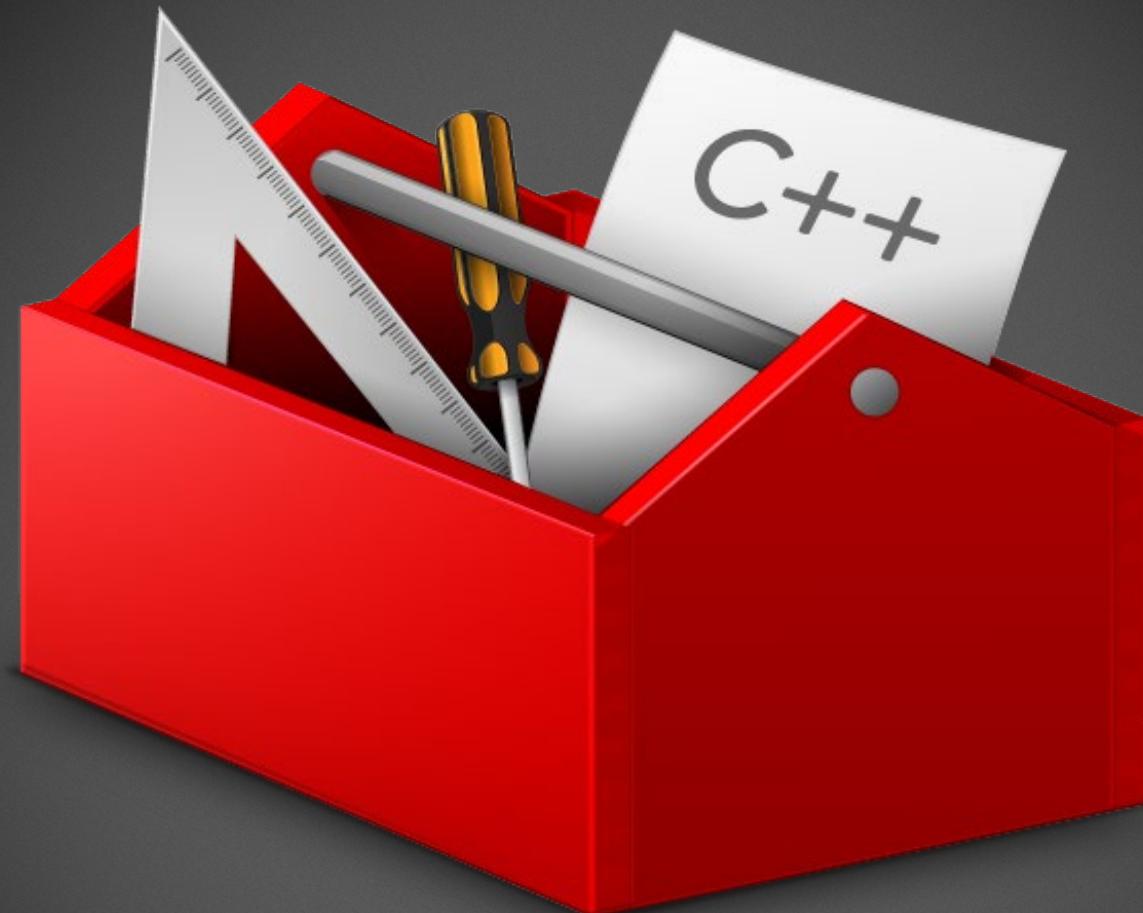


# SDK– DeckLink Software Developers Kit

Blackmagicdesign



Mac OS X™

Windows™

Linux™

December 2012

# Table of Contents

---

<b>1</b>	<b>Introduction</b>	<b>12</b>
1.1	Welcome	12
1.2	Overview	12
1.3	API Design	13
1.3.1	Overview	13
1.3.2	Object Model	13
1.3.3	Object Interfaces	13
1.3.4	Reference Counting	14
1.3.5	Interface Stability	14
1.3.5.1	New Interfaces	14
1.3.5.2	Updated Interfaces	15
1.3.5.3	Deprecated Interfaces	15
1.3.5.4	Removed interfaces	15
1.4	Interface Reference	16
1.4.1	IUnknown Interface	16
1.4.1.1	IUnknown::QueryInterface method	17
1.4.1.2	IUnknown::AddRef method	18
1.4.1.3	IUnknown::Release method	18
<b>2</b>	<b>DeckLink API</b>	<b>19</b>
2.1	Using the DeckLink API in a project	19
2.2	Accessing DeckLink devices	19
2.2.1	Windows	20
2.2.2	Mac OS X and Linux	20
2.3	High level interface	21
2.3.1	Capture	21
2.3.2	Playback	22
2.3.3	3D Functionality	23
2.3.3.1	3D Capture	23
2.3.3.2	3D Playback	25
2.3.4	Streaming Encoder	27
2.3.4.1	Streaming Encoder Capture	27
2.4	Interface Reference	28
2.4.1	IDeckLinkIterator Interface	28

# Table of Contents

---

2.4.1.1	IDeckLinkIterator::Next method	29
2.4.2	IDeckLink Interface	30
2.4.2.1	IDeckLink::GetmodelName method	32
2.4.2.2	IDeckLink::GetdisplayName method	33
2.4.3	IDeckLinkOutput Interface	34
2.4.3.1	IDeckLinkOutput::DoesSupportVideoMode method	37
2.4.3.2	IDeckLinkOutput::IsScheduledPlaybackRunning method	38
2.4.3.3	IDeckLinkOutput::GetDisplayModelerator method	39
2.4.3.4	IDeckLinkOutput::SetScreenPreviewCallback method	40
2.4.3.5	IDeckLinkOutput::EnableVideoOutput method	41
2.4.3.6	IDeckLinkOutput::DisableVideoOutput method	41
2.4.3.7	IDeckLinkOutput::SetVideoOutputFrameMemoryAllocator method	42
2.4.3.8	IDeckLinkOutput::CreateVideoFrame method	43
2.4.3.9	IDeckLinkOutput::CreateAncillaryData method	44
2.4.3.10	IDeckLinkOutput::DisplayVideoFrameSync method	45
2.4.3.11	IDeckLinkOutput::ScheduleVideoFrame method	46
2.4.3.12	IDeckLinkOutput::SetScheduledFrameCompletionCallback method	47
2.4.3.13	IDeckLinkOutput::GetBufferedVideoFrameCount method	48
2.4.3.14	IDeckLinkOutput::EnableAudioOutput method	49
2.4.3.15	IDeckLinkOutput::DisableAudioOutput method	50
2.4.3.16	IDeckLinkOutput::WriteAudioSamplesSync method	51
2.4.3.17	IDeckLinkOutput::BeginAudioPreroll method	52
2.4.3.18	IDeckLinkOutput::EndAudioPreroll method	53
2.4.3.19	IDeckLinkOutput::ScheduleAudioSamples method	54
2.4.3.20	IDeckLinkOutput::GetBufferedAudioSampleFrameCount	55
2.4.3.21	IDeckLinkOutput::FlushBufferedAudioSamples method	56
2.4.3.22	IDeckLinkOutput::SetAudioCallback method	57
2.4.3.23	IDeckLinkOutput::StartScheduledPlayback method	58
2.4.3.24	IDeckLinkOutput::StopScheduledPlayback method	59
2.4.3.25	IDeckLinkOutput::GetScheduledStreamTime method	60
2.4.3.26	IDeckLinkOutput::GetReferenceStatus method	61
2.4.3.27	IDeckLinkOutput::GetHardwareReferenceClock method	62
2.4.4	IDeckLinkInput Interface	63
2.4.4.1	IDeckLinkInput::DoesSupportVideoMode method	66
2.4.4.2	IDeckLinkInput::GetDisplayModelerator method	67

# Table of Contents

---

2.4.4.3	IDeckLinkInput::SetScreenPreviewCallback method	68
2.4.4.4	IDeckLinkInput::EnableVideoInput method	69
2.4.4.5	IDeckLinkInput::GetAvailableVideoFrameCount method	70
2.4.4.6	IDeckLinkInput::DisableVideoInput method	71
2.4.4.7	IDeckLinkInput::EnableAudioInput method	72
2.4.4.8	IDeckLinkInput::DisableAudioInput method	73
2.4.4.9	IDeckLinkInput::GetAvailableAudioSampleFrameCount method	74
2.4.4.10	IDeckLinkInput::SetVideoInputFrameMemoryAllocator method	75
2.4.4.11	IDeckLinkInput::StartStreams method	76
2.4.4.12	IDeckLinkInput::StopStreams method	76
2.4.4.13	IDeckLinkInput::FlushStreams method	77
2.4.4.14	IDeckLinkInput::PauseStreams method	78
2.4.4.15	IDeckLinkInput::SetCallback method	79
2.4.4.16	IDeckLinkInput::GetHardwareReferenceClock method	80
2.4.5	IDeckLinkVideoFrame Interface	81
2.4.5.1	IDeckLinkVideoFrame::GetWidth method	83
2.4.5.2	IDeckLinkVideoFrame::GetHeight method	83
2.4.5.3	IDeckLinkVideoFrame::GetRowBytes method	84
2.4.5.4	IDeckLinkVideoFrame::GetPixelFormat method	84
2.4.5.5	IDeckLinkVideoFrame::GetFlags method	85
2.4.5.6	IDeckLinkVideoFrame::GetBytes method	85
2.4.5.7	IDeckLinkVideoFrame::GetTimecode method	86
2.4.5.8	IDeckLinkVideoFrame::GetAncillaryData method	87
2.4.6	IDeckLinkVideoOutputCallback Interface	88
2.4.6.1	IDeckLinkVideoOutputCallback::ScheduledFrameCompleted method	89
2.4.6.2	IDeckLinkVideoOutputCallback::ScheduledPlaybackHasStopped method	90
2.4.7	IDeckLinkMutableVideoFrame Interface	91
2.4.7.1	IDeckLinkMutableVideoFrame::SetFlags method	92
2.4.7.2	IDeckLinkMutableVideoFrame::SetTimecode method	93
2.4.7.3	IDeckLinkMutableVideoFrame::SetTimecodeFromComponents method	94
2.4.7.4	IDeckLinkMutableVideoFrame::SetAncillaryData method	95
2.4.7.5	IDeckLinkMutableVideoFrame::SetTimecodeUserBits method	96
2.4.8	IDeckLinkVideoFrame3DExtensions Interface	97
2.4.8.1	IDeckLinkVideoFrame3DExtensions::Get3DPackingFormat method	98
2.4.8.2	IDeckLinkVideoFrame3DExtensions::GetFrameForRightEye method	99

# Table of Contents

---

2.4.9	IDeckLinkAudioOutputCallback Interface	100
2.4.9.1	IDeckLinkAudioOutputCallback::RenderAudioSamples method	101
2.4.10	IDeckLinkInputCallback Interface	102
2.4.10.1	IDeckLinkInputCallback::VideoInputFrameArrived method	103
2.4.10.2	IDeckLinkInputCallback::VideoInputFormatChanged method	105
2.4.11	IDeckLinkVideoInputFrame Interface	106
2.4.11.1	IDeckLinkVideoInputFrame::GetStreamTime method	107
2.4.11.2	IDeckLinkVideoInputFrame::GetHardwareReferenceTimestamp method	108
2.4.12	IDeckLinkAudioInputPacket Interface	109
2.4.12.1	IDeckLinkAudioInputPacket::GetSampleFrameCount method	110
2.4.12.2	IDeckLinkAudioInputPacket::GetBytes method	110
2.4.12.3	IDeckLinkAudioInputPacket::GetPacketTime method	111
2.4.13	IDeckLinkDisplayModelIterator Interface	112
2.4.13.1	IDeckLinkDisplayModelIterator::Next method	113
2.4.14	IDeckLinkDisplayMode Interface	114
2.4.14.1	IDeckLinkDisplayMode::GetWidth method	115
2.4.14.2	IDeckLinkDisplayMode::GetHeight method	115
2.4.14.3	IDeckLinkDisplayMode::GetName method	116
2.4.14.4	IDeckLinkDisplayMode::GetDisplayMode method	116
2.4.14.5	IDeckLinkDisplayMode::GetFrameRate method	117
2.4.14.6	IDeckLinkDisplayMode::GetFieldDominance method	118
2.4.14.7	IDeckLinkDisplayMode::GetFlags method	118
2.4.15	IDeckLinkConfiguration Interface	119
2.4.15.1	IDeckLinkConfiguration::SetFlag method	121
2.4.15.2	IDeckLinkConfiguration::GetFlag method	122
2.4.15.3	IDeckLinkConfiguration::SetInt method	123
2.4.15.4	IDeckLinkConfiguration::GetInt method	124
2.4.15.5	IDeckLinkConfiguration::SetFloat method	125
2.4.15.6	IDeckLinkConfiguration::GetFloat method	126
2.4.15.7	IDeckLinkConfiguration::SetString method	127
2.4.15.8	IDeckLinkConfiguration::GetString method	128
2.4.15.9	IDeckLinkConfiguration::WriteConfigurationToPreferences method	129
2.4.16	IDeckLinkAPIInformation Interface	130
2.4.16.1	IDeckLinkAPIInformation::GetFlag method	131
2.4.16.2	IDeckLinkAPIInformation::GetInt method	132

# Table of Contents

---

2.4.16.3	IDeckLinkAPIInformation::GetFloat method	133
2.4.16.4	IDeckLinkAPIInformation::GetString method	134
2.4.17	IDeckLinkAttributes Interface	135
2.4.17.1	IDeckLinkAttributes::GetFlag method	136
2.4.17.2	IDeckLinkAttributes::GetInt method	137
2.4.17.3	IDeckLinkAttributes::GetFloat method	138
2.4.17.4	IDeckLinkAttributes::GetString method	139
2.4.18	IDeckLinkMemoryAllocator Interface	140
2.4.18.1	IDeckLinkMemoryAllocator::AllocateBuffer method	142
2.4.18.2	IDeckLinkMemoryAllocator::ReleaseBuffer method	143
2.4.18.3	IDeckLinkMemoryAllocator::Commit method	144
2.4.18.4	IDeckLinkMemoryAllocator::Decommit method	145
2.4.19	IDeckLinkKeyer Interface	146
2.4.19.1	IDeckLinkKeyer::Enable method	147
2.4.19.2	IDeckLinkKeyer::SetLevel method	148
2.4.19.3	IDeckLinkKeyer::RampUp method	149
2.4.19.4	IDeckLinkKeyer::RampDown method	150
2.4.19.5	IDeckLinkKeyer::Disable method	151
2.4.20	IDeckLinkVideoFrameAncillary Interface	152
2.4.20.1	IDeckLinkVideoFrameAncillary GetPixelFormat method	153
2.4.20.2	IDeckLinkVideoFrameAncillary GetDisplayMode method	153
2.4.20.3	IDeckLinkVideoFrameAncillary GetBufferForVerticalBlankingLine method	154
2.4.21	IDeckLinkTimecode Interface	155
2.4.21.1	IDeckLinkTimecode::GetBCD method	156
2.4.21.2	IDeckLinkTimecode::GetComponents method	157
2.4.21.3	IDeckLinkTimecode::GetString method	158
2.4.21.4	IDeckLinkTimecode::GetFlags method	158
2.4.21.5	IDeckLinkTimecode::GetTimecodeUserBits method	159
2.4.22	IDeckLinkScreenPreviewCallback Interface	160
2.4.22.1	IDeckLinkScreenPreviewCallback::DrawFrame method	161
2.4.23	IDeckLinkGLScreenPreviewHelper Interface	162
2.4.23.1	IDeckLinkGLScreenPreviewHelper::InitializeGL method	164
2.4.23.2	IDeckLinkGLScreenPreviewHelper::PaintGL method	164
2.4.23.3	IDeckLinkGLScreenPreviewHelper::SetFrame method	165
2.4.23.4	IDeckLinkGLScreenPreviewHelper::Set3DPreviewFormat	166

# Table of Contents

---

2.4.24	IDeckLinkCocoaScreenPreviewCallback Interface	167
2.4.25	IDeckLinkDX9ScreenPreviewHelper Interface	168
2.4.25.1	IDeckLinkDX9ScreenPreviewHelper::Initialize method	170
2.4.25.2	IDeckLinkDX9ScreenPreviewHelper::Render method	171
2.4.25.3	IDeckLinkDX9ScreenPreviewHelper::SetFrame method	172
2.4.25.4	IDeckLinkDX9ScreenPreviewHelper::Set3DPreviewFormat method	173
2.4.25.5	IDeckLinkVideoConversion Interface	174
2.4.25.6	IDeckLinkVideoConversion::ConvertFrame method	175
2.4.26	IDeckLinkDeckControl Interface	176
2.4.26.1	IDeckLinkDeckControl::Open method	179
2.4.26.2	IDeckLinkDeckControl::Close method	180
2.4.26.3	IDeckLinkDeckControl::GetCurrentState method	181
2.4.26.4	IDeckLinkDeckControl::SetStandby method	182
2.4.26.5	IDeckLinkDeckControl::SendCommand method	183
2.4.26.6	IDeckLinkDeckControl::Play method	184
2.4.26.7	IDeckLinkDeckControl::Stop method	185
2.4.26.8	IDeckLinkDeckControl::TogglePlayStop method	186
2.4.26.9	IDeckLinkDeckControl::Eject method	187
2.4.26.10	IDeckLinkDeckControl::GoToTimecode method	188
2.4.26.11	IDeckLinkDeckControl::FastForward method	189
2.4.26.12	IDeckLinkDeckControl::Rewind method	190
2.4.26.13	IDeckLinkDeckControl::StepForward method	191
2.4.26.14	IDeckLinkDeckControl::StepBack method	192
2.4.26.15	IDeckLinkDeckControl::Jog method	193
2.4.26.16	IDeckLinkDeckControl::Shuttle method	194
2.4.26.17	IDeckLinkDeckControl::GetTimecodeString method	195
2.4.26.18	IDeckLinkDeckControl::GetTimecode method	196
2.4.26.19	IDeckLinkDeckControl::GetTimecodeBCD method	197
2.4.26.20	IDeckLinkDeckControl::SetPreroll method	198
2.4.26.21	IDeckLinkDeckControl::GetPreroll method	199
2.4.26.22	IDeckLinkDeckControl::SetCaptureOffset method	200
2.4.26.23	IDeckLinkDeckControl::GetCaptureOffset method	201
2.4.26.24	IDeckLinkDeckControl::SetExportOffset method	202
2.4.26.25	IDeckLinkDeckControl::GetExportOffset method	203
2.4.26.26	IDeckLinkDeckControl::GetManualExportOffset method	204

# Table of Contents

---

2.4.26.27	IDeckLinkDeckControl::StartExport method	205
2.4.26.28	IDeckLinkDeckControl::StartCapture method	207
2.4.26.29	IDeckLinkDeckControl::GetDeviceID method	209
2.4.26.30	IDeckLinkDeckControl::Abort method	210
2.4.26.31	IDeckLinkDeckControl::CrashRecordStart method	211
2.4.26.32	IDeckLinkDeckControl::CrashRecordStop method	212
2.4.26.33	IDeckLinkDeckControl::SetCallback method	213
2.4.27	IDeckLinkDeckControlStatusCallback Interface	214
2.4.27.1	IDeckLinkDeckControlStatusCallback::TimecodeUpdate method	215
2.4.27.2	IDeckLinkDeckControlStatusCallback::VTRControlStateChanged method	216
2.4.27.3	IDeckLinkDeckControlStatusCallback::DeckControlEventReceived method	217
2.4.27.4	IDeckLinkDeckControlStatusCallback::DeckControlStatusChanged method	218
2.5.1	IBMDStreamingDiscovery Interface	219
2.5.1.1	IBMDStreamingDiscovery::InstallDeviceNotifications method	220
2.5.1.2	IBMDStreamingDiscovery::UninstallDeviceNotifications method	221
2.5.2	IBMDStreamingDeviceNotificationCallback Interface	222
2.5.2.1	IBMDStreamingDeviceNotificationCallback::StreamingDeviceArrived method	223
2.5.2.2	IBMDStreamingDeviceNotificationCallback::StreamingDeviceRemoved method	224
2.5.2.3	IBMDStreamingDeviceNotificationCallback::StreamingDeviceModeChanged method	225
2.5.3	IBMDStreamingVideoEncodingMode Interface	226
2.5.3.1	IBMDStreamingVideoEncodingMode::GetName method	228
2.5.3.2	IBMDStreamingVideoEncodingMode::GetPresetID method	229
2.5.3.3	IBMDStreamingVideoEncodingMode::GetSourcePositionX method	229
2.5.3.4	IBMDStreamingVideoEncodingMode::GetSourcePositionY method	230
2.5.3.5	IBMDStreamingVideoEncodingMode::GetSourceWidth method	230
2.5.3.6	IBMDStreamingVideoEncodingMode::GetSourceHeight method	231
2.5.3.7	IBMDStreamingVideoEncodingMode::GetDestWidth method	231
2.5.3.8	IBMDStreamingVideoEncodingMode::GetDestHeight method	232
2.5.3.9	IBMDStreamingVideoEncodingMode::GetFlag method	233
2.5.3.10	IBMDStreamingVideoEncodingMode::GetInt method	234
2.5.3.11	IBMDStreamingVideoEncodingMode::GetFloat method	235
2.5.3.12	IBMDStreamingVideoEncodingMode::GetString method	236
2.5.3.13	IBMDStreamingVideoEncodingMode::CreateMutableVideoEncodingMode method	237
2.5.4	IBMDStreamingMutableVideoEncodingMode Interface	238
2.5.4.1	IBMDStreamingMutableVideoEncodingMode::SetSourceRect method	239

# Table of Contents

---

2.5.4.2	IBMDStreamingMutableVideoEncodingMode::SetDestSize method	240
2.5.4.3	IBMDStreamingMutableVideoEncodingMode::SetFlag method	241
2.5.4.4	IBMDStreamingMutableVideoEncodingMode::SetInt method	242
2.5.4.5	IBMDStreamingMutableVideoEncodingMode::SetFloat method	243
2.5.4.6	IBMDStreamingMutableVideoEncodingMode::SetString method	244
2.5.5	IBMDStreamingVideoEncodingModePresetIterator Interface	245
2.5.5.1	IBMDStreamingVideoEncodingModePresetIterator::Next method	246
2.5.6	IBMDStreamingDeviceInput Interface	247
2.5.6.1	IBMDStreamingDeviceInput::DoesSupportVideoInputMode method	249
2.5.6.2	IBMDStreamingDeviceInput::GetVideoInputModelIterator method	250
2.5.6.3	IBMDStreamingDeviceInput::SetVideoInputMode method	251
2.5.6.4	IBMDStreamingDeviceInput::GetCurrentDetectedVideoInputMode method	252
2.5.6.5	IBMDStreamingDeviceInput::GetVideoEncodingMode method	253
2.5.6.6	IBMDStreamingDeviceInput::GetVideoEncodingModePresetIterator method	254
2.5.6.7	IBMDStreamingDeviceInput::DoesSupportVideoEncodingMode method	255
2.5.6.8	IBMDStreamingDeviceInput::SetVideoEncodingMode method	256
2.5.6.9	IBMDStreamingDeviceInput::StartCapture method	257
2.5.6.10	IBMDStreamingDeviceInput::StopCapture method	258
2.5.6.11	IBMDStreamingDeviceInput::SetCallback method	259
2.5.7	IBMDStreamingH264InputCallback Interface	260
2.5.7.1	IBMDStreamingH264InputCallback::H264NALPacketArrived method	261
2.5.7.2	IBMDStreamingH264InputCallback::H264AudioPacketArrived method	262
2.5.7.3	IBMDStreamingH264InputCallback::MPEG2TSPacketArrived method	263
2.5.7.4	IBMDStreamingH264InputCallback::H264VideoInputConnectorScanningChanged method	264
2.5.7.5	IBMDStreamingH264InputCallback::H264VideoInputConnectorChanged method	265
2.5.7.6	IBMDStreamingH264InputCallback::H264VideoInputModeChanged method	266
2.5.8	IBMDStreamingH264NALPacket Interface	267
2.5.8.1	IBMDStreamingH264NALPacket::GetPayloadSize method	268
2.5.8.2	IBMDStreamingH264NALPacket::GetBytes method	268
2.5.8.3	IBMDStreamingH264NALPacket::GetBytesWithSizePrefix method	269
2.5.8.4	IBMDStreamingH264NALPacket::GetDisplayTime method	270
2.5.8.5	IBMDStreamingH264NALPacket::GetPacketIndex method	270
2.5.9	IBMDStreamingAudioPacket Interface	271
2.5.9.1	IBMDStreamingAudioPacket::GetCodec method	272
2.5.9.2	IBMDStreamingAudioPacket::GetPayloadSize method	272

# Table of Contents

---

2.5.9.3	IBMDStreamingAudioPacket::GetBytes method	273
2.5.9.4	IBMDStreamingAudioPacket::GetPlayTime method	274
2.5.9.5	IBMDStreamingAudioPacket::GetPacketIndex method	274
2.5.10	IBMDStreamingMPEG2TSPacket Interface	275
2.5.10.1	IBMDStreamingMPEG2TSPacket::GetPayloadSize method	276
2.5.10.2	IBMDStreamingMPEG2TSPacket::GetBytes method	276
2.5.11	IBMDStreamingH264NALParser Interface	277
2.5.11.1	IBMDStreamingH264NALParser::IsNALSequenceParameterSet method	278
2.5.11.2	IBMDStreamingH264NALParser::IsNALPictureParameterSet method	279
2.5.11.3	IBMDStreamingH264NALParser::GetProfileAndLevelFromSPS method	280
2.6	Common Data Types	281
2.6.1	Basic Types	281
2.6.2	Time Representation	283
2.6.3	Display Modes	284
2.6.4	Pixel Formats	286
2.6.5	Field Dominance	290
2.6.6	Frame Flags	291
2.6.7	Video Input Flags	291
2.6.8	Video Output Flags	291
2.6.9	Output Frame Completion Results Flags	292
2.6.10	Frame preview format	292
2.6.11	Video Connection Modes	293
2.6.12	Audio Sample Rates	293
2.6.13	Audio Sample Types	293
2.6.14	DeckLink Information ID	294
2.6.15	DeckLink Attribute ID	295
2.6.16	DeckLink Configuration ID	297
2.6.17	Audio Output Stream Type	302
2.6.18	Analog Video Flags	302
2.6.19	Audio Connection Modes	302
2.6.20	Audio Output Selection switch	303
2.6.21	Output Conversion Modes	303
2.6.22	Input Conversion Modes	304
2.6.23	Video Input Format Changed Events	304
2.6.24	Detected Video Input Format Flags	304

# Table of Contents

---

2.6.25	Display Mode Characteristics	305
2.6.26	Video 3D packing format	305
2.6.27	Display Mode Support	305
2.6.28	BMDTimecodeFormat	306
2.6.29	BMDTimecodeFlags	306
2.6.30	BMDTimecodeBCD	307
2.5.31	Deck Control Mode	308
2.5.32	Deck Control Event	308
2.5.33	Deck Control VTR Control States	309
2.6.34	Deck Control Status Flags	309
2.6.35	Deck Control Export Mode Ops Flags	310
2.6.36	Deck Control error	311
2.6.37	Genlock reference status	312
2.6.38	Idle Video Output Operation	312
2.6.39	Device Busy State	312
2.6.40	Streaming Device Mode	313
2.6.41	Streaming Device Encoding Frame Rates	313
2.6.42	Streaming Device Encoding Support	314
2.6.43	Streaming Device Codecs	314
2.6.44	Streaming Device H264 Profile	314
2.6.45	Streaming Device H264 Level	315
2.6.46	Streaming Device H264 Entropy Coding	315
2.6.47	Streaming Device Audio Codec	315
2.6.48	Streaming Device Encoding Mode Properties	316
2.7	Formulas	317
2.7.1	Color space Conversion Formulas	317

# Introduction

## 1.1 Welcome

Thanks for downloading the Blackmagic Design DeckLink Software Developers Kit.

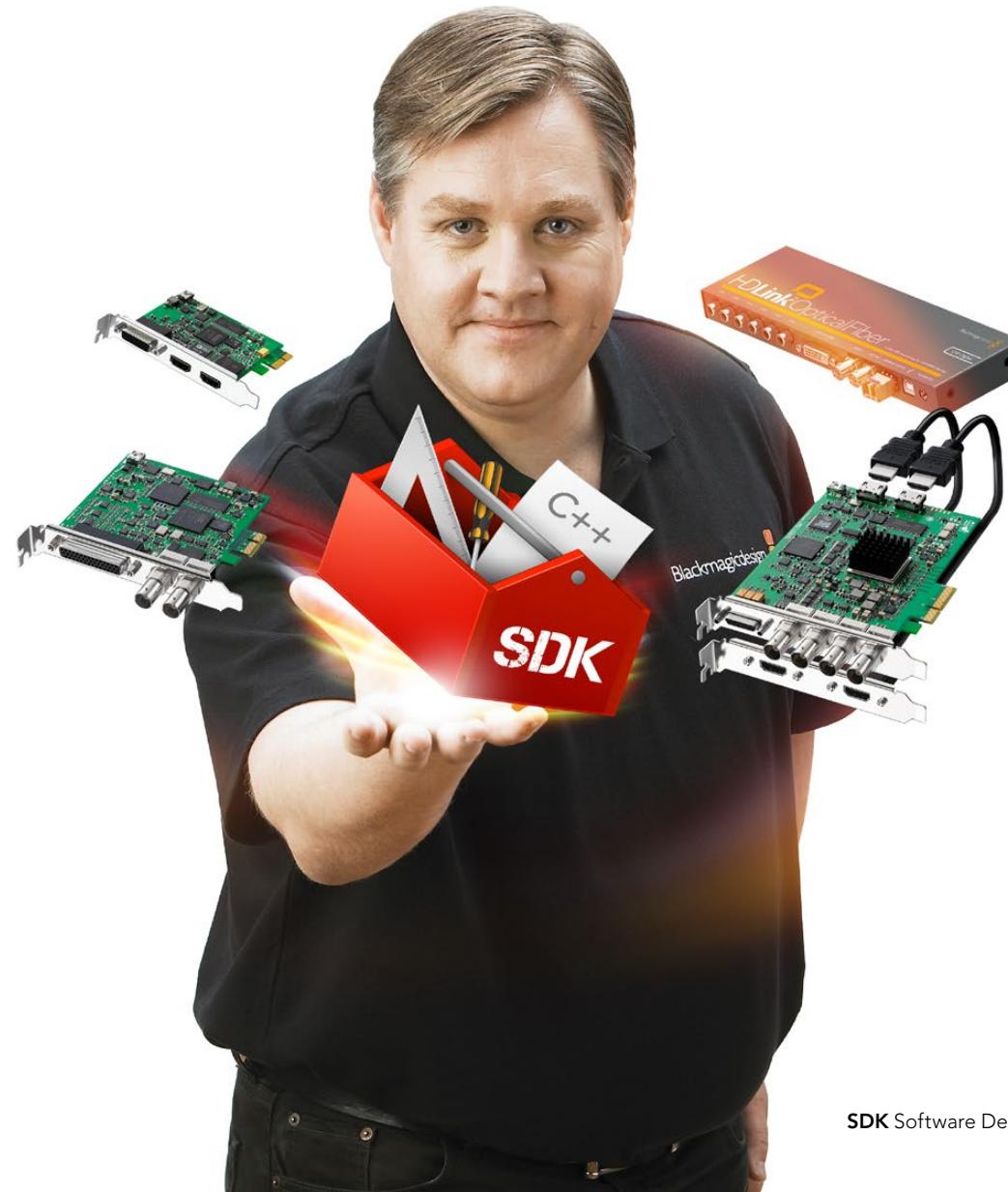
## 1.2 Overview

The DeckLink SDK provides a stable, cross-platform interface to a Blackmagic Design DeckLink product line. The SDK provides both low-level control of hardware and high-level interfaces to allow developers to easily perform common tasks.

The SDK consists of a set of interface descriptions & sample applications which demonstrate the use of the basic features of the hardware. The details of the SDK are described in this document.

The SDK supports Microsoft Windows XP, Vista, Mac OS X and Linux platforms.

You can download the SDK from  
[www.blackmagicdesign.com/support](http://www.blackmagicdesign.com/support)



### 1.3.1 Overview

The libraries supporting the Blackmagic SDK are shipped as part of the product installers for each supported product line. Applications built against the interfaces shipped in the SDK will dynamically link against the library installed on the end-user's system.

### 1.3.2 Object Model

The SDK interface is modeled on Microsoft's Component Object Model (COM). On Microsoft Windows platforms, it is provided as a native COM interface registered with the operating system. On other platforms application code is provided to allow the same COM style interface to be used.

The COM model provides a paradigm for creating flexible and extensible interfaces without imposing much overhead or baggage.

### 1.3.3 Object Interfaces

The DeckLink API provides programmatic access to all current Blackmagic Design DeckLink, Multibridge and Intensity products. "DeckLink" is used as a generic term to refer to all supported products and models except where noted.

The API provides high-level interfaces to allow capture & playback of audio and video with frame buffering and scheduling as well as low-level interfaces for controlling features available on different capture card models.

Functionality within the API is accessed via "object interfaces". Each object in the system may inherit from and be accessed via a number of object interfaces. Typically the developer is able to interact with object interfaces and leave the underlying objects to manage themselves.

# API Design

---

Each object interface class has a Globally Unique ID (GUID) called an “Interface ID”. On platforms with native COM support, an IID may be used to obtain a handle to an exported interface object from the OS, which is effectively an entry point to an installed API.

Each interface may have related interfaces that are accessed by providing an IID to an existing object interface (see **IUnknown::QueryInterface**). This mechanism allows new interfaces to be added to the API without breaking API or ABI compatibility.

## 1.3.4 Reference Counting

The API uses reference counting to manage the life cycle of object interfaces. The developer may need to add or remove references on object interfaces (see **IUnknown::AddRef** and **IUnknown::Release**) to influence their life cycle as appropriate in the application.

## 1.3.5 Interface Stability

The SDK provides a set of stable interfaces for accessing Blackmagic Design hardware. Whilst the published interfaces will remain stable, developers need to be aware of some issues they may encounter as new products, features and interfaces become available.

### 1.3.5.1 New Interfaces

Major pieces of new functionality may be added to the SDK as a whole new object interface. Already released applications will not be affected by the additional functionality. Developers making use of the new functionality should be sure to check the return of **CoCreateInstance** and/or **QueryInterface** as these interfaces will not be available on users systems which are running an older release of the Blackmagic drivers.

Developers can choose to either reduce the functionality of their application when an interface is not available, or to notify the user that they must install a later version of the Blackmagic drivers.

## 1.3.5.2 Updated Interfaces

As new functionality is added to the SDK, some existing interfaces may need to be modified or extended. To maintain compatibility with released software, the original interface will be deprecated but will remain available and maintain its unique identifier (IID). The replacement interface will have a new identifier and remain as similar to the original as possible.

## 1.3.5.3 Deprecated Interfaces

Interfaces which have been replaced with an updated version, or are no longer recommended for use are “deprecated”. Deprecated interfaces are moved out of the main interface description files into an interface description file named according to the release in which the interface was deprecated. Deprecated interfaces are also renamed with a suffix indicating the release prior to the one in which they were deprecated.

It is recommended that developers update their applications to use the most recent SDK interfaces when they release a new version of their applications. As an interim measure, developers may include the deprecated interface descriptions, and updating the names of the interfaces in their application to access the original interface functionality.

## 1.3.5.4 Removed interfaces

Interfaces that have been deprecated for some time may eventually be removed in a major driver update if they become impractical to support.

## 1.4 Interface Reference

Every object interface subclasses the **IUnknown** interface.

### 1.4.1 IUnknown Interface

Each API interface is a subclass of the standard COM base class – **IUnknown**. The **IUnknown** object interface provides reference counting and the ability to look up related interfaces by interface ID. The interface ID mechanism allows interfaces to be added to the API without impacting existing applications.

Public Member Functions	
Method	Description
QueryInterface	Provides access to supported child interfaces of the object.
AddRef	Increments the reference count of the object.
Release	Decrements the reference count of the object. When the final reference is removed, the object is freed.

### 1.4.1.1 IUnknown::QueryInterface method

The **QueryInterface** method looks up a related interface of an object interface.

#### Syntax

```
HRESULT QueryInterface(REFIID id, void **outputInterface);
```

#### Parameters

Name	Direction	Description
id	in	Interface ID of interface to lookup
outputInterface	out	New object interface or NULL on failure.

#### Return Values

Value	Description
E_NOINTERFACE	Interface was not found
S_OK	Success

### 1.4.1.2 IUnknown::AddRef method

The **AddRef** method increments the reference count for an object interface.

#### Syntax

```
ULONG AddRef();
```

#### Parameters

none.

#### Return Values

Value	Description
Count	New reference count – for debug purposes only.

### 1.4.1.3 IUnknown::Release method

The **Release** method decrements the reference count for an object interface. When the last reference is removed from an object, the object will be destroyed.

#### Syntax

```
ULONG Release();
```

#### Parameters

none.

#### Return Values

Value	Description
Count	New reference count – for debug purposes only.

## 2.1 Using the DeckLink API in a project

The supplied sample applications provide examples of how to include the DeckLink API in a project on each supported platform.

To use the DeckLink API in your project, one or more files need to be included:

Windows	DeckLink X.Y\Win\Include\DeckLinkAPI.idl
Mac OS X	DeckLink X.Y/Mac/Include/DeckLinkAPI.h
	DeckLink X.Y/Mac/Include/DeckLinkAPIDispatch.cpp
Linux	DeckLink X.Y/Linux/Include/DeckLinkAPI.h
	DeckLink X.Y/Linux/Include/DeckLinkAPIDispatch.cpp

You can also include the optional header file "DeckLinkAPIVersion.h". It defines two macros containing the SDK version numbers which can be used at runtime by your application to compare the version of the DeckLink API it is linked to with the version of the SDK used at compile time.

## 2.2 Accessing DeckLink devices

Most DeckLink API object interfaces are accessed via the **IDeckLinkIterator** object. How a reference to an **IDeckLinkIterator** is obtained varies between platforms depending on their level of support for COM:

### 2.2.1 Windows

The main entry point to the DeckLink API is the **IDeckLinkIterator** interface. This interface should be obtained from COM using **CoCreateInstance**:

```
IDeckLinkIterator *deckLinkIterator = NULL;  
  
CoCreateInstance(CLSID_CDeckLinkIterator, NULL, CLSCTX_ALL,  
                 IID_IDeckLinkIterator, (void**)&deckLinkIterator);
```

On success, **CoCreateInstance** returns an HRESULT of S\_OK and deckLinkIterator points to a new **IDeckLinkIterator** object interface.

### 2.2.2 Mac OS X and Linux

On platforms without native COM support, a C entry point is provided to access an **IDeckLinkIterator** object:

```
IDeckLinkIterator *deckLinkIterator = CreateDeckLinkIteratorInstance();
```

On success, deckLinkIterator will point to a new **IDeckLinkIterator** object interface otherwise it will be set to NULL.

### 2.3 High level interface

The DeckLink API provides a framework for video & audio streaming which greatly simplifies the task of capturing or playing out video and audio streams. This section provides an overview of how to use these interfaces.

#### 2.3.1 Capture

An application performing a standard streaming capture operation should perform the following steps:

- If desired, enumerate the supported capture video modes by calling **IDeckLinkInput::GetDisplayModeIterator**. For each reported capture mode, call **IDeckLinkInput::DoesSupportVideoMode** to check if the combination of the video mode and pixel format is supported.
- **IDeckLinkInput::EnableVideoInput**
- **IDeckLinkInput::EnableAudioInput**
- **IDeckLinkInput::SetCallback**
- **IDeckLinkInput::StartStreams**
- While streams are running:
  - receive calls to **IDeckLinkInputCallback::VideoInputFrameArrived** with video frame and corresponding audio packet
- **IDeckLinkInput::StopStreams**

Audio may be “pulled” from a separate thread if desired.

If audio is not required, the call to **IDeckLinkInput::EnableAudioInput** may be omitted and the **IDeckLinkInputCallback::VideoInputFrameArrived** callback will receive NULL audio packets.

### 2.3.2 Playback

An application performing a standard streaming playback operation should perform the following steps:

- **IDeckLinkOutput::DoesSupportVideoMode** to check if the combination of the video mode and pixel format is supported.
- **IDeckLinkOutput::EnableVideoOutput**
- **IDeckLinkOutput::EnableAudioOutput**
- **IDeckLinkOutput::SetScheduledFrameCompletionCallback**
- **IDeckLinkOutput::SetAudioCallback**
- **IDeckLinkOutput::BeginAudioPreroll**
- While more frames or audio need to be pre-rolled:
  - **IDeckLinkOutput::ScheduleVideoFrame**
  - Return audio data from **IDeckLinkAudioOutputCallback::RenderAudioSamples**
  - When audio preroll is complete, call **IDeckLinkOutput::EndAudioPreroll**
- **IDeckLinkOutput::StartScheduledPlayback**
- While playback is running:
  - Schedule more video frames from **IDeckLinkVideoOutputCallback::ScheduledFrameCompleted**
  - Schedule more audio from **IDeckLinkAudioOutputCallback::RenderAudioSamples**

If audio is not required, the call to **IDeckLinkOutput::EnableAudioOutput**, **IDeckLinkOutput::SetAudioCallback** and **IDeckLinkOutput::BeginAudioPreroll** may be omitted.

If pre-roll is not required initial **IDeckLinkOutput::ScheduleVideoFrame** calls and the call to **IDeckLinkOutput::BeginAudioPreroll** and **IDeckLinkOutput::EndAudioPreroll** may be omitted.

### 2.3.3 3D Functionality

3D (dual-stream) capture and playback is supported by certain DeckLink devices such as the DeckLink HD Extreme 3D. The 3D functionality is only available over HDMI or SDI, where Channel A and Channel B represent the left and right eyes. The 3D packing must be manually set when connecting to pre-HDMI 1.4 devices. When capturing from an HDMI 1.4 compliant source, the 3D packing format will automatically detected, and cannot be overridden. When outputting to an HDMI 1.4 compliant device / monitor, the packing format will be adjusted according to the device / monitor's capabilities, but can be manually changed. Refer to the **IDeckLinkConfiguration** Interface and **BMDVideo3DPackingFormat** sections for more information on getting and setting the packing format.

#### 2.3.3.1 3D Capture

An application performing a streaming 3D capture operation should perform the following steps:

- If desired, enumerate the supported capture video modes by calling **IDeckLinkInput::GetDisplayModeIterator**.  
For each reported capture mode, check for the presence of the **bmdDisplayModeSupports3D** flag in the return value of **IDeckLinkDisplayMode::GetFlag** indicating that this mode is supported for 3D capture. Call **IDeckLinkInput::DoesSupportVideoMode** with the **bmdVideoInputDualStream3D** flag to check if the combination of the video mode and pixel format is supported.
- Call **IDeckLinkInput::EnableVideoInput** with the **bmdVideoInputDualStream3D** flag.
- **IDeckLinkInput::EnableAudioInput**
- **IDeckLinkInput::SetCallback**
- **IDeckLinkInput::StartStreams**

- While streams are running:
  - Receive calls to **IDeckLinkInputCallback::VideoInputFrameArrived** with left eye video frame and corresponding audio packet..

Inside the callback:

- Call **IDeckLinkVideoInputFrame::QueryInterface** with **IID\_IDeckLinkVideoFrame3DExtensions**.
- **IDeckLinkVideoFrame3DExtensions::GetFrameForRightEye**

The returned frame object must be released by the caller when no longer required.

- **IDeckLinkInput::StopStreams**

### 2.3.3.2 3D Playback

To support 3D playback, your application must provide the API with a video frame object which implements the **IDeckLinkVideoFrame** interface and returns a valid object implementing the **IDeckLinkVideoFrame3DExtensions** interface when its **QueryInterface** method is called with **IID\_IDecklinkVideoFrame3DExtensions**. This can be achieved by providing your own class which:

- subclasses both **IDeckLinkVideoFrame** and **IDeckLinkVideoFrame3DExtensions** interfaces
- returns a pointer to itself (cast to **IDeckLinkVideoFrame3DExtensions**) when its **QueryInterface** method is called with **IID\_IDeckLinkVideoFrame3DExtensions**.
- implements all the methods in the **IDeckLinkVideoFrame** and **IDeckLinkVideoFrame3DExtensions** classes.

An application performing a streaming 3D playback operation should perform the following steps:

- Check if 3D is supported for the desired video mode with **IDeckLinkOutput::DoesSupportVideoMode** called with **bmdVideoOutputDualStream3D**.
- Call **IDeckLinkOutput::EnableVideoOutput** with the **bmdVideoOutputDualStream3D** flag set.
- **IDeckLinkOutput::EnableAudioOutput**
- **IDeckLinkOutput::SetScheduledFrameCompletionCallback**
- **IDeckLinkOutput::SetAudioCallback**
- **IDeckLinkOutput::BeginAudioPreroll**

- While more frames or audio need to be pre-rolled:
  - Create a video frame object that subclasses **IDeckLinkVideoFrame** and **IDeckLinkVideoFrame3DExtensions** as explained above.
  - **IDeckLinkOutput::ScheduleVideoFrame**
  - Return audio data from **IDeckLinkAudioOutputCallback::RenderAudioSamples**

When audio preroll is complete, call **IDeckLinkOutput::EndAudioPreroll**

- **IDeckLinkOutput::StartScheduledPlayback**
- While playback is running:
  - Schedule more video frames from **IDeckLinkVideoOutputCallback::ScheduledFrameCompleted**
  - Schedule more audio from **IDeckLinkAudioOutputCallback::RenderAudioSamples**

If audio is not required, the call to **IDeckLinkOutput::EnableAudioOutput**, **IDeckLinkOutput::SetAudioCallback** and **IDeckLinkOutput::BeginAudioPreroll** may be omitted.

If pre-roll is not required initial **IDeckLinkOutput::ScheduleVideoFrame** calls and the call to **IDeckLinkOutput::BeginAudioPreroll** and **IDeckLinkOutput::EndAudioPreroll** may be omitted.

## 2.3.4 Streaming Encoder

Streaming encoder functionality is supported by certain DeckLink devices such as the H.264 Pro Recorder. Uncompressed video and audio streams may be encoded into a compressed bitstream and made available to suitable applications involving compressed video and audio.

### 2.3.4.1 Streaming Encoder Capture

An application performing a typical streaming encoder capture operation should perform the following steps:

- Enumerate the preset video encoding modes by calling **IBMDStreamingDeviceInput::GetVideoEncodingModePresetIterator**. For each reported video encoding mode call **IBMDStreamingDeviceInput::GetCurrentDetectedVideoInputMode** and **IBMDStreamingDeviceInput::DoesSupportVideoEncodingMode** to check if the current video input mode and video encoding mode are supported.
- If desired, call **IBMDStreamingVideoEncodingMode::CreateMutableVideoEncodingMode** to change the encoder bitrate or other encoder settings.
- **IBMDStreamingDeviceInput::SetVideoEncodingMode**
- **IBMDStreamingDeviceInput::SetCallback**
- **IBMDStreamingDeviceInput::StartCapture**
- While capture is running:
  - receive calls to **IBMDStreamingH264InputCallback::MPEG2TSPacketArrived** with MPEG transport stream data to process both compressed video and audio
  - alternatively, receive calls to **IBMDStreamingH264InputCallback::H264NALPacketArrived** and **IBMDStreamingH264InputCallback::H264AudioPacketArrived** to process compressed video and audio data separately
- **IBMDStreamingDeviceInput::StopCapture**

## 2.4 Interface Reference

### 2.4.1 IDeckLinkIterator Interface

The **IDeckLinkIterator** interface is used to enumerate the available DeckLink devices.

A reference to an **IDeckLinkIterator** object interface may be obtained from **CoCreateInstance** on platforms with native COM support or from **CreateDeckLinkIteratorInstance** on other platforms.

The **IDeckLink** interface(s) returned may be used to access the related interfaces which provide access to the core API functionality.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLink	IID_IDeckLink	<b>IDeckLinkIterator::Next</b> returns <b>IDeckLink</b> interfaces representing each attached DeckLink device.

#### Public Member Functions

Method	Description
Next	Returns a an <b>IDeckLink</b> object interface corresponding to an individual DeckLink device.

### 2.4.1.1 IDeckLinkIterator::Next method

The **Next** method creates an object representing a physical DeckLink device and assigns the address of the IDekLink interface of the newly created object to the decklinkInstance parameter.

#### Syntax

```
HRESULT Next (IDeckLink **decklinkInstance);
```

#### Parameters

Name	Direction	Description
decklinkInstance	out	Next IDekLink object interface

#### Return Values

Value	Description
S_FALSE	No (more) devices found
E_FAIL	Failure
S_OK	Success

**SECTION**  
**2**

# DeckLink API

## 2.4.2 IDeckLink Interface

The **IDeckLink** object interface represents a physical DeckLink device attached to the host computer.

**IDeckLink** object interfaces are obtained from **IDeckLinkIterator**. **IDeckLink** may be queried to obtain the related **IDeckLinkOutput**, **IDeckLinkInput** and **IDeckLinkConfiguration** interfaces.

### Related Interfaces

Interface	Interface ID	Description
IDeckLinkIterator	IID_IDeckLinkIterator	<b>IDeckLinkIterator::Next</b> returns <b>IDeckLink</b> interfaces representing each attached DeckLink device.
IDeckLinkOutput	IID_IDeckLinkOutput	An <b>IDeckLinkOutput</b> object interface may be obtained from <b>IDeckLink</b> using <b>QueryInterface</b>
IDeckLinkInput	IID_IDeckLinkInput	An <b>IDeckLinkInput</b> object interface may be obtained from <b>IDeckLink</b> using <b>QueryInterface</b>
IDeckLink Configuration	IID_IDeckLinkConfiguration	An <b>IDeckLinkConfiguration</b> object interface may be obtained from <b>IDeckLink</b> using <b>QueryInterface</b>
IDeckLink Attributes	IID_IDeckLinkAttributes	An <b>IDeckLinkAttributes</b> object interface may be obtained from <b>IDeckLink</b> using <b>QueryInterface</b> .
IDeckLinkKeyer	IID_IDeckLinkKeyer	An <b>IDeckLinkKeyer</b> object interface may be obtained from <b>IDeckLink</b> using <b>QueryInterface</b> .

Interface	Interface ID	Description
IDeckLinkDeckControl	IID_IDeckLinkDeckControl	An <b>IDeckLinkDeckControl</b> object may be obtained from <b>IDeckLink</b> using <b>QueryInterface</b>

Public Member Functions	
Method	Description
GetmodelName	Method to get DeckLink device model name.
GetDisplayName	Method to get a device name suitable for user interfaces

### 2.4.2.1 IDeckLink::GetModelName method

The **GetmodelName** method can be used to get DeckLink device model name.

#### Syntax

```
HRESULT Get modelName (string *modelName);
```

#### Parameters

Name	Direction	Description
modelName	out	Hardware model name. This allocated string must be freed by the caller when no longer required.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.2.2 IDeckLink::GetDisplayName method

The **GetDisplayName** method returns a string suitable for display in a user interface. The string is made of the model name (as returned by **GetmodelName**) followed by an increasing number (starting from 1) if more than one instance of a device is present in the system. If not, the returned string is simply the model name.

#### Syntax

```
HRESULT GetDisplayName (string *displayName);
```

#### Parameters

Name	Direction	Description
displayName	out	The device's display name. This allocated string must be freed by caller when no longer required

#### Return Values

Value	Description
E_FAIL	Failed to allocate the string
S_OK	Success

### 2.4.3 IDeckLinkOutput interface

The **IDeckLinkOutput** object interface allows an application to output a video and audio stream from a DeckLink device.

An **IDeckLinkOutput** interface can be obtained from an **IDeckLink** object interface using **QueryInterface**. If **QueryInterface** for an output interface is called on an input only device, then **QueryInterface** will fail and return **E\_NOINTERFACE**.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLinkOutput	IID_IDeckLinkOutput	An <b>IDeckLinkOutput</b> object interface may be obtained from <b>IDeckLink</b> using <b>QueryInterface</b>
IDeckLinkDisplayModelerator	IID_IDeckLinkDisplayModelerator	<b>IDeckLinkOutput::GetDisplayModelerator</b> returns an <b>IDeckLinkDisplayModelerator</b> object interface
IDeckLinkVideoFrame	IID_DeckLinkVideoFrame	<b>IDeckLinkOutput::CreateVideoFrame</b> may be used to create a new <b>IDeckLinkVideoFrame</b> object interface
IDeckLinkVideoOutputCallback	IID_DeckLinkVideoOutputCallback	An <b>IDeckLinkVideoOutputCallback</b> object interface may be registered with <b>IDeckLinkOutput::SetScheduleFrameCompletionCallback</b>
IDeckLinkAudioOutputCallback	IID_DeckLinkAudioOutputCallback	An <b>IDeckLinkAudioOutputCallback</b> object interface may be registered with <b>IDeckLinkOutput::SetAudioCallback</b>

SECTION  
**2**

## DeckLink API

Public Member Functions	
Method	Description
DoesSupportVideoMode	Check whether a given video mode is supported for output
GetDisplayModelIterator	Get an iterator to enumerate the available output display modes
SetScreenPreviewCallback	Register screen preview callback
EnableVideoOutput	Enable video output
DisableVideoOutput	Disable video output
SetVideoOutputFrameMemoryAllocator	Register custom memory allocator
CreateVideoFrame	Create a video frame
CreateAncillaryData	Create ancillary buffer
DisplayVideoFrameSync	Display a video frame synchronously
ScheduleVideoFrame	Schedule a video frame for display
SetScheduledFrameCompletionCallback	Register completed frame callback
GetBufferedVideoFrameCount	Gets number of frames queued.
EnableAudioOutput	Enable audio output
DisableAudioOutput	Disable audio output

Public Member Functions	
Method	Description
WriteAudioSamplesSync	Play audio synchronously
BeginAudioPreroll	Start pre-rolling audio
EndAudioPreroll	Stop pre-rolling audio
ScheduleAudioSamples	Schedule audio samples for play-back
GetBufferedAudioSampleFrameCount	Returns the number of audio sample frames currently buffered for output
FlushBufferedAudioSamples	Flush buffered audio
SetAudioCallback	Register audio output callback
StartScheduledPlayback	Start scheduled playback
StopScheduledPlayback	Stop scheduled playback
GetScheduledStreamTime	Returns the elapsed time since scheduled playback began.
IsScheduledPlaybackRunning	Determine if the video output scheduler is running
GetHardwareReferenceClock	Get scheduling time
GetReferenceStatus	Provides reference genlock status

### 2.4.3.1 IDeckLinkOutput::DoesSupportVideoMode method

The **DoesSupportVideoMode** method indicates whether a given display mode is supported on output.  
Modes may be supported, unsupported or supported with conversion.

**Note:** If a pixel format is not natively supported in the card's hardware it will be converted by software  
and **bmdDisplayModeSupportedWithConversion** will be returned.

#### Syntax

```
HRESULT DoesSupportVideoMode (BMDDisplayMode displayMode, BMDPixelFormat pixelFormat, BMDVideoOutputFlags flags,
    BMDDisplayModeSupport *support, IDeckLinkDisplayMode **resultDisplayMode);
```

#### Parameters

Name	Direction	Description
displayMode	in	Display mode to check
pixelFormat	in	Pixel format to check (0 for any)
flags	in	Video output flags (see <b>BMDVideoOutputFlags</b> for details).
support	out	Video output mode supported result.
resultDisplayMode	out	If this parameter is not NULL, an <b>IDeckLinkDisplaymode</b> object representing the given displayMode is returned.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.2 IDeckLinkOutput::IsScheduledPlaybackRunning method

The **IsScheduledPlaybackRunning** method is called to determine if the driver's video output scheduler is currently active.

#### Syntax

```
HRESULT IsScheduledPlaybackRunning (boolean *active)
```

#### Parameters

Name	Direction	Description
active	out	Active status of driver video output scheduler

#### Return Values

Value	Description
E_INVALIDARG	Parameter active status variable is NULL
E_FAIL	Failure
S_OK	Success

### 2.4.3.3 IDeckLinkOutput::GetDisplayModeIterator method

The **GetDisplayModeIterator** method returns an iterator which enumerates the available display modes.

#### Syntax

```
HRESULT GetDisplayModeIterator (IDeckLinkDisplayModeIterator **iterator);
```

#### Parameters

Name	Direction	Description
iterator	out	Display mode iterator

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.3.4 IDeckLinkOutput::SetScreenPreviewCallback method

The **SetScreenPreviewCallback** method is called to register an instance of an **IDeckLinkScreenPreviewCallback** object. The registered object facilitates the updating of an on-screen preview of a video stream being played.

##### Syntax

**HRESULT** SetScreenPreviewCallback (**IDeckLinkScreenPreviewCallback** \*previewCallback)

##### Parameters

Name	Direction	Description
previewCallback	in	The <b>IDeckLinkScreenPreview</b> object to be registered.

##### Return Values

Value	Description
E_OUTOFMEMORY	Unable to create kernel event (Windows only)
E_FAIL	Failure
S_OK	Success

### 2.4.3.5 IDeckLinkOutput::EnableVideoOutput method

The **EnableVideoOutput** method enables video output. Once video output is enabled, frames may be displayed immediately with **DisplayVideoFrameSync** or scheduled with **ScheduleVideoFrame**.

#### Syntax

```
HRESULT EnableVideoOutput (BMDDisplayMode displayMode, BMDVideoOutputFlags flags);
```

#### Parameters

Name	Direction	Description
displayMode	in	Display mode for video output
flags	in	Flags to control ancillary data and video output features.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_ACCESSDENIED	Unable to access the hardware
E_OUTOFMEMORY	Unable to create a new frame

### 2.4.3.6 IDeckLinkOutput::DisableVideoOutput method

The **DisableVideoOutput** method disables video output.

#### Syntax

```
HRESULT DisableVideoOutput (BMDDisplayMode displayMode);
```

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.7 IDeckLinkOutput::SetVideoOutputFrameMemoryAllocator method

The **SetVideoOutputFrameMemoryAllocator** method sets a custom memory allocator for video frame allocations during playback. The use of a custom memory allocator is optional.

#### Syntax

```
HRESULT SetVideoOutputFrameMemoryAllocator (IDeckLinkMemoryAllocator *theAllocator);
```

#### Parameters

Name	Direction	Description
theAllocator	in	Allocator object with an <b>IDeckLinkMemoryAllocator</b> interface

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.8 IDeckLinkOutput::CreateVideoFrame method

The **CreateVideoFrame** method creates a video frame for output  
(see **IDeckLinkMutableVideoFrame** for more information).

#### Syntax

```
HRESULT CreateVideoFrame (long width, long height, long rowBytes,  
BMDPixelFormat pixelFormat, BMDFrameFlags flags,  
IDeckLinkMutableVideoFrame **outFrame);
```

#### Parameters

Name	Direction	Description
width	in	frame width in pixels
height	in	frame height in pixels
rowBytes	in	bytes per row
pixelFormat	in	pixel format
flags	in	frame flags
outFrame	out	newly created video frame

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.9 IDeckLinkOutput::CreateAncillaryData method

The **CreateAncillaryData** method creates an ancillary buffer that can be attached to an **IDeckLinkMutableVideoFrame**.

#### Syntax

```
HRESULT CreateAncillaryData (BMDPixelFormat pixelFormat,  
                           IDeckLinkVideoFrameAncillary** outBuffer);
```

#### Parameters

Name	Direction	Description
pixelFormat	in	Pixel format for ancillary data
outBuffer	out	New video frame ancillary buffer

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_ACCESSDENIED	Video output is not enabled.

### 2.4.3.10 IDeckLinkOutput::DisplayVideoFrameSync method

The **DisplayVideoFrameSync** method is used to provide a frame to display as the next frame output. It should not be used during scheduled playback.

Video output must be enabled with **EnableVideoOutput** before frames can be displayed.

#### Syntax

```
HRESULT DisplayVideoFrameSync (IDeckLinkVideoFrame *theFrame);
```

#### Parameters

Name	Direction	Description
theFrame	in	frame to display – after call return, the frame may be released

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_ACCESSDENIED	The video output is not enabled.
E_INVALIDARG	The frame attributes are invalid.

### 2.4.3.11 IDeckLinkOutput::ScheduleVideoFrame method

The **ScheduleVideoFrame** method is used to schedule a frame for asynchronous playback at a specified time.

Video output must be enabled with **EnableVideoOutput** before frames can be displayed. Frames may be scheduled before calling **StartScheduledPlayback** to preroll. Once playback is initiated, new frames can be scheduled from **IDeckLinkVideoOutputCallback**.

#### Syntax

```
HRESULT ScheduleVideoFrame (IDeckLinkVideoFrame *theFrame,
                           BMDTimeValue displayTime, BMDTimeValue displayDuration,
                           BMDTimeScale timeScale);
```

#### Parameters

Name	Direction	Description
theFrame	in	frame to display
displayTime	in	time at which to display the frame in timeScale units
displayDuration	in	duration for which to display the frame in timeScale units
timeScale	in	time scale for displayTime and displayDuration

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_ACCESSDENIED	The video output is not enabled.
E_INVALIDARG	The frame attributes are invalid.
E_OUTOFMEMORY	Too many frames are already scheduled

### 2.4.3.12 IDeckLinkOutput::SetScheduledFrameCompletionCallback method

The **SetScheduledFrameCompletionCallback** method configures a callback which will be called when each scheduled frame is completed.

#### Syntax

```
HRESULT SetScheduledFrameCompletionCallback(  
    IDeckLinkOutputCallback *theCallback);
```

#### Parameters

Name	Direction	Description
theCallBack	in	callback object implementing the <b>IDeckLinkOutputCallback</b> object interface

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.13 IDeckLinkOutput::GetBufferedVideoFrameCount method

The **GetBufferedVideoFrameCount** method gets the number of frames queued.

#### Syntax

```
HRESULT GetBufferedVideoFrameCount (uint32_t *bufferedFrameCount) ;
```

#### Parameters

Name	Direction	Description
bufferedFrameCount	out	The frame count.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.14 IDeckLinkOutput::EnableAudioOutput method

The **EnableAudioOutput** method puts the hardware into a specified audio output mode. Once audio output is enabled, sample frames may be output immediately using **WriteAudioSamplesSync** or as part of scheduled playback using **ScheduleAudioSamples**.

#### Syntax

```
HRESULT EnableAudioOutput(BMDAudioSampleRate sampleRate,  

BMDAudioSampleType sampleType,  

uint32_t channelCount, BMDAudioOutputStreamType streamType);
```

#### Parameters

Name	Direction	Description
sampleRate	in	Sample rate to output
sampleType	in	Sample type to output
channelCount	in	Number of audio channels to output – only 2, 8 or 16 channel output is supported.
streamType	in	Type of audio output stream.

#### Return Values

Value	Description
E_FAIL	Failure
E_INVALIDARG	Invalid number of channels requested
S_OK	Success
E_ACCESSDENIED	Unable to access the hardware or audio output not enabled.
E_OUTOFMEMORY	Unable to create internal object

### 2.4.3.15 IDeckLinkOutput::DisableAudioOutput method

The **DisableAudioOutput** method disables the hardware audio output mode.

#### Syntax

```
HRESULT DisableAudioOutput();
```

#### Parameters

none.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.16 IDeckLinkOutput::WriteAudioSamplesSync method

The **WriteAudioSamplesSync** method is used to play audio sample frames immediately. Audio output must be configured with **EnableAudioOutput**. **WriteAudioSamplesSync** should not be called during scheduled playback.

#### Syntax

```
HRESULT WriteAudioSamplesSync (void *buffer,  
                             uint32_t sampleFrameCount,  
                             uint32_t *sampleFramesWritten);
```

#### Parameters

Name	Direction	Description
buffer	in	Buffer containing audio sample frames. Audio channel samples must be interleaved into a sample frame and sample frames must be contiguous.
sampleFrameCount	in	Number of sample frames available
sampleFramesWritten	out	Actual number of sample frames queued

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.17 IDeckLinkOutput::BeginAudioPreroll method

The **BeginAudioPreroll** method requests the driver begin polling the registered **IDeckLinkAudioOutputCallback::RenderAudioSamples** object interface for audio-preroll.

#### Syntax

```
HRESULT BeginAudioPreroll ();
```

#### Parameters

none.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.18 IDeckLinkOutput::EndAudioPreroll method

The **EndAudioPreroll** method requests the driver stop polling the registered **IDeckLinkAudioOutputCallback** object interface for audio-preroll.

#### Syntax

```
HRESULT EndAudioPreroll ();
```

#### Parameters

none.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.19 IDeckLinkOutput::ScheduleAudioSamples method

The **ScheduleAudioSamples** method is used to provide audio sample frames for scheduled playback. Audio output must be enabled with **EnableAudioOutput** before frames may be scheduled.

#### Syntax

```
HRESULT ScheduleAudioSamples (void *buffer, uint32_t sampleFrameCount, BMDTimeValue streamTime,  
BMDTimeScale timeScale, uint32_t *sampleFramesWritten);
```

#### Parameters

Name	Direction	Description
buffer	in	Buffer containing audio sample frames. Audio channel samples must be interleaved into a sample frame and sample frames must be contiguous.
sampleFrameCount	in	Number of sample frames available
streamTime	in	time for audio playback in units of timeScale. To queue samples to play back immediately after currently buffered samples both streamTime and timeScale may be set to zero.
timeScale	in	Time scale for the audio stream.
sampleFramesWritten	out	Actual number of sample frames scheduled

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_ACCESSDENIED	Either audio output has not been enabled or an audio sample write is in progress.
E_INVALIDARG	No timescale has been provided. A timescale is necessary as the audio packets are time-stamped.

### 2.4.3.20 IDeckLinkOutput::GetBufferedAudioSampleFrameCount method

The **GetBufferedAudioSampleFrameCount** method returns the number of audio sample frames currently buffered for output.

This method may be used to determine how much audio is currently buffered before scheduling more audio with **ScheduleAudioSamples**.

#### Syntax

**HRESULT** GetBufferedAudioSampleFrameCount (**uint32\_t** \*bufferedSampleFrameCount)

#### Parameters

Name	Direction	Description
bufferedSampleFrameCount	out	Number of audio frames currently buffered.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.21 IDeckLinkOutput::FlushBufferedAudioSamples method

The **FlushBufferedAudioSamples** method discards any buffered audio sample frames.

**FlushBufferedAudioSamples** should be called when changing playback direction. Buffered audio is implicitly flushed when stopping audio playback with **StopScheduledPlayback** or **DisableAudioOutput**.

#### Syntax

```
HRESULT FlushBufferedAudioSamples ();
```

#### Parameters

none.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.22 IDeckLinkOutput::SetAudioCallback method

The **SetAudioCallback** method configures a callback which will be called regularly to allow the application to queue audio for scheduled playback.

Use of this method is optional – audio may alternately be queued from **IDeckLinkVideoOutputCallback::ScheduledFrameCompleted**.

#### Syntax

**HRESULT** SetAudioCallback (**IDeckLinkAudioOutputCallback** \***theCallback**);

#### Parameters

Name	Direction	Description
<b>theCallBack</b>	in	callback object implementing the <b>IDeckLinkAudioOutputCallback</b> object interface

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.23 IDeckLinkOutput::StartScheduledPlayback method

The **StartScheduledPlayback** method starts scheduled playback. Frames may be pre-rolled by scheduling them before starting playback. **SetScheduledFrameCompletionCallback** may be used to register a callback to be called when each frame is completed.

Playback starts immediately when **StartScheduledPlayback** is called but at a specified “playback start time”. Scheduled frames are output as the playback time reaches the time at which the frames were scheduled.

#### Syntax

```
HRESULT StartScheduledPlayback (BMDTimeValue playbackStartTime,  
                                BMDTimeScale timeScale, double playbackSpeed);
```

#### Parameters

Name	Direction	Description
playbackStartTime	in	Time at which the playback starts in units of timeScale
timeScale	in	Time scale for playbackStartTime and playbackSpeed.
playbackSpeed	in	Speed at which to play back : 1.0 is normal playback, -1.0 is reverse playback. Fast or slow forward or reverse playback may also be specified.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.24 IDeckLinkOutput::StopScheduledPlayback method

The **StopScheduledPlayback** method stops scheduled playback immediately or at a specified time. Any frames or audio scheduled after the stop time will be flushed.

#### Syntax

```
HRESULT StopScheduledPlayback (BMDTimeValue stopPlaybackAtTime,  
                               BMDTimeValue *actualStopTime, BMDTimeScale timeScale);
```

#### Parameters

Name	Direction	Description
stopPlaybackAtTime	in	Playback time at which to stop in units of timeScale. Specify 0 to stop immediately.
actualStopTime	out	Playback time at which playback actually stopped in units of timeScale. Specify NULL to stop immediately
timeScale	in	Time scale for stopPlaybackAtTime and actualStopTime. Specify 0 to stop immediately.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.3.25 IDeckLinkOutput::GetScheduledStreamTime method

The **GetScheduledStreamTime** method returns the elapsed time since scheduled playback began.

#### Syntax

```
HRESULT GetScheduledStreamTime (BMDTimeScale desiredTimeScale,  
                                BMDTimeValue *streamTime,    double *playbackSpeed);
```

#### Parameters

Name	Direction	Description
desiredTimeScale	in	Time scale for elapsedTimeSinceSchedulerBegan
streamTime	out	Frame time
playbackSpeed	out	Scheduled playback speed

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_ACCESSDENIED	Video output is not enabled

### 2.4.3.26 IDeckLinkOutput::GetReferenceStatus method

The **GetReferenceStatus** method provides the genlock reference status of the DeckLink device.

#### Syntax

```
HRESULT GetReferenceStatus (BMDReferenceStatus *referenceStatus)
```

#### Parameters

Name	Direction	Description
referenceStatus	out	A bit-mask of the reference status. See <b>BMDReferenceStatus</b> for more details.

#### Return Values

Value	Description
E_FAIL	Failure
E_POINTER	The parameter is invalid.
S_OK	Success

### 2.4.3.27 IDeckLinkOutput::GetHardwareReferenceClock method

The **GetHardwareReferenceClock** method returns a clock that is locked to the rate at which the DeckLink hardware is outputting frames. The absolute values returned by this method are meaningless, however the relative differences between subsequent calls can be used to determine elapsed time. This method can be called while video output is enabled (see **IDeckLinkOutput::EnableVideoOutput** for details).

#### Syntax

```
HRESULT GetHardwareReferenceClock (BMDTimeScale desiredTimeScale, BMDTimeValue  
*hardwareTime, BMDTimeValue *timeInFrame, BMDTimeValue *ticksPerFrame);
```

#### Parameters

Name	Direction	Description
desiredTimeScale	in	Desired time scale
hardwareTime	out	Hardware reference time (in units of desiredTimeScale)
timeInFrame	out	Time in frame (in units of desiredTimeScale)
ticksPerFrame	out	Number of ticks for a frame (in units of desiredTimeScale)

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

## 2.4.4 IDeckLinkInput interface

The **IDeckLinkInput** object interface allows an application to capture a video and audio stream from a DeckLink device.

An **IDeckLinkInput** interface can be obtained from an **IDeckLink** object interface using **QueryInterface**. If QueryInterface for an input interface is called on an output only device, then QueryInterface will fail and return E\_NOINTERFACE.

Video capture operates in a push model with each video frame being delivered to an **IDeckLinkInputCallback** object interface. Audio capture is optional and can be handled by using the same callback.

Please note that DeckLink devices or DeckLink sub-devices are half-duplex. Therefore either capture or render can be enabled, but not simultaneously.

### Related Interfaces

Interface	Interface ID	Description
IDeckLink	IID_IDeckLink	An <b>IDeckLinkInput</b> object interface may be obtained from <b>IDeckLink</b> using <b>QueryInterface</b>
IDeckLinkDisplayModeIterator	IID_IDeckLinkDisplayModeIterator	<b>IDeckLinkInput::GetDisplayModeIterator</b> returns an <b>IDeckLinkDisplayModeIterator</b> object interface
IDeckLinkInputCallback	IID_DeckLinkInputCallback	An <b>IDeckLinkInputCallback</b> object interface may be registered with <b>IDeckLinkInput::SetCallback</b>

SECTION  
**2**

## DeckLink API

Public Member Functions	
Method	Description
DoesSupportVideoMode	Check whether a given video mode is supported for input
GetDisplayModelIterator	Get an iterator to enumerate the available input display modes
SetScreenPreviewCallback	Register screen preview callback
EnableVideoInput	Configure video input
DisableVideoInput	Disable video input
EnableAudioInput	Configure audio input
DisableAudioInput	Disable audio input
GetBufferedAudioSampleFrameCount	Query audio buffer status – for pull model audio.
StartStreams	Start synchronized capture
StopStreams	Stop synchronized capture
PauseStreams	Pause synchronized capture
FlushStreams	Removes any buffered video and audio frames.

SECTION  
**2**

## DeckLink API

---

Public Member Functions	
Method	Description
SetCallback	Register input callback
GetHardwareReferenceClock	Get the hardware system clock
SetVideoInputFrameMemoryAllocator	Register custom memory allocator for input video frames

#### 2.4.4.1 **IDeckLinkInput::DoesSupportVideoMode** method

The **DoesSupportVideoMode** method indicates whether a given display mode is supported on input.

Modes may be supported, unsupported or supported with conversion.

##### Syntax

```
HRESULT DoesSupportVideoMode (BMDDisplayMode displayMode, BMDPixelFormat pixelFormat,  
BMDVideoInputFlags flags, BMDDisplayModeSupport *support, IDeckLinkDisplayMode **resultDisplayMode);
```

##### Parameters

Name	Direction	Description
displayMode	in	Display mode to check
pixelFormat	in	Pixel format to check (0 for any)
flags	in	Video output flags (see <b>BMDVideoInputFlags</b> for details).
support	out	Video output mode supported result.
resultDisplayMode	out	If this parameter is not NULL, an <b>IDeckLinkDisplaymode</b> object representing the given displayMode is returned.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.4.2 IDeckLinkInput::GetDisplayModeIterator method

The **GetDisplayModeIterator** method returns an iterator which enumerates the available display modes.

#### Syntax

```
HRESULT GetDisplayModeIterator (IDeckLinkDisplayModeIterator **iterator);
```

#### Parameters

Name	Direction	Description
iterator	out	display mode iterator

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.4.3 IDeckLinkInput::SetScreenPreviewCallback method

The **SetScreenPreviewCallback** method is called to register an instance of an **IDeckLinkScreenPreviewCallback** object.

The registered object facilitates the updating of an on-screen preview of a video stream being captured.

#### Syntax

**HRESULT** SetScreenPreviewCallback (**IDeckLinkScreenPreviewCallback** \***previewCallback**)

#### Parameters

Name	Direction	Description
<b>previewCallback</b>	in	The <b>IDeckLinkScreenPreview</b> object to be registered.

#### Return Values

Value	Description
<b>S_OK</b>	Success

#### 2.4.4.4 IDeckLinkInput::EnableVideoInput method

The **EnableVideoInput** method configures video input and puts the hardware into video capture mode. Video input (and optionally audio input) is started by calling **StartStreams**.

##### Syntax

```
HRESULT EnableVideoInput(BMDDisplayMode displayMode,  
                        BMDPixelFormat pixelFormat,  
                        BMDVideoInputFlags flags);
```

##### Parameters

Name	Direction	Description
displayMode	in	Video mode to capture
pixelFormat	in	Pixel format to capture
flags	in	Capture flags

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	Is returned on invalid mode or video flags
E_ACCESSDENIED	Unable to access the hardware or input stream currently active
E_OUTOFMEMORY	Unable to create a new frame

### 2.4.4.5 IDeckLinkInput::GetAvailableVideoFrameCount method

The **GetAvailableVideoFrameCount** method provides the number of available input frames.

#### Syntax

```
HRESULT GetAvailableVideoFrameCount (uint32_t *availableFrameCount);
```

#### Parameters

Name	Direction	Description
availableFrameCount	out	Number of available input frames.

#### Return Values

Value	Description
S_OK	Success

#### 2.4.4.6 IDeckLinkInput::DisableVideoInput method

The **DisableVideoInput** method disables the hardware video capture mode.

##### Syntax

```
HRESULT DisableVideoInput();
```

##### Parameters

none.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.4.7 IDeckLinkInput::EnableAudioInput method

The **EnableAudioInput** method configures audio input and puts the hardware into audio capture mode. Synchronized audio and video input is started by calling **StartStreams**.

##### Syntax

```
HRESULT EnableAudioInput(BMDAudioSampleRate sampleRate,  
                        BMDAudioSampleType sampleType,  
                        uint32_t channelCount);
```

##### Parameters

Name	Direction	Description
sampleRate	in	Sample rate to capture
sampleType	in	Sample type to capture
channelCount	in	Number of audio channels to capture – only 2, 8 or 16 channel capture is supported.

##### Return Values

Value	Description
E_FAIL	Failure
E_INVALIDARG	Invalid number of channels requested
S_OK	Success

#### 2.4.4.8 IDeckLinkInput::DisableAudioInput method

The **DisableAudioInput** method disables the hardware audio capture mode.

##### Syntax

```
HRESULT DisableAudioInput();
```

##### Parameters

none.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.4.9 IDeckLinkInput::GetAvailableAudioSampleFrameCount method

The **GetAvailableAudioSampleFrameCount** method returns the number of audio sample frames currently buffered.

Use of this method is only required when using pull model audio – the same audio data is made available to **IDeckLinkInputCallback** and may be ignored.

##### Syntax

```
HRESULT GetAvailableAudioSampleFrameCount (uint32_t *availableSampleFrameCount);
```

##### Parameters

Name	Direction	Description
availableSampleFrameCount	out	The number of buffered audio frames currently available.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.4.10 IDeckLinkInput::SetVideoInputFrameMemoryAllocator method

The **SetVideoInputFrameMemoryAllocator** method sets a custom memory allocator for video frame allocations during capture. Use of a custom memory allocator is optional.

##### Syntax

```
HRESULT SetVideoInputFrameMemoryAllocator (IDeckLinkMemoryAllocator *theAllocator);
```

##### Parameters

Name	Direction	Description
theAllocator	in	Allocator object with an <b>IDeckLinkMemoryAllocator</b> interface

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.4.11 IDeckLinkInput::StartStreams method

The **StartStreams** method starts synchronized video and audio capture as configured with **EnableVideoInput** and optionally **EnableAudioInput**.

##### Syntax

```
HRESULT StartStreams();
```

##### Parameters

none.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_ACCESSDENIED	Input stream is already running.
E_UNEXPECTED	Video and Audio inputs are not enabled.

#### 2.4.4.12 IDeckLinkInput::StopStreams method

The **StopStreams** method stops synchronized video and audio capture.

##### Syntax

```
HRESULT StopStreams();
```

##### Parameters

none.

##### Return Values

Value	Description
S_OK	Success
E_ACCESSDENIED	Input stream already stopped.

#### 2.4.4.13 IDeckLinkInput:FlushStreams method

The **FlushStreams** method removes any buffered video and audio frames.

##### Syntax

```
HRESULT FlushStreams ();
```

##### Parameters

none.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.4.14 IDeckLinkInput::PauseStreams method

The **PauseStreams** method pauses synchronized video and audio capture. Capture time continues while the streams are paused but no video or audio will be captured. Paused capture may be resumed by calling **PauseStreams** again. Capture may also be resumed by calling **StartStreams** but capture time will be reset.

##### Syntax

```
HRESULT PauseStreams();
```

##### Parameters

none.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.4.15 IDeckLinkInput::SetCallback method

The **SetCallback** method configures a callback which will be called for each captured frame. Synchronized capture is started with **StartStreams**, stopped with **StopStreams** and may be paused with **PauseStreams**.

##### Syntax

```
HRESULT SetCallback (IDeckLinkInputCallback *theCallback);
```

##### Parameters

Name	Direction	Description
theCallBack	in	callback object implementing the <b>IDeckLinkInputCallback</b> object interface

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.4.16 **IDeckLinkInput::GetHardwareReferenceClock** method

The **GetHardwareReferenceClock** method returns a clock that is locked to the system clock.

The absolute values returned by this method are meaningless, however the relative differences between subsequent calls can be used to determine elapsed time. This method can be called while video input is enabled (see **IDeckLinkInput::EnableVideoInput** for details).

##### Syntax

```
HRESULT GetHardwareReferenceClock (BMDTimeScale desiredTimeScale, BMDTimeValue *hardwareTime,
                                  BMDTimeValue *timeInFrame, BMDTimeValue *ticksPerFrame);
```

##### Parameters

Name	Direction	Description
desiredTimeScale	in	Desired time scale
hardwareTime	out	Hardware reference time (in units of desiredTimeScale)
timeInFrame	out	Time in frame (in units of desiredTimeScale)
ticksPerFrame	out	Number of ticks for a frame (in units of desiredTimeScale)

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

## 2.4.5 IDeckLinkVideoFrame Interface

The **IDeckLinkVideoFrame** object interface represents a video frame.

The **GetWidth**, **GetHeight** methods may be used to determine the pixel dimensions of the frame buffer. Pixels on a given row are packed according to the pixel format returned by **GetPixelFormat** - see **BMDPixelFormat** for details. Note that in some formats (HD720 formats, for example), there is padding between rows - always use **GetRowBytes** to account for the row length, including padding.

Developers may sub-class **IDeckLinkVideoFrame** to provide an implementation which fits well with their application's structure.

### Related Interfaces

Interface	Interface ID	Description
IDeckLinkMutableVideoFrame	IID_IDeckLinkMutableVideoFrame VIdeoFrame	<b>IDeckLinkMutableVideoFrame</b> subclasses <b>IDeckLinkVideoFrame</b>
IDeckLinkVideoInputFrame	IID_IDeckLinkVideoInputFrame VideoInputFrame	<b>IDeckLinkVideoInputFrame</b> subclasses <b>IDeckLinkVideoFrame</b>

### Public Member Functions

Method	Description
GetWidth	Get video frame width in pixels
GetHeight	Get video frame height in pixels
GetRowBytes	Get bytes per row for video frame
GetPixelFormat	Get pixel format for video frame

**Public Member Functions**

Method	Description
GetFlags	Get frame flags
GetBytes	Get pointer to frame data
GetTimecode	Gets timecode information
GetAncillaryData	Gets ancillary data

### 2.4.5.1 IDeckLinkVideoFrame::GetWidth method

The **GetWidth** method returns the width of a video frame.

#### Syntax

```
long GetWidth();
```

#### Return Values

Value	Description
Width	Video frame width in pixels

### 2.4.5.2 IDeckLinkVideoFrame::GetHeight method

The **GetHeight** method returns the height of a video frame.

#### Syntax

```
long GetHeight();
```

#### Return Values

Value	Description
Height	Video frame height in pixels

### 2.4.5.3 IDeckLinkVideoFrame::GetRowBytes method

The **GetRowBytes** method returns the number of bytes per row of a video frame.

#### Syntax

```
long GetRowBytes();
```

#### Return Values

Value	Description
BytesCount	Number of bytes per row of video frame

### 2.4.5.4 IDeckLinkVideoFrame::GetPixelFormat method

The **GetPixelFormat** method returns the pixel format of a video frame.

#### Syntax

```
BMDPixelFormat GetPixelFormat();
```

#### Return Values

Value	Description
PixelFormat	Pixel format of video frame ( <b>BMDPixelFormat</b> )

#### 2.4.5.5 IDeckLinkVideoFrame::GetFlags method

The **GetFlags** method returns status flags associated with a video frame.

##### Syntax

```
BMDFrameFlags GetFlags();
```

##### Return Values

Value	Description
FrameFlags	Video frame flags ( <b>BMDFrameFlags</b> )

#### 2.4.5.6 IDeckLinkVideoFrame::GetBytes method

The **GetBytes** method allows direct access to the data buffer of a video frame.

##### Syntax

```
HRESULT GetBytes( void **buffer);
```

##### Parameters

Name	Direction	Description
buffer	out	Pointer to raw frame buffer – only valid while object remains valid.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.5.7 IDeckLinkVideoFrame::GetTimecode method

The **GetTimecode** method returns the value specified in the ancillary data for the specified timecode type. If the specified timecode type is not found or is invalid, **GetTimecode** returns **S\_FALSE**.

#### Syntax

<b>HRESULT</b>	<b>GetTimecode (BMDTimecodeFormat format, IDeckLinkTimecode **timecode)</b>
----------------	---

#### Parameters

Name	Direction	Description
<b>format</b>	in	<b>BMDTimecodeFormat</b> to query
<b>timecode</b>	out	New <b>IDeckLinkTimecode</b> object interface containing the requested timecode or NULL if requested timecode is not available.

#### Return Values

Value	Description
<b>E_FAIL</b>	Failure
<b>S_OK</b>	Success
<b>E_ACCESSDENIED</b>	An invalid or unsupported timecode format was requested.
<b>S_FALSE</b>	The requested timecode format was not present or valid in the ancillary data.

### 2.4.5.8 IDeckLinkVideoFrame::GetAncillaryData method

The **GetAncillaryData** method returns a pointer to a video frame's ancillary data.

#### Syntax

```
HRESULT GetAncillaryData (IDeckLinkVideoFrameAncillary **ancillary)
```

#### Parameters

Name	Direction	Description
ancillary	out	Pointer to a new <b>IDeckLinkVideoFrameAncillary</b> object. This object must be released by the caller when no longer required.

#### Return Values

Value	Description
S_OK	Success
S_FALSE	No ancillary data present.

## 2.4.6 IDeckLinkVideoOutputCallback Interface

The **IDeckLinkVideoOutputCallback** object interface is a callback class which is called for each frame as its processing is completed by the DeckLink device.

An object with an **IDeckLinkVideoOutputCallback** object interface may be registered as a callback with the **IDeckLinkOutput** object interface.

**IDeckLinkVideoOutputCallback** should be used to monitor frame output statuses and queue a replacement frame to maintain streaming playback. If the application is managing its own frame buffers, they should be disposed or reused inside the **ScheduledFrameCompleted** callback.

### Related Interfaces

Interface	Interface ID	Description
IDeckLinkOutput	IID_IDeckLinkOutput	An <b>IDeckLinkVideoOutputCallback</b> object interface may be registered with <b>IDeckLinkOutput::SetScheduledFrameCompletionCallback</b>

### Public Member Functions

Method	Description
ScheduledFrameCompleted	Called when playback of a scheduled frame is completed
ScheduledPlaybackHasStopped	Called when playback has stopped.

### 2.4.6.1 IDeckLinkVideoOutputCallback::ScheduledFrameCompleted method

The **ScheduledFrameCompleted** method is called when a scheduled video frame playback is completed. This method is abstract in the base interface and must be implemented by the application developer. The result parameter (required by COM) is ignored by the caller.

The **IDeckLinkVideoOutputCallback** methods are called on a dedicated callback thread. To prevent video frames from being either dropped or delayed, ensure that any application processing on the callback thread takes less time than a frame time. If the application processing time is greater than a frame time, multiple threads should be used.

#### Syntax

```
HRESULT ScheduledFrameCompleted (IDeckLinkVideoFrame* completedFrame,  
BMDOutputFrameCompletionResult result);
```

#### Parameters

Name	Direction	Description
completedFrame	in	Completed frame
result	in	Frame completion result – see <b>BMDOutputFrameCompletionResult</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.6.2 IDeckLinkVideoOutputCallback::ScheduledPlaybackHasStopped method

The **ScheduledPlaybackHasStopped** method is called when a scheduled playback has stopped.

#### Syntax

**HRESULT** ScheduledPlaybackHasStopped(**void**)

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.7 IDeckLinkMutableVideoFrame Interface.

The **IDeckLinkMutableVideoFrame** object interface represents a video frame created for output. Methods are provided to attach ancillary data and set timecodes within the frame.

**IDeckLinkMutableVideoFrame** is a subclass of **IDeckLinkVideoFrame** and inherits all its methods. It is created by the **IDeckLinkOutput::CreateVideoFrame** method.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLinkVideoFrame	IID_IDeckLinkVideoFrame VideoFrame	<b>IDeckLinkMutableVideoFrame</b> subclasses <b>IDeckLinkVideoFrame</b>

#### Public Member Functions

Method	Description
SetFlags	Set flags applicable to a video frame
SetTimecode	Set timecode
SetTimecodeFromComponents	Set components of specified timecode type
SetAncillaryData	Set frame ancillary data
SetTimecodeUserBits	Set the timecode user bits

### 2.4.7.1 IDeckLinkMutableVideoFrame::SetFlags method

The **SetFlags** method sets output flags associated with a video frame.

#### Syntax

```
HRESULT SetFlags (BMDFrameFlags newFlags);
```

#### Parameters

Name	Direction	Description
newFlags	in	<b>BMDFrameFlags</b> to set - see <b>BMDFrameFlags</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.7.2 IDeckLinkMutableVideoFrame::SetTimecode method

The **SetTimecode** method sets the specified timecode type for the frame.

**Note:** To set VITC an ancillary buffer must first be attached.

#### Syntax

```
HRESULT SetTimecode (BMDTimecodeFormat format, BMDTimecode* timecode);
```

#### Parameters

Name	Direction	Description
format	in	<b>BMDTimecodeFormat</b> to update
timecode	in	<b>IDeckLinkTimecode</b> object interface containing timecode to copy.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.7.3 IDeckLinkMutableVideoFrame::SetTimecodeFromComponents method

The **SetTimecodeFromComponents** method sets the components of the specified timecode type for the frame.

**Note:** To set VITC an ancillary buffer must first be attached.

#### Syntax

```
HRESULT SetTimecodeFromComponents (BMDTimecodeFormat format, uint8_t hours,
                                  uint8_t minutes, uint8_t seconds, uint8_t frames, BMDTimecodeFlags flags);
```

#### Parameters

Name	Direction	Description
format	in	BMDTimecodeFormat to update
hours	in	Value of hours component of timecode
minutes	in	Value of minutes component of timecode
seconds	in	Value of seconds component of timecode
frames	in	Value of frames component of timecode
flags	in	Timecode flags (see BMDTimecodeFlags for details)

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.7.4 IDeckLinkMutableVideoFrame::SetAncillaryData method

The **SetAncillaryData** method sets frame ancillary data. An **IDeckLinkVideoFrameAncillary** may be created using the **IDeckLinkOutput::CreateAncillaryData** method.

##### Syntax

```
HRESULT SetAncillaryData (IDeckLinkVideoFrameAncillary* ancillary);
```

##### Parameters

Name	Direction	Description
ancillary	in	<b>IDeckLinkVideoFrameAncillary</b> data to output with the frame.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.7.5 IDeckLinkMutableVideoFrame::SetTimecodeUserBits method

The **SetTimecodeUserBits** method sets the timecode user bits.

#### Syntax

```
HRESULT SetTimecodeUserBits (BMDTimecodeFormat format, BMDTimecodeUserBits userBits)
```

#### Parameters

Name	Direction	Description
format	in	The format of the timecode.
userBits	in	The user bits to set.

#### Return Values

Value	Description
E_NOTIMPL	Not implemented
E_INVALIDARG	The format parameter is invalid.
E_UNEXPECTED	Timecode object is not present. See: <b>IDeckLinkMutableVideoFrame::SetTimecode</b>

## 2.4.8 IDeckLinkVideoFrame3DExtensions Interface

The **IDeckLinkVideoFrame3DExtensions** object interface allows linking of video frames in left eye / right eye pairs, to support 3D capture and playback.

This interface is applicable only to DeckLink devices which support 3D features, such as the DeckLink HD Extreme 3D. All frames belonging to a 3D stream carry an **IDeckLinkVideoFrame3DExtensions** object, which indicates whether this frame is a left- or right-eye frame and allows access to the right eye frame if this frame is a left eye frame.

When capturing in a 3D video mode, an **IDeckLinkVideoFrame3DExtensions** object can be obtained by calling **IDeckLinkVideoFrame::QueryInterface** on frames returned by the API.

When outputting in a 3D video mode, your application must provide video frame objects which implement the **IDeckLinkVideoFrame** interface and return a valid **IDeckLinkVideoFrame3DExtensions** object. See section 2.3.3.

An **IDeckLinkVideoFrame3DExtensions** object can be obtained:

- From **IDeckLinkVideoInputFrame** using **QueryInterface**, if capturing in 3D mode has been enabled (see **IDeckLinkInput::Enable** and **bmdVideoInputDualStream3D** for details) or by subclassing **IDeckLinkVideoInputFrame**. By subclassing **IDeckLinkVideoFrame3DExtensions**.

### Related Interfaces

Interface	Interface ID	Description
<b>IDeckLinkVideoFrame</b>	<b>IID_IDeckLinkVideoFrame</b>	When capturing in a 3D mode, an <b>IDeckLinkVideoFrame3DExtensions</b> may be obtained from <b>IDeckLinkVideoFrame</b> using <b>QueryInterface</b>

Public Member Functions	
Method	Description
Get3DPackingFormat	The indication of whether the frame represents the left or the right eye.
GetFrameForRightEye	Get the right eye frame of a 3D pair.

#### 2.4.8.1 IDeckLinkVideoFrame3DExtensions::Get3DPackingFormat method

The **Get3DPackingFormat** method indicates whether the video frame belongs to the left eye or right eye stream.

##### Syntax

```
BMDVideo3DPackingFormat Get3DPackingFormat (void)
```

##### Return Values

Value	Description
Packing format	Either <b>bmdVideo3DPackingRightOnly</b> or <b>bmdVideo3DPackingLeftOnly</b> . See <b>BMDVideo3DPackingFormat</b> for more details.

### 2.4.8.2 IDeckLinkVideoFrame3DExtensions::GetFrameForRightEye method

The **GetFrameForRightEye** method accesses the right eye frame of a 3D pair.

#### Syntax

```
HRESULT GetFrameForRightEye (IDeckLinkVideoFrame* *rightEyeFrame)
```

#### Parameters

Name	Direction	Description
rightEyeFrame	out	The right eye frame. This object must be released by the caller when no longer required.

#### Return Values

Value	Description
E_INVALIDARG	The parameter is invalid.
S_FALSE	This frame is the right eye frame.
S_OK	Success

## 2.4.9 IDeckLinkAudioOutputCallback Interface

The **IDeckLinkAudioOutputCallback** object interface is a callback class called regularly during playback to allow the application to check for the amount of audio currently buffered and buffer more audio if required.

An **IDeckLinkAudioOutputCallback** object interface may be registered with **IDeckLinkOutput::SetAudioCallback**.

### Related Interfaces

Interface	Interface ID	Description
<b>IDeckLinkOutput</b>	<b>IID_IDeckLinkOutput</b>	An <b>IDeckLinkAudioOutputCallback</b> object interface may be registered with <b>IDeckLinkOutput::SetAudioCallback</b>

### Public Member Functions

Method	Description
<b>RenderAudioSamples</b>	Called to allow buffering of more audio samples if required

### 2.4.9.1 IDeckLinkAudioOutputCallback::RenderAudioSamples method

The **RenderAudioSamples** method is called at a rate of 50Hz during playback. When audio preroll is enabled with a call to **IDeckLinkOutput::BeginAudioPreroll**, the **RenderAudioSamples** method is called continuously until either **IDeckLinkOutput::EndAudioPreroll** or **IDeckLinkOutput::StartScheduledPlayback** is called.

During preroll (preroll is TRUE) call **IDeckLinkOutput::ScheduleAudioSamples** to schedule sufficient audio samples for the number of video frames that have scheduled.

During playback (preroll is FALSE) check the count of buffered audio samples with **IDeckLinkOutput::GetBufferedAudioSampleFrameCount** and when required, schedule more audio samples with **IDeckLinkOutput::ScheduleAudioSamples**.

#### Syntax

**HRESULT** RenderAudioSamples (**boolean** preroll);

#### Parameters

Name	Direction	Description
preroll	in	Flag specifying whether driver is currently prerolling (TRUE) or playing (FALSE).

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.10 IDeckLinkInputCallback Interface

The **IDeckLinkInputCallback** object interface is a callback class which is called for each captured frame.

An object with an **IDeckLinkInputCallback** interface may be registered as a callback with the **IDeckLinkInput** object interface.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLinkInput	IID_IDeckLinkInput	An <b>IDeckLinkInputCallback</b> object interface may be registered with <b>IDeckLinkInput::SetCallback</b>
IDeckLinkVideoInputFrame	IID_DeckLinkVideoInputFrame	An <b>IDeckLinkVideoInputFrame</b> object interface is passed to <b>IDeckLinkInputCallback::VideoInputFrameArrived</b>
IDeckLinkAudioInputPacket	IID_DeckLinkAudioInputPacket	An <b>IDeckLinkAudioInputPacket</b> object interface is passed to <b>IDeckLinkInputCallback::VideoInputFrameArrived</b>

#### Public Member Functions

Method	Description
VideoInputFrameArrived	Called when new video data is available
VideoInputFormatChanged	Called when a video input format change is detected

### 2.4.10.1 IDeckLinkInputCallback::VideoInputFrameArrived method

The **VideoInputFrameArrived** method is called when a video input frame or an audio input packet has arrived. This method is abstract in the base interface and must be implemented by the application developer. The result parameter (required by COM) is ignored by the caller.

#### Syntax

```
HRESULT VideoInputFrameArrived(  
    IDeckLinkVideoInputFrame *videoFrame,  
    IDeckLinkAudioInputPacket *audioPacket);
```

#### Parameters

Name	Direction	Description
videoFrame	in	<p>The video frame that has arrived. The video frame is only valid for the duration of the callback.</p> <p>To hold on to the video frame beyond the callback call <b>AddRef</b>, and to release the video frame when it is no longer required call <b>Release</b>.</p> <p>The video frame will be NULL under the following circumstances:</p> <ul style="list-style-type: none"><li>- On Intensity Pro with progressive NTSC only, every video frame will have two audio packets.</li><li>- With 3:2 pulldown there are five audio packets for each four video frames.</li><li>- If video processing is not fast enough, audio will still be delivered.</li></ul>

Name	Direction	Description
audioPacket	in	New audio packet-only valid if audio capture has been enabled with <b>IDeckLinkInput::EnableAudioInput</b> The audio packet will be NULL under the following circumstances: <ul style="list-style-type: none"><li>- Audio input is not enabled.</li><li>- If video processing is sufficiently delayed old video may be received with no audio.</li></ul>

**Return Values**

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.10.2 **IDeckLinkInputCallback::VideoInputFormatChanged** method

The **VideoInputFormatChanged** method is called when a video input format change has been detected by the hardware.

To enable this feature, the **bmdVideoInputEnableFormatDetection** flag must set when calling **IDeckLinkInput::EnableVideoInput()**.

**Note:** The video format change detection feature is not currently supported on all hardware.

Check the **BMDDeckLinkSupportsInputFormatDetection** attribute to determine if this feature is supported for a given device and driver (see **IDeckLinkAttributes** Interface for details).

#### Syntax

```
HRESULT VideoInputFormatChanged (BMDVideoInputFormatChangedEvents notificationEvents,  
                                IDeckLinkDisplaymode *newDisplayMode, BMDDetectedVideoInputFormatFlags detectedSignalFlags);
```

#### Parameters

Name	Direction	Description
notificationEvents	in	The notification events - enable input detection
newDisplayMode	in	The new display mode.
detectedSignalFlags	in	The detected signal flags

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.11 IDeckLinkVideoInputFrame Interface

The **IDeckLinkVideoInputFrame** object interface represents a video frame which has been captured by an **IDeckLinkInput** object interface. **IDeckLinkVideoInputFrame** is a subclass of **IDeckLinkVideoFrame** and inherits all its methods.

Objects with an **IDeckLinkVideoInputFrame** interface are passed to the **IDeckLinkInputCall back::VideoInputFrameArrived** callback.

#### Related Interfaces

Interface	Interface ID	Description
<b>IDeckLinkInput</b>	<b>IID_IDeckLinkInput</b>	New input frames are returned to <b>IDeckLinkInputCallback::VideoInputFrameArrived</b> by the <b>IDeckLinkInput</b> interface
<b>IDeckLinkVideoFrame</b>	<b>IID_IDeckLinkVideoFrame</b>	<b>IDeckLinkVideoInputFrame</b> subclasses <b>IDeckLinkVideoFrame</b>

#### Public Member Functions

Method	Description
<b>GetStreamTime</b>	Get video frame timing information
<b>GetHardwareReferenceTimestamp</b>	Get hardware reference timestamp

### 2.4.11.1 IDeckLinkVideoInputFrame::GetStreamTime method

The **GetStreamTime** method returns the time and duration of a captured video frame for a given timescale.

#### Syntax

```
HRESULT GetStreamTime (BMDTimeValue *frameTime,  
                      BMDTimeValue *frameDuration,  
                      BMDTimeScale timeScale);
```

#### Parameters

Name	Direction	Description
frameTime	out	Frame time (in units of timeScale)
frameDuration	out	Frame duration (in units of timeScale)
timeScale	in	Time scale for output parameters

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.11.2 IDeckLinkVideoInputFrame::GetHardwareReferenceTimestamp method

The **GetHardwareReferenceTimestamp** method returns frame time and frame duration for a given timescale.

#### Syntax

```
HRESULT GetHardwareReferenceTimestamp (BMDTimeScale timeScale,  
                                     BMDTimeValue *frameTime, BMDTimeValue *frameDuration);
```

#### Parameters

Name	Direction	Description
timeScale	in	The time scale - see <b>BMDTimeScale</b> for details.
frameTime	out	The frame time - see <b>BMDTimeValue</b> for details.
frameDuration	out	The frame duration - see <b>BMDTimeValue</b> for details.

#### Return Values

Value	Description
E_INVALIDARG	Timescale is not set
S_OK	Success

### 2.4.12 IDeckLinkAudioInputPacket Interface

The **IDeckLinkAudioInputPacket** object interface represents a packet of audio which has been captured by an **IDeckLinkInput** object interface.

Objects with an **IDeckLinkAudioInputPacket** object interface are passed to the **IDeckLinkInputCallback::VideoInputFrameArrived** callback.

Audio channel samples are interleaved into a sample frame and sample frames are contiguous.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLink InputCallback	IID_IDeckLink InputCallback	New audio packets are returned to the <b>IDeckLinkInputCallback::VideoInputFrameArrived</b> callback

#### Public Member Functions

Method	Description
GetSampleFrameCount	Get number of sample frames in packet
GetBytes	Get pointer to raw audio frame sequence
GetPacketTime	Get corresponding video timestamp

### 2.4.12.1 IDeckLinkAudioInputPacket::GetSampleFrameCount method

The **GetSampleFrameCount** method returns the number of sample frames in the packet.

#### Syntax

```
Long      GetSampleCount ();
```

#### Return Values

Value	Description
Count	Audio packet size in sample frames

### 2.4.12.2 IDeckLinkAudioInputPacket::GetBytes method

The **GetBytes** method returns a pointer to the data buffer of the audio packet.

#### Syntax

```
HRESULT   GetBytes (void **buffer);
```

#### Parameters

Name	Direction	Description
buffer	out	pointer to audio data – only valid while object remains valid

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.12.3 IDeckLinkAudioInputPacket::GetPacketTime method

The **GetPacketTime** method returns the time stamp of the video frame corresponding to the specified audio packet.

#### Syntax

```
HRESULT GetPacketTime(BMDTimeValue *packetTime,  
                      BMDTimeScale timeScale);
```

#### Parameters

Name	Direction	Description
packetTime	out	Video frame time corresponding to audio packet in timeScale units
timeScale	in	Time scale for time stamp to be returned

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.13 IDeckLinkDisplayModelIterator Interface

The **IDeckLinkDisplayModelIterator** object interface is used to enumerate the available display modes for a DeckLink device.

An **IDeckLinkDisplayModelIterator** object interface may be obtained from an **IDeckLinkInput** or **IDeckLinkOutput** object interface using the **GetDisplayModelIterator** method.

#### Related Interfaces

Interface	Interface ID	Description
<b>IDeckLinkInput</b>	<b>IID_IDeckLinkInput</b>	<b>IDeckLinkInput::GetDisplayModelIterator</b> returns an <b>IDeckLinkDisplayModelIterator</b> object interface
<b>IDeckLinkOutput</b>	<b>IID_IDeckLinkOutput</b>	<b>IDeckLinkOutput::GetDisplayModelIterator</b> returns an <b>IDeckLinkDisplayModelIterator</b> object interface
<b>IDeckLinkInputCallback</b>	<b>IID_IDeckLinkInputCallback</b>	<b>IDeckLinkDisplayModelIterator::Next</b> returns an <b>IDeckLinkDisplayMode</b> object interface for each available display mode

#### Public Member Functions

Method	Description
<b>Next</b>	Returns a pointer to an <b>IDeckLinkDisplayMode</b> interface for an available display mode

### 2.4.13.1 IDeckLinkDisplayModeIterator::Next method

The **Next** method returns the next available **IDeckLinkDisplayMode** interface.

#### Syntax

```
HRESULT Next (IDeckLinkDisplayMode **displayMode);
```

#### Parameters

Name	Direction	Description
displayMode	out	<b>IDeckLinkDisplayMode</b> object interface or NULL when no more display modes are available.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.14 IDeckLinkDisplayMode Interface

The **IDeckLinkDisplayMode** object interface represents a supported display mode.

The **IDeckLinkDisplayModeIterator** object interface enumerates supported display modes, returning **IDeckLinkDisplayMode** object interfaces.

##### Related Interfaces

Interface	Interface ID	Description
IDeckLink DisplayMode Iterator	IID_IDeckLink DisplayModeIterator	<b>IDeckLinkDisplayModeIterator::Next</b> returns an <b>IDeckLinkDisplayMode</b> object interface for each available display mode

##### Public Member Functions

Method	Description
GetWidth	Get video frame width in pixels
GetHeight	Get video frame height in pixels
GetName	Get descriptive text
GetDisplayMode	Get corresponding <b>BMDDisplayMode</b>
GetFrameRate	Get the frame rate of the display mode
GetFieldDominance	Gets the field dominance of the frame
GetFlags	Returns flags associated with display modes (see <b>BMDDisplaymodeFlags</b> for more details).

#### 2.4.14.1 IDeckLinkDisplayMode::GetWidth method

The **GetWidth** method returns the width of a video frame in the display mode.

##### Syntax

```
long GetWidth();
```

##### Return Values

Value	Description
Width	Video frame width in pixels

#### 2.4.14.2 IDeckLinkDisplayMode::GetHeight method

The **GetHeight** method returns the height of a video frame in the display mode.

##### Syntax

```
long GetHeight();
```

##### Return Values

Value	Description
Height	Video frame height in pixels

### 2.4.14.3 IDeckLinkDisplayMode::GetName method

The **GetName** method returns a string describing the display mode.

#### Syntax

<b>HRESULT</b>	<b>GetName (string *name);</b>
----------------	--------------------------------

#### Parameters

Name	Direction	Description
<b>name</b>	out	Descriptive string This allocated string must be freed by the caller when no longer required.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.14.4 IDeckLinkDisplayMode::GetDisplayMode method

The **GetDisplayMode** method returns the corresponding **BMDDisplayMode** for the selected display mode.

#### Syntax

<b>BMDDisplayMode</b>	<b>GetDisplayMode ();</b>
-----------------------	---------------------------

#### Return Values

Value	Description
<b>mode</b>	<b>BMDDisplayMode</b> corresponding to the display mode

### 2.4.14.5 IDeckLinkDisplayMode::GetFrameRate method

The **GetFrameRate** method returns the frame rate of the display mode.

The frame rate is represented as the two integer components of a rational number for accuracy.

The actual frame rate can be calculated by timevalue / timescale.

#### Syntax

```
HRESULT GetFrameRate (BMDTimeValue *timeValue, BMDTimeScale *timeScale);
```

#### Parameters

Name	Direction	Description
timeValue	out	Frame rate value (numerator)
timeScale	out	Frame rate scale (denominator)

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.14.6 IDeckLinkDisplayMode:: GetFieldDominance method

The **GetFieldDominance** method gets the field dominance of the frame.

##### Syntax

```
BMDFieldDominance GetFieldDominance ();
```

##### Return Values

Value	Description
FieldDominance	The field dominance - see <b>BMDFieldDominance</b> for details.

#### 2.4.14.7 IDeckLinkDisplayMode::GetFlags method

The **GetFlags** method returns flags associated with display modes.

##### Syntax

```
BMDDisplayModeFlags GetFlags ();
```

##### Return Values

Value	Description
Flags	The display mode flags - see <b>BMDDisplaymodeFlags</b> for details.

### 2.4.15 IDeckLinkConfiguration Interface

The **IDeckLinkConfiguration** object interface allows querying and modification of DeckLink configuration parameters.

An **IDeckLinkConfiguration** object interface can be obtained from the **IDeckLink** interface using **QueryInterface**.

The configuration settings are globally visible (not limited to the current process).

Changes will persist until the **IDeckLinkConfiguration** object is released, unless

**WriteConfigurationToPreferences** is called. In which case, the changes will be made permanent and will persist across restarts.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLink	IID_IDeckLink	DeckLink device interface

#### Public Member Functions

Method	Description
SetFlag	Sets a boolean value into the configuration setting associated with the given <b>BMDDeckLinkConfigurationID</b> .
GetFlag	Gets the current boolean value of a setting associated with the given <b>BMDDeckLinkConfigurationID</b> .
SetInt	Sets the current int64_t value into the configuration setting associated with the given <b>BMDDeckLinkConfigurationID</b> .
GetInt	Gets the current int64_t value of a setting associated with the given <b>BMDDeckLinkConfigurationID</b> .

SECTION  
2

## DeckLink API

Public Member Functions	
Method	Description
SetFloat	Sets the current double value into the configuration setting associated with the given <b>BMDDeckLinkConfigurationID</b> .
GetFloat	Gets the current double value of a setting associated with the given <b>BMDDeckLinkConfigurationID</b> .
SetString	Sets the current string value into the configuration setting with the given <b>BMDDeckLinkConfigurationID</b> .
GetString	Gets the current string value of a setting associated with the given <b>BMDDeckLinkConfigurationID</b> .
WriteConfigurationToPreferences	Saves the current settings to system preferences so that they will persist across system restarts.

### 2.4.15.1 IDeckLinkConfiguration::SetFlag method

The **SetFlag** method sets a boolean value into the configuration setting associated with the given **BMDDeckLinkConfigurationID**.

#### Syntax

```
HRESULT SetFlag (BMDDeckLinkConfigurationID cfgID, boolean value);
```

#### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	in	The boolean value to set into the selected configuration setting.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no flag type configuration setting for this operation corresponding to the given <b>BMDDeckLinkConfigurationID</b> .
E_NOTIMPL	The request is correct however it is not supported by the DeckLink hardware.

### 2.4.15.2 IDeckLinkConfiguration::GetFlag method

The **GetFlag** method gets the current boolean value of a configuration setting associated with the given **BMDDeckLinkConfigurationID**.

#### Syntax

```
HRESULT GetFlag (BMDDeckLinkConfigurationID cfgID, boolean *value);
```

#### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	out	The boolean value that is set in the selected configuration setting.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no flag type configuration setting for this operation corresponding to the given <b>BMDDeckLinkConfigurationID</b> .
E_NOTIMPL	The request is correct however it is not supported by the DeckLink hardware.

### 2.4.15.3 IDeckLinkConfiguration::SetInt method

The **SetInt** method sets the current int64\_t value of a configuration setting associated with the given **BMDDeckLinkConfigurationID**.

#### Syntax

```
HRESULT SetInt (BMDDeckLinkConfigurationID cfgID, int64_t value);
```

#### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	in	The integer value to set into the selected configuration setting.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no integer type configuration setting for this operation corresponding to the given <b>BMDDeckLinkConfigurationID</b> .
E_NOTIMPL	The request is correct however it is not supported by the DeckLink hardware.

#### 2.4.15.4 IDeckLinkConfiguration::GetInt method

The **GetInt** method gets the current int64\_t value of a configuration setting associated with the given **BMDDeckLinkConfigurationID**.

##### Syntax

```
HRESULT GetInt (BMDDeckLinkConfigurationID cfgID, int64_t *value);
```

##### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	out	The integer value that is set in the selected configuration setting.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no integer type configuration setting for this operation corresponding to the given <b>BMDDeckLinkConfigurationID</b> .
E_NOTIMPL	The request is correct however it is not supported by the DeckLink hardware.

### 2.4.15.5 IDeckLinkConfiguration::SetFloat method

The **SetFloat** method sets the current double value of a configuration setting associated with the given **BMDDeckLinkConfigurationID**.

#### Syntax

```
HRESULT SetFloat (BMDDeckLinkConfigurationID cfgID, double value);
```

#### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	in	The double value to set into the selected configuration setting.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no float type configuration setting for this operation corresponding to the given <b>BMDDeckLinkConfigurationID</b> .
E_NOTIMPL	The request is correct however it is not supported by the DeckLink hardware.

### 2.4.15.6 IDeckLinkConfiguration::GetFloat method

The **GetFloat** method gets the current double value of a configuration setting associated with the given **BMDDeckLinkConfigurationID**.

#### Syntax

```
HRESULT GetFloat (BMDDeckLinkConfigurationID cfgID, double *value);
```

#### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	out	The double value that is set in the selected configuration setting.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no float type configuration setting for this operation corresponding to the given <b>BMDDeckLinkConfigurationID</b> .
E_NOTIMPL	The request is correct however it is not supported by the DeckLink hardware.

### 2.4.15.7 IDeckLinkConfiguration::SetString method

The **SetString** method sets the current string value of a configuration setting associated with the given **BMDDeckLinkConfigurationID**.

#### Syntax

```
HRESULT SetString (BMDDeckLinkConfigurationID cfgID, string value);
```

#### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	in	The string to set into the selected configuration setting.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no string type configuration setting for this operation corresponding to the given <b>BMDDeckLinkConfigurationID</b> .
E_NOTIMPL	The request is correct however it is not supported by the DeckLink hardware.

### 2.4.15.8 IDeckLinkConfiguration::GetString method

The **GetString** method gets the current string value of a configuration setting associated with the given **BMDDeckLinkConfigurationID**.

#### Syntax

```
HRESULT GetString (BMDDeckLinkConfigurationID cfgID, string *value);
```

#### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	out	The string set in the selected configuration setting. This allocated string must be freed by the caller when no longer required.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no string type configuration setting for this operation corresponding to the given <b>BMDDeckLinkConfigurationID</b> .
E_NOTIMPL	The request is correct however it is not supported by the DeckLink hardware.

### 2.4.15.9 IDeckLinkConfiguration::WriteConfigurationToPreferences method

The **WriteConfigurationToPreferences** method saves the current settings to system preferences so they will persist across system restarts. This method requires administrative privileges. Configuration settings changed through this interface will be reverted when the interface is released unless this method is called.

#### Syntax

```
HRESULT WriteConfigurationToPreferences ();
```

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_ACCESSDENIED	Insufficient privileges to write to system preferences.

### 2.4.16 IDeckLinkAPIInformation Interface

The **IDeckLinkAPIInformation** object interface provides global API information. A reference to an **IDeckLinkAPIInformation** object interface may be obtained from **CoCreateInstance** on platforms with native COM support or from **CreateDeckLinkAPIInformationInstance** on other platforms.

Public Member Functions	
Method	Description
GetFlag	Gets a boolean flag associated with specified <b>BMDDeckLinkAPIInformationID</b>
GetInt	Gets an int64_t associated with specified <b>BMDDeckLinkAPIInformationID</b>
GetFloat	Gets a float associated with specified <b>BMDDeckLinkAPIInformationID</b>
GetString	Gets a string associated with specified <b>BMDDeckLinkAPIInformationID</b>

### 2.4.16.1 IDeckLinkAPIInformation::GetFlag method

The **GetFlag** method gets a boolean flag associated with a given **BMDDeckLinkAPIInformationID**.

#### Syntax

```
HRESULT GetFlag (BMDDeckLinkAPIInformationID cfgID, bool *value);
```

#### Parameters

Name	Direction	Description
cfgID	in	<b>BMDDeckLinkAPIInformationID</b> to get flag value.
value	out	Value of flag corresponding to cfgID.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no flag type attribute corresponding to cfgID.

### 2.4.16.2 IDeckLinkAPIInformation::GetInt method

The **GetInt** method gets an int64\_t value associated with a given **BMDDeckLinkAPIInformationID**.

#### Syntax

```
HRESULT GetInt (BMDDeckLinkAPIInformationID cfgID, int64_t *value);
```

#### Parameters

Name	Direction	Description
cfgID	in	<b>BMDDeckLinkAPIInformationID</b> to get int value.
value	out	Value of int corresponding to cfgID.

#### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	There is no int type attribute corresponding to cfgID.

### 2.4.16.3 IDeckLinkAPIInformation::GetFloat method

The **GetFloat** method gets a float value associated with a given **BMDDeckLinkAPIInformationID**.

#### Syntax

```
HRESULT GetFloat (BMDDeckLinkAPIInformationID cfgID, double *value);
```

#### Parameters

Name	Direction	Description
cfgID	in	<b>BMDDeckLinkAPIInformationID</b> to get float value.
value	out	Value of float corresponding to cfgID.

#### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	There is no float type attribute corresponding to cfgID.

#### 2.4.16.4 IDeckLinkAPIInformation::GetString method

The **GetString** method gets a string value associated with a given **BMDDeckLinkAPIInformationID**.

##### Syntax

```
HRESULT GetString (BMDDeckLinkAPIInformationID cfgID, String *value);
```

##### Parameters

Name	Direction	Description
cfgID	in	<b>BMDDeckLinkAPIInformationID</b> to get string value.
value	out	Value of string corresponding to cfgID.

##### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	There is no string type attribute corresponding to cfgID.
E_OUTOFMEMORY	Unable to allocate memory for string

### 2.4.17 IDeckLinkAttributes Interface

The **IDeckLinkAttributes** object interface provides details about the capabilities of a DeckLink card. The detail types that are available for various capabilities are: flag, int, float, and string. The DeckLink Attribute ID section lists the hardware capabilities and associated attributes identifiers that can be queried using this object interface. An **IDeckLinkAttributes** object interface can be obtained from the **IDeckLink** interface using **QueryInterface**.

#### Related Interfaces

Interface	Interface ID	Description
<b>IDeckLink</b>	<b>IID_IDeckLink</b>	Decklink device interface

#### Public Member Functions

Method	Description
GetFlag	Gets a boolean flag corresponding to a <b>BMDDeckLinkAttributeID</b>
GetInt	Gets an int64_t corresponding to a <b>BMDDeckLinkAttributeID</b>
GetFloat	Gets a float corresponding to a <b>BMDDeckLinkAttributeID</b>
GetString	Gets a string corresponding to a <b>BMDDeckLinkAttributeID</b>

### 2.4.17.1 IDeckLinkAttributes::GetFlag method

The **GetFlag** method gets a boolean flag associated with a given **BMDDeckLinkAttributeID**.  
(See **BMDDeckLinkAttributeID** for a list of attribute IDs)

#### Syntax

```
HRESULT GetFlag (BMDDeckLinkAttributeID cfgID, boolean *value);
```

#### Parameters

Name	Direction	Description
cfgID	in	<b>BMDDeckLinkAttributeID</b> to get flag value.
value	out	The value corresponding to cfgID.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no flag type attribute corresponding to cfgID.

### 2.4.17.2 IDeckLinkAttributes::GetInt method

The **GetInt** method gets an **int64\_t** value associated with a given **BMDDeckLinkAttributeID**.

#### Syntax

```
HRESULT GetInt ( BMDDeckLinkAttributeID cfgID, int64_t *value);
```

#### Parameters

Name	Direction	Description
cfgID	in	<b>BMDDeckLinkAttributeID</b> to get int value.
value	out	The value corresponding to cfgID.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no int type attribute corresponding to cfgID.

### 2.4.17.3 IDeckLinkAttributes::GetFloat method

The **GetFloat** method gets a float value associated with a given **BMDDeckLinkAttributeID**.

#### Syntax

```
HRESULT GetFloat (BMDDeckLinkAttributeID cfgID, double *value);
```

#### Parameters

Name	Direction	Description
cfgID	in	<b>BMDDeckLinkAttributeID</b> to get float value.
value	out	The value corresponding to cfgID.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no float type attribute corresponding to cfgID.

#### 2.4.17.4 IDeckLinkAttributes::GetString method

The **GetString** method gets a string value associated with a given **BMDDeckLinkAttributeID**.

##### Syntax

```
HRESULT GetString (BMDDeckLinkAttributeID cfgID, string *value);
```

##### Parameters

Name	Direction	Description
cfgID	in	<b>BMDDeckLinkAttributeID</b> to get string value.
value	out	The value corresponding to cfgID. This allocated string must be freed by the caller when no longer required.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	There is no string type attribute corresponding to cfgID.

### 2.4.18 IDeckLinkMemoryAllocator Interface

The **IDeckLinkMemoryAllocator** object interface is a callback class used to provide control over the memory intensive video frame allocations required during playback and capture.

An object with the **IDeckLinkMemoryAllocator** object interface may be registered as a callback with the **IDeckLinkOutput** or **IDeckLinkInput** interfaces.

During playback or capture, calls will be made to this interface object to manage memory buffers for storing video frame data. Memory buffers may be allocated and released more frequently than once per video frame played back or captured, such as when video format conversion is performed.

Implementation of this interface is optional - if this callback is not registered, a default allocator will be used.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLinkOutput	IID_IDeckLinkOutput	An <b>IDeckLinkMemoryAllocator</b> object interface may be registered with <b>IDeckLinkOutput::SetVideoOutputFrameMemoryAllocator</b>
IDeckLinkInput	IID_IDeckLinkInput	An <b>IDeckLinkMemoryAllocator</b> object interface may be registered with <b>IDeckLinkInput::SetVideoInputFrameMemoryAllocator</b>

**Public Member Functions**

Method	Description
AllocateBuffer	Called to allocate memory for a frame
ReleaseBuffer	Called to release a previously allocated frame
Commit	Called to notify the allocator that frame buffers will be required
Decommit	Called to notify the allocator that frame buffers will no longer be required (until next call to Commit).

### 2.4.18.1 IDeckLinkMemoryAllocator::AllocateBuffer method

The **AllocateBuffer** method is called by the owner interface to allocate a buffer for a video frame. This method is abstract in the base interface and must be implemented by the application developer.

#### Syntax

```
HRESULT AllocateBuffer (unsigned long bufferSize,  
                      void **allocatedBuffer);
```

#### Parameters

Name	Direction	Description
bufferSize	in	Size of the memory to be allocated for a new video frame
allocatedBuffer	out	Address of newly allocated buffer <b>Note:</b> Returned address for buffer must be aligned on a 16-byte boundary.

#### Return Values

Value	Description
S_OK	Success
E_OUTOFMEMORY	There is insufficient memory to allocate a buffer of the requested size.

### 2.4.18.2 IDeckLinkMemoryAllocator::ReleaseBuffer method

The **ReleaseBuffer** method is called by the owner interface to release previously allocated memory. This method is abstract in the base interface and must be implemented by the application developer.

#### Syntax

```
HRESULT ReleaseBuffer ( void *buffer);
```

#### Parameters

Name	Direction	Description
buffer	in	Pointer to the buffer to be released

#### Return Values

Value	Description
S_OK	Success

### 2.4.18.3 IDeckLinkMemoryAllocator::Commit method

The **Commit** method is called by the owner interface to notify the allocator that frame buffers will be required. The allocator should allocate any structures required for memory pool management in this callback. This method is abstract in the base interface and must be implemented by the application developer.

#### Syntax

```
HRESULT Commit();
```

#### Parameters

none.

#### Return Values

Value	Description
S_OK	Success
E_OUTOFMEMORY	There is insufficient memory to allocate a buffer of the requested size.

#### 2.4.18.4 IDeckLinkMemoryAllocator::Decommit method

The **Decommit** method is called by the owner interface to notify the allocator that frame buffers will no longer be required. The allocator should de-allocate any structures required for memory pool management in this callback. The owner interface will call the Commit method again before allocating more frames. This method is abstract in the base interface and must be implemented by the application developer.

##### Syntax

```
HRESULT Decommit();
```

##### Parameters

none.

##### Return Values

Value	Description
S_OK	Success

### 2.4.19 IDeckLinkKeyer Interface

The **IDeckLinkKeyer** object interface allows configuration of the keying functionality available on most DeckLink cards. An **IDeckLinkKeyer** object interface can be obtained from the **IDeckLink** interface using **QueryInterface**.

#### Related Interfaces

Interface	Interface ID	Description
<b>IDeckLink</b>	<b>IID_IDeckLink</b>	DeckLink device interface

#### Public Member Functions

Method	Description
Enable	Turn on keyer.
SetLevel	Set the level that the image is blended into the frame.
RampUp	Progressively blends in an image over a given number of frames
RampDown	Progressively blends out an image over a given number of frames
Disable	Turn off keyer

### 2.4.19.1 IDeckLinkKeyer::Enable method

The **Enable** method turns on the keyer functionality. The **IDeckLinkAttributes** interface can be used to determine if hardware supports the keyer functionality. If external keying is selected, the mask is output on CH A and the key on CH B. The following table lists the hardware that support various keyer capabilities.

The following table displays hardware which supports the keyer functionality.

Device	Internal	External	HD
Intensity Pro	no	no	no
Intensity Shuttle	no	no	no
DeckLink SDI	yes	no	no
DeckLink Optical Fiber	yes	no	no
DeckLink Duo	yes	no	no
DeckLink Quad	yes	no	no
DeckLink Studio	yes	yes	no
UltraStudio SDI	no	no	no
UltraStudio Express	no	no	no
UltraStudio 3D	yes	yes	yes
UltraStudio Pro	yes	yes	no
DeckLink HD Extreme	yes	yes	yes
Multibridge Pro	yes	yes	yes
Multibridge Eclipse	yes	yes	yes

continued over page...

**Syntax**

```
HRESULT Enable (boolean isExternal);
```

**Parameters**

Name	Direction	Description
isExternal	in	Specifies internal or external keying.

**Return Values**

Value	Description
E_FAIL	Failure
S_OK	Success

**2.4.19.2 DeckLinkKeyer::SetLevel method**

The **SetLevel** method sets the level that the image is blended onto the frame. 0 is no blend, 255 is completely blended onto the frame.

**Syntax**

```
HRESULT SetLevel (uint8_t level);
```

**Parameters**

Name	Direction	Description
level	in	The level that the image is to be blended onto the frame.

**Return Values**

Value	Description
S_OK	Success

### 2.4.19.3 IDeckLinkKeyer::RampUp method

The **RampUp** method progressively blends in an image over a given number of frames from 0 to 255.

#### Syntax

```
HRESULT RampUp (uint32_t numberOfFrames);
```

#### Parameters

Name	Direction	Description
numberOfFrames	in	The number of frames that the image is progressively blended in.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.19.4 IDeckLinkKeyer::RampDown method

The **RampDown** method progressively blends out an image over a given number of frames from 255 to 0.

##### Syntax

```
HRESULT RampDown (uint32_t numberOfFrames);
```

##### Parameters

Name	Direction	Description
numberOfFrames	in	The number of frames that the image is progressively blended out.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.19.5 IDeckLinkKeyer::Disable method

The **Disable** method turns off the keyer functionality.

#### Syntax

```
HRESULT Disable();
```

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.20 IDeckLinkVideoFrameAncillary Interface

The **IDeckLinkVideoFrameAncillary** object interface represents the ancillary data associated with a video frame. CEA-708 closed-captions are encoded with data bits in the 2 least-significant-bits of each 10 bit pixel component. These bits are not preserved when capturing in an 8 bit pixel format. To capture or output CEA-708 captions, a 10 bit pixel format such as **bmdFormat10BitYUV** must be used.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLinkOutput	IID_IDeckLinkOutput	An <b>IDeckLinkVideoFrameAncillary</b> object can be obtained with <b>IDeckLinkOutput::CreateAncillaryData</b> .
IDeckLinkVideoFrame	IID_IDeckLinkVideoFrame	An <b>IDeckLinkVideoFrameAncillary</b> object can be obtained from <b>IDeckLinkVideoFrame::GetAncillaryData</b> .
IDeckLinkMutableVideoFrame	IID_IDeckLinkMutableVideoFrame	An <b>IDeckLinkVideoFrameAncillary</b> object be set into a video frame using <b>IDeckLinkMutableVideoFrame::SetAncillaryData</b> .

#### Public Member Functions

Method	Description
GetPixelFormat	Gets pixel format of a video frame.
GetDisplayMode	Gets corresponding <b>BMDDisplayMode</b> for the selected display mode.
GetBufferForVerticalBlankingLine	Access vertical blanking line buffer.

#### 2.4.20.1 IDeckLinkVideoFrameAncillary::GetPixelFormat method

The **GetPixelFormat** method gets the pixel format of a video frame.

##### Syntax

```
BMDPixelFormat GetPixelFormat();
```

##### Return Values

Value	Description
PixelFormat	Pixel format of video frame ( <b>BMDPixelFormat</b> )

#### 2.4.20.2 IDeckLinkVideoFrameAncillary::GetDisplayMode method

The **GetDisplayMode** method returns the corresponding **BMDDisplayMode** for the selected display mode.

##### Syntax

```
BMDDisplayMode GetDisplayMode();
```

##### Return Values

Value	Description
mode	<b>BMDDisplayMode</b> corresponding to the display mode.

### 2.4.20.3 **IDeckLinkVideoFrameAncillary::GetBufferForVerticalBlankingLine** method

The **GetBufferForVerticalBlankingLine** method allows access to a specified vertical blanking line within the ancillary for the associated frame.

Ancillary lines are numbered from one. For NTSC video, the top ancillary lines are numbered starting from four, with lines 1 to 3 referring to the ancillary lines at the bottom of the picture, as per convention.

The pointer returned by **GetBufferForVerticalBlankingLine** is in the same format as the associated active picture data and is valid while the **IDeckLinkVideoFrameAncillary** object interface is valid.

#### Syntax

**HRESULT** GetBufferForVerticalBlankingLine (**uint32\_t** lineNumber, **void\*** \*buffer)

#### Parameters

Name	Direction	Description
lineNumber	in	Ancillary line number to access.
buffer	out	Pointer into ancillary buffer for requested line or NULL if line number was invalid.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	An invalid ancillary line number was requested

### 2.4.21 IDeckLinkTimecode Interface

The **IDeckLinkTimecode** object interface represents a video timecode and provides methods to access the timecode or its components.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLinkVideoFrameAncillary	IID_IDeckLinkVideoFrameAncillary	<b>IDeckLinkVideoFrameAncillary::GetTimecode</b> returns an <b>IDeckLinkTimecode</b> object interface

#### Public Member Functions

Method	Description
GetBCD	Get timecode in BCD
GetComponents	Get timecode components
GetString	Get timecode as formatted string
GetFlags	Get timecode flags
GetTimecodeUserBits	Get timecode user bits.

### 2.4.21.1 IDeckLinkTimecode::GetBCD method

The **GetBCD** method returns the timecode in Binary Coded Decimal representation.

#### Syntax

```
BMDTimecodeBCD GetBCD();
```

#### Return Values

Value	Description
Timecode	Timecode value in BCD format (See <b>BMDTimecodeBCD</b> for details)

### 2.4.21.2 IDeckLinkTimecode::GetComponents method

The **GetComponents** method returns individual components of the timecode. Specify NULL for any unwanted parameters.

#### Syntax

```
HRESULT GetComponents(uint8_t *hours, uint8_t *minutes, uint8_t *seconds, uint8_t *frames);
```

#### Parameters

Name	Direction	Description
hours	out	Hours component of timecode
minutes	out	Minutes component of timecode
seconds	out	Seconds component of timecode
frames	out	Frames component of timecode

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.21.3 IDeckLinkTimecode::GetString method

The **GetString** method returns the timecode formatted as a standard timecode string.

#### Syntax

```
HRESULT GetString(string *timecode);
```

#### Parameters

Name	Direction	Description
timecode	out	Timecode formatted as a standard timecode string: "HH:MM:SS:FF". This allocated string must be freed by the caller when no longer required

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.21.4 IDeckLinkTimecode::GetFlags method

The **GetFlags** method returns the flags accompanying a timecode.

#### Syntax

```
HRESULT BMDDTimecodeFlags GetFlags();
```

#### Return Values

Value	Description
timecodeFlags	Timecode flags (see <b>BMDDTimecodeFlags</b> for details)

### 2.4.21.5 IDeckLinkTimecode::GetTimecodeUserBits method

The **GetTimecodeUserBits** method returns the timecode user bits.

#### Syntax

```
HRESULT GetTimecodeUserBits (BMDTimecodeUserBits *userBits);
```

#### Parameters

Name	Direction	Description
userBits	out	The user bits.

#### Return Values

Value	Description
E_POINTER	The userBits parameter is NULL.
S_OK	Success

### 2.4.22 IDeckLinkScreenPreviewCallback Interface

The **IDeckLinkScreenPreviewCallback** object interface is a callback class which is called to facilitate updating of an on-screen preview of a video stream being played or captured.

An object with the **IDeckLinkScreenPreviewCallback** object interface may be registered as a callback with the **IDeckLinkInput** or **IDeckLinkOutput** interfaces.

During playback or capture, frames will be delivered to the preview callback. A dedicated preview thread waits for the next available frame before calling the callback. The frame delivery rate may be rate limited by the preview callback - it is not required to maintain full frame rate and missing frames in preview will have no impact on capture or playback.

#### Related Interfaces

Interface	Interface ID	Description
<b>IDeckLinkInput</b>	<b>IID_IDeckLinkInput</b>	An <b>IDeckLinkScreenPreviewCallback</b> object interface may be registered with <b>IDeckLinkInput::SetScreenPreviewCallback</b>
<b>IDeckLinkOutput</b>	<b>IID_IDeckLinkOutput</b>	An <b>IDeckLinkScreenPreviewCallback</b> object interface may be registered with <b>IDeckLinkOutput::SetScreenPreviewCallback</b>

#### Public Member Functions

Method	Description
<b>DrawFrame</b>	Called when a new frame is available for the preview display

### 2.4.22.1 IDeckLinkScreenPreviewCallback::DrawFrame method

The **DrawFrame** method is called on every frame boundary while scheduled playback is running.

*For example:* Scheduled NTSC which runs at 29.97 frames per second, will result in the preview callback's DrawFrame() method being called 29.97 times per second while scheduled playback is running.

The return value (required by COM) is ignored by the caller.

**Note:** If the frame to be drawn to the preview hasn't changed since the last time the callback was called, the frame parameter will be NULL.

#### Syntax

```
HRESULT DrawFrame(IDeckLinkVideoFrame *theFrame);
```

#### Parameters

Name	Direction	Description
theFrame	in	Video frame to preview

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.23 IDeckLinkGLScreenPreviewHelper Interface

The **IDeckLinkGLScreenPreviewHelper** object interface may be used with a simple **IDeckLinkScreenPreviewCallback** implementation to provide OpenGL based preview rendering which is decoupled from the incoming or outgoing video stream being previewed.

A reference to an **IDeckLinkGLScreenPreviewHelper** object interface may be obtained from **CoCreateInstance** on platforms with native COM support or from **CreateOpenGLScreenPreviewHelper** on other platforms.

Typical usage of **IDeckLinkGLScreenPreviewHelper** is as follows:

- Configure an OpenGL context as an orthographic projection using code similar to the following:

```
glViewport(0, 0, (GLsizei)newSize.width, (GLsizei)newSize.height);
glMatrixMode(GL_PROJECTION);
glLoadIdentity();
glOrtho(-1.0, 1.0, -1.0, 1.0, -1.0, 1.0);
glMatrixMode(GL_MODELVIEW);
```
- Create an **IDeckLinkGLScreenPreviewHelper** object interface using **CoCreateInstance** or **CreateOpenGLScreenPreviewHelper** Call **IDeckLinkGLScreenPreviewHelper::InitializeGL** from the OpenGL context
- When repainting the **OpenGL** context, call **IDeckLinkGLScreenPreviewHelper::PaintGL**.  
The preview image will be drawn between (-1,-1) and (1,1) in the GL space.
- Add any graphical overlays on the preview window as desired.
- Create a subclass of **IDeckLinkScreenPreviewCallback** which calls  
**IDeckLinkGLScreenPreviewHelper::SetFrame** from  
**IDeckLinkScreenPreviewCallback::DrawFrame**

- Register an instance of the **IDeckLinkScreenPreviewCallback** subclass with **IDeckLinkInput::SetScreenPreviewCallback** or **IDeckLinkOutput::SetScreenPreviewCallback** as appropriate.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLinkScreenPreview	IID_IDeckLinkScreenPreview	<b>IDeckLinkGLScreenPreviewHelper::SetFrame</b> may be called from <b>IDeckLinkScreenPreview::DrawFrame</b>

#### Public Member Functions

Method	Description
InitializeGL	Initialize GL previewing
PaintGL	Repaint the GL preview
SetFrame	Set the preview frame to display on the next PaintGL call
Set3DPreviewFormat	Set the 3D preview format.

### 2.4.23.1 IDeckLinkGLScreenPreviewHelper::InitializeGL method

The **InitializeGL** method should be called from the preview OpenGL context during initialization of that context.

#### Syntax

```
HRESULT InitializeGL();
```

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.23.2 IDeckLinkGLScreenPreviewHelper::PaintGL method

The **PaintGL** method should be called from the preview OpenGL context whenever the preview frame needs to be repainted. Frames to be displayed should be provided to **IDeckLinkGLScreenPreviewHelper::SetFrame**.

**PaintGL** and **SetFrame** allow OpenGL updates to be decoupled from new frame availability.

#### Syntax

```
HRESULT PaintGL();
```

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.23.3 IDeckLinkGLScreenPreviewHelper::SetFrame method

The **SetFrame** method is used to set the preview frame to display on the next call to **IDeckLinkGLScreenPreviewHelper::PaintGL**.

Depending on the rate and timing of calls to **SetFrame** and **PaintGL**, some frames may not be displayed or may be displayed multiple times.

#### Syntax

**HRESULT** SetFrame(**IDeckLinkVideoFrame** \***theFrame**)

#### Parameters

Name	Direction	Description
<b>theFrame</b>	in	Video frame to preview

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.23.4 IDeckLinkGLScreenPreviewHelper::Set3DPreviewFormat

The **Set3DPreviewFormat** method is used to set the 3D preview format.

##### Syntax

```
HRESULT Set3DPreviewFormat(BMD3DPreviewFormat *previewFormat);
```

##### Parameters

Name	Direction	Description
previewFormat	in	The 3D preview format. See the Linked frame preview format ( <b>BMD3DPreviewFormat</b> ) section for more details.

##### Return Values

Value	Description
S_OK	Success

#### 2.4.24 IDeckLinkCocoaScreenPreviewCallback Interface

The **IDeckLinkCocoaScreenPreviewCallback** object interface is a cocoa callback class which is called to facilitate updating of an on-screen preview of a video stream being played or captured.

An **IDeckLinkCocoaScreenPreviewCallback** object can be created by calling **CreateCocoaScreenPreview**. This object can be registered as a callback with **IDeckLinkInput::SetScreenPreviewCallback** or **IDeckLinkOutput::SetScreenPreviewCallback** as appropriate.

During playback or capture, frames will be delivered to the preview callback. A dedicated preview thread waits for the next available frame before calling the callback. The frame delivery rate may be rate limited by the preview callback - it is not required to maintain full frame rate and missing frames in preview will have no impact on capture or playback.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLinkInput	IID_IDeckLinkInput	An <b>IDeckLinkCocoaScreenPreviewCallback</b> object interface may be registered with <b>IDeckLinkInput::SetScreenPreviewCallback</b>
IDeckLinkOutput	IID_IDeckLinkOutput	An <b>IDeckLinkCocoaScreenPreviewCallback</b> object interface may be registered with <b>IDeckLinkOutput::SetScreenPreviewCallback</b>

### 2.4.25 IDeckLinkDX9ScreenPreviewHelper Interface

The **IDeckLinkDX9ScreenPreviewHelper** object interface may be used with a simple **IDeckLinkScreenPreviewCallback** implementation to provide DirectX based preview rendering which is decoupled from the incoming or outgoing video stream being previewed.

A reference to an **IDeckLinkDX9ScreenPreviewHelper** object is obtained from **CoCreateInstance**.

Typical usage of **IDeckLinkDX9ScreenPreviewHelper** is as follows:

- Create an **IDeckLinkDX9ScreenPreviewHelper** object interface using **CoCreateInstance**.
- If 3D preview is required, call **IDeckLinkDX9ScreenPreviewHelper::Set3DPreviewFormat**
- Setup Direct 3D parameters:

```
D3DPRESENT_PARAMETERS      d3dpp;
IDirect3DDevice9*          dxDevice;

d3dpp.BackBufferFormat = D3DFMT_UNKNOWN;
d3dpp.BackBufferCount = 2;
d3dpp.Windowed = TRUE;
d3dpp.SwapEffect = D3DSWAPEFFECT_DISCARD;
d3dpp.hDeviceWindow = hwnd;
d3dpp.PresentationInterval = D3DPRESENT_INTERVAL_DEFAULT;
```

- Create a new device:  

```
CreateDevice(D3DADAPTER_DEFAULT, D3DDEVTYPE_HAL, hwnd, D3DCREATE_
HARDWARE_VERTEXPROCESSING | D3DCREATE_MULTITHREADED, &d3dpp,
&dxDevice);
```
- Call **IDeckLinkDX9ScreenPreviewHelper::Initialize** (dxDevice)

- When repainting, call the following methods:  
`dxDevice->BeginScene();`  
`IDeckLinkDX9ScreenPreviewHelper::Render();`  
`dxDevice->EndScene();`
- Create a subclass of **IDeckLinkScreenPreviewCallback** which calls  
`IDeckLinkDX9ScreenPreviewHelper::SetFrame` from  
`IDeckLinkScreenPreviewCallback::DrawFrame`.
- Register an instance of the **IDeckLinkScreenPreviewCallback** subclass with  
`IDeckLinkInput::SetScreenPreviewCallback` or `IDeckLinkOutput::SetScreenPreviewCallback`  
as appropriate.

### Related Interfaces

Interface	Interface ID	Description
IDeckLinkScreenPreview	<code>IID_IDeckLinkScreenPreview</code>	<b>IDeckLinkDX9ScreenPreviewHelper::SetFrame</b> may be called from <b>IDeckLinkScreenPreview::DrawFrame</b>

### Public Member Functions

Method	Description
Initialize	Initialize DirectX previewing.
Render	Repaint the DirectX preview.
SetFrame	Set the preview frame for display.
Set3DPreviewFormat	Set the 3D preview format.

### 2.4.25.1 IDeckLinkDX9ScreenPreviewHelper::Initialize method

The **Initialize** method sets the IDirect3DDevice9 object to be used by the DeckLink API's preview helper.

#### Syntax

```
HRESULT Initialize(void *device);
```

#### Parameters

Name	Direction	Description
device	in	The IDirect3DDevice9 object

#### Return Values

Value	Description
S_OK	Success

### 2.4.25.2 IDeckLinkDX9ScreenPreviewHelper::Render method

The Render method should be called whenever the preview frame needs to be repainted.

The frames to be displayed should be provided to **IDeckLinkDX9ScreenPreviewHelper::SetFrame**.

#### Syntax

```
HRESULT Render( RECT *rc);
```

#### Parameters

Name	Direction	Description
rc	in	The display surface rectangle. If rc is NULL, the whole view port / surface is used. If the rc dimensions have changed, the display texture will be resized.

#### Return Values

Value	Description
S_OK	Success

### 2.4.25.3 IDeckLinkDX9ScreenPreviewHelper::SetFrame method

The **SetFrame** method will set a 2D or 3D **IDeckLinkVideoFrame** into a texture. This method is used to set the preview frame to display on the next call to **IDeckLinkDX9ScreenPreviewHelper::Render**.

Depending on the rate and timing of calls to **SetFrame** and **Render**, some frames may not be displayed or may be displayed multiple times.

#### Syntax

```
HRESULT SetFrame(IDeckLinkVideoFrame *primaryFrame);
```

#### Parameters

Name	Direction	Description
primaryFrame	in	The video frame to preview.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.25.4 IDeckLinkDX9ScreenPreviewHelper::Set3DPreviewFormat method

The **Set3DPreviewFormat** method is used to set the 3D preview format.

##### Syntax

```
HRESULT SetFrame(IDeckLinkVideoFrame *primaryFrame);
```

##### Parameters

Name	Direction	Description
previewFormat	in	The 3D preview format. See the 'Frame preview format' section ( <b>BMD3DPreviewFormat</b> ) for more details.

##### Return Values

Value	Description
S_OK	Success

### 2.4.25.5 IDeckLinkVideoConversion Interface

The **IDeckLinkVideoConversion** object interface provides the capability to copy an image from a source frame into a destination frame converting between the formats as required. A reference to an **IDeckLinkVideoConversion** object interface may be obtained from **CoCreateInstance** on platforms with native COM support or from **CreateVideoConversionInstance** on other platforms.

Public Member Functions	
Method	Description
ConvertFrame	Copies and converts a source frame into a destination frame.

### 2.4.25.6 IDeckLinkVideoConversion::ConvertFrame method

The **ConvertFrame** method copies the source frame (srcFrame) to the destination frame (dstFrame).

The frame dimension and pixel format of the video frame will be converted if possible. The return value for this method should be checked to ensure that the desired conversion is supported.

The **IDeckLinkVideoFrame** object for the destination frame, with the desired properties, can be created using **IDeckLinkOutput::CreateVideoFrame**. Alternatively the destination frame can be created by subclassing **IDeckLinkVideoFrame** and setting properties directly in the subclassed object.

#### Syntax

```
HRESULT ConvertFrame (IDeckLinkVideoFrame* srcFrame, IDeckLinkVideoFrame* dstFrame)
```

#### Parameters

Name	Direction	Description
srcFrame	in	The properties of the source frame
dstFrame	in	The properties of the destination frame

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_NOTIMPL	Conversion not currently supported

### 2.4.26 IDeckLinkDeckControl Interface

The **IDeckLinkDeckControl** object interface provides the capability to control a deck via the RS422 port (if available) of a DeckLink device.

An **IDeckLinkDeckControl** object interface can be obtained from the **IDeckLink** interface using **QueryInterface**.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLink DeckControl	IID_IDeckLinkDeck Control	An <b>IDecklinkDeckControl</b> object interface may be obtained from <b>IDeckLink</b> using <b>QueryInterface</b> .
IDeckLink DeckControl StatusCallback	IID_IDeckLinkDeck ControlStatusCallback	An <b>IDeckLinkDeckControlStatusCallback</b> object interface may be registered with <b>IDeckLinkDeckControl::SetCallback</b> .

#### Public Member Functions

Method	Description
Open	Open a connection to the deck.
Close	Close the connection to the deck.
GetCurrentState	Get the current state of the deck.
SetStandby	Put the deck into standby mode.
SendCommand	Send a custom command to the deck.

Public Member Functions	
Method	Description
Play	Send a play command to the deck.
Stop	Send a stop command to the deck.
TogglePlayStop	Toggle between play and stop mode.
Eject	Send an eject command to the deck.
GoToTimecode	Set the deck to go the specified timecode on the tape.
FastForward	Send a fast forward command to the deck.
Rewind	Send a rewind command to the deck.
StepForward	Send a step forward command to the deck.
StepBack	Send a step back command to the deck.
Jog	Send a jog forward / reverse command to the deck.
Shuttle	Send a shuttle forward / reverse command to the deck.
GetTimecodeString	Get a timecode from deck in string format.
GetTimecode	Get a timecode from deck in IDekLinkTimeCode format.
GetTimecodeBCD	Get a timecode from deck in BMDDTimecodeBCD format.

Public Member Functions	
Method	Description
SetPreroll	Set the preroll period.
GetPreroll	Get the preroll period.
SetCaptureOffset	Set the field accurate capture timecode offset.
GetCaptureOffset	Current capture timecode offset
SetExportOffset	Set the field accurate export timecode offset.
GetExportOffset	Get the current setting of the field accurate export timecode offset.
GetManualExportOffset	Get the recommended delay fields of the current deck.
StartExport	Start an export to tape.
StartCapture	Start a capture.
GetDeviceID	Get deck device ID.
Abort	Stop current deck operation.
CrashRecordStart	Send a record command to the deck.
CrashRecordStop	Send a stop record command to the deck.
SetCallback	Set a deck control status callback.

### 2.4.26.1 IDeckLinkDeckControl::Open method

The **Open** method configures a deck control session and opens a connection to a deck.

This command will fail if a RS422 serial port is not available on the DeckLink device.

The application should wait for a **IDeckLinkDeckControlStatusCallback::DeckControlStatusChanged** callback notification with the **bmdDeckControlStatusDeckConnected** bit set before using the rest of the deck control functionality.

#### Syntax

<b>HRESULT</b>	<b>Open (BMDTimeScale timeScale, BMDTimeValue timeValue, boolean timecodeIsDropFrame, BMDDeckControlError *error)</b>
----------------	---

#### Parameters

Name	Direction	Description
<b>timeScale</b>	in	The time scale.
<b>timeValue</b>	in	The time value in units of BMDTimeScale.
<b>timecodeIsDropFrame</b>	in	Timecode is drop frame (TRUE) or a non drop frame (FALSE).
<b>error</b>	out	The error code from the deck - see BMDDeckControlError for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.2 IDeckLinkDeckControl::Close method

The **Close** method will optionally place the deck in standby mode before closing the connection.

#### Syntax

**HRESULT** Close (boolean standbyOn)

#### Parameters

Name	Direction	Description
standbyOn	in	Place the deck into standby mode (TRUE) before disconnection.

#### Return Values

Value	Description
S_OK	Success

### 2.4.26.3 IDeckLinkDeckControl::GetCurrentState method

The **GetCurrentState** method will get the current state of the deck.

#### Syntax

```
HRESULT GetcurrentState (BMDDeckControlMode *mode, BMDDeckControlVTRControlState *vtrControlState,  
BMDDeckControlStatusFlags *flags);
```

#### Parameters

Name	Direction	Description
mode	out	The deck control mode - see <b>BMDDeckControlMode</b> for details.
vtrControlState	out	The deck control state - see <b>BMDDeckControlVTRControlState</b> for details.
flags	out	The deck control status flags - see <b>BMDDeckControlStatusFlags</b> for details.

#### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

#### 2.4.26.4 IDeckLinkDeckControl::SetStandby method

The **SetStandby** method will send a “set standby” command to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

##### Syntax

```
HRESULT SetStandby (boolean standbyOn);
```

##### Parameters

Name	Direction	Description
standbyOn	in	Set standby on (TRUE) , or set standby off (FALSE)

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.26.5 IDeckLinkDeckControl::SendCommand method

The **SendCommand** method will send a custom command to the deck. A custom command operation cannot occur if there is an export-to-tape, capture or a custom command operation in progress. The supplied custom command must conform to the Sony 9 Pin protocol and must not include the checksum byte. It will be generated by this interface and added to the command. The deck's response (minus the checksum) is stored in the provided buffer.

#### Syntax

```
HRESULT SendCommand ( uint8_t *inBuffer, uint32_t inBufferSize, uint8_t *outBuffer, uint32_t
                      *outDataSize, uint32_t outBufferSize, BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
inBuffer	in	The buffer containing the command packet to transmit.
inBufferSize	in	The size of the buffer containing the command packet to transmit.
outBuffer	out	The buffer to contain the response packet.
outDataSize	out	The size of the response data.
outBufferSize	out	The size of the buffer that will contain the response packet.
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

**Return Values**

Value	Description
E_INVALIDARG	One or more parameters are invalid.
E_UNEXPECTED	A previous custom command is still being processed.
E_FAIL	Failure - check error parameter
S_OK	Success

**2.4.26.6 IDeckLinkDeckControl::Play method**

The **Play** method will send a “play” command to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

**Syntax**

```
HRESULT Play (BMDDeckControlError *error);
```

**Parameters**

Name	Direction	Description
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

**Return Values**

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.7 IDeckLinkDeckControl::Stop method

The **Stop** method will send a “stop” command to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT Stop (BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.8 IDeckLinkDeckControl::TogglePlayStop method

The **TogglePlayStop** method will send a “play” command to the deck, if the deck is currently paused or stopped. If the deck is currently playing, a “pause” command will be sent to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT TogglePlayStop (BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.9 IDeckLinkDeckControl::Eject method

The **Eject** method will send an “eject tape” command to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT Eject (BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.10 IDeckLinkDeckControl::GoToTimecode method

The **GoToTimecode** method will send a “go to timecode” command to the deck.

#### Syntax

```
HRESULT GoToTimecode (BMDTimecodeBCD timecode, BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
timecode	in	The timecode to go to.
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.11 IDeckLinkDeckControl::FastForward method

The **FastForward** method will send a “fast forward” command to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT FastForward (boolean viewTape, BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
viewTape	in	View the tape (TRUE) or enable automatic selection of “tape view” or “end to end view” (FALSE)
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.12 IDeckLinkDeckControl::Rewind method

The **Rewind** method will send a “rewind” command to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT Rewind (boolean viewTape, BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
viewTape	in	View the tape (TRUE) or enable automatic selection of “tape view” or “end to end view” (FALSE)
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.13 IDeckLinkDeckControl::StepForward method

The **StepForward** method will send a “step forward” command to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT StepForward (BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.14 IDeckLinkDeckControl::StepBack method

The **StepBack** method will send a “step back” command to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT StepBack (BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.15 IDeckLinkDeckControl::Jog method

The **Jog** method will send a “jog playback” command to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT Jog (double rate, BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
rate	in	The rate at which to jog playback. A value greater than 0 will enable forward playback, value less than 0 will enable reverse playback. The rate range is from -50.0 to 50.0
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.16 IDeckLinkDeckControl::Shuttle method

The **Shuttle** method will send a “shuttle” playback command to the deck. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT Shuttle (double rate, BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
rate	in	The rate at which to shuttle playback. A value greater than 0 will enable forward playback, a value less than 0 will enable reverse playback. The rate range is from -50.0 to 50.0
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.17 IDeckLinkDeckControl::GetTimecodeString method

The **GetTimecodeString** method will return the current timecode in string format.

#### Syntax

```
HRESULT GetTimecodeString (string currentTimeCode, BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
currentTimeCode	out	The current timecode in string format.
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.18 IDeckLinkDeckControl::GetTimecode method

The **GetTimecode** method will return the current timecode in **IDeckLinkTimecode** format.

#### Syntax

```
HRESULT GetTimecode (IDeckLinkTimecode currentTimecode, BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
currentTimeCode	out	The current timecode in <b>IDeckLinkTimecode</b> format.
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.19 IDeckLinkDeckControl::GetTimecodeBCD method

The **GetTimecodeBCD** method will return the current timecode in BCD format.

#### Syntax

```
HRESULT GetTimecodeBCD (BMDTimecodeBCD *currentTimecode, BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
currentTimeCode	out	The timecode in BCD format.
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.20 IDeckLinkDeckControl::SetPreroll method

The **SetPreroll** method will set the preroll time period.

#### Syntax

```
HRESULT SetPreroll (uint32_t prerollSeconds);
```

#### Parameters

Name	Direction	Description
prerollSeconds	in	The preroll period in seconds to set.

#### Return Values

Value	Description
S_OK	Success

### 2.4.26.21 IDeckLinkDeckControl::GetPreroll method

The **GetPreroll** method will get the preroll period setting.

#### Syntax

```
HRESULT GetPreroll (uint32_t *prerollSeconds);
```

#### Parameters

Name	Direction	Description
prerollSeconds	out	The current preroll period.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.22 IDeckLinkDeckControl::SetCaptureOffset method

The capture offset may be used to compensate for a deck specific offset between the inpoint and the time at which the capture starts.

#### Syntax

```
HRESULT SetCaptureOffset (int32_t captureOffsetFields);
```

#### Parameters

Name	Direction	Description
captureOffsetFields	in	The timecode offset to set in fields.

#### Return Values

Value	Description
S_OK	Success

### 2.4.26.23 IDeckLinkDeckControl::GetCaptureOffset method

The **GetCaptureOffset** method will return the current setting of the field accurate capture timecode offset in fields.

#### Syntax

```
HRESULT GetCaptureOffset (int32_t *captureOffsetFields);
```

#### Parameters

Name	Direction	Description
captureOffsetFields	out	The current timecode offset in fields.

#### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.24 IDeckLinkDeckControl::SetExportOffset method

The **SetExportOffset** method will set the current export timecode offset in fields. This method permits fine control of the timecode offset to tailor for the response of an individual deck by adjusting the number of fields prior to the in or out point where an export will begin or end.

#### Syntax

```
HRESULT SetExportOffset (int32_t exportOffsetFields);
```

#### Parameters

Name	Direction	Description
exportOffsetFields	in	The timecode offset in fields.

#### Return Values

Value	Description
S_OK	Success

### 2.4.26.25 IDeckLinkDeckControl::GetExportOffset method

The **GetExportOffset** method will return the current setting of the export offset in fields.

#### Syntax

```
HRESULT GetExportOffset (int32_t * exportOffsetFields);
```

#### Parameters

Name	Direction	Description
exportOffsetFields	out	The current timecode offset in fields.

#### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.26 IDeckLinkDeckControl::GetManualExportOffset method

The **GetManualExportOffset** method will return the manual export offset for the current deck. This is only applicable for manual exports and may be adjusted with the main export offset if required.

#### Syntax

```
HRESULT GetManualExportOffset (int32_t * deckManualExportOffsetFields);
```

#### Parameters

Name	Direction	Description
deckManualExportOffsetFields	out	The current timecode offset.

#### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.27 IDeckLinkDeckControl::StartExport method

The **StartExport** method starts an export to tape operation using the given parameters. Prior to calling this method, the output interface should be set up as normal (refer to the **Playback** and **IDeckLinkOutput** interface sections). **StartScheduledPlayback** should be called in the **bmdDeckControlPrepareForExportEvent** event in **IDeckLinkDeckControl StatusCallback::DeckControlEventReceived** callback. The callback object should be set using **IDeckLinkDeckControl::SetCallback**. A connection to the deck should then be opened using **IDeckLinkDeckControl::Open**. The preroll period can be set using **IDeckLink DeckControl::SetPreroll** and an offset period set using **IDeckLinkDeckControl::SetExportOffset**.

After **StartExport** is called, the export will commence when the current time code equals the “inTimecode”. Scheduled frames are exported until the current timecode equals the “outTimecode”. During this period the **IDeckLinkDeckControlStatusCallback** will be called when deck control events occur.

At the completion of the export operation the **bmdDeckControlExportCompleteEvent** in the **IDeckLinkDeckControlStatusCallback::DeckControlEventReceived** will occur several frames from the “outTimecode”. Resources may be released at this point or another export may be commenced.

**Syntax**

**HRESULT** StartExport (**BMDTimecodeBCD** inTimecode, **BMDTimecodeBCD** outTimecode,  
**BMDDeckControlExportModeOpsFlags** exportModeOps, **BMDDeckControlError** \*error);

**Parameters**

Name	Direction	Description
inTimecode	in	The timecode to start the export sequence.
outTimecode	in	The timecode to stop the export sequence.
exportModeOps	in	The export mode operations - see <b>BMDDeckControlExportModeOpsFlags</b> for details.
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

**Return Values**

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	The parameter is invalid.

#### 2.4.26.28 **IDeckLinkDeckControl::StartCapture** method

The **StartCapture** method starts a capture operation using the given parameters.

Prior to calling this method, the input interface should be set up as normal (refer to the **Capture** and **IDeckLinkInput** interface sections), **IDeckLinkDeckControl** should be configured (see description below) and a connection to the deck established using **IDeckLinkDeckControl::Open**.

A callback object should be set using **IDeckLinkDeckControl::SetCallback** and an offset period set using **IDeckLinkDeckControl::SetCaptureOffset**.

After **StartCapture** is called, the application must wait until the **bmdDeckControlPrepareForCaptureEvent** event is received via **IDeckLinkDeckControl StatusCallback::DeckControlEventReceived** callback. Reception of that event signals that the serial timecodes attached to the **IDeckLinkVideoFrame** objects (received via **IDeckLink InputCallback::VideoInputFrameArrived**) can be used to determine if the frame is between the inTimecode and outTimecode timecodes.

The application must take into account that the serial timecode values should be adjusted by the value set using **IDeckLinkDeckControl::SetCaptureOffset**.

During this period **IDeckLinkDeckControlStatusCallback** will be called when deck control events occur.

At the completion of the capture operation the **bmdDeckControlCaptureCompleteEvent** event in the **IDeckLinkDeckControlStatusCallback::DeckControlEventReceived** method will occur several frames from the "outTimecode". Resources may be released at this point. **IDeckLinkDeckControl** will return to VTR control mode.

**Syntax**

**HRESULT** StartCapture (**boolean** useVITC, **BMDTimecodeBCD** inTimecode, **BMDTimecodeBCD** outTimecode, **BMDDeckControlError** \*error);

**Parameters**

Name	Direction	Description
useVITC	in	If true use VITC as the source of timecodes.
inTimecode	in	The timecode to start the capture sequence.
outTimecode	in	The timecode to stop the capture sequence.
error	out	Error code sent by the deck - see <b>BMDDeckControlError</b> for details.

**Return Values**

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.29 IDeckLinkDeckControl::GetDeviceID method

The **GetDeviceID** method gets the device ID returned by the deck. The **IDeckLinkDeckControl** must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT GetDeviceID (uint16_t *deviceId, BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
deviceId	out	The code for the device model.
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.4.26.30 IDeckLinkDeckControl::Abort method

The **Abort** operation is synchronous. Completion is signaled with a **bmdDeckControlAbortedEvent** event.

#### Syntax

```
HRESULT Abort (void);
```

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.26.31 IDeckLinkDeckControl::CrashRecordStart method

The **CrashRecordStart** method sets the deck to record. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT CrashRecordStart (BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.32 IDeckLinkDeckControl::CrashRecordStop method

The **CrashRecordStop** method stops the deck record operation. The **IDeckLinkDeckControl** object must be in VTR control mode for this command to succeed.

#### Syntax

```
HRESULT CrashRecordStop (BMDDeckControlError *error);
```

#### Parameters

Name	Direction	Description
error	out	The error code sent by the deck - see <b>BMDDeckControlError</b> for details.

#### Return Values

Value	Description
E_FAIL	Failure - check error parameter.
S_OK	Success
E_INVALIDARG	The parameter is invalid.

### 2.4.26.33 IDeckLinkDeckControl::SetCallback method

The **SetCallback** method installs a callback object to be called when deck control events occur.

#### Syntax

```
HRESULT SetCallback ( IDeckLinkDeckControlStatusCallback *callback);
```

#### Parameters

Name	Direction	Description
callback	in	The callback object implementing the <b>IDeckLinkDeckControlStatusCallback</b> object interface

#### Return Values

Value	Description
S_OK	Success

### 2.4.27 IDeckLinkDeckControlStatusCallback Interface

The **IDeckLinkDeckControlStatusCallback** object interface is a callback class which is called when the Deck control status has changed.

An object with the **IDeckLinkDeckControlStatusCallback** object interface may be registered as a callback with the **IDeckLinkDeckControl** interface.

#### Related Interfaces

Interface	Interface ID	Description
IDeckLinkDeckControl	IID_IDeckLinkDeckControl	An <b>IDeckLinkDeckControlStatusCallback</b> object interface may be registered with <b>IDeckLinkDeckControl::SetCallback</b>

#### Public Member Functions

Method	Description
TimecodeUpdate	Called when there is a change to the timecode.
VTRControlStateChanged	Called when the control state of the deck changes.
DeckControlEventReceived	Called when a deck control event occurs.
DeckControlStatusChanged	Called when deck control status has changed.

### 2.4.27.1 IDeckLinkDeckControlStatusCallback::TimecodeUpdate method

The **TimecodeUpdate** method is called when there is a change to the timecode.

Timecodes may be missed when playing at non 1x speed. This method will not be called during capture, and the serial timecode attached to each frame delivered by the API should be used instead.

#### Syntax

**HRESULT** TimecodeUpdate (BMDDTimecodeBCD currentTimecode);

#### Parameters

Name	Direction	Description
currentTimecode	in	The current timecode.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.27.2 IDeckLinkDeckControlStatusCallback::VTRControlStateChanged method

The **VTRControlStateChanged** method is called when there is a change in the deck control state.

Refer to **BMDDeckControlVTRControlState** for the possible states. This method is only called while in VTR control mode.

#### Syntax

**HRESULT** VTRControlStateChanged (**BMDDeckControlVTRControlState** newState, **BMDDeckControlError** error);

#### Parameters

Name	Direction	Description
<b>newState</b>	in	The new deck control state - see <b>BMDDeckControlVTRControlState</b> for details.
<b>error</b>	in	The deck control error code.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.4.27.3 IDeckLinkDeckControlStatusCallback::DeckControlEventReceived method

The **DeckControlEventReceived** method is called when a deck control event occurs.

#### Syntax

```
HRESULT DeckControlEventReceived (BMDDeckControlEvent event, BMDDeckControlError error);
```

#### Parameters

Name	Direction	Description
event	in	The deck control event that has occurred - see <b>BMDDeckControlEvent</b> for details.
error	in	The deck control error that has occurred.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

#### 2.4.27.4 IDeckLinkDeckControlStatusCallback::DeckControlStatusChanged method

The **DeckControlStatusChanged** method is called when the deck control status has changed.

##### Syntax

```
HRESULT DeckControlStatusChanged (BMDDeckControlStatusFlags flags, uint32_t mask);
```

##### Parameters

Name	Direction	Description
flags	in	The deck control current status - see <b>BMDDeckControlStatusFlags</b> for details.
mask	in	The deck control status event flag(s) that has changed.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.1 IBMDStreamingDiscovery Interface

The **IBMDStreamingDiscovery** object interface is used to install or remove the callback for receiving streaming device discovery notifications.

A reference to an **IBMDStreamingDiscovery** object interface may be obtained from **CoCreateInstance** on platforms with native COM support or from **CreateBMDStreamingDiscoveryInstance** on other platforms.

Public Member Functions	
Method	Description
InstallDeviceNotifications	Install device notifications callback
UninstallDeviceNotifications	Remove device notifications callback

### 2.5.1.1 IBMDStreamingDiscovery::InstallDeviceNotifications method

The **InstallDeviceNotifications** method installs the callback which will be called when a new streaming device becomes available.

**Note:** Only one callback may be installed at a time.

#### Syntax

```
HRESULT InstallDeviceNotifications (IBMDStreamingDeviceNotificationCallback* theCallback);
```

#### Parameters

Name	Direction	Description
theCallback	in	Callback object implementing the <b>IBMDStreamingDeviceNotificationCallback</b> object interface

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	The callback parameter is invalid.
E_UNEXPECTED	An unexpected internal error has occurred.

### 2.5.1.2 IBMDStreamingDiscovery::UninstallDeviceNotifications method

The **UninstallDeviceNotifications** method removes the device notifications callback.

#### Syntax

```
HRESULT UninstallDeviceNotifications ();
```

#### Return Values

Value	Description
S_OK	Success
E_UNEXPECTED	An unexpected internal error has occurred.

### 2.5.2 IBMDStreamingDeviceNotificationCallback Interface

The **IBMDStreamingDeviceNotificationCallback** object interface is a callback class which is called when a streaming device arrives, is removed or undergoes a mode change.

#### Related Interfaces

Interface	Interface ID	Description
IBMDStreamingDiscovery	IID_IBMDStreamingDiscovery	An <b>IBMDStreamingDeviceNotificationCallback</b> object interface may be installed with <b>IBMDStreamingDiscovery::InstallDeviceNotifications</b>

#### Public Member Functions

Method	Description
StreamingDeviceArrived	Streaming device arrived
StreamingDeviceRemoved	Streaming device removed
StreamingDeviceModeChanged	Streaming device mode changed

### 2.5.2.1 IBMDStreamingDeviceNotificationCallback::StreamingDeviceArrived method

The **StreamingDeviceArrived** method is called when a new streaming device becomes available.

The result parameter (required by COM) is ignored by the caller.

#### Syntax

```
HRESULT StreamingDeviceArrived (IDeckLink * device);
```

#### Parameters

Name	Direction	Description
device	in	streaming device

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.2.2 IBMDStreamingDeviceNotificationCallback::StreamingDeviceRemoved method

The **StreamingDeviceRemoved** method is called when a streaming device is removed.

The result parameter (required by COM) is ignored by the caller.

#### Syntax

```
HRESULT StreamingDeviceRemoved (IDeckLink* device);
```

#### Parameters

Name	Direction	Description
device	in	streaming device

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.2.3 IBMDStreamingDeviceNotificationCallback::StreamingDeviceModeChanged method

The **StreamingDeviceModeChanged** method is called when a streaming device's mode has changed.

The result parameter (required by COM) is ignored by the caller.

#### Syntax

```
HRESULT StreamingDeviceModeChanged (IDeckLink* device, BMDStreamingDeviceMode mode);
```

#### Parameters

Name	Direction	Description
device	in	streaming device
mode	in	new streaming device mode after the mode change occurred

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.3 IBMDStreamingVideoEncodingMode Interface

The **IBMDStreamingVideoEncodingMode** object interface represents a streaming video encoding mode.

The encoding mode encapsulates all the available encoder settings such as video codec settings and audio codec settings. To make changes to encoder settings use the **IBMDStreamingMutableVideoEncodingMode** object interface obtained via the **CreateMutableVideoEncodingMode** method.

#### Related Interfaces

Interface	Interface ID	Description
IBMDStreamingVideoEncodingModePresetIterator	IID_IBMDStreamingVideoEncodingModePresetIterator	<b>IBMDStreamingVideoEncodingModePresetIterator::Next</b> returns an <b>IBMDStreamingVideoEncodingMode</b> object interface for each available video encoding mode.
IBMDStreamingMutableVideoEncodingMode	IID_IBMDStreamingMutableVideoEncodingMode	A mutable subclass of <b>IBMDStreamingVideoEncodingMode</b> may be created using <b>CreateMutableVideoEncodingMode</b>

#### Public Member Functions

Method	Description
GetName	Get the name describing the video encoding mode.
GetPresetID	Get the unique ID representing the video encoding mode.
GetSourcePositionX	Get the x coordinate of the origin of the video source rectangle.
GetSourcePositionY	Get the y coordinate of the origin of the video source rectangle.
GetSourceWidth	Get the width of the video source rectangle.

Public Member Functions	
Method	Description
GetSourceHeight	Get the height of the video source rectangle.
GetDestWidth	Get the width of the video destination rectangle.
GetDestHeight	Get the height of the video destination rectangle.
GetFlag	Get the current value of a boolean encoding mode setting.
GetInt	Get the current value of a int64_t encoding mode setting.
GetFloat	Get the current value of a double encoding mode setting.
GetString	Get the current value of a string encoding mode setting.
CreateMutableVideoEncodingMode	Create a mutable copy of the <b>IBMDStreamingVideoEncodingMode</b> object interface.

### 2.5.3.1 IBMDStreamingVideoEncodingMode::GetName method

The **GetName** method returns a string describing the video encoding mode.

#### Syntax

```
HRESULT GetName (string name);
```

#### Parameters

Name	Direction	Description
name	out	Video encoding name. This allocated string must be freed by the caller when no longer required.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_POINTER	The name parameter is invalid.

### 2.5.3.2 IBMDStreamingVideoEncodingMode::GetPresetID method

The **GetPresetID** method returns the unique ID representing the preset video mode.

#### Syntax

```
unsigned int GetPresetID();
```

#### Return Values

Value	Description
id	Unique ID of preset video mode.

### 2.5.3.3 IBMDStreamingVideoEncodingMode::GetSourcePositionX method

The **GetSourcePositionX** method returns the x coordinate of the origin of the source rectangle used for encoding video.

#### Syntax

```
unsigned int GetSourcePositionX();
```

#### Return Values

Value	Description
xPosition	The x coordinate in pixels for source rectangle origin.

### 2.5.3.4 IBMDStreamingVideoEncodingMode::GetSourcePositionY method

The **GetSourcePositionY** method returns the y coordinate of the origin of the source rectangle used for encoding video.

#### Syntax

```
unsigned int GetSourcePositionY();
```

#### Return Values

Value	Description
yPosition	The y coordinate in pixels for source rectangle origin.

### 2.5.3.5 IBMDStreamingVideoEncodingMode::GetSourceWidth method

The **GetSourceWidth** method returns the width of the source rectangle used for encoding video.

#### Syntax

```
unsigned int GetSourceWidth();
```

#### Return Values

Value	Description
width	Width in pixels of the source rectangle.

### 2.5.3.6 IBMDStreamingVideoEncodingMode::GetSourceHeight method

The **GetSourceHeight** method returns the height of the source rectangle used for encoding video.

#### Syntax

```
unsigned int GetSourceHeight();
```

#### Return Values

Value	Description
height	Height in pixels of the source rectangle.

### 2.5.3.7 IBMDStreamingVideoEncodingMode::GetDestWidth method

The **GetDestWidth** method returns the width of the destination rectangle used when encoding video. If the destination rectangle is different to the source rectangle the video will be scaled when encoding.

#### Syntax

```
unsigned int GetDestWidth();
```

#### Return Values

Value	Description
width	Width in pixels of the destination rectangle.

### 2.5.3.8 IBMDStreamingVideoEncodingMode::GetDestHeight method

The **GetDestHeight** method returns the height of the destination rectangle used when encoding video. If the destination rectangle is different to the source rectangle the video will be scaled when encoding.

#### Syntax

```
unsigned int GetDestHeight();
```

#### Return Values

Value	Description
height	Height in pixels of the destination rectangle.

### 2.5.3.9 IBMDStreamingVideoEncodingMode::GetFlag method

The **GetFlag** method gets the current value of the boolean configuration setting associated with the given **BMDStreamingEncodingModePropertyID**.

#### Syntax

```
HRESULT GetFlag ( BMDStreamingEncodingModePropertyID cfgID, boolean* value);
```

#### Parameters

Name	Direction	Description
cfgID	in	<b>BMDStreamingEncodingModePropertyID</b> to get flag value.
value	out	The value corresponding to cfgID.

#### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.5.3.10 IBMDStreamingVideoEncodingMode::GetInt method

The **GetInt** method gets the current value of the int64\_t configuration setting associated with the given **BMDStreamingEncodingModePropertyID**.

#### Syntax

```
HRESULT GetInt ( BMDStreamingEncodingModePropertyID cfgID, int64_t* value);
```

#### Parameters

Name	Direction	Description
cfgID	in	<b>BMDStreamingEncodingModePropertyID</b> to get integer value.
value	out	The value corresponding to cfgID.

#### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.5.3.11 IBMDStreamingVideoEncodingMode::GetFloat method

The **GetFloat** gets the current value of the double configuration setting associated with the given **BMDStreamingEncodingModePropertyID**.

#### Syntax

```
HRESULT GetFloat ( BMDStreamingEncodingModePropertyID cfgID, double* value);
```

#### Parameters

Name	Direction	Description
cfgID	in	<b>BMDStreamingEncodingModePropertyID</b> to get double value.
value	out	The value corresponding to cfgID.

#### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.5.3.12 IBMDStreamingVideoEncodingMode::GetString method

The **GetString** current value of the string configuration setting associated with the given **BMDStreamingEncodingModePropertyID**.

#### Syntax

```
HRESULT GetString ( BMDStreamingEncodingModePropertyID cfgID, string value);
```

#### Parameters

Name	Direction	Description
cfgID	in	<b>BMDStreamingEncodingModePropertyID</b> to get string value.
value	out	The value corresponding to cfgID. This allocated string must be freed by the caller when no longer required.

#### Return Values

Value	Description
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.
E_OUTOFMEMORY	Unable to allocate memory for string.

### 2.5.3.13 **IBMDStreamingVideoEncodingMode::CreateMutableVideoEncodingMode** method

The **CreateMutableVideoEncodingMode** method creates a new object interface which is a mutable copy of the **IBMDStreamingVideoEncodingMode** object interface.

**IBMDStreamingMutableVideoEncodingMode** is a subclass of **IBMDStreamingVideoEncodingMode** and inherits all its methods. It provides additional methods to change settings for the encoding of video and audio streams.

#### Syntax

**HRESULT** CreateMutableVideoEncodingMode ( **IBMDStreamingMutableVideoEncodingMode\*\*** newEncodingMode);

#### Parameters

Name	Direction	Description
newEncodingMode	out	A new mutable encoding mode object interface.

#### Return Values

Value	Description
S_OK	Success
E_POINTER	The newEncodingMode parameter is invalid.
E_OUTOFMEMORY	Unable to allocate memory for new object interface.

## 2.5.4 IBMDStreamingMutableVideoEncodingMode Interface

The **IBMDStreamingMutableVideoEncodingMode** object interface represents a mutable streaming video encoding mode.

Methods are provided to set video codec settings and audio codec settings. Use this object interface if you wish to perform cropping or scaling of the input video frame, adjust the video or audio bit rate and to change other video or audio codec settings.

### Related Interfaces

Interface	Interface ID	Description
IBMDStreamingVideoEncodingMode	IID_IBMDStreamingVideoEncodingMode	An <b>IBMDStreamingMutableVideoEncodingMode</b> object interface may be created from an <b>IBMDStreamingVideoEncodingMode</b> interface object using its <b>CreateMutableVideoEncodingMode</b> method.

### Public Member Functions

Method	Description
SetSourceRect	Set the video source rectangle.
SetDestSize	Set the size of the video destination rectangle.
SetFlag	Set the value for a boolean encoding mode setting.
SetInt	Set the value for an int64_t encoding mode setting.
SetFloat	Set the value for a double encoding mode setting.
SetString	Set the value for a string encoding mode setting.

### 2.5.4.1 IBMDStreamingMutableVideoEncodingMode::SetSourceRect method

The **SetSourceRect** method sets the source rectangle used for encoding video.

Cropping of the input video frame can be achieved by using a source rectangle that is different to the input video frame dimensions.

When no source rectangle is set, the source rectangle of the parent **IBMDStreamingVideoEncodingMode** object interface will be used by the encoder.

#### Syntax

```
HRESULT SetSourceRect (uint32_t posX, uint32_t posY, uint32_t width, uint32_t height);
```

#### Parameters

Name	Direction	Description
posX	in	X coordinate of source rectangle origin.
posY	in	Y coordinate of source rectangle origin.
width	in	Width of source rectangle.
height	in	Height of source rectangle.

#### Return Values

Value	Description
S_OK	Success

### 2.5.4.2 IBMDStreamingMutableVideoEncodingMode::SetDestSize method

The **SetDestSize** method sets the destination rectangle used for encoding video.

When the destination rectangle size is set to a different size to the source rectangle size, scaling will be performed by the encoder.

When no destination rectangle size is set, the source rectangle size of the parent **IBMDStreamingVideoEncodingMode** object interface will be used by the encoder.

#### Syntax

```
HRESULT SetDestSize (uint32_t width, uint32_t height);
```

#### Parameters

Name	Direction	Description
width	in	Width of destination rectangle.
height	in	Height of destination rectangle.

#### Return Values

Value	Description
S_OK	Success

### 2.5.4.3 IBMDStreamingMutableVideoEncodingMode::SetFlag method

The **SetFlag** method sets a boolean value into the configuration setting associated with the given **BMDStreamingEncodingModePropertyID**.

#### Syntax

**HRESULT** SetFlag (**BMDStreamingEncodingModePropertyID** cfgID, **boolean** value);

#### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	in	The boolean value to set into the selected configuration setting.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

#### 2.5.4.4 IBMDStreamingMutableVideoEncodingMode::SetInt method

The **SetInt** method sets an `int64_t` value into the configuration setting associated with the given **BMDStreamingEncodingModePropertyID**.

##### Syntax

```
HRESULT SetInt (BMDStreamingEncodingModePropertyID cfgID, int64_t value);
```

##### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	in	The integer value to set into the selected configuration setting.

##### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.5.4.5 IBMDStreamingMutableVideoEncodingMode::SetFloat method

The **SetFloat** method sets a double value into the configuration setting associated with the given **BMDStreamingEncodingModePropertyID**.

#### Syntax

```
HRESULT SetFloat (BMDStreamingEncodingModePropertyID cfgID, double value);
```

#### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	in	The double value to set into the selected configuration setting.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

### 2.5.4.6 IBMDStreamingMutableVideoEncodingMode::SetString method

The **SetString** method sets a string value into the configuration setting associated with the given **BMDStreamingEncodingModePropertyID**.

#### Syntax

```
HRESULT SetString ( BMDStreamingEncodingModePropertyID cfgID, string value);
```

#### Parameters

Name	Direction	Description
cfgID	in	The ID of the configuration setting.
value	in	The string value to set into the selected configuration setting.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	One or more parameters are invalid.

## 2.5.5 IBMDStreamingVideoEncodingModePresetIterator Interface

The **IBMDStreamingVideoEncodingModePresetIterator** object interface is used to enumerate the available preset video encoding modes.

A device may have a number of preset encoding modes. These are convenient encoding modes which can be used to encode video and audio into formats suitable for a number of commonly available playback devices.

A reference to an **IBMDStreamingVideoEncodingModePresetIterator** object interface may be obtained from an **IBMDStreamingDeviceInput** object interface using the **GetVideoEncodingModePresetIterator** method.

### Related Interfaces

Interface	Interface ID	Description
IBMDStreamingDeviceInput	IID_IBMDStreamingDeviceInput	<b>IBMDStreamingDeviceInput::GetVideoEncodingModePresetIterator</b> returns an <b>IBMDStreamingVideoEncodingModePresetIterator</b> object interface.

### Public Member Functions

Method	Description
Next	Returns a pointer to an <b>IBMDStreamingVideoEncodingMode</b> object interface for an available preset encoding mode.

### 2.5.5.1 IBMDStreamingVideoEncodingModePresetIterator::Next method

The **Next** method returns the next available **IBMDStreamingVideoEncodingMode** object interface.

#### Syntax

```
HRESULT Next (IBMDStreamingVideoEncodingMode** videoEncodingMode);
```

#### Parameters

Name	Direction	Description
videoEncodingMode	out	<b>IBMDStreamingVideoEncodingMode</b> object interface or NULL when no more video encoding modes are available.

#### Return Values

Value	Description
S_OK	Success
S_FALSE	No (more) preset encoding modes are available.
E_POINTER	The videoEncodingMode parameter is invalid.

## 2.5.6 IBMDStreamingDeviceInput Interface

The **IBMDStreamingDeviceInput** object interface represents a physical streaming video encoder device.

### Related Interfaces

Interface	Interface ID	Description
IDeckLink	IID_IDeckLink	An <b>IBMDStreamingDeviceInput</b> object interface may be obtained from IDeckLink using <b>QueryInterface</b> .
IBMDStreamingDeviceNotificationCallback	IID_IBMDStreamingDeviceNotificationCallback	<b>IBMDStreamingDeviceNotificationCallback::StreamingDeviceArrived</b> returns an <b>IDeckLink</b> object interface representing a streaming video encoder device

### Public Member Functions

Method	Description
DoesSupportVideoInputMode	Indicates whether a video input mode is supported by the device
GetVideoInputModelerator	Get an iterator to enumerate available video input modes
SetVideoInputMode	Set a display mode as the device's video input mode
GetCurrentDetectedVideoInputMode	Get the current video input mode detected by the device
GetVideoEncodingMode	Get the currently configured video encoding mode
GetVideoEncodingModePresetIterator	Get an iterator to enumerate available video encoding mode presets
DoesSupportVideoEncodingMode	Indicates whether a video encoding mode is supported by the device

Public Member Functions	
Method	Description
SetVideoEncodingMode	Set a video encoding mode as the device's current video encoding mode
StartCapture	Start a video encoding capture
StopCapture	Stop a video encoding capture
SetCallback	Set a callback for receiving new video and audio packets

### 2.5.6.1 IBMDStreamingDeviceInput::DoesSupportVideoInputMode method

The **DoesSupportVideoInputMode** method indicates whether a given video input mode is supported on the device.

#### Syntax

```
HRESULT DoesSupportVideoInputMode (BMDDisplayMode inputMode, boolean* result);
```

#### Parameters

Name	Direction	Description
inputMode	in	<b>BMDDisplayMode</b> to test for input support.
result	out	Boolean value indicating whether the mode is supported.

#### Return Values

Value	Description
S_OK	Success
E_POINTER	The result parameter is invalid.
E_INVALIDARG	The inputMode parameter is invalid

### 2.5.6.2 IBMDStreamingDeviceInput::GetVideoInputModeIterator method

The **GetVideoInputModeIterator** method returns an iterator which enumerates the available video input modes.

#### Syntax

```
HRESULT GetVideoInputModeIterator (IDeckLinkDisplayModeIterator** iterator);
```

#### Parameters

Name	Direction	Description
iterator	out	Display mode iterator

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_POINTER	The iterator parameter is invalid.

### 2.5.6.3 IBMDStreamingDeviceInput::SetVideoInputMode method

The **SetVideoInputMode** method configures the device to use the specified video display mode for input.

#### Syntax

```
HRESULT SetVideoInputMode (BMDDisplayMode inputMode);
```

#### Parameters

Name	Direction	Description
inputMode	in	Display mode to set as the input display mode

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	The inputMode parameter is invalid.

### 2.5.6.4 IBMDStreamingDeviceInput::GetCurrentDetectedVideoInputMode method

The **GetCurrentDetectedVideoInputMode** method returns the current video input display mode as detected by the device.

#### Syntax

```
HRESULT GetCurrentDetectedVideoInputMode (BMDDisplayMode* detectedMode);
```

#### Parameters

Name	Direction	Description
detectedMode	out	Display mode the device detected for video input

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	The detectedMode parameter is invalid.

### 2.5.6.5 IBMDStreamingDeviceInput::GetVideoEncodingMode method

The **GetVideoEncodingMode** method returns the currently configured video encoding mode.

#### Syntax

```
HRESULT GetVideoEncodingMode (IBMDStreamingVideoEncodingMode** encodingMode);
```

#### Parameters

Name	Direction	Description
encodingMode	out	Current video encoding mode

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	The encodingMode parameter is invalid.

### 2.5.6.6 IBMDStreamingDeviceInput::GetVideoEncodingModePresetIterator method

The **GetVideoEncodingModePresetIterator** method returns an iterator which enumerates the available video encoding mode presets.

Different video display modes may have different encoding mode presets.

#### Syntax

```
HRESULT GetVideoEncodingModePresetIterator (BMDDisplayMode inputMode,  
                                         IBMDStreamingVideoEncodingModePresetIterator** iterator);
```

#### Parameters

Name	Direction	Description
inputMode	in	The DisplayMode to iterate encoding mode presets for
iterator	out	Video encoding mode preset iterator

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	The iterator parameter is invalid.

### 2.5.6.7 IBMDStreamingDeviceInput::DoesSupportVideoEncodingMode method

The **DoesSupportVideoEncodingMode** method indicates whether a given video encoding mode is support by the device for the given input display mode. Modes may be supported, not supported or supported with changes. If a mode is supported with changes, the changed mode will be returned by the **changedEncodingMode** parameter.

#### Syntax

```
HRESULT DoesSupportVideoEncodingMode (BMDDisplayMode inputMode, IBMDStreamingVideoEncodingMode* encodingMode,  
BMDStreamingEncodingSupport* result, IBMDStreamingVideoEncodingMode** changedEncodingMode);
```

#### Parameters

Name	Direction	Description
inputMode	in	Display mode to be used with the video encoding mode
encodingMode	in	Video encoding mode to be tested for support
result	out	Indicates whether the mode is supported, not supported or supported with changes
changedEncodingMode	out	Changed encoding mode when the mode is supported with changes

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_POINTER	One or more out parameters are invalid
E_INVALIDARG	The encodingMode parameter is invalid

### 2.5.6.8 IBMDStreamingDeviceInput::SetVideoEncodingMode method

The **SetVideoEncodingMode** method sets the given video encoding mode as the device's current video encoding mode. It is necessary to set a video encoding mode before calling the **StartCapture** method.

#### Syntax

```
HRESULT SetVideoEncodingMode (IBMDStreamingVideoEncodingMode*  
encodingMode);
```

#### Parameters

Name	Direction	Description
encodingMode	in	Video encoding mode to be used by the device.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_INVALIDARG	The encodingMode parameter is invalid

### 2.5.6.9 IBMDStreamingDeviceInput::StartCapture method

The **StartCapture** method starts a capture on the device using the current video encoding mode.

If a callback implementing the **IBMDStreamingH264InputCallback** object interface has been set by the **SetCallback** method, calls will be made as new compressed video and audio packets are made available by the device.

#### Syntax

```
HRESULT StartCapture();
```

#### Parameters

none.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.6.10 IBMDStreamingDeviceInput::StopCapture method

The **StopCapture** method stops a capture if a capture is currently in progress.

#### Syntax

```
HRESULT StopCapture();
```

#### Parameters

none.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.6.11 IBMDStreamingDeviceInput::SetCallback method

The **SetCallback** method configures a callback which will be called for new input from the device or when the device input changes.

An object shall be passed implementing the **IBMDStreamingH264InputCallback** object interface as the callback to receive callbacks for new video and audio packets.

An existing callback can be removed by passing NULL in the callback parameter.

#### Syntax

**HRESULT** SetCallback (**IUnknown\*** theCallback);

#### Parameters

Name	Direction	Description
theCallback	in	callback object implementing the <b>IUnknown</b> object interface

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

## 2.5.7 IBMDStreamingH264InputCallback Interface

The **IBMDStreamingH264InputCallback** object interface is a callback class which is called when encoded video and audio packets are available or when the video input to the streaming device changes.

Once a capture has been started with the **IBMDStreamingDeviceInput::StartCapture** method, compressed video and audio packets will become available asynchronously.

This callback object interface can also be used to detect changes to the video input display mode and changes to the video input connector, whether or not a capture is in progress.

### Related Interfaces

Interface	Interface ID	Description
IBMDStreamingDeviceInput	IID_IBMDStreamingDeviceInput	An <b>IBMDStreamingH264InputCallback</b> object interface may be installed with <b>IBMDStreamingDeviceInput::SetCallback</b>

Public Member Functions	
Method	Description
H264NALPacketArrived	Called when a NAL video packet is available
H264AudioPacketArrived	Called when an audio packet is available
MPEG2TSPacketArrived	Called when a transport stream packet is available
H264VideoInputConnectorScanningChanged	Called when the video input connect scanning mode has changed
H264VideoInputConnectorChanged	Called when the video input connect connector has changed
H264VideoInputModeChanged	Called when the video input display mode has changed

### 2.5.7.1 IBMDStreamingH264InputCallback::H264NALPacketArrived method

The **H264NALPacketArrived** method is called when an **IBMDStreamingH264NALPacket** becomes available from the streaming device while a capture is in progress.

The result parameter (required by COM) is ignored by the caller.

#### Syntax

```
HRESULT H264NALPacketArrived (IBMDStreamingH264NALPacket* nalPacket);
```

#### Parameters

Name	Direction	Description
nalPacket	in	NAL packet containing compressed video.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.7.2 IBMDStreamingH264InputCallback::H264AudioPacketArrived method

The **H264AudioPacketArrived** method is called when an **IBMDStreamingAudioPacket** becomes available from the streaming device while a capture is in progress.

The result parameter (required by COM) is ignored by the caller.

#### Syntax

```
HRESULT H264AudioPacketArrived (IBMDStreamingAudioPacket* audioPacket);
```

#### Parameters

Name	Direction	Description
audioPacket	in	Audio packet containing compressed audio.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.7.3 IBMDStreamingH264InputCallback::MPEG2TSPacketArrived method

The **MPEG2TSPacketArrived** method is called when an **IBMDStreamingMPEG2TSPacket** becomes available from the streaming device while a capture is in progress.

The result parameter (required by COM) is ignored by the caller.

#### Syntax

```
HRESULT MPEG2TSPacketArrived (IBMDStreamingMPEG2TSPacket* tsPacket);
```

#### Parameters

Name	Direction	Description
tsPacket	in	MPEG transport stream packet containing video or audio data.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.7.4 IBMDStreamingH264InputCallback::H264VideoInputConnectorScanningChanged method

The **H264VideoInputConnectorScanningChanged** method is called when the input connect scanning mode has changed.

This method will be called independently of capture state.

The result parameter (required by COM) is ignored by the caller.

#### Syntax

**HRESULT** H264VideoInputConnectorScanningChanged ();

#### Parameters

none.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.7.5 IBMDStreamingH264InputCallback::H264VideoInputConnectorChanged method

The **H264VideoInputConnectorChanged** method is called when the streaming device detects a change to the input connector.

This method will be called independently of capture state.

The result parameter (required by COM) is ignored by the caller.

#### Syntax

**HRESULT** H264VideoInputConnectorChanged ();

#### Parameters

none.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.7.6 IBMDStreamingH264InputCallback::H264VideoInputModeChanged method

The **H264VideoInputModeChanged** method is called when the streaming device detects a change to the video input display mode.

This method will be called independently of capture state.

The result parameter (required by COM) is ignored by the caller.

#### Syntax

```
HRESULT H264VideoInputModeChanged ();
```

#### Parameters

none.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

## 2.5.8 IBMDStreamingH264NALPacket Interface

The **IBMDStreamingH264NALPacket** object interface represents an MPEG-4 AVC/H.264 Network Adaptation Layer (NAL) packet.

Objects with an **IBMDStreamingH264NALPacket** object interface are passed to the **IBMDStreamingH264InputCallback::H264NALPacketArrived** callback.

The MPEG-4 AVC/H.264 NAL packet contains the compressed H.264 video bitstream which can be passed to a suitable H.264 video decoder for decoding and display. For some applications it may be more convenient to process NAL video packets instead of processing video carried in transport stream packets.

### Related Interfaces

Interface	Interface ID	Description
IBMDStreamingH264InputCallback	IID_IBMDStreamingH264InputCallback	New MPEG-4 AVC/H.264 NAL packets are passed to the <b>IBMDStreamingH264InputCallback::H264NALPacketArrived</b> callback

### Public Member Functions

Method	Description
GetPayloadSize	Get number of bytes in the NAL packet
GetBytes	Get pointer to NAL packet data
GetBytesWithSizePrefix	Get pointer to NAL packet data prefixed by a 32bit size value
GetDisplayTime	Get display time for the NAL packet
GetPacketIndex	Not Implemented

### 2.5.8.1 IBMDStreamingH264NALPacket::GetPayloadSize method

The **GetPayloadSize** method gets the number of bytes in the NAL packet.

#### Syntax

```
long GetPayloadSize();
```

#### Return Values

Value	Description
Count	NAL packet size in bytes

### 2.5.8.2 IBMDStreamingH264NALPacket::GetBytes method

The **GetBytes** method returns a pointer to the data buffer of the NAL packet.

#### Syntax

```
HRESULT GetBytes(void** buffer);
```

#### Parameters

Name	Direction	Description
buffer	out	Pointer to NAL packet data buffer – only valid while object remains valid.

#### Return Values

Value	Description
S_OK	Success
E_POINTER	The parameter is invalid.

### 2.5.8.3 IBMDStreamingH264NALPacket::GetBytesWithSizePrefix method

The **GetBytesWithSizePrefix** method returns a pointer to a data buffer starting with a 32bit unsigned integer containing the size of the NAL packet followed by the data buffer of the NAL packet. This arrangement may be required by some video decoders.

**Note:** The size of the data buffer returned by **GetBytesWithSizePrefix** is 4 bytes larger than the size of the data buffer returned by **GetBytes**.

#### Syntax

**HRESULT** GetBytesWithSizePrefix (**void\*\*** buffer);

#### Parameters

Name	Direction	Description
buffer	out	Pointer to NAL packet data buffer prefixed by size value – only valid while object remains

#### Return Values

Value	Description
S_OK	Success
E_POINTER	The parameter is invalid.

#### 2.5.8.4 IBMDStreamingH264NALPacket::GetDisplayTime method

The **GetDisplayTime method** returns the time at which to display the video contained in the NAL packet. The display time is in units of the requested time scale.

##### Syntax

```
HRESULT GetDisplayTime (uint64_t requestedTimeScale, uint64_t* displayTime);
```

##### Parameters

Name	Direction	Description
requestedTimeScale	in	Time scale for the displayTime
displayTime	out	Time at which to display the video

##### Return Values

Value	Description
S_OK	Success
E_POINTER	The displayTime parameter is invalid.

#### 2.5.8.5 BMDStreamingH264NALPacket::GetPacketIndex method

The **GetPacketIndex** method is not implemented.

## 2.5.9 IBMDStreamingAudioPacket Interface

The **IBMDStreamingAudioPacket** object interface represents an audio packet.

Objects with an **IBMDStreamingAudioPacket** object interface are passed to the **IBMDStreamingH264InputCallback::H264AudioPacketArrived** callback.

The audio packet can contain compressed audio, such as MPEG-2 AAC audio, which can be passed to a suitable audio decoder for decoding and playback. For some applications it may be more convenient to process audio packets instead of processing audio carried in transport stream packets.

### Related Interfaces

Interface	Interface ID	Description
IBMDStreamingH264InputCallback	IID_IBMDStreamingH264InputCallback	New audio packets are passed to the <b>IBMDStreamingH264InputCallback::H264AudioPacketArrived</b> callback

### Public Member Functions

Method	Description
GetCodec	Get the codec describing the type of audio in the audio packet
GetPayloadSize	Get number of bytes in the audio packet
GetBytes	Get pointer to audio packet data
GetPlayTime	Get the play time for the audio in the audio packet
GetPacketIndex	Not Implemented

### 2.5.9.1 IBMDStreamingAudioPacket::GetCodec method

The **GetCodec** method returns the codec describing the audio in the packet.

#### Syntax

```
BMDStreamingAudioCodec GetCodec();
```

#### Return Values

Value	Description
Codec	The codec for the audio in the packet.

### 2.5.9.2 IBMDStreamingAudioPacket::GetPayloadSize method

The **GetPayloadSize** method gets the number of bytes in the audio packet.

#### Syntax

```
long GetPayloadSize();
```

#### Return Values

Value	Description
Count	Audio packet size in bytes.

### 2.5.9.3 IBMDStreamingAudioPacket::GetBytes method

The **GetBytes** method returns a pointer to the data buffer of the audio packet.

#### Syntax

```
HRESULT GetBytes (void** buffer);
```

#### Parameters

Name	Direction	Description
buffer	out	Pointer to audio packet data buffer – only valid while object remains valid.

#### Return Values

Value	Description
S_OK	Success
E_POINTER	The parameter is invalid.

#### 2.5.9.4 IBMDStreamingAudioPacket::GetPlayTime method

The **GetPlayTime** method returns the time at which to playback the audio contained in the audio packet. The play time is in units of the requested time scale.

##### Syntax

```
HRESULT GetPlayTime (uint64_t requestedTimeScale, uint64_t* playTime);
```

##### Parameters

Name	Direction	Description
requestedTimeScale	in	Time scale for the displayTime
playTime	out	Time at which to play the audio

##### Return Values

Value	Description
S_OK	Success
E_POINTER	The parameter is invalid.

#### 2.5.9.5 IBMDStreamingAudioPacket::GetPacketIndex method

The **GetPacketIndex** method is not implemented.

### 2.5.10 IBMDStreamingMPEG2TSPacket Interface

The **IBMDStreamingMPEG2TSPacket** object interface represents an MPEG-2 transport stream packet as defined by ISO/IEC 13818-1.

Objects with an **IBMDStreamingMPEG2TSPacket** object interface are passed to the **IBMDStreamingH264InputCallback::MPEG2TSPacketArrived** callback.

The MPEG-2 transport stream packet can contain compressed audio or video together with metadata for decoding and synchronizing audio and video streams. For some applications it may be more convenient to process transport stream packets as an alternative to processing NAL video packets and audio packets separately.

#### Related Interfaces

Interface	Interface ID	Description
IBMDStreamingH264InputCallback	IID_IBMDStreamingH264InputCallback	New MPEG-2 transport stream packets are passed to the <b>IBMDStreamingH264InputCallback::MPEG2TSPacketArrived</b> callback

#### Public Member Functions

Method	Description
GetPayloadSize	Get number of bytes in the MPEG-2 transport stream packet
GetBytes	Get pointer to MPEG-2 transport stream packet

### 2.5.10.1 IBMDStreamingMPEG2TSPacket::GetPayloadSize method

The **GetPayloadSize** method returns the number of bytes in the MPEG-2 transport stream packet including the header.

#### Syntax

```
long GetPayloadSize();
```

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success

### 2.5.10.2 IBMDStreamingMPEG2TSPacket::GetBytes method

The **GetBytes** method returns a pointer to the data buffer of the MPEG-2 transport stream packet.

#### Syntax

```
HRESULT GetBytes(void** buffer);
```

#### Parameters

Name	Direction	Description
buffer	out	Pointer to MPEG-2 transport stream packet data buffer - only valid while object remains valid.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_POINTER	The parameter is invalid

### 2.5.11 IBMDStreamingH264NALParser Interface

The **IBMDStreamingH264NALParser** object interface is used to retrieve video codec settings from a NAL packet.

A reference to an **IBMDStreamingH264NALParser** object interface may be obtained from **CoCreateInstance** on platforms with native COM support or from **CreateBMDStreamingH264NALParser** on other platforms.

#### Related Interfaces

Interface	Interface ID	Description
BMDStreamingH264NALPacket	IID_IBMDStreamingH264NALPacket	The NAL packet to be parsed by a method in the <b>IBMDStreamingH264NALParser</b> object interface

#### Public Member Functions

Method	Description
IsNALSequenceParameterSet	Get the packet's Sequence Parameter Set setting
IsNALPictureParameterSet	Get the packet's Picture Parameter Set setting
GetProfileAndLevelFromSPS	Get the packet's profile and level setting

### 2.5.11.1 IBMDStreamingH264NALParser::IsNALSequenceParameterSet method

The **IsNALSequenceParameterSet** method parses the specified NAL packet to determine if the Sequence Parameter Set (SPS) decoding parameter has been set in the NAL packet.

#### Syntax

```
HRESULT IsNALSequenceParameterSet (IBMDStreamingH264NALPacket* nal);
```

#### Parameters

Name	Direction	Description
nal	in	The NAL Packet to query for the state of the sequence parameter.

#### Return Values

Value	Description
S_OK	The sequence parameter of the NAL packet is set.
E_FALSE	The sequence parameter of the NAL packet is not set.

### 2.5.11.2 IBMDStreamingH264NALParser::IsNALPictureParameterSet method

The **IsNALPictureParameterSet** method parses the specified NAL packet to determine if the Picture Parameter Set (PPS) decoding parameter has been set in the NAL packet.

This information can be used to configure a decoder for decoding the video contained in the NAL packet.

#### Syntax

```
HRESULT IsNALPictureParameterSet (IBMDStreamingH264NALPacket* nal);
```

#### Parameters

Name	Direction	Description
nal	in	The NAL Packet to query for the state of the picture parameter.

#### Return Values

Value	Description
S_OK	The picture parameter of the NAL packet is set.
E_FALSE	The picture parameter of the NAL packet is not set.

### 2.5.11.3 IBMDStreamingH264NALParser::GetProfileAndLevelFromSPS method

The **GetProfileAndLevelFromSPS** method parses the specified NAL packet and returns the H.264 profile, level and profile compatibility flags. These values can be used to determine if the video contained in the NAL packet can be decoded by a certain H.264 decoder.

#### Syntax

```
HRESULT GetProfileAndLevelFromSPS ( IBMDStreamingH264NALPacket* nal, uint32_t* profileIdc,  

uint32_t* profileCompatibility, uint32_t* levelIdc);
```

#### Parameters

Name	Direction	Description
nal	in	The NAL Packet to query for the profile and level.
profileIdc	out	The H.264 profile for this NAL packet.
profileCompatibility	out	The set of profile constraint flags for this NAL packet.
levelIdc	out	The H.264 level for this NAL packet.

#### Return Values

Value	Description
E_FAIL	Failure
S_OK	Success
E_POINTER	One or more parameters are invalid.

**2.6 Common Data Types****2.6.1 Basic Types****boolean**

**boolean** is represented differently on each platform by using its system type:

Windows	BOOL
Mac OS X	bool
Linux	bool

**Strings**

**Strings** are represented differently on each platform, using the most appropriate system type:

Windows	BSTR
Mac OS X	CFStringRef
Linux	char *

**int64\_t**

The 64 bit integer type is represented differently on each platform, using the most appropriate system type:

Windows	LONGLONG
Mac OS X	int64_t
Linux	int64_t

## Basic Types

### `uint64_t`

The 64 bit unsigned integer type is represented differently on each platform, using the most appropriate system type:

Windows	ULLONG
Mac OS X	<code>uint64_t</code>
Linux	<code>uint64_t</code>

### `uint32_t`

The 32 bit unsigned integer type is represented differently on each platform, using the most appropriate system type:

Windows	<code>unsigned long</code>
Mac OS X	<code>uint32_t</code>
Linux	<code>uint32_t</code>

### `int32_t`

The 32 bit integer type is represented differently on each platform, using the most appropriate system type:

Windows	<code>long</code>
Mac OS X	<code>int32_t</code>
Linux	<code>int32_t</code>

## Basic Types

### `uint16_t`

The 16 bit unsigned integer type is represented differently on each platform, using the most appropriate system type:

Windows	unsigned short
Mac OS X	<code>uint16_t</code>
Linux	<code>uint16_t</code>

### `uint8_t`

The 8 bit unsigned integer type is represented differently on each platform, using the most appropriate system type:

Windows	unsigned char
Mac OS X	<code>uint8_t</code>
Linux	<code>uint8_t</code>

## 2.6.2 Time Representation

The API uses a flexible scheme to represent time values which can maintain accuracy for any video or audio rate. Time is always represented as a time scale and a time value. The time scale is a unit of ticks per second specified by the API user. Time values are represented as a number of time units since playback or capture began. The API user should choose a time scale value appropriate to the type of video or audio stream being handled. Some examples are provided below:

Stream type	Suggested time scale	Frame time values
24 fps video	24000	0, 1000, 2000, 3000...
23.98 fps video	24000	0, 1001, 2002, 3003...

**BMDTimeScale**

**BMDTimeScale** is a large integer type which specifies the time scale for a time measurement in ticks per second.

**BMDTimeValue**

**BMDTimeValue** is a large integer type which represents a time in units of BMDTimeScale.

**BMDTimecodeUserBits**

**BMDTimecodeUserBits** is a 32-bit unsigned integer representing timecode user bits.

### 2.6.3 Display Modes

**BMDDisplayMode** enumerates the video modes supported for output and input.

Mode	Width	Height	Frames per Second	Fields per Frame	Suggested Time Scale	Display Duration
bmdModeNTSC	720	486	30/1.001	2	30000	1001
bmdModeNTSC2398	720	486	30/1.001*	2	24000*	1001
bmdModeNTSCp	720	486	60/1.001	1	60000	1001
bmdModePAL	720	576	25	2	25	1
bmdModePALp	720	576	50	1	50	1
bmdModeHD720p50	1280	720	50	1	50	1
bmdModeHD720p5994	1280	720	60/1.001	1	60000	1001
bmdModeHD720p60	1280	720	60	1	60	1
bmdModeHD1080p2398	1920	1080	24/1.001	1	24000	1001
bmdModeHD1080p24	1920	1080	24	1	24	1
bmdModeHD1080p25	1920	1080	25	1	25000	1000
bmdModeHD1080p2997	1920	1080	30/1.001	1	30000	1001
bmdModeHD1080p30	1920	1080	30	1	30000	1000

continued over page...

Mode	Width	Height	Frames per Second	Fields per Frame	Suggested Time Scale	Display Duration
bmdModeHD1080i50	1920	1080	25	2	25	1
bmdModeHD1080i5994	1920	1080	30/1.001	2	30000	1001
bmdModeHD1080i6000	1920	1080	30	2	30000	1000
bmdModeHD1080p50	1920	1080	50	1	50000	1000
bmdModeHD1080p5994	1920	1080	60/1.001	1	60000	1001
bmdModeHD1080p6000	1920	1080	60	1	60000	1000
bmdMode2k2398	2048	1556	24/1.001	2	24000	1001
bmdMode2k24	2048	1556	24	2	24	1
bmdMode2k25	2048	1556	25	2	25000	1000

**Note:** bmdModeNTSC2398 mode will be played out on the SDI output with a frame rate of 29.97 frames per second with 3:2 pull down.

Some cards may not support all of these modes.

## 2.6.4 Pixel Formats

**BMDPixelFormat** enumerates the pixel formats supported for output and input.

**bmdFormat8BitYUV** : 'UYVY' 4:2:2 Representation

Four 8-bit unsigned components (CCIR 601) are packed into one 32-bit **little-endian** word.



```
int framesize = (Width * 16 / 8) * Height
              = rowbytes * Height
```

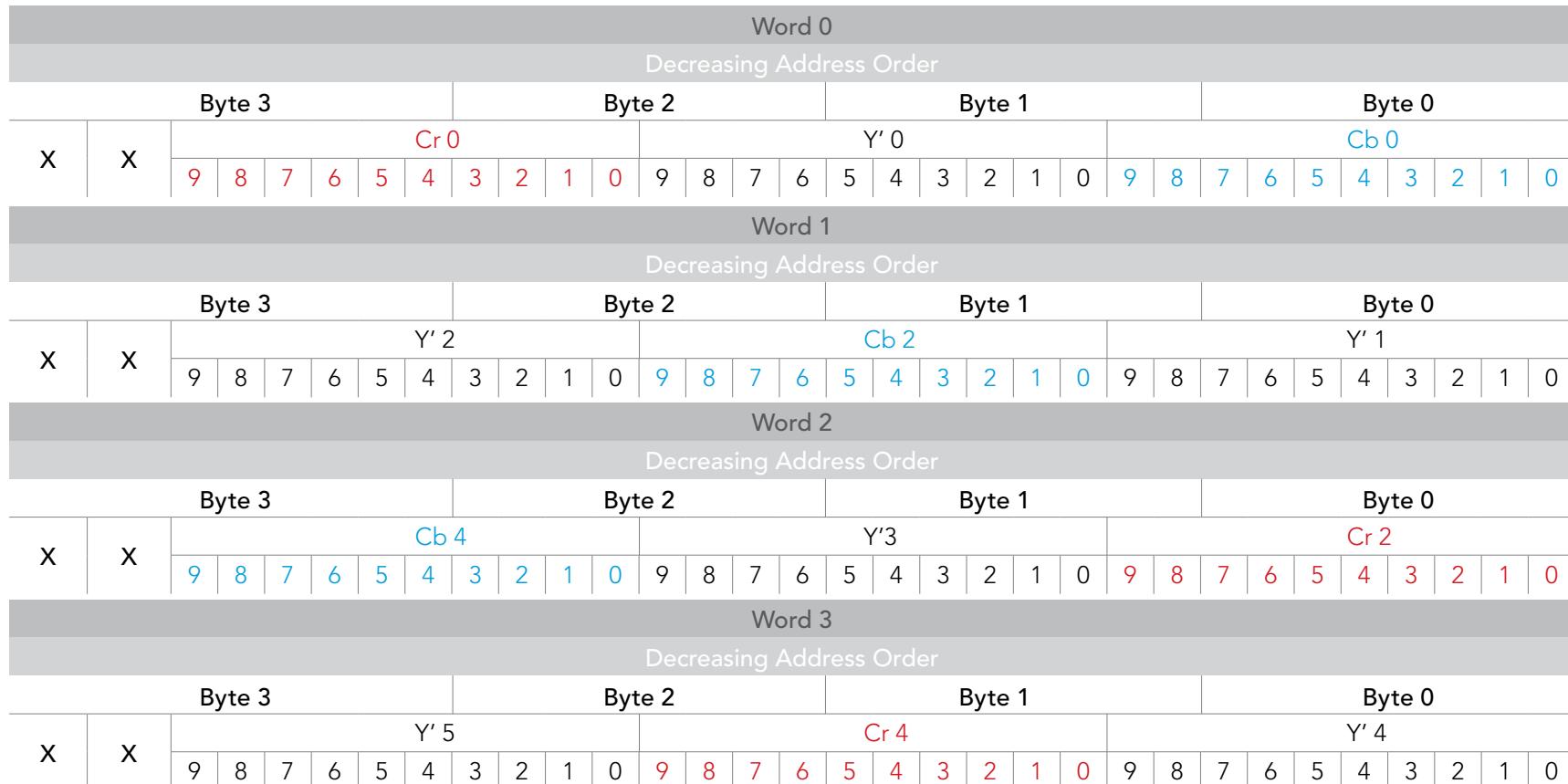
In this format, two pixels fit into 32 bits or 4 bytes, so one pixel fits into 16 bits or 2 bytes.

For the row bytes calculation, the image width is multiplied by the number of bytes per pixel.

For the frame size calculation, the row bytes are simply multiplied by the number of rows in the frame.

**bmdFormat10BitYUV** : 'v210' 4:2:2 Representation

Twelve 10-bit unsigned components are packed into four 32-bit **little-endian** words.

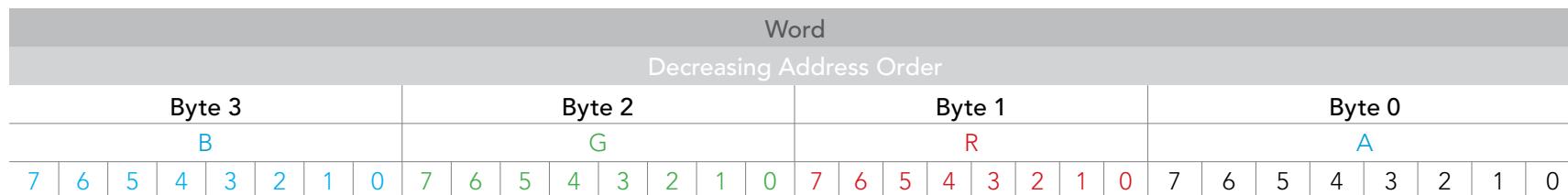


```
int framesize = ((Width + 47) / 48) * 128 * Height
                = rowbytes * Height
```

In this format, each line of video must be aligned on a 128 byte boundary. Six pixels fit into 16 bytes so 48 pixels fit in 128 bytes. For the row bytes calculation the image width is rounded to the nearest 48 pixel boundary and multiplied by 128. For the frame size calculation the row bytes are simply multiplied by the number of rows in the frame.

**bmdFormat8BitARGB** : ARGB (or ARGB32) 4:4:4:4 raw

Four 8-bit unsigned components are packed into one 32-bit little-endian word.  
Alpha channel is valid.



```
int framesize = (Width * 32 / 8) * Height
                = rowbytes * Height
```

In this format, each pixel fits into 32 bits or 4 bytes. For the row bytes calculation the image width is multiplied by the number of bytes per pixel. For the frame size calculation, the row bytes are simply multiplied by the number of rows in the frame.

**bmdFormat8BitBGRA** : BGRA (or RGB32) 4:4:4:x raw

Four 8-bit unsigned components are packed into one 32-bit little-endian word.

The alpha channel may be valid.

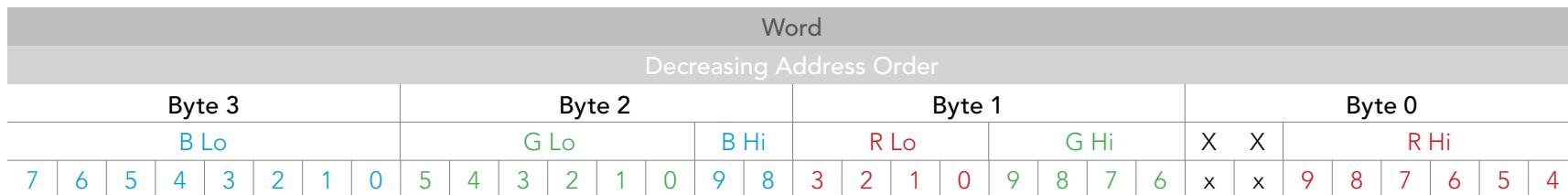
Word															
Decreasing Address Order															
Byte 3				Byte 2				Byte 1				Byte 0			
X				R				G				B			
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

```
int framesize = (Width * 32 / 8) * Height
               = rowbytes * Height
```

In this format, each pixel fits into 32 bits or 4 bytes. For the row bytes calculation, the image width is multiplied by the number of bytes per pixel. For the frame size calculation, the row bytes are simply multiplied by the number of rows in the frame.

**bmdFormat10BitRGB** : 'r210' 4:4:4 raw

Three 10-bit unsigned components are packed into one 32-bit big-endian word.



```
int framesize = ((Width + 63) / 64) * 256 * Height
            = rowbytes * Height
```

In this format each line of video must be aligned a 256 byte boundary. One pixel fits into 4 bytes so 64 pixels fit into 256 bytes. For the row bytes calculation, the image width is rounded to the nearest 64 pixel boundary and multiplied by 256. For the frame size calculation, the row bytes are simply multiplied by the number of rows in the frame.

### 2.6.5 Field Dominance

<b>BMDFieldDominance</b>	enumerates settings applicable to video fields.
<b>bmdUnknownFieldDominance</b>	Indeterminate field dominance.
<b>bmdLowerFieldFirst</b>	The first frame starts with the lower field (the second-from-the-top scan line).
<b>bmdUpperFieldFirst</b>	The first frame starts with the upper field (the top scan line).
<b>bmdProgressiveFrame</b>	A complete frame containing all scan lines.
<b>bmdProgressiveSegmentedFrame</b>	A progressive frame encoded as a PsF (See <b>IDeckLinkDisplayMode::GetFieldDominance</b> for details)

## 2.6.6 Frame Flags

**BMDFrameFlags** enumerates a set of flags applicable to a video frame.

<b>bmdFrameFlagDefault</b>	No other flags applicable.
<b>bmdFrameFlagFlipVertical</b>	Frame should be flipped vertically on output
<b>bmdFrameHasNoInputSource</b>	No input source was detected – frame is invalid

## 2.6.7 Video Input Flags

**BMDVideoInputFlags** enumerates a set of flags applicable to video input.

<b>bmdVideoInputFlagDefault</b>	No other flags applicable
<b>bmdVideoInputEnableFormatDetection</b>	Enable video input mode detection. (See <a href="#">IDeckLinkInputCallback::VideoInputFormatChanged</a> for details)
<b>bmdVideoInputDualStream3D</b>	Set the DeckLink device to capture the 3D mode version of the selected <b>BMDDisplayMode</b> display mode.

## 2.6.8 Video Output Flags

**BMDVideoOutputFlags** enumerates flags which control the output of video data.

<b>bmdVideoOutputFlagDefault</b>	No flags applicable.
<b>bmdVideoOutputRP188</b>	Output RP188 timecode. If supplied see: <a href="#">IDeckLinkMutableVideoFrame::SetTimecode</a>
<b>bmdVideoOutputVANC</b>	Output VANC data. If supplied see: <a href="#">IDeckLinkMutableVideoFrame::SetAncillaryData</a>
<b>bmdVideoOutputVITC</b>	Output VITC timecode data. If supplied see: <a href="#">IDeckLinkMutableVideoFrame::SetAncillaryData</a>
<b>bmdVideoOutputDualStream3D</b>	Set the DeckLink device to output the 3D version of the selected <b>BMDDisplayMode</b> display mode.

## 2.6.9 Output Frame Completion Results Flags

**BMDOutputFrameCompletionResult** enumerates the possible frame output completion statuses.

<b>bmdOutputFrameCompleted</b>	Frame was displayed normally
<b>bmdOutputFrameDisplayedLate</b>	Frame was displayed late
<b>bmdOutputFrameDropped</b>	Frame was dropped
<b>bmdOutputFrameFlushed</b>	Frame was flushed

Frames are “flushed” when they have been scheduled but are no longer needed due to an action initiated by the API user e.g. a speed or direction change. If frame scheduling falls behind frame output, the hardware will output the least late frame available. When this happens, the frame will receive a completion status of “displayed late”. Frames that are never displayed due to a less late frame being available will receive a completion status of “dropped”.

## 2.6.10 Frame preview format

**BMD3DPreviewFormat** enumerates the dual preview formats available for the DeckLink screen preview.

The OpenGL based preview format can be set using **IDeckLinkGLScreenPreviewHelper::SetLinkedFramePreviewFormat**.

The DirectX based preview format can be set using **IDeckLinkDX9ScreenPreviewHelper::Set3DPreviewFormat**.

<b>bmd3DPreviewFormatDefault</b>	Preview frames in the default top-bottom format.
<b>bmd3DPreviewFormatLeftOnly</b>	Preview the left eye frame only.
<b>bmd3DPreviewFormatRightOnly</b>	Preview the right eye frame only.
<b>bmd3DPreviewFormatSideBySide</b>	Preview the frames frame in side by side format
<b>bmd3DPreviewFormatTopBottom</b>	Preview the frames in top-bottom format.

### 2.6.11 Video Connection Modes

**BMDVideoConnection** enumerates the possible video connection interfaces.

<b>bmdVideoConnectionSDI</b>	SDI video connection
<b>bmdVideoConnectionHDMI</b>	HDMI video connection
<b>bmdVideoConnectionOpticalSDI</b>	Optical SDI connection
<b>bmdVideoConnectionComponent</b>	Component video connection
<b>bmdVideoConnectionComposite</b>	Composite video connection
<b>bmdVideoConnectionSVideo</b>	S-Video connection

### 2.6.12 Audio Sample Rates

**BMDAudioSampleRate** enumerates the possible audio sample rates.

<b>bmdAudioSampleRate48kHz</b>	48 kHz sample rate
--------------------------------	--------------------

### 2.6.13 Audio Sample Types

**BMDAudioSampleType** enumerates the possible audio sample types.

<b>bmdAudioSampleType16bitInteger</b>	16 bit audio sample
<b>bmdAudioSampleType32bitInteger</b>	32 bit audio sample

### 2.6.14 DeckLink Information ID

**BMDDeckLinkAPIInformationID** enumerates a set of information details which may be queried (see **IDeckLinkAPIInformation** Interface for details).

Name	Type	Description																
<b>BMDDeckLinkAPIVersion</b>	String	The user viewable API version number. This allocated string must be freed by the caller when no longer required.																
<b>BMDDeckLinkAPIVersion</b>	Int	<p>The API version number.</p> <p>Format:</p> <table><tr><td colspan="4">Word</td></tr><tr><td colspan="4">Decreasing Address Order</td></tr><tr><td>Byte 4</td><td>Byte 3</td><td>Byte 2</td><td>Byte 1</td></tr><tr><td>Major Version</td><td>Minor Version</td><td>Sub Version</td><td>Extra</td></tr></table>	Word				Decreasing Address Order				Byte 4	Byte 3	Byte 2	Byte 1	Major Version	Minor Version	Sub Version	Extra
Word																		
Decreasing Address Order																		
Byte 4	Byte 3	Byte 2	Byte 1															
Major Version	Minor Version	Sub Version	Extra															

### 2.6.15 DeckLink Attribute ID

**BMDDeckLinkAttributeID** enumerates a set of attributes of a DeckLink device which may be queried (see **IDeckLinkAttributes** Interface for details).

Name	Type	Description
<b>BMDDeckLinkSupportsInternalKeying</b>	Flag	True if internal keying is supported on this device.
<b>BMDDeckLinkSupportsExternalKeying</b>	Flag	True if external keying is supported on this device.
<b>BMDDeckLinkSupportsHDKeying</b>	Flag	True if HD keying is supported on this device.
<b>BMDDeckLinkSerialDevicePortName</b>	String	The operating system name of the RS422 serial port on this device. This allocated string must be freed by the caller when no longer required.
<b>BMDDeckLinkMaximumAudioChannels</b>	Int	The maximum number of audio channels supported by this device.
<b>BMDDeckLinkSupportsInputFormatDetection</b>	Flag	True if input format detection is supported on this device.
<b>BMDDeckLinkHasReferenceInput</b>	Flag	True if the DeckLink device has a genlock reference source input connector.
<b>BMDDeckLinkHasSerialPort</b>	Flag	True if device has a serial port.
<b>BMDDeckLinkNumberOfSubDevices</b>	Int	Some DeckLink hardware devices contain multiple independent sub-devices. This attribute will be equal to one for most devices, or two or more on a card with multiple sub-devices (eg DeckLink Duo).
<b>BMDDeckLinkSubDeviceIndex</b>	Int	Some DeckLink hardware devices contain multiple independent sub-devices. This attribute indicates the index of the sub-device, starting from zero.
<b>BMDDeckLinkVideoOutputConnections</b>	Int	The video output connections supported by the hardware (see <b>BMDVideoConnection</b> for more details). Multiple video output connections can be active simultaneously. When querying the enabled video outputs, the returned integer is a bitmask of <b>BMDVideoConnection</b> where the corresponding bit is set for each active output connection.
<b>BMDDeckLinkVideoInputConnections</b>	Int	The video input connections supported by the hardware (see <b>BMDVideoConnection</b> for more details).

Name	Type	Description
BMDDeckLinkHasAnalogVideoOutputGain	Flag	True if analog video output gain adjustment is supported on this device.
BMDDeckLinkCanOnlyAdjustOverallVideoOutputGain	Flag	True if only the overall video output gain can be adjusted. In this case, only the luma gain can be accessed with the IDeckLinkConfiguration interface, and it controls all three gains (luma, chroma blue and chroma red).
BMDDeckLinkHasVideoInputAntiAliasingFilter	Flag	True if there is an antialiasing filter on the analog video input of this device.
BMDDeckLinkHasBypass	Flag	True if this device has loop-through bypass function.
BMDDeckLinkVideoInputGainMinimum	Float	The minimum video input gain in dB for this device.
BMDDeckLinkVideoInputGainMaximum	Float	The maximum video input gain in dB for this device.
BMDDeckLinkVideoOutputGainMinimum	Float	The minimum video output gain in dB for this device.
BMDDeckLinkVideoOutputGainMaximum	Float	The maximum video output gain in dB for this device.
BMDDeckLinkDeviceBusyState	Int	The current busy state of the device. (See <b>BMDDeviceBusyState</b> for more information)
BMDDeckLinkSupportsDesktopDisplay	Flag	True if the extended desktop feature is supported on this device and platform.
BMDDeckLinkDeviceIsPlaybackOnly	Flag	True if this device only supports playback operations.
BMDDeckLinkDeviceIsCaptureOnly	Flag	True if this device only supports capture operations.
BMDDeckLinkSupportsClockTimingAdjustment	Flag	True if this device supports clock timing adjustment.

### 2.6.16 DeckLink Configuration ID

**BMDDeckLinkConfigurationID** enumerates the set of configuration settings of a DeckLink device which may be queried or set (see **IDeckLinkConfiguration** Interface for details).

Name	Type	Description
<code>bmdDeckLinkConfigUse1080pNotPsF</code>	Flag	In 1080 modes use P not PsF if this setting is enabled.
<code>bmdDeckLinkConfigHDMI3DPackingFormat</code>	Int(64)	The 3D packing format setting. See <b>BMDVideo3DPackingFormat</b> for more details.
<code>bmdDeckLinkConfigAnalogAudioConsumerLevels</code>	Flag	If set true the analog audio levels are set to maximum gain on audio input and maximum attenuation on audio output. If set false the selected analog input and output gain levels are used.
<code>bmdDeckLinkConfigFieldFlickerRemoval</code>	Flag	Sets field flicker removal when paused functionality. True if enabled.
<code>bmdDeckLinkConfigHD1080p24ToHD1080i5994Conversion</code>	Flag	True if HD 1080p24 to HD 1080i5994 conversion is enabled.
<code>bmdDeckLinkConfig444SDIVideoOutput</code>	Flag	True if 444 video output is enabled.
<code>bmdDeckLinkConfig3GBpsVideoOutput</code>	Flag	True if 3GB/s video output is enabled.
<code>bmdDeckLinkConfigBlackVideoOutputDuringCapture</code>	Flag	True if black output during capture is enabled. This feature is only supported on legacy DeckLink devices.
<code>bmdDeckLinkConfigLowLatencyVideoOutput</code>	Flag	If set true, the latency in scheduled video playback will be improved. If set true, <b>DisplayVideoFrameSync</b> will guarantee that the provided frame will be output as soon the previous frame output has been completed. This feature should be considered experimental.

Name	Type	Description
bmdDeckLinkConfigVideoOutputConnection	Int(64)	The output video connection. See <b>BMDVideoConnection</b> for more details. Enabling video output on one connection will enable output on other available output connections which are compatible. The status of active output connection can be queried with this setting. Multiple video output connections can be active simultaneously. When querying the enabled video outputs, the returned integer is a bitmask of <b>BMDVideoConnection</b> where the corresponding bit is set for each active output connection. When setting active video outputs, only one video output connection can be enabled per call, ie, the integer argument must refer to a single video output connection. Enabling multiple output connections simultaneously requires multiple calls.
bmdDeckLinkConfigVideoOutputConversionMode	Int(64)	Settings for video output conversion. The possible output modes are enumerated by <b>BMDVideoOutputConversionMode</b> .
bmdDeckLinkConfigAnalogVideoOutputFlags	Int(64)	Settings for analog video output. <b>BMDAnalogVideoFlags</b> enumerates the available analog video flags.
bmdDeckLinkConfigReferenceInputTimingOffset	Int(64)	Adjust genlock timing offset. The supported range is between -511 and 511.
bmdDeckLinkConfigVideoInputConnection	Int(64)	The input video connection. Only one video input connection can be active at a time. See <b>BMDVideoConnection</b> for more details.
bmdDeckLinkConfigAnalogVideoInputFlags	Int(64)	The analog video input flags. See <b>BMDAnalogVideoFlags</b> for more details.
bmdDeckLinkConfigVideoInputConversionMode	Int(64)	The video input conversion mode. See <b>BMDVideoInputConversionMode</b> for more details.
bmdDeckLinkConfig32PulldownSequenceInitialTimecodeFrame	Int(64)	The A-frame setting for NTSC 23.98, which is used to appropriately adjust the timecode. The frame setting range is between 0 and 29.
bmdDeckLinkConfigVANCSourceLine1Mapping	Int(64)	The configuration of up to three lines of VANC to be transferred to or from the active picture on capture or output. The acceptable range is between 0 and 30. A value of 0 will disable the capture of that line.
bmdDeckLinkConfigVANCSourceLine2Mapping		The acceptable range is between 0 and 30. A value of 0 will disable the capture of the line.
bmdDeckLinkConfigVANCSourceLine3Mapping		The acceptable range is between 0 and 30. A value of 0 will disable the capture of the line.

Name	Type	Description
bmdDeckLinkConfigAudioInputConnection	Int(64)	The configuration of the audio input connection. See <b>BMDAudioConnection</b> for more details.
bmdDeckLinkConfigAnalogAudioInputScaleChannel1	Float	The analog audio input scale in dB. The supported range is between -12.00 and 12.00.
bmdDeckLinkConfigAnalogAudioInputScaleChannel2		
bmdDeckLinkConfigAnalogAudioInputScaleChannel3		
bmdDeckLinkConfigAnalogAudioInputScaleChannel4		
bmdDeckLinkConfigDigitalAudioInputScale	Float	The digital audio input scale in dB. The acceptable range is between -12.00 and 12.00.
bmdDeckLinkConfigAudioOutputAESAnalogSwitch	Int(64)	The AES / analog audio output selection switch. This is applicable only to cards that support switchable analog audio outputs.
bmdDeckLinkConfigAnalogAudioOutputScaleChannel1	Float	The analog audio output scale in dB. The acceptable range is between -12.00 and 12.00.
bmdDeckLinkConfigAnalogAudioOutputScaleChannel2		
bmdDeckLinkConfigAnalogAudioOutputScaleChannel3		
bmdDeckLinkConfigAnalogAudioOutputScaleChannel4		
bmdDeckLinkConfigDigitalAudioOutputScale	Float	The digital audio output scale in dB. The acceptable range is between -12.00 and 12.00.
bmdDeckLinkConfigVideoOutputIdleOperation	Int(64)	Video output idle control. See <b>BMDIdleVideoOutputOperation</b> for more details.
bmdDeckLinkConfigSwapSerialRxTx	Flag	If set to true, the Rx and Tx lines of the RS422 port on the DeckLink device will be swapped.
bmdDeckLinkConfigBypass	Int(64)	The state of the bypass feature. This parameter can be set to a value of -1 for normal operation or zero to bypass the card. A timeout of up to 65 seconds may be specified in milliseconds. If the timeout is reached without the parameter being reset, the card will be bypassed automatically. The actual timeout will be approximately the time requested.
bmdDeckLinkConfigClockTimingAdjustment	Int(64)	Clock frequency adjustment for fine output control. The acceptable range is from -127 to 127 PPM (Parts Per Million).

Name	Type	Description
bmdDeckLinkConfigVideoInputScanning	Flag	The video input connector scanning on the H.264 Pro Recorder. True if enabled.
bmdDeckLinkConfigDefaultVideoOutputMode	Int(64)	The default video output mode. See <b>BMDDisplayMode</b> for more details.
bmdDeckLinkConfigDefaultVideoOutputModeFlags	Int(64)	The default video output mode 2D or 3D flag setting. See <b>bmdVideoOutputDualStream3D</b> for more details.
bmdDeckLinkConfigVideoOutputComponentLumaGain	Float	The component video output luma gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoOutputGainMinimum</b> and <b>BMDDeckLinkVideoOutputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoOutputComponentChromaBlueGain	Float	The component video output chroma blue gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoOutputGainMinimum</b> and <b>BMDDeckLinkVideoOutputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoOutputComponentChromaRedGain	Float	The component video output chroma red gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoOutputGainMinimum</b> and <b>BMDDeckLinkVideoOutputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoOutputCompositeLumaGain	Float	The composite video output luma gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoOutputGainMinimum</b> and <b>BMDDeckLinkVideoOutputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoOutputCompositeChromaGain	Float	The composite video output chroma gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoOutputGainMinimum</b> and <b>BMDDeckLinkVideoOutputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoOutputSVideoLumaGain	Float	The s-video output luma gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoOutputGainMinimum</b> and <b>BMDDeckLinkVideoOutputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoOutputSVideoChromaGain	Float	The s-video output chroma gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoOutputGainMinimum</b> and <b>BMDDeckLinkVideoOutputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.

Name	Type	Description
bmdDeckLinkConfigVideoInputComponentLumaGain	Float	The component video input luma gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoInputGainMinimum</b> and <b>BMDDeckLinkVideoInputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoInputComponentChromaBlueGain	Float	The component video input chroma blue gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoInputGainMinimum</b> and <b>BMDDeckLinkVideoInputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoInputComponentChromaRedGain	Float	The component video input chroma red gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoInputGainMinimum</b> and <b>BMDDeckLinkVideoInputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoInputCompositeLumaGain	Float	The composite video input luma gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoInputGainMinimum</b> and <b>BMDDeckLinkVideoInputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoInputCompositeChromaGain	Float	The composite video input chroma gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoInputGainMinimum</b> and <b>BMDDeckLinkVideoInputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoInputSVideoLumaGain	Float	The s-video input luma gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoInputGainMinimum</b> and <b>BMDDeckLinkVideoInputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.
bmdDeckLinkConfigVideoInputSVideoChromaGain	Float	The s-video input chroma gain in dB. The accepted range can be determined by using the <b>BMDDeckLinkVideoInputGainMinimum</b> and <b>BMDDeckLinkVideoInputGainMaximum</b> attributes with <b>IDeckLinkAttributes</b> interface.

### 2.6.17 Audio Output Stream Type

**BMDAudioOutputStreamType** enumerates the Audio output stream type  
(see **IDeckLinkOutput::EnableAudioOutput** for details).

**bmdAudioOutputStreamContinuous**

Audio stream is continuous.

**bmdAudioOutputStreamContinuousDontResample**

Lock audio sample rate. (not currently supported)

**bmdAudioOutputStreamTimestamped**

Audio stream is time stamped.

### 2.6.18 Analog Video Flags

**BMDAnalogVideoFlags** enumerates a set of flags applicable to analog video.

**bmdAnalogVideoFlagCompositeSetup75**

This flag is only applicable to NTSC composite video and sets the black level to 7.5 IRE, which is used in the USA, rather than the default of 0.0 IRE which is used in Japan.

**bmdAnalogVideoFlagComponentBetacamLevels**

This flag is only applicable to the component analog video levels. It sets the levels of the color difference channels in accordance to the SMPTE standard or boosts them by a factor of 4/3 for the Betacam format.

### 2.6.19 Audio Connection Modes

**BMDAudioConnection** enumerates the possible audio connection interfaces.

**bmdAudioConnectionEmbedded**      Embedded SDI or HDMI audio connection

**bmdAudioConnectionAES/EBU**      AES/EBU audio connection

**bmdAudioConnectionAnalog**      Analog audio connection

### 2.6.20 Audio Output Selection switch

**BMDAudioOutputAnalogAESSwitch** enumerates the settings of the audio output Analog / AES switch.

Refer to the **IDeckLinkConfiguration** interface to get and set analog / AES switch settings.

**bmdAudioOutputSwitchAESEBU**

AES / EBU audio output.

**bmdAudioOutputSwitchAnalog**

Analog audio output.

### 2.6.21 Output Conversion Modes

**BMDVideoOutputConversionMode** enumerates the possible video output conversions.

**bmdNoVideoOutputConversion**

No video output conversion

**bmdVideoOutputLetterboxDownconversion**

Down-converted letterbox SD output

**bmdVideoOutputAnamorphicDownconversion**

Down-converted anamorphic SD output

**bmdVideoOutputHD720toHD1080Conversion**

HD720 to HD1080 conversion output

**bmdVideoOutputHardwareLetterboxDownconversion**

Simultaneous output of HD and down-converted letterbox SD

**bmdVideoOutputHardwareAnamorphicDownconversion**

Simultaneous output of HD and down-converted anamorphic SD

**bmdVideoOutputHardwareCenterCutDownconversion**

Simultaneous output of HD and center cut SD

**bmdVideoOutputHardware720p1080pCrossconversion**

The simultaneous output of 720p and 1080p cross-conversion

**bmdVideoOutputHardwareAnamorphic720pUpconversion**

The simultaneous output of SD and up-converted anamorphic 720p

**bmdVideoOutputHardwareAnamorphic1080iUpconversion**

The simultaneous output of SD and up-converted anamorphic 1080i

**bmdVideoOutputHardwareAnamorphic149To720pUpconversion**

The simultaneous output of SD and up-converted anamorphic

widescreen aspect ratio 14:9 to 720p.

**bmdVideoOutputHardwareAnamorphic149To1080iUpconversion**

The simultaneous output of SD and up-converted anamorphic

widescreen aspect ratio 14:9 to 1080i.

**bmdVideoOutputHardwarePillarbox720pUpconversion**

The simultaneous output of SD and up-converted pillarbox 720p

**bmdVideoOutputHardwarePillarbox1080iUpconversion**

The simultaneous output of SD and up-converted pillarbox 1080i

## 2.6.22 Input Conversion Modes

**BMDVideoInputConversionMode** enumerates the possible video input conversions.

<b>bmdNoVideoInputConversion</b>	No video input conversion
<b>bmdVideoInputLetterboxDownconversionFromHD1080</b>	HD1080 to SD video input down conversion
<b>bmdVideoInputAnamorphicDownconversionFromHD1080</b>	Anamorphic from HD1080 to SD video input down conversion
<b>bmdVideoInputLetterboxDownconversionFromHD720</b>	Letter box from HD720 to SD video input down conversion
<b>bmdVideoInputAnamorphicDownconversionFromHD720</b>	Anamorphic from HD720 to SD video input down conversion
<b>bmdVideoInputLetterboxUpconversion</b>	Letterbox video input up conversion
<b>bmdVideoInputAnamorphicUpconversion</b>	Anamorphic video input up conversion

## 2.6.23 Video Input Format Changed Events

**BMDVideoInputFormatChangedEvents** enumerates the properties of the video input signal format that have changed.

(See **IDeckLinkInputCallback::VideoInputFormatChanged** for details).

<b>bmdVideoInputDisplayModeChanged</b>	Video input display mode has changed (see <b>BMDDisplayMode</b> for details)
<b>bmdVideoInputFieldDominanceChanged</b>	Video input field dominance has changed (see <b>BMDFieldDominance</b> for details)
<b>bmdVideoInputColorspaceChanged</b>	Video input color space has changed (see <b>BMDDetectedVideoInputFormatFlags</b> for details))

## 2.6.24 Detected Video Input Format Flags

**BMDDetectedVideoInputFormatFlags** enumerates the video input signal

(See **IDeckLinkInputCallback::VideoInputFormatChanged** for details)

<b>bmdDetectedVideoInputYCbCr422</b>	The video input detected is YCbCr 4:2:2 representation.
<b>bmdDetectedVideoInputRGB444</b>	The video input detected is RGB 4:4:4 representation.

### 2.6.25 Display Mode Characteristics

**BMDDisplayModeFlags** enumerates the possible characteristics of an **IDeckLinkDisplayMode** object.

**bmdDisplayModeSupports3D**

The 3D equivalent of this display mode is supported by the installed DeckLink device.

**bmdDisplayModeColorspaceRec601**

This display mode uses the Rec. 601 standard for encoding interlaced analogue video signals in digital form.

**bmdDisplayModeColorspaceRec709**

This display mode uses the Rec. 709 standard for encoding high definition video content.

### 2.6.26 Video 3D packing format

The **BMDVideo3DPackingFormat** enumerates standard modes where two frames are packed into one.

**bmdVideo3DPackingSidebySideHalf**

Frames are packed side-by-side as a single stream.

**bmdVideo3DPackingLinebyLine**

The two eye frames are packed on alternating lines of the source frame.

**bmdVideo3DPackingTopAndBottom**

The two eye frames are packed into the top and bottom half of the source frame.

**bmdVideo3DPackingFramePacking**

Frame packing is a standard HDMI 1.4a 3D mode (Top / Bottom full).

**bmdVideo3DPackingLeftOnly**

Only the left eye frame is displayed.

**bmdVideo3DPackingRightOnly**

Only the right eye frame is displayed.

### 2.6.27 Display Mode Support

**BMDDisplayModeSupport** enumerates the possible display mode support types.

**bmdDisplayModeNotSupported**

Display mode is not supported

**bmdDisplayModeSupported**

Display mode is supported natively

**bmdDisplayModeSupportedWithConversion**

Display mode is supported with conversion

### 2.6.28 BMDTimecodeFormat

**BMDTimecodeFormat** enumerates the possible video frame timecode formats.

**bmdTimecodeRP188VITC1**

RP188 VITC1 timecode (DBB1=1) on line 9.

**bmdTimecodeRP188VITC2**

RP188 VITC2 timecode (DBB1=2) on line 571.

**bmdTimecodeRP188LTC**

RP188 LTC timecode (DBB1=0) on line 10.

**bmdTimecodeRP188Any**

In capture mode the first valid RP188 timecode will be returned.

**bmdTimecodeVITC**

In playback mode the timecode is set as RP188 VITC1.

**bmdTimecodeVITCField2**

VITC timecode field 1.

**bmdTimecodeSerial**

VITC timecode field 2.

Serial timecode.

### 2.6.29 BMDTimecodeFlags

**BMDTimecodeFlags** enumerates the possible flags that accompany a timecode.

**bmdTimecodeFlagDefault**

timecode is a non-drop timecode

**bmdTimecodeIsDropFrame**

timecode is a drop timecode

## 2.6.30 BMDTimecodeBCD

Each four bits represent a single decimal digit:

digit	bit 3	bit 2	bit 1	bit 0
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

Word															
Decreasing Address Order															
Byte 4				Byte 3				Byte 2				Byte 1			
Tens of hours		hours		Tens of minutes		minutes		Tens of seconds		seconds		Tens of frames		frames	
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

### 2.6.31 Deck Control Mode

**BMDDeckControlMode** enumerates the possible deck control modes.

<b>bmdDeckControlNotOpened</b>	Deck control is not opened
<b>bmdDeckControlVTRControlMode</b>	Deck control VTR control mode
<b>bmdDeckControlExportMode</b>	Deck control export mode
<b>bmdDeckControlCaptureMode</b>	Deck control capture mode

### 2.6.32 Deck Control Event

**BMDDeckControlEvent** enumerates the possible deck control events.

<b>bmdDeckControlAbortedEvent</b>	This event is triggered when a capture or edit-to-tape operation is aborted.
<b>bmdDeckControlPrepareForExportEvent</b>	This export-to-tape event is triggered a few frames before reaching the in-point. At this stage, <b>IDeckLinkOutput::StartScheduledPlayback()</b> must be called.
<b>bmdDeckControlExportCompleteEvent</b>	This export-to-tape event is triggered a few frames after reaching the out-point. At this point, it is safe to stop playback. Upon reception of this event the deck's control mode is set back to <b>bmdDeckControlVTRControlMode</b> .
<b>bmdDeckControlPrepareForCaptureEvent</b>	This capture event is triggered a few frames before reaching the in-point. The serial timecode attached to <b>IDeckLinkVideoInputFrames</b> is now valid.
<b>bmdDeckControlCaptureCompleteEvent</b>	This capture event is triggered a few frames after reaching the out-point. Upon reception of this event the deck's control mode is set back to <b>bmdDeckControlVTRControlMode</b> .

### 2.6.33 Deck Control VTR Control States

**BMDDeckControlVTRControlState** enumerates the possible deck control VTR control states.

**bmdDeckControlNotInVTRControlMode**

The deck is currently not in VTR control mode.

**bmdDeckControlVTRControlPlaying**

The deck is currently playing.

**bmdDeckControlVTRControlRecording**

The deck is currently recording

**bmdDeckControlVTRControlStill**

The deck is currently paused.

**bmdDeckControlVTRControlShuttleForward**

The deck is currently in shuttle forward mode.

**bmdDeckControlVTRControlShuttleReverse**

The deck is currently in shuttle reverse mode.

**bmdDeckControlVTRControlJogForward**

The deck is currently in jog (one frame at a time) forward mode.

**bmdDeckControlVTRControlJogReverse**

The deck is currently in jog (one frame at a time) reverse mode.

**bmdDeckControlVTRControlStopped**

The deck is currently stopped.

### 2.6.34 Deck Control Status Flags

**BMDDeckControlStatusFlags** enumerates the possible deck control status flags.

**bmdDeckControlStatusDeckConnected**

The deck has been connected (TRUE) / disconnected (FALSE).

**bmdDeckControlStatusRemoteMode**

The deck is in remote (TRUE) / local mode (FALSE).

**bmdDeckControlStatusRecordInhibited**

Recording is inhibited (TRUE) / allowed(FALSE).

**bmdDeckControlStatusCassetteOut**

The deck does not have a cassette (TRUE).

### 2.6.35 Deck Control Export Mode Ops Flags

**BMDDeckControlExportModeOpsFlags** enumerates the possible deck control edit-to-tape and export-to-tape mode operations.

<b>bmdDeckControlExportModeInsertVideo</b>	Insert video
<b>bmdDeckControlExportModeInsertAudio1</b>	Insert audio track 1
<b>bmdDeckControlExportModeInsertAudio2</b>	Insert audio track 2
<b>bmdDeckControlExportModeInsertAudio3</b>	Insert audio track 3
<b>bmdDeckControlExportModeInsertAudio4</b>	Insert audio track 4
<b>bmdDeckControlExportModeInsertAudio5</b>	Insert audio track 5
<b>bmdDeckControlExportModeInsertAudio6</b>	Insert audio track 6
<b>bmdDeckControlExportModeInsertAudio7</b>	Insert audio track 7
<b>bmdDeckControlExportModeInsertAudio8</b>	Insert audio track 8
<b>bmdDeckControlExportModeInsertAudio9</b>	Insert audio track 9
<b>bmdDeckControlExportModeInsertAudio10</b>	Insert audio track 10
<b>bmdDeckControlExportModeInsertAudio11</b>	Insert audio track 11
<b>bmdDeckControlExportModeInsertAudio12</b>	Insert audio track 12
<b>bmdDeckControlExportModeInsertTimeCode</b>	Insert timecode
<b>bmdDeckControlExportModeInsertAssemble</b>	Enable assemble editing.
<b>bmdDeckControlExportModeInsertPreview</b>	Enable preview auto editing
<b>bmdDeckControlUseManualExport</b>	Use edit on/off (TRUE) or autoedit (FALSE). Edit on/off is currently not supported.

### 2.6.36 Deck Control error

**BMDDeckControlError** enumerates the possible deck control errors.

**bmdDeckControlNoModelError**

**bmdDeckControlModeError**

The deck is not in the correct mode for the desired operation.

Eg. A play command is issued, but the current mode is not VTRControlMode

**bmdDeckControlMissedInPointError**

The in point was missed while prerolling as the current timecode has passed the begin in / capture timecode.

**bmdDeckControlDeckTimeoutError**

Deck control timeout error

**bmdDeckControlCommandFailedError**

A deck control command request has failed.

**bmdDeckControlDeviceAlreadyOpenedError**

The deck control device is already open.

**bmdDeckControlFailedToOpenDeviceError**

Deck control failed to open the serial device.

**bmdDeckControlInLocalModeError**

The deck in local mode and is no longer controllable.

**bmdDeckControlEndOfTapeError**

Deck control has reached or is trying to move past the end of the tape.

**bmdDeckControlUserAbortError**

Abort an export-to-tape or capture operation.

**bmdDeckControlNoTapeInDeckError**

There is currently no tape in the deck.

**bmdDeckControlNoVideoFromCardError**

A capture or export operation was attempted when the input signal was invalid.

**bmdDeckControlNoCommunicationError**

The deck is not responding to requests.

**bmdDeckControlBufferTooSmallError**

When sending a custom command, either the internal buffer is too small for the provided custom command (reduce the size of the custom command), or the buffer provided for the command's response is too small (provide a larger one).

**bmdDeckControlBadChecksumError**

When sending a custom command, the deck's response contained an invalid checksum.

**bmdDeckControlUnknownError**

Deck control unknown error

### 2.6.37 Genlock reference status

**BMDReferenceStatus** enumerates the genlock reference statuses of the DeckLink device.

**bmdReferenceNotSupportedByHardware**

The DeckLink device does not have a genlock input connector.

**bmdReferenceLocked**

Genlock reference lock has been achieved.

### 2.6.38 Idle Video Output Operation

**BMDIdleVideoOutputOperation** enumerates the possible output modes when idle.

**bmdIdleVideoOutputBlack**

When not playing video, the device will output black frames.

**bmdIdleVideoOutputLastFrame**

When not playing video, the device will output the last frame played.

### 2.6.39 Device Busy State

**BMDDeviceBusyState** enumerates the possible busy states for a device.

**bmdDeviceCaptureBusy**

The device is currently being used for capture.

**bmdDevicePlaybackBusy**

The device is currently being used for playback.

**bmdDeviceSerialPortBusy**

The device's serial port is currently being used.

#### 2.6.40 Streaming Device Mode

**BMDStreamingDeviceMode** enumerates the possible device modes for the streaming device.

**bmdStreamingDeviceNotPowered**  
**bmdStreamingDeviceBooting**  
**bmdStreamingDeviceNeedsFirmwareUpdate**  
**bmdStreamingDeviceUpdatingFirmware**  
**bmdStreamingDeviceIdle**  
**bmdStreamingDeviceEncoding**  
**bmdStreamingDeviceStopping**  
**bmdStreamingDeviceUnknown**

The streaming device is not powered.  
The streaming device is booting.  
The streaming device needs a firmware update.  
The streaming device is updating firmware.  
The streaming device is idle.  
The streaming device is encoding.  
The streaming device is stopping.  
The streaming device is in an unknown state.

#### 2.6.41 Streaming Device Encoding Frame Rates

**BMDStreamingEncodingFrameRate** enumerates the possible encoded frame rates of the streaming device.

**bmdStreamingEncodedFrameRate50i**  
**bmdStreamingEncodedFrameRate5994i**  
**bmdStreamingEncodedFrameRate60i**  
**bmdStreamingEncodedFrameRate2398p**  
**bmdStreamingEncodedFrameRate24p**  
**bmdStreamingEncodedFrameRate25p**  
**bmdStreamingEncodedFrameRate2997p**  
**bmdStreamingEncodedFrameRate30p**  
**bmdStreamingEncodedFrameRate50p**  
**bmdStreamingEncodedFrameRate5994p**  
**bmdStreamingEncodedFrameRate60p**

The encoded interlaced frame rate is 50 fields per second.  
The encoded interlaced frame rate is 59.94 fields per second.  
The encoded interlaced frame rate is 60 fields per second.  
The encoded progressive frame rate is 23.98 frames per second.  
The encoded progressive frame rate is 24 frames per second.  
The encoded progressive frame rate is 25 frames per second.  
The encoded progressive frame rate is 29.97 frames per second.  
The encoded progressive frame rate is 30 frames per second.  
The encoded progressive frame rate is 50 frames per second.  
The encoded progressive frame rate is 59.94 frames per second.  
The encoded progressive frame rate is 60 frames per second.

#### 2.6.42 Streaming Device Encoding Support

**BMDStreamingEncodingSupport** enumerates the possible types of support for an encoding mode.

**bmdStreamingEncodingModeNotSupported**

The encoding mode is not supported.

**bmdStreamingEncodingModeSupported**

The encoding mode is supported.

**bmdStreamingEncodingModeSupportedWithChanges**

The encoding mode is supported with changes to encoding parameters.

#### 2.6.43 Streaming Device Codecs

**BMDStreamingVideoCodec** enumerates the possible codecs that are supported by the streaming device.

**bmdStreamingVideoCodecH264**

The H.264/AVC video compression codec.

#### 2.6.44 Streaming Device H264 Profile

**BMDStreamingH264Profile** enumerates the possible H.264 video coding profiles that are available on the streaming device. Profiles indicate the complexity of algorithms and coding tools required by a decoder, with Baseline Profile requiring the lowest complexity decoder to decode the encoded video.

**bmdStreamingH264ProfileHigh**

High Profile

**bmdStreamingH264ProfileMain**

Main Profile

**bmdStreamingH264ProfileBaseline**

Baseline Profile

#### 2.6.45 Streaming Device H264 Level

**BMDStreamingH264Level** enumerates the possible H.264 video coding levels that are available on the streaming device. Levels indicate bitrate and resolution constraints on a video decoder. Higher levels require a decoder capable of decoding higher bitrates and resolutions than lower levels.

<b>bmdStreamingH264Level12</b>	Level 1.2
<b>bmdStreamingH264Level13</b>	Level 1.3
<b>bmdStreamingH264Level2</b>	Level 2
<b>bmdStreamingH264Level21</b>	Level 2.1
<b>bmdStreamingH264Level22</b>	Level 2.2
<b>bmdStreamingH264Level3</b>	Level 3
<b>bmdStreamingH264Level31</b>	Level 3.1
<b>bmdStreamingH264Level32</b>	Level 3.2
<b>bmdStreamingH264Level4</b>	Level 4
<b>bmdStreamingH264Level41</b>	Level 4.1
<b>bmdStreamingH264Level42</b>	Level 4.2

#### 2.6.46 Streaming Device H264 Entropy Coding

**BMDStreamingH264EntropyCoding** enumerates the possible entropy coding options.

<b>bmdStreamingH264EntropyCodingCAVLC</b>	Context-adaptive variable-length coding.
<b>bmdStreamingH264EntropyCodingCABAC</b>	Context-adaptive binary arithmetic coding.

#### 2.6.47 Streaming Device Audio Codec

**BMDStreamingAudioCodec** enumerates the possible audio codecs.

<b>bmdStreamingAudioCodecAAC</b>	MPEG Advanced Audio Coding (AAC).
----------------------------------	-----------------------------------

### 2.6.48 Streaming Device Encoding Mode Properties

**BMDStreamingEncodingModePropertyID** enumerates the possible properties of the encoding mode.

**bmdStreamingEncodingPropertyVideoFrameRate**

Video frame rate as a **BMDStreamingEncodingFrameRate** value

**bmdStreamingEncodingPropertyVideoBitRateKbps**

Video codec bitrate in kilobits per second

**bmdStreamingEncodingPropertyH264Profile**

Video codec profile as a **BMDStreamingH264Profile** value

**bmdStreamingEncodingPropertyH264Level**

Video codec level as a **BMDStreamingH264Level** value

**bmdStreamingEncodingPropertyH264EntropyCoding**

Video codec entropy coding as a **BMDStreamingH264EntropyCoding** value

**bmdStreamingEncodingPropertyH264HasBFrames**

Boolean value indicating whether B-Frames will be output by encoding mode

**bmdStreamingEncodingPropertyAudioCodec**

Audio codec as a **BMDStreamingAudioCodec** value

**bmdStreamingEncodingPropertyAudioSampleRate**

Audio sampling rate in Hertz

**bmdStreamingEncodingPropertyAudioChannelCount**

Number of audio channels

**bmdStreamingEncodingPropertyAudioBitRateKbps**

Audio codec bitrate in kilobits per second

**2.7 Formulas****2.7.1 Color space Conversion Formulas**

The following basic equations convert between gamma-corrected RGB and YUV colour spaces.

**SD RGB to YUV conversion**

$$Y = 0.257R + 0.504G + 0.098B + 16$$

$$Cb = -0.148R - 0.291G + 0.439B + 128$$

$$Cr = 0.439R - 0.368G - 0.071B + 128$$

**HD RGB to YUV conversion**

$$Y = 0.183R + 0.614G + 0.062B + 16$$

$$Cb = -0.101R - 0.338G + 0.439B + 128$$

$$Cr = 0.439R - 0.399G - 0.040B + 128$$

**SD YUV to RGB conversion**

$$R = 1.164(Y - 16) + 1.596(Cr - 128)$$

$$G = 1.164(Y - 16) - 0.813(Cr - 128) - 0.391(Cb - 128)$$

$$B = 1.164(Y - 16) + 2.018(Cb - 128)$$

**HD YUV to RGB conversion**

$$R = 1.164(Y - 16) + 1.793(Cr - 128)$$

$$G = 1.164(Y - 16) - 0.534(Cr - 128) - 0.213(Cb - 128)$$

$$B = 1.164(Y - 16) + 2.115(Cb - 128)$$

Ensure that output values are clamped to keep them in the 0 - 255 range. The valid SMPTE ranges are Y: 16-240, Cb/ Cr: 16-235.

**IDeckLinkOutput::DisplayVideoFrameSync** or **IDeckLinkOutput::ScheduleVideoFrame** can convert RGB formatted frames to YUV for output.

