Intel® Media Software Development Kit 2012 Release Notes

(Version 3.0.774.38156)

Overview

The **Intel® Media Software Development Kit** (Intel® Media SDK) is a software development library that exposes the media acceleration capabilities of Intel® platforms for decoding, encoding and video preprocessing. The API library covers a wide range of Intel platforms. The Intel Media SDK targets general application developers who want to integrate encoding and decoding into their applications.

Please see the "`<install-folder>\doc\MediaSDK Sample Guide.pdf`" for information on sample source code provided with the Intel Media SDK.

New Features

The Intel® Media SDK 2012 introduces API version 1.3. This version is backwards compatible with API version 1.1. API version 1.3 introduces extensions to support Multi-view Video Coding (MVC) (for details please see "`<install-folder>\doc\mediasdkmvc-man.pdf`") and JPEG*/Motion JPEG Decoding (for details please see "`<install-folder>\doc\mediasdkjpeg-man.pdf`").

This release also includes the following changes to API version 1.1 released in Intel® Media SDK v2.0:

- Surface type neutral transcoding was introduced. `mfxExtOpaqueSurfaceAlloc` structure was added to define opaque surface allocation information (used as extended buffer). `IOPattern` enumerator was extended with `MFX_IOPATTERN_IN_OPAQUE_MEMORY`, `MFX_IOPATTERN_OUT_OPAQUE_MEMORY` values; `MFX_MEMTYPE_OPAQUE_FRAME` frame type enumerator was added to support neutral transcoding.
- `mfxExtAVCRefListCtrl` structure was added to allow configuration of reference frame options for H.264 encoder and decoder. Used as extended buffer.

*Other names and brands may be claimed as the property of others.

- mfxExtVideoSignalInfo structure was added to define the video signal information. Used as extended buffer.
- mfxExtVPPDoUse structure added. This is a hint structure that instructs VPP to use certain algorithms in the pipeline. Used as extended buffer.
- mfxExtVPPFrameRateConversion structure added to configure VPP frame rate conversion algorithm. Used as extended buffer.
- mfxFrameId structure was added to mfxFrameInfo to support MVC options.
- mfxFrameData was extended with DataFlag field. It uses bit-OR-ed values to itemize additional information about the frame buffer.
- Enumerator for mfxFrameData::Corrupted field was defined to itemize the decoding corruption types.
- mfxFrameInfo extended with the Accuracy, Convergence, TimeStampCalc and ExtendedPicStruct fields.
- mfxExtCodingOption extended with the RefPicMarkRep field.
- The FrameType enumerator was extended with types related to the second field of a frame.
- FrcAlgm enumerator was added to itemize frame rate conversion algorithms.
- ExtendedBufferID enumerator was extended with following values to support described above extended buffers:
  MFX_EXTBUFF_VPP_SCENE_CHANGE
  MFX_EXTBUFF_VIDEO_SIGNAL_INFO
  MFX_EXTBUFF_VPP_DOUSE
  MFX_EXTBUFF_OPAQUE_SURFACE_ALLOCATION
  MFX_EXTBUFF_AVC_REFLIST_CTRL
- MVC encoder interview prediction mode introduced.
- MVC decoder enhanced with multithreaded mode.
- Core interface was extended to support opaque memory in plug-in (user module). Internal allocator was exposed and four new functions to map / unmap opaque memory to "real" one were added.
- Several MVC related variables were renamed. "ID" was renamed to "Id" and "Mvc" to "MVC" to make the naming consistent across the whole API.
- New macro MFX_MEMTYPE_BASE was added to simplify usage of opaque memory in applications.
- New status MFX_ERR_MORE_BITSTREAM was added. It can be returned by AVC encoder in field output mode.
- New coding option mfxExtCodingOption::FieldOutput was added. It switches AVC encoder to field output mode.
- New extended buffer mfxExtPictureTimingSEI was added. It is used for fine tuning of picture timing SEI during AVC encoding
- AsyncDepth parameter is now supported by VPP and MPEG-2 Video encoders.
- AVBR BRC mode is now supported by H.264 encoder.

- DecodedOrder is deprecated and no longer supported by decoders.
- New extended buffer mfxExtAvcTemporalLayers was added. Application uses this buffer to encode temporal scalable sequence.
- New option mfxExtCodingOption::SingleSeiNalUnit was added. Application may set it to instruct encoder to put all SEI messages, each in separate NAL unit or all in one in one NAL unit. New option mfxExtCodingOption::VuiVclHrdParameters was added. Application may set it to instruct encoder to write VCL HRD parameters to SPS header.
- New variable mfxExtCodingOption::BRCParamMultiplier was added. It is intended to workaround upper bitrate limitation of the current API.
- New structure mfxHDLPair was added. It provides an ability to pass a pair of handles through the current API in places where single handle is passed now.
- Several defines were added for future Microsoft* DirectX* 11 support - MFX_HANDLE_D3D11_DEVICE_AND_CONTEXT and MFX_IMPL_VIA_D3D11.
- mfxFrameData::Corrupted field is now supported by VC-1 and MPEG-2 Video decoders.
- H.264 encoder now supports long-term reference frames control (for progressive encoding only).
- H.264 encoder supports dynamic resolution change.
- H.264 encoder supports dynamic bitrate change without I-frame insertion for CBR and VBR modes.
- __cdecl calling convention was added to API functions.
- MFX_PROFILE_AVC_EXTENDED was added to mfxstructures.h to "legitimate" previously existed support of this profile in H.264 decoder.
- mfxExtCodingOption::NalHrdConformance option was added. When set to OFF it allows H.264 encoder to violate HRD conformance. This feature is targeted for video conferencing usage mostly.
- Introduced new video decoding functionality: JPEG/Motion JPEG conforming to the ITU-T* Rec. T.81 / ISO*/IEC* 10918-1.
- mfxInfoMFX structure was extended with JPEG decoding configuration parameters.
- RGB32 was added as output format for video pre-processing.
- Quality/performance tradeoff of video pre-processing algorithms was rebalanced: quality of the output video was improved at the cost of some performance degradation for resize and de-interlace filters combination.

Please see the Intel Media SDK Reference Manual for details "<install-folder>\doc\mediasdk-man.pdf"

For information on the USER class please see "<install-folder>\doc\mediasdkusr-man.pdf"

For information on Multi-view Video Coding support please see "<install-folder>\doc\mediasdkmvc-man.pdf"

For information on JPEG/Motion JPEG support please see "<install-folder>\doc\mediasdkjpeg-man.pdf"

Additionally, the Intel Media SDK package now contains a standalone library which exposes an Application Programming Interface (API) for Stereoscopic 3D (S3D) rendering with Intel® HD Graphics 3000/2000. Please see Package Contents section for locations of header igfx_s3dcontrol.h and library igfx_s3dcontrol.lib files.

This library can be used either independently or along with any version of the Intel Media SDK library to utilize, for instance, decoding functionality.

System Requirements

Hardware

- IA-32 or Intel® 64 architecture processors with the Intel® Core™ processor or later is required for this Developer's release.
- 200 MB free hard disk space for this release.
- The software implementation DLLs, libmfxsw32.dll and libmfxsw64.dll, requires compatible IA-32 or Intel® 64 architecture processor with support for Intel® Streaming SIMD Extensions 2 instructions.

Software

- Microsoft* Windows Vista* with Service Pack 2, or Microsoft Windows* 7 Operating System
- Microsoft Visual C++* 2005 with Service Pack 1, or later version of Microsoft Visual C++
- For the Microsoft DirectShow* samples: Microsoft Windows SDK Update 6.1 for Windows Vista, or later
- For the Microsoft Media Foundation* samples: Microsoft Windows SDK for Windows 7

Package Contents

Note: The suffix <arch> indicates 32- or 64-bit Microsoft* Windows* (either "win32" or "x64"). Both are always installed to allow for cross-platform development.

<install-folder>	Intel® Media SDK Release Notes (this file), End User License Agreement (EULA) "Intel Media SDK EULA.rtf" and license file "license.txt"
<install-folder>\bin\<arch>	Intel® Media SDK Dynamic Library, software implementation: libmfxsw32.dll for IA-32 architecture

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	`libmfxsw64.dll` for Intel® 64 architecture
`<install-folder>\doc`	Intel® Media SDK documentation: • Intel® Media SDK Reference Manual `mediasdk-man.pdf` • Intel® Media SDK Extensions for User-Defined Functions `mediasdkusr-man.pdf` • Intel® Media SDK Extensions for Multi-view Video Coding `mediasdkmvc-man.pdf` • Intel® Media SDK Extensions for JPEG/Motion JPEG decoding `mediasdkjpeg-man.pdf` • Microsoft DirectShow* Filter Interfaces and Specifications `MediaSDK Filters Specifications.pdf` • Samples Overview `MediaSDK Sample Guide.pdf` • Intel® Media Developer's Guide `Intel_Media_Developers_Guide.pdf` • Intel® Media SDK Library Distribution and Dispatching Process `mediasdk-distrib.pdf`
`<install-folder>\include`	External Intel® Media SDK headers: • Type definitions in `mfxdefs.h` • Structure definitions in `mfxstructures.h` • Function definitions in C in `mfxvideo.h` • C++ wrapper of the SDK functions in `mfxvideo++.h` • Extensions for Multi-view Video Coding options `mfxmvc.h` • Extensions for User-Defined Functions `mfxplugin.h` • C++ wrapper for User-Defined Functions `mfxplugin++.h` • Extensions for JPEG*/Motion JPEG Video Decoding options `mfxjpeg.h`

`<install-folder>\`
`lib\`
`<arch>`
	• Static Dispatcher Library `libmfx.lib`
	• Static Dispatcher Library `libmfxmd.lib` build with /MD compiler option to compatibility with applications using the multithread- and DLL-specific version of the run-time library

<install-folder>\ igfx_s3dcontrol\ include	• S3D API definitions igfx_s3dcontrol.h
<install-folder>\ igfx_s3dcontrol\ lib\<arch>	• Static S3D Control Library igfx_s3dcontrol.lib
<install-folder>\ samples\ _bin\<arch>	Contains the following source code samples: • Intel® Media SDK Encoding Sample in folder sample_encode • Intel® Media SDK Decoding and S3D Rendering Sample in folder sample_decode. A script for building a video wall application using this sample is provided. • Intel® Media SDK Transcoding Sample in folder sample_multi_transcode • Intel® Media SDK Video Processing Sample in folder sample_vpp • Intel® Media SDK Rotation Plug-in Sample in folder sample_user_modules\rotate_cpu • Intel® Media SDK OpenCL™ Plug-in Sample in folder sample_user_modules\rotate_opencl • Intel® Media SDK VPPPlugin Utility Class in folder sample_utilities\vpp_plugin • Intel® Media SDK Application Sample using Microsoft DirectShow in folder sample_dshow_player • Intel® Media SDK Plug-Ins Sample using Microsoft DirectShow in folder sample_dshow_plugins • Intel® Media SDK Application Sample using Microsoft Multimedia Framework Plug-ins in folder sample_studio • Intel® Media SDK Video Conferencing Sample in folder sample_videoconf For use only with Microsoft Windows 7 Operating System: • Intel® Media SDK Plug-Ins Sample using Microsoft Media Foundation* in folder sample_mfoundation_plugins
<install-folder>\ samples\	Pre-built binaries of installed sample applications • If installed, console sample application binaries: sample_encode.exe sample_decode.exe (with sample_video_wall.bat) sample_vpp.exe

	`sample_multi_transcode.exe`
	`sample_videoconf.exe`
	• If installed, user plug-in sample binaries:
	`sample_rotate_plugin.dll`
	`sample_plugin_opencl.dll (with ocl_rotate.cl)`
	• If installed, Microsoft DirectShow sample binary application
	`sample_dshow.exe`
	• If installed, Microsoft DirectShow filters
	`h264_dec_filter.dll`
	`h264_enc_filter.dll`
	`mpeg2_dec_filter.dll`
	`mpeg2_enc_filter.dll`
	`vc1_dec_filter.dll`
	`mvc_dec_filter.dll`
	`jpeg_dec_filter.dll`
	`imc_*.dll`
	• If installed, Microsoft Multimedia Framework sample binary application
	`sample_studio.exe`
	`sample_studio_builder.exe`
	`sample_studio_profiles.txt`

`<install-folder>\`
`tools\`
	Contains the following tools in binary form:
	• Intel® Media SDK Tracer in folder `mediasdk_tracer`. This utility performs runtime recording of Intel Media SDK API calls and parameters to a log file.
	• Intel® Media SDK System Analyzer in folder `mediasdk_sys_analyzer`. This utility analyzes the system and reports back Intel Media SDK related capabilities, graphics driver and components status.

Installation

1. Installation requires full administrative rights.
2. Extract files from the .ZIP file to the target hard drive.
3. Select the installer that matches the target system architecture:

File Name for Installer	Target System Architecture
Intel(R)_Media_SDK_win32.msi	IA-32 architecture running Microsoft* Windows Vista* or Windows* 7 Operating System
Intel(R)_Media_SDK_x64.msi	Intel® 64 architecture running Microsoft Windows Vista or Windows 7 64-bit Operating System

Note: If win32 is installed, the x64 lib and bin files are also present to enable cross-platform development and vice versa.

Known Limitations

The Intel® Media SDK library has the following known limitations:

- The Intel Media SDK dispatcher libmfx.lib is best used with a standard DLL entry point (as recommended by Microsoft*) when used in a DLL application such as a Microsoft DirectShow* filter. The DLL entry point setting can be found under the Link > Advanced compiler options. Non-standard entry points can be used, but are not recommended.
- Loading of library libmfxsw32.dll/libmfxsw64.dll not through the dispatcher is unsafe.
- Using the Intel Media SDK in parallel with Intel® Threading Building Blocks could impact performance.
- Frames for different views in single AU in MVC encoder must be provided to encoder in order specified by mfxMVCViewDependency.
- MFX_EXTBUFF_AVC_REFLIST_CTRL and MFX_EXTBUFF_CODING_OPTION_SPSPPS external buffers are not supported by MVC encoder.
- MVC encoder supports MFX_PROFILE_AVC_STEREO_HIGH (progressive encoding only) and MFX_PROFILE_AVC_MULTIVIEW_HIGH with two views.
- H.264 encoder doesn't support processing of mfxExtPictureTimingSEI template. During initialization 0xFFFF values will be reset to default values. In runtime 0xFFFF values will be put to bitstream as is.
- Known limitations for H.264 Multiple-Segment Encoding:
    1. Hardcoded HRD parameters: bit_rate_scale = 0, cpb_size_scale = 3
    2. Encoded bit_rate_value_minus1, bit_rate_scale represent BitRate from original SPS within precision of kbps (maximum supported BitRate is 2^16 - 1 kbps).
    3. Encoded cpb_size_value_minus1, cpb_size_scale represent CpbSize from original SPS within precision of Kb (maximum supported CpbSize is 2^16 - 1 Kb).

4. Encoded time_scale, num_units_in_tick could be both multiplied by 2 if the time_scale from original SPS is odd.
5. Conflicts between SPS/PPS and mfxVideoParam for parameters that are not covered by SPS/PPS could lead to change of parameters in SPS/PPS.

- RefPicMarkRepSEI syntax is not supported by MVC encoder.
- H.264 encoder is known to be slower on x64 platform than on win32 platform.
- If the MPEG-2 Video encoder mfxVideoParam::mfxInfoMFX::CodecProfile is initialized to 0, then the stream will be encoded as MFX_PROFILE_MPEG2_MAIN. Additionally if the MPEG-2 Video encoder mfxVideoParam::mfxInfoMFX::CodecLevel is initialized to 0, then the stream will be encoded as MFX_LEVEL_MPEG2_MAIN.
- MFX_FRCALGM_DISTRIBUTED_TIMESTAMP is unsupported by InverseTelecine and Deinterlace (60i->60p) VPP filters.
- Target usages 4 and 5 of H.264/MVC encoders are known to be non-monotonic in terms of encoding FPS versus encoding quality.
- Parameter BRCParamMultiplier is not supported by MVC video encoder.
- RGB32 as output color format for video pre-processing is allowed only if resize filter is enabled.
- H.264 encoder sets num_reorder_frames to 1 in case of encoding with reference B-frames (B-pyramid).
- MVC encoder inserts SEI messages for the base view. The Buffering Period SEI message contains CBP removal information which is not correct according to Annex H specification. Access unit size includes prefix NAL unit (type 14) size, but its size should not be included according to H.8.5.3.7 of H.264 specification.
- H.264 decoder may consume more than 1 frame from input bitstream and propagate same timestamp to all of the consumed frames instead of calculating timestamps using the frame rate information.
- Target usage 7 of H.264/MVC encoders is known to have a non-monotonic quality vs. bitrate dependency.
- MPEG2 Video, VC-1 and MVC decoders are not optimized for low delay of output frames.

Other Limitations

- Limitations related to source code samples are discussed in their corresponding readme files. See "<install-folder>\doc\MediaSDK Sample Guide.pdf" for an overview of the samples and additional documentation.

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