DTAPI

Multi-PLP Extensions

REFERENCE

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Struct DtBigTsSplitPars

Structure for specifying the parameters for the "Big-TS splitting" operation, which is defined for DVB-C2 and DVB-T2. This operation splits one "big" Transport Stream into multiple SPTSes (Single Program Transport Streams), one for each data PLP in the group. Each SPTS will contain one service and adapted PSI/SI. The Transport Stream for the common PLP gets the common SI.

The parameters in this structure are used for the creation and modification of PAT, SDT and EIT tables for a single PLP. Furthermore it specifies the PIDs to be included in the Transport Stream. This structure is used in class **`DtPlpInPars`**.

```
struct DtBigTsSplitPars
{
  bool  m_Enabled;            // Enable "Big-TS splitting"
  bool  m_IsCommonPlp;        // Common PLP (yes/no)
  bool  m_SplitSdtIn;         // SDT is already split (yes/no)
  std::vector<int>  m_Pids;   // Series of PIDs to include
  // Parameters below are not used in case m_IsCommonPlp == true
  int  m_OnwId;               // Original Network ID of the Big TS
  int  m_TsId;                // Transport Stream ID of the Big TS
  int  m_ServiceId;           // ID of the service to include in PLP
  int  m_PmtPid;              // PID of the PMT table of selected service
  int  m_NewTsId;             // Transport Stream ID of the TS in the PLP
  // Parameters below are not used in case m_SplitSdtIn == true
  int  m_SdtLoopDataLength;           // SDT loop data length
  unsigned char  m_SdtLoopData[168];  // The SDT-actual loop data
};
```

Members

m_Enabled

If true, "Big-TS splitting" is enabled, otherwise it is disabled and the remaining parameters are not used. Big-TS splitting is supported for DVB-C2 and DVB-T2. Must be set to false for ATSC 3.0.

m_IsCommonPlp

If true, the type of the associated PLP is a common PLP, otherwise the type is a data PLP.

m_SplitSdtIn

If true, the "Big TS" is "MPLP-prepared" and already contains separated SDT subtables for each PLP.

m_Pids

Series of PID values that specify the elementary streams to be included in Transport Stream for the associated PLP (e.g. for the data PLP: service components, ECM and PCR PIDs and for the common PLP: CAT, NIT, TOT, TDT-table PIDs).

The following parameters are not used if parameters are related to a common PLP (*m_IsCommonPlp* equals *true)*.

m_OnwId, m_TsId, m_ServiceId

Identifies a service from the "Big TS" to include in the Transport Stream for the PLP.

m_PmtPid
The PID of the PMT-table of the selected service, needed for the creation of a new PAT-table.

m_NewTsId
Specifies the Transport Stream ID of the newly created TS in the PLP.

The following parameters are not used if the "Big TS" already contains separated SDT subtables for each PLP (*m_SplitSdtIn* equals *true*); otherwise, a new SDT-actual table is created for the selected service with the aid of the parameters below.

m_SdtLoopDataLength
Length of the new SDT-loop data for the selected service. The valid range is 0, 5 … 168.

m_SdtLoopData
Specifies the new SDT-actual loop data for the selected service. The SDT-loop data starts with the service_id field and includes the SDT-loop descriptors. The maximum length of the SDT-loop data is 168 bytes.

Struct DtComplexFloat

Structure describing a complex floating-point number.

```
Struct DtComplexFloat
{
   int   m_Re;                  // Real part
   int   m_Im;                  // Imaginary part
};
```

Members

m_Re
The real part of the complex floating-point number.

m_Im
The imaginary part of the complex floating-point number.

Struct DtPlpInpPars

Structure for specifying the input stream for a PLP. This structure is used in class **DtAtsc3Pars**, **DtDvbC2Pars**, **DtDvbT2ComponentPars** and in class **DtIsdbTmmPars**, in an array of structs. The index in the array corresponds to the index of the related PLP (or TS in case of ISDB-Tmm).

```
struct DtPlpInpPars
{
   int  m_FifoIdx;                    // Index of input FIFO
   InDataType  m_DataType;            // Input data type
   DtBigTsSplitPars  m_BigTsSplit;    // Big-TS splitting parameters
};
```

Members

m_FifoIdx

The index of the FIFO used by the associated PLP. PLPs in the same group that have "Big-TS" splitting enabled can share the same input FIFO.
The index will be used in several methods that operate on a specific FIFO (e.g. **DtMplpOutpChannel::WriteMplp()**).
The default value of *m_FifoIdx* is equal to the index in the array of **DtPlpInpPars** structs. For writing data to the n[th] PLP (which is specified at index n in the array of **DtPlpInpPars**) you have to use FIFO index n.
The valid range of *m_FifoIdx* is 0 … 255.

m_DataType

Specifies the type of the input data.

Value	Meaning
ALP	ATSC Link layer Protocol (ALP) packets
GSE	Generic Stream Encapsulation (GSE) packets
TS188	188-byte TS packets
TS204	204-byte TS packets

m_BigTsSplit

Specifies (for this PLP) the parameters for the "Big-TS" splitting operation.

Struct DtTestPointOutPars

Test-point data generation is specified by the Verification and Validation (V&V) group for ATSC 3.0, DVB-C2 and DVB-T2 as a means for the verification and validation of the specifications. Structure **DtTestPointOutPars** enables or disables test-point data generation, and – if enabled – specifies the associated handler.

This structure is used in class **DtAtsc3Pars**, **DtDvbC2Pars** and in class **DtDvbT2ComponentPars**.

```
struct DtTestPointOutPars
{
  bool  m_Enabled;                    // Enable test points (yes/no)
  void*  m_pTpWriteDataOpaque;        // Opaque pointer
  DtTpWriteDataFunc*  m_pTpWriteDataFunc; // Test-point data handler
};
```

Members

m_Enabled

If true, the generation of test point data is enabled. Whenever test point data is available, the callback function is called and the test point data is passed to the callback function. Note that test point data generation cannot be performed in real time.

m_pTpWriteDataOpaque

Opaque pointer that is passed to the callback function.

m_pTpWriteDataFunc

Pointer to the callback function of type **DtTpWriteDataFunc** that handles the generated test point data.

Struct DtVirtualOutData

Structure describing the type of output data generated by a virtual output.

```
struct DtVirtualOutData
{
 OutDataType  m_DataType;                // Output data type
 union {
   struct {                              // 16-bit int I/Q samples
     const unsigned char**  m_pBuffer;   // Array of buffers
     int  m_NumBuffers;                  // #Buffers
     int  m_NumBytes;                    // #Bytes in each buffer
   } IqSamplesInt16;
   struct {                              // 32-bit float I/Q samples
     const unsigned char**  m_pBuffer;   // Array of buffers
     int  m_NumBuffers;                  // #Buffers
     int  m_NumBytes;                    // #Bytes in each buffer
   } IqSamplesFloat32;
   struct {                              // 188byte T2MI TS packets
     const unsigned char*  m_pBuffer;    // Pointer to TS packet(s)
     int  m_NumBytes;                    // #Bytes
     __int64  m_T2MiFrameNr;             // T2MI frame counter
   } T2MiTs188;
 } u;
};
```

Members

m_DataType

Type of output data.

Value	Meaning
IQ_INT16	Pairs of signed 16-bit integers in I, Q order, little Endian
IQ_FLOAT32	Pairs of 32-bit floats in I, Q order
T2MI_TS188	T2-MI packets encapsulated into DVB/MPEG Transport Stream packets

u.IqSamplesInt16

Structure used in case *m_DataType* equals **IQ_INT16**.

u.IqSamplesInt16.m_pBuffer

Pointer to an array of *m_NumBuffers* pointers to buffers of length *m_NumBytes*.
The buffers contain pairs of signed 16-bit integers in I, Q order, little Endian.

u.IqSamplesInt16.m_NumBuffers

The number of buffers. There is one output buffer for each output channel (e.g. 2 buffers in case of MISO).

u.IqSamplesInt16.m_NumBytes

The number of bytes in each buffer.

u.IqSamplesFloat32

Structure used in case *m_DataType* equals **IQ_Float32**.

u.IqSamplesFloat32.m_pBuffer
Pointer to an array of *m_NumBuffers* pointers to buffers of *m_NumBytes* length.
The buffers contain pairs of 32-bit floats in I, Q order.

u.IqSamplesFloat32.m_NumBuffers
The number of buffers. There is one output buffer for each output channel (e.g. 2 buffers in case of MISO).

u.IqSamplesFloat32.m_NumBytes
The number of bytes in each buffer.

u.T2MiTs188
Structure used in case *m_DataType* equals **T2MI_TS188**.

u.T2MiTs188.m_pBuffer
Pointer to a buffer with 188-byte Transport Packets encapsulating T2-MI packets.

u.T2MiTs188.m_NumBytes
The number of bytes in the buffer.

u.T2MiTs188.m_T2MiFrameNr
DVB-T2 superframe counter. The counter is incremented each time the buffer contains a packet that contributes to a new DVB-T2 superframe. This parameter enables cutting of the output data stream at DVB-T2 superframe boundaries.

Struct DtVirtualOutPars

Structure for specifying the output data type in case the output data is generated for a virtual output.

```
struct DtVirtualOutPars
{
  bool  m_Enabled;                              // Parameters enabled
  DtVirtualOutData::OutDataType  m_DataType;    // Output data type
  double  m_Gain;                               // RMS of the I/Q samples
};
```

Members

m_Enabled

If true, the parameters in **DtVirutalOutPars** overrule the default values; otherwise, default output data type and gain will be used.

m_DataType

Specifies the type of output data for the virtual output.

Value	Meaning
IQ_INT16	Pairs of signed 16-bit integers in I, Q order, little Endian
IQ_FLOAT32	Pairs of 32-bit floats in I, Q order
T2MI_TS188	T2-MI packets encapsulated into DVB/MPEG Transport Stream packets

m_Gain

If the output data type is either **IQ_INT16** or **IQ_FLOAT32**, this field specifies the Root Mean Square (RMS) of the complex samples. This value should be set as large as possible to have the largest SNR, but small enough to avoid saturation. When a DekTec card is used for play-out of the I/Q samples, the value 5000 is an appropriate value.

Struct DtAtsc3SubframeInfo

Structure containing the ATSC 3.0 "derived" parameters for subframes. This structure is contained in **`DtAtsc3ParamInfo`**.

```
struct DtAtsc3SubframeInfo
{
   int  m_TotalNumDataCells;  // Number of data cells available for PLPs
   int  m_NumCellsInDataSym;  // Number of cells in data symbol
   int  m_NumCellsInSbsSym;   // Number of cells in SBS symbols
};
```

Members

`m_TotalNumDataCells`
Total number of data cells available for PLPs including the preamble PLP cells for the first sub-frame.

`m_NumCellsInDataSym`
Number of cells per data symbols

`m_NumCellsInSbsSym`
Number of cells in a SBS symbol

Struct DtAtsc3ParamInfo

Structure containing the ATSC 3.0 "derived" parameters: the value of the members follows from the basic ATSC 3.0 modulation parameters.

This structure is an output parameter of **`DtAtsc3Pars::GetParamInfo`**.

```
struct DtAtsc3ParamInfo
{
   int  m_L1BasicNumDataCells;          // Number of cells in L1-Basic
   int  m_L1DetailNumDataCells;         // Number of cells in L1-Detail
   int  m_PreambleNumSymbols;           // Number of preamble symbols
   int  m_NumCellsInFirstPreamble;      // Number of cells in first
                                        // preamble symbol
   int  m_NumCellsInNextPreamble;       // Number of cells in next
                                        // preamble symbol(s)
   int  m_NumPlpCellsInPreambles;       // Number of cells in the preamble
                                        // available for PLPs
   std::vector<DtAtsc3SubframeInfo>  m_Subframes;  // Subframe information
};
```

Members

m_L1BasicNumDataCells
Number of L1-Basic data cells

m_L1DetailNumDataCells
Number of L1-Detail data cells

m_PreambleNumSymbols
Number of preamble symbols

m_NumCellsInFirstPreamble
Number of cells in the first preamble symbol

m_NumCellsInFirstPreamble
Number of cells in the next preamble symbol(s)

m_NumPlpCellsInPreambles
Number of cells in the preamble available for PLPs

m_Subframes
A vector containing the ATSC 3.0 "derived" parameters for the subframes.

Struct DtAtsc3PlpPars

Structure specifying the ATSC 3.0 modulation parameters for one physical layer pipe. This structure is used in struct **DtAtsc3SubframePars**.

```
struct DtAtsc3PlpPars
{
  int  m_Id;                  // PLP ID
  bool  m_LlsFlag;            // Low level signaling present(yes/no)
  int  m_Layer;               // Layer (core/enhanced)
  int  m_Modulation;          // Modulation type
  int  m_CodeRate;            // Code rate
  int  m_FecCodeLength;       // FEC code length
  int  m_FecOuterCode;        // FEC outer code type
  int  m_LdmInjectLevel;      // LDM injection level
  // Core layer PLP parameters
  int  m_PlpType;             // PLP-type (dispersed/non-dispersed)
  int  m_NumSubslices;        // Number of subslices
  int  m_SubsliceInterval;    // Subslice interval
  int  m_TiMode;              // Time interleaver mode
  int  m_CtiDepth;            // Convolutional time interleaver depth
  bool  m_TiExtInterleaving; // Enable extended interleaving (yes/no)
  // HTI interleaving parameters
  bool  m_HtiInterSubframe;  // Enable inter-subframe interleaving
  int  m_HtiNumTiBlocks;      // Number of TI blocks
  int  m_HtiNumFecBlocksMax; // Maximum number of FEC blocks per
                              // interleaving frame
  int  m_HtiCellInterleaver; // Enable the cell interleaver
  // Schedueling parameters
  int  m_CoreLayerPlpId;      // PLP ID of the corresponding core layer
  int  m_HtiNumFecBlocks;     // Number of FEC blocks per subframe
  int  m_PlpSize;             // PLP size in number of cells per subframe
  int  m_PlpStart;            // PLP starting cell
};
```

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_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_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 FEC 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_LdmInjectLevel

Specifies the enhanced layer injection level relative to the core PLP. Used when Layer=Enhanced. Values 0...9 give an injection level: *m_LdmInjectLevel* / 2.0 dB.

Values 10...30 give an injection level: *m_LdmInjectLevel* - 5.0 dB.

m_PlpType

Specifies whether the PLP is dispersed or non-dispersed. Used for core PLPs.

Value	Meaning
DTAPI_ATSC3_PLPTYPE_NONDISP	Non-dispersed PLP-type
DTAPI_ATSC3_PLPTYPE_DISP	Dispersed PLP-type

m_NumSubslices

Number of subslices The valid range is 1...16384. Only used for core PLPs where the PLP type is dispersed.

m_SubsliceInterval

Subslice interval. The valid range is 1... 16777215. Only used for core PLPs where the PLP type is dispersed.

m_TiMode

Time interleaver mode. Only used for core PLPs.

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_CtiDepth

Convolutional time interleaver (CTI) depth. Only used for core PLPs where the time interleaver mode is CTI.

Value	Meaning
DTAPI_ATSC3_CTIDEPTH_512	512 rows
DTAPI_ATSC3_CTIDEPTH_724	724 rows
DTAPI_ATSC3_CTIDEPTH_887	887 rows (1254 rows if extended interleaving is used)
DTAPI_ATSC3_CTIDEPTH_1024	1024 rows (1448 rows if extended interleaving is used)

m_TiExtInterleaving

If true, extended interleaving is used for this PLP. Only used for core PLPs.

m_HtiInterSubframe

If false, the inter-subframe interleaving is not used (i.e. only intra-subframe interleaving is used). If true, interleaving is used with one TI block per interleaving frame spread over multiple sub-frames. Only used for core PLPs where the time interleaver mode is HTI.

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.
The valid range is 1 … 16. Only used for core PLPs where the time interleaver mode is HTI.

m_HtiNumFecBlocksMax
The maximum number of FEC blocks per interleaving frame for the current PLP. The valid range is 1 ... 4096. Only used for core PLPs where the time interleaver mode is HTI.

m_HtiCellInterleaver
If true, enable the HTI cell interleaving. Only used for core PLPs where the time interleaver mode is HTI.

m_CoreLayerPlpId
If enhanced layer PLP, the PLP ID of the corresponding core layer PLP. Currently the enhanced layer is scheduled with the same number of cells as the core layer. The valid range is 0 … 63. Only used for enhanced PLPs.

m_HtiNumFecBlocks
The number of FEC blocks per interleaving frame for the current PLP. The valid range is 1 ... 4096. Only used for core PLPs where the time interleaver mode is HTI.

m_PlpSize
For core PLPs: the number of cells per subframe, -1 means to use the full subframe.
For enhanced PLPs: the number of cells of the enhanced layer PLP, -1 means the complete size of the core layer PLP (identified by *m_CoreLayerPlpId*).
The valid range is -1 ... 16777215. Only used if the time interleaver mode is None or CTI.

m_PlpStart
If set to -1, the PLP-start is automatically determined by allocating PLPs by increasing PLP index assuming each PLP uses PLP-size cells (for non-dispersed PLPs) or ceil(PLP-size/number of sub-slices) cells (for dispersed PLPs).
For complex FDM allocations the previous algorithm is not sufficient and PLP-start must be set manually. For core PLPs: the index of the starting cell of the PLP in the current subframe. For enhanced PLPs: the index of the starting cell of the PLP counting from the start of the corresponding core PLP (identified by *m_CoreLayerPlpId*).
The valid range is -1 ... 16777215.

Struct DtAtsc3SubframePars

Structure describing ATSC 3.0 parameters for one subframe. This structure is used in class **DtAtsc3Pars**, in a vector of structs for the subframes.

```
struct DtAtsc3SubframePars
{
   int  m_Miso;                // MISO
   int  m_MisoNumTx;           // Number of MISO transmitters
   int  m_MisoTxIndex;         // MISO tranmitter index
   int  m_FftSize;             // FFT-size
   int  m_ReducedCarriers;     // Carrier reduction coefficient
   int  m_GuardInterval;       // Guard interval
   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_NumOfdmSymbols;      // Number of payload OFDM symbol
   bool  m_FreqInterleaver;    // Enable frequency interleaver
   std::<vector<DtAtsc3PlpPar> m_Plps; // PLPs
};
```

Members

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_MisoNumTx

The number of transmitters in a MISO transmission. Valid values values are 0 (No MISO), 2, 3 or 4.

m_MisoTxIndex

The index of the transmitter in a MISO transmission. The valid range is 0 … *m_MisoNumTx*-1.

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	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_PilotPatern

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

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

m_Plps
A vector specifying the ATSC 3.0 modulation parameters for the physical layer pipes.
The valid size is 1 … 64.

Struct DtDvbC2DSlicePars

Structure describing DVB-C2 parameters for one data slice. This structure is used in class **DtDvbC2Pars**, in an array of **DTAPI_DVBC2_NUM_DSLICE_MAX** structs for the data slices.

```
struct DtDvbC2DSlicePars
{
   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
   bool  m_ConstConfig;        // Constant data slice configuration(yes/no)
   bool  m_LeftNotch;          // Left notch present (yes/no)
   std::<vector<DtDvbC2PlpPar> m_Plps; // PLPs
};
```

Members

m_Id

Unique identification of the data slice within a C2-System. The valid range is 0 … 255.

m_TunePosition

Tune position of the associated data slice relative to the start frequency of the C2-System, in multiples of 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_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.
The valid range is -128 … 127 if the guard interval is 1/128.
The valid range is -256 … 255 if the guard interval is 1/64.

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.
The valid range is -128 … 127 if the guard interval is 1/128.
The valid range is -256 … 255 if the guard interval is 1/64.
If *m_OffsetLeft* equals *m_OffsetRight*, the data slice is empty and no input streams are created for the PLPs of the data slice.

m_TiDepth

Time interleaving depth within the associated data slice.

Value	Meaning
DTAPI_DVBC2_TIDEPTH_NONE	No time interleaving
DTAPI_DVBC2_TIDEPTH_4	4 OFDM symbols
DTAPI_DVBC2_TIDEPTH_8	8 OFDM symbols
DTAPI_DVBC2_TIDEPTH_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 true, indicates that the configuration of the associated data slice shall not change; otherwise, the configuration is assumed to be variable.

m_LeftNotch

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

m_Plps

A vector specifying the DVB-C2 modulation parameters for the physical layer pipes.

Struct DtDvbC2L1UpdateDSlicePars

Structure describing DVB-C2 parameter updates for one data slice. This structure is used in class **DtDvbC2L1UpdatePars**.

```
struct DtDvbC2L1UpdateDSlicePars
{
  bool  m_Enable;             // Enable the data slice (yes/no)
  int   m_OffsetLeft;         // Updated data slice left offset
  int   m_OffsetRight;        // Updated data slice right offset
  std::vector<DtDvbC2L1UpdatePlpPar> m_Plps; // L1 PLP updates
};
```

Members

m_Enable

If true, the data slice is enabled, otherwise it is disabled and the remaining parameters are not used. Only enabled data slices will occur in the L1 signalling.
Note that only "empty" data slices can be disabled. An empty data slice is either a data slice where *m_OffsetLeft== m_OffsetRight* in the global configuration, or a data slice where all PLPs have *m_NoData==true*.

m_OffsetLeft

Updated 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.
The valid range is -128 … 127 if the guard interval is 1/128.
The valid range is -256 … 255 if the guard interval is 1/64.

m_OffsetRight

Updated 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.
The valid range is -128 … 127 if the guard interval is 1/128.
The valid range is -256 … 255 if the guard interval is 1/64.

If the data slice is not empty then for type 1 data slices no change is accepted and for type 2 must hold that *m_OffsetLeft< m_OffsetRight*. It is up to the user to ensure that there is sufficient bandwidth and no bitrate overflow.

m_Plps

A vector specifying the DVB-C2 parameters updates for the physical layer pipes. Note that the number of physical layer pipes and the order of physical layer pipes must be the same as in the global configuration.

Struct DtDvbC2L1UpdatePlpPars

Structure describing DVB-C2 parameter updates for one physical layer pipe. This structure is used in class **DtDvbC2L1UpdateDSlicePars**.

```
struct DtDvbC2L1UpdatePlpPars
{
  bool  m_Enable;             // Enable the PLP (yes/no)
};
```

Members

m_Enable

If true, the physical layer pipe is enabled, otherwise it is disabled. Only enabled physical layer pipes will occur in the L1 signalling.
Note that only physical layer pipes where *m_NoData==true* can be disabled.

Struct DtDvbC2L1UpdatePars

Structure describing the updated DVB-C2 L1 signalling part2 parameters. This structure is used in class **DtDvbC2Pars**.

```
struct DtDvbC2L1UpdatePars
{
   int  m_NumFrames;          // Number of C2 frames the update is used
   // L1 data slice updates
   std::vector<DtDvbC2L1UpdateDSlicePars>  m_DSlices;
};
```

Members

m_NumFrames

Number of C2 frames the updated data slice parameters are used.

m_DSlices

A vector specifying for each data slice the updated data slice parameters.
Note that the number of data slices and the order of data slices must be the same as in **DtDvbC2Pars**.

Struct DtDvbC2ModStatus

Structure containing the status of the DVB-C2 modulator. This structure is an output parameter of **`DtMplpOutpChannel::GetMplpModStatus`**.

```
struct DtDvbC2ModStatus
{
   int   m_MplpModFlags;       // Multi-PLP-modulator flags
   __int64  m_DjbOverflows;    // Number of DJB overflows
   __int64  m_DjbUnderflows;   // Number of DJB underflows
};
```

Members

`m_MplpModFlags`
Multi-PLP-modulator flags. If the modulator stalls *`m_MplpModFlags`* is set to a nonzero value.

`m_DjbOverflows`
Total number De-Jitter Buffer overflows.
If such overflow occurs, the *`DtDvbC2PlpPars::m_IssyOutputDelay`* parameter must be decreased or *`DtDvbC2PlpPars::m_IssyBufs`* must be increased.

`m_DjbUnderflows`
Total number De-Jitter Buffer underflows.
If such underflow occurs, the *`DtDvbC2PlpPars::m_IssyOutputDelay`* parameter must be increased.

Struct DtDvbC2NotchPars

Structure specifying a DVB-C2 notch band. This structure is used in class **DtDvbC2Pars**, in an array of **DTAPI_DVBC2_NUM_NOTCH_MAX** structs.

```
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 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 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 DtDvbC2PaprPars

Structure for specifying PAPR reduction parameters. This structure is used in class **DtDvbC2Pars**.

```
struct DtDvbC2PaprPars
{
  bool   m_TrEnabled;          // PAPR TR enabled
  double  m_TrVclip;           // Clipping threshold
  int   m_TrMaxIter;           // Maximum number of iterations
};
```

Members

m_TrEnabled
If true, PAPR TR is active, otherwise PAPR TR is not active.

m_TrVclip
PAPR TR clipping threshold. The valid range is 1 … 4.32 (Volt).

m_TrMaxIter
Maximum number of iterations. Must be greater than or equal to 1.
Note: PAPR TR processing time is proportional to this parameter.

Struct DtDvbC2ParamInfo

Structure containing the DVB-C2 "derived" parameters: the value of the members follows from the basic DVB-C2 modulation parameters.

This structure is an output parameter of **`DtDvbC2Pars::GetParamInfo`**.

```
struct DtDvbC2ParamInfo
{
   int  m_L1Part2Length;      // Number of bits of the L1 part2 data
   int  m_NumL1Symbols;       // Total number of symbols per frame
   int  m_NumSymbols;         // Number of L1 symbols
   int  m_PilotSpacing;       // Distance between pilots
   int  m_FftSize;            // FFT size
   int  m_MinCarrierOffset;   // Lowest used carrier offset
   int  m_CenterFrequency;    // Center frequency
};
```

Members

m_L1Part2Length
Number of bits of the L1 part 2 data (including CRC).

m_NumL1Symbols
Number of L1 symbols (L_P).

m_NumSymbols
Total number of symbols per frame ($L_P + L_{data}$).

m_PilotSpacing
The number of carriers between pilots (D_X).

m_FftSize
FFT size.

m_MinCarrierOffset
The lowest used carrier offset.

m_CenterFrequency
Center frequency, expressed as the distance from 0 Hz in multiples of the carrier spacing.

Struct DtDvbC2PlpPars

Structure specifying the DVB-C2 modulation parameters for one physical layer pipe. This structure is used in class **DtDvbC2DSlicePars**.

```
struct DtDvbC2PlpPars
{
   // Mode adaptation layer: TS input
   int   m_Ccm;                 // ACM/CCM bit in the BBFrame header 0 or 1
   bool   m_Hem;                // High Efficiency Mode (yes/no)
   bool   m_Npd;                // Null Packet Deletetion (yes/no)
   int   m_Issy;                // ISSY mode
   int   m_IssyBufs;            // ISSY BUFS
   int   m_IssyOutputDelay;     // ISSY output delay in T units
   int   m_TsRate;              // Transport stream rate

   // Mode adaptation layer: GSE input
   int   m_GseLabelType;        // GSE-label type
   // Modulation parameters
   int   m_Id;                  // PLP ID
   int   m_Type;                // PLP type
   bool   m_Bundled;            // PLP bundled (yes/no)
   int   m_GroupId;             // PLP group ID
   int   m_FecType;             // FEC type
   int   m_CodeRate;            // Code rate
   int   m_Modulation;          // Modulation type
   int   m_HdrCntr;             // Header counter
   std::vector<DtDvbC2XFecFrameHeader>  m_AcmHeaders;    // ACM headers
   bool   m_PsiSiReproc;        // PSI/SI reprocessing is performed (yes/no)
   int   m_TsId;                // Transport stream ID
   int   m_OnwId;               // Original network ID
   bool   m_NoData;             // No input data is provided for this PLP
};
```

Members

m_Ccm
ACM/CCM-field (Adaptive Coding and Modulation or Constant Coding and Modulation) in the BBFrame header 0 or 1.

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

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

m_Issy

ISSY mode, according to the table below.

Value	Meaning
DTAPI_DVBC2_ISSY_NONE	No ISSY field is used
DTAPI_DVBC2_ISSY_SHORT	2 byte ISSY field is used
DTAPI_DVBC2_ISSY_LONG	3 byte ISSY field is used

m_IssyBufs

ISSY 'BUFS' value. The valid range is 0 … 2097151

m_IssyOutputDelay

Delay (in T units) between the incoming data and the output data in the receiver model. This value determines the minimum and maximum dejitter buffer usage and is used to compute the ISSY 'BUFSTAT' field.

m_TsRate

Transport-Stream rate in bps. If *m_TsRate* is set to '0', no ISSY is used and null-packet deletion is not active then the transport stream rate is computed from the PLP parameters.

m_GseLabelType

GSE-label type.

Value	Meaning
DTAPI_DVBC2_GSE_LABEL_3BYTE	3-byte GSE label
DTAPI_DVBC2_GSE_LABEL_6BYTE	6-byte GSE label
DTAPI_DVBC2_GSE_LABEL_NONE	No GSE label

m_Id

Unique identification of the PLP within a C2-System. The valid range is 0 … 255.

m_Bundled

If true, the associated PLP is bundled with other PLP(s) within the current C2 System. All the bundled PLPs have the same PLP ID. An input stream is created only for the first PLP of the bundle.

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_GroupId

Identifies the PLP group with which the PLP is associated. 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 FECFrames following the FECFrame header: 0=1 FECFrame; 1=2 FECFrames.

m_AcmHeaders

A vector that holds the XFEC Frame modulation parameters for Adaptive Coding and Modulation (ACM) testing. If the number of ACM headers is greater than zero, then the successive XFEC frames of this PLP use the modulation and coding parameters from the m_AcmHeaders vector. After the last value is used, it loops again to the start of the vector. In this case the *m_FecType*, *m_Modulation*, *m_CodeRate* and *m_HdrCntr* parameters from the **DtDvbC2PlpPars** structure are ignored.

m_PsiSiReproc

If true, indicates that PSI/SI has been reprocessed.

m_TsId, m_OnwId

If *m_PsiSiReproc* is set to 'false', these members specify the Transport Stream ID and Original Network ID of the TS in the PLP. A receiver will use these fields if it can't rely on the PSI/SI.

m_NoData

If true, no input data is provided for this PLP. It is implicitly true for all PLPs in a data slice where *m_OffsetLeft* == *m_OffsetRight*.

Struct DtDvbC2XFecFrameHeader

Structure describing the coding and modulation parameters for a series of XFEC frames for Adaptive Coding and Modulation (ACM) tests. This structure is used in class **DtDvbC2PlpPars**.

```
struct DtDvbC2XFecFrameHeader
{
   int  m_FecType;             // PLP FEC type
   int  m_Modulation;          // PLP modulation
   int  m_CodeRate;            // PLP code rate
   int  m_HdrCntr;             // Header counter
   int  m_XFecFrameCount;      // Number XFEC frames using these parameters
};
```

Members

m_FecType
PLP FEC type. See **DtDvbC2PlpPars** for a list of applicable values.

m_Modulation
PLP modulation. See **DtDvbC2PlpPars** for a list of applicable values.

m_CodeRate
PLP code rate. See **DtDvbC2PlpPars** for a list of applicable values.

m_HdrCntr
PLP header counter. See **DtDvbC2PlpPars** for a list of applicable values.

m_XFecFrameCount
Number of XFEC frames using the parameters. The valid range is 1 … 256.

Struct DtDvbT2AuxPars

Structure for specifying AUX stream parameters, which can be inserted for test purposes. This structure is used in class **`DtDvbT2ComponentPars`**.

```
struct DtDvbT2AuxPars
{
   int    m_NumDummyStreams;   // Number of dummy AUX streams
};
```

Members

`m_NumDummyStreams`

Number of dummy AUX streams added for test purposes.
If TX signature through AUX streams is enabled, the valid range is 0 ...14; otherwise, the valid range is 0 ...15.

Struct DtDvbT2MiPars

Structure for enabling T2-MI generation, and for specifying its parameters. This structure is used in class **DtDvbT2Pars**.

```
Struct DtDvbT2MiPars
{
  bool  m_Enabled;            // Enable T2-MI output
  int   m_Pid;                // (First) T2-MI data PID
  int   m_StreamId;           // Stream-id for the (first) T2-MI stream
  int   m_Pid2;               // Second T2-MI data PID
  int   m_StreamId2;          // Stream-id for the second T2-MI stream
  int   m_PcrPid;             // T2-MI PCR PID
  int   m_PmtPid;             // T2-MI PMT PID
  int   m_TsRate;             // T2-MI Transport-Stream rate
  int   m_TimeStamping;       // T2-MI timestamping
  __int64  m_SecSince2000;    // First T2-MI output timestamp value
  int   m_Subseconds;         // Number of subseconds
  int   m_T2miUtco;           // Offset in seconds between UTC and Y2000
  bool  m_EncodeFef;          // Encode FEF (yes/no)
};
```

Members

m_Enabled
If true, T2-MI generation is enabled. An MPEG-2 Transport Stream is generated containing Transport Packets that encapsulate the T2-MI packets.

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

m_StreamId
Stream-id for the generated T2-MI stream. The valid range is 0 … 7.

m_Pid2
A second PID carrying the T2-MI packet data, used in case of multi-profile stream generation. The valid range is 0 … 8190.

m_StreamId2
Stream-id for the second generated T2-MI stream, used in case of multi-profile stream generation. The valid range is 0 … 7.

m_PcrPid
PID carrying PCR values. If *m_PcrPid* equals -1, no PCRs are inserted in the Transport Stream; otherwise a PCR is inserted on the indicated PID once per 40ms. The valid range is -1 … 8190.

m_PmtPid
PID carrying the PMT-table. If *m_PmtPid* equals -1, no PAT and no PMT-table are inserted in the Transport Stream; otherwise, PAT and PMT are inserted on PID 0 once per 100ms. The valid range is -1 … 8190.

m_TsRate
T2-MI Transport-Stream rate in bits per second.

m_TimeStamping
Type of DVB-T2 timestamps to insert.

Value	Meaning
DTAPI_DVBT2MI_TIMESTAMP_NULL	Null timestamp
DTAPI_DVBT2MI_TIMESTAMP_REL	Relative timestamps. Use *m_Subseconds*.
DTAPI_DVBT2MI_TIMESTAMP_ABS	Absolute timestamps. Use *m_SecSince2000*, *m_Subseconds* and *m_T2MiUtco*.

m_SecSince2000

Number of seconds since 2000-01-01 00:00:00 UTC. This value is inserted in the first DVB-T2 timestamp that is generated. Subsequent timestamps are computed.
This field is used if *m_TimeStamping* equals **DTAPI_DVBT2MI_TIMESTAMP_ABS**.

m_Subseconds

Number of subsecond units (T_{sub}) elapsed since the time expressed in the seconds field. This value is inserted in the first generated DVB-T2 timestamp. Subsequent timestamps are computed.
This field is used if *m_TimeStamping* is either **DTAPI_DVBT2MI_TIMESTAMP_REL** or **TAPI_DVBT2MI_TIMESTAMP_ABS**.
The T2 system bandwidth defines the units of the subseconds as shown in the table below.

Bandwidth	Subseconds units, T_{sub}
1.7 MHz	1/131 μs
5 MHz	1/40 μs
6 MHz	1/48 μs
7 MHz	1/56 μs
8 MHz	1/64 μs
10 MHz	1/80 μs

m_T2MiUtco

Offset in seconds between UTC and *m_SecSince2000*. As of February 2009 the value shall be 2 and shall change as a result of each new leap second. This field is used if *m_TimeStamping* equals **DTAPI_DVBT2MI_TIMESTAMP_ABS**.

m_EncodeFef

If true, generates a FEF part composite packet with the required subpart. Otherwise, only generates a FEF part NULL packet when FEF is enabled.

Struct DtDvbT2ModStatus

Structure containing the status of the DVB-T2 modulator. This structure is an output parameter of **`DtMplpOutpChannel::GetMplpModStatus`**.

```
struct DtDvbT2ModStatus
{
  int   m_MplpModFlags;                // Multi-PLP-modulator flags
  __int64  m_PlpNumBlocksOverflows;    // Number of PLP block overflows
  __int64  m_BitrateOverflows;         // Number of bitrate overflows
  __int64  m_TtoErrorCount;            // Number of invalid TTOs
  // T2MI specific
  __int64  m_T2MiOutputRateOverflows; // Number of T2MI rate overflows
  int   m_T2MiOutputRate;              // Current effective T2MI rate
};
```

Members

m_MplpModFlags
Multi-PLP-modulator flags. If the modulator stalls *m_MplpModFlags* is set to a nonzero value.

m_PlpNumBlocksOverflows
Total number of FEC frames for which the requested number of PLP blocks is greater than *DtDvbT2PlpPars::m_NumBlocks*. An overflow results in an invalid stream.

m_BitrateOverflows
Total number FEC frames for which too many bits were allocated. An overflow results in an invalid stream.

m_TtoErrorCount
Number of times the generated TTO value was invalid. Typically this occurs if *DtDvbT2PlpPars::m_IssyTDesign* is too small.

m_T2MiOutputRateOverflows
Number of T2-MI bitrate overflows. The *DtDvbT2MiPars::m_TsRate* must be increased for reliable operation.

m_T2MiOutputRate
Current T2-MI rate excluding null packets in bps.

Struct DtDvbT2PaprPars

Structure for specifying the PAPR reduction parameters. This structure is used in class **DtDvbT2ComponentPars**.

```
struct DtDvbT2PaprPars
{
  bool   m_AceEnabled;         // PAPR ACE enabled
  double  m_AceVclip;          // ACE clipping threshold
  double  m_AceGain;           // ACE gain
  double  m_AceLimit;          // ACE limit
  int   m_AceInterpFactor;     // ACE interplation factor
  int   m_AcePlpIndex;         // PLP used for PAPR ACE
  bool   m_TrEnabled;          // PAPR TR enabled
  bool   m_TrP2Only            // PAPR TR is only applied on the P2 symbol
  double  m_TrVclip;           // TR clipping threshold
  int   m_TrMaxIter;           // TR maximum number of iterations
  int   m_L1ExtLength;         // L1 extension field length
  bool   m_L1AceEnabled;       // L1 ACE enabled
  double  m_L1AceCMax;         // L1 ACE max constellation extension value
  bool   m_L1Scrambling;       // L1 Post Scrambling (for V1.3.1 only)
  // Parameters only applicable for DVB-T2 V1.2.1
  int   m_NumBiasBalCells;     // Number cells added to reduce P2 PAPR
  int   m_BiasBalancing;       // L1 bias compensation
};
```

Members

m_AceEnabled
If true, PAPR ACE is active, otherwise PAPR ACE is not active.

m_AceVclip
PAPR ACE clipping threshold. The valid range is 1 … 4.32 (Volt).

m_AceGain
PAPR ACE gain. The valid range is 0 … 31 (steps of 1).

m_AceLimit
PAPR ACE limit. The valid range is 0.7 … 1.4 (steps of 0.1).

m_AceInterpFactor
PAPR ACE interpolation factor. The valid range is 1 … 4.
Note: PAPR ACE processing time is proportional to this parameter.

m_AcePlpIndex
PLP used for the PAPR ACE.

m_TrEnabled
If true, PAPR TR is active, otherwise PAPR TR is not active.

m_TrP2Only
If true, PAPR TR is only applied on the P2 symbol, otherwise PAPR TR is applied on all symbols.

m_TrVclip
PAPR TR clipping threshold. The valid range is 1 … 4.32 (Volt).

m_TrMaxIter
Maximum number of iterations. Must be greater than or equal to 1.

Note: PAPR TR processing time is proportional to this parameter.

m_L1ExtLength
L1 extension field length. The valid rang is 0 … 65535.

m_L1AceEnabled
If true, L1 ACE is active, otherwise L1 ACE is not active. Only applicable when DVB-T2 V1.3.1 is selected.

m_L1AceCMax
Maximum value added to extend the QAM constellation values of L1.

m_L1Scrambling
If true, L1-Post scrambling is active.

m_NumBiasBalCells
Number of dummy cells added to reduce the P2 PAPR.
The valid range is 0 … *DtDvbT2ParamInfo::m_BiasBalCellsMax.*

m_BiasBalancing
L1 bias balancing.

Value	Meaning
DTAPI_DVBT2_BIAS_BAL_OFF	No L1 bias compensation
DTAPI_DVBT2_BIAS_BAL_ON	Modify the L1 reserved fields and L1 extension field padding to compensate the L1 bias

Struct DtDvbT2ParamInfo

Structure containing the DVB-T2 "derived" parameters: the value of the members follows from the basic DVB-T2 modulation parameters.

This structure is an output parameter of **`DtDvbT2Pars::GetParamInfo`** and **`DtDvbT2Pars::OptimisePlpNumBlocks`**.

```
struct DtDvbT2ParamInfo{
   int  m_TotalCellsPerFrame;     // Total number of cells per frame
   int  m_L1CellsPerFrame;        // #L1 cells per frame
   int  m_AuxCellsPerFrame;       // #Aux stream cells per frame
   int  m_BiasBalCellsPerFrame;   // #Bias balancing cells per frame
   int  m_BiasBalCellsMax;        // Max #bias balancing cells
   int  m_DummyCellsPerFrame;     // #Dummy cells per frame
   int  m_SamplesPerFrame;        // #Samples per frame
};
```

Members

m_TotalCellsPerFrame
Total number of cells per frame.

m_L1CellsPerFrame
Total number of cells per frame used for L1 signalling.

m_AuxCellsPerFrame
Total number of auxiliary stream cells per frame.

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; dummy cells overhead = *m_DummyCellsPerFrame* / *m_TotalCellsPerFrame*. It is only computed for the first frame.

m_SamplesPerFrame
Total number of samples per frame.

Struct DtDvbT2PlpPars

Structure specifying the DVB-T2 modulation parameters for one PLP (Physical Layer Pipe). This structure is used in class **DtDvbT2ComponentPars**, in an array of **DTAPI_DVBT2_NUM_PLP_MAX** structs for the physical layer pipes.

```
struct DtDvbT2PlpPars
{
  // Mode adaptation layer: TS input
  bool  m_Hem;                // High Efficiency Mode (yes/no)
  bool  m_Npd;                // Null Packet Deletetion (yes/no)
  int   m_Issy;               // ISSY mode
  int   m_IssyBufs;           // ISSY BUFS
  int   m_IssyTDesign;        // ISSY T_design value
  int   m_CompensatingDelay;  // Additional delay in samples
  int   m_TsRate;             // Transport Stream rate
  // Mode adaptation layer: GSE input
  int   m_GseLabelType;       // GSE-label type
  // L1 parameters
  int   m_Id;                 // PLP ID
  int   m_GroupId;            // PLP group ID
  int   m_Type;               // PLP type
  int   m_PayloadType;        // PLP payload type
  int   m_CodeRate;           // Code rate
  int   m_Modulation;         // Modulation type
  bool  m_Rotation;           // Constellation rotation (yes/no)
  int   m_FecType;            // FEC type
  int   m_FrameInterval;      // T2-frame interval
  int   m_FirstFrameIdx;      // First frame index
  int   m_TimeIlLength;       // Time interleaving length
  int   m_TimeIlType;         // Timer interleaving type
  bool  m_InBandAFlag;        // In-band A signalling information (yes/no)
  bool  m_InBandBFlag;        // In-band B signalling information (yes/no)
  bool  m_NumBlocks;          // Maximum number of FEC blocks per IL frame
  int   m_NumOtherPlpInBand;  // Number of other PLPs in the in-band sign
  int   m_OtherPlpInBand[DTAPI_DVBT2_NUM_PLP_MAX-1];
                              // Array of IDs of the other in band PLPs
  // Parmeters below are only meaningful for type 1 PLPs in TFS system.
  bool  m_FfFlag;             // FF flag
  int   m_FirstRfIdx;         // First TFS RF channel where PLP occurs
};
```

Members

m_Hem

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

m_Npd

If true, null-packet deletion is active.

m_Issy
ISSY mode.

Value	Meaning
DTAPI_DVBT2_ISSY_NONE	No ISSY field is used
DTAPI_DVBT2_ISSY_SHORT	2-byte ISSY field is used
DTAPI_DVBT2_ISSY_LONG	3-byte ISSY field is used

m_IssyBufs
ISSY 'BUFS' value. The valid range is 0 … 2097151

m_IssyTDesign
T_design value for TTO generation. Set to '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 and the first output bit of the Transport Stream.

m_CompensatingDelay
Additional delay (in samples) before the TS data is sent. Set to '-1' to have the modulator choose the value.

m_TsRate
Transport stream rate in bps. If *m_TsRate* is set to '0' and no null-packet deletion is active then the transport stream rate is computed from the PLP parameters.

m_GseLabelType
GSE-label type.

Value	Meaning
DTAPI_DVBT2_GSE_LABEL_3BYTE	3-byte GSE label
DTAPI_DVBT2_GSE_LABEL_6BYTE	6-byte GSE label
DTAPI_DVBT2_GSE_LABEL_NONE	No GSE label

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_PayloadType

PLP payload type.

Value	Meaning
DTAPI_DVBT2_PAYLOAD_GSE	Generic Stream Encapsulation
DTAPI_DVBT2_PAYLOAD_TS	Transport Stream

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	5/6 (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.

m_FecType
FEC type used by the PLP.

Value	Meaning
DTAPI_DVBT2_LDPC_16K	16K LDPC
DTAPI_DVBT2_LDPC_64K	64K LDPC

m_FrameInterval
The T2-frame interval within the super-frame for this PLP. The valid range is 1 ... 255.

m_FirstFrameIdx
The index of the first frame of the super-frame in which this PLP occurs. The valid range is 0 ... *m_FrameInterval*-1.

m_TimeIlLength
Time interleaving length. The valid range is 0 … 255.
If *m_TimeIlType* is set to '0' (**DTAPI_DVBT2_IL_ONETOONE**), this parameter specifies the number of TI-blocks per interleaving frame.
If *m_TimeIlType* is set to '1' (**DTAPI_DVBT2_IL_MULTI**), this parameter specifies the number of T2 frames to which each interleaving frame is mapped.

m_TimeIlType
Type of interleaving used by the PLP.

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

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

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

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

m_NumOtherPlpInBand
Specifies the number of other PLPs in the in-band signalling. The valid range is 0 … **DTAPI_DVBT2_NUM_PLP_MAX-1**.

m_OtherPlpInBand
Array specifying the IDs of the other PLPs in the in-band signalling.

m_FfFlag
If true, the PLP occurs on the same RF channel in each T2-frame; otherwise, inter-frame TFS is applied. This parameter is only meaningful for a type 1 PLP in a TFS system.

m_FirstRfIdx
The RF channel where this PLP occurs on in the first frame of a super-frame in a TFS system. If, *m_FfFlag* is set to 'true' the field indicates the RF channel the PLP occurs on in every T2-frame. This parameter is only meaningful for a type 1 PLP in TFS system.

Struct DtDvbT2RbmEvent

Structure containing the Receiver Buffer Model (RBM) event data. If RBM-validation is enabled then on an RBM-event the **DtDvbT2RbmEvent** parameters are sampled and passed to the RBM-event handler.

```
struct DtDvbT2RbmEvent
{
  int  m_DataPlpId;                    // Data PLP ID
  int  m_DataPlpIndex;                 // Data PLP index
  double  m_Time;                      // Time in T units
  int  m_IsCommonPlp;                  // Common PLP
  DtDvbT2RbmEvent  m_EventType;        // RBM event type
  union {
    struct {
       // DTAPI_DVBT2_RBM_EVENT_PLOT parameters
       int  m_TdiWriteIndex;           // TDI write index
       int  m_TdiReadIndex;            // TDI read index
       int  m_TdiReadAvailable;        // Available cells in TDI buffer
       int  m_DjbSize;                 // Dejitter buffer size in bits
    } Plot;
    struct {
       // DTAPI_DVBT2_RBM_EVENT_BUFS_TOO_SMALL parameters
       int  m_Bufs;                    // BUFS value
    } BufsTooSmall;
    struct {
       // DTAPI_DVBT2_RBM_EVENT_TTO_IN_THE_PAST parameters
       int  m_Tto;                     // TTO value
    } TtoInThePast;
    struct {
       // DTAPI_DVBT2_RBM_EVENT_DJB_OVERFLOW parameters
       int  m_DjbSize;                 // Dejitter buffer size in bits
       int  m_DjbMaxSize;
    } DjbOverflow;
    struct {
       // DTAPI_DVBT2_RBM_EVENT_CRC8_ERROR_HEADER parameters
       int  m_Val;                     // CRC8 value
    } Crc8ErrorHeader;
    struct {
       // DTAPI_DVBT2_RBM_EVENT_DFL_TOO_LARGE parameters
       int  m_SyncD;                   // SYNCD
       int  m_Dfl;                     // DFL
    } SyncDTooLarge;
    struct {
       // DTAPI_DVBT2_RBM_EVENT_INVALID_SYNCD parameters
       int  m_SyncD;                   // SYNCD
       int  m_Left;                    // #bytes left
    } InvalidSyncD;
    struct {
       // DTAPI_DVBT2_RBM_EVENT_TDI_OVERFLOW parameters
       int  m_TdiWriteIndex;           // TDI write index
       int  m_TdiReadIndex;            // TDI read index
    } TdiOverflow;
    struct {
       // DTAPI_DVBT2_RBM_EVENT_INVALID_PLP_START parameters
       int  m_PlpId1;                  // IDs of overlapping PLPs
       int  m_PlpId2;
```

```
    } InvalidPlpStart;
    struct {
        // DTAPI_DVBT2_RBM_EVENT_ISCR_ERROR parameters
        int  m_Delta;                  // Delta time in T units
    } IscrError;
    struct {
        // DTAPI_DVBT2_RBM_EVENT_BUFS_NOT_CONSTANT parameters
        int  m_CufBufs;                // Current and new BUFS values
        int  m_NewBufs;
    } BufsNotConstant;
    struct {
        // DTAPI_DVBT2_RBM_EVENT_PLP_NUM_BLOCKS_TOO_SMALL parameters
        int  m_PlpNumBlocks;           // Number of blocks
    } PlpNumBlocksTooSmall;
  } u;
};
```

Members

m_DataPlpId
Data PLP ID identifying the stream.

m_DataPlpIndex
Data PLP index.

m_Time
Time in T units.

m_IsCommonPlp
Indicates whether the event refers to a common PLP.
Possible values:
-1 : Event doesn't refer to a specific PLP
0 : Data PLP
1 : Common PLP

m_EventType
Type of Receiver Buffer Model event

Value	Meaning
DTAPI_DVBT2_RBM_EVENT_PLOT	Plot event
DTAPI_DVBT2_RBM_EVENT_DJB_UNDERFLOW	De-jitter buffer underflow
DTAPI_DVBT2_RBM_EVENT_BUFS_TOO_SMALL	BUFS gives too small dejitter buffer
DTAPI_DVBT2_RBM_EVENT_TTO_IN_THE_PAST	TTO gives time in the past
DTAPI_DVBT2_RBM_EVENT_DJB_OVERFLOW	De-jitter buffer overflow
DTAPI_DVBT2_RBM_EVENT_CRC8_ERROR_HEADER	CRC8 error in BBFrame
DTAPI_DVBT2_RBM_EVENT_DFL_TOO_LARGE	DFL too large in BBFrame
DTAPI_DVBT2_RBM_EVENT_SYNCD_TOO_LARGE	SYNCD too large in BBFrame
DTAPI_DVBT2_RBM_EVENT_INVALID_UPL	Invalid UPL in BBFrame
DTAPI_DVBT2_RBM_EVENT_INVALID_SYNCD	Invalid SYNCD in BBFrame

DTAPI_DVBT2_RBM_EVENT_TDI_OVERFLOW	TDI overflow
DTAPI_DVBT2_RBM_EVENT_TOO_MANY_TI_BLOCKS	Too many TI blocks queued
DTAPI_DVBT2_RBM_EVENT_INVALID_PLP_START	PLP-start values gives overlap
DTAPI_DVBT2_RBM_EVENT_FDI_OVERFLOW	Frequency/L1 de-interleaver overflow
DTAPI_DVBT2_RBM_EVENT_NO_TS_RATE	Not enough ISCR data to estimate TS rate
DTAPI_DVBT2_RBM_EVENT_ISCR_ERROR	ISCR error
DTAPI_DVBT2_RBM_EVENT_BUFS_NOT_CONSTANT	BUFS not constant
DTAPI_DVBT2_RBM_EVENT_ISSYI_NOT_CONSTANT	ISSYI not constant
DTAPI_DVBT2_RBM_EVENT_HEM_NOT_CONSTANT	HEM not constant
DTAPI_DVBT2_RBM_EVENT_PLP_NUM_BLOCKS_TOO_SMALL	PLP numblocks for this interleaving frame is too small

u.Plot
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_PLOT**.

u.Plot.m_TdiWriteIndex
Write index in time de-interleaver buffer.

u.Plot.m_TdiReadIndex
Read index in time de-interleaver buffer.

u.Plot.m_TdiReadAvailable
Number of available cells in the time de-interleaver read buffer.

u.Plot.m_DjbSize
De-jitter buffer size in number of bits.

u.BufsTooSmall
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_BUFS_TOO_SMALL**.

u.BufsTooSmall.m_Bufs
BUFS value.

u.TtoInThePast
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_TTO_IN_THE_PAST**.

u.TtoInThePast.m_Tto
TTO value from the ISSY-field

u.DjbOverflow
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_DJB_OVERFLOW**.

u.DjbOverflow.m_DjbSize
De-jitter buffer size in bits.

u.DjbOverflow.m_DjbMaxSize
Maximum de-jitter buffer size in bits.

u.Crc8ErrorHeader
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_CRC8_ERROR_HEADER**.

u.Crc8ErrorHeader.m_Val
CRC-8 value from the baseband header.

u.SyncDTooLarge
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_DFL_TOO_LARGE**.

u.SyncDTooLarge.m_SyncD
SYNCD value from the baseband header.

u.SyncDTooLarge.m_Dfl
DFL value from the baseband header.

u.InvalidSyncD
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_INVALID_SYNCD**.

u.InvalidSyncD.m_SyncD
SYNCD value from the baseband header.

u.InvalidSyncD.m_Left
Number of bits remaining from the last baseband frame.

u.TdiOverflow
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_TDI_OVERFLOW**.

u.TdiOverflow.m_TdiWriteIndex
Write index in time de-interleaver buffer.

u.TdiOverflow.m_TdiReadIndex
Read index in time de-interleaver buffer.

u.InvalidPlpStart
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_TDI_OVERFLOW**.

u.InvalidPlpStart.m_Plp1, u.InvalidPlpStart.m_Plp2
IDs of the overlapping PLPs.

u.IscrError
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_ISCR_ERROR**.

u.IscrError.m_Delta
Delta time in T-units.

u.BufsNotConstant
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_TDI_OVERFLOW**.

u.BufsNotConstant.m_CurBufs, u.BufsNotConstant.m_NewBufs
Current and new BUFS values

u.PlpNumBlocksTooSmall
Structure used for event type **DTAPI_DVBT2_RBM_EVENT_PLP_NUM_BLOCKS_TOO_SMALL**.

u.PlpNumBlocksTooSmall.m_PlpNumBlocks
NUM_BLOCKS value for this PLP.

Struct DtDvbT2RbmValidation

Structure for enabling Receiver Buffer Model (RBM) validation, and specifying its parameters. This structure is used in class **DtDvbT2ComponentPars**.

```
Struct DtDvbT2RbmValidation
{
  bool  m_Enabled;            // Enable RBM validation
  bool  m_PlotEnabled;        // Enable RBM plotting events
  int   m_PlotPeriod;         // Plot period in T-units
  void* m_pCallbackOpaque;    // Opaque pointer for the callback function
  void  (*m_pCallbackFunc)( void*, const DtDvbT2RbmEvent*);
                              // Pointer to the callback function
};
```

Members

m_Enabled

If true, Receiver Buffer Model (RBM) validation is enabled. When a RBM-violation occurs, the callback function *(*m_pCallbackFunc)* is called and an RBM-event is passed.
Note that RBM-validation consumes a substantial amount of CPU cycles and therefore cannot always be performed in real time.

m_PlotEnabled

If true, Receiver Buffer Model (RBM) plotting is enabled. Periodically, the callback function will be called passing a **DTAPI_DVBT2_RBM_EVENT_PLOT** event.

m_PlotPeriod

Plot period time in T-units.

m_pCallbackOpaque

Opaque pointer that is passed to the callback function.

m_pCallbackFunc

Pointer to the callback function that handles the RBM-events.

Struct DtDvbT2TxSigPars

Structure for enabling and specifying the DVB-T2 transmitter signature. This structure is used in class **DtDvbT2ComponentPars**.

```
Struct DtDvbT2TxSigPars
{
  bool  m_TxSigAuxEnabled;   // Enable TX signature through AUX streams
  int   m_TxSigAuxId;        // Transmitter ID
  int   m_TxSigAuxP;         // P-value
  int   m_TxSigAuxQ;         // Q-value
  int   m_TxSigAuxR;         // R-value
  bool  m_TxSigFefEnabled;   // Enable TX signature through FEF
  int   m_TxSigFefId1;       // Transmitter ID for 1st period
  int   m_TxSigFefId2;       // Transmitter ID for 2nd period
};
```

Members

m_TxSigAuxEnabled
If true, transmitter signature transmission through AUX streams is enabled.

m_TxSigAuxId
Transmitter ID. The valid range is 0 … 3071.

m_TxSigAuxP
The total number of possible transmitter IDs (M) is derived from *m_TxSigAuxP* (P). M = 3 * (P+1). The valid range for *m_TxSigAuxP* is 0 … 1023.

m_TxSigAuxQ
The number of cells used per transmitter (N) is derived from *m_TxSigAuxQ* (Q). N = 2 ^ Q. The valid range for *m_TxSigAuxQ* is 0 … 15.

m_TxSigAuxR
The number of T2-frames used per transmitter signature (L) is derived from *m_TxSigAuxR* (R). L = R+1. The valid range for *m_TxSigAuxR* is 0 … 255.

m_TxSigFefEnabled
If true, transmitter signature transmission through FEF is enabled. To use this, FEF generation must be enabled and the FEF length must be greater than or equal to **DTAPI_TXSIG_FEF_LEN_MIN**.

m_TxSigFefId1
Transmitter ID for the first signature period. The valid range is 0 … 7.

m_TxSigFefId2
Transmitter ID for the second signature period. The valid range is 0 … 7.

Class DtAtsc3Pars

Class specifying parameters for ATSC 3.0 modulation.

```
class DtAtsc3Pars
{
  // System parameters
  int  m_Bandwidth;          // System bandwidth
  // Bootstrap parameters
  int  m_MinorVersion;       // Minor version
  int  m_EasWakeup;          // Emergency alert system wake-up
  // Preamble (L1-Basic and L1-Detail) parameters
  int  m_PreambleFftSize;    // Preamble FFT size
  int  m_PreambleGuardInterval; // Preamble guard interval
  int  m_PreamblePilotDx;    // Preamble pilot pattern Dx
  int  m_PreambleReducedCarriers; // Preamble carrier reduction
  int  m_L1BasicFecMode;     // L1-Basic FEC-type mode
  int  m_L1DetailFecMode;    // L1-Detail FEC-type mode
  int  m_L1DetailAddParity;  // L1-Detail additional parity mode
  int  m_TimeInfoFlag;       // Time information insertion
  int  m_TimeSeconds;        // Initial seconds component
  int  m_TimeNanoseconds;    // Initial nanoseconds component
  bool  m_LlsFlag;           // Low level signaling present(yes/no)
  int  m_Papr;               // PAPR reduction mode
  // Frame parameters
  int  m_FrameLengthMode;    // Frame length mode (time/symbol aligned)
  int  m_FrameLength;        // Frame length in units of 5 milliseconds
  // Subframe parameters
  std::vector<DtAtsc3SubframePars>  m_Subframes;
  // Parameters specifying the source for each PLP
  int  m_NumPlpInputs;       // Number of PLP input streams
  DtPlpInpPars  m_PlpInputs[DTAPI_ATSC3_NUM_PLP_MAX];
  // Miscellaneous: Virtual output, Test-point output
  DtVirtualOutPars  m_VirtOutput;
  DtTestPointOutPars  m_TpOutput;
};
```

Public members

m_Bandwidth

System bandwidth.

Value	Meaning
DTAPI_ATSC3_6MHZ	6 MHz
DTAPI_ATSC3_7MHZ	7 MHz
DTAPI_ATSC3_8MHZ	8 MHz

m_MinorVersion

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

m_EasWakeup

Emergency alert system wake-up information. The valid range is 0 … 3.

m_PreambleFftSize

The FFT-size used for the preamble symbols.

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.

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.

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

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

m_L1BasicFecMode
The FEC-type mode used for L1-Basic. The valid range is 1 … 5.

m_L1DetailFecMode
The FEC-type mode used for L1-Detail. The valid range is 1 … 7.

m_L1DetailAddParity
L1-Detail aditional parity mode, specifying the ratio (K) of the number of additional parity bits. The valid range is 0 … 2.

m_TimeInfoFlag
Specifies the generation of the timing information and the precision. If time information is generated, *m_TimeSecond* and *m_TimeNanoeconds* specify the initial time.

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

m_TimeSeconds
Initial seconds component of the time. It specifies the number of seconds elapsed since the PTP epoch on 1st January 1970.

m_TimeSeconds
Initial nanoseconds component of the time.

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

m_Papr
The peak to average power reduction method. This is used to fill PAPR field in the L1-signaling.

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
Must be 0 if symbol-aligned frames are configured. Otherwise, it specifies the length of a frame in units of 5 milliseconds. The valid values are 0 and 10 … 1000.

m_Subframes
A vector specifying the ATSC 3.0 modulation parameters for the subframes.
The valid size is 1 … 64.

m_NumPlpInputs
Specifies the number of PLP inputs in the ATSC 3.0 system. The valid range is 1 … **DTAPI_ATSC3_NUM_PLP_MAX**.

m_PlpInputs
Array specifying the PLP input streams. The index in the array is related to the index of a PLP in the ATSC 3.0 system (i.e. the first **DtPlpInpPars** in the array is related to the first PLP in the ATSC 3.0 system, which is the first PLP in the first subframe).

m_VirtOutput
In case of a virtual output *m_VirtOutput* specifies the virtual output data parameters.

m_TpOutput
In case of a virtual output *m_VirtOutput* specifies the virtual output data parameters.

Remarks

The **DtMplpOutpChannel::SetModControl()** method sets the parameters for the ATSC 3.0 modulator. The multi-PLP modulator can be used for both single-PLP and multi-PLP parameter sets. The **DtMplpOutpChannel::WriteMplpPacket** method is used to write data to the output channel.

DtAtsc3Pars::CheckValidity

Check ATSC 3.0 parameters for validity.

```
DTAPI_RESULT DtAtsc3Pars::CheckValidity();
DTAPI_RESULT DtAtsc3Pars::CheckValidity(
 [out] int&  SubframeIdx          // Index of the subrame
 [out] int&   PlpIdx              // Index of the PLP
);
```

Parameters

SubframeIdx

Output parameter that is set to the index of the subframe causing the error or is set to -1 if not applicable.

PlpIdx

Output parameter that is set to the index of the PLP within the subframe causing the error or is set to -1 if not applicable.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameters are valid
DTAPI_E_INVALID_BANDWIDTH	Invalid ATSC 3.0 bandwidth
DTAPI_E_INVALID_CODERATE	Invalid PLP code rate
DTAPI_E_INVALID_CONSTEL	Invalid PLP modulation type
DTAPI_E_INVALID_CRED	Invalid carrier reduction coefficient
DTAPI_E_INVALID_EAS	Invalid Emergency Alert Signal
DTAPI_E_INVALID_FECMODE	Invalid L1-Basic or L1-Detail FEC-mode
DTAPI_E_INVALID_FECTYPE	Invalid PLP FEC-type
DTAPI_E_INVALID_FFTMODE	Invalid FFT-size
DTAPI_E_INVALID_FRAMELENGTH	Invalid frame length
DTAPI_E_INVALID_FRAMEMODE	Invalid frame length mode
DTAPI_E_INVALID_GUARD	Invalid guard interval
DTAPI_E_INVALID_HTI_PARS	Invalid HTI interleaving parameters
DTAPI_E_INVALID_INP_TYPE	Invalid input type; only ALP is supported
DTAPI_E_INVALID_LAYER	Invalid PLP-layer type
DTAPI_E_INVALID_LDM_LEVEL	Invalid LDM injection level
DTAPI_E_INVALID_MISO	Invalid MISO parameter(s)
DTAPI_E_INVALID_NUM_INPUTS	Unexpected number of inputs
DTAPI_E_INVALID_PAPR	Invalid PAPR mode

DTAPI_RESULT	Meaning
DTAPI_E_INVALID_PARITY	Invalid additional parity mode
DTAPI_E_INVALID_PLP_REF	Invalid PLP-ID reference
DTAPI_E_INVALID_PLP_SIZE	Invalid PLP-size
DTAPI_E_INVALID_PLP_START	Invalid PLP-start
DTAPI_E_INVALID_PLP_TYPE	Invalid PLP-type
DTAPI_E_INVALID_TIME	Invalid time information generation mode
DTAPI_E_INVALID_TIME_IL	Invalid time interleaving mode or depth
DTAPI_E_INVALID_VERSION	Invalid bootstrap minor version
DTAPI_E_NUM_PLP	Invalid number of PLPs
DTAPI_E_NUM_SUBFRAMES	Invalid number of subframes
DTAPI_E_NUM_SUBSLICES	Invalid number of subslices symbols
DTAPI_E_NUM_SYMBOLS	Invalid number of OFDM symbols
DTAPI_E_NUM_SYMBOLS	Invalid number of OFDM symbols
DTAPI_E_PILOT_BOOST	Invalid pilot boost factor
DTAPI_E_PILOT_PATTERN	Invalid pilot pattern
DTAPI_E_PLP_ID	Duplicate or invalid PLP IDs
DTAPI_E_PREAMBLE_PAR_COMBI	Invalid combination of preamble parameters
DTAPI_E_SUBSLICE_INTERVAL	Invalid subslice interval

DtDvbC2Pars::GetParamInfo

Get the ATSC 3.0 “derived” parameters.

```
DTAPI_RESULT DtAtsc3Pars::GetParamInfo(
 [out] DtAtsc3ParamInfo&  ParamInfo   // ATSC 3.0 derived information
);
```

Parameters

ParamInfo

Output parameter that receives the ATSC 3.0 “derived” parameters.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameters are valid
Other result values	Error in modulation parameters, please refer to **DtAtsc3Pars::CheckValidity**

DtDvbC2Pars

Class DtDvbC2Pars

Class specifying parameters for DVB-C2 modulation.

```
class DtDvbC2Pars
{
  int  m_Bandwidth;          // Bandwidth (channel raster)
  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
  bool  m_ReservedTone;      // Reserved tones present (yes/no)
  int  m_L1TiMode;           // L1 time interleaving mode
  // Data-slice parameters
  int  m_NumDSlices;         // Number of data slices
  DtDvbC2DSlicePars  m_DSlices[DTAPI_DVBC2_NUM_DSLICE_MAX];
  // Notches
  int  m_NumNotches;         // Number of notches
  DtDvbC2NotchPars  m_Notches[DTAPI_DVBC2_NUM_NOTCH_MAX];
  // Parameters specifying the source for each PLP
  int  m_NumPlpInputs;       // Number of PLP input streams
  DtPlpInpPars  m_PlpInputs[DTAPI_DVBC2_NUM_PLP_MAX];
  // Miscellaneous: PAPR, Virtual output, Test-point output
  DtDvbC2PaprPars  m_PaprPars;
  DtVirtualOutPars  m_VirtOutput;
  DtTestPointOutPars  m_TpOutput;
  // Parameters specifying the generated carriers of one C2-system
  int  m_OutpFreqOffset;     // Output frequency offset
  int  m_OutpBandwidth;      // Output bandwidth (0 means default)
  // L1 updates
  std::vector<DtDvbC2L1UpdatePars>  m_L1Updates;
};
```

Public members

m_Bandwidth

Channel raster of the network.

Value	Meaning
DTAPI_DVBC2_6MHZ	6 MHz
DTAPI_DVBC2_8MHZ	8 MHz

m_NetworkId

Network ID. Unique identification of the DVB-C2 network. The valid range is 0 … 0xFFFF.

m_C2SystemId

C2-System ID. Unique identification of a C2-System. The valid range is 0 … 0xFFFF.

m_StartFrequency

Start frequency of the C2-System by means of the distance from 0Hz in multiples of the carrier spacing. The valid range is 0 … 0xFFFFFF and multiples of 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. The valid range is 0 ... 65535.

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_ReservedTone

If true, indicates one or more reserved tones (carriers) are used. When carriers are reserved (e.g PAPR TR is enabled) it shall be set to true.

m_L1TiMode

L1 time interleaving mode.

Value	Meaning
DTAPI_DVBC2_L1TIMODE_NONE	No time interleaving
DTAPI_DVBC2_L1TIMODE_BEST	Best fit
DTAPI_DVBC2_L1TIMODE_4	4 OFDM symbols
DTAPI_DVBC2_L1TIMODE_8	8 OFDM symbols

m_NumDSlices

Specifies the number of data slices in the C2-System. The valid range is 1 … **DTAPI_DVBC2_NUM_DSLICE_MAX**.

m_DSlices

Array specifying the DVB-C2 parameters for the data slices.

m_NumNotches

Specifies the number of notch bands in the C2-System. The valid range is 0 … **DTAPI_DVBC2_NUM_NOTCH_MAX**.

m_Notches

Array specifying the notch bands in the C2-System.

m_NumPlpInputs

Specifies the number of PLP inputs in the C2-System. The valid range is 1 … **DTAPI_DVBC2_NUM_PLP_MAX**.

m_PlpInputs

Array specifying the PLP input streams. The index in the array is related to the index of a PLP in the C2 System (i.e. the first **DtPlpInpPars** in the array is related to the first PLP in the C2 System, which is the first PLP in the first data slice).
Note that PLPs in empty data slices are not taken into account and in case of bundled PLPs only the first PLP occurrence is taken into account.

m_PaprPars
Specifies the PAPR reduction parameters.

m_VirtOutput
In case of a virtual output *m_VirtOutput* specifies the virtual output data parameters.

m_TpOutput
In case of a virtual output *m_VirtOutput* specifies the virtual output data parameters.

m_OutpFreqOffset
Output frequency offset from *m_StartFrequency* (in carriers) of the generated spectrum. Must be a multiple of the carrier spacing (D_X=24 for guard interval 1/128 and D_X=12 for guard interval 1/64). *m_OutpFreqOffset* in combination with *m_OutpBandwidth* can be used to output a part of carriers of one C2-system.

m_OutpBandwidth
Output bandwidth (in carriers). 0 selects the default output bandwidth. Must be a multiple of the carrier spacing (D_X=24 for guard interval 1/128 and D_X=12 for guard interval 1/64).

m_L1Updates
A series of L1 signalling part2 parameters updates. The first update is applied immediately. After the last update is applied, it loops to the first one .

Remarks

This class is used both for the initialization of the multi-PLP modulator and the traditional single-PLP DVB-C2 modulator. The **DtOutpChannel::SetModControl()** method sets the parameters for the single-PLP DVB-C2 modulator. Thereafter **DtOutpChannel::Write** method is used to write the data to the output channel.

The **DtMplpOutpChannel::SetModControl()** method sets the parameters for the multi-PLP DVB-C2 modulator. The multi-PLP modulator can be used for both single-PLP and multi-PLP parameter sets. The **DtMplpOutpChannel::WriteMplp** method is used to write data to the output channel.

DtDvbC2Pars::CheckValidity

Check DVB-C2 parameters for validity.

```
DTAPI_RESULT DtDvbC2Pars::CheckValidity(void);
```

Parameters

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameters are valid
DTAPI_E_BROADBAND_NOTCH	Broadband notch cannot be inside a data slice
DTAPI_E_DSLICE_OFFSETS	Invalid data slice offset
DTAPI_E_DSLICE_OVERLAP	Data slices cannot overlap
DTAPI_E_DSLICE_T1_NDP	Null-packet deletion not allowed for type1 data slices
DTAPI_E_DSLICE_T1_TSRATE	TS-rate/ISSY combination not possible for type1 data slice
DTAPI_E_DSLICE_TUNE_POS	Invalid data slice tune position
DTAPI_E_INVALID_PARS	Invalid parameter value (generic error)
DTAPI_E_INVALID_RATE	PLP TS-rate is too high
DTAPI_E_INVALID_START_FREQ	Invalid start frequency
DTAPI_E_NO_TSRATE	PLP TS-rate is not specified
DTAPI_E_NOTCH_OFFSETS	Invalid notch
DTAPI_E_L1_PART2_TOO_LONG	L1 part 2 data is too long
DTAPI_E_PLP_BUNDLED	Inconsistent PLP bundled parameters
DTAPI_E_PLP_ID	Duplicate PLP IDs

DtDvbC2Pars::GetParamInfo

Get the DVB-C2 “derived” parameters.

```
DTAPI_RESULT DtDvbC2Pars::GetParamInfo(
 [out] DtDvbC2ParamInfo&  ParamInfo   // DVB-C2 derived information
);
```

Parameters

ParamInfo

Output parameter that receives the DVB-C2 “derived” parameters.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameters are valid
Other result values	Error in modulation parameters, please refer to **DtDvbC2Pars::CheckValidity**

DtDvbT2ComponentPars

Class describing the modulation parameters for one DVB-T2 component (e.g. base or lite).

```
class DtDvbT2ComponentPars
{
  int  m_T2Version;          // DVB-T2 specification version
  int  m_T2Profile;          // DVB-T2 profile
  bool  m_T2BaseLite;        // T2-Lite is used in a base profile
  int  m_Bandwidth;          // DVB-T2 channel bandwidth
  int  m_FftMode;            // FFT mode (or size)
  int  m_Miso;               // MISO mode
  int  m_GuardInterval;      // Guard interval
  int  m_Papr;               // PAPR reduction mode
  int  m_BwtExt;             // Bandwidth extension
  int  m_PilotPatern;        // Pilot pattern
  int  m_L1Modulation;       // L1 modulation type
  int  m_CellId;             // Cell ID
  int  m_NetworkId;          // Network ID
  int  m_T2SystemId;         // T2 system ID
  bool  m_L1Repetition;      // L1 repetition (yes/no)
  int  m_NumT2Frames;        // Number of T2 frames in a super frame
  int  m_NumDataSyms;        // Number of data OFDM symbols per T2-frame
  int  m_NumSubslices;       // Number of subslices per T2-frame
  int  m_ComponentStartTime; // Offset (T) at which the component starts
  bool  m_FefEnable;         // Insert FEF (yes/no)
  int  m_FefType;            // FEF type
  int  m_FefS1;              // FEF S1 field value
  int  m_FefS2;              // FEF S2 field value
  int  m_FefLength;          // FEF length
  int  m_FefInterval;        // FEF interval
  int  m_FefSignal;          // Type of signal during FEF period
  int  m_NumRfChans;         // Number of RF channels
  int  m_RfChanFreqs[DTAPI_DVBT2_NUM_RF_MAX];
                             // Array of RF channel frequencies
  int  m_StartRfIdx;         // First used RF channel
  int  m_NumPlps;            // Number of PLPs
  std::vector<DtDvbT2PlpPars>  m_Plps;
                             // Vector of PLP parameters
  std::vector<DtPlpInpPars>  m_PlpInputs;
                             // Vector of PLP input stream
  DtDvbT2AuxPars  m_Aux;     // AUX streams
  DtDvbT2PaprPars  m_PaprPars;// PAPR reduction parameters
  DtDvbT2TxSigPars  m_TxSignature;
                             // Transmitter signature parameters
  DtDvbT2RbmValidation  m_RbmValidation;
                             // Receiver Buffer Model validation
  DtTestPointOutPars  m_TpOutput;
                             // Test point data output parameters
};
```

Public members

m_T2Version

DVB-T2 specification version.

Value	Meaning
DTAPI_DVBT2_VERSION_1_1_1	Version 1.1.1
DTAPI_DVBT2_VERSION_1_2_1	Version 1.2.1
DTAPI_DVBT2_VERSION_1_3_1	Version 1.3.1

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_T2BaseLite

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

m_Bandwidth

The bandwidth of the channel.

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

m_FftMode

The FFT size used for computing OFDM symbols.

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

m_Miso

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

Value	Meaning
DTAPI_DVBT2_MISO_OFF	No MISO
DTAPI_DVBT2_MISO_TX1	TX1 only
DTAPI_DVBT2_MISO_TX2	TX2 only
DTAPI_DVBT2_MISO_SUM	TX1+ TX2 through one output channel
DTAPI_DVBT2_MISO_BOTH	Both TX1and TX2 through two output channels

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_Papr

The peak to average power reduction method. This is used to fill PAPR field in the L1-post signalling block.

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

m_BwtExt

If true, the extended carrier mode is used.

m_PilotPattern

The Pilot Pattern used.

Value	Meaning
DTAPI_DVBT2_PP_1	PP1
DTAPI_DVBT2_PP_2	PP2
DTAPI_DVBT2_PP_3	PP3
DTAPI_DVBT2_PP_4	PP4
DTAPI_DVBT2_PP_5	PP5

DTAPI_DVBT2_PP_6	PP6
DTAPI_DVBT2_PP_7	PP7
DTAPI_DVBT2_PP_8	PP8

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

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

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

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

m_T2SystemId
T2 system ID. Unique identification of the T2 system. The valid range is 0 … 0xFFFF.

m_L1Repetition
If true, L1 signalling is provided for the next frame.

m_NumT2Frames
The number of T2 frames in a super frame. The valid range is 1 … 255.

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

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

m_ComponentStartTime
Specifies the offset in number of T-units at which the T2 component starts. Note: it should be set to 0 for the first component.

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

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

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

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

m_FefLength
The length of a FEF-part in number of T-units (= samples). For the base profile the valid range is 0 … 0x3FFFFF, for the lite profile the valid range is 0 … 0xFFFFFF.

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

m_FefSignal
The type of signal generated during the FEF period.

Value	Meaning
DTAPI_DVBT2_FEF_ZERO	Zero I/Q samples
DTAPI_DVBT2_FEF_1K_OFDM	1K OFDM symbols with 852 active carriers containing BPSK symbols
DTAPI_DVBT2_FEF_1K_OFDM_384	1K OFDM symbols with 384 active carriers containing BPSK symbols

m_NumRfChans
The number of frequencies in the T2 system. The valid range is 1 … **DTAPI_DVBT2_NUM_RF_MAX**.

m_RfChanFreqs
Array specifying the center frequencies of the RF channels. This is only used to fill the L1-post FREQUENCY fields. The valid range is 1 … 0xFFFFFFFF.

m_NumPlps
Specifies the number of physical layer pipes in the T2 system. The valid range is 1 … **DTAPI_DVBT2_NUM_PLP_MAX**. Must be set to '1' in case not using the Multi-PLP modulator.

m_Plps
Vector specifying the DVB-T2 modulation parameters for the PLPs.

m_PlpInputs
Vector specifying the PLP input streams. This is only used in case of using the Multi-PLP modulator. Default the FIFO index and PLP index maps 1:1 and "Big-TS splitting" is disabled.

m_Aux
Specifies the AUX stream parameters.
By default, the generation of AUX streams is disabled.

m_PaprPars
Specifies the PAPR reduction parameters.
By default, PAPR reduction is disabled.

m_TxSignature
Specifies the transmission of the DVB-T2 transmitter signature.
By default, the transmission of a transmitter signature is disabled.

m_RbmValidation
Specifies the Receiver Buffer Model validation. This can only be used with the Multi-PLP modulator.
By default, RBM-validation is disabled.

m_TpOutput
Specifies the generation of test point data.

DtDvbT2Pars

Class describing parameters for DVB-T2 modulation, it describes the modulation parameters of a DVB-T2 component and optionally the parameters of a second component (e.g. base and a lite profile). The class **DtDvbT2ComponentPars** describes the component parameters.

```
class DtDvbT2Pars : public DtDvbT2ComponentPars
{
  int  m_NumFefComponents;   // Number of DVB-T2 components in FEF part
  DtDvbT2ComponentPars  m_FefComponent[1];
                             // Parameters for a second DVB-T2 component

  DtVirtualOutPars  m_VirtOutput;
                             // Virtual-output parameters
  DtDvbT2MiPars  m_T2Mi;     // T2-MI output parameters
};
```

Inherited Public members

The public members inherited from **DtDvbT2ComponentPars** describe the modulation parameters for the first DVB-T2 component; see description of **class DtDvbT2ComponentPars**.

Public members

m_NumFefComponents
: The number of DVB-T2 components transmitted in the FEF part of the first DVB-T2 component. The parameters for these DVB-T2 components are specified in *m_FefComponent*. The valid range is 0 … 1.

m_FefComponent
: Array specifying the DVB-T2 modulation parameters for the DVB-T2 components transmitted in the FEF part of the first DVB-T2 component.

m_VirtOutput
: When the output channel has been attached to a virtual output, *m_VirtOutput* specifies the virtual output data parameters. This can only be used with the Multi-PLP modulator.
By default, the virtual output parameters are disabled.

m_T2Mi
: Specifies the parameters for generation of T2-MI. This can only be used with the Multi-PLP modulator.
By default, the output of T2-MI is disabled.

Remarks

This class is used both for the initialization of the multi-PLP modulator and the traditional single-PLP DVB-T2 modulator. The **DtOutpChannel::SetModControl()** method sets the parameters for the single-PLP DVB-T2 modulator. Thereafter **DtOutpChannel::Write** method is used to write the data to the output channel.

The **DtMplpOutpChannel::SetModControl()** method sets the parameters for the multi-PLP DVB-T2 modulator. The multi-PLP modulator can be used for both single-PLP and multi-PLP parameter sets. The **DtMplpOutpChannel::WriteMplp** method is used to write data to the output channel.

DtDvbT2Pars::CheckValidity

Check DVB-T2 parameters for validity.

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

Parameters

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameters are valid
DTAPI_E_BIAS_BAL_CELLS	Invalid number of bias balancing cells
DTAPI_E_BUFS	Invalid BUFS values
DTAPI_E_COMMON_PLP_COUNT	More than one common PLP per group ID
DTAPI_E_COMP_OVERLAP	The fames of two components (lite and base profile) overlap.
DTAPI_E_FEF	Error in FEF parameters
DTAPI_E_FIXED_CELL_PARS	Invalid fixed cell parameters
DTAPI_E_FRAME_INTERVAL	Frame interval must divide number of T2 frames
DTAPI_E_INVALID_BWT_EXT	Invalid bandwidth extension
DTAPI_E_INVALID_FFTMODE	Invalid FFT mode
DTAPI_E_INVALID_GUARD	Invalid guard interval
DTAPI_E_INVALID_NUMDTSYM	Invalid number of data symbols
DTAPI_E_INVALID_NUMT2FRM	Invalid number of T2 frames
DTAPI_E_INVALID_PARS	Invalid parameter value (generic error)
DTAPI_E_INVALID_TIME_IL	Invalid time interleaver length
DTAPI_E_MULTI_COMPS	Invalid mix of parameters in multi component configuration
DTAPI_E_NO_TSRATE	PLP TS-rate is not specified
DTAPI_E_NUM_PLP	Too many PLPs (i.e. L1 data too large)
DTAPI_E_OTHER_PLP_IN_BAND	Invalid PLP ID in m_OtherPlpInBand array
DTAPI_E_PILOT_PATTERN	Pilot pattern not allowed in combination with other parameters
DTAPI_E_PLP_ID	Duplicate PLP IDs
DTAPI_E_PLP_NUM_BLOCKS	Invalid number of PLP blocks (not enough bandwidth)
DTAPI_E_SUBSLICES	Number of subslices and/or TIME_IL_LENGTH does not give an integer number of cells per subslice
DTAPI_E_T2_LITE	Invalid T2 lite profile parameters
DTAPI_E_TI_MEM_OVF	Too many cells in time interleaver

DtDvbT2Pars::GetParamInfo

Get the DVB-T2 “derived” parameters.

```
DTAPI_RESULT DtDvbT2Pars::GetParamInfo(
 [out] DtDvbT2ParamInfo&  ParamInfo   // (First) T2-component information
);
DTAPI_RESULT DtDvbT2Pars::GetParamInfo(
 [out] DtDvbT2ParamInfo&  ParamInfo1, // First T2-component information
 [out] DtDvbT2ParamInfo&  ParamInfo2  // Second T2-component information
);
```

Parameters

ParamInfo, ParamInfo1

Output parameter that receives the DVB-T2 “derived” parameters of the first component.

ParamInfo2

Output parameter that receives the DVB-T2 “derived” parameters of the second component.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameters are valid
Other result values	Error in modulation parameters, please refer to **DtDvbT2Pars::CheckValidity**

DtDvbT2Pars::OptimisePlpNumBlocks

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

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

Parameters

ParamInfo

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

OptPlpNumBlocks

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

OptNumDataSyms

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

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameters are valid
Other result values	Error in modulation parameters, please refer to **DtDvbT2Pars::CheckValidity**

Remarks

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

Class DtIsdbTmmPars

Class specifying parameters for ISDB-Tmm modulation.

```
class DtIsdbTmmPars
{
  int  m_Bandwidth;          // Bandwidth (channel raster)
  int  m_SubChannel;         // Sub-channel of the center segment
  // TS parameters
  int  m_NumTss;             // Number of transport streams
  DtIsdbtPars  m_Tss[DTAPI_ISDBT_NUM_TS_MAX];
  DtPlpInpPars  m_TsInputs[DTAPI_ISDBT_NUM_TS_MAX];
  // Virtual output
  DtVirtualOutPars  m_VirtOutput;
};
```

Public members

m_Bandwidth

Channel raster of the network.

Value	Meaning
DTAPI_ISDBT_BW_6MHZ	6 MHz
DTAPI_ISDBT_BW_7MHZ	7 MHz
DTAPI_ISDBT_BW_8MHZ	8 MHz

m_SubChannel

Sub channel of the center segment of the spectrum, which implicitly specifies the sub-channels of the 1-segment streams in the signal. The valid range is 0 … 41.

m_NumTss

Specifies the number of transport streams in the ISDB-Tmm system. The valid range is 0 … **DTAPI_ISDBT_NUM_TS_MAX**.

m_Tss

An array of **DtIsdbtPars**, specifying the modulation parameters for each transport stream. The index in the array is related to the index of the transport stream in the ISDB-Tmm system.
See the description of struct **DtIsdbtPars** in "DTAPI Reference – Core Classes".

m_TsInputs

Array specifying the input transport streams. The index in the array is related to the index of the transport stream in the ISDB-Tmm system.

m_VirtOutput

In case of a virtual output *m_VirtOutput* specifies the virtual output data parameters.

Remarks

This class is only used for the initialization of the multi-PLP modulator. The class **DtIsdbtPars** can be used to initialize the traditional single-PLP modulator.

DtIsdbTmmPars::CheckValidity

Check ISDB-T parameters for validity.

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

Parameters

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Parameters are valid
DTAPI_E_INVALID_BANDWIDTH	Invalid value for bandwidth or not equal for all streams
DTAPI_E_INVALID_BTYPE	Invalid value for broadcast type
DTAPI_E_INVALID_GUARD	Invalid value for guard-interval length or not equal for all streams
DTAPI_E_INVALID_MODE	Invalid value for transmission mode or not equal for all streams
DTAPI_E_INVALID_NUMSEGM	Number of segments is more than 33 or the number of segments in a streams is not equal to 1, 3 or 13, or number of segments is invalid for the current broadcast type does not match number of segments specified in m_LayerPars
DTAPI_E_INVALID_PARTIAL	'Partial Reception' is selected for a stream but the number of segments in layer A is not 1
DTAPI_E_INVALID_SIZE	'No hierarchical multiplexing' (use TMCC) is selected for a stream where the input type is 188-byte TS packets
DTAPI_E_INVALID_SUBCH	Invalid sub-channel number

DtTpWriteDataFunc

User-supplied callback function used for the processing of test-point data. The data can be written to a file, or processed otherwise.

```
void  DtTpWriteDataFunc(
  [in] void*  pOpaque,        // Opaque pointer
  [in] int  TpIndex,          // Test point
  [in] int  StreamIndex       // Stream index
  [in] const void*  pBuffer,  // Test-point data buffer
  [in] int  Length,           // Number of data items
  [in] int  Format,           // Test point data format
  [in] float  Mult,           // Multiplication factor
  [in] int  IsNewFrame        // New frame (yes/no)
);
```

Parameters

pOpaque

The opaque pointer that was specified in **DtTestPointOutPars**.

TpIndex

Specifies the test point.

For DVB-C2 the following test points are defined:

Value	Meaning
DTAPI_DVBC2_TPnn	DVB-C2 test point nn

Where nn is: 07, 08, 10, 13, 15, 18, 20, 22, 26, 27, 31, 32, 33, 37, 40, 41 and 42.

For DVB-T2 the following test points are defined:

Value	Meaning
DTAPI_DVBT2_TPnn	DVB-T2 test point nn

Where nn is: 03, 04, 06, 08, 09, 11, 12, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30, 32, 33, 34, 50, 51 and 53.

StreamIndex

Identifies the stream. For DVB-C2 bits 0..7 specify the PLP-ID and bits 8..15 specify the data slice I. For DVB-T2 bits 0..7 specify the PLP-index and bit 8 is set when the PLP-type is a common PLP.

pBuffer

Pointer to a buffer containing the test point data.

Length

Number of test points data items available in buffer.

Format

The data format of the test-point data items.

Value	Meaning
DTAPI_TP_FORMAT_HEX	Byte data
DTAPI_TP_FORMAT_BIT	Bit data. Eight bits are packaged per byte, most significant bit first
DTAPI_TP_FORMAT_CFLOAT32	Complex 32-bit floating-point data of type **DtComplexFloat**
DTAPI_TP_FORMAT_INT64	64-bit integer data

Mult

Multiplication factor for the complex floating point data.

IsNewFrame

If true, the test point data relates to a new frame.

::DtapiModPars2TsRate

Compute Transport-Stream rate from modulation parameters. There are three new overloads one for DVB-C2, one for DVB-T2 and one for ISDB-Tmm modulation type.

```
// Overload to be used for DVB-C2
DTAPI_RESULT ::DtapiModPars2TsRate(
 [out] int&  TsRate          // Computed Transport-Stream rate
  [in] DtDvbC2Pars  C2Pars,  // DVB-C2 modulation parameters
  [in] int  PlpIdx           // PLP index
);
// Overload to be used for DVB-T
DTAPI_RESULT ::DtapiModPars2TsRate(
 [out] int&  TsRate          // Computed Transport-Stream rate
  [in] DtDvbTPars  TPars,    // DVB-T modulation parameters
  [in] int  Idx              // Idx=0: high priority stream; idx=1 low
                             // priority stream
);
// Overload to be used for DVB-T2
DTAPI_RESULT ::DtapiModPars2TsRate(
 [out] int&  TsRate          // Computed Transport-Stream rate
  [in] DtDvbT2Pars  T2Pars,  // DVB-T2 modulation parameters
  [in] int  PlpIdx           // PLP index
);
// Overload to be used for ISDB-Tmm
DTAPI_RESULT ::DtapiModPars2TsRate(
 [out] int&  TsRate          // Computed Transport-Stream rate
  [in] DtIsdbTmmPars TmmPars, // ISDB-Tmm modulation parameters
  [in] int  TsIdx            // TS index
);
```

Parameters

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

C2Pars
DVB-C2 modulation parameters; see description of **class DtDvbC2Pars**.

TPars
DVB-T2 modulation parameters; see the description of struct **DtDvbTPars** in "DTAPI Reference – Core Classes".

T2Pars
DVB-T2 modulation parameters; see description of **class DtDvbT2Pars**.

TmmPars
ISDB-Tmm modulation parameters; see description of **class DtIsdbTmmPars**.

PlpIdx
The index of the PLP for which the Transport-Stream rate is computed.

TsIdx

The index of the TS in the ISDB-Tmm system for which the Transport-Stream rate is computed.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	The TS rate has been computed from the modulation parameters successfully
Other result values	Error in modulation parameters, please refer to **DtDvbC2Pars::CheckValidity** , **DtDvbT2Pars::CheckValidity** and **DtIsdbTmmPars::CheckValidity**

DtMplpOutpChannel

Class representing a multi-PLP modulator for modulation of DVB-C2, DVB-T2 and ISDB-Tmm signals. Class **`DtMplpOutpChannel`** is derived from **`DtOutpChannel`**. For the inherited methods, please refer to the DTAPI documentation.

```
class DtMplpOutpChannel : public DtOutpChannel;
```

DtMplpOutpChannel::AttachVirtual

Attach the output-channel object to a virtual output using the licenses of a particular device. A virtual output lets the user pass the output data to the specified callback function, instead of DTAPI writing the data to a physical output.

```
DTAPI_RESULT DtMplpOutpChannel::AttachVirtual(
  [in] DtDevice*  pDtDevice, // Object representing a DekTec device
  [in] bool (*pFunc)(void*, DtVirtualOutData*),
                             // Pointer to the callback function
  [in] void*  pOpaque        // Opaque pointer for the callback function
);
```

Parameters

pDtDvc

Pointer to the object that represents a DekTec device. The **DtDevice** object must be attached to the device hardware. The device is used only for reading licenses.

pFunc

Pointer to the callback function that will handle the generated output data. When the virtual-output calls this function the opaque pointer and a pointer to a **DtVirtualOutData** struct describing the output data are passed. To prevent hanging of the application, the callback function is not allowed to block. In case the callback function has to wait for a certain condition, it can return the Boolean value false. After a few milliseconds the virtual-output will call this function again with the same parameters and will repeat this until the callback function returns the Boolean value true.

pOpaque

Opaque pointer that is passed to the callback function.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Channel object has been attached successfully
DTAPI_E_ATTACHED	The channel object is already attached a hardware function
DTAPI_E_DEVICE	The **DtDevice** pointer is not valid or the **DtDevice** object is not attached to the device hardware
DTAPI_E_INVALID_ARG	The value of one of the parameters is invalid

Remarks

The intended usage for this method is to allow the user to output the multi-PLP modulator result to file or to a specific device. The licenses are taken from the DekTec device.

DtMplpOutpChannel::GetMplpFifoFree

Get the number of free bytes in the specified multi-PLP modulator FIFO.

```
DTAPI_RESULT DtMplpOutpChannel::GetMplpFifoFree(
  [in] int   FifoIndex        // FIFO index
 [out] int&  FifoFree         // Number of free bytes in the FIFO
);
```

Parameters

FifoIndex
Specifies the FIFO index.

FifoFree
Free space in the specified multi-PLP modulator FIFO, in number of bytes.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	FIFO free has been retrieved successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached

Remarks

If a Data transfer is in progress and/or the transmit-control state is **DTAPI_TXCTRL_HOLD** or **DTAPI_TXCTRL_SEND**, then every call to **GetMplpFifoFree** may return a different value.

DtMplpOutpChannel::GetMplpFifoSize

Get the current size of the multi-PLP modulator FIFO.

```
DTAPI_RESULT DtMplpOutpChannel::GetMplpFifoSize(
  [in] int  FifoIndex        // FIFO index
 [out] int&  FifoSize        // Size of Transmit FIFO in bytes
);
```

Parameters

FifoIndex
Specifies the FIFO index.

FifoSize
Size of the multi-PLP modulator FIFO in number of bytes.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	FIFO size has been retrieved successfully
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

Remarks

The size of the multi-PLP modulator FIFOs is fixed, it cannot be changed.

DtMplpOutpChannel::GetMplpModStatus

Get the status of the multi-PLP modulator. There are overloads for DVB-C2 and for DVB-T2.

```
DTAPI_RESULT DtMplpOutpChannel::GetMplpModStatus(
 [out] DtDvbC2ModStatus*  pDvbC2ModStat         // Status of DVB-C2
modulator
);
DTAPI_RESULT DtMplpOutpChannel::GetMplpModStatus(
 [out] DtDvbT2ModStatus*  pDvbT2ModStat         // Status of DVB-T2
modulator
);
DTAPI_RESULT DtMplpOutpChannel::GetMplpModStatus(
 [out] DtDvbT2ModStatus*  pDvbT2ModStat1        // Status of DVB-T2
modulator for the first component
 [out] DtDvbT2ModStatus*  pDvbT2ModStat2        // Status of DVB-T2
modulator for the second component
);
```

Parameters

pDvbC2ModStat

DVB-C2 modulator status; see description of **struct DtDvbC2ModStatus**.

pDvbT2ModStat, pDvbT2ModStat1

DVB-T2 modulator status for the first component; see description of **struct DtDvbT2ModStatus**.

pDvbT2ModStat2

DVB-T2 modulator status for the second component; see description of **struct DtDvbT2ModStatus**.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	The status of the MPLP modulator has been retrieved successfully
DTAPI_E_IDLE	Not allowed when in IDLE state
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	The currently active modulator does not support the request

Remarks

DtMplpOutpChannel::SetMplpChannelModelling

Set channel-modelling parameters. This function may only be called when using the multi-PLP modulator while the transmit-control state is **DTAPI_TXCTRL_IDLE**.

```
DTAPI_RESULT DtMplpOutpChannel::SetMplpChannelModelling(
  [in] bool   CmEnable,          // Enable/disable channel modelling
  [in] DtCmPars&  CmPars         // Channel modelling parameters
  [in] int   ChannelIdx=0        // Output channel index
);
```

Parameters

CmEnable

Enable channel modelling. This parameter provides an easy way to turn off channel modelling entirely for the specified output channel.

CmPars

Channel-modelling parameters. See description of struct **DtCmPars** in "DTAPI Reference – Core Classes".

ChanneIdx

Index of the output channel (e.g. to specify the channel modelling parameters for the individual transmitters in case of MISO).

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Channel-modelling parameters have been applied successfully
DTAPI_E_CM_NUMPATHS	The number of paths specified in **CmPars** exceeds the maximum number of paths
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	The channel has no license for channel-modelling, or channel modelling is not supported for this type of channel

Remarks

DtMplpOutpChannel::SetModControl

Set modulation-control parameters for modulator channels. There are five overloads defined for the multi-PLP modulator output: ATSC 3.0, DVB-C2, DVB-T, DVB-T2 and one for ISDB-Tmm.

```
// Overload to be used for ATSC 3.0
DTAPI_RESULT DtMplpOutpChannel::SetModControl(
  [in] DtAtsc3Pars&  Atsc3Pars     // ATSC 3.0 modulation parameters
);
// Overload to be used for DVB-C2
DTAPI_RESULT DtMplpOutpChannel::SetModControl(
  [in] DtDvbC2Pars&  DvbC2Pars     // DVB-C2 modulation parameters
);
// Overload to be used for DVB-T
DTAPI_RESULT DtMplpOutpChannel::SetModControl(
  [in] DtDvbTPars&  DvbTPars // DVB-T modulation parameters
);
// Overload to be used for DVB-T2
DTAPI_RESULT DtMplpOutpChannel::SetModControl(
  [in] DtDvbT2Pars&  DvbT2Pars     // DVB-T2 modulation parameters
);
// Overload to be used for ISDB-Tmm
DTAPI_RESULT DtMplpOutpChannel::SetModControl(
  [in] DtIsdbTmmPars&  IsdbTmmPars// ISDB-Tmm modulation parameters
);
```

Parameters

Atsc3Pars
ATSC 3.0 modulation parameters; see description of **class DtAtsc3Pars**.

DvbC2Pars
DVB-C2 modulation parameters; see description of **class DtDvbC2Pars**.

DvbTPars
DVB-T modulation parameters; see the description of struct **DtDvbTPars** in "DTAPI Reference – Core Classes".

DvbT2Pars
DVB-T2 modulation parameters; see description of **class DtDvbT2Pars**.

IsdbTmmPars
ISDB-Tmm modulation parameters; see description of **class DtIsdbTmmPars**.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	The modulation parameters have been set successfully
DTAPI_E_DEV_DRIVER	Unclassified failure in device driver
DTAPI_E_IDLE	Transmit-control state is not **DTAPI_TXCTRL_IDLE**;

	The requested modulation parameters can only be set in idle state
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function
DTAPI_E_NOT_SUPPORTED	The output channel does not support the specified modulation type

Remarks

For DVB-T no FIFO index is specified through `DvbTPars`. FIFO index 0 is used for the high priority stream and if DVB-T hierarchical modulation is enabled, FIFO index 1 is used for the low priority stream.

DtMplpOutpChannel::WriteMplp

Write data to a multi-PLP modulator FIFO.

```
DTAPI_RESULT DtMplpOutpChannel::WriteMplp(
  [in] int   FifoIdx,          // FIFO index
  [in] char*  pBuffer,         // Pointer to data to be written to the FIFO
  [in] int   NumBytesToWrite // Number of bytes to be written
);
```

Parameters

FifoIndex
Specifies the FIFO index.

pBuffer
Pointer to the buffer containing the data to be written to the multi-PLP modulator FIFO. The pointer must be aligned to a 32-bit word boundary.

NumBytesToWrite
Number of bytes to be to be written to the multi-PLP modulator FIFO. The buffer size must be positive and a multiple of four.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Write operation has been completed successfully
DTAPI_E_INVALID_BUF	The buffer is not aligned to a 32-bit word boundary
DTAPI_E_INVALID_FIFO_IDX	Invalid FIFO index. FIFO index has not been specified in **DtMplpOutpChannel::SetModControl** parameters
DTAPI_E_INVALID_SIZE	The specified transfer size is negative or not a multiple of four
DTAPI_E_IDLE	Cannot write data because transmission-control state is **DTAPI_TXCTRL_IDLE**
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

Remarks

The data buffer can be any buffer in user space. The data is only written when the transmit-control state is **DTAPI_TXCTRL_HOLD** or **DTAPI_TXCTRL_SEND** (see **DtOutpChannel::SetTxControl()**), *and* sufficient space is available in the FIFO. **WriteMplp()** returns when all data has been transferred to the multi-PLP modulator FIFO.

The data from a multi-PLP modulator FIFO is only transferred to the modulator when all multi-PLP modulator FIFOs carrying transport packets (data type **TS188** or **TS204**) have data to contribute. The contribution of multi-PLP modulator FIFOs carrying GSE-packets (data type **GSE**) is optional.

For this reason the thread executing **WriteMplp()** will sleep forever if *NumBytesToWrite* is greater than the number of free bytes in the MPLP FIFO and one of the other MPLP FIFOs (data type **TS188** or **TS204**) is empty.

DtMplpOutpChannel::WriteMplpPacket

Write a GSE- or ALP-packets to a multi-PLP modulator FIFO.

```
DTAPI_RESULT DtMplpOutpChannel::WriteMplpPacket(
  [in] int  FifoIdx,          // FIFO index
  [in] char*  pPacket,        // Packet to be written to the FIFO
  [in] int  PacketSize        // Size of the packet
);
DTAPI_RESULT DtMplpOutpChannel::WriteMplpPacket(
  [in] int  FifoIdx,          // FIFO index
  [in] char*  pPacket,        // Packet to be written to the FIFO
  [in] int  PacketSize        // Size of the packet
  [in] FractionInt  Duration // Duration of the packet
);
```

Parameters

FifoIndex

Specifies the FIFO index.

pPacket

Pointer to one data packet (ALP or GSE).
For details on the GSE-packet data format, see DTAPI Manual – Overview and Data Formats.pdf. For details on the ALP-packet data format, see ATSC: "Link-Layer Protocol" Doc. A/330.

PacketSize

Size of the data packet to be written to the multi-PLP modulator FIFO.

Duration

The duration of the data packet in seconds. It defines the earliest moment a next packet can be transmitted.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Write operation has been completed successfully
DTAPI_E_INVALID_BUF	The buffer is not aligned to a 32-bit word boundary
DTAPI_E_INVALID_FIFO_IDX	Invalid FIFO index. FIFO index has not been specified in **DtMplpOutpChannel::SetModControl** parameters
DTAPI_E_INVALID_INP_TYPE	The data type of the FIFO is not ALP nor GSE
DTAPI_E_INVALID_SIZE	The specified transfer size is negative or larger than the maximum packet size
DTAPI_E_IDLE	Cannot write data because transmission-control state is **DTAPI_TXCTRL_IDLE**
DTAPI_E_NOT_ATTACHED	Channel object is not attached to a hardware function

Remarks

The data buffer can be any buffer in user space. The data is only written when the transmit-control state is **DTAPI_TXCTRL_HOLD** or **DTAPI_TXCTRL_SEND** (see **DtOutpChannel::SetTxControl()**),

and sufficient space is available in the FIFO. **`WriteMplpPacket()`** returns when all data has been transferred to the multi-PLP modulator FIFO.

The data from a multi-PLP modulator FIFO is only transferred to the modulator when all multi-PLP modulator FIFOs carrying transport packets (data type **`TS188`** or **`TS204`**) have data to contribute. The contribution of multi-PLP modulator FIFOs carrying GSE- or ALP-packets (data type **`GSE`** or **`ALP`**) is optional.

For this reason the thread executing **`WriteMplpPacket()`** will sleep forever if *`PacketSize`* is greater than the number of free bytes in the MPLP FIFO and one of the other MPLP FIFOs (data type **`TS188`** or **`TS204`**) is empty.