



Full Motion Player

Application Programmer Interface

REALmagic™ embedded API
preliminary version 0.8
subject to change without notice

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May 1, 2001

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Chapter 1

Use guidelines

1.1 Programming notes

Some samples in C are included with the driver.
Please refer to them for more information on how to use the driver.

1.2 Technical support

If you need additional information, if you encounter problems or if you have any suggestions, please contact REALmagic developer support at <mailto:support@sdesigns.com>.

Chapter 2

Installation

2.1 Linux

See the README file in archive

2.2 QnX

The POSIX Message Queue Server has be to running, start it with

`Mqueue &`

The QNX CD-Rom driver has to be disabled.

The driver is packaged in a single executable, mpegsrv. A front-end application is needed to access its functionalities.

Note for use on a Galaxy test system

The photon GUI must be running in a 640*480 video mode The IGS video system enabler (the igs executable) must be started and provided with a valid command.

2.3 VxWorks

Under VxWorks, the driver is delivered as an object file (MPEGDrv.o).

The driver can be linked directly to VxWorks or loaded dynamically. Once loaded, all the FMP functions are directly accessible.

2.4 Windows CE

The driver is delivered in DLL form.

The FMP functions are exported from the RMMOD.DLL module.

The DLLS are:

RMGRAPH.DLL API implementation.

RMPROXY.DLL Low level driver.

RMDEMUX.DLL Demux and memory management

RMDVD.DLL DVD Navigation

RMSVCD.DLL SVCD/VCD Navigation

RMCC.DLL Closed Caption

RMSOURCE.DLL File systems

RMDVDDEV.DLL DVD-ROM Atapi driver.

RMCDDA.DLL Audio CD driver.

For some adaptations kits (like Venus), all the DLLs are combined into RMMOD.DLL

Chapter 3

Streaming video

This driver has been specially designed and optimized for streaming video.

The data interface is based on a push model: the application must create a Task or Thread and then push the data it receives from the network (or from the disk) into the driver.

Basically the application will create a Task dedicated to listen to a Live Source of MPEG data and bring it to system memory to be transferred to the MPEG driver.

Synchronization

1. The application must send play (FMPPPlay) or pause (FMPPPause) to the driver before sending any data.
2. The application must stop sending data to the driver before sending a stop command (FMPPStop).
3. The driver takes care of the memory management : the application has to ask a buffer to the driver. Then the application can fill this buffer with data and then can push the buffer back to the driver.
4. Overflow is handled by the data source: overflow condition happens when the memory manager cannot deliver a buffer (FMPPGetBuffer block until a buffer is available or return an error code if the bBlockingCall argument is set to FALSE).
5. Underflow is handled by the MPEG driver: underflow condition happens when the video decoder is in starvation.

The application can prevent this condition to happen by re-buffering data when a low-water mark condition is reached.

It is recommended to use double-buffering to prevent underflow conditions.

6. The application cannot call any FMPPStop or FMPPClose before pushing back all the buffers to driver. If FMPPStop or FMPPClose is called between a FMPPGetBuffer/FMPPPush call sequence, the driver will not be able to release its memory.

PES Support

To enable PES playback, open the driver (FMPPOpen) with the FMPPF_PES option.

When you get a buffer from the driver (FMPPGetBuffer) you have to specify if you want a video or an audio buffer in the FMPP_BUFFER structure.

Here is a small code snippet :

```
FMPP_BUFFER FMPPBuf;  
if (FMPPOpen (FMPPF_PES, 1024*32, 8, 0, 0) != FMPE_OK)  
{  
    FMPPClose ();  
    goto exit.now;  
}
```

```
FMPPlay ();
while (1)
{
    FMPBuf.dwFlagsEx = FMP_VIDEO_PES;
    if (FMPGetBuffer (&FMPBuf, TRUE) == FMPE_OK)
    {
        nbytes = fread (FMPBuf.pBuffer, 1, 1024*32, file_handle);
        FMPBuf.dwDataSize = nbytes;
        if (FMPPush (&FMPBuf) != FMPE_OK)
        {
            printf ("FMPPush() error");
            printf ("FMPBuf.pBuffer = 0x%08lx", FMPBuf.pBuffer);
        }
    }
}
```

The pes packets must not have 0 as the packet length.

If there are 0 length (in the case of video packets inside a transport stream) then there is a special PES format that the MPEG driver can accept:

The PES file format is meant to model how PES data coming from a transport stream will be pushed to the MPEG driver for decoding. For both audio and video files, the data can be formatted as follows.

A data block may or may not contain an entire packet, but it will never contain more than one packet.

In other words, each data block may contain at most one PES packet.

If the whole PES packet cannot fit in the data block, then the next data block(s) will contain the rest of the packet. PES packets always start on data block boundaries.

DataBlock = { 00 00 01 BA — Flags (4 bytes) — PacketDataLength (4 bytes) — packet data }

DataBlockLength = 4 + 4 + 4 + PacketDataLength

Thus a stream that an application would push to the MPEG driver would look like the following.

PushedVideoStream = DataBlock, DataBlock, DataBlock, ..., DataBlock PushedAudioStream = DataBlock, DataBlock, DataBlock, ..., DataBlock

When the application calls FMPPush, the buffer will be filled with a single DataBlock. The length of the FMP_BUFFER will be set to DataBlockLength. The application will also set the dwFlagsEx to flag either audio or video as appropriate.

Flag values are as follow:

1. - Continuation packet (flag 0)
2. - Discontinuity (flag 1)
3. - Packet start (flag 2)
4. - Packet checksum error (flag 3)

Here is the beginning of a video sequence.

```
** 0 - Len 1944 (0x798) Flags 0x00000002 Offset 12 (0xc)
** 1 - Len 1640 (0x668) Flags 0x00000002 Offset 1968 (0x7b0)
** 2 - Len 3000 (0xbb8) Flags 0x00000002 Offset 3620 (0xe24)
** 3 - Len 1656 (0x678) Flags 0x00000002 Offset 6632 (0x19e8)
** 4 - Len 1616 (0x650) Flags 0x00000002 Offset 8300 (0x206c)
** 5 - Len 1992 (0x7c8) Flags 0x00000002 Offset 9928 (0x26c8)
** 6 - Len 1824 (0x720) Flags 0x00000002 Offset 11932 (0x2e9c)
** 7 - Len 1672 (0x688) Flags 0x00000002 Offset 13768 (0x35c8)
** 8 - Len 3400 (0xd48) Flags 0x00000002 Offset 15452 (0x3c5c)
** 9 - Len 2192 (0x890) Flags 0x00000002 Offset 18864 (0x49b0)
```

** 10 - Len 2264 (0x8d8) Flags 0x00000002 Offset 21068 (0x524c)
** 11 - Len 3944 (0xf68) Flags 0x00000002 Offset 23344 (0x5b30)
** 12 - Len 3264 (0xcc0) Flags 0x00000002 Offset 27300 (0x6aa4)
** 13 - Len 3496 (0xda8) Flags 0x00000002 Offset 30576 (0x7770)
** 14 - Len 16356 (0x3fe4) Flags 0x00000002 Offset 34084 (0x8524)
** 15 - Len 16356 (0x3fe4) Flags 0x00000000 Offset 50452 (0xc514)
** 16 - Len 16356 (0x3fe4) Flags 0x00000000 Offset 66820 (0x10504)
** 17 - Len 16356 (0x3fe4) Flags 0x00000000 Offset 83188 (0x144f4)
** 18 - Len 12696 (0x3198) Flags 0x00000000 Offset 99556 (0x184e4)
** 19 - Len 2024 (0x7e8) Flags 0x00000002 Offset 112264 (0x1b688)

For each line, the application would do an FMPPush, pushing the entire data block as described above. Note that blocks 14 - 18 are actually a single PES packet. The others are all individual PES packets.

Implementing trick modes

Chapter 4

Command description

Push Model

Following are the different commands you can use to access the driver. Here is a summary of the commands classed by function.

To open and close the MPEG driver

MPEGDriverEntry opens the MPEG driver
MPEGDriverUnload closes the MPEG driver

To open and close a stream

FMPOpen opens a stream (Push Model)
FMPClose closes a stream

To play the stream

FMPPlay plays a stream
FMPPause pauses a stream
FMPSStop stops a stream

To set and get parameters

FMPSet sets a parameter
FMPSGet gets a parameter

To send data to the driver

FMPGetBuffer gets a buffer from the driver
FMPPush pushes data to the driver
FMPSFlush flushes the internal buffers

4.1 Callback functions

A callback function is a function of your application called by the driver in some situations.

You use the FMPOpen command to define callback functions.

Depending on the flags specified when declaring your function, the return status is passed in DWORD Value

Your function should look like this:

```
DWORD MyCallBack(DWORD dwContext, DWORD dwMsg, DWORD dwValue);
```

You should return a zero value if successful. A return value of `FMPM_ERROR` specifies that an error occurred while executing a command. The error in Value may be one of the following:

`FMPE_ERROR` System error occurred while reading the stream

`FMPM_STARVATION` Message issued when the video decoder is starving. Value is the total size of buffers in the driver in PTS units.

`FMPM_EOS` Message issued when the video and audio decoders have finished decoding the stream.

4.2 Disc functions

4.2.1 AngleChange

In Angle Block, change the Angle

```
DWORD AngleChange (bAngleNumber);
```

Arguments

BYTE bAngleNumber Angle Number. Must be set between 1 and 9

Return value

Zero if successful. Otherwise returns an error code.

`DVDE_ARG` Arguments are not valid.

`DVDE_UNAUTHORIZED` Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.1: Operating Systems and Streaming Models

4.2.2 AudioStreamChange

Set the Stream number of the Audio.

```
DWORD AudioStreamChange (bStreamNumber);
```

Arguments

BYTE bStreamNumber Audio Stream number (DVD: between 0 and 7, SVCD: 0 or 1)

Return value

DVD Zero if successful. Otherwise returns an error code.

`DVDE_ARG` Arguments are not valid.

`DVDE_UNAUTHORIZED` Unauthorized operation.

SVCD

FMPE_OK successful

FMPE_UNEXPECTED unknown errors

See also

DVDI_LAST_ATR(??)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•		•	
Windows CE			•		•	
QnX			•		•	
Linux			•		•	

Figure 4.2: Operating Systems and Streaming Models

4.2.3 BackwardScan

The operation to scan play at the specified Speed. This user function includes scan play and slow playback for backward navigation at any speed (except normal speed).

`DWORD BackwardScan (wSpeed, bFast);`

Arguments

DWORD wSpeed Speed of the stream (2 for x2, 4 for x4, 6 for x6, 8 for x8)

BOOL bFast TRUE if Fast-Forward, FALSE if Slow motion

Return value

Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

Remarks

Backward slow motion is implemented.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.3: Operating Systems and Streaming Models

4.2.4 ButtonActivate

Activate the current Highlighted Button.

`DWORD ButtonActivate();`

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.4: Operating Systems and Streaming Models

4.2.5 ButtonSelectAndActivate

Activate the specified Highlighted Button.

```
DWORD ButtonSelectAndActivate(BYTE bButton);
```

Arguments

BYTE bButton the button number (between 1 and 36)

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation

DVDE_ARG Arguments are not valid

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.5: Operating Systems and Streaming Models

4.2.6 CDDANextTrack

Next audio track.

```
DWORD CDDANextTrack();
```

Return value

FMPE_OK successful

FMPE_CDDA_FAILURE failure or end of disk reached

Remarks

This function does not stop the normal operation if the end of the disk is reached.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks						•
Windows CE						•
QnX						•
Linux						•

Figure 4.6: Operating Systems and Streaming Models

4.2.7 CDDAPrevTrack

Previous audio track.

```
DWORD CDDAPrevTrack( );
```

Return value

FMPE_OK successful

FMPE_CDDA_FAILURE failure or beginning of disk reached

Remarks

This function does not stop the normal operation if the beginning of the disk is reached.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks						•
Windows CE						•
QnX						•
Linux						•

Figure 4.7: Operating Systems and Streaming Models

4.2.8 ChapterPlay

Play from the beginning of a chapter specified by the Title number and the chapter number

```
DWORD ChapterPlay(bTitleNumber, wChapterNumber);
```

Arguments

BYTE bTitleNumber Title Number to play. The number is set between 1 and 99

WORD wChapterNumber Chapter Number to play. The number is set between 1 and 999

Return value

Zero if successful. Otherwise, returns an error code.

DVDE_ARG Argument is not valid.

DVDE_TITLENUMBER The Title number does not exist

DVDE_PTTNUMBER The PTT number does not exist

DVDE_UNAUTHORIZED Unauthorized operation.

Remarks

Branch to PTT specified by user. Execute Pre-Command.

See also

TitlePlay(4.2.36), DVDI_TT_SRPTI (5)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.8: Operating Systems and Streaming Models

4.2.9 ChapterSearch

Stop the current presentation and start the presentation from the beginning of PTT (Part.of.Title) specified by PTT numbers within the same Title.

```
DWORD ChapterSearch(wChapterNumber);
```

Arguments

WORD wChapterNumber Chapter Number to play. The number is set between 1 and 999

Return value

Zero if successful. Otherwise, returns an error code.

DVDE_ARG Argument is not valid.

DVDE_PTTNUMBER The Chapter number does not exist

DVDE_UNAUTHORIZED Unauthorized operation.

Remarks

Branch to nominated PTT specified by the user. Do not execute Pre-Command

See also

ChapterPlay(4.2.8)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.9: Operating Systems and Streaming Models

4.2.10 ClearRepeatAB

Turns off the RepeatAB function and resets all bookmarks.

```
DWORD ClearRepeatAB();
```

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.10: Operating Systems and Streaming Models

4.2.11 DefaultsPgSearch

Stop the current play item and start from the list corresponding to the Default List Offset specified in the PSD (Play Sequence Descriptor).

`DWORD DefaultPGSearch ();`

Return value

Zero if successful. Otherwise returns an error code.

VCD/SVCD

FMPE_OK successful

FMPE_UNEXPECTED unknown errors

FMPE_DISABLED the function is currently disabled

FMPE_INVALIDARG the list offset requested is out of range

FMPE_TIMERACTIVATED the timer has been activated

FMPE_FAILURE

See also

PrevPGSearch(4.2.21), NextPGSearch(4.2.19)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks				•	•	
Windows CE				•	•	
QnX				•	•	
Linux				•	•	

Figure 4.11: Operating Systems and Streaming Models

4.2.12 FastForward

Fast forward.

`DWORD FastForward(speed);`

Arguments

BYTE speed Fast forward speed. 3 speeds supported. Press fast forward key once for 2X, twice for 3X, and three times for 4X.

Return value

Zero if successful. Otherwise returns an error code.

VCD/VCD2/SVCD

FMPE_OK successful

FMPE_UNEXPECTED unknown errors

OS	Push Model	File Playback	DVD	VCD	VCD2	SVCD	CD Audio
VxWorks				•	•	•	
Windows CE				•	•	•	
QnX				•	•	•	
Linux				•	•	•	

Figure 4.12: Operating Systems and Streaming Models

4.2.13 ForwardScan

The operation to scan play at the specified Speed. This user function includes scan play and slow playback for forward navigation at any speed (except normal speed).

```
DWORD ForwardScan (wSpeed, bFast);
```

Arguments

WORD wSpeed Speed of the stream (2 for x2, 4 for x4, 6 for x6, 8 for x8)

BOOL bFast TRUE if Fast-Forward, FALSE if Slow motion

Return value

Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

Remarks

Slow motion is implemented.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.13: Operating Systems and Streaming Models

4.2.14 GoUp

Stop the execution of the current Program Chain and play the GoUp Program Chain (specified in the current Program Chain)

```
DWORD GoUp();
```

Return value

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.14: Operating Systems and Streaming Models

4.2.15 KaraokeAudioPresentationModeChange

Change the mode of Audio Mixing mode for Karaoke.

```
DWORD KaraokeAudioPresentationMode (dwMode);
```

Arguments

DWORD dwMode Mode for the Audio Mixing mode for Karaoke

Return value

Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

Remarks

Not implemented for DVD

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks						
Windows CE						
QnX						
Linux						

Figure 4.15: Operating Systems and Streaming Models

4.2.16 LeftButtonSelect

Select the Buttons on the Menu Screen.

```
DWORD LeftButtonSelect();
```

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.16: Operating Systems and Streaming Models

4.2.17 LowerButtonSelect

Select the Buttons on the Menu Screen.

```
DWORD LowerButtonSelect();
```

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.17: Operating Systems and Streaming Models

4.2.18 MenuCall

Call the Menu in the Program Chain (PGC).

```
DWORD MenuCall (bMenuID);
```

Arguments

BYTE bMenuID Specifies the Menu ID to be called

There are six type of Menu ID:

DVD_TITLE_ID Call Title Menu

DVD_ROOT_ID Call Root Menu

DVD_AUDIO_ID Call Audio Menu

DVD_SUBPICTURE_ID Call Sub-picture Menu

DVD_ANGLE_ID Call Angle Menu

DVD_PTT_ID Call PTT Menu

Return value

Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.18: Operating Systems and Streaming Models

4.2.19 NextPgSearch

DVD Stop the current presentation and start the presentation from the beginning of the next Program within the same PGC.

VCD2/SVCD Stop the current play item and start from the list corresponding to the Next List Offset specified in the PSD (Play Sequence Descriptor)

`DWORD NextPGSearch();`

Return value

DVD Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

VCD2/SVCD

FMPE_OK successful

FMPE_UNEXPECTED unknow errors

FMPE_DISABLED the function is currently disabled

FMPE_INVALIDARG the specified time is out of range

FMPE_TIMERACTIVATED the timer has been activated

FMPE_FAILURE vcd2/svcd is not currently playing

See also

DVD: GoUp(4.2.14), TopPGSearch(4.2.37), PrevPGSearch(4.2.21)

VCD2/SVCD: PrevPGSearch(4.2.21), ReturnPGSearch(4.2.27), DefaultPGSearch(4.2.11)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•	•	•	
Windows CE			•	•	•	
QnX			•	•	•	
Linux			•	•	•	

Figure 4.19: Operating Systems and Streaming Models

4.2.20 NumericSelections

Implement numeric functions of the Selection List.

`DWORD NumericSelections (bSeletionNumber)`

Arguments

BYTE bSeletionNumber Selection number selected by user (between 0 and 99)

Return value

Zero if successful. Otherwise returns an error code.

VCD2/SVCD

FMPE_OK successful

FMPE_UNEXPECTED unknown errors

FMPE_DISABLED the function is currently disabled

FMPE_INVALIDARG

- BSN (base selection number) is zero.

- selection is out of range.
- the list offset requested is out of range.

FMPE_TIMERACTIVATED the timer has been activated

FMPE_FAILURE

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks				•	•	
Windows CE				•	•	
QnX				•	•	
Linux				•	•	

Figure 4.20: Operating Systems and Streaming Models

4.2.21 PrevPgSearch

DVD Stop the current presentation and start the presentation from the beginning of previous Program within the same Program Chain (PGC).

VCD2/SVCD Stop the current play item and start from the list corresponding to the Previous List Offset specified in the PSD (Play Sequence Descriptor).

DWORD PrevPgSearch();

Return value

DVD Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

VCD/SVCD

FMPE_OK successful

FMPE_UNEXPECTED unknow errors

FMPE_DISABLED the function is currently disabled

FMPE_INVALIDARG the specified time is out of range

FMPE_TIMERACTIVATED the timer has been activated

FMPE_FAILURE vcd/svcd is not currently playing

See also

DVD: GoUp(4.2.14), TopPgSearch(4.2.37), NextPgSearch(4.2.19)

VCD2/SVCD: NextPgSearch(4.2.19), ReturnPgSearch(4.2.27), DefaultPgSearch(4.2.11)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•	•	•	
Windows CE			•	•	•	
QnX			•	•	•	
Linux			•	•	•	

Figure 4.21: Operating Systems and Streaming Models

4.2.22 RepeatAB

Turn on A-B Repeat function. Call once to set Bookmark A. Call second time to set Bookmark B and start the looping playback. Call a third time to turn off.

`DWORD RepeatAB();`

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•	•	•	
Windows CE			•	•	•	
QnX			•	•	•	
Linux			•	•	•	

Figure 4.22: Operating Systems and Streaming Models

4.2.23 RepeatChapter

Toggle RepeatChapter function on and off.

`DWORD RepeatChapter();`

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•	•	•	•
Windows CE			•	•	•	•
QnX			•	•	•	•
Linux			•	•	•	•

Figure 4.23: Operating Systems and Streaming Models

4.2.24 RepeatTitle

Toggle RepeatTitle function on and off.

`DWORD RepeatTitle();`

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			•
Windows CE			•			•
QnX			•			•
Linux			•			•

Figure 4.24: Operating Systems and Streaming Models

4.2.25 Resume

This operation returns from the Menu-space

`DWORD Resume();`

Return value

DVD Zero if successful. Otherwise returns an error code.

DVDE_NORESUME Nothing to resume

DVDE_UNAUTHORIZED Unauthorized operation.

VCD/SVCD

FMPE_OK successful.

FMPE_UNEXPECTED unknown errors.

FMPE_DISABLED its not in pausing.

FMPE_FAILURE

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•	•	•	
Windows CE			•	•	•	
QnX			•	•	•	
Linux			•	•	•	

Figure 4.25: Operating Systems and Streaming Models

4.2.26 ResumeBookmark

Resumes playback from last saved bookmark.

`DWORD ResumeBookmark(pBookmark);`

Arguments

void* pBookmark Pointer to bookmark to resume from. This pointer must point to a CRMBookmark structure.

Return value

Zero if successful. Otherwise, returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

Remarks

See also

StoreBookmark(4.2.32)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.26: Operating Systems and Streaming Models

4.2.27 ReturnPgSearch

Stop the current play item and start from the list corresponding to the Return List Offset specified in the PSD (Play Sequence Descriptor).

`DWORD ReturnPgSearch ()`;

Return value

VCD/SVCD

FMPE_OK successful
 FMPE_UNEXPECTED unknown errors
 FMPE_DISABLED the function is currently disabled
 FMPE_INVALIDARG the list offset requested is out of range
 FMPE_TIMERACTIVATED the timer has been activated
 FMPE_FAILURE

See also

PrevPgSearch(4.2.21), NextPgSearch(4.2.19), DefaultPgSearch(4.2.11)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks				•	•	
Windows CE				•	•	
QnX				•	•	
Linux				•	•	

Figure 4.27: Operating Systems and Streaming Models

4.2.28 Rewind

Rewind

`DWORD Rewind(speed)`

Arguments

BYTE speed Rewind speed. 3 speeds supported. Press rewind key once for 2X, twice for 3X, and three times for 4X.

Return value

VCD/VCD2/SVCD

FMPE_OK successful
 FMPE_UNEXPECTED unknown errors

OS	Push Model	File Playback	DVD	VCD	VCD2	SVCD	CD Audio
VxWorks				•	•	•	
Windows CE				•	•	•	
QnX				•	•	•	
Linux				•	•	•	

Figure 4.28: Operating Systems and Streaming Models

4.2.29 RightButtonSelect

Select the Buttons on the Menu Screen.

```
DWORD RightButtonSelect();
```

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.29: Operating Systems and Streaming Models

4.2.30 Stilloff

Operation to release Still.

```
DWORD Stilloff();
```

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.30: Operating Systems and Streaming Models

4.2.31 StopForResume

This operation stops playback and prepares to resume later.

```
DWORD StopForResume();
```

Return value

DVD Zero if successful. Otherwise returns an error code.

VCD/SVCD

FMPE_OK successful.

FMPE_UNEXPECTED unknown errors.

FMPE_DISABLED already pausing

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•	•	•	
Windows CE			•	•	•	
QnX			•	•	•	
Linux			•	•	•	

Figure 4.31: Operating Systems and Streaming Models

4.2.32 StoreBookmark

Stop the current playback, and saves a bookmark that can be used to resume playback later.

```
DWORD StoreBookmark(pBookmark);
```

Arguments

void* pBookmark Pointer to save bookmark to. This pointer must have at least a size of CRMBookmark (at least 10K bytes) allocated.

Return value

Zero if successful. Otherwise, returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation. Bookmark cannot be saved.

Remarks

When function returns pBookmark will contain the current Bookmark information. Also note that sometimes Bookmark cannot be saved.

See also

ResumeBookmark([4.2.26](#))

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.32: Operating Systems and Streaming Models

4.2.33 SubPictureStreamChange

Set the stream number of the Sub-Picture and whether the sub-picture is displayed or not.

```
DWORD SubPictureStreamChange (bStreamNumber, bDisplayFlag);
```

Arguments

BYTE StreamNumber Subpicture Stream number (between 0 and 31) (62: No Supicture or Subpicture Stream not selected, 63: Dummy Stream)

BOOL DisplayFlag Display Sub-picture or not

Return value

Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

See also

SubPicture_Query_Attributes(??)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.33: Operating Systems and Streaming Models

4.2.34 TimePlay

Play from the specified position of the Title by the Title number and Time

```
DWORD TimePlay(bTitleNumber, sTime);
```

Arguments

BYTE bTitleNumber Title Number to play The number is set between 1 and 99

STRING sTime value defining the time to start playback in the form of "hh:mm:ss:ff" (hours, minutes, seconds, and frames, each two digits)

Return value

Zero if successful. Otherwise returns an error code. DVDE_ARG Arguments are not valid. DVDE_TITLENUMBER The Title number does not exist DVDE_UNAUTHORIZED Unauthorized operation.

Remarks

The Player accesses to the specified frame (time code) and starts playing.

This function is only allowed for a One_Sequential_PGC_Title. This function executes the Pre-Command of the Program Chain.

See also

TimeSearch()

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.34: Operating Systems and Streaming Models

4.2.35 TimeSearch

This command stops the current presentation and starts presentation from the specified position of the title by Time within the same title.

```
DWORD TimeSearch( sTime);
```

Arguments

STRING sTime value defining the time to start playback in the form of "hh:mm:ss:ff" (hours, minutes, seconds, and frames, each two digits)

Return value

DVD Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

SVCD

FMPE_OK successful

FMPE_NOINTERFACE this interface is not supported in this case

FMPE_UNEXPECTED unknow errors

FMPE_INVALIDARG the specified time is out of range

FMPE_TIMERACTIVATED the timer has been activated

FMPE_FAILURE SVCD is not currently playing

Remarks

The Player accesses to the specified frame (time code) and starts playing. This function is only allowed for a One_Sequential_PGC_Title. This function does not execute the Pre-Command of the Program Chain.

See also

TimePlay(4.2.34)

4.2.36 TitlePlay

Play the Title by the Title number.

```
DWORD TitlePlay (bTitleNumber);
```

Arguments

BYTE bTitleNumber Title Number to play The number is set between 1 and 99

Return value

Zero if successful or returns an error code

FMPGetLastError may be used to retrieve the last error code. The following are valid error codes from FMPGetLastError:

DVDE_ARG Argument is not valid.

DVDE_TITLENUMBER The Title number does not exist

DVDE_UNAUTHORIZED Unauthorized operation.

Remarks

Jump to the specific Title number. Execute Pre-Command (for DVD)

See also

ChapterPlay(4.2.8), DVDI_TT_SRPTI(5)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•	•	•	•
Windows CE			•	•	•	•
QnX			•	•	•	•
Linux			•	•	•	•

Figure 4.35: Operating Systems and Streaming Models

4.2.37 TopPgSearch

Stop the current presentation and start the presentation from the beginning of the current Program within the same PGC.

DWORD TopPgSearch ();

Return value

Zero if successful. Otherwise, returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

See also

GoUp(4.2.14), PrevPgSearch(4.2.21), NextPgSearch(4.2.19)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.36: Operating Systems and Streaming Models

4.2.38 UpperButtonSelect

Select the Buttons on the Menu Screen.

DWORD UpperButtonSelect();

Return value

Zero if successful. Otherwise returns an error code.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 4.37: Operating Systems and Streaming Models

4.3 General functions

to be written.

4.3.1 FMPEAbout

This function returns a version number, the date of compilation and a Copyright notice.

```
DWORD FMPEAbout( TCHAR* sVersion, TCHAR* sDate, TCHAR *sCopyright);
```

Remarks

The version number returned is of the following format : *a.b.c.d*, where *a, b, c, d* are respectively the version, revision, build and release numbers.

The date of compilation returned is of the following format: *mm dd yyyy*. As an example: Dec 9 1999.

sVersion should point to a string 16-TCHAR-or-more long.

sDate should point to a 12-TCHAR-or-more long one.

sCopyright should point to a 64-TCHAR-or-more long one.

No string-overflow checking is performed within the function (the string have to be allocated by the application).

Any of those three pointers can have a NULL value, if the information it provides is unwanted.

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
---------	----------

Operating Systems and Streaming Models

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks	•	•	•	•	•
Windows CE	•	•	•	•	•
QnX	•	•	•	•	•
Linux	•	•	•	•	•

Figure 4.38: FMPEAbout Operating Systems and Streaming Models

4.3.2 FMPClose

This function closes the driver

```
DWORD FMPClose ();
```

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
FMPE_DRIVER_NOT_OPEN	The driver is not open

See also

FMPOpen(4.3.6), FMPOpenDiscPlayback(4.3.7), MPEGDriverUnload(4.3.14)

Operating Systems and Streaming Models

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks	•	•	•	•	•
Windows CE	•	•	•	•	•
QnX	•	•	•	•	•
Linux	•	•	•	•	•

Figure 4.39: FMPClose Operating Systems and Streaming Models

4.3.3 FMPFlush

This function flushes internal Fifos of the driver

```
DWORD FMPFlush (BOOL bGDF);
```

Arguments

BOOL bGDF If TRUE, discard any incoming data till the next section

Return value

Zero if successful. Otherwise returns an error code.

Remarks

This function can be used to accelerate seek time (after a seek you can flush the internal buffers of the driver to accelerate the display time).

See also

FMPPush(4.3.10)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks	•	•				
Windows CE	•	•				
QnX		•				
Linux		•				

Figure 4.40: Operating Systems and Streaming Models

4.3.4 FMPPGet

This command returns a value of specified setting for specified stream

```
DWORD FMPPGet (index);
```

Arguments

DWORD index Index of the value to get

Return value

Value of the setting. Or 0xFFFFFFFF in case of error.

FMPPGetLastError can be used to obtain error information about the command.

Remarks

The FMPGet command allows you to get a stream setting. A NULL handle allows retrieval of a non-stream setting. The driver settings include information, status and default settings.

See also

Settings(5), FMPSet(4.3.11)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks	•	•	•	•	•	
Windows CE	•	•	•	•	•	•
QnX	•	•	•	•	•	
Linux	•	•	•	•	•	

Figure 4.41: Operating Systems and Streaming Models

4.3.5 FMPGetBuffer

This function gets a buffer for the memory Manager of the driver

```
DWORD FMPGetBuffer (PFMP_BUFFER pBuffer, BOOL bBlockingCall);
```

Arguments

PFMP_BUFFER pBuffer Pointer to a FMP_BUFFER structure:

BOOL bBlockingCall If set to TRUE and no more memory is available in the Memory Manager, this call will block till some buffer gets freed up.

If set to FALSE, and no more memory is available in the Memory Manager, this call will return an error code.

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
FMPE_DRIVER_NOT_OPEN	The driver is not open
FMPE_NOT_ENOUGH_MEMORY	All the memory of the memory manager is used

See also

FMPPush for FMP_BUFFER declaration(4.3.10), Streaming Video.

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks	•				
Windows CE	•				
QnX	•				
Linux	•				

Figure 4.42: FMPGetBuffer Operating Systems and Streaming Models

4.3.6 FMPOpen

This command opens the MPEG driver in push mode.

```
DWORD FMPOpen (dwflags, dwSize, dwCount, pCallback, dwContext);
```

Arguments

DWORD flags Specifies initial demux and stream playback mode on Open

FMPF_TRANSPORT Transport stream demux (push model)
 FMPF_SYSTEM System stream demux (push model)
 FMPF_SYSTEM Program stream demux (push model)
 FMPF_VIDEO Video stream (MPEG1/MPEG2) (push model)
 FMPF_MPEG_AUDIO MPEG Audio stream (push model)
 FMPF_AC3 AC3 Audio stream (push model)
 FMPF_DVD DVD Demux (push model)
 FMPF_SVCD SVCD/VCD Demux (push model)
 FMPF_CDDA CDDA demux (push model)
 FMPF_PES pes stream support (push model)

DWORD dwSize Size of buffers (Memory Manager)

DWORD dwCount Number of buffers to allocate. The total size of the Memory Manager is dwSize * dwCount.

FUNCPTR pCallback User Callback to receive driver notifications.

DWORD dwContext Callback Context (reported when the callback is called)

Remarks

This command open the driver in push mode. The application has to feed the driver with data. Please refer to the streaming video section and the sample code for the details on the push model.

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
FMPE_DRIVER_OPEN	The driver is already open
FMPE_CANNOT_OPEN_DRIVER	Cannot open the MPEG driver
FMPE_NOT_ENOUGH_MEMORY	No more memory available

See also

FMPClose([4.3.2](#))

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks	•				
Windows CE	•				
QnX	•				
Linux	•				

Figure 4.43: FMPOpen Operating Systems and Streaming Models

4.3.7 FMPOpenDiscPlayback

This command opens the MPEG driver in pull mode for Disc Playback.

```
DWORD FMPOpenDiscPlayback (PFMP_OPENSTRUCT pFMPOpenStruct);
```

Arguments

PFMP_OPENSTRUCT pFMPOpenStruct Pointer to the following:

```
typedef struct tagFMP_OPENSTRUCT {
    DWORD    dwStructSize;    // Size of the structure
    DWORD    dwFlags;        // Open Flag
    DWORD    dwSize;         // Size of buffers
    DWORD    dwCount;        // Number of buffers
    PFMP_CALLBACK pCallback; // FMP Callback
    DWORD    dwContext;      // Callback context
    BYTE     bDriverNumber;  // Driver Number (not used : MPEGDriverEntry defines the driver number)
    TCHAR*   sFileName;     // File Name (not used)
    BYTE     bFileSystem;   // Disk data access method
    BYTE     bDiscContent;  // Disc Content (returned by the driver)
} FMP_OPENSTRUCT, *PFMP_OPENSTRUCT;
```

Open Flag is:

```
FMPF_TRANSPORT Transport stream demux
FMPF_SYSTEM System stream demux
FMPF_PROGRAM Program stream demux
FMPF_VIDEO Video stream (MPEG1/2)
FMPF_MPEG_AUDIO MPEG Audio stream
FMPF_AC3 AC3 Audio stream
FMPF_DVD DVD demux
FMPF_SVCD VCD/SVCD demux
```

Disk data access method is:

```
SYS_ACCESS using the OS function
```

Disc content is:

```
FMPC_DVD_VIDEO DVD Video Disc
FMPC_VCD Video CD Disc
FMPC_SVCD Super Video CD Disc
FMPC_CDDA CD audio
FMPC_UNSUPPORTED Namely, CDI and HQ-VCD
FMPC_UNKNOWN Failure to recognize a known type of disc
```

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
FMPE_DRIVER_OPEN	The driver is already open
FMPE_CANNOT_OPEN_DRIVER	Cannot open the MPEG driver
FMPE_NOT_ENOUGH_MEMORY	No more memory available

See also

FMPClose(4.3.2)

Operating Systems and Streaming Models

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks		•	•	•	•
Windows CE		•	•	•	•
QnX		•	•	•	•
Linux		•	•	•	•

Figure 4.44: FMPOpenDiscPlayback Operating Systems and Streaming Models

4.3.8 FMPPause

This command will PAUSE the video and audio decoders. The source can still send data before pause, but this data will not be decoded. This function can be used before a PLAY to prefill the driver.

```
DWORD FMPPause();
```

Remarks

This function is synchronous: when the call returns, the driver will be in paused mode.

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
FMPE_DRIVER_NOT_OPEN	The driver is not open

SeeAlso

FMPSStop(4.3.12), FMPPPlay(4.3.9)

Operating Systems and Streaming Models

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks	•	•	•	•	•
Windows CE	•	•	•	•	•
QnX	•	•	•	•	•
Linux	•	•	•	•	•

Figure 4.45: FMPPause Operating Systems and Streaming Models

4.3.9 FMPPPlay

This command starts the playback.

```
DWORD FMPPPlay ();
```

Remarks

This function is synchronous: when the call returns, the driver will be in play mode.

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
FMPE_DRIVER_NOT_OPEN	The driver is not open

SeeAlso

FMPPause(4.3.8), FMPPStop(4.3.12)

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks	•	•	•	•	•
Windows CE	•	•	•	•	•
QnX	•	•	•	•	•
Linux	•	•	•	•	•

Figure 4.46: FMPPplay Operating Systems and Streaming Models

4.3.10 FMPPush

This function pushes data into the driver to be decoded

```
DWORD FMPPush (PFMP_BUFFER pBuffer);
```

Arguments

PFMP_BUFFER pBuffer Pointer to a FMP_BUFFER structure

```
typedef struct {
void *pBuffer;           // Address of the buffer
DWORD dwBufferSize;      // Size of the buffer
DWORD dwDataSize;        // Size of valid data in the buffer
DWORD dwFlags;           // Flags
DWORD dwFlagsEx;         // Extended flags (used for PES support)
DWORD pReserved[8];      // Reserved
} FMP_BUFFER, *PFMP_BUFFER;
```

Flags can be :

FMPB_DISCONTINUITY Data discontinuity.

FMPB_TRICK_MODE_START Data for trick mode start (stop decoding the audio and stop decoding P frames).

FMPB_TRICK_MODE_END Data for trick mode end (resume normal playback).

Remarks

You can push data only in Paused and Play mode. You cannot push data in stop mode. The Buffer you push must be allocated by the Memory Manager of the driver (you must get it using FMPPush). This call is supposed to be asynchronous: it should return very quickly.

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
FMPE_DRIVER_NOT_OPEN	The driver is not open
FMPE_PUSH_WHILE_STOPPED	Pushing data in stopped state

See also

FMPGetBuffer(4.3.5)

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks	•				
Windows CE	•				
QnX	•				
Linux	•				

Figure 4.47: FMPPush Operating Systems and Streaming Models

4.3.11 FMPSet

This command will initialize the stream or the driver with specified setting.

```
DWORD FMPSet (index, value);
```

Arguments

DWORD index Index of the value to set or zero for nothing that can be combined with a flag

DWORD value New value for the setting

Return value

Returns the previous value of the given setting if successful otherwise returns 0xFFFFFFFF in case of error.

Remarks

The FMPSet command allows you to set a parameter of driver.

You can specify audio or video settings for the driver. In this case, the values set in the driver will be the default values, for any future opened streams.

See also

FMPGet(4.3.4), Settings5

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks	•	•	•	•	•	
Windows CE	•	•	•	•	•	
QnX	•	•	•	•	•	
Linux	•	•	•	•	•	

Figure 4.48: Operating Systems and Streaming Models

4.3.12 FMPStop

This command stops the playback.

```
DWORD FMPStop ();
```

Remarks

This function is synchronous: when the call returns, the driver will be in stop mode.

Using the push model (FMPOpen), it is possible to resume playback after a FMPStop (using FMPPPlay).

Using the disc playback model (FMPOpenDiscPlayback), it is not possible to resume playback after a FMPStop.

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
FMPE_DRIVER_NOT_OPEN	The driver is not open

See also

FMPPPause(4.3.8), FMPPPlay(4.3.9)

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks	•	•	•	•	•
Windows CE	•	•	•	•	•
QnX	•	•	•	•	•
Linux	•	•	•	•	•

Figure 4.49: FMPStop Operating Systems and Streaming Models

4.3.13 MPEGDriverEntry

Initialize the MPEG driver. This function has to be called before FMPOpen.

```
DWORD MPEGDriverEntry(BYTE bDriveNumber);
```

Arguments

BYTE bDriveNumber is the DVD Drive Number:

0 Primary master

2 Secondary master

NO_DRIVE Do not attempt DVD or CDRom drive access

Remarks

NO_DRIVE parameter is useful for instance when playing files from hard disk.

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
FMPE_ENTRY_MOD_INIT_FAILED	Module loader failed to initialize
FMPE_ENTRY_HWL_INIT_FAILED	Failed to create MPEG Hardware driver
FMPE_ENTRY_DVDDEV_INIT_FAILED	Failed to create DVD-ROM device driver

Operating Systems and Streaming Models

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks	•	•	•	•	•
Windows CE	•	•	•	•	•
QnX					
Linux	•	•	•	•	•

Figure 4.50: MPEGDriverEntry Operating Systems and Streaming Models

4.3.14 MPEGDriverUnload

Prepare the MPEG driver to be unloaded. This function has to be called after FMPClose.

```
DWORD MPEGDriverUnload ();
```

ReturnValue

Returns a 32 bit unsigned value. Typical return values might include one of the following :

FMPE_OK	No error
---------	----------

Operating Systems and Streaming Models

OS	Push Model	DVD	VCD	SVCD	CD Audio
VxWorks	•	•	•	•	•
Windows CE	•	•	•	•	•
QnX					
Linux	•	•	•	•	•

Figure 4.51: MPEGDriverUnload Operating Systems and Streaming Models

4.4 Picture placement**4.4.1 FMPSetDestination**

Allow choosing coordinates of destination image if possible (depends on video output choice)

```
FMPSetDestination(DWORD x,DWORD y,DWORD w,DWORD h)
```

Arguments

DWORD x Left horizontal coordinate

DWORD y Top vertical coordinate

DWORD w Horizontal length

DWORD h Vertical length

Return value

Zero if successful. Otherwise returns an error code.

See also

FMPSet with FMPI_DESTINATION_WINDOW ([4.3.11](#))

4.4.2 FMPSetSource

This function allows the user to set a small rectangle area inside the source area as the play back source area. The coordinates are relative to the source window (usually 720*480 for MPEG2 NTSC).

```
DWORD FMPSetSource(DWORD x,DWORD y,DWORD w,DWORD h);
```

Arguments

DWORD x Left horizontal coordinate

DWORD y Top vertical coordinate

DWORD w Horizontal length

DWORD h Vertical length

See also

FMPSet with FMPI_SOURCE_WINDOW (4.3.11)

4.4.3 FMPSetVisibleSource

This function allows the user to set a small rectangle area inside the source area as the play back source area. The coordinates are relative to the source window (usually 720*480 for MPEG2 NTSC).

```
DWORD FMPSetVisibleSource(DWORD x,DWORD y,DWORD w,DWORD h);
```

Arguments

DWORD x Left horizontal coordinate

DWORD y Top vertical coordinate

DWORD w Horizontal length

DWORD h Vertical length

See also

FMPSet with FMPI_VISIBLE_SOURCE_WINDOW (4.3.11)

Chapter 5

Settings

Following are the different settings and status for the MPEG driver.

They can be read with the FMPIGet command (4.3.4) and written with the FMPISet command (4.3.11) using the FMPI_XXX index.

Some settings are read only and are marked as r, others can be written and are marked r/w.

When it is r/s it means that you can write the value only if it is not yet determined. To be used carefully.

The FMPIGet and FMPISet commands always use 32 bits values. When a value is less than 32 bits long, the unused bits are zero.

5.1 CDDA settings

CDDAI_CONTENTS	Returns the length of all the tracks of the CD-Audio	implemented
----------------	------------------------------------------------------	-------------

Figure 5.1: CDDA settings

5.1.1 CDDAI_TOC

Query the table of content of the CD-Audio

```
DWORD DVDQueryAttribute (CDDAI_TOC, dwArg);
```

Arguments

dwArg DWORD dwArg:

Return value

Zero if successful.

Remarks

If a track does not exist, its length will be 0xFFFFFFFF

Here is a small code :

```
#define LBA_TO_MSF(LBN) ((0x00FF0000 & (((LBN)/(60*75)) << 16)) | \
                        (0x0000FF00 & (((LBN)%(60*75))/75 << 8)) | \
                        (0x000000FF & (((LBN)%(60*75))%75) ))
#define MSF_M(MSF) ((MSF) >> 16) & (0x000000FF)
#define MSF_S(MSF) ((MSF) >> 8) & (0x000000FF)
```

```

#define MSF_F(MSF) ((MSF) & 0x000000FF))

void getTracksDuration()
{
    FMP_OPENSTRUCT FMPOpenStruct;
    DWORD tmp [101];
    DWORD MSF, i;
    BYTE bSec, bMin, bFrame;
    MPEGDriverEntry(DRIVE_NUMBER);
    FMPOpenStruct.dwStructSize = sizeof (FMP_OPENSTRUCT);
    FMPOpenStruct.bDriverNumber = DRIVE_NUMBER;
    FMPOpenStruct.dwSize = 32 * 1024;
    FMPOpenStruct.dwCount = 10;
    FMPOpenStruct.pCallback = NULL;
    FMPOpenStruct.dwContext = 0;
    FMPOpenStruct.sFileName = NULL;
    FMPOpenStruct.dwFlags = FMPC_DVD;
    FMPOpenStruct.bDiscContent = FMPC_UNKNOWN;
    FMPOpenStruct.bFileSystem = 0x00;

    tmp [0] = FMPOpenDiscPlayback (&FMPOpenStruct);

    if (tmp [0] != 0) {
        printf("Failed to open the playback\n");
        return;
    }
    memset ( tmp, 0, 101 * sizeof(DWORD));
    DVDQueryAttribute ( CDDAI_TOC, (DWORD)tmp );

    //TOC starts from the element 1 of the 'tmp'
    //print first ten elements of the TOC

    for ( i = 1; i <= 10; i++ ) {
        if ( tmp [i] == 0xffffffff ) {
            printf("Cannot get duration of the track %d\n", i);
        }
        else {
            MSF    = LBA_TO_MSF( tmp [i]);
            bMin   = (BYTE)MSF_M(MSF);
            bSec   = (BYTE)MSF_S(MSF);
            bFrame = (BYTE)MSF_F(MSF);
            printf ("TRACK  %d:  %d: %d: %d \n", i, bMin, bSec, bFrame);
        }
    }
    FMPClose();
    MPEGDriverUnload();
}

```

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks						•
Windows CE						•
QnX						•
Linux						•

Figure 5.2: Operating Systems and Streaming Models

5.2 DVD, SVCD, VCD settings

Setting code		Description	Models	Status
FMPI_DISC_TYPE	r	Retrieves the type of the disc (DVD/SVCD or VCD)	DVD/SVCD/VCD	Not implemented
FMPI_ANGLES_AVAILABLE	r	Retrieves a value specifying the number of available angles.	DVD	Implemented
FMPI_AUDIO_STREAMS_AVAILABLE	r	Retrieves a value specifying the number of available audio streams	DVD/SVCD/VCD	Implemented
FMPI_BALANCE	r/w	Sets or retrieves a value indicating the stereo balance.	All	Implemented
FMPI_BUTTONS_AVAILABLE	r	Retrieves a value specifying the number of available buttons.	DVD	Implemented
FMPI_CAN_SCAN	r	Retrieves a value specifying whether the current file supports scanning (fast-forwarding and rewinding).	DVD	Implemented
FMPI_CAN_SEEK	r	Retrieves a value specifying whether the current file has the ability to seek to a specific time.	DVD	Implemented
FMPI_CC_ACTIVE	r/w	Sets or retrieves a value specifying the closed captioning service state (on or off).		
FMPI_COLOR_KEY	r/w	Sets or retrieves the color key being used by the DVD playback.		
FMPI_CURRENT_ANGLE	r/w	Retrieves a the current angle of a multi-angle title.	DVD	Implemented
FMPI_CURRENT_AUDIO_STREAM	r/w	Sets or retrieves a value specifying the current audio stream.	DVD/SVCD/VCD	Implemented
FMPI_AUDIO_OUTPUT	r/w	Sets or retrieves audio output device; 1: AC3,DTS send to external decoder, 0: Audio decoded in hardware and sent to stereo and Spdif decoder. Can change the audio output only in stop state (not on fly).	DVD/SVCD/VCD	Implemented
FMPI_CURRENT_BUTTON	r	Retrieves a value specifying the number of the current button	DVD	Implemented
FMPI_CURRENT_CHAPTER	r	Retrieves a value specifying the chapter number currently being played	DVD	Implemented
FMPI_CURRENT_DISC_SIDE	r	Retrieves a value specifying the current disc side		
FMPI_CURRENT_DOMAIN	r	Retrieves a value specifying the current DVD domain of the DVD player	DVD	Implemented
FMPI_CURRENT_SUBPICT_STREAM	r/w	Sets or retrieves a value specifying the source of the subpicture	DVD	Implemented
FMPI_CURRENT_TIME	r	Retrieves a value specifying the current playback time, in seconds	DVD/CD-Audio	Implemented
to be ct'd. . .				

Setting code (ct'd)		Description (ct'd)	Models	Status
FMPI_CURRENT_TITLE	r	Retrieves a value specifying the title number currently being played	DVD/CD-Audio	Implemented
DisplaySize	r/w	Sets or retrieves a value specifying the size of the image display window		
FMPI_FRAMES_PER_SECOND	r	Retrieves a value specifying the number of frames per second used by the DVD title		
FMPI_MUTE	r/w	Sets or retrieves a value indicating the current mute state		Implemented
FMPI_RATE	r/w	Sets or retrieves a value specifying the clip's playback rate		
FMPI_SHOW_CAPTIONING	r/w	Sets or retrieves a value specifying whether the closed caption area is visible and closed captioning is enabled		
FMPI_SUBPICTURE_ON	r/w	Sets or retrieves a value specifying whether the subpicture is displayed	DVD	Implemented
FMPI_SUBPICTURE_STREAM_AVAILABLE	r	Retrieves a value specifying the number of available subpicture streams	DVD	Implemented
FMPI_TITLES_AVAILABLE	r	Retrieves a value specifying the number of titles available in the current volume	DVD/CD-Audio	Implemented
FMPI_TOTAL_TITLE_TIME	r	Retrieves a value specifying the total playback time for the current title	DVD/CD-Audio	Implemented
FMPI_UNIQUE_ID	r	Retrieves a value specifying the unique identifier associated with the DVD volume		
FMPI_LEFT_VOLUME	r/w	Sets or retrieves a value specifying the volume, in hundredths of decibels		
FMPI_RIGHT_VOLUME	r/w	Sets or retrieves a value specifying the volume, in hundredths of decibels		
FMPI_CURRENT_TRACK	r	Retrieves a value specifying the track number currently being played	VCD/SVCD	Implemented
FMPI_CURRENT_SPEED	r	Retrieves the current scanning speed	DVD	Implemented
FMPI_TRICK_MODE	r	Retrieves a value specifying current trick mode or the current scanning speed	VCD/SVCD	Implemented

5.3 DVD settings

Following are the different settings and status for streams.

They can be read with the `DVDQueryAttribute` command (see ??) and written with the `DVDQUERY_ATR` command (see ??) using the `DVDI_XXX` index.

The driver settings are considered as default settings for future opened streams.

DVDI.TT_SRPTI	Title Search Pointer Table Information: pointer to a TT_SRPTI struct	implemented
DVDI.VTS_AST_ATR	Audio Attributes of the current VTS: pointer to a AST_ATR struct	implemented
DVDI.VTS_SPST_ATR	Subpicture Attributes of the current VTS: pointer to a SPST_ATR struct	implemented
DVDI.SPRM	System Parameters of the decoder	implemented
DVDI.VIDEO_MODE	Video Mode Attributes	implemented

Figure 5.3: DVD settings

5.3.1 DVDI_AST_ATR

Query the attributes of the Audio Streams of the current VTS.

```
DWORD DVDQueryAttribute (DVDI_AST_ATR, PAST_ATR pAST_ATR);
```

Arguments

PAST_ATR pAST_ATR Pointer to a AST_ATR structure:

```
typedef struct {
    BYTE bAST_Ns;                // Number of Audio Streams available (1 to 8)
    BOOL bAvailable[MAX_AST];    // If True, the audio stream is available in the current Program Chain
    BYTE bAudioCodingMode [MAX_AST]; // Audio Coding Mode :
    BOOL bMultichannelExtension [MAX_AST]; // Multichannel extension
    BYTE bAudioType [MAX_AST];    // Audio Type
    BYTE bAudioApplicationMode [MAX_AST]; // Audio Application Mode
    BYTE bQuantization [MAX_AST]; // Quantization / DRC
    BYTE bfs [MAX_AST];          // Frequency
    BYTE bNumberOfAudioChannels [MAX_AST]; // Number of Audio channels
    WORD wLanguageCode [MAX_AST]; // Refer to Language codes
    WORD wLanguageCodeExtension [MAX_AST]; // Refer to Language codes
    BYTE bApplicationExtension [MAX_AST]; // Refer Annex C
} AST_ATR, *PAST_ASTR;
```

Audio coding modes are:

- 000b Dolby AC-3
- 010b MPEG-1
- 011b MPEG-2 with extension
- 100b Linear PCM audio
- 110b DTS
- 111b SDDS

Audio types are:

- 00b Not specified
- 01b Language

Audio application modes are:

- 00b Not specified
- 01b Karaoke mode
- 10b Surround mode
- 11b reserved

Number of audio channels are:

- 000b 1ch (mono)
- 001b 2ch (stereo)
- 010b 3ch
- 011b 4ch
- 100b 5ch
- 101b 6ch
- 110b 7ch
- 111b 8ch

All arrays go from 0 to b_Ns.

Return value

Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

Remarks

Here is a small code:

```

DWORD dwReturn;
AST_ATR ast_atr;
dwReturn = DVDQueryAttribute ( DVDI_AST_ATR, (DWORD)&ast_atr);
dwReturn = (DWORD) ast_atr.bAST_Ns;
dwReturn = (DWORD) ast_atr.bAudioCodingMode [1];
dwReturn = (DWORD) ast_atr.bMultichannelExtension [1];
dwReturn = (DWORD) ast_atr.bAudioType [1];
dwReturn = (DWORD) ast_atr.bAudioApplicationMode [1];
dwReturn = (DWORD) ast_atr.bQuantization [1];
dwReturn = (DWORD) ast_atr.bfs [1];
dwReturn = (DWORD) ast_atr.bNumberOfAudioChannels [1];
dwReturn = (DWORD) ast_atr.wLanguageCode [1];
dwReturn = (DWORD) ast_atr.wLanguageCodeExtension [1];
dwReturn = (DWORD) ast_atr.bApplicationExtension [1];
if ( ast_atr.bAvailable [1])
return TRUE;
else return FALSE;

```

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 5.4: Operating Systems and Streaming Models

5.3.2 DVDI_SPRM

Query the current System Parameters of the decoder.

```
DWORD DVDQueryAttribute (DVDI_SPRM, value);
```

Arguments

DWORD value System Parameter

SPRM	Value	Meaning
M.LCD	0	Menu Description Language Code
ASTN	1	Audio stream number
SPSTN	2	Sub-picture number and On/Off flag for TT_DOM
AGLN	3	Angle number
TTN	4	Title number for TT_DOM
VTN_TTN	5	VTN Title number for TT_DOM
TT_PGCN	6	Title PGC number
PTTN	7	Part_of_Title number for One_Sequential_PGC_Title
HL_BTTN	8	Highlighted Button number for Selection State
NV_TMR	9	Navigation Timer
NV_TMR_TT_PGCN	10	TT_PGCN for NV_TMR
P_AMXMD	11	Player Audio Mixing Mode for Karaoke
CTY_CD	12	Country Code for Parental Management
PTL_LVL	13	Parental Level
P_CFGV	14	Player Configuration for Video
P_CFGA	15	Player Configuration for Audio
INI_LCD_AST	16	Initial Language Code for AST
INI_LCD_EXT_AST	17	Initial Language Code extension for AST
INI_LCD_SPST	18	Initial Language Code for SPST
INI_LCD_EXT_SPST	19	Initial Language Code extension for SPST
PRC	20	Player Region Code
	21	Reserved
	22	Reserved
	23	Reserved for extended playback mode

Figure 5.5: DVD settings

Return value

Queried value if success, 0xFFFFFFFF if error (you can query error code using DVDGetLastError).

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 5.6: Operating Systems and Streaming Models

5.3.3 DVDI_SPST_ATR

Query the attributes of the Subpicture Streams of the courant VTS.

```
DWORD DVDQueryAttribute (DVDI_SPST_ATR, PSPST_ATR pSPST_ATR);
```

Arguments

PSTST_ATR pPSTST_ATR Pointer to a SPST_ATR structure:

```

typedef struct {
    BYTE bSPST_Ns;           // Number of Subpicture Streams available (1..32)
    BOOL bAvailable[MAX_SP]; // If True, the audio stream is available in the current Program Chain.
    BYTE bSubpictureType [MAX_SP]; // Subpicture type : 00b Not specified, 01b Language
    WORD wLanguageCode [MAX_SP]; // See Language codes
    WORD wLanguageCodeExtension [MAX_SP]; // See Language codes
} SPST_ATR, *PSPST_ATR;

```

All arrays go from 0 to bSPST_Ns-1.

Return value

Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

See also

SubPictureStreamChange(4.2.33)

Remarks

Here is a small code:

```

DWORD dwReturn;
SPSR_ATR spst_atr;
dwReturn = DVDQueryAttribute(DVDI_SPST_ATR, (DWORD)& spst_atr);
dwReturn = (DWORD) spst_atr.bSPST_Ns;
dwReturn = (DWORD) spst_atr.bSubpictureType [0];
dwReturn = (DWORD) spst_atr.wLanguageCode [0];
dwReturn = (DWORD) spst_atr.wLanguageCodeExtension [0];
if (spst_atr.bAvailable [0])
    return TRUE;

else return FALSE;

```

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 5.7: Operating Systems and Streaming Models

5.3.4 DVDI_TT_SRPTI

Query the Title Search Pointer Table Information of the current VMG.

```
DWORD DVDQueryAttribute (DVDI_TT_SRPTI, PTT_SRPTI pTT_SRPTI);
```

Arguments

PTT_SRPTI pTT_SRPTI Pointer to a TT_SRPTI structure:

```
typedef struct {
  BYTE bTT_SRP_Ns;          // Number of Titles (1..99)
  BYTE bALG_Ns [MAX_AGL];  // Number of Angles (1-9)
  WORD wPTT_Ns [MAX_TT];   // Number of Part_of_Titles
} TT_SRPTI, * TT_SRPTI;
```

All arrays go from 1 to bTT_SRP_Ns.

Return value

Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid

DVDE_UNAUTHORIZED Unauthorized operation

Remarks

There can be between 1 and 99 titles and 1 to 999 Part_of_Titles in each Title

See also

TitlePlay([4.2.36](#))

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 5.8: Operating Systems and Streaming Models

5.3.5 DVDI_VIDEO_MODE

Query the attributes of the current Video Mode.

```
DWORD DVDQueryAttribute ( DVDI_VIDEO_MODE, PVIDEOMODE pVIDEO_MODE);
```

Arguments

PVIDEO_MODE pVIDEO_MODE Pointer to a VIDEO_MODE structure

```
typedef struct {
  BYTE bAspectRatio  // Aspect Ratio
  BYTE bDisplayMode  // Describes the permitted display modes on 4:3 monitors.
} VIDEO_MODE, *PVIDEO_MODE;
```

See

Return value

Zero if successful. Otherwise returns an error code.

DVDE_ARG Arguments are not valid.

DVDE_UNAUTHORIZED Unauthorized operation.

See also

VideoPresentationModeChange for aspect ratio and output video modes (??)

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks			•			
Windows CE			•			
QnX			•			
Linux			•			

Figure 5.9: Operating Systems and Streaming Models

5.4 General settings

Setting code		Description
FMPI_TRICKMODE	r/w	Signal a TrickMode section. The driver waits the next section to go into or out of TrickMode playback (I-Frames only, no audio). Values are : FMPV_TRICKMODE_NOCHANGE No trick mode change FMPV_TRICKMODE_START Start trick mode after next section FMPV_TRICKMODE_END End trick mode after next section
FMPI_STC	r	System Time Clock of the Decoder in PTS (32bit value so most significant bit is ignored).
FMPI_PTS	r	Last Presentation Time Stamp from the stream depacketizer (32bit value so most significant bit is ignored).
FMPI_AUDIO_COUNT	r	Number of available audio streams
FMPI_AUDIO_SELECT	r/w	Select a desired audio stream for transport stream. There are two modes for the setting : if ≤ 8 : the value is interpreted as zero-based. if ≥ 8 : the value is interpreted as a PID.
FMPI_BRIGHTNESS	r/w	Set brightness (0..1000).
FMPI_SATURATION	r/w	Set saturation (0..1000).
FMPI_CONTRAST	r/w	Set contrast (0..1000).
FMPI_AUDIO_SPEED	r/w	User can modify the current audio sample rate by a mutiplying factor(DWORD) using FMPSet/Get function. The default value is 1000 in decimal.

5.4.1 FMPI_STANDARDTV

Select the output format for the TV, NTSC or PALs.

```
DWORD FMPSet (FMPI_STANDARDTV, DWORD dwValue);
```

Arguments

DWORD dwValue the desired format. Supported formats are:

- 0 NTSC
- 1 PAL
- 2 PAL-60
- 3 PAL-M

Return value

Zero if successful. Otherwise returns an error code.

OS	Push Model	File Playback	DVD	VCD	SVCD	CD Audio
VxWorks	•	•	•	•	•	
Windows CE	•	•	•	•	•	
QnX	•	•	•	•	•	
Linux	•	•	•	•	•	

Figure 5.10: Operating Systems and Streaming Models

5.5 Source and destination settings

Use

```
DWORD FMPISet(FMPI_SOURCE_WINDOW, WND* SrcWnd);
```

with

```
typedef struct {
    DWORD x;
    DWORD y;
    DWORD w;
    DWORD h;
} WND;
```

Setting code	Description
FMPI_SOURCE_WINDOW	Sets or retrieves source window coordinates.
FMPI_VISIBLE_SOURCE_WINDOW	Sets or retrieves visible source window coordinates.
FMPI_DESTINATION_WINDOW	Sets or retrieves destination window coordinates.

and

```
DWORD FMPISet(FMPI_OVERLAY_FLAGS, DWORD dwOverlayFlags);
```

with dwOverlayFlags a combination of:

VIDEO_ZOOM_ENABLE Zoom VisibleSource (from Source) area in Destination window

VIDEO_TV_DEST_ENABLE use Destination window instead of full screen on TV

VIDEO_HDTV_DEST_ENABLE use Destination window instead of full screen on HDTV

OSD_VIDEO_INDEPENDENT_DEST On screen display can have different destination than the MPEG Video

Chapter 6

Events

DVD event notification code	Description	Status
FMPM_DVD_ANGLE_CHANGE	Signals that either the number of available angles changed or that the current user angle number changed	Implemented
FMPM_DVD_ANGLES_BLOCK	Indicates whether an angle block is being played and angle changes can be performed	Implemented
FMPM_DVD_AUDIO_STREAM_CHANGE	Signals that the current user audio stream number changed	Implemented
FMPM_DVD_BUTTONS_CHANGE	Signals that number of available buttons changed	Implemented
FMPM_DVD_BUTTON_CHANGE	Signals that the currently selected button number changed	Implemented
FMPM_DVD_PROGRAM_START	Signals that the DVD player started playback of a new program	Implemented
FMPM_CURRENT_TIME	Signals the beginning of every video object unit (VOBU), which occurs every 0.4 to 1.0 seconds	Implemented
FMPM_DVD_DOMAIN_CHANGE	Indicates the DVD player's new domain	Implemented
FMPM_DVD_NO_FP_PGC	Indicates that the DVD disc does not have a FP_PGC (First Play Program Chain)	Implemented
FMPM_DVD_PARENTAL_LEVEL_CHANGE	Signals that the authored content has changed the parental level setting in the player	Implemented
FMPM_PLAYBACK_STOPPED	Indicates that playback has been stopped. The DVD Navigator has completed playback of the PGC and did not find any other branching instruction for subsequent playback	Implemented
FMPM_DVD_STILL_OFF	Signals the end of any still (PGC, Cell, or VOB)	Implemented
FMPM_DVD_STILL_ON	Signals the beginning of any still (PGC, Cell, or VOB)	Implemented
FMPM_DVD_SUBPICTURE_STREAM_CHANGE	Signals that the current user subpicture stream number changed for the main title	Implemented
FMPM_TITLE_CHANGE	Indicates when the current title number changes	Implemented
FMPM_DVD_VALID_UOPS_CHANGE	Signals that the available set of UOPS has changed	Implemented

6.1 FMPM_DVD_ANGLE_CHANGE

Signals that the current user angle number has changed.

Arguments

DWORD dwValue Value indicating the current user angle number

Remarks

Angle numbers range from 1 to 9. The current angle number can change automatically with a navigation command authored on the disc as well as through application control by using the DVDAngleChange function. All domains raise this event.

6.2 FMPM_DVD_ANGLES_BLOCK

Indicates whether an angle block is being played and angle changes can be performed.

Arguments

DWORD dwValue Boolean (BOOL) value that indicates if an angle block is being played back. Zero (0) indicates that playback is not in an angle block and angles are not available, One (1) indicates that an angle block is being played back and angle changes can be performed.

Remarks

Angle changes are not restricted to angle blocks and the manifestation of the angle change can be seen only in an angle block.

6.3 FMPM_DVD_AUDIO_STREAM_CHANGE

Signals that the current user audio stream number changed for the main title.

Arguments

DWORD dwValue Value indicating the new user audio stream number. Audio stream numbers range from 0 to 7. Stream 0xFFFFFFFF indicates that no stream is selected.

Remark

The current user audio stream can change automatically with a navigation command authored on the disc as well as through application control by using the DVDSelectAudioStream function. All domains raise this event.

6.4 FMPM_DVD_BUTTONS_CHANGE

Signals that the number of available buttons changed or that the currently selected button number changed.

Arguments

DWORD dwValue Value indicating the number of available buttons

Remarks

Button numbers range from 1 to 36.

The currently selected button can change automatically with a navigation command authored on the disc as well as through application control by using DVDSelectButton function. All domains raise this event.

6.5 FMPM_DVD_CURRENT_TIME

Signals the beginning of every video object unit (VOBU), which occurs every 0.4 to 1.0 seconds.

Arguments

DWORD dwValue Value indicating the current playback timecode in a binary coded decimal (BCD) hours, minutes, seconds, frames (HH:MM:SS:FF) format

DWORD dwValue Value indicating the current playback timecode in a binary coded decimal (BCD) hours, minutes, seconds, frames (HH:MM:SS:FF) format.

Remarks

Only simple linear movies signal this event.
The DVD_TITLE_DOMAIN domain raises this event.

6.6 FMPM_DVD_DOMAIN_CHANGE

Indicates the DVD player's new domain.

Arguments

DWORD dwValue Value indicating the new domain.

Remarks

The DVD player signals this event whenever it changes domains. All domains raise this event.

6.7 FMPM_DVD_NO_FP_PGC

Signals that the DVD disc does not have a FP_PGC (First Play Program Chain) and that the DVD Navigator will not automatically load any PGC and start playback.

Remarks

The FP_DOM domain raises this event.

6.8 FMPM_DVD_PARENTAL_LEVEL_CHANGE

Signals that the authored content has changed the parental level setting in the player.

Arguments

DWORD dwValue Value representing the new parental level set in the player.

Remarks

This event indicates that the authored content has changed the parental level setting. The new parental level indicated by lParam1 can be used to validate the current user.

6.9 FMPPM_DVD_PLAYBACK_STOPPED

Indicates that playback has been stopped. The DVD Navigator has completed playback of the PGC and did not find any other branching instruction for subsequent playback.

Remarks

All domains (DVD_DOMAIN) raise this event. This event is not raised on user initiated stop, only on completion of the playback of the PGC.

6.10 FMPPM_DVD_PROGRAM_START

Signals that the DVD player started playback of a new program.

Arguments

DWORD dwValue Value indicating the new chapter (program) number

Remarks

The DVD_TITLE_DOMAIN domain raises this event.

6.11 FMPPM_DVD_STILL_OFF

Signals the end of any still (PGC, Cell, or VOB).

This event indicates that any currently active still has been released. All domains raise this event.

6.12 FMPPM_DVD_STILL_ON

Signals the beginning of any still (PGC, Cell, or VOB).

Arguments

DWORD dwValue Value indicating the number of seconds the still will last.

0xFFFFFFFF indicates an infinite still, meaning wait until the user presses a button or until the application calls DVDStillOff.

Remark

All combinations of buttons and still are possible (buttons on with still on, buttons on with still off, button off with still on, button off with still off).

All domains raise this event.

6.13 FMPPM_DVD_SUBPICTURE_STREAM_CHANGE

Signals that the current user subpicture stream number changed for the main title.

Arguments

DWORD dwValue Value indicating the new user subpicture stream number.

Subpicture stream numbers range from 0 to 31. Stream 0xFFFFFFFF indicates that no stream is selected.

Remark

The subpicture can change automatically with a navigation command authored on disc as well as through application control using DVDSubpictureSelectStream.

All domains raise this event.

6.14 FMPM_DVD_TITLE_CHANGE

Indicates when the current title number changes.

DWORD dwValue Value indicating the new title number.

Remarks

Title numbers range from 1 to 99. This number indicates the TTN, which is the title number with respect to the whole disc, not the VTS_TTN which is the title number with respect to just a current VTS.

The DVD_TITLE_DOMAIN domain raises this event.

6.15 FMPM_DVD_VALID_UOPS_CHANGE

Signals that the available authorized commands has changed.

Arguments

DWORD dwValue Value representing the VALID_UOP_SOMTHING_OR_OTHER bit-field structure that indicates which IDvdControl commands the DVD disc explicitly disabled.

Remarks

This event indicates only which operations are explicitly disabled by the content on the DVD disc, and does not guarantee that it is valid to call methods that are not disabled. For example, if no buttons are present, the DVDButtonActivate function won't work, even though the method is not explicitly disabled.

All domains raise this event.

Chapter 7

Language codes

Language name	code	Language family
ABKHAZIAN	AB	IBERO-CAUCASIAN
AFAN (OROMO)	OM	HAMITIC
AFAR	AA	HAMITIC
AFRIKAANS	AF	GERMANIC
ALBANIAN	SQ	INDO-EUROPEAN (OTHER)
AMHARIC	AM	SEMITIC
ARABIC	AR	SEMITIC
ARMENIAN	HY	INDO-EUROPEAN (OTHER)
ASSAMESE	AS	INDIAN
AYMARA	AY	AMERINDIAN
AZERBAIJANI	AZ	TURKIC/ALTAIC
BASHKIR	BA	TURKIC/ALTAIC
BASQUE	EU	BASQUE
BENGALI;BANGLA	BN	INDIAN
BHUTANI	DZ	ASIAN
BIHARI	BH	INDIAN
BISLAMA	BI	[not given]
BRETON	BR	CELTIC
BULGARIAN	BG	SLAVIC
BURMESE	MY	ASIAN
BYELORUSSIAN	BE	SLAVIC
CAMBODIAN	KM	ASIAN
CATALAN	CA	ROMANCE
CHINESE	ZH	ASIAN
CORSICAN	CO	ROMANCE
CROATIAN	HR	SLAVIC
CZECH	CS	SLAVIC
DANISH	DA	GERMANIC
DUTCH	NL	GERMANIC
ENGLISH	EN	GERMANIC
ESPERANTO	EO	INTERNATIONAL AUX.
ESTONIAN	ET	FINNO-UGRIC
FAROESE	FO	GERMANIC
FIJI	FJ	OCEANIC/INDONESIAN
FINNISH	FI	FINNO-UGRIC
FRENCH	FR	ROMANCE

to be ct'd...

Language name (ct'd)	code	Language family (ct'd)
FRISIAN	FY	GERMANIC
GALICIAN	GL	ROMANCE
GEORGIAN	KA	IBERO-CAUCASIAN
GERMAN	DE	GERMANIC
GREEK	EL	LATIN/GREEK
GREENLANDIC	KL	ESKIMO
GUARANI	GN	AMERINDIAN
GUJARATI	GU	INDIAN
HAUSA	HA	NEGRO-AFRICAN
HEBREW	HE	SEMITIC
HINDI	HI	INDIAN
HUNGARIAN	HU	FINNO-UGRIC
ICELANDIC	IS	GERMANIC
INDONESIAN	ID	OCEANIC/INDONESIAN
INTERLINGUA	IA	INTERNATIONAL AUX.
INTERLINGUE	IE	INTERNATIONAL AUX.
INUKTITUT	IU	[]
INUPIAK	IK	ESKIMO
IRISH	GA	CELTIC
ITALIAN	IT	ROMANCE
JAPANESE	JA	ASIAN
JAVANESE	JV	OCEANIC/INDONESIAN
KANNADA	KN	DRAVIDIAN
KASHMIRI	KS	INDIAN
KAZAKH	KK	TURKIC/ALTAIC
KINYARWANDA	RW	NEGRO-AFRICAN
KIRGHIZ	KY	TURKIC/ALTAIC
KURUNDI	RN	NEGRO-AFRICAN
KOREAN	KO	ASIAN
KURDISH	KU	IRANIAN
LAOTHIAN	LO	ASIAN
LATIN	LA	LATIN/GREEK
LATVIAN;LETTISH	LV	BALTIC
LINGALA	LN	NEGRO-AFRICAN
LITHUANIAN	LT	BALTIC
MACEDONIAN	MK	SLAVIC
MALAGASY	MG	OCEANIC/INDONESIAN
MALAY	MS	OCEANIC/INDONESIAN
MALAYALAM	ML	DRAVIDIAN
MALTESE	MT	SEMITIC
MAORI	MI	OCEANIC/INDONESIAN
MARATHI	MR	INDIAN
MOLDAVIAN	MO	ROMANCE
MONGOLIAN	MN	[not given]
NAURU	NA	[not given]
NEPALI	NE	INDIAN
NORWEGIAN	NO	GERMANIC
OCCITAN	OC	ROMANCE
ORIYA	OR	INDIAN
PASHTO;PUSHTO	PS	IRANIAN
PERSIAN (farsi)	FA	IRANIAN
POLISH	PL	SLAVIC

to be ct'd...

Language name (ct'd)	code	Language family (ct'd)
PORTUGUESE	PT	ROMANCE
PUNJABI	PA	INDIAN
QUECHUA	QU	AMERINDIAN
RHAETO-ROMANCE	RM	ROMANCE
ROMANIAN	RO	ROMANCE
RUSSIAN	RU	SLAVIC
SAMOAN	SM	OCEANIC/INDONESIAN
SANGHO	SG	NEGRO-AFRICAN
SANSKRIT	SA	INDIAN
SCOTS GAELIC	GD	CELTIC
SERBIAN	SR	SLAVIC
SERBO-CROATIAN	SH	SLAVIC
SESOTHO	ST	NEGRO-AFRICAN
SETSWANA	TN	NEGRO-AFRICAN
SHONA	SN	NEGRO-AFRICAN
SINDHI	SD	INDIAN
SINGHALESE	SI	INDIAN
SISWATI	SS	NEGRO-AFRICAN
SLOVAK	SK	SLAVIC
SLOVENIAN	SL	SLAVIC
SOMALI	SO	HAMITIC
SPANISH	ES	ROMANCE
SUNDANESE	SU	OCEANIC/INDONESIAN
SWAHILI	SW	NEGRO-AFRICAN
SWEDISH	SV	GERMANIC
TAGALOG	TL	OCEANIC/INDONESIAN
TAJIK	TG	IRANIAN
TAMIL	TA	DRAVIDIAN
TATAR	TT	TURKIC/ALTAIC
TELUGU	TE	DRAVIDIAN
THAI	TH	ASIAN
TIBETAN	BO	ASIAN
TIGRINYA	TI	SEMITIC
TONGA	TO	OCEANIC/INDONESIAN
TSONGA	TS	NEGRO-AFRICAN
TURKISH	TR	TURKIC/ALTAIC
TURKMEN	TK	TURKIC/ALTAIC
TWI	TW	NEGRO-AFRICAN
UIGUR	UG	[]
UKRAINIAN	UK	SLAVIC
URDU	UR	INDIAN
UZBEK	UZ	TURKIC/ALTAIC
VIETNAMESE	VI	ASIAN
VOLAPUK	VO	INTERNATIONAL AUX.
WELSH	CY	CELTIC
WOLOF	WO	NEGRO-AFRICAN
XHOSA	XH	NEGRO-AFRICAN
YIDDISH	YI	GERMANIC
YORUBA	YO	NEGRO-AFRICAN
ZHUANG	ZA	[]
ZULU	ZU	NEGRO-AFRICAN

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