Global Unique Identifier MSBs
    unsigned int m_GuidLow;  // DVB-CID Global Unique Identifier LSBs
    // CID content. Key: Content ID (0...31);
    // Value: Content information field(24-bit)
    std::map<int, int> m_Content;
};
```

### Members

*m\_Enable*

Enable the insertion of DVB channel identification signaling information in the RF-signal.

*m\_GuidHigh*

The 32 most significant bits of the DVB channel identification Global Unique Identifier

*m\_GuidLow*

The 32 least significant bits of the DVB channel identification Global Unique Identifier

*m\_Content*

Map that specifies the DVB channel identification content, according ETSI TS 103 129 table 1. The key in the map is the Content ID. The value stored in the map is the information field.

Content ID 0 (carrier ID format) shall have the value 0x0001

## struct DtDvbS2Isi

This structure specifies the input stream identifiers received in a DVB-S2 signal used for the statistic `DTAPI_STAT_DVBS2_ISI`.

```
struct DtDvbS2Isi
{
    std::vector<int> m_Isi;    // All input stream identifiers found.
};
```

### Members

*m\_Isi*  
All input stream identifiers in the signal found.

## struct DtDvbS2IsiSigData

This structure specifies the input stream data received in a DVBS2 stream used for the statistic `DTAPI_STAT_DVBS2_ISI_SIGDATA`.

```
struct DtDvbS2IsiSigData
{
    int m_Isi; // Stream identifier
    int m_FrameCount; // Number of frames counted
    std::vector<DtDvbS2PlsData> m_Pls; // PLS values.
};
```

### Members

*m\_Isi*

The DVBS2 input stream identifier.

*m\_FrameCount*

Number of frames for this stream received within a time window.

*m\_Pls*

Physical layer values found in this stream.

## struct DtDvbS2ModCod

This structure specifies a single DVB-S2 MODCOD.

```
struct DtDvbS2ModCod
{
    int m_ModType;           // Modulation type, e.g. DTAPI_MOD_DVBS2_QPSK
    int m_CodeRate;         // Code rate, e.g. DTAPI_MOD_1_2
};
```

### Members

*m\_ModType*

The modulation type, e.g. `DTAPI_MOD_DVBS2_QPSK`

*m\_CodeRate*

The code rate, e.g. `DTAPI_MOD_1_2`.

## struct DtDvbS2PlsData

This structure specifies the physical layer data received in a DVB-S2 stream used in `DtDvbS2IsiSigData`.

```

struct DtDvbS2PlsData
{
    int m_FrameCount;           // Number of frames for this PLS
    int m_ModType;             // Modulation type, e.g. DTAPI_MOD_DVBS2_QPSK int
    m_CodeRate;                // Code rate, e.g. DTAPI_MOD_1_2
    int m_Pilots;              // Pilots (yes/no)
    int m_FecFrame;           // Long or short FECFRAME
};
    
```

### Members

*m\_FrameCount*

Number of frames for this PLS received within a timeframe.

*m\_ModType*

The modulation type, e.g. `DTAPI_MOD_DVBS2_QPSK`

*m\_CodeRate*

The code rate, e.g. `DTAPI_MOD_1_2`

*m\_Pilots*

DVB-S.2 pilots

Value	Meaning
<code>DTAPI_MOD_S2_NOPILOTS</code>	Pilots disabled
<code>DTAPI_MOD_S2_PILOTS</code>	Pilots enabled

*m\_FecFrame*

Value	Meaning
<code>DTAPI_MOD_S2_SHORTFRM</code>	Short FECFRAME (16.200 bits)
<code>DTAPI_MOD_S2_LONGFRM</code>	Long FECFRAME (64.800 bits)

## struct DtDvbS2StreamSelPars

This structure specifies the selection parameters for a DVB-S2 input stream.

```
struct DtDvbS2StreamSelPars
{
    int m_Isi;                // Input stream identifier
};
```

### Members

*m\_Isi*

Input stream identifier for a stream in a multiple input stream (MIS). If the stream is a single input stream (SIS), the selection is ignored.

If `DTAPI_RXMODE_STL3`, `DTAPI_RXMODE_STL3FULL` or `DTAPI_RXMODE_STL3ALL` (see `DtInpChannel::SetRxMode`) is selected, value `DTAPI_DVBS2_DEMOD_ISI_ALL` should be used to receive L3 frames from all streams.

## struct DtDvbTPars

This structure describes the DVB-T modulation parameters.

```

struct DtDvbTTpsInfo
{
    int m_Bandwidth;           // Bandwidth
    int m_Constellation;      // Constellation
    int m_HpCodeRate;         // High priority stream code rate
    int m_LpCodeRate;         // Low priority stream code rate
    int m_Guard;              // Guard interval
    int m_Interleaving;       // Interleaving
    int m_Mode;               // Transmission mode
    int m_Hierarchy;          // Hierarchy information
    int m_CellId;             // Cell identifier or -1 if not used
    int m_HpS48S49;          // High priority S48 and S49
    int m_LpS48S49;          // Low priority S48 and S49
};

```

### Members

*m\_Bandwidth*

DVB-T constellation pattern.

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

*m\_Constellation*

DVB-T constellation pattern.

Value	Meaning
DTAPI_MOD_DVBT_QPSK	QPSK
DTAPI_MOD_DVBT_QAM16	16-QAM
DTAPI_MOD_DVBT_QAM64	64-QAM

*m\_HpCodeRate, m\_LpCodeRate*

High priority stream and low priority stream 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

*m\_Guard*

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	1/4

*m\_Interleaving*

Interleaving.

Value	Meaning
DTAPI_MOD_DVBT_INDEPTH	In-depth interleaver (2k, 4k)
DTAPI_MOD_DVBT_NATIVE	Native interleaver

*m\_Mode*

Transmission mode.

Value	Meaning
DTAPI_MOD_DVBT_2K	2k mode
DTAPI_MOD_DVBT_4K	4k mode (DVB-H)
DTAPI_MOD_DVBT_8K	8k mode

*m\_Hierarchy*

Hierarchy information.

Value	Meaning
DTAPI_MOD_DVBT_HARCHY_NONE	Non hierarchical
DTAPI_MOD_DVBT_HARCHY_A1	Alpha = 1
DTAPI_MOD_DVBT_HARCHY_A2	Alpha = 2
DTAPI_MOD_DVBT_HARCHY_A4	Alpha = 4

*m\_CellId*

16-bit cell identifier (*cell\_id*) or -1 if not available.

*m\_HpS48S49, m\_LpS48S49*

High priority stream and low priority stream S48 and S49 bits for DVB-H or -1 if not used. The values may be OR-ed together.

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_S49_OFF	MPE-FEC is not used
DTAPI_MOD_DVBT_S49	At least one elementary stream uses MPE-FEC

## struct DtDvbTStreamSelPars

This structure specifies the selection parameters for a DVB-T transport stream.

```
struct DtDvbTStreamSelPars
{
    // No parameters required
};
```

### Members

### Remarks

No additional parameters are required to select a DVB-T transport stream. Hierarchical DVB-T demodulation is not supported.

## struct DtDvbTTpsInfo

This structure describes the DVB-T Transmission Parameter Signaling (TPS) information used for the statistic `DTAPI_STAT_DVBT_TPS_INFO`.

```

struct DtDvbTTpsInfo
{
    int m_LengthIndicator;           // TPS length indicator
    int m_Constellation;            // Constellation
    int m_HpCodeRate;              // High priority stream code rate
    int m_LpCodeRate;             // Low priority stream code rate
    int m_Guard;                   // Guard interval
    int m_Interleaving;           // Interleaving
    int m_Mode;                   // Transmission mode
    int m_Hierarchy;              // Hierarchy information
    int m_CellId;                 // Cell identifier or -1 if not available
    int m_HpS48S49;               // High priority S48 and S49
    int m_LpS48S49;               // Low priority S48 and S49
    int m_OddS50_S53;            // S50..S53 of the odd frames
    int m_EvenS50_S53;           // S50..S53 of the even frames
};
    
```

### Members

*m\_LengthIndicator*

TPS length indicator field.

*m\_Constellation*

DVB-T constellation pattern.

Value	Meaning
<code>DTAPI_MOD_DVBT_QPSK</code>	QPSK
<code>DTAPI_MOD_DVBT_QAM16</code>	16-QAM
<code>DTAPI_MOD_DVBT_QAM64</code>	64-QAM

*m\_HpCodeRate, m\_LpCodeRate*

High priority stream and low priority stream code rate.

<code>DTAPI_MOD_1_2</code>	Code rate 1/2
<code>DTAPI_MOD_2_3</code>	Code rate 2/3
<code>DTAPI_MOD_3_4</code>	Code rate 3/4
<code>DTAPI_MOD_5_6</code>	Code rate 5/6
<code>DTAPI_MOD_7_8</code>	Code rate 7/8

*m\_Guard*

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	1/4

*m\_Interleaving*

Interleaving.

Value	Meaning
DTAPI_MOD_DVBT_INDEPTH	In-depth interleaver (2k, 4k)
DTAPI_MOD_DVBT_NATIVE	Native interleaver

*m\_Mode*

Transmission mode.

Value	Meaning
DTAPI_MOD_DVBT_2K	2k mode
DTAPI_MOD_DVBT_4K	4k mode (DVB-H)
DTAPI_MOD_DVBT_8K	8k mode

*m\_Hierarchy*

Hierarchy information.

Value	Meaning
DTAPI_MOD_DVBT_HARCHY_NONE	Non hierarchical
DTAPI_MOD_DVBT_HARCHY_A1	Alpha = 1
DTAPI_MOD_DVBT_HARCHY_A2	Alpha = 2
DTAPI_MOD_DVBT_HARCHY_A4	Alpha = 4

*m\_CellId*

16-bit cell identifier (cell\_id) or -1 if not available.

*m\_HpS48S49, m\_LpS48S49*

High priority stream and low priority stream S48 and S49 bits for DVB-H or -1 if not available. The values may be OR-ed together.

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_S49_OFF	MPE-FEC is not used
DTAPI_MOD_DVBT_S49	At least one elementary stream uses MPE-FEC

*m\_OddS50\_S53, m\_EvenS50\_S53*

Reserved bits of odd and even frames.

## struct DtDvbT2AuxPars

This structure specifies the DVB-T2 auxiliary stream information from the layer-1 post signaling data.

```
struct DtDvbT2AuxPars
{
    int m_AuxStreamType;           // Auxiliary stream type
    int m_AuxPrivateConfig;       // Auxiliary stream info
};
```

### Members

*m\_AuxStreamType*

Type of the current auxiliary stream.

*m\_AuxPrivateConfig*

Field for future use for signaling auxiliary streams.

## struct DtDvbT2DemodL1PostPlp

This structure specifies the DVB-T2 layer-1 post signaling information for one physical layer pipe (PLP).

```

struct DtDvbT2DemodL1PostPlp
{
    int m_Id; // PLP ID: 0..255
    int m_Type; // PLP type
    int m_PayloadType; // PLP payload type
    int m_FfFlag; // FF flag
    int m_FirstRfIdx; // First TFS RF channel where PLP occurs
    int m_FirstFrameIdx; // First frame index
    int m_GroupId; // PLP group ID
    int m_CodeRate; // Code rate
    int m_Modulation; // Modulation type
    int m_Rotation; // Constellation rotation (yes/no)
    int m_FecType; // FEC type
    int m_NumBlocks; // Maximum number of FEC blocks per IL frame
    int m_FrameInterval; // T2-frame interval
    int m_TimeIlLength; // Time interleaving length
    int m_TimeIlType; // Time interleaving type
    int m_InBandAFlag; // In-band A signaling information (yes/no)
    int m_InBandBFlag; // In-band B signaling information (yes/no) int
    m_Reserved1; // Reserved field1
    int m_PlpMode; // PLP mode
    int m_Static; // Static configuration
    int m_StaticPadding; // Static padding
};

```

### Members

*m\_Id*

Unique identification of the PLP within a T2 system.

*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\_PayloadType*

PLP payload type.

Value	Meaning
DTAPI_DVBT2_PAYLOAD_GFPS	Generic Fixed-length Packetized Stream
DTAPI_DVBT2_PAYLOAD_GCS	Generic Continuous Stream
DTAPI_DVBT2_PAYLOAD_GSE	Generic Stream Encapsulation
DTAPI_DVBT2_PAYLOAD_TS	Transport Stream

*m\_FfFlag*

FF flag. This parameter is only meaningful for type-1 PLPs in a time-frequency-slicing (TFS) configuration.

*m\_FirstRfIdx*

First TFS RF channel. This parameter is only meaningful for type-1 PLPs in a time-frequency-slicing (TFS) configuration.

*m\_FirstFrameIdx*

First frame index.

*m\_GroupId*

Identifies the PLP group with which the PLP is associated.

*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, not for T2 lite
DTAPI_DVBT2_COD_5_6	4/5, not for T2 lite
DTAPI_DVBT2_COD_1_3	1/3, only for T2 lite
DTAPI_DVBT2_COD_2_5	2/5, only for T2 lite

*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 '1', 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; not allowed in T2 lite

*m\_NumBlocks*

Maximum number of FEC blocks for this PLP.

*m\_FrameInterval*

T2 frame interval for this PLP.

*m\_TimeIILength*

Time-interleaving length.

If *m\_TimeIILength* 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.

*m\_TimeILType*

Type of time interleaving used by the PLP.

Value	Meaning
<b>DTAPI_DVBT2_IL_ONETOONE</b>	One interleaving frame corresponds to one T2 frame
<b>DTAPI_DVBT2_IL_MULTI</b>	One interleaving frame is carried in multiple T2 frames

*m\_InBandAFlag*

If '1', the in-band A flag is set and in-band signaling information is inserted in this PLP.

*m\_InBandBFlag*

If '1', the in-band B flag is set and in-band signaling information is inserted in this PLP. This is only useful if DVB-T2 V1.2.1 is selected.

*m\_Reserved1*

Field reserved for future use. It is sometimes used for bias balancing.

*m\_PlpMode*

Mode used for the current PLP.

Value	Meaning
<b>DTAPI_DVBT2_PLP_MODE_NONE</b>	Not specified, used if DVB-T2 V1.1.1 is selected.
<b>DTAPI_DVBT2_PLP_MODE_NORMAL</b>	Normal Mode
<b>DTAPI_DVBT2_PLP_MODE_HEM</b>	High Efficiency Mode

*m\_Static*

If '1', the layer 1 post signaling fields only changes at a superframe boundaries otherwise the fields may change at any time.

*m\_StaticPadding*

If '1', BB-frame padding is not used, otherwise BB-frame padding may be used.

## Remarks

Unsupported fields are set to **DTAPI\_STAT\_UNSUP\_INTITEM**.

## struct DtDvbT2RfPars

This structure specifies the DVB-T2 time-frequency-slicing (TFS) RF-channel information from the layer-1 post signaling data.

```
struct DtDvbT2RfPars
{
    int m_RfIdx;           // Index of the RF-frequency
    int m_Frequency;     // Center frequency in Hz
};
```

### Members

*m\_RfIdx*

The index of this RF-frequency within the loop.

*m\_Frequency*

The center frequency in Hz of the RF channel.

## struct DtDvbT2DemodL1Data

This structure specifies the DVB-T2 layer-1 post signaling data.

```

struct DtDvbT2DemodL1Data
{
    // P1 information
    struct DtDvbT2DemodL1P1
    {
        bool m_Valid;           // P1 found
        int m_FftMode;        // FFT mode (or size)
        int m_Miso;           // MISO used
        int m_Fef;           // FEF used
        int m_T2Profile;     // DVB-T2 profile
    } m_P1;
    // L1-Pre information
    struct DtDvbT2DemodL1Pre
    {
        bool m_Valid;           // L1-pre found
        int m_Type;           // Stream type within the super frame
        int m_BwtExt;         // Bandwidth extension
        int m_S1;             // S1 field value
        int m_S2;             // S2 field value
        int m_L1Repetition;   // L1 repetition (yes/no)
        int m_GuardInterval;  // Guard interval
        int m_Papr;           // PAPR reduction mode
        int m_L1Modulation;   // L1 modulation type
        int m_L1CodeRate;     // L1 code rate
        int m_L1FecType;     // L1 FEC type
        int m_L1PostSize;     // Size of the L1-post in OFDM cells
        int m_L1PostInfoSize; // Size of the L1-post information
        int m_Rotation;       // Constellation rotation (yes/no)
        int m_PilotPatern;    // Pilot pattern
        int m_TxIdAvailability; // The TX-id
        int m_CellId;        // Cell ID
        int m_NetworkId;     // Network ID
        int m_T2SystemId;    // T2 system ID
        int m_NumT2Frames;    // Number of T2 frames in a super frame
        int m_NumDataSyms;    // Number of data OFDM symbols per T2-frame
        int m_RegenFlag;     // Regeneration count indicator
        int m_L1PostExt;     // L1-post extensions (yes/no)
        int m_NumRfChans;    // Number of RF channels
        int m_CurrentRfIdx;   // Current RF channel index
        int m_T2Version;     // DVB-T2 specification version
        int m_L1PostScrambling; // L1-post scrambling
        int m_T2BaseLite;    // T2-Lite is used in a base profile
    } m_L1Pre;
    // L1-Post information
    struct DtDvbT2DemodL1Post
    {
        bool m_Valid;           // L1-post found
        int m_NumPlps;        // Number of PLPs
        int m_NumAux;         // Number of auxiliary streams
        // TFS RF-channel frequencies
        std::vector< DtDvbT2DemodRfPars> m_RfChanFeqs;
        int m_FefType;         // FEF type (if FEF is used)
        int m_FefLength;      // FEF length (if FEF is used)
        int m_FefInterval;    // FEF interval (if FEF is used)
        // PLPs
        std::vector< DtDvbT2DemodL1PostPlp> m_Plps;
        // Auxiliary stream signaling information
        std::vector< DtDvbT2DemodAuxPars> m_AuxPars;
    } m_L1Post;
};

```

## Public members

*m\_P1.m\_Valid*

If true, P1 signaling data has been successfully decoded and is valid.

*m\_P1.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\_P1.m\_Miso*

If '1', MISO is used otherwise SISO.

*m\_P1.m\_Fef*

If '1', FEF-parts are used.

*m\_P1.m\_T2Profile*

DVB-T2 profile.

Value	Meaning
DTAPI_DVBT2_PROFILE_BASE	Base profile
DTAPI_DVBT2_PROFILE_LITE	Lite profile (Requires DVB-T2 version 1.3.1)

*m\_L1Pre.m\_Valid*

If true, L1-pre signaling data has been successfully decoded and is valid.

*m\_L1Pre.m\_Type*

Stream types carried within the current T2 superframe.

Value	Meaning
DTAPI_DVBT2_TYPE_TS	Transport Stream only
DTAPI_DVBT2_TYPE_GS	Generic Stream only
DTAPI_DVBT2_TYPE_TS_GS	Mixed Transport Stream and Generic Stream

*m\_L1Pre.m\_BwtExt*

If '1', the extended carrier mode is used.

*m\_L1Pre.m\_S1*

S1 field.

*m\_L1Pre.m\_S2*

S2 field.

*m\_L1Pre.m\_L1Repetition*

If '1', L1 signaling is provided for the next frame.

*m\_L1Pre.m\_GuardInterval*

The guard interval between OFDM 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\_L1Pre.m\_Papr*

The peak to average power reduction method.

For DVB-T2 version 1.1.1:

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

For DVB-T2 version 1.2.1 and higher:

Value	Meaning
DTAPI_DVBT2_PAPR_NONE	L1-ACE is used and TR is used on P2 symbols only
DTAPI_DVBT2_PAPR_ACE	L1-ACE and ACE only are used
DTAPI_DVBT2_PAPR_TR	L1-ACE and TR only are used
DTAPI_DVBT2_PAPR_ACE_TR	L1-ACE, ACE and TR are used

*m\_L1Pre.m\_L1Modulation*

The modulation type used for the L1-post signaling block.

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

*m\_L1Pre.m\_L1CodeRate*

Convolutional coding rate used for the L1-post signaling block.

Value	Meaning
DTAPI_DVBT2_COD_1_2	1/2

*m\_L1Pre.m\_L1FecType*

FEC type used for the L1-post signaling block.

Value	Meaning
DTAPI_DVBT2_LDPC_16K	16K LDPC

*m\_L1Pre.m\_L1PostSize*

Size of the coded and modulated L1-post signaling data block, in OFDM cells.

*m\_L1Pre.m\_L1PostInfoSize*

Size of the information part of the L1-post signaling data block, in bits, including the extension field, if present, but excluding the CRC.

*m\_L1Pre.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\_L1Pre.m\_TxIdAvailability*

Field for signaling the availability of transmitter identification signals within the current geographic cell.

*m\_L1Pre.m\_CellId*

Cell ID. Unique identification of a geographic cell in a DVB-T2 network.

*m\_L1Pre.m\_NetworkId*

Network ID. Unique identification of the DVB-T2 network.

*m\_L1Pre.m\_T2SystemId*

T2 system ID. Unique identification of the T2 system.

*m\_L1Pre.m\_NumT2Frames*

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

*m\_L1Pre.m\_NumDataSyms*

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

*m\_L1Pre.m\_RegenFlag*

Indicates the number of times the DVB-T2 signal has been regenerated.

*m\_L1Pre.m\_L1PostExt*

If '1', the L1-post extension field is present.

*m\_L1Pre.m\_NumRfChans*

The number of frequencies in the T2 system.

*m\_L1Pre.m\_CurrentRfIdx*

The index of the current RF channel within its TFS structure.

*m\_L1Pre.m\_T2Version*

Version of the DVB-T2 specification.

Value	Meaning
<b>DTAPI_DVBT2_VERSION_1_1_1</b>	Version 1.1.1
<b>DTAPI_DVBT2_VERSION_1_2_1</b>	Version 1.2.1
<b>DTAPI_DVBT2_VERSION_1_3_1</b>	Version 1.3.1

*m\_L1Pre.m\_L1PostScrambling*

If '1', L1-post signaling is scrambled.

*m\_L1Pre.m\_T2BaseLite*

If '1', T2 lite is used in a base profile component.

*m\_L1Post.m\_Valid*

If '1', L1-post signaling data has been successfully decoded and is valid.

*m\_L1Post.m\_NumSubslices*

The number of subslices per T2 frame for type-2 PLPs.

*m\_L1Post.m\_NumPlps*

Indicates the number of physical layer pipes in the T2 system.

*m\_L1Post.m\_NumAux*

Indicates the number of auxiliary streams.

*m\_L1Post.m\_RfChanFreqs*

A vector specifying the TFS RF-channel frequencies.

*m\_L1Post.m\_FefType*

Specifies the FEF type, only if FEF is used (i.e. *m\_L1P.m\_Fef*='1').

*m\_L1Post.m\_FefLength*

The length of a FEF-part in number of T-units (= samples), only if FEF is used (i.e. *m\_L1P.m\_Fef*='1').

*m\_L1Post.m\_FefInterval*

The number of T2 frames between two FEF parts, only if FEF is used (i.e. *m\_L1P.m\_Fef*='1').

*m\_L1Post.m\_Plps*

A vector specifying the DVB-T2 L1-post signaling data for the physical layer pipes (not necessarily for each detected PLP).

*m\_L1Post.m\_AuxPars*

A vector specifying the auxiliary signaling information.

## Remarks

Unsupported fields are set to **DTAPI\_STAT\_UNSUP\_INTITEM**.

## struct DtDvbT2ParamInfo

This structure contains the DVB-T2 “derived” parameters which can be computed from the main DVB-T2 parameters. `DtDvbT2Pars::GetParamInfo` and `DtDvbT2Pars::OptimisePlpNumBlocks` set the members in this structure.

```
struct DtDvbT2ParamInfo
{
    int m_TotalCellsPerFrame;           // Total number of cells per frame
    int m_L1CellsPerFrame;             // Total #L1 signaling cells per frame
    int m_AuxCellsPerFrame;           // Total #auxiliary stream cells per frame   int
    m_BiasBalCellsPerFrame;           // Total number of L1 bias balancing cells
    int m_BiasBalCellsMax;            // Maximum #L1 bias balancing cells per P2
    int m_DummyCellsPerFrame;         // Total number of cells lost per frame
    int m_SamplesPerFrame;            // Total number of samples per frame
};
```

### Members

`m_TotalCellsPerFrame`

Total number of cells per frame.

`m_L1CellsPerFrame`

Total number of cells per frame used for L1 signaling.

The overhead is  $m\_L1CellsPerFrame / m\_TotalCellsPerFrame$ .

`m_AuxCellsPerFrame`

Total number of auxiliary stream cells per frame. This member is currently only used for Tx signaling if it is enabled.

`m_BiasBalCellsPerFrame`

Total number of L1 bias balancing cells per frame.

`m_BiasBalCellsMax`

Maximum number of L1 bias balancing cells per P2.

`m_DummyCellsPerFrame`

Total number of cells lost per frame. It is computed for the first frame in case no NDP is used.

The dummy cells overhead =  $m\_DummyCellsPerFrame / m\_TotalCellsPerFrame$ .

`m_SamplesPerFrame`

Total number of samples per frame.

## struct DtDvbT2PlpPars

This structure specifies the DVB-T2 modulation parameters for one physical layer pipe (PLP). It is used in class `DtDvbT2Pars`, in an array of structures that specify the parameters for each PLP.

```

struct DtDvbT2PlpPars
{
    bool m_Hem; // High Efficiency Mode: yes/no
    bool m_Npd; // Null Packet Deletion: yes/no
    int m_Issy; // ISSY mode. See DTAPI_DVB_T2_ISSY_XXX
    int m_IssyBufs; // ISSY BUFS
    int m_IssyTDesign; // T-design value for TTO generation
    int m_CompensatingDelay; // Additional delay before TS data is sent
    int m_TsRate; // If 0 compute rate from PLP parameters
    int m_Id; // PLP ID: 0..255
    int m_GroupId; // PLP group ID: 0..255
    int m_Type; // PLP type: DTAPI_DVB_T2_PLP_TYPE_XXX
    int m_CodeRate; // PLP code rate: DTAPI_DVB_T2_COD_XXX
    int m_Modulation; // PLP modulation: DTAPI_DVB_T2_BPSK/..
    bool m_Rotation; // Constellation rotation: yes/no
    int m_FecType; // FEC type: 0=16K, 1=64K
    int m_FrameInterval; // T2-frame interval for this PLP: 1..255
    int m_FirstFrameIdx; // First frame index: 0..m_FrameInterval-1
    int m_TimeIlLength; // Time interleaving length: 0..255
    int m_TimeIlType; // Interleaving type: DTAPI_DVB_T2_IL_XXX
    bool m_InBandAFlag; // In band A signaling information: yes/no
    bool m_InBandBFlag; // In band B signaling information: yes/no
    bool m_NumBlocks; // Number of FEC blocks per IL frame

    // IDs of the other PLPs in In Band Signaling
    int m_NumOtherPlpInBand; // Number of other PLPs in m_OtherPlpInBand
    int m_OtherPlpInBand[DTAPI_DVB_T2_NUM_PLP_MAX-1];

    // The parameters below are only meaningful for type 1 PLPs in TFS case
    bool m_FfFlag; // FF-flag
    int m_FirstRfIdx; // First TFS RF channel: 0..NumRf-1
};

```

### 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 (NPD) is active, otherwise it is not active.

`m_Issy`

ISSY mode.

Value	Meaning
<code>DTAPI_DVB_T2_ISSY_NONE</code>	No ISSY field is used
<code>DTAPI_DVB_T2_ISSY_SHORT</code>	2-byte ISSY field is used
<code>DTAPI_DVB_T2_ISSY_LONG</code>	3-byte ISSY field is used

`m_IssyBufs`

Value of the ISSY BUFS parameter.

`m_IssyTDesign`

T-design value for TTO generation. Use 0 to have the modulator choose the value. T-design is defined as the delay (in samples) between the start of the first T2 frame in which the PLP is mapped (`m_FirstFrameIdx`) and the first output bit of the transport stream.

*m\_CompensatingDelay*

Additional delay (in samples) before the TS data is sent. Use -1 to let the modulator choose the value.

*m\_TsRate*

Transport stream rate. If 0, the rate is computed from the PLP parameters. This is only possible if no NPD is used.

*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, not for T2 lite
DTAPI_DVBT2_COD_5_6	4/5, not for T2 lite
DTAPI_DVBT2_COD_1_3	1/3, only for T2 lite
DTAPI_DVBT2_COD_2_5	2/5, only for T2 lite

*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; not allowed in T2 lite

*m\_FrameInterval*

T2-frame interval for this PLP. The valid range is 1 .. 255.

*m\_FirstFrameIdx*

First frame index. The valid range is 0 .. *m\_FrameInterval*-1.

*m\_TimeIlLength*

Time interleaving length.

If *m\_TimeIlType* is set to '0', this parameter specifies the number of T1-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 time interleaving used by the PLP.

Value	Meaning
DTAPI_DVBT2_IL_ONETOONE	One interleaving frame corresponds to one T2 frame
DTAPI_DVBT2_IL_MULTII	One interleaving frame is carried in multiple T2 frames

*m\_InBandAFlag*

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

*m\_InBandBFlag*

If true, the in-band B flag is set and in-band signaling information is inserted in this PLP. This is only useful if DVB-T2 V1.2.1 is selected.

*m\_NumBlocks*

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

*m\_NumOtherPlpInBand*

Number of other PLPs in the in-band signaling.

*m\_OtherPlpInBand[DTAPI\_DVBT2\_NUM\_PLP\_MAX-1]*

IDs of the other PLPs in the in-band signaling.

*m\_FfFlag*

FF flag.

This parameters is only meaningful for type-1 PLPs in the TFS case.

*m\_FirstRfIdx*

First TFS RF channel. The valid range is 0 .. Number of RF channels - 1.

This parameters is only meaningful for type-1 PLPs in the TFS case.

## struct DtDvbT2StreamSelPars

This structure specifies the criteria to select a PLP from a DVB-T2 stream.

```
struct DtDvbC2StreamSelPars
{
    int m_PlpId;                // Data PLP ID
    int m_CommonPlpId;         // Common PLP ID
};
```

### Members

*m\_PlpId*

Unique identification of the data PLP within the DVB-T2 stream. The valid range is 0 .. 255 and **DTAPI\_DVBT2\_PLP\_ID\_AUTO**. The value **DTAPI\_DVBT2\_PLP\_ID\_AUTO** specifies automatic selection of the PLP. In this case the first PLP is selected.

*m\_CommonPlpId*

Unique identification of the common PLP within the DVB-T2 stream. It will be combined with the selected data physical layer pipe. The valid values for *m\_CommonPlpId* are: 0 .. 255, **DTAPI\_DVBT2\_PLP\_ID\_NONE** and **DTAPI\_DVBT2\_PLP\_ID\_AUTO**.

The value **DTAPI\_DVBT2\_PLP\_ID\_NONE** specifies that no common PLP is used. The value **DTAPI\_DVBT2\_PLP\_ID\_AUTO** specifies automatic selection of the common PLP.

## struct DtEventArgs

Describes an 'event'. When a user has subscribed to an event and the event fires, DTAPI uses this struct to inform the callback function about the originating device and the reason for the event.

```

struct DtEventArgs
{
    int m_HwCat;           // Hardware category: DTAPI_CAT_XXX
    __int64 m_Serial;     // Serial number of device causing the event
    int m_Value1;        // Event value #1
    int m_Value2;        // Event value #2
    void* m_pContext;    // Opaque pointer passed on subscription
};
    
```

### Members

*m\_HwCat*

Identifies the hardware category:

Parameter	Meaning
DTAPI_CAT_PCI	PCI or PCI-Express device
DTAPI_CAT_USB	USB-2 or USB-3 device
DTAPI_CAT_NW	Network device
DTAPI_CAT_IP	Network appliance: DTE-31xx
DTAPI_CAT_NIC	Non-DekTec network card

*m\_Serial*

Identifies the serial number of the device causing the event.

*m\_Value1*

Event-specific value #1:

Parameter	Meaning
DT_EVENT_VALUE1_POWER_UP	For event DT_EVENT_TYPE_POWER. A device power up has been occurred.
DT_EVENT_VALUE1_POWER_DOWN	For event DT_EVENT_TYPE_POWER. A device power down has been occurred.
DT_EVENT_VALUE1_NO_LOCK	Internal PLLs have not achieved or lost lock.
DT_EVENT_VALUE1_LOCKED	Full clock-lock has been achieved.

*m\_Value2*

Event-specific value #2. This member variable is not used and reserved for future use.

*m\_pContext*

Context pointer passed to DTAPI when subscribing to the event (`DtapiRegisterCallback` or `DtDevice::RegisterCallback`).

## struct DtFractionInt

This structure represents a precise rational number expressed as the quotient of two integers: the numerator and the denominator.

```
struct DtFractionInt
{
    int m_Num;           // Numerator
    int m_Den;          // Denominator
};
```

### Members

*m\_Num*

The numerator of the fraction.

*m\_Den*

The denominator of the fraction.

### Notes

- This structure provides a way to represent rational numbers with arbitrary precision and avoids loss of accuracy due to floating-point rounding errors.
- The *m\_Den* member should not be zero. If a zero denominator is encountered, the result of any operation involving the fraction will be undefined.

## struct DtHdmiTxStatus

Structure describing the status of the HDMI output port and connected monitor.

```

struct DtHdmiTxStatus
{
    bool m_MonDetected;           // A monitor is detected
    bool m_EdidError;           // An error in the EDID is detected
    bool m_SupportHdmi;         // HDMI VSDB is available
    bool m_SupportYCbCr444;     // YCbCr 4:4:4 is supported
    bool m_SupportYCbCr422;     // YCbCr 4:2:2 is supported
    bool m_SupportBasicAudio;   // Basic audio is supported
    bool m_SupportScDc;        // SCDC is supported
    bool m_SupportHdr;         // HDR is supported
    bool m_ColorimetryForced;   // Colorimetry values are set
    bool m_ForceTestPicture;   // User forced the test picture
    bool m_UsingTestPicture;   // Test picture is used
    bool m_ForceMonitorDetected; // User forced monitor detected
    bool m_DisableEdidCheck;   // True if EDID will not be used
    bool m_DisableHdmiOutput;  // True if user disabled HDMI output
    DtHdmiVidStd m_UsedVidStd;  // Video standard used
    DtHdmiVidStd m_SelectedVidStd; // Video standard selected
    int m_UsedVidMod;          // DTAPI_HDMI_VIDMOD_xx video mode used
    int m_SelectedVidMod;     // Video mode selected
    int m_SupportedEotf;      // Supported electro-optical transfer
                               // function
    int m_SupportedStaticMetadataDescr; // Supported static metadata descriptors

    bool m_SupportMonitorRangeLimits; // Supported static metadata descriptors

                               // Monitor range limits are set
    int m_MaxPixelClk;        // Maximum pixel rate clock in MHz
    int m_MinVRate;           // Minimum vertical rate
    int m_MaxVRate;           // Maximum vertical rate
    int m_MinHRate;           // Minimum horizontal rate
    int m_MaxHRate;           // Maximum horizontal rate
    std::vector<DtHdmiVidStd> m_MonSupportedVidStd; // Vector of supported video standards

    unsigned int m_StateMask; // Bitfields indicating operating state
};

```

### Members

*m\_MonDetected*

This member is true if a display is detected on the HDMI connector.

*m\_EdidError*

This member is true if a fault is detected during the parsing of the EDID (=Extended Display Identification Data) retrieved from the connected display.

*m\_SupportHdmi*

This member is true if the connected display supports HDMI. A HDMI capable device should have a HDMI Vendor Specific Data Block in the EDID.

*m\_SupportYCbCr444*

This member is true if the connected display supports YCbCr444 as indicated by the CEA extension in the EDID.

*m\_SupportYCbCr422*

This member is true if the connected display supports YCbCr422 as indicated by the CEA extension in the EDID.

*m\_SupportBasicAudio*

This member is true if the connected display supports basic audio as indicated by the CEA extension in the EDID.

*m\_SupportScDc*

This member is true if the connected display supports SCDC (= Status and Control Data Channel) as indicated by the HDMI Forum Vendor Specific Data Block in the EDID.

*m\_SupportHdr*

This member is true if the connected display supports HDR (=High Dynamic Range). A HDR capable display should have a HDR Static Metadata Data Block in the EDID. If true, the *m\_SupportedEotf* and *m\_SupportedStaticMetadataDescr* indicates the HDR types supported by the display.

*m\_ColorimetryForced*

True if a colorimetry values is set with the function `DtAvOutput::SetHdmiColorimetry`.

*m\_ForceTestPicture*

This member indicates the Enable value of the `DtAvOutput::ForceHdmiTestPicture` function.

*m\_UsingTestPicture*

This member is true if a test picture is displayed at the HDMI output. This can be the case if a video format is put on the output that is not supported by the display or by forcing the test picture using the `DtAvOutput::ForceHdmiTestPicture` function. If the display only supports 3G, but 12G is played out, no test picture is displayed and only one sub-image is put on the HDMI output. This can be detected by the *m\_SelectedVidStd* and *m\_UsedVidStd* members. The *m\_SelectedVidStd* will be the 12G video standard and the *m\_UsedVidStd* will be the 3G video standard.

*m\_ForceMonitorDetected*

This member is always false and only used for debugging purpose.

*m\_DisableEdidCheck*

This member indicates the Disable value of the `DtAvOutput::DisableHdmiEdidCheck` function. The default value is false.

*m\_DisableHdmiOutput*

This member indicates the Disable value of the `DtAvOutput::DisableHdmiOutput` function. The default value is false.

*m\_UsedVidStd*

This member indicates the actual video standard displayed at the HDMI output. This video standard can be different to the video standard played at the SDI output in some cases. See the *m\_UsingTestPicture* member for details.

*m\_SelectedVidStd*

This member indicates the actual video standard played at the SDI output. This video standard can be different to the video standard played at the HDMI output in some cases. See the *m\_UsingTestPicture* member for details.

*m\_UsedVidMod*

This member indicates the actual video mode used at the HDMI output. This member can be different to the *m\_SelectedVidMod* if the display does not support the selected video mode.

*m\_SelectedVidMod*

This member indicates the video mode selected by the `DtAvOutput::SetHdmiVideoMode` function. The default value is `DTAPI_HDMI_VIDMOD_YCBCR_422`.

*m\_SupportedEotf*

This member is a bitmask of the Electro-Optical Transfer Functions supported by the attached display. This member is only valid if *m\_SupportHdr* is true.

Bit	Meaning
0	Traditional gamma – SDR Luminance Range support
1	Traditional gamma – HDR Luminance Range support
2	SMPTE ST 2084 (PQ) support

3	Hybrid Log-Gamma (HLG) based on ITU-R BT.2100-0 support
others	Reserved for future use

*m\_SupportedStaticMetadataDescr*

This member is a bitmask of the Static Metadata Descriptors supported by the attached display. This member is only valid if *m\_SupportHdr* is true.

Bit	Meaning
0	Static Metadata Type 1 (e.g. HDR10, PQ)
others	Reserved for future use

*m\_SupportMonitorRangeLimits*

This member is true if the connected display indicates the Display Range Limits in the EDID.

Is that case, the *m\_MaxPixelClk*, *m\_MinVRate*, *m\_MaxVRate*, *m\_MinHRate*, *m\_MaxHRate* members are valid.

*m\_MaxPixelClk*

This member indicates the maximal pixel clock [MHz] supported by the display as indicated in the Display Range Limits in the EDID. This member is only valid when *m\_SupportMonitorRangeLimits* is true.

*m\_MinVRate*

This member indicates the minimal vertical rate [Hz] supported by the display as indicated in the Display Range Limits in the EDID. For interlaced formats this is the field rate. This member is only valid when *m\_SupportMonitorRangeLimits* is true.

*m\_MaxVRate*

This member indicates the maximal vertical rate [Hz] supported by the display as indicated in the Display Range Limits in the EDID. For interlaced formats this is the field rate. This member is only valid when *m\_SupportMonitorRangeLimits* is true.

*m\_MinHRate*

This member indicates the minimal horizontal rate [Hz] supported by the display as indicated in the Display Range Limits in the EDID. This member is only valid when *m\_SupportMonitorRangeLimits* is true.

*m\_MaxHRate*

This member indicates the maximal horizontal rate [Hz] supported by the display as indicated in the Display Range Limits in the EDID. This member is only valid when *m\_SupportMonitorRangeLimits* is true.

*m\_MonSupportedVidStd*

This member contains a list of all supported video standards supported by the display as indicated in the EDID.

*m\_StateMask*

This member is a bitmask of the state of the HDMI output port. If errors occur during the HDMI port initialization, it will be indicated in this member. Several bits can be active simultaneously.

Bit	Mask	Level	Meaning
0	0x001	Info	Should be active in default operation mode and connected display
1	0x002	Error	SCDC initialization error: Possible error with HDMI cable connection
2	0x004	Error	Error reading EEDID
3	0x008	Error	Error updating video standard (non-specific error)
4	0x010	Info	Display disconnected
5	0x020	Error	HPD forced: Do not force the hot plug detection. It will not initialize the HDMI output port correctly.

8	0x100	Error	PLL lock timeout
9	0x200	Error	SCDC TMDS configuration error
10	0x400	Error	Error initializing HDMI output driver
Other		Debug	Internal states

## struct DtHdmiVidStd

Structure describing the video standard on an HDMI port.

```
struct DtHdmiVidStd
{
    bool m_VidStd;                // Video standard
    DtAspectRatio m_AspectRatio; // Picture Aspect Ratio
};
```

### Members

*m\_VidStd*

Indicates the video standard.

*m\_AspectRatio*

Picture aspect ratio.

Value	Meaning
DT_AR_UNKNOWN	Unknown aspect ratio
DT_AR_4_3	4x3
DT_AR_16_9	16x9
DT_AR_14_9	14x9

## struct DtHwFuncDesc

Structure describing a hardware function.

```

struct DtHwFuncDesc
{
    DtDeviceDesc  m_DvcDesc;           // Device descriptor
    int m_ChanType;           // Channel type (OR-able)
    DtCaps  m_Flags;           // Capability flags (OR-able)
    int m_IndexOnDvc;         // Relative index of hardware function
    int m_Port;               // Physical port number (1..#ports)
    unsigned char m_Ip[4];     // IPv4 address (TS-over-IP only)
    unsigned char m_IpV6[3][16]; // IPv6 address (TS-over-IP only)
    unsigned char m_MacAddr[6]; // MAC address (TS-over-IP only)
};
    
```

### Members

*m\_DvcDesc*

Device descriptor of 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** do not have an associated channel object because no direct interaction is possible.

Value	Channel Object	Meaning
<b>DTAPI_CHAN_DISABLED</b>	n.a.	Channel is disabled
<b>DTAPI_CHAN_INPUT</b>	<b>DtInpChannel</b>	Input channel
<b>DTAPI_CHAN_OUTPUT</b>	<b>DtOutpChannel</b>	Output channel
<b>DTAPI_CHAN_DBLBUF</b>	n.a.	The hardware function is a double-buffered copy of another hardware function
<b>DTAPI_CHAN_LOOPTHR</b>	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 must be disabled before port #1 is configured for APSK operation. Only physical port #1 can be configured for APSK operation.

*m\_Flags*

Capability flags that provide further information about the hardware function.

The available capabilities are listed in DTAPI.h as **DTAPI\_CAP\_XXX**.

*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 and the DTA-2160 is port #4;
- Double-buffered outputs like on the DTA-140 count as a single port.

*m\_Ip*

IPv4 address of the hardware function. This field is only valid for functions with capability **DTAPI\_CAP\_IP**.

*m\_IpV6[3]*

Array of IPv6 addresses of the hardware function. This field is only valid for functions with capability **DTAPI\_CAP\_IP**. The array contains the link-local, site-local and global IPv6 addresses associated to the hardware function. If an IPv6 address type is not available, an entry with all 0's is added to the end.

*m\_MacAddr*

MAC address of the hardware function. This field is only valid for functions with capability **DTAPI\_CAP\_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 is *either* **DTAPI\_CHAN\_INPUT** or **DTAPI\_CHAN\_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 DtIpPars

**DtIpPars** struct is deprecated. The **DtIpPars2** struct is the successor.

The parameters in this structure are used when starting transmission or reception of a TS-over-IP stream to or from a unicast or multicast destination.

The parameters in this structure are used when starting transmission or reception of a TS-over-IP stream to or from a unicast or multicast destination. **DtIpPars** is also used to read back TS-over-IP parameters using **DtIpChannel::GetIpPars**.

Both IPv4 and IPv6 are supported, as selected by the **DTAPI\_IP\_V4/DTAPI\_IP\_V6** flag in *m\_Flags*.

**DtIpPars** supports network redundancy (SMPTE 2022-7 “Seamless Protection Switching of SMPTE ST 2022 IP Datagrams”) by setting *m\_Mode* to **DTAPI\_IP\_TX\_2022\_7** (transmission on two links) or **DTAPI\_IP\_RX\_2022\_7** (reception from two links). If one of these modes is used, the redundant link parameters have to be specified in the six struct members starting at *m\_Ip2*. Network redundancy is currently supported only by DekTec’s DTA-2162 (Dual GigE port card for PCIe).

SD-SDI is also supported (SMPTE 2022 5/6) by setting the video standard in the *m\_IpProfile* member.

See the description of the members for more information.

```

struct DtIpPars
{
    // Main link
    unsigned char m_Ip[16];           // IP address (IPv4/IPv6)
    unsigned short m_Port;           // Port number
    unsigned char m_SrcFltIp[16];    // Source filter: IP address (IPv4/IPv6)
    unsigned short m_SrcFltPort;     // Source filter: port number
    int m_VlanId;                    // VLAN ID
    int m_VlanPriority;              // VLAN priority

    // Redundant link (mode DTAPI_IP_TX_2022_7, DTAPI_IP_RX_2022_7 only)
    u_char m_Ip2[16];               // IP address (IPv4/IPv6)
    u_short m_Port2;                // Port number
    u_char m_SrcFltIp2[16];         // Source filter: IP address (IPv4/IPv6)
    u_short m_SrcFltPort2;          // Source filter: port number
    int m_VlanId2;                  // VLAN ID
    int m_VlanPriority2;             // VLAN priority

    int m_TimeToLive;                // Time-to-live (TTL) for IP Tx
    int m_NumTpPerIp;                // #TPs per IP packet
    int m_Protocol;                  // Protocol: DTAPI_PROTO_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;                     // Control flags
    int m_Mode;                       // Redundancy mode
    DtIpProfile m_IpProfile;         // IP stream profile
};

```

### Members when used for IP reception (Rx)

*m\_Ip* (main link), *m\_Ip2* (redundant link)

IP address from which to receive IP packets, specified as 4 bytes for IPv4 and 16 bytes for IPv6. For unicast receive, all bytes can be set to 0. If the IP address is in the multicast range, **DTAPI** automatically joins and drops membership of the multicast group when required. The **DTAPI\_IP\_V4/DTAPI\_IP\_V6** flag in *m\_Flags* member selects between using the IPv4 and IPv6 protocol.

*m\_Port, m\_Port2*

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, m\_SrcFltIp2*

Source IP address for source-specific multicast.

Relevant only if the IP address is a multicast address. In this case *m\_SrcFltIp(2)* can be set to a specific IP address for listening to a single multicast source.

If *m\_SrcFltIp(2)* is set to 0.0.0.0 (or 16x 0 for IPv6), any-source multicast is used and the multicast sender may be any IP address.

*m\_SrcFltPort, m\_SrcFltPort2*

Source-specific multicast: source port number associated with *m\_SrcFltIp(2)*.

*m\_SrcFltPort(2)* may be set to a specific source port number, or to 0 for accepting IP packets from any source port.

*m\_VlanId, m\_VlanId2*

VLAN identifier (VID) as specified in IEEE 802.1Q. If set to 0, VLAN is not used. If set to a positive integer, only packets with the specified VLAN identifier are received.

*m\_VlanPriority, m\_VlanPriority2*

Not used for Rx.

*m\_TimeToLive*

Not used for Rx.

*m\_NumTpPerTp*

**Write:** Expected number of transport packets stored in one IP packet. This value is used to estimate the receive buffer size. If omitted, a value of 7 is used for the estimation.

**Read back:** Number of transport packets stored in one IP packet in the incoming stream.

*m\_Protocol*

Expected protocol.

**Write:** Only automatic detection (value `DTAPI_PROTO_AUTO`) is allowed.

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

Value	Meaning
<code>DTAPI_PROTO_UDP</code>	UDP
<code>DTAPI_PROTO_RTP</code>	RTP
<code>DTAPI_PROTO_AUTO</code>	Automatically detect UDP or RTP

*m\_DiffServ*

Not used.

*m\_FecMode*

Error-correction mode.

Value	Meaning
<code>DTAPI_FEC_DISABLE</code>	Do not apply error correction
<code>DTAPI_FEC_2D</code>	Apply error correction with the FEC streams received on port numbers <i>m_Port+2</i> and <i>m_Port+4</i>

*m\_FecNumRows, m\_FecNumCols*

**Write:** Expected number of FEC rows and columns in the FEC matrix. These values are used to estimate the receive buffer size. If omitted, a maximal matrix size of 10x10 is used for the estimation when using MPEG-2 packets and 375x4 when using SDI. These values are only used if *m\_FecMode* is not `DTAPI_FEC_DISABLE`.

*Read back*: Number of rows and columns in the FEC matrix that has been detected. In SMPTE-2022 these parameters are called *D* and *L* respectively.

*m\_Flags*

Control/status flags. In the current version of DTAPI a single flag is supported, selecting between IPv4 and IPv6 addressing.

Value	Meaning
<b>DTAPI_IP_V4</b>	Use the IPv4 protocol. All IP addresses are 4 bytes long. This is the default when neither <b>DTAPI_IP_V4</b> nor <b>DTAPI_IP_V6</b> is specified.
<b>DTAPI_IP_V6</b>	Use the IPv6 protocol. All IP addresses are 16 bytes long.

*m\_Mode*

IP redundancy mode.

Value	Meaning
<b>DTAPI_IP_NORMAL</b>	Normal mode: non-redundant IP reception. The constructor of <b>DtIpPars</b> initializes <i>m_Mode</i> to this mode, so this is the default.
<b>DTAPI_IP_RX_2022_7</b>	Receive packets from two IP ports and merge the packets into a single logical stream. This mode is defined by the SMPTE 2022-7 standard. This mode can only be used when the port supports capability <b>CAP_IP_PAIR</b> and has an <u>odd</u> physical port number N. The port will be paired with IP port N+1. The redundant link parameters must have to be valid. The incoming streams on ports N and N+1 must be equal to each other, with the exception of the IP-address fields. Such streams can be generated by e.g. a DTA-2162 in <b>DTAPI_IP_TX_2022_7</b> mode.  This mode is not supported for IPv6 with the UDP protocol. If using the <b>2022_7</b> mode with IPv6 and UDP, unpredictable output is returned to the application. When using IPv6, only the RTP protocol is supported for receive.

*m\_IpProfile*

The *m\_IpProfile* defines the maximal bitrate and the maximal path skew of the expected receiving stream(s). These values are used for receive buffer calculations and for the SMPTE 2022-7 mode. Also the SDI standard (for SMPTE 2022 5/6) can be selected. See the *DtIpProfile* struct for details.

## Members when used for IP transmission (Tx)

*m\_Ip* (*main link*), *m\_Ip2* (*redundant link*)

IP destination address that will be used for transmission. *m\_Ip* is specified as 4 bytes for IPv4 and 16 bytes for IPv6. The **DTAPI\_IP\_V4/DTAPI\_IP\_V6** flag in *m\_Flags* member selects between using the IPv4 and IPv6 protocol.

*m\_Port*, *m\_Port2*

Destination port number. When the protocol is RTP, the port number shall be even.

*m\_SrcFltIp*, *m\_SrcFltIp2*

Not used for specifying Tx parameters.  
*Read back*: The host's IP address.

*m\_SrcFltPort*, *m\_SrcFltPort2*

Source port number used for transmission. This member is used only if the **DTAPI\_IP\_TX\_MANSRCPORT** flag in *m\_Flags* is set. If the **DTAPI\_IP\_TX\_MANSRCPORT** flag is not set, a free source port is assigned automatically.

*Read back*: The selected source port number.

*m\_VlanId*, *m\_VlanId2*

VLAN identifier (VID) as specified in IEEE 802.1Q. If set to 0, VLAN is not used. If set to a positive integer, the IP packets will be tagged with the specified VLAN identifier.

*m\_VlanPriority, m\_VlanPriority2*

Priority value which refers to the IEEE 802.1p Priority Code Point (PCP). It is used in the VLAN header as specified in IEEE 802.1Q.

*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. This member is not used when the video standard is SDI.

*m\_Protocol*

Protocol used for encapsulation of transport packets. When using the SDI video standard, only DTAPI\_PROTO\_RTP is allowed.

Value	Meaning
DTAPI_PROTO_UDP	UDP
DTAPI_PROTO_RTP	RTP

*m\_DiffServ*

Value to be put in the *Differentiated Services* field (formerly *Type Of Service*) in the IPv4 header or *Traffic Class* field in the IPv6 header. The valid range is 0..255. The default value is 0.

Bits	Field	Meaning
7..2	DSCP	Differentiated Services Code Point
1..0	ECN	Explicit Congestion Notification

*m\_FecMode*

Error-correction mode.

Value	Meaning
DTAPI_FEC_DISABLE	Do not add FEC packets
DTAPI_FEC_2D_M1	Generate FEC packets as specified in SMPTE-2022. The FEC-packet is inserted exact in the middle of the next 2 TS packets. The FEC packets are NOT BLOCK aligned generated.
DTAPI_FEC_2D_M1_B	See DTAPI_FEC_2D_M1. The FEC packets are BLOCK aligned generated.
DTAPI_FEC_2D_M2	Generate FEC packets as specified in SMPTE-2022. The FEC-packet is inserted exact after the following IP TS packet. The FEC packets are NOT BLOCK aligned generated.
DTAPI_FEC_2D_M2_B	See DTAPI_FEC_2D_M2. The FEC packets are BLOCK aligned generated.

*m\_FecNumRows, m\_FecNumCols*

Number of rows and columns in the FEC matrix. In SMPTE-2022 these parameters are called *D* and *L* respectively. The DTAPI supports all matrix sizes with the following restriction:  
L > 0 and D >= 0

*m\_Flags*

Control/status flags.

Value	Meaning
DTAPI_IP_V4	Use the IPv4 protocol. All IP addresses are 4 bytes long. This is the default when neither DTAPI_IP_V4 nor DTAPI_IP_V6 is specified (this is if <i>m_Flags</i> is 0)
DTAPI_IP_V6	Use the IPv6 protocol. All IP addresses are 16 bytes long.

<b>DTAPI_IP_TX_MANSRCPORT</b>	Use <i>m_SrcFltPort</i> and <i>m_SrcFltPort2</i> as the source port for transmitting packets. If this flag is not specified, a free source port is assigned automatically.
-------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------

*m\_Mode*

IP redundancy mode.

Value	Meaning
<b>DTAPI_IP_NORMAL</b>	Normal mode: non-redundant IP transmission. The constructor of <b>DtIpPars</b> initializes <i>m_Mode</i> to this mode, so this is the default.
<b>DTAPI_IP_TX_2022_7</b>	Transmit TS-over-IP packets to two physical IP ports at once. This mode is defined by the SMPTE 2022-7 standard. Both streams will be equal to each other, with the exception of the IP-addressing fields. This mode can only be used when the port supports capability <b>CAP_IP_PAIR</b> and has an <u>odd</u> physical port number N. The redundant link is port N+1. The redundant link parameters must have to be valid.

*m\_IpProfile*

If SDI is used for transmitting (SMPTE 2022 5/6) the video standard must be set. See the **DtIpProfile** struct for details.

## struct DtIpPars2

The parameters in this structure are used when starting transmission or reception of a TS-over-IP stream to or from a unicast or multicast destination. **DtIpPars2** is also used to read back TS-over-IP parameters using **DtIpChannel::GetIpPars**.

Both IPv4 and IPv6 are supported, as selected by the **DTAPI\_IP\_V4/DTAPI\_IP\_V6** flag in *m\_Flags*.

**DtIpPars2** supports network redundancy (SMPTE 2022-7 “Seamless Protection Switching of SMPTE ST 2022 IP Datagrams”) by setting *m\_Mode* to **DTAPI\_IP\_TX\_2022\_7** (transmission on two links) or **DTAPI\_IP\_RX\_2022\_7** (reception from two links). If one of these modes is used, the redundant link parameters have to be specified in the six struct members starting at *m\_Ip2*. Network redundancy is currently supported only by DekTec’s DTA-2162 (Dual GigE port card for PCIe).

SD-SDI is also supported (SMPTE 2022 5/6) by setting the video standard in the *m\_IpProfile* member.

See the description of the members for more information.

```

struct DtIpPars2
{
    // Main link
    unsigned char m_Ip[16];           // IP address (IPv4/IPv6)
    unsigned short m_Port;           // Port number
    unsigned char m_Gateway[16];     // New gateway (IPv4/IPv6)

    std::vector<DtIpSrcFlt> m_SrcFlt; // Source IP/port filter
    int m_VlanId;                    // VLAN ID
    int m_VlanPriority;              // VLAN priority

    // Redundant link (mode DTAPI_IP_TX_2022_7, DTAPI_IP_RX_2022_7 only)
    u_char m_Ip2[16];               // IP address (IPv4/IPv6)
    u_short m_Port2;               // Port number
    std::vector<DtIpSrcFlt> m_SrcFlt2; // Source IP/port filter
    int m_VlanId2;                 // VLAN ID
    int m_VlanPriority2;           // VLAN priority

    int m_TimeToLive;              // Time-to-live (TTL) for IP Tx
    int m_NumTpPerIp;             // #TPs per IP packet
    int m_Protocol;                // Protocol: DTAPI_PROTO_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;                  // Control flags
    int m_Mode;                   // Redundancy mode
    DtIpProfile m_IpProfile;      // IP stream profile
};

```

### Members when used for IP reception (Rx)

*m\_Ip* (main link), *m\_Ip2* (redundant link)

IP address from which to receive IP packets, specified as 4 bytes for IPv4 and 16 bytes for IPv6. For unicast receive, all bytes can be set to 0. If the IP address is in the multicast range, **DTAPI** automatically joins and drops membership of the multicast group when required. The **DTAPI\_IP\_V4/DTAPI\_IP\_V6** flag in *m\_Flags* member selects between using the IPv4 and IPv6 protocol.

*m\_Port*, *m\_Port2*

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\_Gateway*, *m\_Gateway2*

Not used for Rx.

*m\_SrcFlt, m\_SrcFlt2*

A list of source IP addresses and ports for source-specific multicast.

The source IP-address is only relevant if the IP address is a multicast address. In this case *m\_SrcFlt(2)* can be set to a specific IP address/port for listening to a single or multiple multicast sources.

If *m\_SrcFlt.m\_SrcFltIp(2)* is set to 0.0.0.0 (or 16x 0 for IPv6), or the list is empty, any-source multicast is used and the multicast sender may be any IP address.

If *m\_SrcFlt.m\_SrcFltPort(2)* may be set to a specific source port number, or to 0 for accepting IP packets from any source port.

*m\_VlanId, m\_VlanId2*

VLAN identifier (VID) as specified in IEEE 802.1Q. If set to 0, VLAN is not used. If set to a positive integer, only packets with the specified VLAN identifier are received.

*m\_VlanPriority, m\_VlanPriority2*

Not used for Rx.

*m\_TimeToLive*

Not used for Rx.

*m\_NumTpPerTp*

**Write:** Expected number of transport packets stored in one IP packet. This value is used to estimate the receive buffer size. If omitted, a value of 7 is used for the estimation.

**Read back:** Number of transport packets stored in one IP packet in the incoming stream.

*m\_Protocol*

Expected protocol.

**Write:** Only automatic detection (value `DTAPI_PROTO_AUTO`) is allowed.

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

Value	Meaning
<code>DTAPI_PROTO_UDP</code>	UDP
<code>DTAPI_PROTO_RTP</code>	RTP
<code>DTAPI_PROTO_AUTO</code>	Automatically detect UDP or RTP

*m\_DiffServ*

Not used.

*m\_FecMode*

Error-correction mode.

Value	Meaning
<code>DTAPI_FEC_DISABLE</code>	Do not apply error correction
<code>DTAPI_FEC_2D</code>	Apply error correction with the FEC streams received on port numbers <i>m_Port+2</i> and <i>m_Port+4</i>

*m\_FecNumRows, m\_FecNumCols*

**Write:** Expected number of FEC rows and columns in the FEC matrix. These values are used to estimate the receive buffer size. If omitted, a maximal matrix size of 10x10 is used for the estimation when using MPEG-2 packets and 375x4 when using SDI. These values are only used if *m\_FecMode* is not `DTAPI_FEC_DISABLE`.

**Read back:** Number of rows and columns in the FEC matrix that has been detected. In SMPTE-2022 these parameters are called *D* and *L* respectively.

### *m\_Flags*

Control/status flags. In the current version of DTAPI a single flag is supported, selecting between IPv4 and IPv6 addressing.

Value	Meaning
<b>DTAPI_IP_V4</b>	Use the IPv4 protocol. All IP addresses are 4 bytes long. This is the default when neither <b>DTAPI_IP_V4</b> nor <b>DTAPI_IP_V6</b> is specified.
<b>DTAPI_IP_V6</b>	Use the IPv6 protocol. All IP addresses are 16 bytes long.

### *m\_Mode*

IP redundancy mode.

Value	Meaning
<b>DTAPI_IP_NORMAL</b>	Normal mode: non-redundant IP reception. The constructor of <b>DtIpPars</b> initializes <i>m_Mode</i> to this mode, so this is the default.
<b>DTAPI_IP_RX_2022_7</b>	Receive packets from two IP ports and merge the packets into a single logical stream. This mode is defined by the SMPTE 2022-7 standard. This mode can only be used when the port supports capability <b>CAP_IP_PAIR</b> and has an <u>odd</u> physical port number N. The port will be paired with IP port N+1. The redundant link parameters must have to be valid. The incoming streams on ports N and N+1 must be equal to each other, with the exception of the IP-address fields. Such streams can be generated by e.g. a DTA-2162 in <b>DTAPI_IP_TX_2022_7</b> mode.  This mode is not supported for IPv6 with the UDP protocol. If using the 2022_7 mode with IPv6 and UDP, unpredictable output is returned to the application. When using IPv6, only the RTP protocol is supported for receive.

### *m\_IpProfile*

The *m\_IpProfile* defines the maximal bitrate and the maximal path skew of the expected receiving stream(s). These values are used for receive-buffer calculations and for the SMPTE 2022-7 mode. Also the SDI standard (for SMPTE 2022 5/6) can be selected. See the *DtIpProfile* struct for details.

## Members when used for IP transmission (Tx)

### *m\_Ip* (main link), *m\_Ip2* (redundant link)

IP destination address that will be used for transmission. *m\_Ip* is specified as 4 bytes for IPv4 and 16 bytes for IPv6. The **DTAPI\_IP\_V4/DTAPI\_IP\_V6** flag in *m\_Flags* member selects between using the IPv4 and IPv6 protocol.

### *m\_Port*, *m\_Port2*

Destination port number. When the protocol is RTP, the port number shall be even.

### *m\_Gateway*, *m\_Gateway2*

This member can be used to override the default gateway. If not used, the standard default gateway is used as defined at the network interface.

### *m\_SrcFlt*, *m\_SrcFlt2*

This member is only used when specifying the **DTAPI\_IP\_TX\_MANSRCPORT** flag in *m\_Flags*.

if the **DTAPI\_IP\_TX\_MANSRCPORT** flag in *m\_Flags* is set, the port number of the first element is used for the source port for transmission. If the **DTAPI\_IP\_TX\_MANSRCPORT** flag is not set, a free source port is assigned automatically.

Read back: The host's IP address and used source port.

### *VlanId*, *m\_VlanId2*

VLAN identifier (VID) as specified in IEEE 802.1Q. If set to 0, VLAN is not used. If set to a positive integer, the IP packets will be tagged with the specified VLAN identifier.

*m\_VlanPriority, m\_VlanPriority2*

Priority value which refers to the IEEE 802.1p Priority Code Point (PCP). It is used in the VLAN header as specified in IEEE 802.1Q.

*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. This member is not used when the video standard is SDI.

*m\_Protocol*

Protocol used for encapsulation of transport packets. When using the SDI video standard, only DTAPI\_PROTO\_RTP is allowed.

Value	Meaning
DTAPI_PROTO_UDP	UDP
DTAPI_PROTO_RTP	RTP

*m\_DiffServ*

Value to be put in the *Differentiated Services* field (formerly *Type Of Service*) in the IPv4 header or *Traffic Class* field in the IPv6 header. The valid range is 0..255. The default value is 0.

Bits	Field	Meaning
7..2	DSCP	Differentiated Services Code Point
1..0	ECN	Explicit Congestion Notification

*m\_FecMode*

Error-correction mode.

Value	Meaning
DTAPI_FEC_DISABLE	Do not add FEC packets
DTAPI_FEC_2D_M1	Generate FEC packets as specified in SMPTE-2022. The FEC-packet is inserted exact in the middle of the next 2 TS packets. The FEC packets are NOT BLOCK aligned generated.
DTAPI_FEC_2D_M1_B	See DTAPI_FEC_2D_M1. The FEC packets are BLOCK aligned generated.
DTAPI_FEC_2D_M2	Generate FEC packets as specified in SMPTE-2022. The FEC-packet is inserted exact after the following IP TS packet. The FEC packets are NOT BLOCK aligned generated.
DTAPI_FEC_2D_M2_B	See DTAPI_FEC_2D_M2. The FEC packets are BLOCK aligned generated.

*m\_FecNumRows, m\_FecNumCols*

Number of rows and columns in the FEC matrix. In SMPTE-2022 these parameters are called *D* and *L* respectively. The DTAPI supports all matrix sizes with the following restriction:

$$L > 0 \text{ and } D \geq 0$$

*m\_Flags*

Control/status flags.

Value	Meaning
DTAPI_IP_V4	Use the IPv4 protocol. All IP addresses are 4 bytes long. This is the default when neither DTAPI_IP_V4 nor DTAPI_IP_V6 is specified (this is if <i>m_Flags</i> is 0)
DTAPI_IP_V6	Use the IPv6 protocol. All IP addresses are 16 bytes long.

<b>DTAPI_IP_TX_MANSRCPORT</b>	Use <i>m_SrcFltPort</i> and <i>m_SrcFltPort2</i> as the source port for transmitting packets. If this flag is not specified, a free source port is assigned automatically.
-------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------

*m\_Mode*

IP redundancy mode.

Value	Meaning
<b>DTAPI_IP_NORMAL</b>	Normal mode: non-redundant IP transmission. The constructor of <b>DtIpPars</b> initializes <i>m_Mode</i> to this mode, so this is the default.
<b>DTAPI_IP_TX_2022_7</b>	Transmit TS-over-IP packets to two physical IP ports at once. This mode is defined by the SMPTE 2022-7 standard. Both streams will be equal to each other, with the exception of the IP-addressing fields. This mode can only be used when the port supports capability <b>CAP_IP_PAIR</b> and has an <u>odd</u> physical port number N. The redundant link is port N+1. The redundant link parameters must have to be valid.

*m\_IpProfile*

If SDI is used for transmitting (SMPTE 2022 5/6) the video standard must be set. See the **DtIpProfile** struct for details.

## struct DtIpProfile

This structure describes the IP transmission “profile”. It defines the maximum bitrate and (in SMPTE 2022-7 mode) the maximal skew between path 1 (main link) and path 2(redundant link). These values are only used for IP receive.

The `m_VideoStandard` member must be set for IP transmit and IP receive or use the default value.

This structure is contained in the `DtIpPars` structure.

```

struct DtIpProfile
{
    int m_Profile; // IP transmission profile
    unsigned int m_MaxBitrate; // Maximal bitrate in bps
    int m_MaxSkew; // Maximal skew in ms
    int m_VideoStandard; // DTAPI_VIDSTD_
};
    
```

### Members

#### `m_Profile`

Defines the IP transmission profile. It sets the maximal bitrate and maximal skew using a predefined or user defined profile.

Value	Meaning	
DTAPI_IP_PROF_NOT_DEFINED	No profile defined. This is the default. The DTAPI default values are used as follows: m_MaxSkew=50ms m_MaxBitrate = 270Mbps	
DTAPI_IP_USER_DEFINED	The profile is defined by the <code>m_MaxSkew</code> and <code>m_MaxBitrate</code> members of the <code>DtIpProfile</code> struct.	
DTAPI_IP_LBR_LOW_SKEW	m_MaxSkew=10ms, m_MaxBitrate = 10Mbps	Low bitrate profile
DTAPI_IP_LBR_MODERATE_SKEW	m_MaxSkew=50ms, m_MaxBitrate = 10Mbps	
DTAPI_IP_LBR_HIGH_SKEW	m_MaxSkew=450ms, m_MaxBitrate = 10Mbps	
DTAPI_IP_SBR_LOW_SKEW	m_MaxSkew=10ms, m_MaxBitrate = 270Mbps	Slow bitrate profile
DTAPI_IP_SBR_MODERATE_SKEW	m_MaxSkew=50ms, m_MaxBitrate = 270Mbps	
DTAPI_IP_SBR_HIGH_SKEW	m_MaxSkew=450ms, m_MaxBitrate = 270Mbps	
DTAPI_IP_HBR_LOW_SKEW	m_MaxSkew=10ms, m_MaxBitrate = 3Gbps	High bitrate profile
DTAPI_IP_HBR_MODERATE_SKEW	m_MaxSkew=50ms, m_MaxBitrate = 3Gbps	
DTAPI_IP_HBR_HIGH_SKEW	m_MaxSkew=450ms, m_MaxBitrate = 3Gbps	

#### Notes:

- The `m_MaxBitrate` will be truncated to the maximal physical link speed a card can handle. For the DTA-160, DTA-2160 and DTA-2162 this value will be truncated to maximal 1Gbps.

- The `DtInpChannel::SetFifoSize` function overrules the `m_MaxBitrate` in the above table for the buffer size calculation of the SDI/TS packet buffer.

*m\_MaxBitrate*

This value indicates the maximal expected bitrate of the receiving stream in bps. It's used to calculate the receive buffer size.

*m\_MaxSkew*

The `m_MaxSkew` is the maximal expected difference over time in arrival time between IP packets of path 1 (main link) compared to the IP packets of path 2 (redundant link). In SMPTE 2022-7 this is defined as PD. The skew is in milliseconds.

*m\_VideoStandard*

Set/get the video standard for transmit and receive. The default value is `DTAPI_VIDSTD_TS`. The IP-port supports the following video standards:

Value	Meaning	Supported SMPTE standard
<code>DTAPI_VIDSTD_TS</code>	Transmitting MPEG-2 transport stream data over IP	SMPTE-2022-1 SMPTE-2022-2 SMPTE-2022-7
<code>DTAPI_VIDSTD_525</code>	Transmitting 10-bit, 525 lines, full SDI frames over IP	SMPTE-2022- 5 SMPTE-2022- 6
<code>DTAPI_VIDSTD_625</code>	Transmitting 10-bit, 625 lines, full SDI frames over IP	SMPTE-2022- 7
<code>DTAPI_VIDSTD_UNKNOWN</code>	Video standard is unknown. No IP packets received or unknown video format.	

## struct DtlpQosStat

This structure contains additional IP statistic counters that are calculated by the driver. This structure is contained in the DtlpStat structure. All counters are measured over a time period of one second and one minute. The counters can be retrieved by the m\_QosStatsLastSec and m\_QosStatsLastMin members of the DtlpStat structure.

If the “Seamless Protection Switching” mode is active (SMPTE 2022-7) counters are maintained for path 1 (main link), path 2 (redundant link) and the resulting stream. If the SMPTE 2022-7 mode is inactive, only the main link counters are valid.

```
struct DtlpQosStat
{
    double m_PerAfterFec;           // Packet error rate of reconstructed stream
    double m_MinSkew;              // Min. skew between path 1 and path 2
    double m_MaxSkew;              // Max. skew between path 1 and path 2

    // Main link
    double m_Per1;                 // Packet error rate path 1
    double m_DelayFactor1;         // Delay factor path 1
    double m_MinIpat1;             // Min. interpacket arrival time path 1
    double m_MaxIpat1;             // Max. interpacket arrival time path 1

    // Redundant link
    double m_Per2;                 // Packet error rate path 2
    double m_DelayFactor2;         // Delay factor path 2
    double m_MinIpat2;             // Min. interpacket arrival time path 2
    double m_MaxIpat2;             // Max. interpacket arrival time path 2
};
```

### Members

*m\_Per1, m\_Per2, m\_PerAfterFec*

Packet Error Rate for the main link (m\_Per1), redundant link (m\_Per2) and the resulting stream (m\_PerAfterFec).

*m\_MinSkew, m\_MaxSkew*

The skew is the minimal (m\_MinSkew) and maximal (m\_MaxSkew) difference over time in arrival time between IP packets of the main link compared to the IP packets of the redundant link. If the skew is positive, the main link has a longer delay than the redundant link. If the skew is negative the redundant link has a longer delay. Note: PD as defined in SMPTE 2022-7 is the absolute value of the skew. The skew is measured in milliseconds.

*m\_DelayFactor1 (main link), m\_DelayFactor2 (redundant link)*

Delay Factor in microseconds. The delay factor is an indication of the jitter of the IP stream. It is defined as the maximum difference between the actual arrival time of a UDP/RTP packet and the ideal (jitterless) arrival time of that packet.

*m\_MinIpat1 (main link), m\_MinIpat2 (redundant link)*

Minimal “Inter Packet Arrival Time” of two consecutive IP packets in milliseconds.

*m\_MaxIpat1 (main link), m\_MaxIpat2 (redundant link)*

Maximal “Inter Packet Arrival Time” of two consecutive IP packets in milliseconds.

## struct DtIpStat

Structure with IP statistics calculated by the driver. If the “Seamless Protection Switching” mode is active (SMPT 2022-7) counters are maintained for path 1 (main link), path 2 (redundant link) and the resulting stream. If this mode is inactive, only path 1 values are valid.

Note: The packet counters are not reset after read and a counter wrap must be handled by the application.

```
struct DtIpStat
{
    unsigned int m_TotNumIpPackets;           // #IP packets stream
    unsigned int m_LostIpPacketsBeforeFec;    // #lost IP packets before FEC
    unsigned int m_LostIpPacketsAfterFec;     // #lost IP packets after FEC

    // Main link
    unsigned int m_NumIpPacketsReceived1;     // #IP packets received path 1
    unsigned int m_NumIpPacketsLost1;         // #IP packets lost path 1

    // Redundant link
    unsigned int m_NumIpPacketsReceived2;     // #IP packets received path 2
    unsigned int m_NumIpPacketsLost2;         // #IP packets lost path 2

    DtIpQosStats m_QosStatsLastSec;          // QOS statistics per second
    DtIpQosStats m_QosStatsLastMin;         // QOS statistics per minute
};
```

### Members

*m\_TotNumIpPackets*

Total number of IP packets that the stream should contain. Lost packets are included in this counter.

*m\_LostIpPacketsBeforeFec*

Number of IP packets lost before FEC reconstruction.

*m\_LostIpPacketsAfterFec*

Number of IP packets lost after FEC reconstruction.

*m\_NumIpPacketsReceived1 (main link), m\_NumIpPacketsReceived2 (redundant link)*

Number of IP packets received. Lost IP packets are not included in this counter.

*m\_NumIpPacketsLost1 (main link), m\_NumIpPacketsLost2 (redundant link)*

Number of IP packets lost.

*m\_QosStatsLastSec, m\_QosStatsLastMin*

Quality Of Service statistics calculated by the driver. These statistics are calculated over the last second (*m\_QosStatsLastSec*) and over the last minute (*m\_QosStatsLastMin*). See the *DtIpQosStats* structure for details.

## struct DtIsdbsLayerPars

This structure specifies the ISDB-S modulation for one hierarchical layer. This structure is used in class `DtIsdbsPars`, in an array of four structures for layer 1..4.

```

struct DtIsdbsLayerPars
{
    int m_NumSlots;           // Number of slots
    int m_ModCod;           // Modulation method and code rate
};
    
```

### Members

`m_NumSlots`

The number of slots per frame used for this hierarchical layer.

`m_ModCod`

Modulation type used for this hierarchical layer.

Value	Meaning
DTAPI_ISDBS_MODCOD_BPSK_1_2	BPSK 1/2
DTAPI_ISDBS_MODCOD_QPSK_1_2	QPSK 1/2
DTAPI_ISDBS_MODCOD_QPSK_2_3	QPSK 2/3
DTAPI_ISDBS_MODCOD_QPSK_3_4	QPSK 3/4
DTAPI_ISDBS_MODCOD_QPSK_5_6	QPSK 5/6
DTAPI_ISDBS_MODCOD_QPSK_7_8	QPSK 7/8
DTAPI_ISDBS_MODCOD_8PSK_2_3	8PSK 2/3
DTAPI_ISDBS_MODCOD_NOT_ALLOC	This layer is not used

## struct DtIsdbtStreamSelPars

This structure specifies the selection parameters for an ISDB-T stream.

```
struct DtIsdbtStreamSelPars
{
    // Empty
};
```

### Members

`DtIsdbtStreamSelPars` structure has no members

### Remark

All layers are selected and output the same stream

## struct DtIsdbtLayerData

This structure specifies the ISDB-T modulation parameters for one hierarchical layer. It is used in class `DtIsdbtParamData` used for the statistic `DTAPI_STAT_ISDBT_PARSDATA`.

```

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

### Members

*m\_NumSegments*

Number of segments used in this layer.

*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 *l* 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

## struct DtIsdbtLayerPars

This structure specifies the ISDB-T modulation parameters for one hierarchical layer. It is used in class `DtIsdbtPars`, in an array of three structures 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.

*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 *l* 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 broadcast type **BTYPE\_TV** for 1-segment modulation.

## struct DtIsdbtParamData

This structure specifies the ISDB-T modulation parameters. It is used in class `DtIsdbtParamData` used for the statistic `DTAPI_STAT_ISDBT_PARSDATA`.

```

struct DtIsdbtPars
{
    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
    DtIsdbtLayerData m_LayerPars[3]; // Layer-A/B/C parameters
};
    
```

### Public Members

*m\_BType*

Broadcast type.

Value	Meaning
<code>DTAPI_ISDBT_BTYPE_TV</code>	TV broadcast; Can be used with any number of segments
<code>DTAPI_ISDBT_BTYPE_RAD1</code>	1-segment radio broadcast; Total #segments must be 1
<code>DTAPI_ISDBT_BTYPE_RAD3</code>	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
<code>DTAPI_ISDBT_GUARD_1_32</code>	1/32
<code>DTAPI_ISDBT_GUARD_1_16</code>	1/16
<code>DTAPI_ISDBT_GUARD_1_8</code>	1/8
<code>DTAPI_ISDBT_GUARD_1_4</code>	1/4

*m\_PartialRx*

Flag that indicates whether layer A is used for partial reception: 0 = no partial reception, 1 = partial reception on.

*m\_LayerPars*

Modulation parameters for hierarchical layers A (element 0), B (1) and C (2).

### Remarks

## struct DtPar

This is a generic structure to represent a single parameter setting. It is used for setting and retrieving parameter settings.

```

struct DtPar
{
    DTAPI_RESULT m_Result;           // Result of retrieving the parameters
    int m_ParId;                     // DTAPI_PAR_XXX
    int m_IdXtra[4];                 // Extra identification parameters
    ParValueType m_ValueType;       // Value types of the parameter
    union {
        bool m_ValueBool;           // Value if value type is PAR_VT_BOOL
        double m_ValueDouble;       // Value if value type is PAR_VT_DOUBLE
        int m_ValueInt;              // Value if value type is PAR_VT_INT
        void* m_pValue;              // Pointer for complex types
    };
};
    
```

### Members

#### *m\_Result*

If the user queries one or more parameters with `GetPar`, this member is used to return the result code for retrieving the parameter.

#### *m\_ParId*

Identifies the parameter:

Parameter	Type	Meaning
DTAPI_PAR_DEMOD_THREADS	int	Number of threads used for the software demodulation; The default value is 4.
DTAPI_PAR_DEMOD_LDPC_MAX	int	Maximum number of iterations for ATSC 3.0/DVB-C2/T2 LDPC-error correction; The default value is 50.
DTAPI_PAR_DEMOD_LDPC_AVG	int	Limit for the average number of iterations for ATSC 3.0/DVB-C2/T2 LDPC-error correction; The default value is 16.
DTAPI_PAR_DEMOD_MER_ENA	bool	Enable (true) or disable MER calculation; The default value is 'true'.

#### *m\_IdXtra[4]*

Extra identification parameters. Not yet used.

#### *m\_ValueType*

Identifies the type of the value according to the following table:

Value	Meaning
PAR_VT_BOOL	The value type is bool
PAR_VT_DOUBLE	The value type is double
PAR_VT_INT	The value type is int
PAR_VT_UNDEFINED	The value is not valid yet

## struct DtRawIpHeader

Structure placed in front of all IP Packets in receive mode `DTAPI_RXMODE_IPRAW`.

```
struct DtRawIpHeader
{
    unsigned short  m_Tag;           // 0x44A0h = 'D'160
    unsigned short  m_Length;       // IP packet length
    unsigned int    m_TimeStamp;    // IP packet arrival/transmit timestamp
};
```

### Members

*m\_Tag*

16-bit tag that marks the beginning of a `DtRawIpHeader` structure. The value of this field is fixed to: 0x44A0.

*m\_Length*

16-bit integer that indicates the number of bytes (i.e. size of the IP packet) following directly after the `DtRawIpHeader` structure.

*m\_TimeStamp*

A 32-bit timestamp, taken from the internal 54-MHz system clock on the device, indicating the arrival time of the IP packet following this structure.

## struct DtRdd6Data

Structure describing the Dolby metadata formatted in compliance with SMPTE 2020-1 *Format of Audio Metadata and Description of the Asynchronous Serial Bitstream Transport* and RDD 6 *Description and Guide to the Use of the Dolby E Audio Metadata Serial Bitstream*.

```
struct DtRdd6Data
{
    int m_FirstChannelIndex;
    bool m_DECompleteValid;
    DtDolbyECompleteMetadata m_DEComplete;
    bool m_DEEssentialValid;
    DtDolbyEEssentialMetadata m_DEEssential;
    bool m_DDCompleteValid;
    DtDolbyDigitalCompleteMetadata m_DDComplete;
    bool m_DDEssentialValid;
    DtDolbyDigitalEssentialMetadata m_DDEssential;
};
```

### Members

*m\_FirstChannelIdx*

Derived from ST2020 SDID. Can be -1 for unknown

*m\_DECompleteValid*

The Dolby E Complete metadata is valid.

*m\_DEComplete*

The Dolby E Complete metadata.

*m\_DEEssentialValid*

The Dolby E Essential metadata is valid.

*m\_DEEssential*

The Dolby E Essential metadata.

*m\_DDCompleteValid*

The Dolby Digital Complete metadata is valid.

*m\_DDComplete*

The Dolby Digital Complete metadata.

*m\_DDEssentialValid*

The Dolby Digital Essential metadata is valid.

*m\_DDEssential*

The Dolby Digital Essential metadata.

## struct DtRfLevel

Structure describing a RF-level for a specific frequency. Used by `DtInpChannel::SpectrumScan` to return the RF levels found by scanning a frequency band.

```
struct DtRfLevel
{
    __int64 m_FreqHz;           // Center frequency of the Rf level
    int m_RfLevel;             // RF level found in units of 0.1 dBmV
};
```

### Members

`m_FreqHz`  
The center frequency of the found RF level.

`m_RfLevel`  
RF level found in units of 0.1 dBmV.

## struct DtRsDecStats

This structure specifies the Reed-Solomon decoder statistics used for the statistic `DTAPI_STAT_RSDEC_STATS`.

```
struct DtRsDecStats
{
    bool m_Locked; // Decoder is locked
    __int64 m_ByteSkipCount; // Bytes skipped while looking for sync
    __int64 m_PacketCount; // Decoded packets count
    __int64 m_UncorrPacketCount; // Uncorrected packets count
    __int64 m_ByteErrorCount; // Byte error count
    __int64 m_BitErrorCount; // Bit error count
};
```

### Members

*m\_Locked*

Indication whether the Reed-Solomon decoder is locked.

*m\_BytesSkipCount*

The total number of bytes skipped while looking for synchronization.

*m\_PacketCount*

The total number of decoded transport stream packets.

*m\_UncorrPacketCount*

The total number of uncorrected transport stream packets.

*m\_ByteErrorCount*

The byte error count before Reed-Solomon.

*m\_BitErrorCount*

The bit error count before Reed-Solomon.

## struct DtSdiIpFrameStat

Structure placed in front of all SDI frames in receive mode when using the option `DTAPI_RXMODE_SDI_STAT` and SDI over IP

```
struct DtSdiIpFrameStat
{
    unsigned int m_FrameCount;    // SDI frame counter
    unsigned int m_Timestamp;    // RTP timestamp first IP packet this frame
    unsigned int m_MinIpat;      // Min. IPAT of all IP packets this frame
    unsigned int m_MaxIpat;      // Max. IPAT of all IP packets this frame
    __int64 m_Reserved1;
    __int64 m_Reserved2;
};
```

### Members

*m\_FrameCount*

SDI frame counter as defined in the SMPTE-2022-6 specification. Only the lower 8 bits are used.

*m\_Timestamp*

This is the RTP timestamp of the first IP packets contained in the SDI frame.

*m\_MinIpat*

Minimal Inter Packet Arrival time of all IP packets contained in the SDI frame. This value is in 54MHz units.

*m\_MaxIpat*

Maximal Inter Packet Arrival time of all IP packets contained in the SDI frame. This value is in 54MHz units.

*m\_Reserved1, m\_Reserved2*

Reserved for future use.

## struct DtSpsProgress

This structure describes the progress of an asynchronous spectrum scan. Used by `DtInpChannel::SpectrumScan` to return the current state and RF levels found by scanning a frequency band using the `DtSpsProgressFunc` callback.

```

struct DtSpsProgress
{
    DtRfLevel    m_DtRfLevel;           // A single level
    SpsEvent    m_ProgressEvent;       // Progress event
    DTAPI_RESULT m_Result;             // Result of the spectrum scan
};
    
```

### Members

*m\_DtRfLevel*

The RF level found on a frequency.

*m\_ProgressEvent*

Enumeration defining the type of progress event.

Value	Meaning
<b>SPS_STEP</b>	One frequency step is completed
<b>SPS_CANCELLED</b>	The spectrum scan is cancelled due to execution of <code>DtInpChannel::CancelSpectrumscan</code> or due to execution of a tuning function.
<b>SPS_DONE</b>	The spectrum scan is completed

*m\_Result*

The result code of the spectrum scan.

## struct DtT2MiStreamSelPars

This structure specifies the selection parameters for a T2-MI transport stream containing a complete DVB-T2 stream.

```
struct DtT2MiStreamSelPars
{
    int m_T2MiOutPid;           // T2-MI output PID
    int m_T2MiTsRate;          // T2-MI transport stream rate
};
```

### Members

*m\_T2MiOutPid*

Specifies the PID carrying the T2-MI packet data. The valid range is 0 .. 8190.

*m\_T2MiTsRate*

Specifies the T2-MI transport-stream rate in bits per second. If set to '-1' a variable bitrate transport stream is created, else null packets are added to reach the specified rate. The maximum rate is 72 Mbps.

In case the specified transport-stream rate is too low, T2-MI overflows occur. The number of overflows can be retrieved using the **DTAPI\_STAT\_T2MI\_OVFS** statistic.

### Remarks

T2-MI transport stream selection cannot be combined with DVB-T2 stream (PLP) selection.

## struct DtTimeOfDay

Contains a time-of-day (ToD) timestamp.

```
struct DtTimeOfDay
{
    unsigned int m_Seconds;           // #seconds
    unsigned int m_NanoSeconds;      // #nanosecond
};
```

### Members

*m\_Seconds*

Provides the number of seconds in the time-of-day timestamp.

*m\_NanoSeconds*

Provides the number of nanoseconds in the time-of-day timestamp.

### Remarks

The time information in the structure is intended to contain the time-of-day in seconds/nanoseconds since 1 January 1970, as synchronized by PTP. On DekTec devices that do not support PTP, or do not have a PTP clock slave running, the time of day usually contains the number of seconds / nanoseconds since booting.

## struct DtTimeOfDayState

This structure contains the Time-of-Day state.

```

struct DtTimeOfDayState
{
    int m_State; // State of the time-of-day synchronizer.
    int m_TodReference; // Configured TimeOfDay clock reference
    int m_RefDeviation; // Difference between reference and internal
                        // clock in ppm.
    DtTimeOfDay m_TodTimeStamp; // TimeOfDay timestamp
    DtTimeOfDay m_RefTimeStamp; // Reference timestamp
};
    
```

### Members

*m\_State*

Current state of the configured clock.

*m\_TodReference*

Configured TimeOfDay clock reference.

Value	Meaning
<b>DTAPI_TODREF_INTERNAL</b>	Internal on board clock.
<b>DTAPI_TODREF_STEADYCLOCK</b>	A monotonic increasing clock. On Windows this is the QueryPerformanceCounter and on Linux the CLOCK_MONOTONIC_RAW.

*m\_RefDeviation*

Difference between reference and internal clock in ppm.

*m\_TodTimeStamp*

TimeOfDay timestamp.

*m\_RefTimeStamp*

Reference timestamp.

### Remarks

## struct DtTransmitter

This structure describes a transmitter. Used by `DtInpChannel::BlindScan` to return the transmitters found by scanning a frequency band.

```
struct DtTransmitter
{
    __int64 m_FreqHz;           // Center frequency of the transmitter
    int m_ModType;             // Modulation type
    int m_SymbolRate;         // Symbol rate
};
```

### Members

#### *FreqHz*

Center frequency of the transmitter in Hertz.

#### *ModType*

Type of modulation used in the transmitted signal. See `DtInpChannel::GetDemodControl`, section Modulation Types, for a list of applicable values.

#### *SymbolRate*

The symbol rate of the transmitted signal.

## struct DtVitDecStats

This structure specifies the Viterbi decoder statistics used for the statistic `DTAPI_STAT_VITDEC_STATS`.

```
struct DtVitDecStats
{
    __int64 m_BitCount;           // Input bit count
    __int64 m_BitErrorCount;     // Bit error count
};
```

### Members

*m\_BitCount*

The total number of decoded bits.

*m\_BitErrorCount*

The bit error count before Viterbi.

## Callback functions

### DtBsProgressFunc

Prototype of a callback function to be supplied by the user with the asynchronous `DtInpChannel::BlindScan` method. This callback function is invoked when a blind scan specific event has occurred.

```
typedef void DtBsProgressFunc(  
    [out] DtBsProgress& Progress // Progress information  
    [out] void* pOpaque          // Pointer to event arguments structure  
);
```

#### Parameters

*Progress*

See `DtBsProgress` for a list of applicable values.

*pOpaque*

Opaque pointer that was passed in the `DtInpChannel::BlindscanScan` method.

#### Remarks

The callback function may not block and the amount of processing should be kept as low as possible to avoid stalling the `DTAPI` or driver. In case significant processing time is required the data should be written to a temporary buffer and be processed in another thread.

## DtSpsProgressFunc

Prototype of a callback function to be supplied by the user with `DtInpChannel::SpectrumScan`. This callback function is invoked when a spectrum scan specific event has occurred.

```
typedef void DtSpsProgressFunc (  
    [out] DtSpsProgress& Progress // Progress information  
    [out] void* pOpaque           // Pointer to event arguments structure  
);
```

### Parameters

*Progress*

See `DtSpsProgress` for a list of applicable values.

*pOpaque*

Opaque pointer that was passed in the `DtInpChannel::SpectrumScan` method.

### Remarks

The callback function may not block and the amount of processing should be kept as low as possible to avoid stalling the `DTAPI` or driver. In case significant processing time is required the data should be written to a temporary buffer and be processed in another thread.

## pDtEventCallback

Prototype of an event callback function. If a user subscribes to an event with `::DtapiRegisterCallback` or `DtDevice::RegisterCallback`, a callback with this prototype has to be supplied. When the event fires, DTAPI invokes the callback function and fills in the arguments.

```
typedef void (*pDtEventCallback) (  
    [out] int Event // Event that fired  
    [out] const DtEventArgs* pArgs // Pointer to event arguments struct  
);
```

### Parameters

*Event*

Identifies the event that occurred so that a single callback function can handle multiple events. Refer to `::DtapiRegisterCallback` and `DtDevice::RegisterCallback` for a list of available events.

*pArgs*

Specifies the event arguments with additional information about the event.

### Remarks

The callback function may not block, and the processing time should be kept as low as possible to avoid stalling DTAPI. If significant processing time would be required, the data should be written to a queue and processed in another thread.

## DtCmmbPars

### DtCmmbPars

Structure describing parameters for CMMB modulation.

```

struct 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  
);
```

### Function Arguments

*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

## **DtDemodPars**

### DtDemodPars

The `DtDemodPars` class encapsulates demodulation parameters.

```
class DtDemodPars;
```

## DtDemodPars::CheckValidity

Check demodulation parameters for validity.

```
DTAPI_RESULT DtDemodPars::CheckValidity(
);
```

### Function Arguments

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The demodulation parameters have been set successfully
DTAPI_E_INVALID_BANDWIDTH	Invalid value for bandwidth field
DTAPI_E_INVALID_CONSTEL	Invalid value for constellation field
DTAPI_E_INVALID_GUARD	Invalid value for guard-interval field
DTAPI_E_INVALID_INTERLVNG	Invalid value for interleaving field
DTAPI_E_INVALID_J83ANNEX	Invalid value for J.83 annex
DTAPI_E_INVALID_MODPARS	Invalid demodulation parameters
DTAPI_E_INVALID_PILOTS	Invalid value for pilots
DTAPI_E_INVALID_RATE	Invalid value for convolutional rate or FEC code rate
DTAPI_E_INVALID_SYMRATE	Invalid value for symbol rate
DTAPI_E_INVALID_T2PROFILE	Invalid value for DVB-T2 profile
DTAPI_E_INVALID_TRANSMODE	Invalid value for transmission-mode field

### Remarks

## DtDemodPars::GetModType

Returns the modulation type. The value `DTAPI_MOD_TYPE_UNK` indicates that no valid modulation type has been set.

```
int DtDemodPars::GetModType(  
);
```

### Function Arguments

### Result

### Remarks

## DtDemodPars::SetModType

Initializes the `DtDemodPars` object for the specified modulation type.

```
DTAPI_RESULT DtDemodPars::SetModType(  
    [in] int ModType,           // Modulation type  
);
```

## Function Arguments

### ModType

Modulation type for which the `DtDemodPars` object is initialized.

Value	Meaning	Encapsulated demodulation parameters	Access method in DtDemodPars		
DTAPI_MOD_ATSC	ATSC VSB	DtDemodParsAtsc	Atsc ()		
DTAPI_MOD_ATSC3	ATSC 3.0	DtDemodParsAtsc3	Atsc3 ()		
DTAPI_MOD_DAB	DAB	DtDemodParsDab	Dab ()		
DTAPI_MOD_DVBC2	DVB-C2	DtDemodParsDvbc2	Dvbc2 ()		
DTAPI_MOD_DVBS_QPSK	DVB-S, QPSK	DtDemodParsDvbs	Dvbs ()		
DTAPI_MOD_DVBS2_8PSK	DVB-S.2, 8PSK	DtDemodParsDvbs2	Dvbs2 ()		
DTAPI_MOD_DVBS2_16APSK	DVB-S.2, 16APSK				
DTAPI_MOD_DVBS2_32APSK	DVB-S.2, 32APSK				
DTAPI_MOD_DVBS2_QPSK	DVB-S.2, QPSK				
DTAPI_MOD_S2X_64APSK	DVB-S.2X, 64APSK				
DTAPI_MOD_S2X_128APSK	DVB-S.2X, 128APSK				
DTAPI_MOD_S2X_256APSK	DVB-S.2X, 256APSK				
DTAPI_MOD_S2X_8APSK_1	DVB-S.2X, 8APSK_L				
DTAPI_MOD_S2X_16APSK_1	DVB-S.2X, 16APSK_L				
DTAPI_MOD_S2X_32APSK_1	DVB-S.2X, 32APSK_L				
DTAPI_MOD_S2X_64APSK_1	DVB-S.2X, 64APSK_L				
DTAPI_MOD_S2X_256APSK_1	DVB-S.2X, 256APSK_L				
DTAPI_MOD_DVBT	DVB-T			DtDemodParsDvbt	Dvbt ()
DTAPI_MOD_DVBT2	DVB-T2			DtDemodParsDvbt2	Dvbt2 ()
DTAPI_MOD_IQDIRECT	I/Q samples	DtDemodParsIq	Iq ()		
DTAPI_MOD_ISDBT	ISDB-T	DtDemodParsIsdbt	Isdbt ()		
DTAPI_MOD_QAM16	16-QAM	DtDemodParsQam	Qam ()		
DTAPI_MOD_QAM32	32-QAM				
DTAPI_MOD_QAM64	64-QAM				
DTAPI_MOD_QAM128	128-QAM				
DTAPI_MOD_QAM256	256-QAM				
DTAPI_MOD_QAM_AUTO	Autodetect QAM				

## Result

DTAPI_RESULT	Meaning
DTAPI_OK	The modulation type has been set successfully
DTAPI_E_INVALID_MODTYPE	Invalid modulation type

## Remarks

## IDtDemodEvent

Call back interface for demodulation controller events (e.g. tuning frequency has changed).

### IDtDemodEvent::TuningParsHaveChanged

This event method is called when the tuning frequency has been changed.

```
void IDtDemodEvent::TuningParsHaveChanged(  
    [in] __int64 OldFreqHz           // Old tuning frequency in hertz  
    [in] int OldModType             // Old modulation type  
    [in] int OldParXtra[3]         // Old extra modulation parameters  
    [in] __int64 NewFreqHz         // New tuning frequency in hertz  
    [in] int NewModType            // New modulation type  
    [in] int NewParXtra[3]        // New extra modulation parameters  
);
```

### Function Arguments

*OldFreqHz*

The old tuning frequency (in Hz). A value of -1 indicates no valid frequency was previously set.

*OldModType, OldParXtra[3]*

Old modulation parameters. A value of -1 indicates no previous modulation parameters have been set. Refer to `DtInpChannel::SetDemodControl` for the possible values of these parameters

*NewFreqHz*

The new tuning frequency (in Hz).

*NewModType, NewParXtra[3]*

New modulation parameters. Refer to `DtInpChannel::SetDemodControl` for the possible values of these parameters

## IDtDemodEvent::TuningFreqHasChanged

This event method is called when the tuning frequency has been changed.

```
void IDtDemodEvent::TuningFreqHasChanged(  
    [in] __int64 OldFreqHz           // Old tuning frequency in hertz  
    [in] __int64 NewFreqHz          // New tuning frequency in hertz  
);
```

### Function Arguments

*OldFreqHz*

The old tuning frequency (in Hz). A value of -1 indicates no valid frequency was previously set.

*NewFreqHz*

The new tuning frequency (in Hz).

## DtDrmPars

### DtDrmPars

Structure describing parameters for Digital Radio Mondiale (DRM) modulation.

```
struct DtDrmPars
{
    DrmMode m_DrmMode;           // DRM mode
};
```

### Public Members

*m\_DrmMode*

Sets the DRM mode.

Value	Meaning
<code>DrmMode::MODE_ABCD</code>	DRM mode A, B, C or D
<code>DrmMode::MODE_E</code>	DRM mode E (DRM+)

### Remarks

When using DRM modulation, complete Application Framing (AF) packets (according TS 102 821 section 6.1) must be written to the output channel.

## DtDrmPars::CheckValidity

Check DRM parameters for validity.

```
DTAPI_RESULT DtDrmPars::CheckValidity();
```

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	DRM modulation parameters have been found valid
DTAPI_E_INVALID_MODE	Invalid DRM mode

### Remarks

## DtIqDirectPars

### DtIqDirectPars

Structure describing parameters for IQ-direct modulation.

```

struct DtIqDirectPars
{
    DtFractionInt m_SampleRate; // Sample rate
    int m_IqPacking;           // Packing of IQ-samples
    int m_ChannelFilter;      // Channel filter
    int m_Interpolation;     // Interpolation method
};
    
```

#### Members

*m\_SampleRate*

Specifies the sample rate used by hardware to clock out I and Q samples

*m\_IqPacking*

Specifies the size of the IQ-sample fields which are transferred over the PCI-Express bus, to reduce the PCI-Express bandwidth usage.

Value	Meaning
DTAPI_MOD_IQPKK_AUTO	Best IQ-sample-packing
DTAPI_MOD_IQPKK_NONE	No IQ-sample-packing
DTAPI_MOD_IQPKK_10B	IQ-samples packed into 10 bit
DTAPI_MOD_IQPKK_12B	IQ-samples packed into 12 bit

*m\_ChannelFilter*

Specifies the roll-off of the channel filter or the cut-off frequency of the low-pass filter, only supported for the DTA-2115.

Value	Meaning
DTAPI_MOD_ROLLOFF_AUTO	Default roll-off
DTAPI_MOD_ROLLOFF_NONE	No roll-off
DTAPI_MOD_ROLLOFF_5	5% roll-off
DTAPI_MOD_ROLLOFF_10	10% roll-off
DTAPI_MOD_ROLLOFF_15	15% roll-off
DTAPI_MOD_ROLLOFF_20	20% roll-off
DTAPI_MOD_ROLLOFF_25	25% roll-off
DTAPI_MOD_ROLLOFF_35	35% roll-off
DTAPI_MOD_LPF_0_614	Passband up to sample rate*0.614; used for 2MHz CMMB
DTAPI_MOD_LPF_0_686	Passband up to sample rate*0.686; used for ISDB-T/Tmm/Tsb
DTAPI_MOD_LPF_0_754	Passband up to sample rate*0.754; used for 8MHz CMMB, DAB
DTAPI_MOD_LPF_0_833	Passband up to sample rate*0.833; used for DVB-C2/T/T2
DTAPI_MOD_LPF_0_850	Passband up to sample rate*0.850; used for DVB-T2 extended bandwidth

*m\_Interpolation*

Specifies which interpolation method is used.

Value	Meaning
DTAPI_MOD_INTERPOL_OFDM	Use OFDM interpolation
DTAPI_MOD_INTERPOL_QAM	Use QAM interpolation
DTAPI_MOD_INTERPOL_RAW	Raw mode (e.g. DTA-2115)

## 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 (not dependent on IQ-sample packing).

## DtIqDirectPars::CheckValidity

Check the IQ-direct parameters for validity.

```
DTAPI_RESULT DtIqDirectPars::CheckValidity(  
);
```

### Function Arguments

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	IQ-direct modulation parameters are valid
DTAPI_E_INVALID_ROLLOFF	Invalid roll-off or low-pass filter
DTAPI_E_INVALID_FORMAT	Invalid IQ-packing
DTAPI_E_INVALID_MODE	Invalid interpolation type

### Remarks

## DtIsdbS3Pars

### DtIsdbS3Pars

Structure describing parameters for ISDB-S3 modulation.

```
struct DtIsdbS3Pars
{
    int m_SymRate;           // Symbol rate in baud; default 33.7561Mbd
};
```

#### Public Members

*m\_SymRate*

Symbol rate in baud. Default value: 33.7561Mbd. Valid range: 33.7561Mbd +/- 100ppm.

#### Remarks

When using ISDB-S3 modulation, complete 5810-byte TLV data packets must be written to the output channel.

## DtIsdbS3Pars::CheckValidity

Check ISDB-S3 parameters for validity.

```
DTAPI_RESULT DtIsdbS3Pars::CheckValidity();
```

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	ISDB-S3 modulation parameters have been found valid
DTAPI_E_INVALID_RATE	Invalid ISDB-S3 symbol rate

### Remarks

## DtIsdbtPars

### DtIsdbtPars

Structure describing parameters for ISDB-T modulation.

```

struct DtIsdbtPars
{
    bool m_DoMux;                // Hierarchical multiplexing yes/no
    bool m_FilledOut;           // Members have been given a value
    int m_ParXtra0;             // #Segments, bw, sample rate, sub-channel 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_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\_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\_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\_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.

## 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
);
```

### Function Arguments

*ResultCode*

Value	Meaning
DTAPI_ISDBT_OK	ISDB-T parameters are valid
DTAPI_ISDBT_E_BANDWIDTH	Illegal value for bandwidth field in <i>m_ParXtra0</i>
DTAPI_ISDBT_E_BTYPE	Illegal value for broadcast type ( <i>m_BType</i> )
DTAPI_ISDBT_E_GUARD	Illegal value for guard-interval length ( <i>m_Guard</i> )
DTAPI_ISDBT_E_MODE	Illegal value for transmission mode ( <i>m_Mode</i> )
DTAPI_ISDBT_E_NSEGM	Number of segments is not equal to 1, 3 or 13, or number of segments is invalid for the current broadcast type, or number of segments encoded in <i>m_ParXtra0</i> does not match number of segments specified in <i>m_LayerPars</i>
DTAPI_ISDBT_E_NOTFILLED	Member <i>m_FilledOut</i> is false, indicating that not all ISDB-T parameters have been initialized
DTAPI_ISDBT_E_PARTIAL	'Partial Reception' is selected but number of segments in layer A is not 1
DTAPI_ISDBT_E_SRATE	Illegal value for sample rate field in <i>m_ParXtra0</i>
DTAPI_ISDBT_E_SUBCHANNEL	Invalid sub-channel number. For 1-segment radio: $1 \leq \text{sub channel} \leq 40$ For 1-segment radio: $4 \leq \text{sub channel} \leq 37$

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	ISDB-T modulation parameters have been found valid
DTAPI_E_INVALID_PARS	ISDB-T parameters are invalid. <i>ResultCode</i> 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 ();
```

### Function Arguments

### 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
);
```

### Function Arguments

*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

## ***DtSdi***

### **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
);
```

### Function Arguments

*pInFrame*

Buffer containing the frame to be converted. The buffer address shall be 32-bit aligned.

*InFrameSize*

As an input argument *InFrameSize* 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 argument *InFrameSize* 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 argument *OutFrameSize* 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 argument *OutFrameSize* 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**

## DtStatistic

### struct DtStatistic

This structure represents a single measurement or statistic value, mostly for RF receiver cards. It is used in `DtInpChannel::GetStatistics` to pass measurements and statistics information.

Please use `DtInpChannel::GetSupportedStatistics` to obtain a list of statistics supported for a given input channel.

```

struct DtStatistic
{
    DTAPI_RESULT m_Result;           // Result of retrieving the statistic
    int m_StatisticId;              // DTAPI_STAT_XXX
    int m_IdXtra[4];                // Extra identification parameters
    int m_ValueType;                // Identifies the type of the value
    union {
        bool m_ValueBool;           // Value if value type is STAT_VT_BOOL
        double m_ValueDouble;       // Value if value type is STAT_VT_DOUBLE
        int m_ValueInt;              // Value if value type is STAT_VT_INT
        void* m_pValue;              // Pointer if value type is not boolean,
                                        // int or double
    };
};
    
```

### Members

#### *m\_Result*

If the user queries one or more measurements with `DtInpChannel::GetStatistics`, this member is used to return the result code for retrieving the statistic from the receiver hardware.

#### *m\_StatisticId*

Identifies the statistic:

Statistic	Type	Meaning
DTAPI_STAT_AGC1	int	Returns the AGC1 value
DTAPI_STAT_AGC2	int	Returns the AGC2 value
DTAPI_STAT_ATSC3_L1DATA	struct	ATSC 3.0 layer-1 signaling data
DTAPI_STAT_BADPCKCNT	int	Count of uncorrected packets. Returns 0 if the receiver is not locked. Remark: for DTA-2136 <u>only</u> this value is reset on each call.
DTAPI_STAT_BER_POSTBCH	double	Post-BCH bit error rate. <i>m_IdXtra[0]</i> identifies: DVB-S2 ISI. <i>m_IdXtra[1]</i> identifies: time window.
DTAPI_STAT_BER_POSTLDPC	double	Post-LDPC bit error rate. <i>m_IdXtra[0]</i> identifies: ATSC 3.0/DVB-C2/T2 PLP/DVB-S2 ISI. <i>m_IdXtra[1]</i> identifies: time window.
DTAPI_STAT_BER_POSTVIT	double	Post-Viterbi bit error rate. <i>m_IdXtra[0]</i> identifies: DAB sub-channel's start-address or ISDB-T layer.
DTAPI_STAT_BER_PREBCH	double	Pre-BCH bit error rate. <i>m_IdXtra[0]</i> identifies: ATSC 3.0/DVB-C2/T2 PLP/DVB-S2 ISI. <i>m_IdXtra[1]</i> identifies: time window.
DTAPI_STAT_BER_PRELDPC	double	Pre-LDPC bit error rate. <i>m_IdXtra[0]</i> identifies: ATSC 3.0/DVB-C2/T2

		PLP/DVB-S2 ISI. m_IdXtra[1] identifies: time window.
DTAPI_STAT_BER_PRERS	double	Pre-Reed-Solomon bit error rate. m_IdXtra[0] identifies: DAB sub-channel's start-address or ISDB-T layer.
DTAPI_STAT_BER_PREVIT	double	Pre-Viterbi bit error rate. m_IdXtra[0] identifies: DAB sub-channel's start-address or ISDB-T layer.
DTAPI_STAT_CARRIER_LOCK	bool	Carrier lock status
DTAPI_STAT_CNR	int	Carrier-over-noise ratio in units of 0.1dB
DTAPI_STAT_DAB_ENSEM_INFO	struct	DAB ensemble information from the Fast Information Channel (FIC)
DTAPI_STAT_DAB_TXID_INFO	struct	DAB transmitter identification information (TII)
DTAPI_STAT_DVBC2_DSLICEDISC	int	DVB-C2 data slice discontinuity count
DTAPI_STAT_DVBC2_L1HDR_ERR	int	DVB-C2 L1-Preamble header error count
DTAPI_STAT_DVBC2_L1P2_ERR	int	DVB-C2 L1-Part 2 error count
DTAPI_STAT_DVBC2_L1P2DATA	struct	DVB-C2 layer-1 part 2 signaling data
DTAPI_STAT_DVBC2_PLPSIGDATA	struct	DVB-C2 layer-1 PLP signaling data
DTAPI_STAT_DVBS2_ISI	struct	DVB-S2 input stream identifiers found.
DTAPI_STAT_DVBS2_ISI_SIGDATA	struct	DVB-S2 ISI signaling data.
DTAPI_STAT_DVBT_TPS_INFO	struct	DVB-T transmission parameter signaling information
DTAPI_STAT_DVBT2_L1DATA	struct	DVB-T2 layer-1 signaling data
DTAPI_STAT_DVBT2_L1POST_ERR	int	DVB-T2 L1-Post error count
DTAPI_STAT_DVBT2_L1PRE_ERR	int	DVB-T2 L1-Post error count
DTAPI_STAT_ESNO	int	Energy per symbol to noise power spectral density in units of 0.1 dB. m_IdXtra[1] identifies: time window.
DTAPI_STAT_EBNO	int	Energy per bit to noise power spectral density ratio in units of 0.1 dB. m_IdXtra[0] identifies: DVB-S2 ISI. m_IdXtra[1] identifies: time window.
DTAPI_STAT_FEC_LOCK	bool	FEC decoding lock status
DTAPI_STAT_FER_POSTBCH	double	Post-BCH frame error rate. m_IdXtra[0] identifies: ATSC 3.0/DVB-C2/T2 PLP/DVB-S2 ISI. m_IdXtra[1] identifies: time window.
DTAPI_STAT_FER_POSTLDPC	double	Post-LDPC frame error rate. m_IdXtra[0] identifies: DVB-S2 ISI. m_IdXtra[1] identifies: time window.
DTAPI_STAT_FREQ_SHIFT	double	Input frequency shift (Hz)
DTAPI_STAT_ISDBT_PARSADATA	struct	ISDB-T signaling data
DTAPI_STAT_LDPC_STATS	struct	LDPC error correction counters. m_IdXtra[0] identifies: DVB-C2/T2 PLP.
DTAPI_STAT_LINKMARGIN	int	Difference in dB between C/N of the received signal and the C/N at which the receiver cannot demodulate

		the signal any more in units of 0.1dB. m_IdXtra[0] identifies: DVB-S2 ISI. m_IdXtra[1] identifies time window.
DTAPI_STAT_LOCK	bool	Overall lock status
DTAPI_STAT_LOCK_PERC	int	Lock percentage of a stream during a time window. m_IdXtra[0] identifies: DVB-S2 ISI. m_IdXtra[1] identifies: time window.
DTAPI_STAT_MA_DATA	struct	DVB-C2/T2 mode adaptation data. m_IdXtra[0] identifies: DVB-C2/T2 PLP.
DTAPI_STAT_MA_STATS	struct	DVB-C2/T2 mode adaptation statistics. m_IdXtra[0] identifies: DVB-C2/T2 PLP.
DTAPI_STAT_MER	int	MER in units of 0.1dB. m_IdXtra[0] identifies: ATSC 3.0/DVB-C2/T2 PLP/DVB-S2 ISI. m_IdXtra[1] identifies: time window.
DTAPI_STAT_MER_PLHEADERS	int	MER from the physical headers in a DVBS2 signal in units of 0.1 dB. m_IdXtra[1] identifies: time window.
DTAPI_STAT_OCCUPIEDBW	double	Occupied bandwidth in MHz
DTAPI_STAT_PACKET_LOCK	bool	Packet-level lock status
DTAPI_STAT_PER	double	Packet-error rate. m_IdXtra[0] identifies: DAB sub-channel's start-address or ISDB-T layer.
DTAPI_PLHEADER_LOCK	bool	Lock status of the physical layer headers for DVBS2.
DTAPI_STAT_PLP_BLOCKS	struct	DVB-T2 number of FEC blocks. m_IdXtra[0] identifies: DVB-T2 PLP.
DTAPI_STAT_RELOCKCNT	int	Receiver relock count
DTAPI_STAT_RFLVL_CHAN	int	RF level for channel bandwidth in units of 0.1dBmV
DTAPI_STAT_RFLVL_CHAN_QS	int	Quick-scan RF level for channel bandwidth in units of 0.1dBmV
DTAPI_STAT_RFLVL_NARROW	int	RF level for a narrow bandwidth in units of 0.1dBmV
DTAPI_STAT_RFLVL_NARROW_QS	int	Quick-scan RF level for a narrow bandwidth in units of 0.1dBmV
DTAPI_STAT_RFLVL_UNCALIB	int	Uncorrected RF level reported by the tuner in units of 0.1dBmV
DTAPI_STAT_ROLLOFF	double	Roll-off factor (percentage)
DTAPI_STAT_RS	int	Reed-Solomon error count. Set to -1 if receiver is not locked <b>Note:</b> See remarks section for usage instructions
DTAPI_STAT_RSDEC_STATS	struct	Reed-Solomon decoder statistics. m_IdXtra[0] identifies: DAB sub-channel's start-address or ISDB-T layer.
DTAPI_STAT_SAMPRATE_OFFSET	double	Sample rate offset (ppm)
DTAPI_STAT_SNR	int	Signal-to-noise ratio in units of 0.1dB. m_IdXtra[0] identifies: windows time.

<b>DTAPI_STAT_SPECTRUMINV</b>	bool	Spectrum inversion
<b>DTAPI_STAT_STREAM_LOCK</b>	bool	Lock status of a single stream in a multiple stream signal for DVBS2. <i>m_IdXtra[0]</i> identifies: DVB-S2 ISI.
<b>DTAPI_STAT_T2MI_OVFS</b>	int	DVB-T2 T2-MI overflow count
<b>DTAPI_STAT_TEMP_TUNER</b>	int	Tuner temperature
<b>DTAPI_STAT_VIT_LOCK</b>	bool	Viterbi lock status
<b>DTAPI_STAT_VITDEC_STATS</b>	struct	Viterbi decoder statistics. <i>m_IdXtra[0]</i> identifies: DAB sub-channel's start-address or ISDB-T layer.

*m\_IdXtra[4]*

Extra identification attributes.

When using **DtInpChannel::GetSupportedStatistics**, the **DtStatistic** structure will contain in *m\_IdXtra[0..3]* parameter type identifiers to notify what parameter type is expected. When using **DtInpChannel::GetStatistics** a value according this type must be set in *m\_XtraId[0..3]*. Refer to the table below for possible values.

For DTA-2132 *m\_IdXtra[0]* will contain **STAT\_IDXTRA\_ISI** after requesting supported statistics to notify that an ISI identifier is required. Set an ISI identifier in *m\_IdXtra[0]* when using **DtInpChannel::GetStatistics** to get the statistic for the specified stream. In case of **DTAPI\_STAT\_BER\_POSTLDPC**, **DTAPI\_STAT\_BER\_PREBCH**, **DTAPI\_STAT\_BER\_POSTBCH** and **DTAPI\_STAT\_DVBS2\_ISI\_SIGDATA**, using **DTAPI\_DVBS2\_DEMOD\_ISI\_OVERALL** is not allowed. Note that the currently available ISI identifiers can be requested using **DTAPI\_STAT\_DVBS2\_ISI**.

For DTA-2131, DTA-2138B and DTA-2139B *m\_IdXtra[0]* will contain **STAT\_IDXTRA\_ISDBT\_LAYER** after requesting supported statistics to notify that in case of ISDB-T receiving, the ISDB-T layer identifier is required. Set this identifier in *m\_IdXtra[0]* when using **DtInpChannel::GetStatistics** to get the statistic for the specified layer.

For DTA-2131 *m\_IdXtra[0]* will contain **STAT\_IDXTRA\_PLPID** after requesting supported statistics to notify that a PLP id is required. Set a PLP identifier in *m\_IdXtra[0]* when using **DtInpChannel::GetStatistics** to get the statistics for the specified stream. For DAB receiving *m\_IdXtra[0]* will contain **STAT\_IDXTRA\_SUBCH** to notify that the start address of the sub-channel is required. The start address is specified in a number of CUs (Capacity Units). Set the CU start address in *m\_IdXtra[0]* when using **DtInpChannel::GetStatistics** to get the statistics for the specified sub-channel.

For DTA-2132 *m\_IdXtra[1]* will contain **STAT\_IDXTRA\_TIME\_WINDOW** after requesting supported statistics to notify that a window id can be used. Set this id in *m\_IdXtra[1]* when using **DtInpChannel::GetStatistics** to acquire statistics averaged over the specified window time. If no window is required, use **STAT\_TIME\_NOT\_USED**.

**DtInpChannel::GetSupportedStatistics** returns in *m\_IdXtra[0..3]* the parameter type that must be used in *m\_IdXtra[0..3]* when requesting a statistic with **DtInpChannel::GetStatistics**. The table below lists the possible parameter types.

Value	Meaning
<b>STAT_IDXTRA_NOT_USED</b>	m_IdXtra parameter is not applicable for this statistic, and can be set to -1 (default value).
<b>STAT_IDXTRA_ISDBT_LAYER</b>	m_IdXtra parameter is used for the ISDB-T layer id. Possible values parameter values for requesting with <b>DtInpChannel::GetStatistics</b> are: <b>DTAPI_ISDBT_LAYER_A</b> , <b>DTAPI_ISDBT_LAYER_B</b> , and <b>DTAPI_ISDBT_LAYER_C</b> .
<b>STAT_IDXTRA_ISI</b>	m_IdXtra parameter is used for DVBS2 stream identification. Possible parameter values for statistic requests with <b>DtInpChannel::GetStatistics</b> are: The stream identifier or <b>DTAPI_DVBS2_DEMOD_ISI_OVERALL</b> . If the stream identifier is mandatory and it is not available, error <b>DTAPI_E_PLP_NOT_FOUND</b> is returned. Use <b>DTAPI_STAT_DVBS2_ISI</b> to get the available ISI identifiers.
<b>STAT_IDXTRA_TIME_WINDOW</b>	m_IdXtra parameter is used to identify the time window for calculating a moving average for the statistic. Possible parameter values for requesting with <b>DtInpChannel::GetStatistics</b> are: <b>STAT_TIME_NOT_USED</b> , <b>STAT_TIME_SHORT</b> (1 second), <b>STAT_TIME_MEDIUM</b> (1 minute), and <b>STAT_TIME_NOT_LONG</b> (1 hour).

*m\_ValueType*

Identifies the type of the value according to the following table:

Value	Meaning
<b>STAT_VT_ATSC3_L1</b>	The value type is pointer to <b>DtAtsc3DemodL1Data</b>
<b>STAT_VT_BOOL</b>	The value type is bool
<b>STAT_VT_DOUBLE</b>	The value type is double
<b>STAT_VT_DAB_ENSEM</b>	The value type is pointer to <b>DtDabEnsembleInfo</b>
<b>STAT_VT_DVBC2_L1P2</b>	The value type is pointer to <b>DtDvbc2DemodL1Part2Data</b>
<b>STAT_VT_DVBC2_PLPSIG</b>	The value type is pointer to <b>DtDvbc2DemodL1PlpSigData</b>
<b>STAT_VT_DVBS2_ISI</b>	The value type is pointer to <b>DtDvbs2Isi</b>
<b>STAT_VT_DVBS2_ISI_SIGDATA</b>	The value type is pointer to <b>DtDvbs2IsiSigData</b>
<b>STAT_VT_DVBT_TPS_INFO</b>	The value type is pointer to <b>DtDvbtTpsInfo</b>
<b>STAT_VT_DVBT2_L1</b>	The value type is pointer to <b>DtDvbt2DemodL1Data</b>
<b>STAT_VT_INT</b>	The value type is int
<b>STAT_VT_ISDBT_PARS</b>	The value type is pointer to <b>DtIsdbtParamsData</b>
<b>STAT_VT_LDPC_STATS</b>	The value type is pointer to <b>DtDemodLdpcStats</b>
<b>STAT_VT_MA_DATA</b>	The value type is pointer to <b>DtDemodMaLayerData</b>
<b>STAT_VT_MA_STATS</b>	The value type is pointer to <b>DtDemodMaLayerStats</b>
<b>STAT_VT_PLP_BLOCKS</b>	The value type is pointer to <b>DtDemodPlpBlocks</b>
<b>STAT_VT_RS_STATS</b>	The value type is pointer to <b>DtRsDecStats</b>
<b>STAT_VT_VIT_STATS</b>	The value type is pointer to <b>DtVitDecStats</b>
<b>STAT_VT_UNDEFINED</b>	The value is not valid yet

*m\_ValueBool*, *m\_ValueDouble*, *m\_ValueInt*, *m\_pValue*

The value of the statistic. *m\_ValueType* determines which variable is used.

## Remarks

The **DTAPI\_STAT\_RS** statistic is available only if the hardware has been put in a special mode using the **SetErrorStats** method. Refer to **DtInpChannel::SetErrorStats** for a full description.

In DVB-S2, the **DTAPI\_STAT\_BER\_PRELDPC** statistic is the bit error rate before the receiver has applied any error correction. For the DTA-2137 it is computed from the MER, for the DTA-2132 from the MER\_PLHEADERS. This computation has been validated using DekTec's advanced demodulator simulation software (this software has been used amongst others in the DVB working groups for the definition of DVB-T2 and DVB-C2). The correspondence between theoretical and measured values is very good.

The DTA-2132 statistic **DTAPI\_STAT\_MER\_PLHEADERS** is computed from the header and pilot symbols in the DVB-S2 signal, and **DTAPI\_STAT\_MER** is computed from the input frames symbols.

For the DTA-2137 and DTA-2132, the **DTAPI\_STAT\_ESN0** statistic is computed from the MER (DTA-2137) or MER\_PLHEADERS (DTA-2132), under the assumption that the noise distribution is Gaussian (AWGN channel), as under these circumstances  $E_s/N_0$  and MER (DTA-2137), MER\_PLHEADERS (DTA-2132) are identical.

For the DTA-2137 and DTA-2132, the **DTAPI\_STAT\_EBNO** statistic is computed from the  $E_s/N_0$  and is valid for constant modulated (CCM) streams only.

For the DTA-2132 statistics **DTAPI\_STAT\_STREAM\_LOCK**, **DTAPI\_STAT\_BER\_PRELDPC**, **DTAPI\_STAT\_BER\_POSTLDPC**, **DTAPI\_STAT\_BER\_PREBCH**, **DTAPI\_STAT\_BER\_POSTBCH**, and **DTAPI\_STAT\_DVBS2\_ISI\_SIGDATA** the ldxtra stream id (ISI) parameter is mandatory.

To get a resulting value for all ISI's, the DTA-2132 statistics **DTAPI\_STAT\_LINKMARGIN**, **DTAPI\_STAT\_FER\_POSTLDPC**, **DTAPI\_STAT\_EBNO**, and **DTAPI\_STAT\_FER\_POSTBCH**, the ISI identifier **DTAPI\_STAT\_IDXTRA\_ISI\_OVERALL** has to be used.

The ISI's of the streams in the signal are returned by using the statistic **DTAPI\_STAT\_DVBS2\_ISI**.

## DtStatistic::GetValue

Get the value of the statistic.

```
DTAPI_RESULT DtStatistic::GetValue(int& Value);
DTAPI_RESULT DtStatistic::GetValue(double& Value);
DTAPI_RESULT DtStatistic::GetValue(bool& Value);

DTAPI_RESULT DtStatistic::GetValue(DtAtsc3DemodL1Data*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDabEnsembleInfo*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDvbC2DemodL1Part2Data*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDvbC2DemodL1PlpSigData*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDvbS2Isi*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDvbS2IsiSigData*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDvbTTpsInfo*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDvbT2DemodL1Data*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDemodLdpcStats*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDemodMaLayerData*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDemodMaLayerStats*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtDemodPlpBlocks*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtIsdbtParamsData*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtRsDecStats*& pValue);
DTAPI_RESULT DtStatistic::GetValue(DtVitDecStats*& pValue);
```

### Function Arguments

*Value*

Receives the value of the statistic. The type of Value must match the type of the statistic. Integers are not automatically converted to doubles or vice versa.

*pValue*

Receives a pointer to the value of the statistic.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Frame has successfully been converted
DTAPI_E_INVALID_TYPE	The value type of the overload does not match the type of the statistic

### Remarks

## Global Functions

### ::DtapiCheckDeviceDriverVersion

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

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

#### Function Arguments

*DeviceCategory*

Device category (**DTAPI\_CAT\_PCI** or **DTAPI\_CAT\_USB**) of device driver for which to check the version.

#### Result

DTAPI_RESULT	Meaning
<b>DTAPI_OK</b>	The device drivers are compatible with the current version of the DTAPI library.
<b>DTAPI_E_DRIVER_INCOMP</b>	Version of at least one of the device drivers is incompatible with the DTAPI library. The device drivers need to be upgraded.
<b>DTAPI_E_NO_DEVICE</b>	Device-driver version cannot be queried because no DekTec device of the given category is available in the system, or the DekTec devices are disabled in the Windows device manager, or the DekTec device driver for the category is not installed.

#### Remarks

These functions can only check the driver version if a PCI or USB device is installed. DTE devices use the standard network drivers and no specific DekTec driver that could be incompatible.

## ::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 InclDteDvcs=false, // Include DTE-31xx devices
    [in] int ScanOrder=DTAPI_SCANORDER_ORIG // Sort order for results
);
```

### Function Arguments

*NumEntries*

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

*NumEntriesResult*

Output argument that receives the number of devices found and described in *DvcDescArr*. The value of this argument can be greater than *NumEntries*; in this case **DtapiDeviceScan** returns **DTAPI\_E\_BUF\_TOO\_SMALL**.

*DvcDescArr*

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

*InclDteDvcs*

Include DekTec DTE-31xx devices in the scan. This requires scanning the network.

*ScanOrder*

The order in which the devices in the system are returned. By default the first results are PCI devices (DTA-1xx, DTA-2xxx), then USB devices (DTU-xxx), then networked devices (DTE-31xx). The order of devices within one device category is OS-dependent. If you use **DTAPI\_SCANORDER\_SN** the devices in the *DvcDescArr* array will be sorted by serial number.

Value	Meaning
<b>DTAPI_SCANORDER_ORIG</b>	Sort devices by type (default)
<b>DTAPI_SCANORDER_SN</b>	Sort devices by serial number

### Result

DTAPI_RESULT	Meaning
<b>DTAPI_OK</b>	Scan has completed successfully and the <i>DvcDescArr</i> array was large enough to contain all device descriptions.
<b>DTAPI_E_BUF_TOO_SMALL</b>	The number of device-description entries in <i>DvcDescArr</i> is too small. The number of entries required is returned in <i>NumEntriesResult</i> .

### Remarks

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

If *InclDteDvcs* is set to **true**, **DtapiDeviceScan** also scans the network for DekTec DTE-31xx devices. This will take 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 **DtDeviceDesc** entries, allocate a new array with the number of entries returned in *NumEntriesResult*, and call **DtapiDeviceScan** again.

## ::DtapiDtDeviceDesc2String

Create a descriptive string from a device descriptor, e.g. "DTA-2145 in Slot 0".

```
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
);
```

### Function Arguments

*pDvcDesc*

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

*StringType*

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

Value	Example	Meaning
<code>TYPE_NMB</code>	"DTA-2145"	Device type number
<code>TYPE_AND_LOC</code>	"DTA-2145 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
<code>DTAPI_OK</code>	Successfully created a string
<code>DTAPI_E_INVALID_BUF</code>	An invalid buffer pointer is supplied for <i>pDvcDesc</i> or <i>pString</i>

## ::DtapiDtHwFuncDesc2String

Create a descriptive string for a hardware function from a `DtHwFuncDesc` structure, e.g. “DTA-2145 in slot 5” or “DVB-ASI”.

```
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
);
```

### Function Arguments

*pHwFunc*

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

*StringType*

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

Value	Example	Meaning
<code>TYPE_NMB</code>	“DTA-2111”	Device type number
<code>TYPE_AND_PORT</code>	“DTA-145 port 1”	Device type number and port number if necessary to uniquely identify the hardware function. If both ports of a DTA-145 are configured as output this function will return “DTA-145 port 1”, if port 1 is configured as input and port 2 as output this function will return “DTA-145”.
<code>TYPE_AND_LOC</code>	“DTA-2144 in slot 5”	Device type number and location
<code>ITF_TYPE</code>	“DVB-ASI”	Physical interface type
<code>ITF_TYPE_SHORT</code>	“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
<code>DTAPI_OK</code>	Successfully created a string
<code>DTAPI_E_INVALID_BUF</code>	An invalid buffer pointer is supplied for <i>pHwFunc</i> or <i>pString</i>

## ::DtapiGetDeviceDriverVersion

Get device driver version information.

**Note:** function overload that returns a vector of driver versions should be used to retrieve the DtPcie driver version.

```
DTAPI_RESULT  ::DtapiGetDeviceDriverVersion(
    [in] int DeviceCategory,           // Device-driver category
    [out] int& Major,                 // Major version number
    [out] int& Minor,                 // Minor version number
    [out] int& BugFix,                // Bug fix version number
    [out] int& Build                  // Build number
);

DTAPI_RESULT  ::DtapiGetDeviceDriverVersion(
    [in] int DeviceCategory,           // Device-driver category
    // Vector of driver version information
    [out] std::vector<DtDriverVersionInfo>& DriverVersions
);
```

### Function Arguments

*DeviceCategory*

Argument specifying the device category:

Value	Meaning
DTAPI_CAT_ALL	Query versions of all device drivers available (only supported for function overload that returns a vector of driver versions).
DTAPI_CAT_PCI	PCI-bus device; Query version of <i>Dta32</i> , <i>Dta64</i> or <i>DtPcie64</i> device driver.
DTAPI_CAT_USB	USB device; Query version of <i>Dtu32</i> or <i>Dtu64</i> device driver.
DTAPI_CAT_NW	Network device; Query version of <i>DtaNw32</i> or <i>DtaNw64</i> device driver
DTAPI_CAT_NWAP	VLAN device; Query version of <i>DtaNwAp32</i> or <i>DtaNwAp64</i> device driver

*Major*

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

*Minor*

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

*BugFix*

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

*Build*

Build number.

*DriverVersions*

Vector with the retrieved driver versions.

## 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 with the specified device category is installed.
DTAPI_E_NOT_SUPPORTED	The specified device category does not use a device driver with a version that can be queried.

## Remarks

## ::DtapiGetDtapiServiceVersion

Get version of the **DTAPI** service.

```
DTAPI_RESULT :: DtapiGetDtapiServiceVersion (  
    [out] int& SvcMajor,           // Major version number  
    [out] int& SvcMinor,         // Minor version number  
    [out] int& SvcBugFix,        // Bug fix version number  
    [out] int& SvcBuild          // Build number  
);
```

### Function Arguments

*SvcMajor*

Major version number of the **DTAPI** service.

*SvcMinor*

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

*SvcBugFix*

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

*SvcBuild*

Build number.

### Result

DTAPI_RESULT	Meaning
DTAPI_E_CONNECT_TO_SERVICE	Failed to connect to the DTAPI service.
DTAPI_OK	Version numbers have been retrieved successfully.

### Remarks

The main version of **DTAPI** is the one retrieved with `::DtapiGetVersion`. The version of the **DTAPI** service is required in specific circumstances only.

## ::DtapiGetVersion

Get version of the **DTAPI** library.

```
DTAPI_RESULT ::DtapiGetVersion(  
    [out] int& Major,           // Major version number  
    [out] int& Minor,         // Minor version number  
    [out] int& BugFix,        // Bug fix version number  
    [out] int& Build          // Build number  
);
```

### Function Arguments

#### *Major*

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

#### *Minor*

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

#### *BugFix*

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

#### *Build*

Build number.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Version numbers have been retrieved successfully.

### Remarks

This function always succeeds.

The PCI and USB device driver have their own version number, which is independent from the **DTAPI** library version.

## ::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 InclDteDvcs=false  // Include DTE-31xx devices
    [in] int ScanOrder=DTAPI_SCANORDER_ORIG // Sort order for results
);
```

### Function Arguments

#### *NumEntries*

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

#### *NumEntriesResult*

Output argument that receives the number of hardware functions found and described in *pHwFuncs*. The value of this argument can be greater than *NumEntries*; in this case **DtapiHwFuncScan** returns **DTAPI\_E\_BUFFER\_TOO\_SMALL**.

#### *pHwFuncs*

Pointer to a caller-supplied array of **DtHwFuncDesc** entries to receive the hardware-function descriptors. A NULL pointer may be supplied, but only if *NumEntries* is 0.

#### *InclDteDvcs*

Include DekTec DTE-31xx devices in the scan. This requires scanning the network.

#### *ScanOrder*

The order in which the devices in the system are scanned. By default the first results are functions of DTA devices, then DTU devices, then DTE devices. The order of devices within one device category is OS-defined. If you use **DTAPI\_SCANORDER\_SN** the devices will be sorted by serial number before enumerating the hardware functions.

The order in which the devices in the system are returned. By default the first results are functions of PCI devices (DTA-1xx, DTA-2xxx), then USB devices (DTU-xxx), then networked devices (DTE-31xx). The order of devices within one device category is OS-dependent. If you use **DTAPI\_SCANORDER\_SN** the devices will be sorted by serial number before enumerating the hardware functions.

Value	Meaning
<b>DTAPI_SCANORDER_ORIG</b>	Sort devices by type (default)
<b>DTAPI_SCANORDER_SN</b>	Sort devices by serial number

## Result

DTAPI_RESULT	Meaning
DTAPI_OK	Scan has completed successfully and the <i>pHwFuncs</i> array was large enough to contain all function descriptions.
DTAPI_E_BUF_TOO_SMALL	The number of function-description entries in <i>pHwFuncs</i> is too small. The number of entries required is returned in <i>NumEntriesResult</i> .
DTAPI_E_INVALID_BUF	A NULL pointer was supplied to <i>pHwFuncs</i> while <i>NumEntries</i> is greater than 0.

## 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 implement multiple hardware functions.

If *InclDteDvcs* is set to **true**, the **DtapiHwFuncScan** also scans the network for DekTec DTE-31xx devices. This will take 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.

Another method is to start with setting *pHwFuncs* to NULL and *NumEntries* to 0. The number of required hardware-function entries will be returned, after which *pHwFuncs* can be allocated with the right size and **DtapiHwFuncScan** called 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.

## ::DtapiInitDtIpParsFromIpString

Initializes the IP and source-IP address members of a TS-over-IP parameters structure.

```
DTAPI_RESULT ::DtapiInitIpParsFromIpString (
    [out] DtIpPars& IpPars,           // TS-over-IP parameters to initialize
    [in] const char* pIp,           // String with destination IP address
    [in] const char* pSrcIp        // String with source IP address
);
DTAPI_RESULT ::DtapiInitIpParsFromIpString (
    [out] DtIpPars& IpPars,           // TS-over-IP parameters to initialize
    [in] const wchar_t* pIp,        // String with destination IP address
    [in] const wchar_t* pSrcIp     // String with source IP address
);
```

### Function Arguments

*IpPars*

TS-over-IP parameters structure to initialize.

*pIp*

Pointer to a string that holds the IP address (e.g. "127.0.0.1") to be used as destination IP address. 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. 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 initializes the `m_Ip` and `m_SrcIp` members in the TS-over-IP parameters structure, it will leave the other members untouched.

## ::DtapiIoStd2VidStd

Convert *Value* and *SubValue* parameter values (as used in `DtDevice::SetIoConfig` calls) to a `DTAPI_VIDSTD_XXX` constant (as used in the Matrix API to identify video standards).

```
DTAPI_RESULT ::DtapiIoStd2VidStd(
    [in] int& Value,           // I/O configuration value:
                              // DTAPI_IOCONFIG_SDI/HSDI/3GSDI
    [in] int& SubValue,      // I/O configuration subvalue:
                              // DTAPI_IOCONFIG_1080I50, ...
    [out] int VidStd,        // DTAPI_VIDSTD_XXX: video standard
);
```

### Function Arguments

*Value*, *SubValue*

I/O configuration value and sub value to be converted to a `DTAPI_VIDSTD_XXX` standard.

*VidStd*

Corresponding video standards. For example, value `DTAPI_IOCONFIG_HSDI` and sub value `DTAPI_IOCONFIG_1080I50` are converted to `DTAPI_VIDSTD_1080I50`.

### Result

DTAPI_RESULT	Meaning
<code>DTAPI_E_INVALID_VIDSTD</code>	<i>Value</i> and <i>SubValue</i> do not correspond to a video standard
<code>DTAPI_OK</code>	Successfully converted I/O configuration value and sub value to the corresponding video standard

### Remarks

## ::DtapiModPars2SymRate

Compute symbol rate from transport-stream rate and modulation parameters.

```
DTAPI_RESULT ::DtapiModPars2SymRate (
  [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
);
DTAPI_RESULT ::DtapiModPars2SymRate (
  [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]  DtFractionInt TsRate  // transport-stream rate
);
```

### Function Arguments

*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 395 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 <code>DtOutpChannel::SetModControl</code>

### Remarks

## ::DtapiModPars2TsRate

Compute transport-stream rate from modulation parameters. There are overloads for different modulation types, please refer to `DtOutpChannel::SetModControl`.

```

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] DtFractionInt& 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] DtDvbC2Pars& C2Pars // DVB-C2 modulation parameters
    [in] int PlpIdx=-1 // Optional PLP-index
);

DTAPI_RESULT ::DtapiModPars2TsRate(
    [out] DtFractionInt & TsRate // Computed transport-stream rate
    [in] DtDvbC2Pars& C2Pars // DVB-C2 modulation parameters
    [in] int PlpIdx=-1 // Optional PLP-index
);

DTAPI_RESULT ::DtapiModPars2TsRate(
    [out] int& TsRate // Computed transport-stream rate
    [in] DtDvbTPars& TPars // DVB-T modulation parameters
    [in] int PlpIdx=-1 // Optional PLP-index
);

DTAPI_RESULT ::DtapiModPars2TsRate(
    [out] DtFractionInt & TsRate // Computed transport-stream rate
    [in] DtDvbT2Pars& TPars // DVB-T modulation parameters
    [in] int PlpIdx=-1 // Optional PLP-index
);

DTAPI_RESULT ::DtapiModPars2TsRate(
    [out] int& TsRate // Computed transport-stream rate
    [in] DtDvbT2Pars& T2Pars // DVB-T2 modulation parameters
    [in] int PlpIdx=-1 // Optional PLP-index
);

DTAPI_RESULT ::DtapiModPars2TsRate(
    [out] DtFractionInt & TsRate // Computed transport-stream rate
    [in] DtDvbT2Pars& T2Pars // DVB-T2 modulation parameters
    [in] int PlpIdx=-1 // Optional PLP-index
);

DTAPI_RESULT ::DtapiModPars2TsRate(
    [out] int& TsRate // Computed transport-stream rate
    [in] DtIsdbTmmPars& TmmPars // DVB-S2 modulation parameters
    [in] int TsIdx=-1 // Optional stream-index
);

DTAPI_RESULT ::DtapiModPars2TsRate(
    [out] DtFractionInt & TsRate // Computed transport-stream rate
    [in] DtIsdbTmmPars& TmmPars // DVB-S2 modulation parameters
    [in] int TsIdx=-1 // Optional stream-index
);

```

## Function Arguments

### *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 `DtOutputChannel::SetModControl` on page 395 for more details about these parameters.

### *C2Pars*

DVB-C2 modulation parameters from which the transport-stream rate of a PLP (default PLP0) is computed; see description of `class DtDvbC2Pars`.

### *TPars*

DVB-T modulation parameters from which the transport-stream rate of a stream (default high priority stream) is computed; see description of `class DtDvbTPars`.

### *T2Pars*

DVB-T2 modulation parameters from which the transport-stream rate of a PLP (default PLP0) is computed; see description of `class DtDvbT2Pars`.

### *TmmPars*

ISDB-Tmm modulation parameters from which the transport-stream rate of a stream (default stream 0) is computed; see description of `class DtIsdbTmmPars`.

### *SymRate*

Symbol rate in baud. This argument 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 <code>DtOutputChannel::SetModControl</code>

## Remarks

## ::DtapiPower2Voltage

Convert from dBm to dBmV.

```
DTAPI_RESULT ::DtapiPower2Voltage(  
    [in] int dBm,           // Level in dBm  
    [out] int& dBmV,       // Converted level in dBmV  
    [in] bool Is50Ohm=false // 50 Ohm (true) or 75 Ohm (false)  
);
```

### Function Arguments

*dBm*

Input level in dBm that is to be converted.

*dBmV*

Converted level expressed in dBmV.

*Is50Ohm*

Indicates whether conversion has to be applied for a 50-Ω impedance (true) or a 75-Ω impedance (false).

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Successfully converted the level in dBm to a level in dBmV

### Remarks

## ::DtapiRegisterCallback

Subscribes to one or more events and registers the callback function.

```
DTAPI_RESULT ::DtapiRegisterCallback(
    [in] pDtEventCallback Callback // Callback for occurred events
    [in] void* pContext // Opaque pointer passed to callback
    [in] int EventTypes // Events to subscribe to (OR-able)
    [out] void** pId // Subscription identifier
);
```

### Function Arguments

#### *Callback*

Pointer to the user-provided callback function that will be called when an event occurred.

#### *pContext*

Opaque pointer that is passed to the callback function.

#### *EventTypes*

Specifies the events to subscribe to. The events may be OR-ed together.

Global events:

Event	Meaning
DT_EVENT_TYPE_ADD	A DekTec device has been inserted and is now available.
DT_EVENT_TYPE_REMOVE	A DekTec device has been removed and is no longer available.

#### *pId*

Pointer to the event subscription identifier.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Callback function has been attached successfully to the event(s)
DTAPI_E_INVALID_TYPE	The EventTypes argument contains invalid event types.
DTAPI_E_INVALID_ARG	The value of one of the arguments is invalid, and no specific other error code applies
DTAPI_E_OUT_OF_MEM	Event watcher cannot be allocated

## ::DtapiResult2Str

Convert **DTAPI\_RESULT** value to a string.

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

### Function Arguments

*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.

## ::DtapiUnregisterCallback

Unregister to the one or multiple events.

```
DTAPI_RESULT ::DtapiUnregisterCallback(  
    [in] void* pId // Subscription identifier to unregister  
);
```

### Function Arguments

*pId*

Pointer to the event subscription identifier given by `DtapiRegisterCallback`.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Callback function has been successfully unregistered.
DTAPI_E_INVALID_ARG	The value of one of the arguments is invalid, and no specific other error code applies
DTAPI_E_NOT_INITIALIZED	No callback functions for events have been registered

## ::DtapiVidStd2IoStd

Convert a **DTAPI\_VIDSTD\_XXX** constant, used in the Matrix API to identify video standards, to *Value* and *SubValue* parameter values used in **DtDevice::SetIoConfig** calls.

```
DTAPI_RESULT ::DtapiVidStd2IoStd(
    [in] int VidStd,           // DTAPI_VIDSTD_XXX: video standard
    [out] int& Value,         // I/O configuration value:
                             // DTAPI_IOCONFIG_SDI/HDSDI/3GSDI
    [out] int& SubValue,     // I/O configuration subvalue:
                             // DTAPI_IOCONFIG_1080I50, ...
);
```

### Function Arguments

*VidStd*

Video standard to be converted: **DTAPI\_VIDSTD\_1080I50**, ..

*Value, SubValue*

Converted I/O configuration value and sub value. For example, **DTAPI\_VIDSTD\_1080I50** is converted to value **DTAPI\_IOCONFIG\_HDSDI** and sub value **DTAPI\_IOCONFIG\_1080I50**.

### Result

DTAPI_RESULT	Meaning
<b>DTAPI_E_INVALID_VIDSTD</b>	An invalid value for video standard was specified
<b>DTAPI_OK</b>	Successfully converted the video standard to I/O configuration <i>Value</i> and <i>SubValue</i> values

### Remarks

The return value is only valid for SDI ports. For SPISDI ports there is no corresponding function.

## ::DtapiVidStd2Str

Convert a **DTAPI\_VIDSTD\_XXX** constant to a human-readable string.

```
const char* ::DtapiVidStd2Str(  
    [in] int VidStd,           // DTAPI_VIDSTD_XXX: video standard  
);
```

### Function Arguments

*VidStd*

Video standard to be converted. For example, **DTAPI\_VIDSTD\_1080I50**, is converted to "DTAPI\_VIDSTD\_1080I50".

### Result

### Remarks

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

## ::DtapiVoltage2Power

Convert from dBmV to dBm.

```
DTAPI_RESULT ::DtapiVoltage2Power(  
    [in] int dBmV,           // Level in dBmV  
    [out] int& dBm,         // Converted level in dBm  
    [in] bool Is50Ohm=false // 50 Ohm (true) or 75 Ohm (false)  
);
```

### Function Arguments

*dBmV*

Input level in dBmV that is to be converted.

*dBm*

Converted level expressed in dBm.

*Is50Ohm*

Indicates whether conversion has to be applied for a 50-Ω impedance (true) or a 75-Ω impedance (false).

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Successfully converted the level in dBmV to a level in dBm

### Remarks

## class DtAvInputStatus

Class for reading the status of audio/video input ports.

### DtAvInputStatus::AttachToPort

Attach the audio/video input status object to a specific physical port on the device. Attachment is non-exclusive, so that the status can be read from multiple processes.

```
DTAPI_RESULT DtAvInputStatus::AttachToPort
(
    [in] DtDevice*  pDtDvc,           // Device object
    [in] int  Port           // Physical port number (1..#ports)
);
```

### Function Arguments

*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 status retrieval object is attached to this port.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Status object has been attached successfully to the port.
DTAPI_E_ATTACHED	Status object is already attached.
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver.
DTAPI_E_DEVICE	Pointer <i>pDtDvc</i> is not valid or the device object is not attached to a hardware device.
DTAPI_E_NO_DT_INPUT	<i>Port</i> is not an input
DTAPI_E_NO_SUCH_PORT	Invalid port number for this device

### Remarks

## DtAvInputStatus::Detach

Detach the audio/video input status object from the port and free associated resources.

```
DTAPI_RESULT DtAvInputStatus::Detach  
(  
);
```

### Function Arguments

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Status object has been detached successfully from the port.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function, so it cannot be detached

### Remarks

## DtAvInputStatus::DetectVidStd

Detect the video standard and link nr of the signal currently applied to the input port.

```
DTAPI_RESULT DtAvInputStatus::DetectVidStd (  
    [out] DtDetVidStd& Info          // Detected video standard info  
);
```

### Function Arguments

*Info*

Returns information about the detected video standard.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Call succeeded
DTAPI_E_NOT_SUPPORTED	Detection of video standard is not supported for current device
DTAPI_E_DEV_DRIVER	Unexpected driver error

### Remarks

This function is only supported by cards having the Matrix2, SdiRx or Hdmi capability.

## DtAvInputStatus::GetAudChanStatus

Get the status of the audio channels. A channel is defined as a single stream of audio samples.

```
DTAPI_RESULT DtAvInputStatus::GetAudChanStatus  
(  
    [out] std::vector<DtAudChanStatus>& AudChns;  
);
```

### Function Arguments

*AudChns*

Vector with the retrieved status per audio channel.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The status of the audio channels has been retrieved successfully.
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver.
DTAPI_E_NOT_ATTACHED	Status object is not attached to a hardware port.

### Remarks

## DtAvInputStatus::GetDolbyMetadata

Get Dolby metadata from ancillary data packets in the SDI stream, formatted in compliance with SMPTE 2020-1 *Format of Audio Metadata and Description of the Asynchronous Serial Bitstream Transport* and RDD 6 *Description and Guide to the Use of the Dolby E Audio Metadata Serial Bitstream*.

```
DTAPI_RESULT DtAvInputStatus::GetDolbyMetadata
(
    [out] std::vector<DtRdd6Data>& Metadata; // Metadata read from SDI input
);
```

### Function Arguments

*Metadata*

Retrieved Dolby metadata.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Dolby metadata has been retrieved successfully.
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver.
DTAPI_E_NOT_ATTACHED	Status object is not attached to a hardware port.

### Remarks

## class DtAvOutput

Class to control and get status information from an HDMI output port.

### DtAvOutput::AttachToPort

Attach an `DtAvOutput` object to a specific physical port. Attachment can be exclusive (default) or shared.

```
DTAPI_RESULT DtAvOutput::AttachToPort(
    [in] DtDevice* pDtDvc,           // Device object
    [in] int Port,                  // Physical port number (1..#ports)
    [in] bool Exclusive=true,       // Request exclusive access yes/no
);
```

### Function Arguments

*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. Port number 4 on the DTA-2195 is the HDMI output port.

*Exclusive*

If *false*, request shared access. If *true*, request exclusive access. This is the default. For changing settings on the physical port, exclusive access is needed. Status retrieval can be done in non-exclusive mode. An error (`DTAPI_E_EXCL_ACCESS_REQD`) is returned if the output was attached non-exclusively but the function needs exclusive access.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Channel object has been attached successfully to the port
DTAPI_E_ATTACHED	Channel object is already attached
DTAPI_E_DEVICE	Pointer <i>pDtDvc</i> 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	<i>Port</i> is not an output
DTAPI_E_NO_SUCH_PORT	Invalid port number for this device

## DtAvOutput::Detach

Detach the physical port from the DtAvOutput class. Frees resources allocated for the output class and restores all settings to the default values if exclusively attached.

```
DTAPI_RESULT DtOutputChannel::Detach();
```

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Channel object has been detached successfully from the hardware function
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function, so it cannot be detached

## DtAvOutput::DisableHdmiEdidCheck

If the HDMI EDID check is disabled, the driver will not check the supported features of the connected display (stored in the EDID data) and always put the SDI stream as is on the HDMI output. If the check is enabled, the driver will check the supported features of the connected display and tries to output the best format. E.g. when a 12G SDI signal is streamed to the SDI output by the software, but the monitor does not support 12G but only 3G, a 3G signal will be put on the HDMI output.

```
DTAPI_RESULT DtAvOutput::DisableHdmiEdidCheck (
    [in] bool Disable
);
```

### Function Arguments

#### *Disable*

If true, the EDID check is disabled and the SDI stream is put on the HDMI output as is. The user must be sure the display will not be damaged if a non-supported format is put on the HDMI output. The default value is false.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The function has been executed successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	This function is not supported for this port
DTAPI_E_EXCL_ACCESS_REQD	Exclusive access is required for this function.

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtAvOutput::DisableHdmiOutput

If the HDMI output is disabled, no data is put on the HDMI output and a connected display will go into sleep mode if supported by the display.

```
DTAPI_RESULT DtAvOutput::DisableHdmiOutput (
    [in] bool Disable
);
```

### Function Arguments

*Disable*

If true, the HDMI output is disabled and no data is put on the HDMI output. The default value is false.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The function has been executed successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	This function is not supported for this port
DTAPI_E_EXCL_ACCESS_REQD	Exclusive access is required for this function.

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtAvOutput::ForceHdmiTestPicture

If the HDMI test picture is forced, a test pattern is displayed on the HDMI output instead of the SDI output stream. The test picture will be displayed in the lowest resolution supported by each HDMI certified display.

```
DTAPI_RESULT DtAvOutput::ForceHdmiTestPicture (
    [in] bool Enable
);
```

### Function Arguments

*Enable*

If true, a test picture is displayed on the HDMI output port. The default value is false.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The function has been executed successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	This function is not supported for this port
DTAPI_E_EXCL_ACCESS_REQD	Exclusive access is required for this function.

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtAvOutput::GetHdmiStatus

Get the status of the HDMI output port and connected display.

```
DTAPI_RESULT DtAvOutput::GetHdmiStatus (  
    [out] DtHdmiTxStatus& Status  
);
```

### Function Arguments

*Status*

Returned status of the HDMI output port and connected monitor

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The Status value has been retrieved successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	This function is not supported for this port

## DtAvOutput::SetHdmiVideoMode

Sets the HDMI video mode to use.

```
DTAPI_RESULT DtAvOutput::SetHdmiVideoMode (
    [in] int VidMod
);
```

### Function Arguments

*VidMod*

New video mode to select. The default value is `DTAPI_HDMI_VIDMOD_YCBCR_422`

Value	Meaning
<code>DTAPI_HDMI_VIDMOD_YCBCR_422</code>	YCbCr 4:2:2 video mode
<code>DTAPI_HDMI_VIDMOD_YCBCR_444</code>	YCbCr 4:4:4 video mode
<code>DTAPI_HDMI_VIDMOD_RGB_444</code>	RGB 4:4:4 video mode

### Result

DTAPI_RESULT	Meaning
<code>DTAPI_OK</code>	The video mode has been set successfully
<code>DTAPI_E_NOT_ATTACHED</code>	Channel object is not attached to a hardware function
<code>DTAPI_E_NOT_SUPPORTED</code>	This function is not supported for this port
<code>DTAPI_E_EXCL_ACCESS_REQD</code>	Exclusive access is required for this function.
<code>DTAPI_E_INVALID_ARG</code>	The VidMod parameter is invalid

### Remarks

This function requires exclusive access (`AttachToPort` was called with `Exclusive=true`).

## DtAvOutput::SetHdmiColorimetry

Set the colorimetry values to be used in the Auxiliary Video Information (AVI) InfoFrame. InfoFrames are used for signaling auxiliary information to the attached display.

```
DTAPI_RESULT DtAvOutput::SetHdmiColorimetry(
    [in] int Colorimetry,
    [in] int ExtendedColorimetry
);
```

### Function Arguments

#### *Colorimetry*

Colorimetry value. This is the value for the C0 and C1 bits in the AVI InfoFrame data byte 2. See the CEA-861 standard for details of these bits.

Default value is 0 (= No Data and extended colorimetry not used).

Bit	CEA-861 naming
0	C0
1	C1

#### *ExtendedColorimetry*

Extended Colorimetry value. This is the value for the EC0, EC1 and EC2 bits in the AVI InfoFrame data byte 3. See the CEA-861 standard for details of these values. Default value is 0.

Bit	CEA-861 naming
0	EC0
1	EC1
2	EC2

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The colorimetry values has been set successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	This function is not supported for this port
DTAPI_E_EXCL_ACCESS_REQD	Exclusive access is required for this function.

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtAvOutput::GetHdmiColorimetry

Returns the current colorimetry values as used in the Auxiliary Video Information (AVI) InfoFrame.

```
DTAPI_RESULT DtAvOutput::GetHdmiColorimetry(  
    [out] int& Colorimetry,  
    [out] int& ExtendedColorimetry  
);
```

### Function Arguments

*Colorimetry*

Colorimetry value. See the `DtAvOutput::SetHdmiColorimetry` function for details.

*ExtendedColorimetry*

Extended Colorimetry value. See the `DtAvOutput::SetHdmiColorimetry` function for details.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The colorimetry values have been retrieved successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	This function is not supported for this port

## DtAvOutput::SetHdmiAudioChannel

Selects the audio channels to be put on the HDMI output.

```
DTAPI_RESULT DtAvOutput::SetHdmiAudioChannel(  
    [in] int AudioCh1,  
    [in] int AudioCh2  
);
```

### Function Arguments

*AudioCh1*

The first audio channel to be put on the HDMI output. The default value is 1.

*AudioCh2*

The second audio channel to be put on the HDMI output. The default value is 2.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The function has been executed successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	This function is not supported for this port
DTAPI_E_EXCL_ACCESS_REQD	Exclusive access is required for this function.

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

For 192 kHz audio data, AudioCh1 must be the first channel in the audio group of the first 192 kHz audio data. AudioCh2 must be the first channel in the audio group of the second 192 kHz audio data.

## DtAvOutput::GetHdmiAudioChannel

Returns the current selected audio channels on the HDMI output.

```
DTAPI_RESULT DtAvOutput::GetHdmiAudioChannel(  
    [out] int& AudioCh1,  
    [out] int& AudioCh2  
);
```

### Function Arguments

*AudioCh1*

Selected channel audio channel 1.

*AudioCh2*

Selected channel audio channel 2.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The selected audio channels have been retrieved successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	This function is not supported for this port

## DtDevice

### DtDevice::AttachToIpAddr

Attaches a device object to the device hardware, based on the IP address of a DTE-31xx device.

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

#### Function Arguments

*Ip*

IP address of the DTE-31xx to attach to.

#### 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	A DTE-31xx with the IP address cannot be found.

#### Remarks

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

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

## DtDevice::AttachToSerial

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

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

### Function Arguments

*Serial*

Serial number of the DekTec device to attach to.

### 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_DRIVER_INCOMP	Version of device driver is incompatible with the DTAPI version, device driver needs to be upgraded.
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.

### Remarks

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

## DtDevice::AttachToSlot

Attaches a 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
);
```

### Function Arguments

*PciBusNumber, SlotNumber*

PCI-bus number and slot number of the DekTec device to attach to.

### 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 initialization actions are performed.

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

## DtDevice::AttachToType

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

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

### Function Arguments

#### *TypeNumber*

Integer value representing the type number of the device to attach to. The integer corresponds to the number in the hardware's type string, e.g. 2160 for the DTA-2160 or 245 for DTU-245.

#### *DeviceNo*

If the system contains multiple devices of the same type, this index 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_NO_DEVICE	No DekTec devices found (at all).
DTAPI_E_NO_SUCH_DEVICE	No device with type <i>Typenumber</i> is found in this system, or the number of devices of this type is less-or-equal than <i>DeviceNo</i> .
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 initialization actions are performed.

## DtDevice::ClearGpsErrors

Resets the error flags associated with the on-board GPS time counter. Refer to `GetGpsStatus` for a list of error flags that can be cleared.

```
DTAPI_RESULT DtDevice::ClearGpsErrors();
```

### Function Arguments

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Error flags successfully cleared.
DTAPI_E_NOT_ATTACHED	Device object is not attached to the device hardware
DTAPI_E_NOT_SUPPORTED	The device does not support a GPS time counter and lacks the <code>DTAPI_CAP_GPSTIME</code> capability.

## DtDevice::Detach

Detaches a device object from the device hardware.

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

### Function Arguments

### 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

Event subscribers will be automatically unsubscribed.

## DtDevice::DetectIoStd

Detects the video standard of the signal currently applied to an input port.

```
DTAPI_RESULT DtDevice::DetectIoStd(
    [in] int Port,           // Physical port number (1..#ports)
    [out] int& Value        // Detected video standard
    [out] int& SubValue     // Detected video standard
);
```

### Parameters

*Port*

Physical port number of the port to detect the video standard for.

*Value/SubValue*

Returns the detected video standard. The values can be used via Refer to `SetIoConfig(Port, DTAPI_IOCONFIG_IOSTD, Value, SubValue)` to set the input video standard for a specific port. See `SetIoConfig()` for more information.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Call succeeded.
DTAPI_E_NOT_SUPPORTED	Detection of video standard is not supported for current device.
DTAPI_E_DEV_DRIVER	Unexpected driver error.

### Remarks

This function is only supported by cards having the Matrix capability.

## DtDevice::FlashDisplay

Flashes the LCD display of a DTE-31xx a number of times. With this function, a configuration tool can alert a user to a particular DTE-31xx unit.

```
DTAPI_RESULT DtDevice::FlashDisplay(
    [in] int NumFlashes=5,           // Number of flashes
    [in] int OnTime=100,            // Time (ms) display is on
    [in] int OffTime=100            // Time (ms) display is off
);
```

### Function Arguments

*NumFlashes*

Number of times to flash the display.

*OnTime, OffTime*

Time in ms the LCD display has to be on/off for one flash.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	A 'flash display' command has been sent to the DTE-31xx.
DTAPI_E_NOT_ATTACHED	Device object is not attached to a DTE-31xx.
DTAPI_E_NOT_SUPPORTED	The device is not a DTE-31xx, or a DTE-31xx without a display.

### Remarks

## DtDevice::GetAttribute

Get the value of an attribute for a port of this device.

```
DTAPI_RESULT DtDevice::GetAttribute(
    [in] int& Port,           // Physical port number (1..#ports)
    [in] int& AttrId,       // Attribute identifier
    [out] int& AttrValue    // Returned attribute value
);
// Overload to get device-level attributes
DTAPI_RESULT DtDevice::GetAttribute(
    [in] int& AttrId,       // Attribute identifier
    [out] int& AttrValue    // Returned attribute value
);
```

### Function Arguments

*Port*

Physical port number of the port for which to retrieve the attribute.

*AttrId*

Identifies the attribute that is to be retrieved.

Value	Applicable to	Meaning
DTAPI_ATTR_LEVEL_MAX	Modulator port	Maximum output level in tenth of a dBm. For OFDM modes, the maximum output level is 3dB less.
DTAPI_ATTR_LEVEL_RANGE	Modulator port	Output-level range in tenth of a dB.
DTAPI_ATTR_RFFREQ_ABSMAX	Modulator port / Demodulator port	Absolute maximum output frequency in MHz supported by the hardware. Frequencies between <b>RFFREQ_MAX</b> and <b>RFFREQ_ABSMAX</b> may work, but are not guaranteed to work.
DTAPI_ATTR_RFFREQ_ABSMIN	Modulator port / Demodulator port	Absolute minimum output frequency in MHz supported by the hardware. Frequencies between <b>RFFREQ_ABSMIN</b> and <b>RFFREQ_MIN</b> may work, but are not guaranteed to work.
DTAPI_ATTR_RFFREQ_MAX	Modulator port / Demodulator port	Maximum supported output frequency in MHz.
DTAPI_ATTR_RFFREQ_MIN	Modulator port / Demodulator port	Minimum supported output frequency in MHz.
DTAPI_ATTR_SAMP_RHW_ABSMAX	Modulator port	Absolute maximum sample rate supported by the hardware. The device hardware may work for sample rates between <b>SAMP_RHW_MAX</b> and <b>SAMP_RHW_ABSMAX</b> , but performance specifications are not guaranteed. If <b>SAMP_RHW_MAX</b> equals <b>SAMP_RHW_ABSMAX</b> , sample rate conversion is used for sample rates above <b>SAMP_RHW_MAX</b> .
DTAPI_ATTR_SAMP_RHW_ABSMIN	Modulator port	Absolute minimum sample rate supported by the hardware. The device hardware may work for sample rates between <b>SAMP_RHW_ABSMIN</b> and <b>SAMP_RHW_MIN</b> , but performance specifications are not guaranteed. If <b>SAMP_RHW_MIN</b> equals <b>SAMP_RHW_ABSMIN</b> , sample rate conversion is used for sample rates below <b>SAMP_RHW_MIN</b> .
DTAPI_ATTR_SAMP_RHW_HARDLIM	Modulator port	
DTAPI_ATTR_SAMP_RHW_MAX	Modulator port	Maximum sample rate for which performance specifications are guaranteed.
DTAPI_ATTR_SAMP_RHW_MIN	Modulator port	Minimum sample rate for which performance specifications are guaranteed.

DTAPI_ATTR_SAMP RATE_ABSMAX	Modulator port	Absolute maximum sample rate that is supported. The signal must be band-limited, otherwise signal frequencies between <b>SAMP_RHW_MAX/2</b> and <b>SAMP_RATE_MAX/2</b> are muted and may even fold back (alias) into the main band.
DTAPI_ATTR_SAMP RATE_ABSMIN	Modulator port	Absolute minimum sample rate that is supported.
DTAPI_ATTR_SAMP RATE_MAX	Modulator port	Maximum sample rate for which performance specifications are guaranteed.
DTAPI_ATTR_SAMP RATE_MIN	Modulator port	Minimum sample rate for which performance specifications are guaranteed.
DTAPI_ATTR_NUM_F ANS	Device-level	The number of fans on the device.
DTAPI_ATTR_NUM_T EMP_SENS	Device-level	The number of temperature sensors on the device.
DTAPI_ATTR_LEVEL _RANGE_DIGITAL	Modulator port	Output-level attenuation range including using digital attenua- tion in tenth of a dB.

## Result

DTAPI_RESULT	Meaning
DTAPI_OK	The attribute value has been retrieved successfully
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 attribute is not supported for this device

## Remarks

## DtDevice::GetDescriptor

Get device descriptor.

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

### Function Arguments

*DvcDesc*

Output argument that receives the device descriptor.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The device descriptor has been retrieved successfully
DTAPI_E_NOT_ATTACHED	Device object is not attached to device hardware

### Remarks

## DtDevice::GetDeviceDriverVersion

Get device-driver version information.

```
DTAPI_RESULT DtDevice::GetDeviceDriverVersion(  
    [out] int& Major,           // Major version number  
    [out] int& Minor,          // Minor version number  
    [out] int& BugFix,         // Bug-fix version number  
    [out] int& Build           // Build number  
);
```

### Function Arguments

#### *Major*

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.

#### *Minor*

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

#### *BugFix*

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

#### *Build*

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 a DTE-31xx.

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

### Function Arguments

*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::GetFailsafeAlive

Get current status of the watchdog that controls the failsafe relay of the specified output port.

```
DTAPI_RESULT DtDevice::GetFailsafeAlive(
    [in] int Port,           // Physical port number (1..#ports)
    [out] bool& Alive       // Are we alive and kicking?
);
```

### Function Arguments

*Port*

Physical port number.

*Alive*

Indicates the current status of the watchdog.

If *Alive* is true, all is fine and the board is operating as normal. The failsafe timeout has not expired and the relay is in normal operational mode: the input port is connected to the input channel and the output channel is connected to the output port.

If *Alive* is false, the watchdog timer has expired before **SetFailsafeAlive** was called. The input-to-output relay is switched to failsafe mode: the input port is connected directly to the output port.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The watchdog status has been retrieved successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_CONFIG	The channel is not configured to operate in failsafe mode
DTAPI_E_NOT_SUPPORTED	The channel is not capable of operating in failsafe mode
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

## DtDevice::GetFailsafeConfig

Get configuration info about failsafe mode of the specified output port.

```
DTAPI_RESULT DtDevice::GetFailsafeConfig(
    [in] int Port,           // Physical port number (1..#ports)
    [out] bool& Enable,     // Failsafe enabled yes/no
    [out] int& Timeout      // Watchdog timeout (in ms)
);
```

### Function Arguments

*Port*

Physical port number.

*Enable*

Operation in failsafe mode has been enabled or disabled (see also **SetFailsafeConfig**).

*Timeout*

Current watchdog 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 to operate in failsafe mode
DTAPI_E_NOT_SUPPORTED	The channel is not capable of operating in failsafe mode
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

## DtDevice::GetFanSpeed

Get the current fan speed in rpm.

```
DTAPI_RESULT DtDevice::GetFanSpeed(  
    [in] int Fan  
    [out] int& Rpm  
);
```

### Function Arguments

*Fan*

1-based index of the fan to get the speed of.

*Rpm*

The speed of the fan.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Fan 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.

### Remarks

## DtDevice::GetFirmwareVersion

Get version number of the firmware loaded on the device.

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

### Function Arguments

*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::GetGenlockState

Get the state and the detected video standard currently applied to the specified reference source (“genlock”) input port.

```
DTAPI_RESULT DtDevice::GetGenlockState (
    [out] int& State,           // Current genlock state
    [out] int& RefVidStd      // Reference video standard
    [out] int& DetVidStd      // Detected video standard
);
// OVERLOAD: Just the genlock state and reference video standard
DTAPI_RESULT DtDevice::GetGenlockState (
    [out] int& State,           // Current genlock state
    [out] int& RefVidStd      // Reference video standard
);
// OVERLOAD: Just the genlock state
DTAPI_RESULT DtDevice::GetGenlockState (
    [out] int& State,           // Current genlock state
);
```

### Function Arguments

#### *State*

Returns the genlock state of the on-board video clock generator.

Value	Meaning
DTAPI_GENL_NO_REF	No reference input signal is detected on the reference source input port, or the configured reference video standard (with <b>IoConfig</b> ) is inconsistent with the applied video standard.
DTAPI_GENL_LOCKING	A valid reference input signal is detected on the reference source input and internal PLLs are locking to it.
DTAPI_GENL_LOCKED	Full clock-lock has been achieved.

#### *RefVidStd*

Returns the video standard configured for the reference source (with **SetIoConfig**). Refer to spreadsheet [CapList.xlsx](#), sheet **IO Capabilities**, group **IOSTD**, for a list of all supported values.

#### *DetVidStd*

Returns the detected video standard of the reference source. Refer to spreadsheet [CapList.xlsx](#), sheet **IO Capabilities**, group **IOSTD**, for a list of all supported values.

In case of an unsupported video standard or if the board does not support the detection of the video standard of the reference source, **DTAPI\_VIDSTD\_UNKNOWN** is returned.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Genlock state has been returned.
DTAPI_E_DEV_DRIVER	Unexpected driver error.
DTAPI_E_NOT_ATTACHED	Device object is not attached to device hardware.
DTAPI_E_NOT_SUPPORTED	This function is not supported by the current hardware.

### Remarks

The genlock port is configured with **SetIoConfig**.

## DtDevice::GetGpsStatus

Retrieves the synchronization status and error flags of the on-board GPS time counter.

```
DTAPI_RESULT DtDevice::GetGpsStatus(
    [out] int& Status          // GPS time counter synchronization status
    [out] int& Error          // GPS time counter error flags
);
```

### Function Arguments

#### Status

Returns the current synchronization status of the on-board GPS time counter as a combination of OR-able flags.

Value	Meaning
DTAPI_GPS_10MHZ_SYNC	The on-board clock oscillator driving the GPS time counter is frequency-locked to the 10MHz clock input signal.
DTAPI_GPS_1PPS_SYNC	The GPS time counter is phase-locked to the 1pps input signal.

#### Error

Provides the current status of the error flags associated with the on-board GPS time counter as a combination of OR-able flags.

Value	Meaning
DTAPI_GPS_1PPS_ERROR	The 1pps event occurred unexpectedly when the GPS time counter was not 0. This flag can be cleared with <b>ClearGpsErrors</b> .
DTAPI_GPS_10MHZ_OUT_RANGE	The frequency of the 10MHz clock input signal is outside the valid range.
DTAPI_GPS_10MHZ_NO_SIGNAL	No valid signal is detected on the 10MHz clock input.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Status successfully retrieved.
DTAPI_E_NOT_ATTACHED	Device object is not attached to the device hardware.
DTAPI_E_NOT_SUPPORTED	The device does not support a GPS time counter and lacks the <b>DTAPI_CAP_GPSTIME</b> capability.

## DtDevice::GetGpsTime

Retrieves the current GPS time, expressed in nanoseconds, elapsed since the last 1 pulse-per-second (1pps) event.

```
DTAPI_RESULT DtDevice::GetGpsTime(
    [out] int& GpsTime           // Current GPS time
);
```

### Function Arguments

*GpsTime*

Returns the current GPS time in nanoseconds since the last 1pps event. The value returned will be within the range of 0 to 999,999,999 nanoseconds, even in the absence of the 1pps input signal.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	GPS time successfully retrieved.
DTAPI_E_NO_GPSCCLKREF	The 10MHz clock input signal is missing.
DTAPI_E_NO_GPSSYNC	The on-board GPS time counter is not (yet) synchronized with the 10MHz/1pps input signals.
DTAPI_E_NOT_ATTACHED	Device object is not attached to the device hardware.
DTAPI_E_NOT_SUPPORTED	The device does not support a GPS time counter and lacks the <b>DTAPI_CAP_GPSTIME</b> capability.

## DtDevice::GetIoConfig

Get the I/O configuration of the specified port.

```

DTAPI_RESULT DtDevice::GetIoConfig(
    [in/out] DtIoConfig& IoCfg,           // I/O configuration
);

DTAPI_RESULT DtDevice::GetIoConfig(
    [in] int Port,                       // Physical port number (1..#ports)
    [in] int Group,                      // I/O configuration group
    [out] int& Value                      // I/O configuration value
);

DTAPI_RESULT DtDevice::GetIoConfig(
    [in] int Port,                       // Physical port number (1..#ports)
    [in] int Group,                      // I/O configuration group
    [out] int& Value                      // I/O configuration value
);

DTAPI_RESULT DtDevice::GetIoConfig(
    [in] int Port,                       // Physical port number (1..#ports)
    [in] int Group,                      // I/O configuration group
    [out] int& Value,                    // I/O configuration value
    [out] int& SubValue                  // I/O configuration subvalue
);

DTAPI_RESULT DtDevice::GetIoConfig(
    [in] int Port,                       // Physical port number (1..#ports)
    [in] int Group,                      // I/O configuration group
    [out] int& Value,                    // I/O configuration value
    [out] int& SubValue,                 // I/O configuration subvalue
    [out] __int64& ParXtra0              // Extra parameter #0
);

DTAPI_RESULT DtDevice::GetIoConfig(
    [in] int Port,                       // Physical port number (1..#ports)
    [in] int Group,                      // I/O configuration group
    [out] int& Value,                    // I/O configuration value
    [out] int& SubValue,                 // I/O configuration subvalue
    [out] __int64& ParXtra0,            // Extra parameter #0
    [out] __int64& ParXtra1            // Extra parameter #1
);

```

### Function Arguments

*IoCfg*

I/O configuration parameters for a specific port.

*Port*

Physical port number.

*Group, Value, SubValue, ParXtra0, ParXtra1*

I/O configuration parameters, see **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
DTAPI_E_NOT_SUPPORTED	The method is applied to either another device rather than a DTA-2137 or an invalid port number is given
DTAPI_E_FIRMW_INCOMP	The firmware is incompatible, please upgrade the firmware
DTAPI_E_SERVICE_INCOMP	The DTAPI service needs to be updated
DTAPI_E_INVALID_MODE	For <i>IoConfig</i> DTAPI_IOCTL_S2LOOPMODE: The configuration of the corresponding ASI port is not in loop-through mode

## Remarks

## DtDevice::GetNwSpeed

Get the speed of the network link.

```
DTAPI_RESULT DtDevice::GetNwSpeed(
    [in] int Port,           // Physical port number (1..#ports)
    [out] bool& Enable,     // Manual speed selection enabled/disabled
    [out] int& Speed       // Current link speed
);
```

### Function Arguments

*Port*

Physical port number.

*Enable*

Output argument that is set to *true* if the network port is forced to the specified Speed with the DtDevice::SetNwSpeed function.

*Speed*

Current link speed.

Value	Meaning
DTAPI_NWSPEED_NOLIN	Link not connected
DTAPI_NWSPEED_10MB_HALF	10Mbps, half duplex
DTAPI_NWSPEED_10MB_FULL	10Mbps, full duplex
DTAPI_NWSPEED_100MB_HALF	100Mbps, half duplex
DTAPI_NWSPEED_100MB_FULL	100Mbps, full duplex
DTAPI_NWSPEED_100MB_FULL	100Mbps, full duplex
DTAPI_NWSPEED_1GB_MASTER	1Gbps in master mode
DTAPI_NWSPEED_1GB_SLAVE	1Gbps in slave mode
DTAPI_NWSPEED_10GB	10Gbps

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Network 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 is not a network port

### Remarks

## DtDevice::GetPowerStatus

Get the power status of a device.

```
DTAPI_RESULT DtDevice::GetPowerStatus (
    [out] int& Status,           // Current power status
);
```

### Function Arguments

*Status*

Current power status.

Value	Meaning
DTAPI_POWER_STATUS_OK	Device is powered correctly
DTAPI_POWER_EXT_12V_ABSENT	External 12V is absent

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Device power status 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 is not supported by this method

### Remarks

Currently only the DTA-2180 is supported by this method.

## 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
);
```

### Function Arguments

*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-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 on-board reference-clock counter via the `DtDevice::GetRefClkFreq` method.

## DtDevice::GetRefClkFreq

Gets the frequency of the on-board reference clock.

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

### Function Arguments

*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 on-board reference-clock counter is used for assigning arrival timestamps 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 timestamps.

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::GetTemperature

Get the current temperature of a sensor in degrees Celsius.

```
DTAPI_RESULT DtDevice::GetTemperature(  
    [in] int TempSens  
    [out] int& Temp  
);
```

### Function Arguments

*TempSens*

1-based index of the temperature sensor to get the temperature of.

*Temp*

The current temperature of the device near the given sensor.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Temperature has been read successfully.
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver.
DTAPI_E_NOT_ATTACHED	Device object is not attached to device hardware.

### Remarks

## DtDevice::GetTimeOfDay

Gets the current time-of-day.

```
DTAPI_RESULT DtDevice::GetTimeOfDay(  
    [out] DtTimeOfDay& TimeOfDay  
);
```

### Function Arguments

*TimeOfDay*

Returns the current time-of-day.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Time-of-day has been read successfully.
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver.
DTAPI_E_NOT_ATTACHED	Device object is not attached to device hardware.

### Remarks

## DtDevice::GetTimeOfDayState

Gets the current TOD clock state value.

```
DTAPI_RESULT DtDevice::GetTimeOfDayState(  
    [out] DtTimeOfDayState& TimeOfDayState  
);
```

### Function Arguments

*TimeOfDayState*

Current TOD clock state value, see **DtTimeOfDayState** structure.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	TimeOfDayState has been read successfully.
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver.
DTAPI_E_NOT_ATTACHED	Device object is not attached to device hardware.

### Remarks

## DtDevice::GetUsbSpeed

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

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

### Function Arguments

*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<sup>2</sup>. 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.

<sup>2</sup> USB-2 buses can operate in full-speed mode for backward compatibility reasons (support for USB-1 devices)

## DtDevice::GetVcxoState

Get the state of the on-board VCXO.

```
DTAPI_RESULT DtDevice::GetVcxoState(
    [out] bool& Enable,           // VCXO is enabled or disabled?
    [out] int& Lock,             // Current genlock state
    [out] int& VcxoClkFreqHz    // Measured VCXO frequency in Hz
);
```

### Function Arguments

*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::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
);
```

### Function Arguments

*NumEntries*

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

*NumEntriesResult*

Output argument that receives the number of hardware functions found and described in *pHwFuncs*. The value of this argument 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. A NULL pointer may be supplied, but only if *NumEntries* is 0.

### Result

DTAPI_RESULT	Meaning
<b>DTAPI_OK</b>	Scan has completed successfully and the <i>pHwFuncs</i> array was large enough to contain all function descriptions.
<b>DTAPI_E_BUF_TOO_SMALL</b>	The number of function-description entries in <i>pHwFuncs</i> is too small. The number of entries required is returned in <i>NumEntriesResult</i> .
<b>DTAPI_E_INVALID_BUF</b>	A NULL pointer was supplied to <i>pHwFuncs</i> while <i>NumEntries</i> is greater than 0.

### 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.

Another method is to start with setting *pHwFuncs* to NULL and *NumEntries* to 0. The number of required hardware-function entries will be returned, after which *pHwFuncs* can be allocated with the right size and **DtapiHwFuncScan** called again.

## DtDevice::IsNetworkCardOperational

This function serves as a health check for a network port on new DekTec Network Interface Cards (NICs). It assesses the operational status of the specified port, determining its readiness for transmitting and receiving data streams. It is recommended to call this function during the initialization phase of an application to ensure that the NIC is fully prepared for data transmission or reception.

```
DTAPI_RESULT DtDevice::IsNetworkCardOperational(
    [in] int Port,           // Physical port number (1..#ports)
    [in] bool CheckIPv4=true, // Is network port ready for IP v4 operation?
    [in] bool CheckIPv6=true, // Is network port ready for IP v6 operation?
    [in] int VlanId=0       // VLAN ID to check, 0 is no VLAN
) const;
```

### Parameters

#### *Port*

Represents the physical port number (1-based) of the network port. This function checks the status of this port.

#### *CheckIPv4*

When set to true, this flag instructs the function to verify whether the network port is prepared to handle IPv4 network traffic. The default value is true.

#### *CheckIPv6*

When set to true, this flag instructs the function to assess if the network port is equipped to handle IPv6 network traffic. The default value is true.

#### *VlanId*

Specifies the VLAN ID to be examined.. A value of 0 signifies that no VLAN is being used. The default value is 0.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Network fully operational.
DTAPI_E_BIND	The network card cannot bind to a socket. This function performs a test bind to the card's IP address and port 0.
DTAPI_E_DEV_DRIVER	Unexpected driver error.
DTAPI_E_DISABLED	The network card is disabled.
DTAPI_E_NO_ADAPTER_IP_ADDR	The network card does not have an IP address.
DTAPI_E_NO_LINK	The link is down, check the network cable and speed settings.
DTAPI_E_NOT_ATTACHED	Device object is not attached to device hardware.
DTAPI_E_NOT_SUPPORTED	This function is not supported, probably because it's not a network port.

### Remarks

DekTec network cards, along with the corresponding network stack, may require some time to become fully operational and obtain an IP address from a DHCP server. It's crucial to use this function early in the initialization phase of your application to confirm that the NIC is ready. This is particularly true for applications on fast-booting servers that automatically start after booting. By calling **IsNetworkCardOperational()**, you can ensure the network card is ready and prepared for use before initiating operations. This proactive check helps to prevent potential operational delays or disruptions due to the network card's readiness state.

## 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
);
```

### Function Arguments

*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::RebootFirmware

Reboots the firmware of a DekTec device, identified by the serial number of the device. This method is intended to be used after a firmware upgrade. The new firmware is activated without power cycling the system.

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

### Function Arguments

*Serial*

Serial number of the DekTec device

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Reboot of device firmware is performed successfully
DTAPI_E_IN_USE	The device with the specified serial number is in use
DTAPI_E_NO_SUCH_DEVICE	The device with the specified serial number could not be found
DTAPI_E_NOT_SUPPORTED	The device doesn't support firmware reboot, you need to power cycle the system
DTAPI_E_RESTART_REQD	The reboot of the firmware is not completed, you need to restart the system or restart the driver of this device. A power cycle is not required.

### Remarks

The **RebootFirmware** method requires no application is attached to this device or its ports. For this reason it is a static method.

For Linux an extra (manual) driver stop, wait 1 sec and driver start action is required when **DTAPI\_E\_RESTART\_REQD** is returned (for Windows this action is done by the DtapiService).

## DtDevice::RegisterCallback

Subscribes to a device event (or to multiple events at once) and registers a callback function that will be invoked by DTAPI when the event occurs.

```
DTAPI_RESULT DtDevice::RegisterCallback(
    [in] pDtEventCallback Callback // Function called when event fires
    [in] void* pContext           // Opaque pointer passed to callback
    [in] int EventTypes          // Event(s) to subscribe to (OR-able)
    [out] void** pId             // Subscription identifier
);
```

### Function Arguments

#### *Callback*

Specifies the user-provided callback function that DTAPI will call when the event is fired.

#### *pContext*

Specifies an opaque 'context' pointer that DTAPI passes to the callback function through argument *EventArgs*.

#### *EventTypes*

Specifies the event or events to subscribe to. Events can be OR-ed together.

Device events:

Event	Meaning
DT_EVENT_TYPE_POWER	The device shuts down or turns on, typically caused by the host going asleep or waking up. Applications can use this event to detach from the device when it announces that it is shutting down, and to reattach when the device wakes up again. The DekTec drivers ensure that the application has a certain amount of time to detach. If detaching takes too long, the driver forces a shutdown of the device.
DT_EVENT_TYPE_GENLOCK	The genlock state of the device has changed.
DT_EVENT_TYPE_IOCONFIG	One or more I/O configuration settings of the device have been changed.

#### *pId*

The returned event-subscription identifier.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The caller has successfully subscribed to the event(s).
DTAPI_E_INVALID_TYPE	The <i>EventTypes</i> argument contains invalid event types.
DTAPI_E_INVALID_ARG	The value of one of the arguments is invalid, and no specific other error code applies.
DTAPI_E_OUT_OF_MEM	Subscribing to the event(s) has failed

## DtDevice::SetDisplayName

Set the name on the LCD status display of a DTE-31xx device.

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

### Function Arguments

*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 that supports certain configurable “I/O capabilities”. An overview of the I/O capabilities and the DekTec devices supporting them can be found in spreadsheet [CapList.xlsx](#), sheet [IO Capabilities](#), which is part of the DTAPI user documentation.

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

Two overloads are defined, one to configure a single port and another to configure a number of ports in one operation. It is mandatory to use the latter overload if there are dependencies between the ports, so that the ports must be configured at the same time.

```
DTAPI_RESULT DtDevice::SetIoConfig(
    [in,out] DtIoConfig* pIoConfigs,    // I/O configuration parameters
    [in] int Count,                    // Number of elements In pIoConfigs
);
DTAPI_RESULT DtDevice::SetIoConfig(
    [in] int Port,                    // Physical port number (1..#ports)
    [in] int Group,                   // I/O configuration group
    [in] int Value,                   // I/O configuration value
    [in] int SubValue=-1,             // I/O configuration subvalue
    [in] __int64 ParXtra0=-1,         // Extra parameter #0
    [in] __int64 ParXtra1=-1         // Extra parameter #1
);
```

### Function Arguments

*pIoConfigs, Count*

Array of I/O configuration parameters per port. *Count* is the number of array elements.

*Port*

Physical port number.

*Group, Value, SubValue, ParXtra0, ParXtra1*

Specifies the I/O configuration parameters. Refer to spreadsheet [CapList.xlsx](#), sheet [IO Capabilities](#) for details. In this sheet, *Cap* corresponds to *Value*, while *SubCap* corresponds to *SubValue*. Some additional explanation on a subset of the I/O configuration settings is provided below.

#### Group BOOLIO

I/O capabilities in group **BOOLIO** have a Boolean *Value* argument.

Value	Meaning
DTAPI_IOCONFIG_TRUE	Enable the I/O capability
DTAPI_IOCONFIG_FALSE	Disable the I/O capability

#### Boolean I/O Capability FAILSAFE

If **DTAPI\_IOCONFIG\_FAILSAFE** for an output port is set to **TRUE**, that port is put in “failsafe” mode, protected by a “watchdog”. This means that the user application has to call `DtOutpChannel::SetFailsafeAlive` repeatedly within the watchdog timeout period. If the user application is too late (e.g. due to a crash), the watchdog times out and the failsafe relay is released so that the output is connected directly to the input. Failsafe mode is implemented on the DTA-145, DTA-2145 and the DTA-2175. On these cards, if the watchdog triggers, the input signal on port #1 will be physically connected to port #2 through a relay.

I/O configuration parameter *ParXtra0* specifies the watchdog time out in milliseconds.

#### Boolean I/O Capability GENLOCKED

If set, the output 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 synchronization.

### Boolean I/O Capability GENREF

If set, the input port will act as an SDI genlock reference input. I/O configuration parameter *ParXtra0* specifies the expected video standard, e.g. `DTAPI_IOCONFIG_1080I50`.

### Boolean I/O Capability SWS2APSK

DTA-2137 only: Enable DVB-S2 reception in 16-APSK or 32-APSK mode.

This I/O capability can only be enabled on port 1; port 2 must be disabled. The board can only receive a single channel when this I/O capability is enabled. Without `SWS2APSK`, two channels are available.

### I/O Capability IODIR, OUTPUT for the DTA-2137

The DTA-2137 supports two specific I/O capabilities for looping through the received DVB-S2 stream on one of the ASI ports:

`DTAPI_IOCONFIG_LOOPS2L3` encapsulates DVB-S2 baseband frames (BBFRAMEs) in L3 frames and outputs them on the ASI port.

`DTAPI_IOCONFIG_LOOPS2TS` selects a sub stream from a DVB-S2 Multiple Input Stream, based on ISI (specified in *ParXtra1*). The selected stream can be an MPEG2 transport stream or any other input stream type. It is output on the ASI port.

### I/O Capability RFCLKSEL, for the DTA-2115(B)

The DTA-2115(B) supports two RF clock modes:

`DTAPI_IOCONFIG_RFCLKINT` selects the internal RF clock.

`DTAPI_IOCONFIG_RFCLKEXT` selects the external RF clock input. The external clock can be presented at any time at the DTA-2115(B) frequency reference input. Presenting no signal at the frequency reference input, when external clock mode is enabled, will result in a very instable output signal. See the DTA-2115B datasheet for the specification of the frequency reference input.

## Result

DTAPI_RESULT	Meaning
<code>DTAPI_OK</code>	Channel type has been set successfully
<code>DTAPI_E_ATTACHED</code>	Cannot change I/O configuration because a channel object is attached to this port
<code>DTAPI_E_DEV_DRIVER</code>	Driver was not able to set the I/O configuration
<code>DTAPI_E_FIRMW_INCOMP</code>	The firmware is incompatible
<code>DTAPI_E_INVALID_ARG</code>	The value of one of the arguments is invalid, and no specific other error code applies
<code>DTAPI_E_INVALID_ISI</code>	For <code>DTAPI_IOCONFIG_LOOPS2TS</code> only: An invalid value for ISI is specified. The valid range is 0..255
<code>DTAPI_E_INVALID_MODE</code>	Invalid setting for I/O configuration
<code>DTAPI_E_NO_SUCH_PORT</code>	Invalid port number for this device
<code>DTAPI_E_NOT_ATTACHED</code>	Device object is not attached to device hardware
<code>DTAPI_E_NOT_SUPPORTED</code>	The I/O configuration option is not supported

<code>DTAPI_E_SERVICE_INCOMP</code>
-------------------------------------

The DTAPI service needs to be updated
---------------------------------------

## Remarks

The I/O configuration of a port can only be changed when the underlying device is attached to a `DtDevice` object.

## DtDevice::SetFailsafeAlive

Reset the watchdog timer for operation in failsafe mode of the specified output port. Failing to call this method within the time-out set with `SetFailsafeConfig()` will result in the release of the on-board relay so that the output port is connected directly with the input port.

```
DTAPI_RESULT DtDevice::SetFailsafeAlive(
    [in] int Port,                // Physical port number (1..#ports)
);
```

### Function Arguments

*Port*

Physical port number.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Watchdog has been triggered successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_CONFIG	The channel is not configured to operate in failsafe mode
DTAPI_E_NOT_SUPPORTED	The channel is not capable of operating in failsafe mode
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

## DtDevice::SetFailsafeConfig

Configure failsafe mode of the specified output port.

```
DTAPI_RESULT DtDevice::SetFailsafeConfig(
    [in] int Port,           // Physical port number (1..#ports)
    [in] bool Enable,       // Enable/disable failsafe mode
    [in] int Timeout=0     // Watchdog timeout (in ms)
);
```

### Function Arguments

*Port*

Physical port number.

*Enable*

Enable/disable the failsafe mode and switch to input or failsafe output.

If *Enable* is false, the output channel is connected directly to the input channel.

If *Enable* is true, the output channel will start operating in failsafe mode. The output becomes a failsafe output and the watchdog timer is started. The user application shall call **SetFailsafeAlive** repeatedly within the watchdog timeout period. If the user application is too late (e.g. because it has crashed), the watchdog times out and the failsafe relay is released so that the output is connected directly to the input.

*Timeout*

Specifies the watchdog timeout period in ms.

The timeout value can only be a multiple of 20ms. If the value is not a multiple of 20ms, it will be rounded downwards to the closest multiple of 20ms. Setting *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 to operate in failsafe mode
DTAPI_E_NOT_SUPPORTED	The channel is not capable of operating in failsafe mode
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

## DtDevice::SetLicenseFromFile

Programs licenses from a file on a DekTec device.

```
DTAPI_RESULT DtDevice::SetLicenseFromFile (
    [in] const std::wstring& LicFilename, // The license file
    [in] bool Force=false                // Allow existing licenses to be removed
);
```

### Function Arguments

*LicFilename*

String containing the name of the license file to be programmed on the device.

*Force*

If *false*, the licenses from the file will only be programmed on the DekTec device if no existing licenses will be removed. It will return an error (**DTAPI\_E\_LICENSE**) in case existing licenses would be removed during programming.

If *true*, the licenses from the file will be programmed on the DekTec device regardless of the existing licenses.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The licenses have been programmed successfully
DTAPI_E_FILE_OPEN	Couldn't not open the specified license file
DTAPI_E_NO_SUCH_DEVICE	License is not intended for the attached device
DTAPI_E_NOT_ATTACHED	Device object is not attached to device hardware
DTAPI_E_LICENSE	License string contains invalid licenses or would remove existing licenses on the device
DTAPI_E_XML_ELEM	A required element in the XML license string is missing at the expected location
DTAPI_E_XML_SYNTAX	The XML license string is not well-formed XML

### Remarks

## DtDevice::SetLicenseFromString

Programs licenses from a string on a DekTec device.

```
DTAPI_RESULT DtDevice::SetLicenseFromString (
    [in] const std::wstring& LicString, // The license string
    [in] bool Force=false             // Allow existing licenses to be removed
);
```

### Function Arguments

*LicString*

String containing licenses to be programmed on the device.

*Force*

If *false*, the licenses will only be programmed on the DekTec device if no existing licenses will be removed. It will return an error (**DTAPI\_E\_LICENSE**) in case existing licenses would be removed during programming.

If *true*, the licenses will be programmed on the DekTec device regardless of the existing licenses.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The licenses have been programmed successfully.
DTAPI_E_NO_SUCH_DEVICE	License is not intended for the attached device.
DTAPI_E_NOT_ATTACHED	Device object is not attached to device hardware.
DTAPI_E_LICENSE	License string contains invalid licenses or would remove existing licenses on the device.
DTAPI_E_XML_ELEM	A required element in the XML license string is missing at the expected location.
DTAPI_E_XML_SYNTAX	The XML license string is not well-formed XML.

### Remarks

## DtDevice::SetNwSpeed

Sets the speed of a network link.

```
DTAPI_RESULT DtDevice::SetNwSpeed(
    [in] int Port,           // Physical port number (1..#ports)
    [in] bool Enable,      // Enable manual speed setting
    [in] int Speed         // Link speed selection
);
```

### Function Arguments

*Port*

Physical port number.

*Enable*

Enable (*true*) or disable (*false*) forcing the speed of the network port.  
If set to disable, the Speed argument is not used.

*Speed*

Link speed.

Value	Meaning
DTAPI_NWSPEED_AUTO	Automatically set network link speed
DTAPI_NWSPEED_10MB_HALF	10Mbps, half duplex
DTAPI_NWSPEED_10MB_FULL	10Mbps, full duplex
DTAPI_NWSPEED_100MB_HALF	100Mbps, half duplex
DTAPI_NWSPEED_100MB_FULL	100Mbps, full duplex
DTAPI_NWSPEED_100MB_FULL	100Mbps, full duplex
DTAPI_NWSPEED_1GB_MASTER	1Gbps in master mode
DTAPI_NWSPEED_1GB_SLAVE	1Gbps in slave mode

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Network speed has been retrieved successfully.
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver.
DTAPI_E_INVALID_ARG	Device object is not attached to device hardware.
DTAPI_E_NOT_ATTACHED	Device object is not attached to device hardware.
DTAPI_E_NOT_SUPPORTED	The device is not a network port.

### Remarks

## DtDevice::SfpReadSerialId

Reads SFP serial ID data from the SFP module connected to the specified port.

```
DTAPI_RESULT DtDevice::SfpReadSerialId (
    [in] int Port,           // Physical port number (1..#ports)
    [in] int StartAddr,    // First address in serial ID EEPROM to read
    [in] int NumToRead,    // Number of bytes to read
    [out] unsigned char* pBuffer // Buffer to receives the serial ID bytes
);
```

### Function Arguments

*Port*

Physical port number of the port whose SFP serial ID data to read.

*StartAddr*

Start address in serial ID EEPROM to begin reading from. Valid range is: 0 .. 511.

*NumToRead*

Number of bytes to read. Must be a non-zero positive number. Valid range is: 1 .. 512.

*pBuffer*

Buffer to receive serial ID bytes read. The buffer pointed to must be at least *NumToRead* bytes large.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Succeeded to read the requested serial ID bytes.
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver.
DTAPI_E_EEPROM_READ	Failed to read the requested bytes from the serial ID EEPROM.
DTAPI_E_INVALID_ARG	Invalid start address is used
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_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 port does not have an SFP to read. I.e. it does not have an SFP capability.

### Remarks

This function is only supported by ports, which have an SFP capability, such as **DTAPI\_CAP\_SFP10G** or **DTAPI\_CAP\_SFP25G**.

## DtDevice::UnregisterCallback

Unsubscribes from the specified driver event.

```
DTAPI_RESULT DtDevice::UnregisterCallback(  
    [in] void* pId // Subscription identifier to unregister  
);
```

### Function Arguments

*pId*

Identifies the device event (returned by `DtDevice::RegisterCallback`).

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The caller has unsubscribed from the event.
DTAPI_E_INVALID_ARG	The value of one of the arguments is invalid, and no specific other error code applies.
DTAPI_E_NOT_INITIALIZED	The specified subscription identifier is invalid.

## DtDevice::VpdDelete

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

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

### Function Arguments

#### *Keyword*

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

The keyword must consist of two to maximally 15 characters. Valid characters are '0'..'9', 'A'..'Z', 'a'..'z' and '\_'.

If the keyword does not meet these requirements, **DTAPI\_E\_KEYWORD** is returned.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The VPD item has been deleted successfully.
DTAPI_E_EEPROM_WRITE	The delete operation failed for an unspecified reason.
DTAPI_E_NOT_ATTACHED	The device object is not attached to device hardware.
DTAPI_E_NOT_FOUND	The VPD item with the specified keyword was not found.
DTAPI_E_READ_ONLY	An attempt was made to delete a read-only VPD item.

### Remarks

Items in the read-only section of the VPD EEPROM cannot be deleted.

Deleting a VPD item from the serial EEPROM is a relatively slow operation.

## DtDevice::VpdRead

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

```
DTAPI_RESULT DtOutputChannel::VpdTag(
    [in] const char* Keyword,           // Identifies the VPD item, e.g. "SN"
    [out] char* VpdItem                // Item string read from EEPROM
);
DTAPI_RESULT DtOutputChannel::VpdTag(
    [in] const wchar_t* Keyword,      // Identifies the VPD item, e.g. L"SN"
    [out] wchar_t* VpdItem            // Item string read from EEPROM
);
```

### Function Arguments

#### *Keyword*

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

The keyword must consist of two to maximally 15 characters. Valid characters are '0'..'9', 'A'..'Z', 'a'..'z' and '\_'.

If the keyword does not meet these requirements, **DTAPI\_E\_KEYWORD** is returned.

The table below lists standard read-only VPD items supported by DekTec devices.

Value	Meaning
"VPDID"	Pseudo keyword to retrieve the <i>VPD ID String</i> , e.g. "DTA-100 DVB-ASI-C Output 0..150 Mbps".
"EC"	<i>Engineering Change level</i> . Identifies the hardware revision level of the device, e.g. "Rev 1.0".
"MN"	<i>Manufacturer ID</i> DekTec-internal code identifying the manufacturer of the hardware.
"PD"	<i>Production Date</i> , e.g. "2021.11"
"SN"	<i>Serial Number</i> , e.g. "2178002139".

#### *VpdItem*

Null-terminated string read from the EEPROM. The character array must be caller-allocated. **DTAPI** limits the length of a VPD item to 63 characters, so a 64-char array suffices.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The VPD item has been read successfully.
DTAPI_E_EEPROM_READ	The read operation failed for an unspecified reason.
DTAPI_E_KEYWORD	The specified keyword is not a valid VPD keyword.
DTAPI_E_NOT_ATTACHED	Device object is not attached to device hardware.
DTAPI_E_NOT_FOUND	The VPD item with the specified keyword was not found.

### Remarks

VPD read operations are relatively fast because DekTec drivers cache the VPD data.

## DtDevice::VpdWrite

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

```
DTAPI_RESULT DtDevice::VpdWrite(
    [in] const char* Keyword,    // Identifies the VPD item, e.g. "Y1"
    [in] char* VpdItem         // Item string to be written
);
DTAPI_RESULT DtDevice::VpdWrite(
    [in] const char* Keyword,    // Identifies the VPD item, e.g. L"Y1"
    [in] wchar_t* VpdItem      // Item string to be written
);
```

### Function Arguments

#### *Keyword*

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

The keyword must consist of two to maximally 15 characters. Valid characters are '0'..'9', 'A'..'Z', 'a'..'z' and '\_'.

If the keyword does not meet these requirements, **DTAPI\_E\_KEYWORD** is returned.

#### *VpdItem*

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

### Result

DTAPI_RESULT	Meaning
<b>DTAPI_OK</b>	The VPD item has been written successfully.
<b>DTAPI_E_EEPROM_FULL</b>	The write operation failed because the VPD EEPROM has not enough free space available.
<b>DTAPI_E_EEPROM_WRITE</b>	The write operation failed for an unspecified other reason.
<b>DTAPI_E_KEYWORD</b>	The specified keyword is not a valid VPD keyword.
<b>DTAPI_E_NOT_ATTACHED</b>	The device object is not attached to device hardware.
<b>DTAPI_E_READ_ONLY</b>	An attempt was made to overwrite a read-only VPD item.
<b>DTAPI_E_TOO_LONG</b>	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.

Items cannot be written to the read-only section of the VPD EEPROM.

Writing a VPD item to the serial EEPROM is a relatively slow operation.

## DtInpChannel

### DtInpChannel

Class representing an input channel for receiving the following formats:

- MPEG-2 transport stream over ASI, SPI or IP;
- Serial Digital Interface (SDI);
- Demodulators (receivers).

```
class DtInpChannel;
```

Operations on input channels require *exclusive access* to the hardware. Just a single input channel object can attach to the hardware and that object gets exclusive access.

Demodulators are a special case, because some operations on demodulators do not require exclusive access. Therefore, for demodulators only, an input channel can attach to receiver hardware non-exclusively. In this mode, operations that require exclusive access like reading transport-stream data return an error. However, operations like tuning and getting measurements can be executed, possibly in parallel from multiple processes. This enables application scenarios in which one application tunes the receiver and receives transport stream data, while another application reads MER, constellation points and other measurement data.

## DtInpChannel::AttachToPort

Attach the input-channel object to a specific physical port. Attachment can be exclusive (default) or shared. Demodulators are the only type of input channels that support shared access for a subset of functions (tuning and measurement functions).

```
DTAPI_RESULT DtInpChannel::AttachToPort(
    [in] DtDevice* pDtDvc,        // Device object
    [in] int Port,               // Physical port number (1..#ports)
    [in] bool Exclusive=true,    // Request exclusive access yes/no
    [in] bool ProbeOnly=false    // Just check whether channel is in use
);
```

### Function Arguments

*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 or DTA-2160, on which the top-most Ethernet port is port #4.

*Exclusive*

If *false*, request shared access. If *true*, request exclusive access. This is the default. For demodulators, and for demodulators only, this argument may be set to *false*. This way, multiple input channel objects in multiple processes can access the receiver and demodulator-specific functions that access the receiver using I2C calls can be called simultaneously, e.g. **GetConstellationPoints** and **Tune**. Most generic input-channel functions still require exclusive access to access device registers and will return an error (**DTAPI\_E\_EXCL\_ACCESS\_REQD**) if the channel was attached non-exclusively.

*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	For devices with a failsafe relay only. Attachment in failsafe mode was successfully completed. The application shall call <b>SetFailsafeAlive</b> on a regular basis to prevent the release of the failsafe relay. Failure to do so will physically connect this input port to the buddy output port. This is not an error code; It is intended to make the application aware of fail-safe mode.
DTAPI_E_ATTACHED	Channel object is already attached
DTAPI_E_CONNECT_TO_SERVICE	The DTAPI service is not running
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_DEVICE	Pointer <i>pDtDvc</i> is not valid or the device object is not attached to a hardware device
DTAPI_E_EXCL_MANDATORY	Shared access ( <i>Exclusive=false</i> ) was requested, but this is not supported by the input channel. Only demodulators support shared access.
DTAPI_E_IN_USE	Another channel object is already attached to this port
DTAPI_E_NO_DT_INPUT	<i>Port</i> is not an input

DTAPI_E_NO_SUCH_PORT	Invalid port number for this device
DTAPI_E_OUT_OF_MEM	TS-over-IP: Receive FIFO cannot be allocated

## Remarks

## DtInpChannel::BlindScan

**DtInputChannel** supports synchronous and asynchronous **BlindScan**.

The synchronous version scans the spectrum for valid transponders.

The asynchronous version scans the spectrum and returns the transponder information using a callback mechanism.

```
DTAPI_RESULT DtInpChannel::BlindScan(
    [in] int NumEntries, // #Transponder entries in pResults
    [out] int& NumEntriesResult, // #Transponders found or #entries req.
    [out] DtTransmitter* pResults, // Transmitter descriptions
    [in] __int64 FreqHzSteps, // Optional parameter to select stepsize
    [in] __int64 StartFreqHz, // Optional parameter to select starting
    // frequency
    [in] __int64 EndFreqHz // Optional parameter to select ending
    // frequency
);

DTAPI_RESULT DtInpChannel::BlindScan(
    [in] DtBsProgressFunc pCallback, // Progress callback function
    [in] void* pOpaque, // Opaque pointer
    [in] const DtDemodPars& DemodPars, // Demod pars to use for scanning
    [in] __int64 FreqHzSteps, // Optional parameter to select stepsize
    [in] __int64 StartFreqHz, // Optional parameter to select starting
    // frequency
    [in] __int64 EndFreqHz // Optional parameter to select ending
    // frequency
);
```

### Function Arguments

#### *NumEntries*

Specifies the size of the caller-supplied array *pResults* in number of **DtTransmitter** entries.

#### *NumEntriesResult*

Output argument that receives the number of transponders found. The value can be greater than *NumEntries* (when **BlindScan** returns **DTAPI\_E\_BUF\_TOO\_SMALL**).

#### *pResults*

Pointer to a caller-supplied array of **DtTransmitter** entries to receive the transmitter descriptors.

#### *FreqHzSteps*

This optional argument specifies the step size of the blind scan in Hertz.

#### *StartFreqHz*

This optional argument specifies the starting frequency of the blind scan in Hertz.

#### *EndFreqHz*

This optional argument specifies the ending frequency of the blind scan in Hertz.

#### *pCallback*

A callback function with callback prototype **DtBsProgressFunc** that will be executed by the asynchronous blind scan.

#### *pOpaque*

An optional pointer to a user object that is returned in the callback function.

#### *DemodPars*

The demodulator parameters to use for the asynchronous blind scan.

## Result

DTAPI_RESULT	Meaning
DTAPI_OK	The blind scan succeeded successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	The blind scan is not supported by the attached hardware
DTAPI_E_BUF_TOO_SMALL	The number of transponder-description entries in <i>pResults</i> is too small. The number of entries required is returned in <i>NumEntriesResult</i> .
DTAPI_E_INVALID_FREQ	The range of frequencies specified with <i>FreqHzSteps</i> , <i>StartFreqHz</i> and <i>EndFreqHz</i> is incompatible (too low or too high) with the tuner on the attached hardware

## Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

The synchronous **BlindScan** method is currently only supported by the DTA-2137.

The **BlindScan** method operates with the current LNB settings. To scan the frequency band for multiple local oscillator frequency's and/or polarization modes, the desired LNB setting needs to be applied prior to calling **BlindScan**.

Depending on the starting frequency, the ending frequency and the step size, the synchronous **BlindScan** will take a few minutes to complete. To reduce the amount of time that **BlindScan** needs to complete the scan, the step size can be increased or the frequency band could be narrowed. Alternative the asynchronous method can be used.

## DtInpChannel::CancelBlindScan

Cancels a running asynchronous blind scan.

```
DTAPI_RESULT DtInpChannel::CancelBlindScan();
```

### Function Arguments

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	An active blind scan is cancelled
DTAPI_E_IDLE	No blind scan is currently active
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtInpChannel::CancelSpectrumScan

Cancels a running asynchronous spectrum scan.

```
DTAPI_RESULT DtInpChannel::CancelSpectrumScan();
```

### Function Arguments

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	An active spectrum scan is cancelled
DTAPI_E_IDLE	No spectrum scan is currently active
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtInpChannel::ClearFifo

Clear contents of the receive FIFO and set receive control to `DTAPI_RXCTRL_IDLE`. Clear the overflow flag (`DTAPI_RX_FIFO_OVF`).

```
DTAPI_RESULT DtInpChannel::ClearFifo();
```

### Function Arguments

### Result

DTAPI_RESULT	Meaning
<code>DTAPI_OK</code>	Receive FIFO has been cleared
<code>DTAPI_E_DEV_DRIVER</code>	Unclassified failure in device driver
<code>DTAPI_E_NOT_ATTACHED</code>	Channel object is not attached to a hardware function

### Remarks

This function requires exclusive access (`AttachToPort` was called with `Exclusive=true`).

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`.

## DtInpChannel::ClearFlags

Clear *latched* status flag(s).

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

### Function Arguments

*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 <b>GetFlags</b>
DTAPI_RX_SYNC_ERR	'' ''
DTAPI_RX_RATE_OVF	'' ''
DTAPI_RX_TARGET_ERR	'' ''

### 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

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

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 attaching 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
);
```

### Function Arguments

*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 receive control 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::DetectIoStd

For ASI/SDI or SPI input channels: Detect whether the input signal is ASI, SDI, SPI or SPISDI.

```
DTAPI_RESULT DtInpChannel::DetectIoStd(
    [out] int& Value           // DTAPI_IOCONFIG_***
    [out] int& SubValue       // For (SPI)SDI: specific (SPI)SDI standard
);
```

### Function Arguments

*Value*

Indicates whether a DVB-ASI, an SDI, a SPI or a SPISDI signal was received.

Value	Meaning
DTAPI_IOCONFIG_ASI	A valid DVB-ASI signal is being received
DTAPI_IOCONFIG_SDI	A valid SDI signal is being received
DTAPI_IOCONFIG_SPI	A valid SPI signal is being received
DTAPI_IOCONFIG_SPISDI	A valid SPISDI signal is being received

*SubValue*

If an SDI signal was received, *SubValue* receives the specific SDI standard, for example **DTAPI\_IOCONFIG\_525I59\_94**.

If an SPISDI signal was received, *SubValue* receives the specific SPISDI standard, for example **DTAPI\_IOCONFIG\_SPI525I59\_94**.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The I/O standard was detected successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

This routine may take considerable time to complete the detection process.

## DtInpChannel::GetConstellationPoints

Get an array of constellation points.

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

### Function Arguments

#### *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
DTU-234	0 .. 255	8
DTU-235	-512 .. 512	10
DTU-236	-1024 .. 1024	11
DTA-2135	-512 .. 512	10
DTA-2136	-16384 .. 16384	15
DTA-2137	-16384 .. 16384	15
DTA-2139	-16384 .. 16384	15
DTA-2132	-1024 .. 1024	11
DTA-2139C (ATSC only)	Clean channel: X: -58 .. 58, Y: -101 .. +95 CNR = 0dB: X: -136 .. 120, Y: -101 .. 110	8, 9

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	A valid set of constellation points has been returned
DTAPI_E_INVALID_BUF	The <i>pPoints</i> pointer is invalid
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	This functionality is not supported by the hardware or DTAPI

### Remarks

## DtInpChannel::GetDemodControl

Get modulation parameters as detected by the demodulator.

```
DTAPI_RESULT DtInpChannel::GetDemodControl (
    [out] DtDemodPars* pDemodPars // Receives the demodulation parameters
);
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
);
```

### Function Arguments

*pDemodPars*

Receives the demodulation parameters. The user must have allocated the **DtDemodPars** structure. See class **DtDemodPars** for possible demodulation parameters.

*ModType, ParXtra0, ParXtra1, ParXtra2*

Modulation parameters as detected by the demodulator. See the tables on the following pages for a detailed specification of each parameter, per DekTec board type and firmware version.

### Detailed Parameter Descriptions

Page	Modulation Type
285	Overview
286	ATSC
287	DVB-S
288	DVB-S.2(X)
290	DVB-T
293	QAM

Page	Modulation Type

## Modulation Types

### ModType

Detected modulation type. The value `DTAPI_MOD_TYPE_UNK` indicates that the modulation type could not be detected.

#### L-Band

ModType	Meaning	Required Capability
DTAPI_MOD_DVBS_QPSK	DVB-S, QPSK	DTAPI_CAP_RX_DVBS
DTAPI_MOD_DVBS2_8PSK	DVB-S.2, 8-PSK	DTAPI_CAP_RX_DVBS
DTAPI_MOD_DVBS2_16APSK	DVB-S.2, 16-APSK	DTAPI_CAP_RX_DVBS + DTAPI_CAP_S2APSK
DTAPI_MOD_DVBS2_32APSK	DVB-S.2, 32-APSK	DTAPI_CAP_RX_DVBS + DTAPI_CAP_S2APSK
DTAPI_MOD_DVBS2_QPSK	DVB-S.2, QPSK	DTAPI_CAP_RX_DVBS
DTAPI_MOD_DVBS2	DVB-S.2	DTAPI_CAP_RX_DVBS2
DTAPI_MOD_DVBS2X_8APSK_L	DVB-S.2X	DTAPI_CAP_RX_DVBS2
DTAPI_MOD_DVBS2X_16APSK_L	DVB-S.2X	DTAPI_CAP_RX_DVBS2
DTAPI_MOD_DVBS2X_32APSK_L	DVB-S.2X	DTAPI_CAP_RX_DVBS2
DTAPI_MOD_DVBS2X_64APSK	DVB-S.2X	DTAPI_CAP_RX_DVBS2
DTAPI_MOD_DVBS2X_64APSK_L	DVB-S.2X	DTAPI_CAP_RX_DVBS2
DTAPI_MOD_DVBS2X_128	DVB-S.2X	DTAPI_CAP_RX_DVBS2
DTAPI_MOD_DVBS2X_256	DVB-S.2X	DTAPI_CAP_RX_DVBS2
DTAPI_MOD_DVBS2X_256APSK_L	DVB-S.2X	DTAPI_CAP_RX_DVBS2

#### VHF / UHF

ModType	Meaning	Required Capability
DTAPI_MOD_ATSC	ATSC VSB	DTAPI_CAP_RX_ATSC
DTAPI_MOD_DVBT	DVB-T	DTAPI_CAP_RX_DVBT
DTAPI_MOD_QAM16	16-QAM	DTAPI_CAP_RX_QAM_A for QAM-A DTAPI_CAP_RX_QAM_B for QAM-B DTAPI_CAP_RX_QAM_C for QAM-C
DTAPI_MOD_QAM32	32-QAM	
DTAPI_MOD_QAM64	64-QAM	
DTAPI_MOD_QAM128	128-QAM	
DTAPI_MOD_QAM256	256-QAM	

## Modulation Mode: ATSC

*ModType*

ModType	Meaning	Required Capability
DTAPI_MOD_ATSC	ATSC	DTAPI_CAP_RX_ATSC

*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_UNK	Constellation is unknown		
DTAPI_MOD_ATSC_VSB_MSK	AND-mask for ATSC constellation field		

*ParXtra1, ParXtra2*

Not used in ATSC modulation.

## 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
DTAPI_MOD_CR_UNK	Code rate is unknown

### *ParXtra1*

Extra modulation parameter #1 encodes spectral inversion yes/no

#### Spectral Inversion

ParXtra1	Meaning
DTAPI_MOD_S_S2_SPECNONINV	No spectrum inversion detected
DTAPI_MOD_S_S2_SPECINV	Spectrum inversion detected
DTAPI_MOD_S_S2_SPECINV_UNK	Spectrum inversion status is unknown
DTAPI_MOD_S_S2_SPECINV_MSK	AND-mask for this field

### *ParXtra2*

The detected symbol rate (in bd). The value `DTAPI_MOD_SYMRATE_UNK` indicates the symbol rate could not be detected.

## Modulation Mode: DVB-S.2(X)

*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
DTAPI_MOD_1_5	Code rate 1/5
DTAPI_MOD_2_9	Code rate 2/9
DTAPI_MOD_11_45	Code rate 11/45
DTAPI_MOD_4_15	Code rate 4/15
DTAPI_MOD_13_45	Code rate 13/45
DTAPI_MOD_14_45	Code rate 14/45
DTAPI_MOD_9_20	Code rate 9/20
DTAPI_MOD_7_15	Code rate 7/15
DTAPI_MOD_8_15	Code rate 8/15
DTAPI_MOD_11_20	Code rate 11/20
DTAPI_MOD_5_9	Code rate 5/9
DTAPI_MOD_26_45	Code rate 26/45
DTAPI_MOD_28_45	Code rate 28/45
DTAPI_MOD_23_36	Code rate 23/36
DTAPI_MOD_29_45	Code rate 29/45
DTAPI_MOD_31_45	Code rate 31/45
DTAPI_MOD_25_36	Code rate 25/36
DTAPI_MOD_32_45	Code rate 32/45
DTAPI_MOD_13_18	Code rate 13/18
DTAPI_MOD_11_15	Code rate 11/15

DTAPI_MOD_7_9	Code rate 7/9
DTAPI_MOD_77_90	Code rate 77/90

*ParXtra1*

Extra modulation parameter #1 encodes spectral inversion yes/no, pilots yes/no and long/short FEC frame.

**Spectral Inversion**

See Spectral Inversion section for DVB-S2(X)

**Pilots**

Value	Meaning
DTAPI_MOD_S2_NOPILOTS	Pilots disabled
DTAPI_MOD_S2_PILOTS	Pilots enabled
DTAPI_MOD_S2_PILOTS_UNK	Pilots status is unknown
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_UNK	Frame size is unknown
DTAPI_MOD_S2_FRM_MSK	AND-mask for this field

*ParXtra2*

The detected symbol rate in baud. The value `DTAPI_MOD_SYMRATE_UNK` indicates the symbol rate could not be detected.

## Modulation Mode: DVB-T

*ParXtra0*

Extra modulation parameter #0 is the code rate.

Value	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_5_6	Code rate 5/6
DTAPI_MOD_7_8	Code rate 7/8
DTAPI_MOD_CR_UNK	Code rate is unknown

*ParXtra1*

Extra modulation parameter #1 is the OR of values for the following fields: Bandwidth, Constellation, Guard Interval, Interleaving and Transmission Mode.

### Bandwidth

Value	Meaning
DTAPI_MOD_DVBT_6MHZ	6 MHz
DTAPI_MOD_DVBT_7MHZ	7 MHz
DTAPI_MOD_DVBT_8MHZ	8 MHz
DTAPI_MOD_DVBT_BW_UNK	Bandwidth is unknown
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_UNK	Constellation is unknown
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	1/4
DTAPI_MOD_DVBT_CO_UNK	Guard interval is unknown
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_UNK	Interleaving is unknown
DTAPI_MOD_DVBT_IL_MSK	AND mask

### Transmission Mode

Value	Meaning
DTAPI_MOD_DVBT_2K	2k mode
DTAPI_MOD_DVBT_8K	8k mode
DTAPI_MOD_DVBT_MD_UNK	Transmission mode is unknown
DTAPI_MOD_DVBT_MD_MSK	AND mask

Not used for DVB-T

## Modulation Mode: QAM

### ModType

The QAM constellation is encoded in *ModType* according to the following table.

ModType	Meaning	Required Capability
DTAPI_MOD_QAM16	16-QAM	DTAPI_CAP_RX_QAM_A (QAM-A) DTAPI_CAP_RX_QAM_B (QAM-B) DTAPI_CAP_RX_QAM_C (QAM-C)
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	Required Capability
DTAPI_MOD_J83_A	J.83 annex A (DVB-C)	DTAPI_CAP_RX_QAM_A
DTAPI_MOD_J83_B	J.83 annex B ("American QAM")	DTAPI_CAP_RX_QAM_B
DTAPI_MOD_J83_C	J.83 annex C ("Japanese QAM")	DTAPI_CAP_RX_QAM_C
DTAPI_MOD_J83_UNK	Annex is unknown	

### ParXtra1

For J.83 Annex B, this parameter specifies the interleaving mode detected 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 $\mu$ s / 66 $\mu$ s
DTAPI_MOD_QAMB_I64_J2	0011	64	2	47 $\mu$ s / 33 $\mu$ s
DTAPI_MOD_QAMB_I32_J4	0101	32	4	24 $\mu$ s / 16 $\mu$ s
DTAPI_MOD_QAMB_I16_J8	0111	16	8	12 $\mu$ s / 8.2 $\mu$ s
DTAPI_MOD_QAMB_I8_J16	1001	8	16	5.9 $\mu$ s / 4.1 $\mu$ s
DTAPI_MOD_QAMB_I128_J1	0000	128	1	95 $\mu$ s / 66 $\mu$ s
DTAPI_MOD_QAMB_I128_J2	0010	128	2	190 $\mu$ s / 132 $\mu$ s
DTAPI_MOD_QAMB_I128_J3	0100	128	3	285 $\mu$ s / 198 $\mu$ s
DTAPI_MOD_QAMB_I128_J4	0110	128	4	379 $\mu$ s / 264 $\mu$ s
DTAPI_MOD_QAMB_I128_J5	1000	128	5	474 $\mu$ s / 330 $\mu$ s
DTAPI_MOD_QAMB_I128_J6	1010	128	6	569 $\mu$ s / 396 $\mu$ s
DTAPI_MOD_QAMB_I128_J7	1100	128	7	664 $\mu$ s / 462 $\mu$ s
DTAPI_MOD_QAMB_I128_J8	1110	128	8	759 $\mu$ s / 528 $\mu$ s
DTAPI_MOD_QAMB_IL_UNK	-	-	-	Interleaving mode is unknown

### ParXtra2

The detected symbol rate (in bd). The value DTAPI\_MOD\_SYMRATE\_UNK indicates the symbol rate could not be detected.

## Result

DTAPI_RESULT	Meaning
DTAPI_OK	The modulation parameters have been returned 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	This function is not supported for the underlying hardware

## Remarks

The detected modulation parameters returned by this method should only be considered to be valid if the `DtInpChannel` indicates that receiver- and FEC-lock has been achieved.

## DtInpChannel::GetDescriptor

Get hardware function descriptor for this input channel.

```
DTAPI_RESULT DtInpChannel::GetDescriptor(  
    [out] DtHwFuncDesc& HwFuncDesc // Hardware function descriptor  
);
```

### Function Arguments

*HwFuncDesc*

Output argument that receives the hardware function descriptor.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The hardware function descriptor been retrieved successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

## DtInpChannel::GetFifoLoad

Get the current load of the channel's receive FIFO.

```
DTAPI_RESULT DtInpChannel::GetFifoLoad(  
    [out]int& FifoLoad           // Load of receive FIFO  
);
```

### Function Arguments

*FifoLoad*

This output argument is set to the number of bytes in the receive 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

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

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 current and latched value of the input channel's status flags.

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

### Function Arguments

#### *Flags*

Output argument that is set to the current value 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, *Flags* is set to zero.

Value	Meaning
DTAPI_RX_FIFO_OVF	A receive FIFO overflow condition has occurred. The data in the receive FIFO was not read fast enough to a system buffer.
DTAPI_RX_SYNC_ERR	A synchronization error has occurred in the synchronization stage of the input channel. This error cannot occur in packet mode <b>DTAPI_RXMODE_RAW</b> .
DTAPI_RX_RATE_OVF	Data is entering the receive FIFO faster than 150Mbps (DTA-122 only)
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)
DTAPI_RX_DRV_BUF_OVF	Buffer overflow has occurred between device and host (DTU-3xx devices) caused by low USB performance.
DTAPI_RX_SYNTAX_ERR	Data transfer error between device and host (DTU-351 only)
DTAPI_RX_CPU_OVF	Software demodulation error caused by low CPU performance

#### *Latched*

Output argument that is set to the latched value 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**, **AttachToPort** 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

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtInpChannel::GetIoConfig

Get the I/O configuration of the physical port attached to the input channel. This is the same function as `DtDevice::GetIoConfig` applied to the physical port corresponding to this channel.

```
DTAPI_RESULT DtInpChannel::GetIoConfig(
    [in] int Group,           // I/O configuration group
    [out] int& Value         // I/O configuration value
);

DTAPI_RESULT DtInpChannel::GetIoConfig(
    [in] int Group,           // I/O configuration group
    [out] int& Value,         // I/O configuration value
    [out] int& SubValue      // I/O configuration subvalue
);

DTAPI_RESULT DtInpChannel::GetIoConfig(
    [in] int Group,           // I/O configuration group
    [out] int& Value,         // I/O configuration value
    [out] int& SubValue,     // I/O configuration subvalue
    [out] __int64& ParXtra0  // Extra parameter #0
);

DTAPI_RESULT DtInpChannel::GetIoConfig(
    [in] int Group,           // I/O configuration group
    [out] int& Value,         // I/O configuration value
    [out] int& SubValue,     // I/O configuration subvalue
    [out] __int64& ParXtra0, // Extra parameter #0
    [out] __int64& ParXtra1  // Extra parameter #1
);
```

### Function Arguments

*Group, Value, SubValue, ParXtra0, ParXtra1*

I/O configuration parameters, see `DtDevice::GetIoConfig`.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	I/O configuration has been retrieved successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
Other result codes	See <code>DtDevice::GetIoConfig</code>

### Remarks

This function requires exclusive access (`AttachToPort` was called with `Exclusive=true`).

## DtInpChannel::GetIpPars

Get TS-over-IP parameters of the received stream as detected by the driver.

```
DTAPI_RESULT DtInpChannel::GetIpPars(  
    [in] DtIpPars* pIpPars // Receives the TS-over-IP parameters  
);
```

### Function Arguments

*pIpPars*

Receives the TS-over-IP parameters. The user must have allocated the **DtIpPars** structure.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The TS-over-IP parameters have been retrieved successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	Channel is not a TS-over-IP channel

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtInpChannel::GetIpStat

Get IP statistics from the network driver.

```
DTAPI_RESULT DtInpChannel::GetIpStat(  
    [in] DtIpStat* pIpStat // Receives the IP parameters  
);
```

### Function Arguments

*pIpStat*

Receives the IP statistics. The user must have allocated the `DtIpStat` structure.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The TS-over-IP statistics have been retrieved successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	Channel is not a TS-over-IP channel

### Remarks

This function requires exclusive access (`AttachToPort` was called with `Exclusive=true`).

## DtInpChannel::GetMaxFifoSize

Get the maximum size of the channel's receive FIFO.

```
DTAPI_RESULT DtInpChannel::GetMaxFifoSize(  
    [out]int& MaxFifoSize // Maximum size of FIFO in bytes  
);
```

### Function Arguments

*MaxFifoSize*

Maximum size of the receive FIFO in number of bytes.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Maximum size of FIFO has been read successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

## DtInpChannel::GetPars

Get parameter settings from the demodulator. This function accepts and returns an array of **DtPar** structures so that multiple parameters can be retrieved in one call.

```
DTAPI_RESULT DtInpChannel::GetPars(
    [in] int NumPars,           // Number of parameters
    [in,out] DtPar* pPars     // Array with parameters
);
```

### Function Arguments

*NumPars*

Specifies the size, in number of **DtPar** entries, of the caller-supplied *pPars* array.

*pPar*

Pointer to a caller-supplied array of **DtPar** structures specifying the requested parameters. The current values of the requested parameters are returned through this same array.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameter values have been read successfully
DTAPI_E_INVALID_BUF	Invalid buffer pointer is passed
DTAPI_E_INVALID_TYPE	Parameter type is incorrect
DTAPI_E_NOT_ATTACHED	demodulator is not attached

### Remarks

## DtInpChannel::GetRxClkFreq

DTA-2142 only. Get the frequency of the DVB-SPI clock.

```
DTAPI_RESULT DtInpChannel::GetRxClkFreq(  
    [out]int& RxClkFreq           // Frequency of the DVB-SPI clock in Hertz  
);
```

### Function Arguments

*MaxFifoSize*

Output argument that is set to a measurement of the DVB-SPI clock frequency.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Maximum size of FIFO has been read successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtInpChannel::GetRxControl

Get the current value of receive control.

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

### Function Arguments

*RxControl*

This argument is set to the current value of receive control: `DTAPI_RXCTRL_IDLE` or `DTAPI_RXCTRL_RCV`. Refer to `SetRxControl` for a description of the receive control values.

### Result

DTAPI_RESULT	Meaning
<code>DTAPI_OK</code>	Receive control has been successfully retrieved
<code>DTAPI_E_DEV_DRIVER</code>	Unclassified failure in device driver
<code>DTAPI_E_NOT_ATTACHED</code>	Channel object is not attached to a hardware function

### Remarks

This function requires exclusive access (`AttachToPort` was called with `Exclusive=true`).

*Transport Streams* – In receive modes `DTAPI_RXMODE_ST188`, `DTAPI_RXMODE_STMP2` and `DTAPI_RXMODE_ST204`, receive control is synchronized 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 synchronized to the vertical sync.

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

## DtInpChannel::GetRxMode

Get the current value of receive mode.

```
DTAPI_RESULT DtInpChannel::GetRxMode(  
    [out] int& RxMode           // Receive mode  
);
```

### Function Arguments

*RxControl*

This argument is set to the current value of receive mode.  
Refer to **SetRxMode** for a description of the receive modes.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Receive mode 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

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtInpChannel::GetStatistics

Get statistics information from demodulator. This function gets an array of `DtStatistic` structures so that multiple statistics can be retrieved in one call.

```
DTAPI_RESULT DtInpChannel::GetStatistics(
    [in] int Count, // Number of statistics
    [in out]DtStatistic* pStatistics // Array with statistics
);
```

### Function Arguments

*Count*

The number of requested statistics.

*pStatistic*

An array specifying the statistics to be retrieved in one call. After the call it holds the values of the requested statistics.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The statistics have been read successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_INVALID_MODE	The statistic is not compatible with <b>ErrorStatsMode</b>
DTAPI_E_INVALID_FOR_ACM	The requested statistic is not available for Adaptive Coding Modulation (ACM) in DVB-S2
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_LOCKED	The requested statistic cannot be retrieved because the receiver is not locked to the input signal
DTAPI_E_NOT_SUPPORTED	The requested statistic is not supported by the hardware or the requested return type is not supported
DTAPI_E_TUNING	The statistic cannot be retrieved because the receiver is busy with tuning.

### Remarks

## DtInpChannel::GetStatistic

Get statistic information from demodulator for a single statistic value.

```
DTAPI_RESULT DtInpChannel::GetStatistic(
    [in] int Type,                // Number of statistics
    [out] int& Statistic          // Integer type static value
);

DTAPI_RESULT DtInpChannel::GetStatistic(
    [in] int Type,                // Number of statistics
    [out] double& Statistic       // Double type static value
);

DTAPI_RESULT DtInpChannel::GetStatistic(
    [in] int Type,                // Number of statistics
    [out] bool& Statistic         // Boolean type static value
);
```

### Function Arguments

*Type*

A specific statistic to be retrieved.

*Statistic*

The value for the requested statistic.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The statistics have been read successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_INVALID_ARG	The requested <b>Type</b> is <b>DTAPI_STAT_UNDEFINED</b> , or <b>Statistic</b> type does not match.
DTAPI_E_INVALID_MODE	The statistic is not compatible with <b>ErrorStatsMode</b>
DTAPI_E_INVALID_FOR_ACM	The requested statistic is not available for Adaptive Coding Modulation (ACM) in DVB-S2
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_LOCKED	The requested statistic cannot be retrieved because the receiver is not locked to the input signal
DTAPI_E_NOT_SUPPORTED	The requested statistic is not supported by the hardware or the requested return type is not supported
DTAPI_E_TUNING	The statistic cannot be retrieved because the receiver is busy with tuning.

### Remarks

## 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** (-1).

```
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)
);
```

### Function Arguments

#### *PacketSize*

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

Value	Meaning
<b>DTAPI_PCKSIZE_188</b>	188-byte packets at the transport-stream input
<b>DTAPI_PCKSIZE_204</b>	204-byte packets at the transport-stream input
<b>DTAPI_PCKSIZE_INV</b>	No MPEG-2 compliant packets found at the transport-stream input

SDI mode: SDI video standard of incoming stream. For cards with **DTAPI\_CAP\_MATRIX** one of **DTAPI\_VIDSTD\_XXX**. For cards without that capability one of the following values:

Value	Meaning
<b>DTAPI_SDIMODE_525</b>	525-line video mode input
<b>DTAPI_SDIMODE_625</b>	625-line video mode input
<b>DTAPI_SDIMODE_INV</b>	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
<b>DTAPI_NUMINV_NONE</b>	No invalid bytes
<b>DTAPI_NUMINV_16</b>	16 invalid bytes per packet
<b>DTAPI_NUMINV_OTHER</b>	Other number of invalid bytes per packet
<b>DTAPI_NOT_SUPPORTED</b>	Device does not support this parameter (not DTA-122)

#### *ClkDet*

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

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

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

	DVB-ASI, SDI : No carrier detected TS-over-IP : No IP traffic in the last second
--	-------------------------------------------------------------------------------------

*AsiLock*

For DVB-ASI input channels, this output argument 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 argument 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 argument 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 argument 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 argument *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

**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**

## DtInpChannel::GetStreamSelection

Get the selection parameters for the currently selected DAB-stream, PLP, Layer or T2-MI stream.

```
DTAPI_RESULT DtInpChannel::GetStreamSelection(
    [out] DtDabEtiStreamSelPars& StreamSel // DAB-ETI selection parameters
);
DTAPI_RESULT DtInpChannel::GetStreamSelection(
    [out] DtDabStreamSelPars& StreamSel // DAB stream selection parameters
);
DTAPI_RESULT DtInpChannel::GetStreamSelection(
    [out] DtDvbC2StreamSelPars& StreamSel // PLP selection parameters
);
DTAPI_RESULT DtInpChannel::GetStreamSelection(
    [out] DtDvbS2StreamSelPars& StreamSel // ISI selection parameters
);
DTAPI_RESULT DtInpChannel::GetStreamSelection(
    [out] DtDvbT2StreamSelPars& StreamSel // PLP selection parameters
);
DTAPI_RESULT DtInpChannel::GetStreamSelection(
    [out] DtT2MiStreamSelPars& StreamSel // T2-MI parameters
);
DTAPI_RESULT DtInpChannel::GetStreamSelection(
    [out] DtIsdbtStreamSelPars& StreamSel // ISDB-T selection parameters
);
```

### Function Arguments

*StreamSel*

Output argument that receives the selection parameters.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The selection parameters have been retrieved successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_INVALID_MODE	The current demodulation type does not correspond to the type of the selection parameters
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	The device does not support DAB, DVB-C2, DVB-T2, T2-MI, ISDB-T or DVBS-2

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

## DtInpChannel::GetSupportedPars

Get the parameters supported by the demodulator.

```
DTAPI_RESULT DtInpChannel::GetSupportedPars (  
[in,out] int& NumPars,           // Number of parameters  
[out] DtPar* pPars              // Array with supported parameters  
);
```

### Function Arguments

*NumPars*

As an input argument it specifies the size, in number of **DtPar** entries, of the caller-supplied *pPars* array. As an output argument it receives the number of supported parameters.

*pPar*

Pointer to a caller-supplied array of **DtPar** to receive the requested parameters.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameter information has been read successfully
DTAPI_E_BUF_TOO_SMALL	The number of <b>DtPar</b> entries in <i>pPars</i> is too small
DTAPI_E_NOT_ATTACHED	Advanced demodulator object is not attached

## DtInpChannel::GetSupportedStatistics

Get the supported statistics from demodulator. This function gets an array of `DtStatistic` structures.

```
DTAPI_RESULT DtInpChannel::GetSupportedStatistics(
[in out] int& Count,           // Number of statistics
[out] DtStatistic* pStatistics // Array with statistics
);
```

### Function Arguments

*Count*

As input it specifies the size, in number of `DtStatistic` entries, of the caller-supplied *pStatistics* array. As output it receives the number of supported statistics and described in *pStatistics*.

*pStatistic*

Pointer to a caller-supplied array of `DtStatistic` entries identifying the supported statistics.

### 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_BUFFER_TOO_SMALL	The number of statistic entries in <i>pStatistics</i> is too small.

### Remarks

## 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
);
```

### Function Arguments

#### *Present*

Output argument 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 argument 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

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

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-adaptor detection circuitry.

## DtInpChannel::GetTsRateBps

Get a measurement of the input's transport stream rate.

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

### Function Arguments

*TsRate*

Measurement 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

This function requires exclusive access (`AttachToPort` was called with `Exclusive=true`).

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 current tuner frequency.

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

### Function Arguments

*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::GetViolCount

Get number of code violations on a DVB-ASI input channel.

```
DTAPI_RESULT DtInpChannel::GetViolCount(
    [out] int& ViolCount // Code-violation counter
);
```

### Function Arguments

*ViolCount*

Total number of DVB-ASI code violations since power-up of a DVB-ASI input channel.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Code violation count 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

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

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 32-bit integer value ( $2^{31-1}$ ) has been reached, the counter wraps around to the largest 32-bit negative integer value ( $-2^{31}$ ).

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

## DtInpChannel::I2CLock

Lock the I2C bus for exclusive access.

```
DTAPI_RESULT DtInpChannel::I2CLock(  
    [in] int Timeout // Maximum time to wait for lock  
);
```

### Function Arguments

*Timeout*

Maximum time (in ms) to wait for the I2C lock. The value -1 indicates an infinite wait time.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	I2C lock has successfully been obtained
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_NOT_ATTACHED	Channel object is not attached to device hardware
DTAPI_E_NOT_SUPPORTED	Locking of the I2C bus is not supported on this device
DTAPI_E_TIMEOUT	Lock could not be obtained within the specified timeout

### Remarks

It is recommended to never hold the lock for longer than 2 seconds as locking the I2C bus for prolonged periods of time can result in serious degradation of the performance of the device and can even result in loss of functionality.

Internal use only: this function is exported for DekTec application usage.

## DtInpChannel::I2CRead

Read data from the I2C bus.

```
DTAPI_RESULT DtInpChannel::I2CRead(
    [in] int DvcAddr,           // I2C device address
    [out] char* pBuffer,       // Buffer for receiving the data
    [in] int NumBytesToRead    // #Bytes to read
);
```

### Function Arguments

#### *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	Channel 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 on board I2C bus

### Remarks

The `I2CRead` method is intended for direct low-level access to the on board I2C resources.

Internal use only: this function is exported for DekTec application usage.

## DtInpChannel::I2CUnlock

Release the lock (i.e. exclusive access) on the I2C bus.

```
DTAPI_RESULT DtInpChannel::I2CUnlock(void);
```

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	I2C lock has successfully been released
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_NOT_ATTACHED	Channel object is not attached to device hardware
DTAPI_E_NOT_SUPPORTED	Unlocking of the I2C bus is not supported on this device

### Remarks

Internal use only: this function is exported for DekTec application usage.

## DtInpChannel::I2CWrite

Write data to the I2C bus.

```
DTAPI_RESULT DtInpChannel::I2CWrite(
    [in] int DvcAddr,           // I2C device address
    [in] char* pBuffer,       // Buffer with bytes to write
    [in] int NumBytesToWrite  // #Bytes to write
);
```

### Function Arguments

*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	Channel 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 on board I2C bus.

### Remarks

The `I2CWrite` method is intended for direct low-level access to the on board I2C resources.

Internal use only: this function is exported for DekTec application usage.

## DtInpChannel::I2CWriteRead

Lock the I2C bus followed by a write and/or read action on the I2C bus and finally release the lock.

```
DTAPI_RESULT DtInpChannel::I2CWrite(
    [in] int DvcAddrWrite,           // I2C device address to write to
    [in] char* pBufferWrite,        // Buffer with bytes to write
    [in] int NumBytesToWrite,       // #Bytes to write
    [in] int DvcAddrRead,           // I2C device address to read from
    [out] char* pBufferRead,        // Buffer for receiving the data
    [in] int NumBytesToRead         // #Bytes to read
);
```

### Function Arguments

#### *DvcAddrWrite*

Device address of the targeted I2C device to write to.

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

#### *pBufferWrite*

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.

#### *DvcAddrRead*

Device address of the targeted I2C device to read from.

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

#### *pBufferRead*

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	Channel 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 on board I2C bus.

### Remarks

The **I2CWriteRead** method is intended for direct low-level access to the on board I2C resources.

Internal use only: this function is exported for DekTec application usage.



## 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
);
```

### Function Arguments

*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

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

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**).

Some devices have a single LED, which can be controlled by either **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

For satellite receivers (DTA-2132, DTA-2137, DTE-3137): Enable or disable the LNB controller.

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

### Function Arguments

*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

For satellite receivers (DTA-2132, DTA-2137, DTE-3137): Enable or disable the 22kHz tone on the LNB.

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

### Function Arguments

*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 on-board LNB controller must have been enabled using `DtInpChannel::LnbEnable` method. If the LNB controller is disabled this method will fail.

## DtInpChannel::LnbSendBurst

For satellite receivers (DTA-2132, DTA-2137 and DTE-3137): Transmit a tone burst of type A or B.

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

### Function Arguments

*BurstType*

Controls the burst type.

Value	Meaning
DTAPI_LNB_BURST_A	Burst type A
DTAPI_LNB_BURST_B	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 on-board LNB controller must have been enabled using `DtInpChannel::LnbEnable` method. If the LNB controller is disabled this method will fail.

## DtInpChannel::LnbSendDiseqcMessage

For satellite receivers (DTA-2132, DTA-2137 and DTE-3137): Send a DiSEqC message. There are two overloads: one with and one without capture of the DiSEqC reply.

```
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
);
```

### Function Arguments

*pMsgOut*

Pointer to buffer with the message to send. The maximum allowed message size is 8.

*NumBytesOut*

Number of bytes in the message buffer.

*pMsgIn*

Pointer to buffer in which the reply message is stored. The maximum reply size is 8 bytes.

*NumBytesIn*

As input argument this argument specifies the size of the reply buffer. As output argument this argument 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 on-board LNB controller must have been enabled using the **LnbEnable** method. If the LNB controller is disabled this method will fail.

## DtInpChannel::LnbSetVoltage

For satellite receivers (DTA-2132, DTA-2137 and DTE-3137): Set the LNB voltage.

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

### Function Arguments

*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 the `LnbEnable` method.

## DtInpChannel::PolarityControl

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

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

### Function Arguments

*PolarityControl*

This argument controls inversion of the DVB-ASI signal.

Value	Meaning
DTAPI_POLARITY_AUTO	Automatically detect and correct the polarity
DTAPI_POLARITY_NORMAL	'Normal' operation: do not invert the 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

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

The DVB-ASI signal is sensitive to polarity. Without corrective measures, an inverted DVB-ASI signal – which may be caused by 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
);
DTAPI_RESULT DtInpChannel::Read(
    [in] char* pBuffer,          // Buffer to store data
    [in] int NumBytesToRead     // #Bytes to be read
    [in] int TimeOut            // Maximum time to wait for data
);
```

### Function Arguments

#### *pBuffer*

Pointer to the buffer into which the data bytes from the input channel will be written. The pointer must be aligned to a 32-bit word boundary, except for IP input channels for which there are no alignment restrictions.

#### *NumBytesToRead*

Transfer size: Number of bytes to be read from the input channel. The value of *NumBytesToWrite* must be a multiple of four, except for IP input channels, which can accept any positive value.

#### *TimeOut*

Transfer timeout: specifies the maximum time (in ms) to wait for the requested amount of data. This method will fail if the data cannot be read within the specified period. A value of 0 indicates that no time out applies and -1 specifies an infinite timeout.

### 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_INVALID_TIMEOUT	Invalid timeout period specified
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

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

**Read** returns when *NumBytesToRead* bytes have been transferred into the buffer. The thread executing **Read** will sleep until sufficient data has entered the receive FIFO to complete the transfer. If either the input signal disappears or receive control is **DTAPI\_RXCTRL\_IDLE**, the **Read** call may sleep for an indefinite period of time (the thread 'hangs').

There are two ways to avoid such a 'hanging' thread:

- Before calling **Read**, check the FIFO load. Read an amount of data that is less than or equal to the FIFO load;
- Use **Read** with a time out.

The first method should be used if maximum performance is required. The second method is easier to use at the expense of some extra CPU cycles.

## DtInpChannel::ReadFrame

Read a single 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                   // Maximum time to wait for a frame
);
```

### Function Arguments

*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 argument this argument indicates the size of the frame buffer. The frame buffer should be large enough to receive a complete frame and must be 32-bit aligned.

As an output argument this argument indicates the number of bytes returned in the frame buffer. 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 to wait for a complete frame. This method will fail if a frame cannot be returned within the specified period.

The value of this argument must larger than 0 or -1 to specify an infinite timeout. The default value is -1 (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 too small for receiving a complete frame
DTAPI_E_INVALID_TIMEOUT	Invalid timeout period specified
DTAPI_E_NOT_SDI_MODE	The channel is not in SDI mode (see <b>SetRxMode</b> page 348)
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

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

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

## DtInpChannel::RegisterDemodCallback

Register a callback function for handling demodulator events.

```
DTAPI_RESULT DtInpChannel::RegisterDemodCallback(
    [in] IDtDemodEvent* pEvent,    // Event handler
    [in] __int64 Events=-1,       // Events to register for
);
```

### Function Arguments

*pIEvent*

Pointer to a callback function for handling demodulator events. Use NULL to stop handling events.

*Events*

Events to register for. The table below contains the supported events. Multiple event constants can be OR-ed together to register for multiple events. To register for all demodulator events use the value -1.

Event	Description
DTAPI_EV_TUNE_PARS_HAVE_CHANGED	Tuning parameters have changed ( <b>SetDemodControl</b> , <b>SetTunerFrequency</b> or <b>Tune</b> was called)
DTAPI_EV_TUNE_FREQ_HAS_CHANGED	Tuning frequency has changed ( <b>SetTunerFrequency</b> or <b>Tune</b> was called)

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Callback has been registered or deregistered successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	Registering an event interface is not supported

### Remarks

## DtInpChannel::Reset

Reset input channel.

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

### Function Arguments

*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: <ul style="list-style-type: none"> <li>• Data transfers are halted instantaneously</li> <li>• All data pending in the Receive FIFO is discarded</li> <li>• Receive-control state is reset to DTAPI_RXCTRL_IDLE</li> <li>• Receive-FIFO overflow flag is cleared</li> </ul>
DTAPI_FULL_RESET	Full input-channel reset: <ul style="list-style-type: none"> <li>• All actions for DTAPI_FIFO_RESET, plus:</li> <li>• Synchronization-error flag (DTAPI_RX_SYNC_ERR) is cleared</li> <li>• State machines in the device hardware are reset</li> </ul>

### 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 <i>ResetMode</i> is invalid
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

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**)

## DtInpChannel::SetAdcSampleRate

DTA-2135 only. Set sample rate for ADC input channels. The ADC sample-rate determines the rate at which samples are taken from the down-converted RF signal.

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

### Function Arguments

SampleRate

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 <sup>3</sup>
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

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

Only the first channel of the DTA-2135 provides access the down-converted RF signal.

The IF frequency 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 sampling theory on details how to recover the signal.

<sup>3</sup> The exact frequency is  $27 * 13 / 17 = 20.647059\text{Mhz}$

## DtInpChannel::SetAntPower

For receivers: Turn antenna power on or off.

```
DTAPI_RESULT DtInpChannel::SetAntPower (
    [in] int AntPower           // Antenna power on/off
);
```

### Function Arguments

*AntPower*

Power state according to the table below.

Value	Meaning
DTAPI_POWER_OFF	No power is applied. The 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 antenna 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 have a provision for antenna power

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

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

## DtInpChannel::SetDemodControl

Set the demodulation parameters.

```
DTAPI_RESULT DtInpChannel::SetDemodControl (
    [in] DtDemodPars* pDemodPars // Demodulation parameters
);

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

### Function Arguments

*pDemodPars*

Pointer to a structure containing the demodulation parameters. See class **DtDemodPars** for possible demodulation parameters.

*ModType*

Expected type of modulation of the input signal. See **GetDemodControl** for a list of applicable values, with the exception of the **DTAPI\_MOD\_TYPE\_UNK** value, which cannot be used in the **SetDemodControl** method.

*ParXtra0, ParXtra1, ParXtra2*

Additional parameters further defining the demodulation process. See **GetDemodControl** for a list of applicable values, with the exception of the **DTAPI\_MOD\_XXX\_UNK** values, which cannot be used in the **SetDemodControl** method.

Many of the additional parameters can be automatically detected by the demodulator hardware and therefore it is not always required to fully define the demodulation parameters. However, providing more detail will help the demodulator to achieve signal lock faster, as it will not have to autodetect them.

The tables below show the limitations with respect to automatic detection:

### Automatic detection

*ModType*

The modulation type must always be set explicitly and using automatic detection is not allowed. For DTA-2127 configuring **ModType DTAPI\_MOD\_DVBS2** will also result in receiving DVB-S automatically.

*ParXtra0, ParXtra1, ParXtra2*

The table below lists which parameters can be automatically detected for each of the modulation standards:

Modulation Mode: ATSC		
ParXtra0	Constellation	No automatic detection supported (constellation must be specified)
ParXtra2	Symbol rate	Automatically detected by definition
Modulation Mode: DVB-S		
ParXtra0	Code rate	<b>DTAPI_MOD_CR_AUTO</b>
ParXtra1	Spectral inversion	<b>DTAPI_MOD_S_S2_SPECINV_AUTO</b>
ParXtra2	Symbol rate	<b>DTAPI_MOD_SYMRATE_AUTO</b>

Modulation Mode: DVB-S.2		
ParXtra0	Code rate	DTAPI_MOD_CR_AUTO
ParXtra1	Spectral inversion	Automatically detected by definition
	Pilots	DTAPI_MOD_S2_PILOTS_AUTO
	FEC frame size	DTAPI_MOD_S2_FRM_AUTO
ParXtra2	Symbol rate	DTAPI_MOD_SYMRATE_AUTO Automatic detection is not supported by DTA-2132.

Modulation Mode: DVB-T		
ParXtra0	Code rate	DTAPI_MOD_CR_AUTO
ParXtra1	Bandwidth	No automatic detection supported (bandwidth must be specified)
	Constellation	DTAPI_MOD_DVBT_CO_AUTO
	Guard interval	DTAPI_MOD_DVBT_GU_AUTO
	Interleaving	DTAPI_MOD_DVBT_IL_AUTO
	Tx mode	DTAPI_MOD_DVBT_MD_AUTO

Modulation Mode: QAM		
ParXtra0	J.83 Annex	No automatic detection supported (Annex must be specified)
ParXtra1 (QAM-B)	Interleaving	Automatically detected by definition
ParXtra2	Symbol rate	<p><b>DTAPI_MOD_SYMRATE_AUTO</b> Automatic detection of symbol rate is supported by the DTA-2136, DTA-2138, DTA-2139 and the DTU-234. The DTU-236 supports automatic detection of the symbol rate for QAM-B only.</p> <p>You can directly set the symbol rate the tuner should lock to for the DTA-2136, DTA-2139 and DTU-236. For QAM-A and QAM-C on the DTU-236 this is the only possibility since automatic detection isn't supported.</p>

## Result

DTAPI_RESULT	Meaning
DTAPI_OK	The modulation parameters have been set successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_IN_USE	Another channel object that controls the tuner is currently attached
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 DTAPI_E_INVALID_ROLLOFF	Invalid value for J.83 annex
DTAPI_E_INVALID_MODE	Modulation type is incompatible with demodulator
DTAPI_E_INVALID_MODPARS	Invalid demodulation parameters
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_SYMRATE	Invalid value for symbol rate
DTAPI_E_INVALID_T2PROFILE	Invalid value for DVB-T2 profile
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	This function is not supported for the underlying hardware

## Remarks

For DTA-2136 and DTA-2139 J.83 annex A (DVB-C) QAM-128 is not supported

For DTA-2131 a low C/N and MER could be measured when using a DVB-T2 configuration including Pilot Pattern 8 (PP8).

## DtInpChannel::SetErrorStatsMode

Set the way error statistics are gathered for the specified type of modulation. This method is currently only supported by the DTA-2137.

```
DTAPI_RESULT DtInpChannel::SetErrorStatsMode(
    [in] int ModType,           // Type of modulation
    [in] int Mode              // The desired error statistics mode
);
```

### Function Arguments

#### *ModType*

Type of modulation for which the given error statistics mode is set.

Value	Meaning
DTAPI_MOD_DVBS_QPSK	DVB-S, QPSK
DTAPI_MOD_DVBS2_8PSK	DVB-S.2, 8-PSK
DTAPI_MOD_DVBS2_16APSK	DVB-S.2, 16-APSK
DTAPI_MOD_DVBS2_32APSK	DVB-S.2, 32-APSK
DTAPI_MOD_DVBS2_QPSK	DVB-S.2, QPSK

#### *Mode*

Desired error-statistics mode.

Value	Meaning
DTAPI_ERRORSTATS_BER	(Default for each type of modulation) Bit error rate
DTAPI_ERRORSTATS_RS	Reed-Solomon error count

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The error-statistics mode has been changed successfully
DTAPI_E_INVALID_MODTYPE	The specified type of modulation is not valid
DTAPI_E_INVALID_PARS	The combination of <i>ModType</i> and <i>Mode</i> is not valid

### Remarks

Reed-Solomon error counts (error-statistics mode **DTAPI\_ERRORSTATS\_RS**) can only be used for DVB-S.

## DtInpChannel::SetFifoSize

Set the size the receive FIFO to a specified value. This function is only supported for IP-streams.

The FIFO size can only be changed if receive control is **IDLE**.

```
DTAPI_RESULT DtInpChannel::SetFifoSize(
    [in] int FifoSize           // Size of transmit FIFO in bytes
);
```

### Function Arguments

*FifoSize*

Requested size of the receive FIFO in number of bytes.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The size of the receive FIFO has been set successfully
DTAPI_E_IN_USE	The FIFO size cannot be changed because receive control state is not IDLE.
DTAPI_E_INVALID_SIZE	The specified FIFO size is negative or zero
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_OUT_OF_MEM	Receive FIFO cannot be allocated

### Remarks

The size of the receive FIFO determines the amount of packet data that can be buffered in the driver. It does not increase the receive delay.

## DtInpChannel::SetIoConfig

Set the I/O configuration of the physical port attached to the input channel. This is the same function as `DtDevice::SetIoConfig` applied to the physical port corresponding to this channel.

```
DTAPI_RESULT DtInpChannel::SetIoConfig(
    [in] int Group,           // I/O configuration group
    [in] int Value,         // I/O configuration value
    [in] int SubValue=-1,   // I/O configuration subvalue
    [in] __int64 ParXtra0=-1, // Extra parameter #0
    [in] __int64 ParXtra1=-1 // Extra parameter #1
);
```

### Function Arguments

*Group, Value, SubValue, ParXtra0, ParXtra1*  
I/O configuration parameters, see `DtDevice::SetIoConfig`.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	I/O configuration has been set successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
Other result codes	See <code>DtDevice::SetIoConfig</code>

### Remarks

This function requires exclusive access (`AttachToPort` was called with `Exclusive=true`).

## DtInpChannel::SetIpPars

Set parameters for the reception of TS-over-IP streams.

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

### Function Arguments

*SetIpPars*

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

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	TS-over-IP parameters have been applied successfully
DTAPI_E_BIND	Error binding port to IP address
DTAPI_E_IN_USE	Function Arguments cannot be changed because the channel is busy. The receive-control state should be switched back to idle first
DTAPI_E_INVALID_DIFFSERV	The m_Diffserv parameter is invalid
DTAPI_E_INVALID_FECMODE	The m_FecMode parameter is invalid
DTAPI_E_INVALID_FEC_MATRIX	The m_FecNumCols/m_FecNumRows is invalid
DTAPI_E_INVALID_FLAGS	The m_Flags parameter is invalid
DTAPI_E_INVALID_MODE	The m_Mode parameter is invalid
DTAPI_E_INVALID_IP_ADDR	The m_Ip or m_Ip2 parameter is invalid
DTAPI_E_INVALID_PORT	The m_Port parameter is invalid.
DTAPI_E_INVALID_PROTOCOL	The m_Protocol parameter is invalid
DTAPI_E_INVALID_SRCIP_ADDR	The m_SrcFltIp or m_SrcFltIp2 parameter is invalid
DTAPI_E_INVALID_VIDEOSTD	The m_Videostandard in member m_IpProfile is invalid
DTAPI_E_IPV6_NOT_SUPPORTED	IPv6 is not supported on this operating system
DTAPI_E_MULTICASTOIN	Error joining multicast address
DTAPI_E_NO_ADAPTER_IP_ADDR	The network IP address could not be retrieved. Check the network driver IP protocol settings
DTAPI_E_NO_LINK	The IP parameters cannot be applied because the link is down. Check network cable and speed settings
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NW_DRIVER	The IP address could not be retrieved from the network driver
DTAPI_E_NWAP_DRIVER	An error occurred using the Advanced Protocol Driver.
DTAPI_E_VLAN_NOT_FOUND	The VLAN with the given ID is not found

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

**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, 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 dropped and, if required, the new multicast group is joined.

## DtInpChannel::SetPars

Set parameter settings for the demodulator. This function accepts an array of **DtPar** structures so that multiple parameters can be set in one call.

```
DTAPI_RESULT DtInpChannel::SetPars (
    [in] int Count,           // Number of parameters
    [in] DtPar* pPars        // Array with parameters
);
```

### Function Arguments

*NumPars*

Specifies the size, in number of **DtPar** entries, of the caller-supplied *pPars* array.

*pPar*

Pointer to a caller-supplied array of **DtPar** structures.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameter values have been set successfully
DTAPI_E_INVALID_BUF	Invalid buffer pointer is passed
DTAPI_E_INVALID_TYPE	Parameter type is incorrect
DTAPI_E_NOT_ATTACHED	Demodulator is not attached
DTAPI_E_NOT_IDLE	Demodulator is already started

### Remarks

Demodulation should not yet been started when this function is called.

## 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
);
```

### Function Arguments

*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 receive control.

```
DTAPI_RESULT DtInpChannel::SetRxControl(
    [in] int RxControl          // Receive control
);
```

### Function Arguments

*RxControl*

New receive control value 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.

### 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_NO_IP_PARS	For TS-over-IP channels: receive-control state cannot be set to <b>DTAPI_RXCTRL_RCV</b> because TS-over-IP parameters have not been specified
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

If receive control is set to **DTAPI\_RXCTRL\_RCV**, but the application does not read data from the receive FIFO, then the receive FIFO will quickly overflow.

Calling **AttachToPort**, **Reset** or **ClearFifo** will initialize receive control to **DTAPI\_RXCTRL\_IDLE**.

## DtInpChannel::SetRxMode

Set the receive mode for the input channel. It determines the conversions that will be applied to the input signal. Receive mode has to be set before setting receive control to `DTAPI_RXCTRL_RCV`.

**Note:** For ASI/SDI input channels, first configure the input port for ASI or SDI with `SetIoConfig`, group `IOSTD`. If an ASI-specific receive mode is applied to a channel that is configured for SDI (or vice versa), an error will be returned.

```
DTAPI_RESULT DtInpChannel::SetRxMode (
    [in] int RxMode           // Receive mode
);
```

### Function Arguments

*RxMode*

Receive mode according to the table below.

Value	Meaning
<code>DTAPI_RXMODE_ST188</code>	<i>Transport Stream – 188-byte mode</i> Always store 188-byte packets in the receive FIFO. When the input contains 204-byte packets, the 16 trailing bytes are dropped. Input data without 188- or 204-byte packet structure is dropped.
<code>DTAPI_RXMODE_ST204</code>	<i>Transport Stream – 204-byte mode</i> Always store 204-byte packets in the receive FIFO. When the input contains 188-byte packets, 16 zero bytes are appended. Input data without 188- or 204-byte packet structure is dropped.
<code>DTAPI_RXMODE_STMP2</code>	<i>Transport Stream – MPEG-2 mode</i> Store 188- or 204-byte packets in the receive FIFO without modification. Input data without 188- or 204-byte packet structure is dropped.
<code>DTAPI_RXMODE_STRAW</code>	<i>Transport Stream – Raw mode</i> No notion of packets. All incoming valid data bytes are stored in the Receive FIFO. For DVB-ASI input channels, this mode is incompatible with <code>DTAPI_POLARITY_AUTO!</code> Please refer to the Remarks section.
<code>DTAPI_RXMODE_STTRP</code>	<i>Transport Stream – Transparent mode</i> 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.
<code>DTAPI_RXMODE_STL3</code>	<i>L.3 Baseband frame mode</i> No notion of transport stream packets. The entire DVB-S2 baseband frame is passed with the addition of an L.3 Header. Dummy frames and error frames are skipped. See DTAPI Manual – Overview and Data Formats.pdf for more details.
<code>DTAPI_RXMODE_STL3FULL</code>	<i>Full L.3 Baseband frame mode</i> Similar to <code>DTAPI_RXMODE_STL3</code> . Dummy frames are encoded with ModCod is '0'.
<code>DTAPI_RXMODE_STL3ALL</code>	<i>All L.3 Baseband frame mode</i> (DTA-2132 only) Similar to <code>DTAPI_RXMODE_STL3FULL</code> . Error frames are encoded with a ModCod, carrier to noise ratio set, and no payload.
<code>DTAPI_RXMODE_RAWASI</code>	<i>Raw ASI symbols</i> (Ports needs CAP_RAWASI) The complete incoming data stream can be read as packed 10-bit symbols.

The following modes are valid for SDI capable channels only.

Value	Meaning
<code>DTAPI_RXMODE_SDI_FULL</code>	<i>Full frame mode</i> Store all SDI data (i.e. complete frames).
<code>DTAPI_RXMODE_SDI_ACTVID</code>	<i>Active video mode</i> Store only the active video part of each SDI frame. This mode should only be used in combination with Huffman compression (i.e. with <code>DTAPI_RXMODE_SDI_HUFFMAN</code> flag)!

The following mode is valid for TS-over-IP reception only.

Value	Meaning
<code>DTAPI_RXMODE_IPRAW</code>	<i>Raw IP mode</i> Store unprocessed IP packets in the buffer. If error correction is requested, store FEC streams too. Each IP packet returned by a call the <code>DtInpChannel::Read</code> will be preceded by a <code>DtRawIpHeader</code> structure.

The receive mode can be optionally combined (OR-ed) with the following flag:

Value	Meaning
<b>DTAPI_RXMODE_TIMESTAMP32</b>	<i>Time-stamped mode (32-bit timestamps)</i> Insert a 32-bit timestamp before each packet. The timestamp is a sample of the system clock counter on the device. This flag may not be specified in raw mode ( <b>DTAPI_RXMODE_STRAW</b> ) or any of the SDI modes.
<b>DTAPI_RXMODE_TIMESTAMP64</b>	<i>Time-stamped mode (64-bit timestamps)</i> (hardware shall support <b>DTAPI_CAP_TIMESTAMP64</b> ). Insert a 64-bit timestamp before each packet. The timestamp is a sample of the system clock counter on the device. This flag may not be specified in raw mode ( <b>DTAPI_RXMODE_STRAW</b> ) or any of the SDI modes.
<b>DTAPI_RXMODE_SDI</b>	<i>SDI mode</i> Operate in SDI mode; Otherwise ASI mode will be used. This flag is already OR-ed into <b>DTAPI_RXMODE_SDI_FULL</b> and <b>DTAPI_RXMODE_SDI_ACTVID</b> .
<b>DTAPI_RXMODE_SDI_10B</b>	<i>10-bit SDI samples</i> Provide 10-bit SDI samples. If both this flag and the 16B flag are omitted, 8-bit samples is assumed.
<b>DTAPI_RXMODE_SDI_16B</b>	<i>16-bit SDI samples</i> Provide 10-bit SDI samples packed in 16-bits. Only the 10 least significant bits of each 16-bit sample will be used. If both this flag and the 10B flag are omitted, 8-bit samples is assumed. 16B mode is only supported by cards having the CAP_MATRIX capability.
<b>DTAPI_RXMODE_SDI_HUFFMAN</b>	<i>Huffman compression</i> Compress the SDI using Huffman compression.
<b>DTAPI_RXMODE_SDI_STAT</b>	<i>SDI statistics</i> Inserts statistical information before each SDI frame (a total of 32 bytes). If the <b>DTAPI_RXMODE_TIMESTAMP32</b> is also enabled, the SDI statistics will be inserted after the timestamp. This mode is only supported for IP channels. See the <code>DtSdiIpFrameStat</code> struct for details.

## Result

DTAPI_RESULT	Meaning
<b>DTAPI_OK</b>	Receive mode has been changed successfully
<b>DTAPI_E_DEV_DRIVER</b>	Unclassified failure in device driver
<b>DTAPI_E_INVALID_MODE</b>	The specified receive mode is invalid or incompatible with the input channel
<b>DTAPI_E_NOT_ATTACHED</b>	Channel object is not attached to a hardware function
<b>DTAPI_E_NOT_SUPPORTED</b>	Current device is not supported by this function

## Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

In receive mode **DTAPI\_RXMODE\_STRAW** ("raw" mode), the input channel does not care about the packet structure of the incoming transport stream: 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 and DTA-2142 DVB-SPI ports, packet synchronization 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.

Timestamps are stored in little-endian format: the first byte contains the least-significant 8 bits, the fourth byte the most-significant 8 bits. 32-bit timestamps can be read by code like this:

```
unsigned int TimeStamp = *(unsigned int*) PtrInCharBuffer;
```

## DtInpChannel::SetStreamSelection

Select a DAB-stream, PLP in a DVB-C2 or DVB-T2 stream, T2-MI stream or ISDB-T layer

```
DTAPI_RESULT DtInpChannel::SetStreamSelection(
    [in] DtDabEtiStreamSelPars& StreamSel // DAB-ETI selection parameters
);
DTAPI_RESULT DtInpChannel::SetStreamSelection(
    [in] DtDabStreamSelPars& StreamSel // DAB-stream selection parameters
);
DTAPI_RESULT DtInpChannel::SetStreamSelection(
    [in] DtDvbC2StreamSelPars& StreamSel // PLP selection parameters
);
DTAPI_RESULT DtInpChannel::SetStreamSelection(
    [in] DtDvbS2StreamSelPars& StreamSel // ISI selection parameters
);
DTAPI_RESULT DtInpChannel::SetStreamSelection(
    [in] DtDvbT2StreamSelPars& StreamSel // PLP selection parameters
);
DTAPI_RESULT DtInpChannel::SetStreamSelection(
    [in] DtDvbT2MiStreamSelPars& StreamSel // T2-MI selection parameters
);
DTAPI_RESULT DtInpChannel::SetStreamSelection(
    [in] DtIsdbtStreamSelPars& StreamSel // ISDB-T selection parameters
);
```

### Function Arguments

*StreamSel*

Specification of the PLP/ISI selection criteria.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The PLP has been selected successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_DSLICE_ID	Invalid data slice identifier
DTAPI_E_INVALID_MODE	The current demodulation type does not correspond to the type of the selection parameters
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	The device does not support DAB, DVB-C2, DVB-T2, ISDB-T, T2-MI or DVB-S2
DTAPI_E_PLP_ID	Invalid physical layer pipe identifier
DTAPI_E_LAYER_ID	Invalid ISDB-T layer identifier

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

If the specified PLP/Layer/ISI is not available another PLP/Layer/ISI may be selected.

## DtInpChannel::SetTunerFrequency

Set tuner frequency.

```
DTAPI_RESULT DtInpChannel::SetTunerFrequency (
    [in] __int64& FreqHz           // Frequency in hertz
);
```

### Function Arguments

*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	-
DTU-236	44,000,000 - 865,000,000 Hz	-
DTU-238	42,000,000 - 1002,000,000 Hz	-
DTU-331	42,000,000 - 3220,000,000 Hz	-
DTA-2131	42,000,000 - 870,000,000 Hz	-
DTA-2132	950,000,000 - 2150,000,000 Hz	-
DTA-2135	50,000,000 - 860,000,000 Hz	-
DTA-2136	54,000,000 - 1002,000,000 Hz	-
DTA-2137	950,000,000 - 2150,000,000 Hz	-
DTA-2138	46,000,000 - 876,000,000 Hz	-
DTA-2138B	46,000,000 - 998,000,000 Hz	-
DTA-2139	54,000,000 - 1002,000,000 Hz	-
DTA-2139B	42,000,000 - 1002,000,000 Hz	-

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The tuner frequency has been set successfully
DTAPI_E_INVALID_FREQ	The specified frequency is incompatible (too low or too high) with the tuner
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_IN_USE	Another channel object that controls the tuner is currently attached
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::SpectrumScan

Scans the spectrum and returns RF levels using a callback mechanism.

```
DTAPI_RESULT DtInpChannel::SpectrumScan(
    [in] DtSpsProgressFunc pCallback, // Progress callback function
    [in] void* pOpaque, // Opaque pointer
    [in] int ScanType, // RF level statistics type to use
    [in] __int64 FreqHzSteps, // Optional parameter to select stepsize
    [in] __int64 StartFreqHz, // Optional parameter to select starting
    // frequency
    [in] __int64 EndFreqHz // Optional parameter to select ending
    // frequency
);
```

### Function Arguments

#### *pCallback*

A callback function with callback prototype **DtSpsProgressFunc** that will be executed by the asynchronous spectrum scan.

#### *pOpaque*

An optional pointer to a user object that is returned in the callback function.

#### *ScanType*

The statistic RF level type to use for the scan. This can be any of the following values:

**DTAPI\_STAT\_RFLVL\_NARROW**, **DTAPI\_STAT\_RFLVL\_NARROW\_QS**, **DTAPI\_STAT\_RFLVL\_CHAN** or **DTAPI\_STAT\_RFLVL\_CHAN**.

#### *FreqHzSteps*

This optional argument specifies the step size of the spectrum scan in Hertz.

#### *StartFreqHz*

This optional argument specifies the starting frequency of the spectrum scan in Hertz.

#### *EndFreqHz*

This optional argument specifies the ending frequency of the spectrum scan in Hertz.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The spectrum scan succeeded successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	The spectrum scan is not supported by the attached hardware
DTAPI_E_INVALID_FREQ	The range of frequencies specified with <i>FreqHzSteps</i> , <i>StartFreqHz</i> and <i>EndFreqHz</i> is incompatible (too low or too high) with the tuner on the attached hardware

### Remarks

This function requires exclusive access (**AttachToPort** was called with *Exclusive=true*).

The **SpectrumScan** method is currently only supported by the DTU-236A and the DTU-238.

## DtInpChannel::Tune

Tunes the demodulator to a frequency using the specified demodulation parameters. This function basically combines the functionality of the `SetDemodControl` and `SetTunerFrequency` methods.

```
DTAPI_RESULT DtInpChannel::Tune (
    [in] __int64& FreqHz           // Frequency in hertz
    [in] int ModType,             // Modulation type
    [in] int ParXtra0,           // Extra parameter #0
    [in] int ParXtra1,           // Extra parameter #1
    [in] int ParXtra2           // Extra parameter #2
);

DTAPI_RESULT DtInpChannel::Tune (
    [in] __int64& FreqHz           // Frequency in hertz
    [in] DtDemodPars* pDemodPars // Demodulation parameters
);
```

### Function Arguments

*FreqHz*

Desired tuning frequency (in Hz). See `SetTunerFrequency` for the allowed values.

*ModType, ParXtra0, ParXtra1, ParXtra2*

'Old style' demodulation parameters to use while tuning. Refer to `SetDemodControl` for more details about these parameters.

*pDemodPars*

'New style' demodulation parameters to use while tuning. Refer to `SetDemodControl` for more details about these parameters.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The tuner frequency has been set successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_IN_USE	Another channel object that controls the tuner is currently attached
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_FREQ	The specified frequency is incompatible (too low or too high) with the tuner
DTAPI_E_INVALID_GUARD	Invalid value for guard-interval field
DTAPI_E_INVALID_INTERLVNG	Invalid value for interleaving field
DTAPI_E_INVALID_J83ANNEX DTAPI_E_INVALID_ROLLOFF	Invalid value for J.83 annex
DTAPI_E_INVALID_MODE	Modulation type is incompatible with demodulator
DTAPI_E_INVALID_MODPARS	Invalid demodulation parameters
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_SYMRATE	Invalid value for symbol rate

<b>DTAPI_E_INVALID_T2PROFILE</b>	Invalid value for DVB-T2 profile
<b>DTAPI_E_INVALID_TRANSMODE</b>	Invalid value for transmission-mode field
<b>DTAPI_E_INVALID_USEFRAMENO</b>	Invalid value for use-frame-numbering field
<b>DTAPI_E_NOT_ATTACHED</b>	Channel object is not attached to a hardware function
<b>DTAPI_E_NOT_SUPPORTED</b>	The channel does not include a tuner

## ***DtOutpChannel***

### **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;
```

## DtOutChannel::AttachToPort

Attaches the output-channel object to a specific physical port.

```
DTAPI_RESULT DtOutChannel::AttachToPort(
    [in] DtDevice* pDtDvc,           // Device object
    [in] int Port,                  // Physical port number (1..#ports)
    [in] bool ProbeOnly=false      // Just check whether channel is in use
);
```

### Function Arguments

*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 and DTA-2160, on which the top-most Ethernet port is port #4.

*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. The application shall call the <b>SetFailSafeAlive</b> method on a regular basis to prevent the release of the failsafe relay, which will physically connect the input port to the output port. This is not an error code; It is intended to make the application aware of fail-safe mode.
DTAPI_E_ATTACHED	Channel object is already attached
DTAPI_E_DEVICE	Pointer <i>pDtDvc</i> 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	<i>Port</i> is not an output
DTAPI_E_NO_SUCH_PORT	Invalid port number for this device
DTAPI_E_OUT_OF_MEM	TS-over-IP: Receive FIFO cannot be allocated

### Remarks

## DtOutpChannel::ClearFifo

Clears the contents of the transmit FIFO and sets transmit control to **IDLE**. Also clears the output channel's status flags: transmit-FIFO-underflow flag (**DTAPI\_TX\_FIFO\_UFL**) and transmit-synchronization-error flag (**DTAPI\_TX\_SYNC\_ERR**).

```
DTAPI_RESULT DtOutpChannel::ClearFifo(void)
);
```

### Function Arguments

### 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)**.

## DtOutpChannel::ClearFlags

Clears the *latched* status flag(s).

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

### Function Arguments

*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_CPU_UFL	See <b>GetFlags</b>
DTAPI_TX_DMA_UFL	" "
DTAPI_TX_FIFO_UFL	" "
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 attaching and after **Reset**. A call to **ClearFifo** clears **DTAPI\_TX\_FIFO\_UFL** and **DTAPI\_TX\_SYNC\_ERR**.

## DtOutpChannel::ClearSfnErrors

Clears error flags related to modulator synchronization. See `GetSfnStatus` for a list of error flags.

```
DTAPI_RESULT DtOutpChannel::ClearSfnErrors(void);
```

### Function Arguments

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Flag(s) have been successfully cleared
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
DTAPI_E_SFN_DISABLED	Indicates that the modulator is not operating in a synchronized mode.
DTAPI_E_SFN_NOT_SUPPORTED	Indicates that the output port does not support synchronized operation, as capability <code>DTAPI_CAP_TX_SFN</code> is absent.

## DtOutpChannel::Detach

Detaches output channel object from a hardware function. Frees resources allocated for the output channel.

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

### Function Arguments

#### *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 behavior, 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_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.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Channel object has been detached successfully from the hardware 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

For ASI channels, if packet stuffing is turned on, the output channel keeps transmitting null packets after detaching.

**Detach** may take a long time if **DTAPI\_WAIT\_UNTIL\_SENT** is specified while the FIFO still contains data and transmit control is **IDLE**.

## DtOutpChannel::GetAttribute

Gets the value of an attribute for the port to which this channel is attached.

```
DTAPI_RESULT DtOutpChannel::GetAttribute(  
    [in] int& AttrId,           // Attribute identifier  
    [out] int& AttrValue       // Returned attribute value  
);
```

### Function Arguments

#### *AttrId*

Identifies the attribute that is to be retrieved. Please refer to `DtDevice::GetAttribute` for a list of attributes that can be retrieved.

#### *AttrValue*

Output argument that receives the attribute value.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The attribute value has been retrieved successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	The attribute is not supported for this port

### Remarks

## DtOutpChannel::GetDescriptor

Gets hardware function descriptor for this output channel.

```
DTAPI_RESULT DtOutpChannel::GetDescriptor(  
    [out] DtHwFuncDesc& HwFuncDesc // Hardware function descriptor  
);
```

### Function Arguments

*HwFuncDesc*

Output argument that receives the hardware function descriptor.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The hardware function descriptor been retrieved successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.

### Remarks

## DtOutpChannel::GetExtClkFreq

Gets an estimate of the frequency of the external clock (DTA-102 and DTA-2142 only).

```
DTAPI_RESULT DtOutpChannel::GetExtClkFreq(
    [out] int& ExtClkFreq // Measurement of external-clock frequency
);
```

### Function Arguments

*ExtClkFreq*

Output argument 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  $8 \cdot 204/188$  to obtain the corresponding transport-stream bitrate.

## DtOutpChannel::GetFailsafeAlive

Gets current status of the watchdog that controls the failsafe relay.

```
DTAPI_RESULT DtOutpChannel::GetFailsafeAlive(
[out] bool& Alive           // Are we alive and kicking?
);
```

### Function Arguments

*Alive*

Indicates the current status of the watchdog.

If *Alive* is true, all is fine and the board is operating as normal. The failsafe timeout has not expired and the relay is in normal operational mode: the input port is connected to the input channel and the output channel is connected to the output port.

If *Alive* is false, the watchdog timer has expired before **SetFailsafeAlive** was called. The input-to-output relay is switched to failsafe mode: the input port is connected directly to the output port.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The watchdog status has been retrieved successfully.
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver.
DTAPI_E_CONFIG	The channel is not configured to operate in failsafe mode.
DTAPI_E_NOT_SUPPORTED	The channel is not capable of operating in failsafe mode.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.

### Remarks

## DtOutpChannel::GetFailsafeConfig

Gets configuration info about failsafe mode.

```
DTAPI_RESULT DtOutpChannel::GetFailsafeConfig(
    [out] bool& Enable,           // Failsafe enabled yes/no
    [out] int& Timeout           // Watchdog timeout (in ms)
);
```

### Function Arguments

*Enable*

Operation in failsafe mode has been enabled or disabled (see also **SetFailsafeConfig**).

*Timeout*

Current watchdog 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 to operate in failsafe mode.
DTAPI_E_NOT_SUPPORTED	The channel is not capable of operating in failsafe mode.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.

### Remarks

## DtOutpChannel::GetFifoLoad

Gets the current load of the channel's transmit FIFO.

```
DTAPI_RESULT DtOutpChannel::GetFifoLoad(  
    [out] int& FifoLoad // Load of transmit FIFO in number of bytes  
    [in] int SubChan=0 // Sub-channel  
);
```

### Function Arguments

*FifoLoad*

This output argument is set to the number of bytes in the transmit FIFO.

*SubChan*

Sub-channel selection, used for multi-channel modulation see `DtOutpChannel::SetMultiModConfig`.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The FIFO load has been retrieved successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.

### Remarks

If transmit control is **SEND**, then the value retrieved with `GetFifoLoad` may not be exact: it *approximates* the load of the transmit FIFO.

If a DMA transfer is in progress and/or the transmit control is **SEND**, then every call to `GetFifoLoad` may return a different value.

## DtOutChannel::GetFifoSize

Gets the current size of the channel's transmit FIFO (**GetFifoSize**), or the maximum size supported by the channel (**GetFifoSizeMax**), or a typical size of the transmit FIFO that generally should work well (**GetFifoSizeTyp**).

```
DTAPI_RESULT DtOutChannel::GetFifoSize (
    [out] int& FifoSize          // Size of transmit FIFO in bytes
);
DTAPI_RESULT DtOutChannel::GetFifoSizeMax (
    [out] int& FifoSize          // Maximum size of transmit FIFO in bytes
);
DTAPI_RESULT DtOutChannel::GetFifoSizeTyp (
    [out] int& FifoSize          // Typical size of transmit FIFO in bytes
);
DTAPI_RESULT DtOutChannel::GetMaxFifoSize (
    [out] int& FifoSize          // Maximum size of transmit FIFO in bytes
);
```

### Function Arguments

*FifoSize*

Current, maximum or typical size of the transmit FIFO in number of bytes.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The requested FIFO size has been retrieved successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.

### Remarks

The actual size of the transmit FIFO is adjustable with **SetFifoSize**.

DekTec hardware devices have a transmit FIFO that has a size of at least 8Mbytes.

For modulators **GetFifoSizeMax** returns the size of the hardware FIFO.

## DtOutpChannel::GetFlags

Gets current and latched value of the output channel's status flags.

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

### Function Arguments

#### *Status*

Output argument that receives 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_CPU_UFL	Modulation error caused by low CPU performance.
DTAPI_TX_DMA_UFL	Modulation error caused by low DMA performance.
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	Overflow in hierarchical multiplexing for ISDB-T.
DTAPI_TX_READBACK_ERR	An output pin is forced to an erroneous signal level, e.g. because of a short-circuit (DTA-102 only).
DTAPI_TX_SYNC_ERR	Transmit-FIFO synchronization error. The size of one or more packets mode does not match the transmit mode. This status flag is not used in transmit mode <b>DTAPI_TXMODE_RAW</b> .
DTAPI_TX_TARGET_ERR	The target adapter signals a fault (DTA-102 only).
DTAPI_RX_LINK_ERR	Communication link with the device is broken (DTE-31xx only).
DTAPI_RX_DATA_ERR	Data is lost during transfer to the device (DTE-31xx only).

#### *Latched*

Output argument 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 it is cleared explicitly by **ClearFlag**, or cleared implicitly by one of the following DTAPI-calls: **ClearFifo**, **AttachToPort** 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

## DtOutputChannel::GetIoConfig

Gets the I/O configuration of the physical port attached to the output channel. This is the same function as `DtDevice::GetIoConfig` applied to the physical port corresponding to this channel.

```
DTAPI_RESULT DtOutputChannel::GetIoConfig(
    [in] int Group,           // I/O configuration group
    [out] int& Value         // I/O configuration value
);

DTAPI_RESULT DtOutputChannel::GetIoConfig(
    [in] int Group,           // I/O configuration group
    [out] int& Value,         // I/O configuration value
    [out] int& SubValue      // I/O configuration subvalue
);

DTAPI_RESULT DtOutputChannel::GetIoConfig(
    [in] int Group,           // I/O configuration group
    [out] int& Value,         // I/O configuration value
    [out] int& SubValue,     // I/O configuration subvalue
    [out] __int64& ParXtra0  // Extra parameter #0
);

DTAPI_RESULT DtOutputChannel::GetIoConfig(
    [in] int Group,           // I/O configuration group
    [out] int& Value,         // I/O configuration value
    [out] int& SubValue,     // I/O configuration subvalue
    [out] __int64& ParXtra0, // Extra parameter #0
    [out] __int64& ParXtra1  // Extra parameter #1
);
```

### Function Arguments

*Group*, *Value*, *SubValue*, *ParXtra0*, *ParXtra1*

I/O configuration parameters, see `DtDevice::GetIoConfig`.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	I/O configuration has been retrieved successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
Other result codes	See <code>DtDevice::GetIoConfig</code>

## DtOutpChannel::GetIpPars

Gets IP-related parameters for this channel, as programmed with **SetIpPars**.

```
DTAPI_RESULT DtOutpChannel::GetIpPars(  
    [in] DtIpPars* pIpPars // Receives the TS-over-IP parameters  
);
```

### Function Arguments

*pIpPars*

Receives the TS-over-IP parameters. The user must have allocated the **DtIpPars** structure.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The TS-over-IP parameters have been retrieved successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
DTAPI_E_NOT_SUPPORTED	Channel is not a TS-over-IP channel.

### Remarks

## DtOutpChannel::GetModControl

For modulators: gets current modulation-control parameters.

```
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
    [out] void*& pXtraPars      // More extra parameters
);
```

### Function Arguments

*ModType*

Output argument that receives the modulation type. See **SetModControl1** for a list of applicable values.

*ParXtra0, ParXtra1, ParXtra2*

Extra modulation parameters. See **SetModControl1** for a list of applicable values.

*pXtraPars*

Extra parameters that are stored in a struct (they do not fit in *ParXtra0 .. ParXtra2*). Extra parameters are used for the following modulation types ATSC 3.0, CMMB, ISDB-S, ISDB-T, DVB-C2, DVB-T and DVB-T2.

### 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 output channel is not a modulator.

### Remarks

## DtOutpChannel::GetOutputLevel

Gets 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  
);
```

### Function Arguments

*LeveldBm*

Output level expressed in units of 0.1 dBm (e.g. -30 →  $-30 \times 0.1 = -3\text{dBm}$ ).

### 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 adjustable output level.

### Remarks

## DtOutpChannel::GetRfControl

Gets upconverter parameters for devices with on-board RF upconverter.

```
DTAPI_RESULT DtOutpChannel::GetRfControl (
    [in] __int64& RfRate,           // RF frequency in Hz
    [out] int& LockStatus          // Lock status of RF PLL
);
```

### Function Arguments

#### *RfRate*

Output arguments that is set to the current carrier frequency as programmed into the RF upconverter, expressed in Hertz.

The RF frequency returned in *RfRate* may be different from the frequency programmed with **SetRfControl** because of rounding to the RF step size.

#### *LockStatus*

Output argument that is an OR of the following flags. In the normal operational state all RF PLLs are in lock. The DTA-111, DTA-112 and DTA-115 have three PLLs, the other cards have a single PLL. If *LockStatus* is zero, none of the PLLs is in lock.

Value	Meaning
DTAPI_RFPLL_LOCK1	The first RF PLL is in lock.
DTAPI_RFPLL_LOCK2	The second RF PLL is in lock (DTA-111/112/115)
DTAPI_RFPLL_LOCK3	The third RF PLL is in lock (DTA-111/112/115)

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The upconverter 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 upconverter.

### Remarks

## DtOutpChannel::GetSfnMaxTimeDiff

Retrieves the maximum allowed time difference between the timestamps associated with the samples and the time at which they are actually transmitted. If the time difference exceeds this maximum limit, one of the modulator-synchronization error flags will be set. For more information on these error flags, please refer to the **GetSfnStatus** method.

```
DTAPI_RESULT DtOutpChannel::GetSfnMaxTimeDiff(
    [out] int& TimeDiff // Maximum allowed time difference
);
```

### Function Arguments

*TimeDiff*

Receives the maximum allowed time difference in nanoseconds.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Maximum time difference has been retrieved successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
DTAPI_E_SFN_DISABLED	Indicates that the modulator is not operating in a synchronized mode.
DTAPI_E_SFN_NOT_SUPPORTED	Indicates that the output port does not support synchronized operation, as capability <b>DTAPI_CAP_TX_SFN</b> is absent.

## DtOutpChannel::GetSfnMinTriggerModeDelay

Applies to DTA-2116 only.

This function provides the minimum allowed trigger delay for a modulator that is configured to Trigger Mode. The trigger delay is the time between an edge of the trigger signal on the 1pps input and the moment that the RF signal appears on the output. The minimum trigger delay is dependent on the I/Q sample rate, which is an input parameter. The function computes the minimum trigger delay in nanoseconds and returns it as an output parameter. The trigger delay can be set using the *TimeOffset* parameter in the `DtOutpChannel::SetSfnControl` method.

```
DTAPI_RESULT DtOutpChannel::GetSfnMinTriggerModeDelay (
    [in] DtFractionInt SampleRate // Sample rate in samples per second
    [out] int& DelayNs           // Minimum trigger delay in nanoseconds
);
```

### Function Arguments

*SampleRate*

The I/Q sample rate in samples per second to calculate the minimum trigger delay for.

*DelayNs*

Receives the minimum trigger delay that can be specified for parameter *TimeOffset* of the `DtOutpChannel::SetSfnControl` method.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The minimum trigger delay time has been retrieved successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
DTAPI_E_SFN_NOT_SUPPORTED	Indicates that the output port does not support synchronized operation, as capability <code>DTAPI_CAP_TX_SFN</code> is absent.

## DtOutpChannel::GetSfnModDelay

Calculates and returns the delay between the moment data is written to the output channel and when the modulated data is actually generated on the output. The computed delay represents the minimum amount of time that data must be written before it can be output, but it's essential to add an additional margin to ensure robustness against scheduling delays. It's important to note that this delay can only be computed if the Transmit Control is either HOLD or SEND, not IDLE. This is because certain parameters necessary for the calculation are not known in the IDLE state.

```
DTAPI_RESULT DtOutpChannel::GetSfnModDelay(
    [out] int& ModDelay           // Minimum write-to-output delay
);
```

### Function Arguments

*ModDelay*

Receives the delay of the modulator in milliseconds.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Modulator delay has been retrieved successfully.
DTAPI_E_IDLE	Modulator delay is not available when in IDLE.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
DTAPI_E_SFN_DISABLED	Indicates that the modulator is not operating in a synchronized mode.
DTAPI_E_SFN_NOT_SUPPORTED	Indicates that the output port does not support synchronized operation, as capability DTAPI_CAP_TX_SFN is absent.

## DtOutputChannel::GetSfnStatus

Gets the current value of the status and error flags, for modulators that are synchronized to a 10MHz and 1pps signal in Single Frequency Network (SFN) mode or triggered operation.

The function returns the current status and errors related to SFN or triggered operation, including any synchronization issues that may have occurred. This information can be useful for monitoring the synchronization status of the modulator and diagnosing any problems that may occur during operation.

```
DTAPI_RESULT DtOutputChannel::GetSfnStatus (
    [out] int& Status,           // Modulator synchronization status flags
    [out] int& Errors           // Modulator synchronization errors
);
```

### Function Arguments

#### Status

Receives the status flags related to modulator synchronization.

Value	Meaning
DTAPI_SF_N_IN_SYNC	Indicates whether the modulator is properly synchronized in SFN operation. Specifically, the flag is set if the first I/Q sample in an I/Q packet is transmitted at the timestamp indicated in the packet. Conversely, the flag is cleared when the modulator is initialized for starting SFN operation or when an I/Q sample cannot be transmitted at its corresponding timestamp.

#### Error

Receives the error flags related to modulator synchronization.

Value	Meaning
DTAPI_SF_N_TOO_EARLY_ERR	Indicates that an I/Q sample with an associated timestamp had to be transmitted earlier than the time indicated by its timestamp.
DTAPI_SF_N_TOO_LATE_ERR	Indicates that an I/Q sample had to be transmitted later than the time indicated by its timestamp. This can be caused by various factors, such as errors in the stream, insufficient CPU resources, or FIFO underflow.
DTAPI_SF_N_ABSTIME_ERR	Indicates that modulator synchronization could not be achieved due to issues with the timestamp embedded in the stream. Specifically, the timestamp may deviate too much from the current time, be invalid, or lie in the past.
DTAPI_SF_N_DISCTIME_ERR	Indicates that a discontinuity in the timestamps embedded in the stream was detected.
DTAPI_SF_N_NOTIME_ERR	Indicates that timestamps were expected in the stream, but were not present.
DTAPI_SF_N_START_ERR	Indicates that, when operating in Trigger Mode and a trigger edge was received, the transmission of the first sample could not start on time.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Status and error flags have been retrieved successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
DTAPI_E_SF_N_DISABLED	Indicates that the modulator is not operating in a synchronized mode.
DTAPI_E_SF_N_NOT_SUPPORTED	Indicates that the output port does not support synchronized operation, as capability DTAPI_CAP_TX_SF_N is absent.

## DtOutpChannel::GetSpiClk

DTA-2142 only. Gets the DVB-SPI clock frequency in case the SPI channel is operating with a fixed clock (I/O configurations **SPIFIXEDCLK**, **SPISER8B**, **SPISER10B**).

```
DTAPI_RESULT DtOutpChannel::GetSpiClk(  
    [in] int& SpiClk           // Fixed SPI clock  
);
```

### Function Arguments

*SpiClk*

Receives the frequency of the fixed DVB-SPI clock in Hertz.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The TS-over-IP parameters have been applied successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
DTAPI_E_INVALID_MODE	The SPI clock is not fixed (SPI mode is <b>SPIDVBMODE</b> ).
DTAPI_E_NOT_SUPPORTED	Not a DVB-SPI channel.

### Remarks

## DtOutpChannel::GetTargetId

Gets the target-adapter identifier (DTA-102 only).

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

### Function Arguments

#### *Present*

Output argument 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 argument that is set to an integer value that uniquely identifies the target adapter. Please refer to the DTA-102 data sheet 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	Target-adapter identifier 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::GetTsRateBps

Gets the current transport-stream rate.

```
DTAPI_RESULT DtOutpChannel::GetTsRateBps (
    [out] int& TsRate           // transport-stream rate in bps
);

DTAPI_RESULT DtOutpChannel::GetTsRateBps (
    [out] DtFractionInt& TsRate // transport-stream rate in bps
);
```

### Function Arguments

*TsRate*

Output argument that is set to the current transport-stream rate expressed in bits per second. If an external clock is used, or the bitrate is locked to an input, then result code **DTAPI\_E\_INVALID\_TSRATESEL** is returned.

### Result

DTAPI_RESULT	Meaning
<b>DTAPI_OK</b>	transport-stream rate has been read successfully.
<b>DTAPI_E_DEV_DRIVER</b>	Unclassified failure in device driver.
<b>DTAPI_E_INVALID_TSRATESEL</b>	The current TS-rate selection I/O configuration does not allow retrieval of the transport-stream rate.
<b>DTAPI_E_NOT_ATTACHED</b>	Channel object is not attached to a hardware function.

### Remarks

For a discussion of transport-stream rate vs. transmit-clock rate, refer to **SetTsRateBps**.

## DtOutpChannel::GetTxControl

Gets the current value of transmit control.

```
DTAPI_RESULT DtOutpChannel::GetTxControl (  
    [out] int& TxControl // Transmit control  
);
```

### Function Arguments

*TxControl*

Refer to `SetTxControl` for a description of the different values for transmit control.

### 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

Gets the current transmit mode and null-packet stuffing mode.

```
DTAPI_RESULT DtOutpChannel::GetTxMode(  
    [out] int& TxMode,           // Transmit mode  
    [out] int& StuffMode        // Null-packet stuffing on/off  
);
```

### Function Arguments

*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::LedControl

Takes direct control of the channel's status LED, or let the hardware drive the LED.

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

### Function Arguments

*LedControl*

Value that controls the 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	Channel object is not attached to a hardware function.
DTAPI_E_NOT_SUPPORTED	The device does not have a general-status LED.

### Remarks

## DtOutpChannel::Reset

Resets the output channel.

```
DTAPI_RESULT DtOutpChannel::Reset (
    [in] int ResetMode          // DTAPI_FIFO_RESET or DTAPI_FULL_RESET
);
```

### Function Arguments

*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: <ul style="list-style-type: none"> <li>• Data transfers and packet transmission are halted instantaneously.</li> <li>• All data pending in the transmit FIFO is discarded.</li> <li>• Transmit-control state is reset to DTAPI_TXCTRL_IDLE.</li> <li>• Transmit-FIFO underflow flag is cleared.</li> </ul>
DTAPI_FULL_RESET	Full reset: <ul style="list-style-type: none"> <li>• All actions for DTAPI_FIFO_RESET, plus:</li> <li>• transport-stream rate is reset to zero (except for ISDB-T and OFDM modulation on DTA-110T)</li> </ul>

### 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 <i>ResetMode</i> 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

Sets channel-modelling parameters. This function may only be called while transmit control is **IDLE**.

```
DTAPI_RESULT DtOutpChannel::SetChannelModelling(
    [in] Bool CmEnable,           // Enable/disable channel modelling
    [in] DtCmPars& CmPars       // Channel modelling parameters
);
```

### Function Arguments

*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 <b>CmPars</b> exceeds the maximum number of supported 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::SetCustomRollOff

DTA-2107 only. Sets the FIR-filter coefficients of the root-raised-cosine (RRC) channel filter to construct a custom roll-off factor. The user has to compute the filter coefficients himself.

```
DTAPI_RESULT DtOutpChannel::SetCustomRollOff(
    [in] Bool Enable,           // Enable/disable custom roll-off filter
    [in] DtFilterPars& Filter  // Custom roll-off filter parameters
);
```

### Function Arguments

#### *Enable*

Enable or disable the channel filter with custom roll-off factor.

#### *Filter*

Filter coefficients to be programmed in the hardware.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Channel-modelling parameters have been applied successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
DTAPI_E_NOT_SUPPORTED	The output channel does not support a custom roll-off filter.

### Remarks

The filter does not necessarily need to be an RRC filter. Any set of filter coefficients can be programmed.

## DtOutpChannel::SetFailsafeAlive

Resets the watchdog timer for operation in failsafe mode. Failing to call this method within the time-out set with `SetFailsafeConfig()` will result in the release of the on-board relay so that the output port is connected directly with the input port.

```
DTAPI_RESULT DtOutpChannel::SetFailsafeAlive();
```

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Watchdog has been triggered successfully.
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver.
DTAPI_E_CONFIG	The channel is not configured to operate in failsafe mode.
DTAPI_E_NOT_SUPPORTED	The channel is not capable of operating in failsafe mode.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.

### Remarks

## DtOutChannel::SetFailsafeConfig

Configures failsafe mode.

```
DTAPI_RESULT DtOutChannel::SetFailsafeConfig(
    [in] bool Enable,           // Enable/disable failsafe mode
    [in] int Timeout=0        // Watchdog timeout (in ms)
);
```

### Function Arguments

#### *Enable*

Enable/disable the failsafe mode and switch to input or failsafe output.

If *Enable* is false, the output channel is connected directly to the input channel.

If *Enable* is true, the output channel will start operating in failsafe mode. The output becomes a failsafe output and the watchdog timer is started. The user application shall call **SetFailsafeAlive** repeatedly within the watchdog timeout period. If the user application is too late (e.g. because it has crashed), the watchdog times out and the failsafe relay is released so that the output is connected directly to the input.

#### *Timeout*

Specifies the watchdog timeout period in ms.

The timeout value can only be a multiple of 20ms. If the value is not a multiple of 20ms, it will be rounded downwards to the closest multiple of 20ms. Setting *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 to operate in failsafe mode.
DTAPI_E_NOT_SUPPORTED	The channel is not capable of operating in failsafe mode.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.

### Remarks

## DtOutpChannel::SetFifoSize

Sets the size the transmit FIFO to a specified value (`SetFifoSize`), or to the maximum value supported by the channel (`SetFifoSizeMax`), or to a typical value (`SetFifoSizeTyp`).

The FIFO size can only be changed if transmit control is **IDLE**.

```
DTAPI_RESULT DtOutpChannel::SetFifoSize(
    [in] int FifoSize           // Size of transmit FIFO in bytes
);
DTAPI_RESULT DtOutpChannel::SetFifoSizeMax(void);
DTAPI_RESULT DtOutpChannel::SetFifoSizeTyp(void);
```

### Function Arguments

*FifoSize*

Requested 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.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The size of the transmit FIFO has been set successfully.
DTAPI_E_IN_USE	The FIFO size cannot be changed because transmission-control state is <b>DTAPI_TXCTRL_HOLD</b> or <b>DTAPI_TXCTRL_SEND</b> .
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 `write`) and transmission of that data.

## DtOutpChannel::SetIoConfig

Sets the I/O configuration of the physical port attached to the output channel. This is the same function as `DtDevice::SetIoConfig` applied to the physical port corresponding to this channel.

```
DTAPI_RESULT DtOutpChannel::SetIoConfig(
    [in] int Group,           // I/O configuration group
    [in] int Value,         // I/O configuration value
    [in] int SubValue=-1,   // I/O configuration subvalue
    [in] __int64 ParXtra0=-1, // Extra parameter #0
    [in] __int64 ParXtra1=-1 // Extra parameter #1
);
```

### Function Arguments

*Group, Value, SubValue, ParXtra0, ParXtra1*

I/O configuration parameters, see `DtDevice::SetIoConfig`.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	I/O configuration has been set successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
Other result codes	See <code>DtDevice::SetIoConfig</code>

## DtOutpChannel::SetIpPars

Sets IP-related parameters for the transmission of a TS-over-IP stream. The IP parameters can only be set if transmit control is **IDLE**.

```
DTAPI_RESULT DtOutpChannel::SetIpPars (
    [in] DtIpPars* IpPars           // TS-over-IP parameters
);
```

### Function Arguments

#### *IpPars*

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

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The TS-over-IP parameters have been applied successfully.
DTAPI_E_DST_MAC_ADDR	The IP parameters cannot be applied because MAC address of destination cannot be determined. Most likely the destination address currently is invalid. Check if you can reach the destination IP address using the ping command on the console.
DTAPI_E_IN_USE	The parameters cannot be changed because the channel is busy. Transmit control shall be switched back to <b>IDLE</b> first.
DTAPI_E_INVALID_ARG	The value of one of the TS-over-IP parameters is invalid.
DTAPI_E_INVALID_FECMODE	The <i>m_FecMode</i> parameter is invalid.
DTAPI_E_INVALID_FEC_MATRIX	The <i>m_FecNumCols</i> / <i>m_FecNumRows</i> are invalid.
DTAPI_E_INVALID_FLAGS	The <i>m_Flags</i> parameter is invalid.
DTAPI_E_INVALID_MODE	The <i>m_Mode</i> parameter is invalid.
DTAPI_E_INVALID_PROFILE	The <i>m_Profile</i> in the <i>m_IpProfile</i> member is invalid.
DTAPI_E_INVALID_PROTOCOL	The <i>m_Protocol</i> parameter is invalid or not valid for the current <i>m_FecMode</i> or <i>m_VideoStandard</i> .
DTAPI_E_INVALID_VIDEOSTD	The <i>m_VideoStandard</i> in the <i>m_IpProfile</i> member is invalid.
DTAPI_E_IPV6_NOT_SUPPORTED	IPv6 is not supported on this operating system.
DTAPI_E_NO_ADAPTER_IP_ADDR	The network IP address could not be retrieved. Check the network driver IP protocol settings.
DTAPI_E_NO_LINK	The IP parameters cannot be applied because the link is down. Check network cable and speed settings.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.

<code>DTAPI_E_NOT_SUPPORTED</code>	Channel is not a TS-over-IP channel.
<code>DTAPI_E_NW_DRIVER</code>	The IP address could not be retrieved from the network driver. Check network driver / network connection.
<code>DTAPI_E_NWAP_DRIVER</code>	An error occurred using the Advanced Protocol Driver.
<code>DTAPI_E_VLAN_NOT_FOUND</code>	The VLAN with the given ID is not found.

## Remarks

`SetIpPars` should be called before transmit control is set to **HOLD** or **SEND**.

After the initial call to `SetIpPars`, parameters can be changed again, but only when transmit control is **IDLE**.

## DtOutpChannel::SetModControl

Sets modulation-control parameters for modulator channels. There are eight overloads, six for specific modulation types (CMMB, DVB-C2, DVB-T2, ISDB-S, ISDB-T and IQ-direct), one for the other modulation types and one for setting the DVB channel identification for satellite signals.

The ISDB-T overload can be used to let DTAPI perform hierarchical multiplexing. For ISDB-T without hierarchical multiplexing the first overload of `SetModControl` can be used. In that case the input of the modulator shall already be multiplexed and consist of 204-byte TMCC encoded packets.

If `SetFifoSizeTyp` has been called, `SetModControl` may change the size of the transmit FIFO to an appropriate value for the selected modulation type.

```
// Overload #1 - To be used for all modulation modes except CMMB, DVB-CID,
//             DVB-C2, DVB-T2, ISDB-S 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] DtAtsc3StltpPars& A3StltpPars // ATSC 3.0 STLTP parameters
);
// Overload #3 - To be used for CMMB
DTAPI_RESULT DtOutpChannel::SetModControl (
    [in] DtCmmbPars& CmmbPars // CMMB modulation parameters
);
// Overload #4 - To be used for DRM(+)
DTAPI_RESULT DtOutpChannel::SetModControl (
    [in] DtDrmPars& DrmPars // DRM(+) modulation parameters
);
// Overload #5 - To be used for DVB-C2
DTAPI_RESULT DtOutpChannel::SetModControl (
    [in] DtDvbC2Pars& DvbC2Pars // DVB-C2 modulation parameters
);
// Overload #6 - To be used for DVB-CID
DTAPI_RESULT DtOutpChannel::SetModControl (
    [in] DtDvbCidPars& DvbCidPars // DVB channel identification parameters
);
// Overload #6 - To be used for DVB-T
DTAPI_RESULT DtOutpChannel::SetModControl (
    [in] DtDvbTPars& DvbTPars // DVB-T modulation parameters
);
// Overload #7 - To be used for DVB-T2
DTAPI_RESULT DtOutpChannel::SetModControl (
    [in] DtDvbT2Pars& DvbT2Pars // DVB-T2 modulation parameters
);
// Overload #8 - To be used for ISDB-S with hierarchical multiplexing
DTAPI_RESULT DtOutpChannel::SetModControl (
    [in] DtIsdbsPars& IsdbsPars // ISDB-S modulation parameters
);
// Overload #9 - To be used for ISDB-S3 with hierarchical multiplexing
DTAPI_RESULT DtOutpChannel::SetModControl (
    [in] DtIsdbS3Pars& IsdbS3Pars // ISDB-S3 modulation parameters
);
// Overload #10 - To be used for ISDB-T with hierarchical multiplexing
```

```
DTAPI_RESULT DtOutpChannel::SetModControl(  
    [in] DtIsdbtPars& IsdbtPars    // ISDB-T modulation parameters  
);  
// Overload #11 - To be used for IQ-direct  
DTAPI_RESULT DtOutpChannel::SetModControl(  
    [in] DtIqDirectPars& IqDirectPars    // IQ-direct modulation parameters  
);
```

## Function Arguments

*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**.

*DvbC2Pars*

DVB-C2 modulation parameters; see description of **class DtDvbC2Pars** in document: *DTAPI Reference – DVB-C2+T2 Multi-PLP Extensions*.

*DvbCidPars*

DVB channel identification for satellite (DVB-S2) signals parameters; see description of **class DtDvbCidPars**.

*DvbTPars*

DVB-T modulation parameters; see description of **class DtDvbTPars**.

*DvbT2Pars*

DVB-T2 modulation parameters; see description of **class DtDvbT2Pars** in document: *DTAPI Reference – DVB-C2+T2 Multi-PLP Extensions*.

*IsdbsPars*

ISDB-S modulation parameters for hierarchical multiplexing; see description of **class DtIsdbsPars**.

**Note:** For ISDB-S, the current version of DTAPI supports multiplexing of a single TS only.

*IsdbS3Pars*

ISDB-S3 modulation parameters for hierarchical multiplexing; see description of **class DtIsdbS3Pars**.

**Note:** For ISDB-S3, the current version of DTAPI supports 5810-byte TLV-data packets only.

*IsdbtPars*

ISDB-T modulation parameters for hierarchical multiplexing; see description of **class DtIsdbtPars**.

*IqDirectPars*

IQ-direct modulation parameters; see description of **class DtIqDirectPars**.

## Detailed Parameter Descriptions

Page	Modulation Type
398	Overview
400	ADTB-T
402	ATSC
150	CMMB
403	DAB
404	DTMB
407	DVB-S
408	DVB-S.2
410	DVB-S.2 L.3 baseband frames

Page	Modulation Type
411	DVB-S.2X
413	DVB-S.2X L.3 baseband frames
414	DVB-T / DVB-H
416	IQ-DIRECT
162, 417	ISDB-S
167, 418	ISDB-T
420	QAM
421	DVB-T2 T2-MI

The DVB-C2 and DVB-T2 parameters are described in a separate document: *DTAPI Reference – DVB-C2+T2 Multi-PLP Extensions*.

## Modulation Types

*ModType*

Modulation type:

### L-Band

ModType	Meaning	Required Capability	
DTAPI_MOD_DVBS_QPSK	DVB-S, QPSK	DTAPI_CAP_TX_DVBS	
DTAPI_MOD_DVBS2_16APSK	DVB-S.2, 16-APSK	DTAPI_CAP_TX_S2APSK	
DTAPI_MOD_DVBS2_32APSK	DVB-S.2, 32-APSK		
DTAPI_MOD_DVBS2_8PSK	DVB-S.2, 8-PSK	DTAPI_CAP_TX_DVBS2	
DTAPI_MOD_DVBS2_L3	DVB-S.2 L.3 baseband frame modulation		
DTAPI_MOD_DVBS2_QPSK	DVB-S.2, QPSK		
DTAPI_MOD_DVBS2X_128APSK	DVB-S.2X, 128-APSK	DTAPI_CAP_TX_DVBS2X	
DTAPI_MOD_DVBS2X_16APSK_L	DVB-S.2X, 16-APSK-L		
DTAPI_MOD_DVBS2X_256APSK	DVB-S.2X, 256-APSK		
DTAPI_MOD_DVBS2X_256APSK_L	DVB-S.2X, 256-APSK-L		
DTAPI_MOD_DVBS2X_32APSK_L	DVB-S.2X, 32-APSK		
DTAPI_MOD_DVBS2X_32APSK_L	DVB-S.2X, 32-APSK-L		
DTAPI_MOD_DVBS2X_64APSK	DVB-S.2X, 64-APSK		
DTAPI_MOD_DVBS2X_8APSK_L	DVB-S.2X, 8-APSK-L		
DTAPI_MOD_DVBS2X_BPSK_S_VLSNR	DVB-S.2X, BPSK-S very low SNR		
DTAPI_MOD_DVBS2X_BPSK_S_VLSNR	DVB-S.2X, BPSK-S very low SNR		
DTAPI_MOD_DVBS2X_BPSK_VLSNR	DVB-S.2X, BPSK very low SNR		
DTAPI_MOD_DVBS2X_QPSK_VLSNR	DVB-S.2X, QPSK very low SNR		
DTAPI_MOD_DVBS2X_32APSK_L	DVB-S.2X, 32-APSK-L		
DTAPI_MOD_DVBS2X_L3	DVB-S.2X L.3 baseband frame modulation		
DTAPI_MOD_ISDBS	ISDB-S		DTAPI_CAP_TX_ISDBS

VHF\* / UHF

ModType	Meaning	Required Capability
DTAPI_MOD_ADTBT	ADTB-T	DTAPI_CAP_TX_DTMB
DTAPI_MOD_ATSC	ATSC VSB	DTAPI_CAP_TX_ATSC
DTAPI_MOD_DAB	DAB+/DMB	DTAPI_CAP_TX_DAB
DTAPI_MOD_DMBTH	DMB-T/H	DTAPI_CAP_TX_DTMB
DTAPI_MOD_DVBT	DVB-T / DVB-H	DTAPI_CAP_TX_DVBT
DTAPI_MOD_IQDIRECT	Direct I/Q sample transmission	DTAPI_CAP_TX_IQ
DTAPI_MOD_QAM16	16-QAM	DTAPI_CAP_TX_QAM_A or DTAPI_CAP_TX_QAM_B or DTAPI_CAP_TX_QAM_C
DTAPI_MOD_QAM32	32-QAM	
DTAPI_MOD_QAM64	64-QAM	
DTAPI_MOD_QAM128	128-QAM	
DTAPI_MOD_QAM256	256-QAM	
DTAPI_MOD_T2MI	T2-MI modulation	DTAPI_CAP_TX_DVBT2

## 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_FN420	PN420: Frame header 1 (420 symbols 55.6 $\mu$ s)
DTAPI_MOD_DTMB_FN595	PN595: Frame header 2 (595 symbols 78.7 $\mu$ s)
DTAPI_MOD_DTMB_FN945	PN945: Frame header 3 (945 symbols 125 $\mu$ s)
DTAPI_MOD_DTMB_FN_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	Required Capability
DTAPI_MOD_ATSC	ATSC	DTAPI_CAP_TX_ATSC

### *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 : DAB**

The DAB modulator doesn't work with transport streams but instead expects ETI(NI, G.703) streams with a constant bitrate of 2.048Mbps.

*ParXtra0, ParXtra1, ParXtra2*

Not used in DAB 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, FEC frame size, roll-off and constellation shape.

### 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

### Roll-off

Value	Meaning
DTAPI_MOD_ROLLOFF_AUTO	Default roll-off
DTAPI_MOD_ROLLOFF_NONE	No roll-off
DTAPI_MOD_ROLLOFF_20	20% roll-off
DTAPI_MOD_ROLLOFF_25	25% roll-off
DTAPI_MOD_ROLLOFF_35	35% roll-off
DTAPI_MOD_ROLLOFF_MSK	AND-mask for this field

### Constellation amplitude

Value	Meaning
DTAPI_MOD_S2_CONST_AUTO	Default constellation amplitude
DTAPI_MOD_S2_CONST_E_1	E=1; Average symbol energy is constant (only allowed for DVB-S2 16- and 32-APSK; default)
DTAPI_MOD_S2_CONST_R_1	R=1; Radius of outer ring is constant (only allowed for DVB-S2 16- and 32-APSK)
DTAPI_MOD_S2_CONST_MSK	AND-mask for this field

### ParXtra2

Physical layer scrambling initialization sequence “n”, aka “Gold code”.

### Modulation Mode : DVB-S.2 L.3 Baseband Frame

When DVB-S.2 L.3 baseband frame modulation is used **DTAPI** expects DVB-S2 baseband frames with an additional L.3 Header. See DTAPI Manual – Overview and Data Formats.pdf for more details. **DTAPI** decodes this information and performs the DVB-S2 modulation.

*ParXtra0*

Extra modulation parameter #0 specifies the symbol rate (in bd).

*ParXtra1*

Extra modulation parameter #1 encodes the roll-off.

#### Roll-off

Value	Meaning
DTAPI_MOD_ROLLOFF_AUTO	Default roll-off
DTAPI_MOD_ROLLOFF_NONE	No roll-off
DTAPI_MOD_ROLLOFF_20	20% roll-off
DTAPI_MOD_ROLLOFF_25	25% roll-off
DTAPI_MOD_ROLLOFF_35	35% roll-off
DTAPI_MOD_ROLLOFF_MSK	AND-mask for this field

*ParXtra2*

Not used.

## Modulation Mode : DVB-S.2X

*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
	DVB-S.2X specific code rates
DTAPI_MOD_1_5	Code rate 1/5
DTAPI_MOD_2_9	Code rate 2/9
DTAPI_MOD_11_45	Code rate 11/45
DTAPI_MOD_4_15	Code rate 4/15
DTAPI_MOD_13_45	Code rate 13/45
DTAPI_MOD_14_45	Code rate 14/45
DTAPI_MOD_9_20	Code rate 9/20
DTAPI_MOD_7_15	Code rate 7/15
DTAPI_MOD_8_15	Code rate 8/15
DTAPI_MOD_11_20	Code rate 11/20
DTAPI_MOD_5_9	Code rate 5/9
DTAPI_MOD_26_45	Code rate 26/45
DTAPI_MOD_28_45	Code rate 28/45
DTAPI_MOD_23_36	Code rate 23/36
DTAPI_MOD_29_45	Code rate 29/45
DTAPI_MOD_31_45	Code rate 31/45
DTAPI_MOD_25_36	Code rate 25/36
DTAPI_MOD_32_45	Code rate 32/45
DTAPI_MOD_13_18	Code rate 13/18

DTAPI_MOD_11_15	Code rate 11/15
DTAPI_MOD_7_9	Code rate 7/9
DTAPI_MOD_77_90	Code rate 77/99

*ParXtral*

Extra modulation parameter #1 encodes pilots yes/no, FEC frame size, roll-off and constellation shape.

**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, Medium or Short FECFRAME**

Value	Meaning
DTAPI_MOD_S2_SHORTFRM	Short FECFRAME (16.200 bits)
DTAPI_MOD_S2_MEDIUMFRM	Medium FECFRAME (32.400 bits)
DTAPI_MOD_S2_LONGFRM	Long FECFRAME (64.800 bits)
DTAPI_MOD_S2_FRM_MSK	AND-mask for this field

**Roll-off**

Value	Meaning
DTAPI_MOD_ROLLOFF_AUTO	Default roll-off
DTAPI_MOD_ROLLOFF_NONE	No roll-off
DTAPI_MOD_ROLLOFF_5	5% roll-off
DTAPI_MOD_ROLLOFF_10	10% roll-off
DTAPI_MOD_ROLLOFF_15	15% roll-off
DTAPI_MOD_ROLLOFF_20	20% roll-off
DTAPI_MOD_ROLLOFF_25	25% roll-off
DTAPI_MOD_ROLLOFF_35	35% roll-off
DTAPI_MOD_ROLLOFF_MSK	AND-mask for this field

**Constellation shape**

Value	Meaning
DTAPI_MOD_S2_CONST_AUTO	Default constellation shape
DTAPI_MOD_S2_CONST_E_1	E=1; Average symbol energy is constant
DTAPI_MOD_S2_CONST_MSK	AND-mask for this field

*ParXtra2*

Physical layer scrambling initialization sequence "n", aka "Gold code".

### Modulation Mode : DVB-S.2X L.3 Baseband Frame

When DVB-S.2X L.3 baseband frame modulation is used **DTAPI** expects DVB-S2X baseband frames with an addition L.3 Header. See DTAPI Manual – Overview and Data Formats.pdf for more details. **DTAPI** decodes this information and performs the DVB-S2X modulation.

*ParXtra0*

Extra modulation parameter #0 specifies the symbol rate (in bd).

*ParXtra1*

Extra modulation parameter #1 encodes the roll-off.

**Roll-off**

Value	Meaning
DTAPI_MOD_ROLLOFF_AUTO	Default roll-off
DTAPI_MOD_ROLLOFF_NONE	No roll-off
DTAPI_MOD_ROLLOFF_5	5% roll-off
DTAPI_MOD_ROLLOFF_10	10% roll-off
DTAPI_MOD_ROLLOFF_15	15% roll-off
DTAPI_MOD_ROLLOFF_20	20% roll-off
DTAPI_MOD_ROLLOFF_25	25% roll-off
DTAPI_MOD_ROLLOFF_35	35% roll-off
DTAPI_MOD_ROLLOFF_MSK	AND-mask for this field

*ParXtra2*

Not used.

## 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-Signaling.

#### 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	1/4
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 Signaling Service Indication

Value	Meaning
DTAPI_MOD_DVBT_ENA4849	Enable DVB-H signaling indication bits s48 and s49. <i>Note: If ParXtra2 is set to -1, s48 and s49 are disabled, too</i>
DTAPI_MOD_DVBT_DIS4849	Disable DVB-H signaling bits by setting TPS length field to 31, or 23 when <i>ParXtra2</i> is set to -1
DTAPI_MOD_DVBT_4849_MSK	AND mask

#### DVB-H Signaling – 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 Signaling – 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
DTAPI_MOD_INTERPOL_RAW	Raw mode (e.g. DTA-2115)

### *ParXtra1*

Extra modulation parameter #1 specifies the sample rate used by hardware to clock out I and Q samples.

### *ParXtra2*

Extra modulation parameter #2 is the OR of values for the following fields: Roll-off and IQ-sample packing.

#### Roll-off

Value	Meaning
DTAPI_MOD_ROLLOFF_AUTO	Default roll-off
DTAPI_MOD_ROLLOFF_NONE	No roll-off
DTAPI_MOD_ROLLOFF_5	5% roll-off
DTAPI_MOD_ROLLOFF_10	10% roll-off
DTAPI_MOD_ROLLOFF_15	15% roll-off
DTAPI_MOD_ROLLOFF_20	20% roll-off
DTAPI_MOD_ROLLOFF_25	25% roll-off
DTAPI_MOD_ROLLOFF_35	35% roll-off
DTAPI_MOD_ROLLOFF_MSK	AND-mask for this field

#### IQ-sample packing

Specifies the size of the IQ-sample fields which are transferred over the PCI-Express bus.

Value	Meaning
DTAPI_MOD_IQPCCK_AUTO	Best IQ-sample-packing
DTAPI_MOD_IQPCCK_NONE	No IQ-sample-packing
DTAPI_MOD_IQPCCK_10B	IQ-samples packed into 10 bit
DTAPI_MOD_IQPCCK_12B	IQ-samples packed into 12 bit
DTAPI_MOD_IQPCCK_MSK	AND-mask for this field

## Remarks

IQ-direct modulation parameters can also be set through `class DtIqDirectPars`.

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 (not dependent on IQ-sample packing).

### **Modulation Mode : ISDB-S**

If ISDB-S modulation is selected using `SetModControl(DTAPI_MOD_ISDBS, -1, -1, -1)`, no further parameters are required and **DTAPI** expects an 188-byte transport stream with TMCC information encoded in the SYNC bytes. **DTAPI** will decode the TMCC information for obtaining the required modulation type and code rates.

## 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 initialize 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&)` has 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 broadcast type `BTYPE_TV` for 1-segment modulation.

## Modulation Mode : QAM

### ModType

The QAM constellation is encoded in *ModType* according to the following table.

ModType	Meaning	Required Capability
DTAPI_MOD_QAM16	16-QAM	DTAPI_CAP_TX_QAM_A or DTAPI_CAP_TX_QAM_B or DTAPI_CAP_TX_QAM_C
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	Required Capability
DTAPI_MOD_J83_A	J.83 annex A (DVB-C)	DTAPI_CAP_TX_QAM_A
DTAPI_MOD_J83_B	J.83 annex B ("American QAM")	DTAPI_CAP_TX_QAM_B
DTAPI_MOD_J83_C	J.83 annex C ("Japanese QAM")	DTAPI_CAP_TX_QAM_C

### 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 $\mu$ s / 66 $\mu$ s
DTAPI_MOD_QAMB_I64_J2	0011	64	2	47 $\mu$ s / 33 $\mu$ s
DTAPI_MOD_QAMB_I32_J4	0101	32	4	24 $\mu$ s / 16 $\mu$ s
DTAPI_MOD_QAMB_I16_J8	0111	16	8	12 $\mu$ s / 8.2 $\mu$ s
DTAPI_MOD_QAMB_I8_J16	1001	8	16	5.9 $\mu$ s / 4.1 $\mu$ s
DTAPI_MOD_QAMB_I128_J1	0000	128	1	95 $\mu$ s / 66 $\mu$ s
DTAPI_MOD_QAMB_I128_J2	0010	128	2	190 $\mu$ s / 132 $\mu$ s
DTAPI_MOD_QAMB_I128_J3	0100	128	3	285 $\mu$ s / 198 $\mu$ s
DTAPI_MOD_QAMB_I128_J4	0110	128	4	379 $\mu$ s / 264 $\mu$ s
DTAPI_MOD_QAMB_I128_J5	1000	128	5	474 $\mu$ s / 330 $\mu$ s
DTAPI_MOD_QAMB_I128_J6	1010	128	6	569 $\mu$ s / 396 $\mu$ s
DTAPI_MOD_QAMB_I128_J7	1100	128	7	664 $\mu$ s / 462 $\mu$ s
DTAPI_MOD_QAMB_I128_J8	1110	128	8	759 $\mu$ s / 528 $\mu$ s

### ParXtra2

Not used.

## Modulation Mode : T2MI

When T2-MI modulation is used **DTAPI** expects a 188-byte transport stream carrying T2-MI packets. **DTAPI** will decode the T2-MI packets and perform the DVB-T2 modulation.

### *ParXtra0*

Extra modulation parameter #0 specifies the T2-MI transport-stream bitrate.

### *ParXtra1*

Extra modulation parameter #1 is the OR of values for the following fields: First T2-MI Component PID value, Second T2-MI Component PID value and Multi-Profile.

#### First T2-MI Component PID

PID-value of the first T2-MI component (0 .. 8190).

Value	Meaning
DTAPI_MOD_T2MI_PID1_SHIFT	Bit position of bit 0 of PID-value of the first T2-MI component
DTAPI_MOD_T2MI_PID1_MSK	AND mask for encoded PID field

#### Second T2-MI Component PID

PID-value of the second T2-MI component (0 .. 8190). This field is only valid if multi-profile is enabled.

Value	Meaning
DTAPI_MOD_T2MI_PID2_SHIFT	Bit position of bit 0 of PID-value of the second T2-MI component
DTAPI_MOD_T2MI_PID2_MSK	AND mask for encoded PID field

#### Multi-Profile

Value	Meaning
DTAPI_MOD_T2MI_MULT_DIS	Single profile, only first T2-MI component PID is used
DTAPI_MOD_T2MI_MULT_ENA	Multi-profile, both T2-MI components PIDs are used
DTAPI_MOD_T2MI_MULT_MSK	AND mask for encoded Multi-Profile field

### *ParXtra2*

Extra modulation parameter #2 specifies the DVB-T2 bandwidth.

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

## Result

DTAPI_RESULT	Meaning
DTAPI_OK	The modulation parameters have been set successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_NOT_IDLE	Transmit-control state is not <code>DTAPI_TXCTRL_IDLE</code> ; The requested modulation parameters can only be set in idle state
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 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

Sets level for modulators with an adjustable output level.

```
DTAPI_RESULT DtOutpChannel::SetOutputLevel(  
    [in] int LeveldBm           // Output level in units of 0.1dBm  
);
```

### Function Arguments

*LeveldBm*

Output level expressed in units of 0.1dBm. For example, -30 maps to  $-30 \times 0.1 = -3\text{dBm}$ .

Most modulators do not support a granularity of 0.1dBm. In that case, the output level is rounded to the nearest value supported by the modulator.

### 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::SetMultiModConfig

Configures a modulator for generation of multiple adjacent channels through one output channel.

```
DTAPI_RESULT DtOutpChannel::SetMultiModConfig(
    [in] int NumSubChan,        // Number of sub-channels
    [in] int FreqSpacing       // Frequency spacing
);
```

### Function Arguments

*NumSubChan*

Number of adjacent channels: 1..4 (*NumSubChan=1* switches-off multi-channel modulation).

*FreqSpacing*

Frequency-distance between the center frequencies of the sub-channels.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Power state has been changed successfully
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
DTAPI_E_NUM_CHAN	Invalid number of sub-channels

### Remarks

This method allows users to generate multiple adjacent channels (sub-channels) through one output channel. For example: generating two DVB-C or two DVB-T channels through a single DTA-2111.

The sub-channels share the same modulation settings, set through **SetModControl** and **SetTsRateBps**. When the transmit mode is set to **HOLD**, the multi-modulation channel settings are validated and checked against the limits of the card.

The center frequencies of the sub-channels are located around the carrier frequency of the RF upconverter, in formula:

$$FreqUpConverter - (NumSubChan-1)*FreqSpacing/2 + SubChan*FreqSpacing$$

where **SubChan** is the sub-channel (0..*NumSubChan-1*)

Each sub-channel has its own Transmit FIFO. The **Write** and **GetFifoLoad** methods have an optional *SubChan* parameter to control the contents of each channel individually.

#### Notes:

- Underflow of one of the Transmit FIFOs stalls the transmission of all sub-channels.
- Multi-channel performance is CPU bound, use the **GetFlags** to check for errors.

## DtOutChannel::SetPower

DTA-102 only. Turns on/off power for a target adapter attached to the DTA-102.

```
DTAPI_RESULT DtOutChannel::SetPower (
    [in] int Power           // New power state
);
```

### Function Arguments

*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 target adapters

### Remarks

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

## DtOutpChannel::SetRfControl

Sets upconverter parameters for devices with on-board RF upconverter.

```
DTAPI_RESULT DtOutpChannel::SetRfControl (
    [in] __int64 RfRate          // RF frequency in Hz
);
DTAPI_RESULT DtOutpChannel::SetRfControl (
    [in] int RfRate             // RF frequency in Hz
);
DTAPI_RESULT DtOutpChannel::SetRfControl (
    [in] double RfRate         // RF frequency in Hz
);
```

### Function Arguments

*RfRate*

New carrier frequency for RF upconverter, specified in Hertz. *RfRate* is rounded to the nearest RF frequency compatible with the frequency resolution.

### 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 upconverter
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	The device does not have an RF upconverter

### Remarks

Changing the RF frequency takes some time to let the PLL settle at the new frequency.

## DtOutpChannel::SetRfMode

Sets special modes for devices with on-board RF upconverter.

```
DTAPI_RESULT DtOutpChannel::SetRfMode(
    [in] int RfMode           // Special upconverter mode
);
```

### Function Arguments

*RfMode*

New RF upconverter 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	Apply spectral inversion

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The new upconverter mode has been set successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_INVALID_MODE	The specified upconverter 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::SetSfnAllowedTimeDiff

Sets the maximum allowable time difference between the timestamps associated with the I/Q samples and the actual transmission time. If the maximum time difference is exceeded, either the **DTAPI\_SF\_N\_TOO\_EARLY\_ERR** or **DTAPI\_SF\_N\_TOO\_LATE\_ERR** error flag will be triggered.

```
DTAPI_RESULT DtOutpChannel::SetSfnAllowedTimeDiff(
    [in] int TimeDiff // Maximum allowable time difference
);
```

### Function Arguments

*TimeDiff*

Receives the maximum allowable time difference in nanoseconds. The value returned by this method falls within the range of 0 to 1000000 nanoseconds.

### Result

DTAPI_RESULT	Meaning
<b>DTAPI_OK</b>	Maximum allowed time difference has been set successfully
<b>DTAPI_E_NOT_ATTACHED</b>	Channel object is not attached to a hardware function.
<b>DTAPI_E_NOT_IDLE</b>	Cannot set allowed time difference because transmit control is not <b>IDLE</b>
<b>DTAPI_E_SF_N_DISABLED</b>	Indicates that the modulator is not operating in a synchronized mode.
<b>DTAPI_E_SF_N_NOT_SUPPORTED</b>	Indicates that the output port does not support synchronized operation, as capability <b>DTAPI_CAP_TX_SF_N</b> is absent.

## DtOutpChannel::SetSfnControl

This method is applicable only to modulators that can be synchronized with an external clock source. It sets the modulator's synchronization mode and allows for the application of a time offset to the trigger moment. For more information, refer to the DTA-2116 datasheet.

```
DTAPI_RESULT DtOutpChannel::SetSfnControl (
    [in] int SfnMode           // Modulator synchronization mode
    [in] int TimeOffset       // Time offset in nanoseconds
);
```

### Function Arguments

#### *SfnMode*

Modulator synchronization mode, either **standalone**, **1pps Mode** (4 submodes) or **Trigger Mode** (available only on the DTA-2116).

Value	Meaning
DTAPI_SFN_MODE_DISABLED	Standalone timing, the modulator is not synchronized to an external clock (default mode after initialization).
DTAPI_SFN_MODE_AT_1PPS	Submode of <b>1pps Mode</b> , where the transmission start time is determined by the specified time offset (0 .. 1s), and transmission is free running thereafter.
DTAPI_SFN_MODE_IQPCCK	Submode of <b>1pps Mode</b> , where synchronization relies on timestamps present in the I/Q packets.
DTAPI_SFN_MODE_DVBT_MIP	Submode of <b>1pps Mode</b> , where synchronization relies on timestamps derived from the DVB-T MIP (Mega-frame Initialization Packets) in the input stream.
DTAPI_SFN_MODE_T2MI	Submode of <b>1pps Mode</b> , where synchronization relies on timestamps in the T2-MI input stream.
DTAPI_SFN_MODE_TRIGGER	<b>Trigger Mode</b> , available only on the DTA-2116. The modulator waits for the first rising edge of the 1pps input signal (actually the first 10MHz edge after the 1pps edge) and then starts RF transmission after exactly <i>TimeOffset</i> nanoseconds.

#### *TimeOffset*

Time offset in nanoseconds. The table below indicates the valid range of *TimeOffset* for the different synchronization modes:

Value	TimeOffset – Valid range
DTAPI_SFN_MODE_DISABLED	Not applicable, <i>TimeOffset</i> is not used.
DTAPI_SFN_MODE_AT_1PPS	0 .. 1,000,000,000ns (0 .. 1s).
DTAPI_SFN_MODE_IQPCCK	A time offset cannot be specified (must be 0).
DTAPI_SFN_MODE_DVBT_MIP	-500,000,000ns .. +500,000,000ns (-0.5 .. +0.5s).
DTAPI_SFN_MODE_T2MI	-500,000,000ns .. +500,000,000ns (-0.5 .. +0.5s).
DTAPI_SFN_MODE_TRIGGER	~500* .. 2,147,483,648ns (0 .. 2.147s)

\* This minimum value for *TimeOffset* depends on the sample rate. To obtain the minimum value for your sample rate, you can use the `GetSfnMinTriggerModeDelay()` function.

## Result

DTAPI_RESULT	Meaning
DTAPI_OK	SFN control has been set successfully.
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function.
DTAPI_E_NOT_IDLE	Cannot set allowed time difference because transmit control is not <b>IDLE</b> .
DTAPI_E_SFN_DISABLED	Indicates that the modulator is not operating in a synchronized mode.
DTAPI_E_SFN_INVALID_OFFSET	The specified value for <i>TimeOffset</i> is invalid. Please refer to the table above for the valid range of values and enter a value within that range.
DTAPI_E_SFN_NOT_SUPPORTED	Indicates that the output port does not support synchronized operation, as capability <b>DTAPI_CAP_TX_SFN</b> is absent.

## DtOutpChannel::SetSnr

Sets noise generation mode and signal-to-noise ratio for modulators with a hardware-based white-noise generator.

```
DTAPI_RESULT DtOutpChannel::SetSnr(
    [in] int Mode,           // Noise generation mode
    [in] int SNR            // Desired signal to noise-ratio
);
```

### Function Arguments

#### Mode

Noise generation mode to be used.

Value	Meaning
DTAPI_NOISE_DISABLED	No noise generation
DTAPI_NOISE_WNG_HW	Use build-in Uniform-distributed white-noise generator (for backward compatibility reasons, it equals to DTAPI_NOISE_UNIFORM_HW)
DTAPI_NOISE_UNIFORM_HW	Use build-in Uniform-distributed white-noise generator
DTAPI_NOISE_GAUSSIAN_HW	Use build-in Gaussian-distributed white-noise generator

#### SNR

Desired signal-to-noise ratio, expressed in units of 0.1dB. For example, 250 = 250×0.1 = 25dB. The valid range is 0 .. 300 (0.0 .. 30.0 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

The DTAPI\_NOISE\_WNG\_HW and DTAPI\_NOISE\_UNIFORM\_HW modes are only supported by ports having the DTAPI\_CAP\_SNR capability. The DTAPI\_NOISE\_GAUSSIAN\_HW mode is only supported by ports having the DTAPI\_CAP\_SNR\_GAUSSIAN capability.

## DtOutpChannel::SetSpiClk

DTA-2142 only. Set the DVB-SPI clock frequency in case the SPI channel is operating with a fixed clock (I/O configurations **SPIFIXEDCLK**, **SPISER8B**, **SPISER10B**).

```
DTAPI_RESULT DtOutpChannel::SetSpiClk(  
    [in] Int SpiClk           // Fixed SPI clock  
);
```

### Function Arguments

*SpiClk*

Specifies the frequency of the fixed DVB-SPI clock in Hertz.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The TS-over-IP parameters have been applied successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_INVALID_MODE	The SPI clock is not fixed (SPI mode is <b>SPIDVBMODE</b> )
DTAPI_E_NOT_SUPPORTED	Not a DVB-SPI channel

### Remarks

## DtOutpChannel::SetTsRateBps

Sets the channel's transport-stream rate, based on 188-byte transport packets.

```
DTAPI_RESULT DtOutpChannel::SetTsRateBps (
    [in] int TsRate           // Transport-stream rate in bps
);

DTAPI_RESULT DtOutpChannel::SetTsRateBps (
    [in] DtFractionInt TsRate // Transport-stream rate in bps
);
```

### Function Arguments

*TsRate*

New transport-stream rate (@188) specified in bits per second.

### 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_RATE	The specified transport-rate is invalid (negative) or incompatible (too high) with the attached hardware function
DTAPI_E_MODPARS_NOT_SET	For modulators: cannot set transport-rate because modulation parameters have not been set
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	Setting the TS rate is not allowed

### Remarks

For transmit modes that are not based on 188-byte packets, the transport-stream rate will be different from the line clock. For example, in modes **DTAPI\_TXMODE\_204** and **DTAPI\_TXMODE\_ADD16** the line clock rate is set to 204/188 times the specified transport-stream clock.

The transport-stream rate is usually set in the initialization phase after **AttachToPort**. It is recommended to first set the transmit mode with **SetTxMode** before setting the TS rate with **SetTsRateBps**.

For modulators, the modulation parameters have to be set with **SetModControl** first before setting the TS rate with **SetTsRateBps**.

**SetTsRateBps** may also be used while packets are being transmitted. The DTA and DTU series of devices impose 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 and may stall the output channel.

## DtOutpChannel::SetTsRateRatio

Sets the ratio between transport-stream rate and external clock frequency. If the external clock frequency differs from the specified frequency, the transport stream rate will differ from the desired value by the same percentage.

```
DTAPI_RESULT DtOutpChannel::SetTsRateRatio (
    [in] int TsRate,           // Desired transport stream rate
    [in] int RefClk          // Frequency of external clock
);
```

### Function Arguments

*TsRate*

Transport stream rate in bits per second.

*RefClk*

Frequency (in Hz) of the external reference clock applied to the device.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	The transport-stream ratio has been changed successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_INVALID_TSRATESEL	The channel is not configured in <b>DTAPI_TSRATESEL_EXTRATIO</b> mode
DTAPI_E_NOT_SUPPORTED	The hardware does not have an external clock input

### Remarks

A ratio can only be set if the transport-stream rate selection (**DTAPI\_IOCONFIG\_TSRATESEL**) I/O configuration is **DTAPI\_TSRATESEL\_EXTRATIO**.

## DtOutChannel::SetTxControl

Sets transmit control.

```
DTAPI_RESULT DtOutChannel::SetTxControl (
    [in] int TxControl          // Transmit-control state
);
```

### Function Arguments

*TxControl*

New value for transmit control according to the table below.

Value	Meaning
DTAPI_TXCTRL_IDLE	Packet transmission and DMA writes to the transmit FIFO are disabled.
DTAPI_TXCTRL_HOLD	Packet transmission is disabled, but DMA writes to the transmit FIFO are enabled.
DTAPI_TXCTRL_SEND	Normal operation. Both packet transmission and DMA writes are enabled.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Transmit control 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_LEVEL	The output level specified in <b>SetOutputLevel</b> is invalid for the attached hardware function
DTAPI_E_INVALID_MODE	The specified value for transmit control is invalid or incompatible with the attached hardware function
DTAPI_E_MODE_VIDEOSTD	For TS-over-IP channels: The specified <i>m_VideoStandard</i> in the <i>IpPars</i> structure and the <i>TxMode</i> are not consistent
DTAPI_E_MODPARS_NOT_SET	For modulators: cannot start transmission because modulation parameters have not been set
DTAPI_E_MODTYPE_UNSUP	For modulators: modulation type is not supported
DTAPI_E_NO_IPPARS	For TS-over-IP channels: cannot start transmission because IP parameters have not been specified yet
DTAPI_E_NO_TSRATE	Cannot start transmission because TS rate has not been set
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

Setting transmit control can be used for controlled start-up and shutdown of the streaming process. If transmit control is **DTAPI\_TXCTRL\_HOLD**, the transmit FIFO can be pre-loaded with packets (using **write**), while no packets are transmitted yet. Then, if enough *credit* has been built up in the transmit FIFO, transmit control is set to **DTAPI\_TXCTRL\_SEND**. This procedure prevents accidental Transmit-FIFO underflow in the start-up phase.

For TS-over-IP channels, transmit control values **HOLD** or **SEND** can only be entered if the IP transmission parameters have been specified using **SetIpPars**.

After **AttachToPort** and after **Reset**, transmit control is initialized to **IDLE**.

## DtOutpChannel::SetTxMode

Sets the transmit mode for the output channel. It determines the conversions that will be applied to the data written to the output channel. Transmit mode has to be set while transmit mode is still idle, this is before setting transmit control to `DTAPI_TXCTRL_HOLD` or `DTAPI_TXCTRL_SEND`.

**Note:** For ASI/SDI input channels, first configure the output port for ASI or SDI with `SetIoConfig`, group `IOSTD`. If an ASI-specific transmit mode is applied to a channel that is configured for SDI (or vice versa), an error will be returned.

```
DTAPI_RESULT DtOutpChannel::SetTxMode (
    [in] int TxMode,           // Transmit mode
    [in] int StuffMode       // TS: Null-packet stuffing on/off
                             // SDI: Black-frame stuffing on/off
);
```

### Function Arguments

*TxMode*

New transmit mode according to the table below.

Value	Meaning
<code>DTAPI_TXMODE_188</code>	<i>188-byte mode</i> Packets in the Transmit FIFO are assumed to be 188 bytes long. Packets are transmitted without modification.
<code>DTAPI_TXMODE_192</code>	<i>192-byte mode (DTA-102 only)</i> 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.
<code>DTAPI_TXMODE_204</code>	<i>204-byte mode</i> Packets in the Transmit FIFO are assumed to be 204 bytes long. Packets are transmitted without modification.
<code>DTAPI_TXMODE_ADD16</code>	<i>Add 16 bytes mode</i> Packets in the Transmit FIFO are assumed to be 188 bytes long. The device adds 16 placeholder bytes (0) to every packet.
<code>DTAPI_TXMODE_MINI16</code>	<i>Minus 16 bytes mode</i> Packets in the Transmit FIFO are assumed to be 204 bytes long. The device removes the last 16 bytes of each packet.
<code>DTAPI_TXMODE_RAW</code>	<i>Raw mode</i> No assumptions are made on packet structure. Bytes in the buffer are transmitted unmodified. Null-packet stuffing cannot be applied. This mode is not allowed for TS-over-IP channels.
<code>DTAPI_TXMODE_RAWASI</code>	<i>Raw ASI symbols</i> (Ports needs <code>CAP_RAWASI</code> ) The bytes in the buffer are assumed to be 10-bit packed raw ASI symbols which are transmitted at 270Mb/s.

The following modes are valid for channels configured as SDI.

Value	Meaning
<code>DTAPI_TXMODE_SDI_FULL</code>	<i>Full SDI mode</i> The data in the Transmit FIFO is assumed to consist of complete SDI frames, including all synchronization information.
<code>DTAPI_TXMODE_SDI_ACTVID</code>	<i>Active Video SDI mode</i> 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. This mode can only be used in combination with Huffman compression (i.e.

	with <b>DTAPI_TXMODE_SDI_HUFFMAN</b> flag). When using this mode with Huffman compression disabled, the behavior of the output channel is undefined.
--	------------------------------------------------------------------------------------------------------------------------------------------------------

The following mode is valid for TS-over-IP transmission only.

Value	Meaning
<b>DTAPI_TXMODE_IPRAW</b>	<i>Raw IP mode</i> The Transmit FIFO is assumed to contain time-stamped IP packets that are transmitted unmodified. Each IP packet shall be preceded by a <b>DtRawIpHeader</b> structure.

For DVB-ASI output channels, *TxMode* can be OR-ed with following flags:

<b>DTAPI_TXMODE_BURST</b>	<i>Burst mode</i> The bytes making up a transport packet are sent in one burst, without K28.5 stuffing characters. If this flag is not specified, transmission of packet data is “continuous” (linear over time).
<b>DTAPI_TXMODE_TXONTIME</b>	<i>Transmit on timestamp</i> The MPEG-2 packets in the Transmit FIFO are assumed to be prefixed with a 32-bit timestamp (54MHz resolution) and will be transmitted at the times indicated by the timestamps. See DTAPI Manual – Overview and Data Formats.pdf for more details.

For output channels configured as SDI, *TxMode* can be OR-ed with the values specified in the table below:

Value	Meaning
<b>DTAPI_TXMODE_SDI_10B</b>	<i>10-bit SDI samples</i> Indicates that SDI data in the Transmit FIFO is assumed to consist of 10-bit SDI samples. If both this flag and the 16B flag are omitted, 8-bit samples is assumed.
<b>DTAPI_TXMODE_SDI_16B</b>	<i>16-bit SDI samples</i> Indicates that SDI data in the Transmit FIFO is assumed to consist of 10-bit SDI samples packed in 16-bits. Only the 10 least significant bits of each 16-bit sample are used. If both this flag and the 10B flag are omitted, 8-bit samples is assumed. 16B mode is only supported by cards having the CAP_MATRIX capability.
<b>DTAPI_TXMODE_SDI_HUFFMAN</b>	<i>Huffman compression</i> Indicates that the SDI frame in the Transmit FIFO is assumed to be Huffman compressed. Huffman compression is not supported by cards that support HD-SDI such as the DTA-2152.

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.

#### *StuffMode*

This parameter controls the behavior of the output when there is no packet data available for transmission from the Transmit FIFO.

For channels configured as ASI:

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 configured as SDI:

This parameter is ignored if genlock is not supported.

If genlock is supported, but the output channel is not configured to operate in genlock mode, this parameter enables *black-frame stuffing*: 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 transmit channel is in SDI genlock mode, since the driver will automatically enable black-frame stuffing in this case.

Black-frame stuffing is not supported by cards supporting the matrix model such as the DTA-2152.

## 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 <b>DTAPI_TXCTRL_IDLE</b>

## Remarks

Changing the transmit mode may change the transmit-clock rate! For example, 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 initialization phase just after **AttachToSerial**, **AttachToSlot**, **AttachToType** or **Reset**. It is recommended to set the transmit mode before setting the transport-stream rate.

It is recommended to stop transmission and clear the Transmit FIFO with **clearFifo** before changing transmit mode.

## DtOutpChannel::SetTxPolarity

Sets the polarity of the DVB-ASI output signal.

```
DTAPI_RESULT DtOutpChannel::SetTxPolarity(
    [in] int TxPolarity          // Polarity (normal or inverted)
);
```

### Function Arguments

*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	The polarity of the ASI signal has been changed successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_INVALID_MODE	The specified polarity is invalid
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 output channel

### Remarks

This function can be used to test if an ASI receiver can receive both normal and inverted ASI signals.

## DtOutpChannel::Write

Writes data to the output channel. To avoid deadlock, the user shall meet certain preconditions as described in the Remarks section below.

```
DTAPI_RESULT DtOutpChannel::Write(
    [in] char* pBuffer,           // Buffer with data to be written
    [in] int NumBytesToWrite,    // Number of bytes to be written
    [in] int SubChan=0          // Sub-channel
);
```

### Function Arguments

#### *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, except for IP output channels for which there are no alignment restrictions.

#### *NumBytesToWrite*

Number of bytes to be written to the output channel. The value of *NumBytesToWrite* must be a multiple of 4, except for IP output channels, which can accept any positive value.

#### *SubChan*

Sub-channel selection, used for multi-channel modulation.  
See `DtOutpChannel::SetMultiModConfig`.

### Result

DTAPI_RESULT	Meaning
DTAPI_OK	Write operation has been completed successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_IDLE	Cannot write data because transmit control is <b>IDLE</b>
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_TSRATE	For TS-over-IP channels: cannot write data because transport-stream rate has not been specified, or TS rate is too low
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

### Remarks

Preconditions:

- Transmit mode must be **HOLD** or **SEND**, otherwise **DTAPI\_E\_IDLE** is returned.
- If transmit mode is **HOLD**, the amount of data written may not overflow the transmit FIFO, or deadlock will be the result.

If transmit mode is **SEND**, it is *strongly recommended* that the amount of data written does not overflow the transmit FIFO. Under certain conditions, overflowing the transmit FIFO will work reliably without deadlock, but these conditions are hard to specify. Generally speaking, it is safer for a user application to monitor the FIFO load and never write more data than can be contained in the FIFO.

**write** returns when all data has been transferred to the transmit FIFO.