DTAPI

Matrix API

REFERENCE

April 2013

Table of Contents

Structures

Struct DtVidStdInfo

This structure describes a video standard (i.e. defines its properties).

```
struct DtVidStdInfo
{
  int  m_VidStd;              // Video standard
  bool  m_IsHd;               // HD (=true) or SD (=false)
  bool  m_IsInterlaced;       // Interlaced (=true) or progressive
                              // (=false)
  int  m_NumLines;            // Number of lines per frame
  double  m_Fps;              // Framerate
  bool  m_IsFractional;       // Fractional (=true) or integer framerate
  int  m_FrameNumSym;         // # of symbols per frame
  int  m_LineNumSym;          // # of symbols per line
  int  m_LineNumSymHanc;      // # of hanc symbols per line
  int  m_LineNumSymVanc;      // # of vanc symbols per line
  int  m_LineNumSymEav;       // # of EAV symbols per line
  int  m_LineNumSymSav;       // # of SAV symbols per line
  int  m_Field1StartLine;     // First line of field 1
  int  m_Field1EndLine;       // Last line of field 1
  int  m_Field1VidStartLine; // First video line of field 1
  int  m_Field1VidEndLine;    // Last video line of field 1
  int  m_Field2StartLine;     // First line of field 2
  int  m_Field2EndLine;       // Last line of field 2
  int  m_Field2VidStartLine; // First video line of field 2
  int  m_Field2VidEndLine;    // Last video line of field 2
};
```

Members

m_VidStd
Video standard described. See **::DtapiGetVidStdInfo** for a list of all possible standards.

m_IsHd
Indicates whether the standard has a HD (**true**) or SD (**false**) format.

m_IsInterlaced
Indicates whether the standard is interlaced (**true**) or progressive (**false**). For interlaced formats the field 2 (even field) members should be ignored.

m_NumLines
Number of SDI lines per frame

m_Fps
The frame rate

m_IsFractional
Indicates whether the standard has a fractional frame rate (**true**) or not (**false**).

m_FrameNumSym
Total number of symbols in a frame

m_LineNumSym
Number of symbols per line

m_LineNumSymHanc
Number of HANC symbols per line (for HD, SUM of both streams)

m_LineNumSymVanc
Number of VANC symbols per line (for HD, SUM of both streams)

m_LineNumSymEav
Number of EAV symbols per line (for HD, SUM of both streams)

m_LineNumSymSav
Number of SAV symbols per line (for HD, SUM of both streams)

m_Field1StartLine
First line of field 1 (odd). NOTE: this is a 1 based index.

m_Field1EndLine
Last line of field 1 (odd). NOTE: this is a 1 based index.

m_Field1VidStartLine
First line of the active video section in field 1 (odd). NOTE: this is a 1 based index.

m_Field1VidEndLine
Last line of the active video section in field 1 (odd). NOTE: this is a 1 based index.

m_Field2StartLine
First line of field 2 (odd). NOTE: this is a 1 based index.

m_Field2EndLine
Last line of field 2 (odd). NOTE: this is a 1 based index.

m_Field2VidStartLine
First line of the active video section in field 2 (odd). NOTE: this is a 1 based index.

m_Field2VidEndLine
Last line of the active video section in field 2 (odd). NOTE: this is a 1 based index.

Struct DtBufferInfo

Structure describing the status of a frame buffer.

```
struct DtBufferInfo
{
   int   m_VidStd;              // Current video standard
   int   m_NumColums;           // Depth of buffer (in # frames/columns)
   __int64   m_NumReceived;     // # of received frames
   __int64   m_NumDropped;      // # of dropped frames
   __int64   m_NumNumTransmitted; // # of frames transmitted
   __int64   m_NumDuplicated;   // # of duplicated frames
};
```

Members

m_VidStd
Video standard current set for the frame buffer.

m_NumColumns
Depth of the frame buffer in # frames/columns

m_NumReceived
Total # of frames received

m_NumDropped
Total # of frames dropped

m_NumTransmitted
Total # of frames transmitted

m_NumDuplicated
Total # of duplicated frames

Global Functions

::DtapiGetVidStdInfo

Returns the properties for the specified video standard.

```
DTAPI_RESULT ::DtapiGetVidStdInfo(
  [in] int  VidStd           // Video standard
 [out] DtVidStdInfo  Info,   // Returns the properties
);
```

Parameters

VidStd

Video standard

Value	SMPTE	Resolution	FPS	Remark
DTAPI_VIDSTD_UNKNOWN	-	-	-	Unknown video standard
DTAPI_VIDSTD_525I59_94	SMPTE-259	720x480	29.97	Interlaced
DTAPI_VIDSTD_625I50	SMPTE-259	720x576	25.0	Interlaced
DTAPI_VIDSTD_720P23_98	SMPTE-296	1280x720	23.98	Progressive
DTAPI_VIDSTD_720P24	SMPTE-296	1280x720	24.0	Progressive
DTAPI_VIDSTD_720P25	SMPTE-296	1280x720	25.0	Progressive
DTAPI_VIDSTD_720P29_97	SMPTE-296	1280x720	29.97	Progressive
DTAPI_VIDSTD_720P30	SMPTE-296	1280x720	30.0	Progressive
DTAPI_VIDSTD_720P50	SMPTE-296	1280x720	50.0	Progressive
DTAPI_VIDSTD_720P59_94	SMPTE-296	1280x720	59.94	Progressive
DTAPI_VIDSTD_720P60	SMPTE-296	1280x720	60.0	Progressive
DTAPI_VIDSTD_1080P23_98	SMPTE-274	1920x1080	23.98	Progressive
DTAPI_VIDSTD_1080P24	SMPTE-274	1920x1080	24.0	Progressive
DTAPI_VIDSTD_1080P25	SMPTE-274	1920x1080	25.0	Progressive
DTAPI_VIDSTD_1080P30	SMPTE-274	1920x1080	30.0	Progressive
DTAPI_VIDSTD_1080P29_97	SMPTE-274	1920x1080	29.97	Progressive
DTAPI_VIDSTD_1080I50	SMPTE-274	1920x1080	25.0	Interlaced
DTAPI_VIDSTD_1080I59_94	SMPTE-274	1920x1080	29.97	Interlaced
DTAPI_VIDSTD_1080I60	SMPTE-274	1920x1080	30.0	Interlaced
DTAPI_VIDSTD_1080P50	SMPTE-274	1920x1080	50.0	Progressive
DTAPI_VIDSTD_1080P59_94	SMPTE-274	1920x1080	59.94	Progressive
DTAPI_VIDSTD_1080P60	SMPTE-274	1920x1080	60.0	Progressive

Info

This parameter receives the properties of the video standard.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Video properties have been returned
DTAPI_E_INVALID_VIDSTD	Invalid/unknown video standard was specified

::DtapiGetRequiredUsbBandwidth

Returns the properties for the specified video standard.

```
DTAPI_RESULT ::DtapiGetVidStdInfo(
  [in] int  VidStd           // Video standard
  [in] int  RxMode           // RxMode
 [out] long long&  Bw,       // Returns the required bandwidth
);
```

Parameters

VidStd

Video standard. See DtapiGetVidStdInfo() for a list of valid video standards.

RxMode

The RxMode you intend to use. See DtFrameBuffer::SetRxMode for a list of valid RxModes.

Bw

The bandwidth that is required for the given combination of video standard and RxMode. The bandwidth is in bits/s and can directly be used as argument for SetIoConfig(DTAPI_IOCONFIG_BW).

AncPacket

Object representing an ancillary data packet.

```
class AncPacket {
      int  m_Did;           // Data identifier
      int  m_SdidOrDbn;     // Secondary data id / Data block number
      int  m_Dc;            // Data count
      int  m_Cs;            // Checksum
      unsigned short*  m_pUdw;  // User data words
};
```

Public members

m_Did
Data identifier for ancillary data packet

m_SdidOrDbn
Data block number or secondary data identifier depending on whether it is Type 1 or Type 2 packet

m_Dc
Data count (i.e. number of user words in the packet)

m_Cs
Checksum

m_pUdw
Pointer to buffer holding the user data words. Create/initialise this buffer using the **`AncPacket::Create`** method and destroy it using the **`AncPacket::Destroy`** method.

Remarks

None

AncPacket::Create

Allocates a buffer for the user data and optionally initialises the buffer from a supplied buffer with user data.

```
void AncPacket::Create (
  [in] int  NumWords          // Size of buffer to create
);
// OVERLOAD: just create from supplied buffer
void AncPacket::Create (
  [in] unsigned short*  pUserWords,  // init from this buffer
  [in] int  NumWords          // # of words to copy
);
```

Parameters

NumWords

Size (in # of words) of buffer to allocate.

pUserWords

Pointer to a buffer with data that should be copied to the **AncPacket** object.
NOTE: *m_Dc* will be initialised to *NumWords* in this case.

Remarks

None

AncPacket::Destroy

Destroys (frees) the allocated user data word buffer.

```
void AncPacket::Destroy ();
```

Remarks

None

AncPacket::Size

Returns the size of the user buffer (i.e. the maximum number of user words that can be stored in **AncPacket::m_pUdw**).

```
int AncPacket::Size () const;
```

Remarks

None

AncPacket::Type

Returns the type of packet (Type 1 or Type 2).

```
int AncPacket::Type () const;
```

Remarks

None

DtFrameBuffer::AncAddAudio

Function for adding audio samples to the ancillary data area of the specified frame.

```
DTAPI_RESULT DtFrameBuffer::AncAddAudio (
  [in] __int64   Frame,       // Frame number
  [in] unsigned char*  pBuf, // Buffer with audio samples
 [i/o] int&  BufSize,         // Size of buffer
  [in] int   Format,          // Audio format
  [in] int   Channels,        // Valid channels
  [in] int   AudioGroup       // Audio group the samples should be added to
);
```

Parameters

Frame

Frame number of the SDI frame the audio should be added too.

pBuf

Buffer with the audio samples

BufSize

Size (in bytes) of the supplied buffer with audio samples. This parameter returns the number of bytes actually added from the buffer (can be less than the size of the buffer if max number of audio samples have been added to the frame).

Format

Specifies the format of the audio samples.

Value	Meaning
DTAPI_SDI_AUDIO_PCM16	16-bit PCM audio samples
DTAPI_SDI_AUDIO_PCM32	32-bit PCM audio samples (not supported at the moment)

Channels

Specifies the audio channels included in the buffer (can be OR-ed together).

Value	Meaning
DTAPI_SDI_AUDIO_CHAN1	Channel 1 is included
DTAPI_SDI_AUDIO_CHAN2	Channel 2 is included
DTAPI_SDI_AUDIO_CHAN3	Channel 3 is included
DTAPI_SDI_AUDIO_CHAN4	Channel 4 is included
DTAPI_SDI_AUDIO_CH_PAIR 1	Channel pair 1 is included (= **DTAPI_SDI_AUDIO_CHAN1** | **DTAPI_SDI_AUDIO_CHAN2**)
DTAPI_SDI_AUDIO_CH_PAIR 2	Channel pair 2 is included (= **DTAPI_SDI_AUDIO_CHAN3** | **DTAPI_SDI_AUDIO_CHAN4**)

AudioGroup

Specifies the audio group the samples should be added to.

Value	Meaning
DTAPI_SDI_AUDIO_GROUP1	Add samples to audio group 1
DTAPI_SDI_AUDIO_GROUP2	Add samples to audio group 2
DTAPI_SDI_AUDIO_GROUP3	Add samples to audio group 3
DTAPI_SDI_AUDIO_GROUP4	Add samples to audio group 4

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Audio samples have been added to the frame
DTAPI_E_NOT_STARTED	Cannot add audio while the **DtFrameBuffer** object is idle
DTAPI_E_NOT_ATTACHED	Cannot add audio as long as the **DtFrameBuffer** object is not attached to an output
DTAPI_E_INVALID_FORMAT	The specified format is invalid/not supported
DTAPI_E_VALID_CHANNEL	An unknown audio channel has been specified
DTAPI_E_INVALID_GROUP	An unknown audio group has been specified
DTAPI_E_INVALID_FRAME	The frame number is invalid
DTAPI_E_BUF_TOO_SMALL	Buffer does not contain enough audio samples to fill the audio group. The min. number of bytes required is returned in the *BufSize* parameter.

Remarks

The audio samples will not be actually written to the frame buffer until the **DtFrameBuffer::AncCommit** method is called; until this time the audio samples are cached internally in the DTAPI and other changes can be made the ancillary data space of the frame (e.g. adding audio for another audio group or adding/deleting ancillary data packet).

If multiple channels are specified in the *Channels* parameter, then the **AncAddAudio** function expects the audio samples for the channels to be interleaved in memory. I.e. when **DTAPI_SDI_AUDIO_CH_PAIR1** is specified, the function expects: sample ch1, sample ch2, sample ch1, sample ch2, etc.

DtFrameBuffer::AncAddPacket

Function for adding ancillary data packet to the specified ancillary data space of a specific frame.

```
DTAPI_RESULT DtFrameBuffer::AncAddPacket (
  [in] __int64   Frame,        // Frame to add packet to
  [in] AncPacket&  AncPkt,     // Packet to add
  [in] int  Line,              // Line the packet should be added too
  [in] int  HancVanc,          // Add to HANC or VANC space
  [in] int  Stream             // Add to chrominance or luminance stream
);
```

Parameters

Frame
Frame number of the SDI frame the ancillary data packet should be added too.

AncPkt
Packet too add.

Line
Specifies the line the packet should be added too.

HancVanc

Specifies the ancillary data space in which the packet should be inserted.

Value	Meaning
DTAPI_SDI_HANC	Add to Horizontal ANC space
DTAPI_SDI_VANC	Add to Vertical ANC space

Stream

For HD video standards this parameter specifies the stream in which the packet should be inserted. For SD video standard this parameter should be set to -1.

Value	Meaning
DTAPI_SDI_CHROM	Add to chrominance stream
DTAPI_SDI_LUM	Add to luminance stream

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Packet was added to insertion list
DTAPI_E_NOT_STARTED	Can only be called if the **DtFrameBuffer** object has been started
DTAPI_E_NOT_ATTACHED	**DtFramebuffer** object is not attached to an output
DTAPI_E_INVALID_ANC	Invalid ancillary data space was specified
DTAPI_E_INVALID_STREAM	Invalid stream was specified
DTAPI_E_INVALID_LINE	Invalid line was specified

Remarks

The ancillary data packet will not be actually written to the frame buffer until the **DtFrameBuffer::AncCommit** method is called; until this time the ancillary data packets is cached internally in the DTAPI and other changes can be made the ancillary data space of the frame (e.g. adding audio for another audio group or adding/deleting ancillary data packet).

DtFrameBuffer::AncClear

Clear all existing data from the specified space ancillary data space.

```
DTAPI_RESULT DtFrameBuffer::AncClear (
  [in] __int64  Frame,        // Frame to clear
  [in] int  HancVanc,         // Hanc or Vanc data space
  [in] int  Stream            // stream to clear (HD-only)
);
```

Parameters

Frame

Sequence number of the frame to clear

HancVanc

Specifies which ancillary data space to clear.

Value	Meaning
DTAPI_SDI_HANC	HANC data space
DTAPI_SDI_VANC	VANC data space

Stream

Specifies which stream to clear. NOTE: this is an HD-only parameter and for SD this parameter should be set to -1.

Value	Meaning
DTAPI_SDI_CHROM	Chrominance stream
DTAPI_SDI_LUM	Luminance stream

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Existing data has been marked for deletion and will be deleted when **DtFrameBuffer::AncCommit** is called
DTAPI_E_NOT_STARTED	Can only be called if the **DtFrameBuffer** object has been started
DTAPI_E_NOT_ATTACHED	**DtFramebuffer** object is not attached to both an input and output
DTAPI_E_INVALID_ANC	Specified an invalid ancillary data space
DTAPI_E_INVALID_FRAME	The frame number is invalid
DTAPI_E_INVALID_STREAM	Specified an invalid stream (use -1 for SD)

Remarks

This function can only be used for **DtFrameBuffer** object which are part of a matrix and have both an input and output attached to it (i.e. editing scenario); it will fail in all other cases.

Upon calling this function ancillary data space will not actually be cleared yet, the actual clearing takes place when the **`DtFrameBuffer::AncCommit`** method is called (see also remarks for **`AncCommit`**).

DtFrameBuffer::AncCommit

Commit changes made to ancillary data spaces.

```
DTAPI_RESULT DtFrameBuffer::AncCommit (
  [in] __int64  Frame        // Seq # of frame
);
```

Parameters

Frame
The sequence number of the frame for which changes need to be committed

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Changes have been committed
DTAPI_E_NOT_STARTED	This method can only be called when the **DtFrameBuffer** object has been started
DTAPI_E_NOT_ATTACHED	No output attached to the **DtFrameBuffer** object
DTAPI_E_INTERNAL	Unexpected internal DTAPI error was encountered
DTAPI_E_INVALID_FRAME	The frame number is invalid

Remarks

Upon calling this method the following sequence of events will be executed:

- all existing packets marked for clearing (via **AncClear** or **AncDelPacket**) will be removed;
- audio added via **AncAddAudio** will be embedded in the HANC space;
- new ancillary data packets added via **AncAddPacket** will be inserted in ancillary data spaces

DtFrameBuffer::AncDelAudio

Delete audio from a specific group from a frame.

```
DTAPI_RESULT DtFrameBuffer::AncDelAudio (
  [in] __int64  Frame,        // Seq. # of frame
  [in] int  AudioGroup        // Audio group to delete
  [in] int  Mode              // deletion mode
);
```

Parameters

Frame

Sequence number of the frame to delete the audio from.

AudioGroup

Specifies which audio group should be deleted. See **AncAddAudio** for possible values.

Mode

Specifies the deletion mode.

Value	Meaning
DTAPI_ANC_MARK	Mark the ancillary data packets for deletion (i.e. leave it in the ancillary data space, but set the DID to 0xFF)
DTAPI_ANC_DELETE	Delete the packets from the ancillary data stream

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Audio has been deleted
DTAPI_E_NOT_STARTED	Can only be called if the **DtFrameBuffer** object has been started
DTAPI_E_NOT_ATTACHED	**DtFramebuffer** object is not attached to both an input and output
DTAPI_E_INVALID_MODE	An invalid deletion-mode has been specified
DTAPI_E_INVALID_FRAME	The frame number is invalid

DtFrameBuffer::AncDelPacket

Deletes specific ancillary data packets from a range of SDI lines.

```
DTAPI_RESULT DtFrameBuffer::AncDelPacket (
  [in] __int64  Frame,        // Frame number
  [in] int  DID,              // Ancillary packet Data-ID
  [in] int  SDID,             // Ancillary packet Secondary Data-ID
  [in] int  StartLine,        // first line to scan
  [in] int  NumLines,         // # of lines to scan
  [in] int  HancVanc,         // delete from hanc or vanc
  [in] int  Stream,           // stream to delete packet from (HD-only)
  [in] int  Mode              // deletion mode
);
```

Parameters

Frame
Sequence number of frame to delete the packets from

DID
Ancillary Data-ID of the packets to delete

SDID
Secondary Data-ID of the packet to delete. If not used set this parameter to -1.

StartLine
First line to scan for the specified ancillary data packets. 1 denotes the first line.

NumLines
Number of lines to delete the specified packet from. Use -1 for all lines beginning with *StartLine*.

HancVanc
Specifies which ancillary data space to delete the packet(s) from.

Value	Meaning
DTAPI_SDI_HANC	HANC data space
DTAPI_SDI_VANC	VANC data space

Stream
Specifies which stream to delete the packet()s from . NOTE: this is an HD-only parameter and for SD this parameter should be set to -1.

Value	Meaning
DTAPI_SDI_CHROM	Chrominance stream
DTAPI_SDI_LUM	Luminance stream

Mode

Specifies the deletion mode.

Value	Meaning
DTAPI_ANC_MARK	Mark the ancillary data packet for deletion (i.e. leave it in the ancillary data space, but set the DID to 0xFF)
DTAPI_ANC_DELETE	Delete the packet from the ancillary data stream

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Packet have been deleted
DTAPI_E_NOT_STARTED	Can only be called if the **DtFrameBuffer** object has been started
DTAPI_E_NOT_ATTACHED	**DtFramebuffer** object is not attached to both an input and output
DTAPI_E_INVALID_ANC	Specified an invalid ancillary data space
DTAPI_E_INVALID_STREAM	Specified an invalid stream (use -1 for SD)
DTAPI_E_INVALID_MODE	An invalid deletion-mode has been specified
DTAPI_E_INVALID_FRAME	The frame number is invalid

Remarks

Call **AncCommit** to commit the changes made by this method (see also remarks section for **AncCommit**).

DtFrameBuffer::AncGetAudio

Extracts the audio data from a frame.

```
DTAPI_RESULT DtFrameBuffer::AncGetAudio (
  [in] __int64   Frame,       // Seq. # of frame
  [in] unsigned char*  pBuf, // Buffer to receive audio samples
 [i/o] int&   BufSize,        // Size of pBuf (in bytes) / # bytes returned
  [in] int   Format,          // Format of audio smaples
 [i/o] int&   Channels,       // Audio channel to get / channels returned
  [in] int   AudioGroup       // Audio group to get
);
```

Parameters

Frame
Sequence number of the frame to get the audio from.

pBuf
Pointer to the buffer to receive the audio samples. This buffer needs to be large enough to accommodate the maximum number of audio samples in a frame.

BufSize
Size (in bytes) of the *pBuf*. As output parameter it returns the actual number of bytes returned.

Format
Specifies the format (e.g. 16-bit PCM) of the audio samples. See **AncAddAudio** for possible values.

Channels
As input parameter, this parameter specifies the audio channels to return. As output parameter, this parameter returns which channels have actually been returned. See **AncAddAudio** for possible values.

AudioGroup
Specifies which audio group should be returned. See **AncAddAudio** for possible values.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Available audio samples have been returned
DTAPI_E_NOT_STARTED	Cannot get audio while the **DtFrameBuffer** object is idle
DTAPI_E_NOT_ATTACHED	Cannot get audio as long as the **DtFrameBuffer** object is not attached to an input
DTAPI_E_INVALID_FORMAT	The specified format is invalid/not supported
DTAPI_E_VALID_CHANNEL	An unknown audio channel has been specified
DTAPI_E_INVALID_GROUP	An unknown audio group has been specified
DTAPI_E_BUF_TOO_SMALL	Buffer is too small does to receive the audio samples. The min. number of bytes required is returned in the *BufSize* parameter.
DTAPI_E_INVALID_FRAME	The frame number is invalid

Remarks

None

DtFrameBuffer::AncGetPacket

Gets ancillary data packet(s) from the specified ancillary data space in the frame.

```
DTAPI_RESULT DtFrameBuffer::AncGetPacket (
  [in] __int64   Frame,        // Seq # of frame
  [in] int   DID,              // Data-ID of packet(s) to get
  [in] int   SDID,             // Secondary Data-ID of packet(s) to get
 [i/o] AncPacket*  pAncPktBuf,  // Array of ancillary data packets
 [i/o] int&  NumPackets,      // [in] max. # packets to get / [out] #
                              // packets returned
  [in] int   HancVanc         // Get packet(s) from HANC or VANC area
  [in] int   Stream           // Get packet(s) from chrominance or luminance
                              // stream (HD-only)
);
```

Parameters

Frame
Sequence number of frame to get the packet(s) from

DID
Ancillary Data-ID of the packet(s) to get

SDID
Secondary Data-ID of the packet(s) to get. If not relevant set this parameter to -1.

pAncPktBuf
Array of **AncPacket** objects to receive the requested ancillary data packets

NumPackets
Max number of packets to get. As output, this parameter returns the actual number of packets returned.

HancVanc
Specifies the ancillary data space to get the packets from.

Value	Meaning
DTAPI_SDI_HANC	Get from Horizontal ANC space
DTAPI_SDI_VANC	Get from Vertical ANC space

Stream
For HD video standards this parameter specifies the stream to get the packet(s) from. For SD video standard this parameter should be set to -1.

Value	Meaning
DTAPI_SDI_CHROM	Get from chrominance stream
DTAPI_SDI_LUM	Get from luminance stream

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Available packets have been returned
DTAPI_E_NOT_ATTACHED	Cannot call this method while **DtFrameBuffer** object has not been attached to an input
DTAPI_E_NOT_STARTED	Cannot call this method while **DtFrameBuffer** object is idle
DTAPI_E_INVALID_BUF	*pAncPacket* is invalid (i.e. NULL pointer)
DTAPI_E_INVALID_ANC	Specified an invalid ancillary data space
DTAPI_E_INVALID_STREAM	Specified an invalid stream (use -1 for SD)
DTAPI_E_BUF_TOO_SMALL	Not enough entries in *pAncPacket* for all ancillary data packets requested. The *NumPackets* parameter returns the number of entries needed
DTAPI_E_INVALID_FRAME	The frame number is invalid

Remarks

None

DtFrameBuffer::AncReadRaw

Read raw ancillary data into a memory buffer.

```
DTAPI_RESULT DtFrameBuffer::AncReadRaw (
  [in] __int64   Frame,        // Seq # of frame
  [in] unsigned char*  pBuf,   // Buffer to receive data
 [i/o] int&   BufSize,         // Size of buffer / # bytes returned
  [in] int   DataFormat,       // Data format
  [in] int   StartLine,        // First line to read
  [in] int   NumLines,         // # of lines to read
  [in] int   HancVanc          // HANC or VANC space
  [in] bool   EnableAncFilter // Internal use only
);
```

Parameters

Frame

Sequence number of frame to read.

pBuf

Pointer to the destination buffer to receive the ancillary data from requested lines.

BufSize

Size of destination buffer in number of bytes. Also used as output variable, to return the number of bytes written to the buffer.

DataFormat

Specifies the requested data format.

Value	Meaning
DTAPI_SDI_8BIT	8-bit words, with the MSB 8-bit of a 10-bit SDI symbol (i.e. 2-LSB bits have been discarded)
DTAPI_SDI_10BIT	10-bit SDI symbols concatenated in memory
DTAPI_SDI_16BIT	16-bit words with LSB 10-bit = SDI symbols and MSB 6-bit = '0'

StartLine

Defines the first line to read. 1 denotes the first line.

NumLines

Defines the number of lines to read. Set to -1 to get all lines beginning with the *StartLine*. As output, this parameter returns the number of lines actually read. The value -1 is only valid when reading the HANC.

HancVanc

Specifies the ancillary data space to read.

Value	Meaning
DTAPI_SDI_HANC	Get from Horizontal ANC space
DTAPI_SDI_VANC	Get from Vertical ANC space

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Data has been read successfully
DTAPI_E_INVALID_VIDSTD	No (valid) video standard has been set yet (make sure **DtFrameBuffer::SetVidStd** has been called)
DTAPI_E_NOT_ATTACHED	The **DtFrameBuffer** object is not attached to an input
DTAPI_E_INVALID_BUF	Buffer pointer is invalid (e.g. *pBuf*==NULL or not aligned on a 64-bit boundary)
DTAPI_E_BUF_TOO_SMALL	The supplied buffer is too small to receive the requested number of lines (+ optional stuffing). *BufSize* returns the minimum buffer size required.
DTAPI_E_INVALID_FORMAT	Specified format is invalid/not supported
DTAPI_E_INVALID_LINE	*StartLine* or *NumLines* is invalid (i.e. out of range).
DTAPI_E_INVALID_ANC	Specified ANC space (*HancVanc*) is invalid/not supported
DTAPI_E_INTERNAL	Unexpected internal error occurred

Remarks

Use this method to get raw content HANC or VANC part of a line(s). You will need to parse the returned data yourself to extract individual ancillary data packets.

This method uses DMA transfers to read the ancillary data from the card; since all DMA transfers are 64-bit aligned there may be 1..7 stuffing bytes added to the end of the buffer (the stuffing bytes are included in the count returned by the *BufSize* parameter).

NOTE: This method can only be called if the **DtFrameBuffer** object has been attached to input and a video standard has been set.

DtFrameBuffer::AncWriteRaw

Write raw ancillary data to the frame-buffer.

```
DTAPI_RESULT DtFrameBuffer::AncWriteRaw (
  [in] __int64   Frame,        // Seq # of frame
  [in] unsigned char*  pBuf,   // Buffer wita data to write
 [i/o] int&   BufSize,         // Size of buffer / # bytes returned
  [in] int   DataFormat,       // Data format
  [in] int   StartLine,        // First line to write
  [in] int   NumLines,         // # of lines to read
  [in] int   HancVanc,         // Write to HANC or VANC space
  [in] bool   EnableAncFilter // Internal use only
);
```

Parameters

Frame

Sequence number of frame to write too.

pBuf

Pointer to a buffer holding the data to write.

BufSize

Size of the buffer in number of bytes. Also used as output variable, to return the number of bytes actually read from *pBuf* and written to the frame buffer.

DataFormat

Specifies data format of the data in *pBuf*.

Value	Meaning
DTAPI_SDI_8BIT	8-bit words, with the MSB 8-bit of a 10-bit SDI symbol (i.e. 2-LSB bits have been discarded)
DTAPI_SDI_10BIT	10-bit SDI symbols concatenated in memory
DTAPI_SDI_16BIT	16-bit words with LSB 10-bit = SDI symbols and MSB 6-bit = '0'

StartLine

Defines the first line to write too. 1 denotes the first line.

NumLines

Defines the number of lines to write. Set to -1 to write to all lines beginning with the *StartLine*. As output, this parameter returns the number of lines actually written too. The value -1 is only valid when writing the HANC.

HancVanc

Specifies the ancillary data space to target.

Value	Meaning
DTAPI_SDI_HANC	Write to Horizontal ANC space
DTAPI_SDI_VANC	Write to Vertical ANC space

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Data has been written to the frame-buffer
DTAPI_E_INVALID_VIDSTD	No (valid) video standard has been set yet (make sure **DtFrameBuffer::SetVidStd** has been called)
DTAPI_E_NOT_ATTACHED	The **DtFrameBuffer** object is not attached to an input
DTAPI_E_INVALID_BUF	Buffer pointer is invalid (e.g. *pBuf*==NULL or not aligned on a 64-bit boundary)
DTAPI_E_BUF_TOO_SMALL	The supplied buffer is too small; it does not contain enough data to make up the number of lines (+ optional stuffing). *BufSize* returns the minimum buffer size expected.
DTAPI_E_INVALID_FORMAT	Specified format is invalid/not supported
DTAPI_E_INVALID_LINE	*StartLine* or *NumLines* is invalid (i.e. out of range).
DTAPI_E_INVALID_ANC	Specified ANC space (*HancVanc*) is invalid/not supported
DTAPI_E_INTERNAL	Unexpected internal error occurred

Remarks

Use this method to write raw data to the ancillary data space section of a line.

This method can only write complete lines (that is the HANC/VANC part of a line) and therefore *pBuf* should contain at least *NumLines* worth of data. For the HANC data space each line should start with an EAV and end with a SAV; a VANC line should contain only the data immediate starting after the SAV.

DMA transfers are used to write the ancillary data to the card; since all DMA transfers are 64-bit aligned it may be necessary add between 1and 7 stuffing bytes after the end of the last line to write (the content of these stuffing bytes does not matter as they will be flushed by the hardware).

NOTE: This method can only be called if the **DtFrameBuffer** object has been attached to input and a video standard has been set.

DtFrameBuffer::AttachToInput

Attach the **DtFrameBuffer** object to a physical input port.

```
DTAPI_RESULT DtFrameBuffer::AttachToInput (
  [in] DtDevice*  pDtDvc,     // Device object
  [in] int  Port,             // Port number
);
```

Parameters

pDtDvc

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

Port

Physical port number of the input port the **DtFrameBuffer** object should attach to.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	**DtFrameBuffer** object has been attached successfully to the port
DTAPI_E_ATTACHED	The **DtFrameBuffer** object has already been attached to an input or to an output
DTAPI_E_STARTED	Cannot attach while the **DtFrameBuffer** object has is started
DTAPI_E_INVALID_VIDSTD	No or an invalid video standard has been set
DTAPI_E_OUT_OF_MEM	Not enough memory resources available
DTAPI_E_INTERNAL	Unexpected internal DTAPI error occurred

Remarks

Before attaching an input to the **DtFrameBuffer** object you need to first set the video standard (**DtDevice::SetIoConfig(DTAPI_IOCONFIG_IOSTD,…)**) the object should use.

If a **DtFrameBuffer** object is embedded in a **DtSdiMatrix** object you can attach both an input and one or more outputs to the same **DtFrameBuffer** object. If the object is used stand-alone you can only attach an input if no output is attached to the object.

DtFrameBuffer::AttachToOutput

Attach the **DtFrameBuffer** object to a physical output port.

```
DTAPI_RESULT DtFrameBuffer::AttachToOutput (
  [in] DtDevice*  pDtDvc,     // Device object
  [in] int  Port,             // Port number
  [in] int  Delay,            // Tx-delay
);
```

Parameters

pDtDvc

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

Port

Physical port number of the output port the **DtFrameBuffer** object should attach to.

Delay

Tx-delay in number of frames. This value determines the transmission buffer size. A larger delay relaxes the real-time requirements of an application but increases the delay between the frame being created / received and the frame being visible on the output. Specifying -1 will set the maximum delay. This parameter is only relevant when using the a matrix configuration with at least one input and one output via the DtSdiMatrix class. If you're using a standalone channel, specify 0.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	**DtFrameBuffer** object has been attached successfully to the port
DTAPI_E_ATTACHED	The **DtFrameBuffer** object has already been attached to an to this port or to an input port
DTAPI_E_STARTED	Cannot attach while the **DtFrameBuffer** object has is started
DTAPI_E_INVALID_VIDSTD	No or an invalid video standard has been set
DTAPI_E_OUT_OF_MEM	Not enough memory resources available
DTAPI_E_INTERNAL	Unexpected internal DTAPI error occurred

Remarks

Before attaching an output to the **DtFrameBuffer** object you need to first set the video standard (**DtDevice::SetIoConfig(DTAPI_IOCONFIG_IOSTD,…)**) the object should use.

If a **DtFrameBuffer** object is embedded in a **DtSdiMatrix** object you can attach both an input and one or more outputs to the same **DtFrameBuffer** object. If the object is used stand-alone you can only attach an input if no output is attached to the object.

DtFrameBuffer::Detach

Detaches all associated input and outputs from the **DtFrameBuffer** object.

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

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Detach was successful
DTAPI_E_NOT_ATTACHED	**DtFrameBuffer** object is not attached to any input or output
DTAPI_E_STARTED	Cannot detach while the **DtFrameBuffer** object has is started

Remarks

None

DtFrameBuffer::DetectIoStd

Detects the video standard currently applied to the input port. See DtDevice::DetectIoStd() for the parameters and return values.

```
DTAPI_RESULT DtFrameBuffer::DetectIoStd (
 [out] int&   Value           // Detected video standard
 [out] int&   SubValue        // Detected video standard
);
```

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Call succeeded
DTAPI_E_NOT_ATTACHED	**DtFrameBuffer** object must be attached to an input
DTAPI_E_DEV_DRIVER	Unexpected driver error

DtFrameBuffer::GetBufferInfo

Retrieve configuration and statistics information for the frame-buffer.

```
DTAPI_RESULT DtFrameBuffer::GetBufferInfo (
 [out] DtBufferInfo&  Info,  // Buffer info
);
```

Parameters

Info

This parameter receives the frame buffer information (see **DtBufferInfo** structure definition for more details).

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Buffer information was returned successfully

Remarks

None

DtFrameBuffer::GetCurFrame

Get the sequence number of the frame that is currently being received or transmitted

```
DTAPI_RESULT DtFrameBuffer::GetCurFrame (
 [out] __int64&  CurFrame,   // Seq # of current tx/rx frame
);
```

Parameters

CurFrame

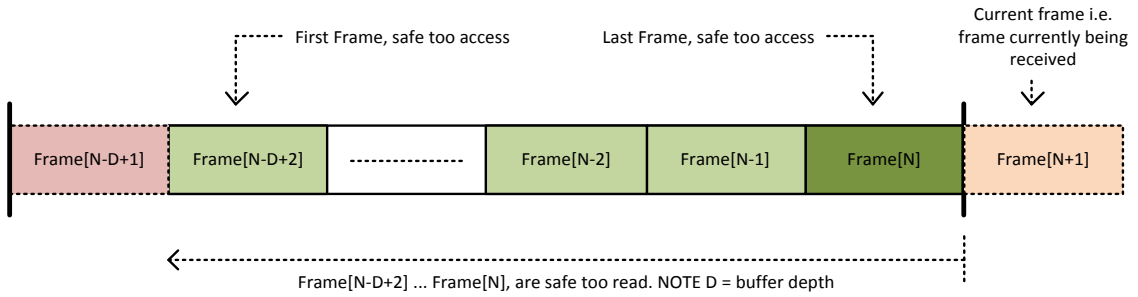
The sequence number of the frame currently being received or transmitted.

Result

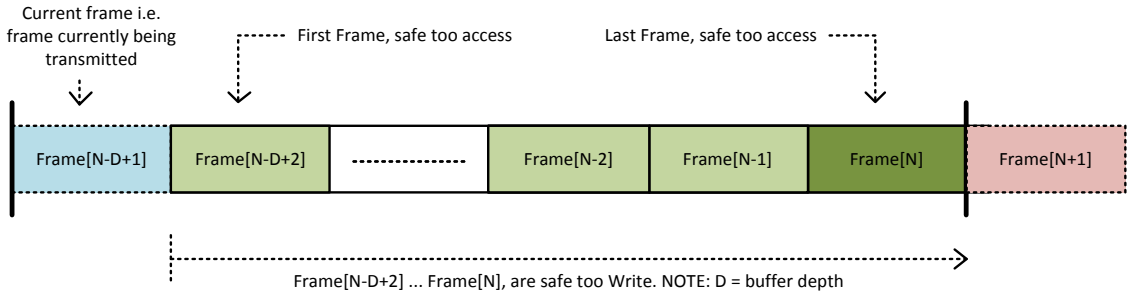
DTAPI_RESULT	Meaning
DTAPI_OK	Current frame was returned
DTAPI_E_NOT_ATTACHED	**DtFrameBuffer** object must be attached to an input and/or output
DTAPI_E_EMBEDDED	**DtFrameBuffer** object is part of an **DtSdiMatrix** object and this method cannot be used; use **DtSdiMatrix::GetCurFrame** instead

Remarks

In case the **DtFrameBuffer** object is operation in input mode (i.e. attached to an input) *CurFrame* indicates the frame that is currently being received, this means that it is safe to read frames numbers: *CurFrame* – (D – 1) ≤ Frame ≤ *CurFrame*-1, where D is the depth of the frame buffer (# columns in frame buffer.



In case of output mode *CurFrame* indicates the frame that is currently being transmitted (i.e. it is safe to write to the frames: *CurFrame*+1 ≤ Frame ≤ *CurFrame* + (D – 1)).



NOTE: use **`DtFrameBuffer::GetBufInfo`** to determine the depth (#columns) of the frame-buffer.

DtFrameBuffer::GetFrameInfo

Retrieve information about a specific frame.

```
DTAPI_RESULT DtFrameBuffer::GetFrameInfo (
  [in] __int64   Frame,       // Seq # of frame to get info for
 [out] DtFrameInfo&  Info,    // Frame info object
);
```

Parameters

Frame

Frame number of the frame for which the information should be returned

Info

This parameter receives the frame information (see **DtFrameInfo** structure definition for more details).

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Frame info was successfully retrieved

Remarks

None

DtFrameBuffer::ReadSdiLines

Read raw SDI lines into a memory buffer.

```
DTAPI_RESULT DtFrameBuffer::ReadSdiLines (
  [in] __int64   Frame,       // Seq # of frame to read
  [in] unsigned char*  pBuf, // Buffer to receive lines
 [i/o] int&   BufSize,        // [i] size of buffer / [o] # bytes returned
  [in] int   DataFormat,      // Desired data format
  [in] int   StartLine,       // First line to get
  [in] int&   NumLines        // # of lines to get
);
// OVERLOAD: read all lines (i.e. full frame)
DTAPI_RESULT DtFrameBuffer::ReadSdiLines (
  [in] __int64   Frame,       // Seq # of frame to read
  [in] unsigned char*  pBuf, // Buffer to receive lines
 [i/o] int&   BufSize,        // [i] size of buffer / [o] # bytes returned
  [in] int   DataFormat       // Desired data format
);
```

Parameters

Frame

Sequence number of frame to read.

pBuf

Pointer to the destination buffer to receive the requested lines.

BufSize

Size of destination buffer in number of bytes. Also used as output variable, to return the number of bytes written to the buffer.

DataFormat

Specifies the requested data format.

Value	Meaning
DTAPI_SDI_8BIT	8-bit words, with the MSB 8-bit of a 10-bit SDI symbol (i.e. 2-LSB bits have been discarded)
DTAPI_SDI_10BIT	10-bit SDI symbols concatenated in memory
DTAPI_SDI_16BIT	16-bit words with LSB 10-bit = SDI symbols and MSB 6-bit = '0'

StartLine

Defines the first line to read. 1 denotes the first line.

NumLines

Defines the number of lines to read. Set to -1 to get all lines beginning with the *StartLine*. As output, this parameter returns the number of lines actually read.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	The requested lines have been read
DTAPI_E_INVALID_VIDSTD	No (valid) video standard has been set yet (make sure **DtFrameBuffer::SetVidStd** has been called)
DTAPI_E_NOT_ATTACHED	The **DtFrameBuffer** object is not attached to an input
DTAPI_E_INVALID_BUF	Buffer pointer is invalid (e.g. *pBuf*==NULL or not aligned on a 64-bit boundary)
DTAPI_E_BUF_TOO_SMALL	The supplied buffer is too small to receive the requested number of lines (+ optional stuffing). *BufSize* returns the minimum buffer size required.
DTAPI_E_INVALID_FORMAT	Specified format is invalid/not supported
DTAPI_E_INVALID_LINE	*StartLine* or *NumLines* is invalid (i.e. out of range).
DTAPI_E_INTERNAL	Unexpected internal error occurred

Remarks

This method uses DMA transfers to read the SDI lines from the card; since all DMA transfers are 64-bit aligned there may be 1..7 stuffing bytes added to the end of the buffer (the stuffing bytes are included in the count returned by the *BufSize* parameter).

NOTE: This method can only be called if the **DtFrameBuffer** object has been attached to input and a video standard has been set.

DtFrameBuffer::ReadVideo

Read active video part of the specified lines into a memory buffer.

```
DTAPI_RESULT DtFrameBuffer::ReadVideo (
  [in] __int64   Frame,       // Seq # of frame to get
  [in] unsigned char*  pBuf, // Buffer to receive video data
 [i/o] int&   BufSize,        // [i] size of buffer / [o] # bytes returned
  [in] int   Field,           // Field to get
  [in] int   Scaling,         // Desired scaling mode
  [in] int   DataFormat,      // Desired data format
  [in] int   StartLine,       // First line to get
  [in] int&   NumLines        // # of lines to get
);
```

Parameters

Frame

Sequence number of frame to read.

pBuf

Pointer to the destination buffer to receive the video lines.

BufSize

Size of destination buffer in number of bytes. Also used as output variable, to return the number of bytes written to the buffer.

Field

Specifies from which field the lines should be read.

Value	Meaning
DTAPI_SDI_FIELD1	Field 1 (=odd field or the only field for progressive)
DTAPI_SDI_FIELD2	Field 2 (=even field)

Scaling

Specifies whether the video should be scaled.

Value	Meaning
DTAPI_SCALING_OFF	Do not scale
DTAPI_SCALING_1_4	Scale video to 1/4th of its original size (i.e. half the vertical and horizontal size)
DTAPI_SCALING_1_16	Scale video to 1/16th of its original size (i.e. quarter the vertical and horizontal size)

NOTE: Scaling should only be used on the full field.

DataFormat

Specifies the requested data format.

Value	Meaning
DTAPI_SDI_8BIT	8-bit words, with the MSB 8-bit of a 10-bit SDI symbol (i.e. 2-LSB bits have been discarded)
DTAPI_SDI_10BIT	10-bit SDI symbols concatenated in memory
DTAPI_SDI_16BIT	16-bit words with LSB 10-bit = SDI symbols and MSB 6-bit = '0'

StartLine

Specifies the relative line, within the selected field, to read first. The value of 1 denotes the first line within the selected field.

NumLines

Specifies the number of lines to read. Set to -1 to get all lines beginning with the *StartLine*. As output, this parameter returns the number of lines actually read.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Requested lines have been retrieved
DTAPI_E_INVALID_VIDSTD	No (valid) video standard has been set yet (make sure **DtFrameBuffer::SetVidStd** has been called)
DTAPI_E_NOT_ATTACHED	The **DtFrameBuffer** object is not attached to an input
DTAPI_E_INVALID_BUF	Buffer pointer is invalid (e.g. *pBuf*==NULL or not aligned on a 64-bit boundary)
DTAPI_E_BUF_TOO_SMALL	The supplied buffer is too small to receive the requested number of lines (+ optional stuffing). *BufSize* returns the minimum buffer size required.
DTAPI_E_INVALID_FORMAT	Specified format is invalid/not supported
DTAPI_E_INVALID_LINE	*StartLine* or *NumLines* is invalid (i.e. out of range).
DTAPI_E_INTERNAL	Unexpected internal error occurred
DTAPI_E_INVALID_FIELD	Invalid/unsupported field specified. NOTE: for progressive frames there is no Field 2, so Field 1 is the only valid field.
DTAPI_E_INVALID_MODE	Invalid/unsupported scaling mode specified

Remarks

This method uses DMA transfers to read the SDI lines from the card; since all DMA transfers are 64-bit aligned there may be 1..7 stuffing bytes added to the end of the buffer (the stuffing bytes are included in the count returned by the *BufSize* parameter).

When retrieving scaled video the number of lines returned by the *NumLines* parameter denotes the number of un-scaled lines (i.e. for **DTAPI_SCALING_1_4** the number of scaled lines in *pBuf* is

NumLines/2 and for **DTAPI_SCALING_1_16** it is *NumLines*/4). Also note that scaling should only be used on the full field (i.e. *StartLine*=1 and *NumLines*=-1).

NOTE: This method can only be called if the **DtFrameBuffer** object has been attached to input and a video standard has been set.

DtFrameBuffer::SetRxMode

Change the way in which the driver/DTAPI read data from the DTU-351.

```
DTAPI_RESULT DtFrameBuffer::SetRxMode (
 [in] int RxMode,            // New RxMode
 [out] __int64&  FirstFrame, // First frame that will use the new mode
);
```

Parameters

RxMode

Sequence number of frame to read.

Value	ANC/Audio data available	ReadSdiLines() available	Video data available
DTAPI_RXMODE_ANC	Yes	No	No
DTAPI_RXMODE_RAW	Only via AncReadRaw()	Yes	Yes
DTAPI_RXMODE_FULL (default)	Yes	Yes	Yes
DTAPI_RXMODE_FULL8	Yes	No	Yes, but only 8bpp
DTAPI_RXMODE_FULL8_SCALED4	Yes	No	Yes, but only 8bpp and only scaled4 and scaled16
DTAPI_RXMODE_FULL8_SCALED16	Yes	No	Yes, but only 8bpp and scaled16
DTAPI_RXMODE_VIDEO	No	No	Yes
DTAPI_RXMODE_VIDEO8	No	No	Yes, but only 8bpp
DTAPI_RXMODE_VIDEO8_SCALED4	No	No	Yes, but only 8bpp and only scaled4 and scaled16
DTAPI_RXMODE_VIDEO8_SCALED16	No	No	Yes, but only 8bpp and scaled16

FirstFrame

The first frame that will be received with the new mode.

DtFrameBuffer::Start

Start/stop receiving or transmitting frames.

```
DTAPI_RESULT DtFrameBuffer::Start (
  [in] bool  Start,          // true=start tx/rx; false=stop tx/rx
);
```

Parameters

Start

Set to true to begin receiving/transmitting frames and set to false to stop reception/transmission.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	**DtFrameBuffer** object has started/stopped
DTAPI_E_INVALID_VIDSTD	No (valid) video standard has been set
DTAPI_E_NOT_ATTACHED	**DtFrameBuffer** object is not attached to an input and/or output.
DTAPI_E_NOT_USB3	**DTU-351 is connected to a USB2 port**
DTAPI_E_INSUF_BW	**Either the driver failed to allocate the requested bandwidth or not enough bandwidth was requested.**

Remarks

NOTE: This method can only be called if the **DtFrameBuffer** object has been attached to input and a video standard has been set.

DtFrameBuffer::SetIoConfig

Configure all attached ports. See DtDevice::SetIoconfig for parameters and return values.

```
DTAPI_RESULT DtFrameBuffer::SetIoConfig (
  [in] int   Group,           // I/O configuration group
  [in] int   Value,           // I/O configuration value
  [in] int   SubValue=-1,     // I/O configuration subvalue
  [in] __int64   ParXtra0=-1, // Extra parameter #0
  [in] __int64   ParXtra1=-1  // Extra parameter #1
);
```

Remarks

If this function returns an error some ports may have the new value and some may not yet have been configured.

DtFrameBuffer::WaitFrame

Wait's for the next frame to be transmitted/received and returns the range of frames which are available/safe too access.

```
DTAPI_RESULT DtFrameBuffer::WaitFrame (
 [out] __int64&  FirstFrame, // First 'safe' frame
 [out] __int64&  LastFrame,  // Last 'safe' frame
);
// OVERLOAD: returns just the last 'safe' frame
DTAPI_RESULT DtFrameBuffer::WaitFrame (
 [out] __int64&  LastFrame,  // Last 'safe' frame
);
```

Parameters

FirstFrame

Sequence number of the first frame in the 'safe area'. The safe area is the range of frames, in the frame buffer, which are safe to read from or write to (i.e. the frames which are not currently being transmitted or received).

LastFrame

Sequence number of the last frame in the 'safe area'.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Wait was successful
DTAPI_E_NOT_ATTACHED	**DtFrameBuffer** object must be attached to an input and/or output
DTAPI_E_EMBEDDED	**DtFrameBuffer** object is part of an **DtSdiMatrix** object and this method cannot be used; use **DtSdiMatrix::WaitFrame** instead
DTAPI_E_DEV_DRIVER	Wait failed due to internal driver error
DTAPI_E_TIMEOUT	This function will wait a maximum of 100ms for a new frame after which it timeouts and returns this error.
DTAPI_E_MATRIX_HALTED	This function returns immediately with this code if it's called on a DTU-351 that is not in lock.

Remarks

This function returns immediately after the hardware has transmitted (in case of output) or received (in case of input) a new frame. The safe area returned by this function is valid for one frame period (e.g. 40ms for 25fps).

When the **DtFrameBuffer** object is operation in output mode *FirstFrame* is the first of the 'safe area' to be transmitted, meaning that you will have the least amount of time to make sure that this frame is up to date.

NOTE: refer to description **DtFrameBuffer::GetCurFrame** of for more details about the 'safe area'.

In input mode the `LastFrame` is the most recently received frame and the `FirstFrame` is the eldest frame in the 'safe area'. As for output mode you will have the least amount of time to access the first frame as the frame buffer it is stored in is the first be overwritten.

DtFrameBuffer::WriteSdiLines

Write RAW SDI lines to the frame buffer.

```
DTAPI_RESULT DtFrameBuffer::WriteSdiLines (
  [in] __int64   Frame,       // Seq # of frame to write too
  [in] unsigned char*  pBuf, // Buffer with data to write
 [i/o] int&   BufSize,        // [i] size of buffer / [o] # of bytes written
  [in] int   DataFormat,      // Format of data in buffer
  [in] int   StartLine,       // First line to write too
  [in] int&   NumLines        // # of lines to write
);
// OVERLOAD: write all lines (i.e. full frame)
DTAPI_RESULT DtFrameBuffer::WriteSdiLines (
  [in] __int64   Frame,       // Seq # of frame to write too
  [in] unsigned char*  pBuf, // Buffer with data to write
 [i/o] int&   BufSize,        // [i] size of buffer / [o] # of bytes written
  [in] int   DataFormat,      // Format of data in buffer
);
```

Parameters

Frame

Sequence number of frame to write.

pBuf

Pointer to the source buffer to with the lines to write.

BufSize

Size of source buffer in number of bytes. Also used as output variable, to return the number of bytes read from the buffer.

DataFormat

Specifies the data format of the lines in the source buffer.

Value	Meaning
DTAPI_SDI_8BIT	8-bit words, with the MSB 8-bit of a 10-bit SDI symbol (i.e. 2-LSB bits have been discarded)
DTAPI_SDI_10BIT	10-bit SDI symbols concatenated in memory
DTAPI_SDI_16BIT	16-bit words with LSB 10-bit = SDI symbols and MSB 6-bit = '0'

StartLine

Defines the first line to write. 1 denotes the first line in the frame (i.e. first line of Field 1).

NumLines

Defines the number of lines to write. Set to -1 to write all lines beginning with the *StartLine*. As output, this parameter returns the number of lines actually written.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	The lines have been written to the frame-buffer on the card
DTAPI_E_INVALID_VIDSTD	No (valid) video standard has been set yet (make sure **DtFrameBuffer::SetVidStd** has been called)
DTAPI_E_NOT_ATTACHED	The **DtFrameBuffer** object is not attached to an output
DTAPI_E_INVALID_BUF	Buffer pointer is invalid (e.g. *pBuf*==NULL or not aligned on a 64-bit boundary)
DTAPI_E_BUF_TOO_SMALL	The supplied buffer is too small; it does not contain enough data to make up the number of lines (+ optional stuffing). *BufSize* returns the minimum buffer size expected.
DTAPI_E_INVALID_FORMAT	Specified format is invalid/not supported
DTAPI_E_INVALID_LINE	*StartLine* or *NumLines* is invalid (i.e. out of range).
DTAPI_E_INTERNAL	Unexpected internal error occurred

Remarks

This method uses DMA transfers to write the SDI lines to the card; since all DMA transfers are 64-bit aligned it may be necessary add between 1and 7 stuffing bytes after the end of the last line to write (the content of the stuffing bytes does not matter as they will be flushed by the hardware).

NOTE: This method can only be called if the **DtFrameBuffer** object has been attached to output and a video standard has been set.

DtFrameBuffer::WriteVideo

Write the active video part of the specified lines to the frame buffer.

```
DTAPI_RESULT DtFrameBuffer::WriteVideo (
  [in] __int64   Frame,       // Seq # of frame to write too
  [in] unsigned char*  pBuf,  // Buffer with data to write
 [i/o] int&   BufSize,        // [i] size of buffer / [o] # bytes written
  [in] int   Field,           // Field to write to
  [in] int   DataFormat,      // Format of data in buffer
  [in] int   StartLine,       // First line to write to
 [i/o] int&   NumLines,       // # of lines to write
);
```

Parameters

Frame

Sequence number of frame to write too.

pBuf

Pointer to the source buffer to containing the video lines to be written to the frame buffer.

BufSize

Size of source buffer in number of bytes. Also used as output variable, to return the actual number of bytes read from the source buffer.

Field

Specifies to which field the lines should be written.

Value	Meaning
DTAPI_SDI_FIELD1	Field 1 (=odd field or the only field for progressive)
DTAPI_SDI_FIELD2	Field 2 (=even field)

DataFormat

Specifies the format of the video data in the source buffer.

Value	Meaning
DTAPI_SDI_8BIT	8-bit words, with the MSB 8-bit of a 10-bit SDI symbol (i.e. 2-LSB bits have been discarded)
DTAPI_SDI_10BIT	10-bit SDI symbols concatenated in memory
DTAPI_SDI_16BIT	16-bit words with LSB 10-bit = SDI symbols and MSB 6-bit = '0'

StartLine

Specifies the relative line, within the selected field, to write too first. The value of 1 denotes the first line within the selected field.

NumLines

Specifies the number of lines to write. Set to -1 to write to all lines beginning with the *StartLine*. As output, this parameter returns the number of lines actually written.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Specified lines have been written to the frame buffer
DTAPI_E_INVALID_VIDSTD	No (valid) video standard has been set yet (make sure **DtFrameBuffer::SetVidStd** has been called)
DTAPI_E_NOT_ATTACHED	The **DtFrameBuffer** object is not attached to an output
DTAPI_E_INVALID_BUF	Buffer pointer is invalid (e.g. *pBuf*==NULL or not aligned on a 64-bit boundary)
DTAPI_E_BUF_TOO_SMALL	The supplied buffer is too small; it does not contain enough data to make up the number of lines (+ optional stuffing). *BufSize* returns the minimum buffer size expected.
DTAPI_E_INVALID_FORMAT	Specified format is invalid/not supported
DTAPI_E_INVALID_LINE	*StartLine* or *NumLines* is invalid (i.e. out of range).
DTAPI_E_INTERNAL	Unexpected internal error occurred
DTAPI_E_INVALID_FIELD	Invalid/unsupported field specified. NOTE: for progressive frames there is no Field 2, so Field 1 is the only valid field.

Remarks

This method uses DMA transfers to write the SDI lines to the card; since all DMA transfers are 64-bit aligned it may be necessary add between 1and 7 stuffing bytes after the end of the last line to write (the content of the stuffing bytes does not matter as they will be flushed by the hardware).

DtSdiMatrix::Attach

Attach to the specified device.

```
DTAPI_RESULT DtSdiMatrix::Attach (
  [in] DtDevice*  pDvc,       // device to attach too
 [out] int&   MaxNumRows,     // max # of rows
);
```

Parameters

pDvc

Pointer to the device object to attach to.

MaxNumRows

Returns the maximum number of rows that are supported for this device.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Success
DTAPI_E_ATTACHED	**DtSdiMatrix** object is already attached
DTAPI_E_INVALID_ARG	*pDvc* pointer is NULL
DTAPI_E_NOT_ATTACHED	The **DtDevice** object pointed to by *pDvc* is not attached
DTAPI_E_NOT_SUPPORTED	Matrix functionality is not supported for the supplied device

Remarks

None

DtSdiMatrix::Detach

Detach from the hardware.

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

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Success

Remarks

None

DtSdiMatrix::GetMatrixInfo

Retrieve the configuration of the matrix.

```
DTAPI_RESULT DtSdiMatrix::GetMatrixInfo (
  [in] DtMatrixInfo&  Info,  // receives matrix info
);
```

Parameters

Info

This parameter receives the matrix information (see **DtMatrixInfo** structure definition for more details).

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Success
DTAPI_E_INVAILD_VIDSTD	Cannot call this method until a video standard has been set (**DtSdiMatrix::SetIoConfig**)

Remarks

None

DtSdiMatrix::Row

Returns the **DtFrameBuffer** object associated with a specific row in the matrix.

```
DtFrameBuffer& DtSdiMatrix::Row (
  [in] int  n,                // index of row to get
);
```

Parameters

n

Zero-based index the row to get

Result

DTAPI_RESULT	Meaning
DTAPI_OK	

Remarks

None

DtSdiMatrix::SetIoConfig

Configure all attached ports. See DtDevice::SetIoconfig for parameters and return values.

```
DTAPI_RESULT DtSdiMatrix::SetIoConfig (
  [in] int  Group,           // I/O configuration group
  [in] int  Value,           // I/O configuration value
  [in] int  SubValue=-1,     // I/O configuration subvalue
  [in] __int64  ParXtra0=-1, // Extra parameter #0
  [in] __int64  ParXtra1=-1  // Extra parameter #1
);
```

Remarks

Only the video standard can be changed using this function, so Group must be DTAPI_IOCONFIG_IOSTD.

If this function returns an error some ports may have the new value and some may not yet have been configured.

DtSdiMatrix::Start

Start/stop receiving and transmitting of frames.

```
DTAPI_RESULT DtSdiMatrix::Start (
  [in] bool  Start,          // true=start tx/rx; false=stop tx/rx
);
```

Parameters

Start
Set to true to start reception/transmission and set to false to stop reception/transmission.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Success
DTAPI_E_INVALID_VIDSTD	No (valid) video standard has been set yet (make sure **DtSdiMatrix::SetVidStd** has been called)

Remarks

None.

DtSdiMatrix::WaitFrame

Wait's for the next frame to be received and returns the range of frames which are available/safe too access.

```
DTAPI_RESULT DtSdiMatrix::WaitFrame (
 [out] __int64&  FirstFrame, // First 'safe' frame
 [out] __int64&  LastFrame,  // Last 'safe' frame
);
// OVERLOAD: returns just the last 'safe' frame
DTAPI_RESULT DtSdiMatrix::WaitFrame (
 [out] __int64&  LastFrame,  // Last 'safe' frame
);
```

Parameters

FirstFrame

Sequence number of the first frame in the 'safe area'. The safe area is the range of frames, in the frame buffer, which are safe to read from or write to (i.e. the frames which are not currently being transmitted or received).

LastFrame

Sequence number of the last frame in the 'safe area'.

Result

DTAPI_RESULT	Meaning
DTAPI_OK	Wait was successful
DTAPI_E_NOT_ATTACHED	**DtSdiMatrix** object must be attached
DTAPI_E_DEV_DRIVER	Wait failed due to internal driver error
DTAPI_E_TIMEOUT	This function will wait a maximum of 100ms for a new frame after which it timeouts and returns this error.

Remarks

This function returns immediately after the hardware has received a new frame. The safe area returned by this function is valid for one frame period (e.g. 40ms for 25fps). The 'safe area' is valid for all inputs and outputs that are part of the **DtSdiMatrix** object i.e. the API guarantees that for all inputs *LastFrame* has been received and that all outputs are transmitting a frame prior to *FirstFrame*.