

# Media Samples Guide

[Overview](#)

[What's New](#)

[Package contents](#)

[Software Requirements](#)

[Installation](#)

[Build Instructions](#)

[Run Instructions](#)

[Legal Information](#)

[Attributions](#)

[FFmpeg\\*](#)

[msinttypes](#)

## Overview

**Samples** work with **Intel® Integrated Native Developer Experience (Intel® INDE) 2015** and **Intel® Media Server Studio 2015 for Windows\* Server**.

They demonstrate how to incorporate the **Intel INDE Media SDK for Windows** and **Intel Media Server Studio – SDK** (hereinafter referred to as "**SDK**") API into various applications.

Some samples can work with **Intel Media Server Studio – HEVC Decoder & Encoder** (hereinafter referred to as "**HEVC Encoder**", "**HEVC Decoder**", "**HEVC**").

Full Transcoding Sample can work with **Intel INDE Audio for Windows** and **Intel Media Server Studio – Audio Decoder & Encoder** (hereinafter referred to as "**Audio library**").

Not all of the samples listed below might be applicable and supported for a particular product. Make sure to check the respective release notes document for potential limitations.

## What's New

- New **HEVC GPU Assist APIs Sample**. The sample provides examples of the typical data and control flow to use the **HEVC GPU Assist APIs** effectively.
- New **OpenCL Video Motion Estimation** and **OpenCL Interoperability Sample** in addition to existing **OpenCL Rotation Plug-In Sample**. The samples demonstrate details of OpenCL usage for typical media processing schemes.

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

- Hardware implementation (“-hw” key) of **SDK** video library is selected by default for all of **Samples**. Software implementation could be invoked via new “-sw” key added to **Samples** applications.
- Premium Telecine Interlace Reverser (PTIR) feature support is added to **Video Processing Sample**. The feature is available only in **Professional** edition of **Intel® Media Server Studio 2015 for Windows\* Server**. For PTIR API details please refer to <msdk-install-folder>/Premium Telecine Interlace Reverser/media\_server\_studio\_ptir\_release\_notes.pdf
- Prebuilt binaries and sources of FFmpeg library are not distributed with **Samples**. For details about new FFmpeg usage scheme please go to “[Build Instructions](#)” section.
- **VP8 Decoder Plugin** via FFmpeg is excluded.
- Transcoding frame rate limitation feature (“-fps” key) was added to **Transcoding Sample**.

## Package contents

### Full list of available samples:

- **Video Decoding Sample**

Console application which performs decoding of elementary compressed video stream to raw frames. Includes the following features:

- stereoscopic 3D (S3D) rendering of elementary MVC (Multi-View Video Coding) streams
- decoding of HEVC (High Efficiency Video Coding) video via **HEVC Decoder**
- decoding with video post processing (color conversion) of raw video sequences

- **Video Encoding Sample**

Console application which performs encoding of raw video frames into elementary compressed stream. Includes the following features:

- video resizing
- video rotation via User Plug-in Sample
- video rotation via User Plug-in Sample using Intel OpenCL™
- encoding HEVC video via **HEVC Encoder**

- **Video Processing Sample**

Console application which performs various video processing algorithms on raw frames.

- **Video Transcoding Sample**

Console application which performs transcoding of elementary video stream from one compressed format to another. Includes the following features:

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

- multiple video streams transcoding
- video resizing, de-interlacing
- video rotation via User Plug-in Sample
- video rotation via User Plug-in Sample using Intel OpenCL
- **Video Conferencing Sample**  
Console application which performs encoding of raw video frames into elementary compressed stream. Shows various encoding features specific to video conferencing use case.
- **Full Transcoding Sample**  
Console application which performs full scale transcoding of media files: allows changing container format and video/audio compression formats. Includes the following features:
  - shows usage of the new Splitters and Muxers Sample using FFmpeg
  - shows usage of the **Audio Library**
- **Transcoding Sample using Microsoft\* DirectShow\***  
Application Sample with GUI (Graphical User Interface) for playback and transcoding using Microsoft DirectShow. Includes the following features:
  - Sample Microsoft DirectShow Plug-Ins (Filters) for video decoding and encoding using **SDK**
  - stereoscopic 3D (S3D) rendering of container MVC (Multi-View Video Coding) streams using custom EVR Presenter Sample
- **Transcoding Sample using Microsoft Media Foundation\***  
Application Sample with Windows\* Presentation Foundation\* (WPF\*) GUI for transcoding using Microsoft Media Foundation Plug-ins
- **Transcoding Sample using Microsoft Windows 8 User Interface**  
A Microsoft Windows 8 UI sample application for transcoding from various media formats to MP4 format with control over encoding parameters
- **OpenCL Video Motion Estimation Sample (New!)**  
Console application which provides step-by-step guidelines on the using Intel's motion estimation extension for OpenCL standard. The motion estimation extension includes a set of host-callable functions for frame-based Video Motion Estimation.
- **OpenCL Interoperability Sample (New!)**  
GUI application which demonstrates how to use **SDK** and Intel OpenCL SDK together for efficient video decoding and fast post-processing.
- **HEVC GPU Assist APIs Sample (New!)**  
The sample provides examples of the typical data and control flow to use the **HEVC GPU Assist APIs** effectively. Could work in two modes – as a standalone application that demonstrates patterns of new API and in a tandem with full H265 encoder (this mode could be useful for encoder debugging and testing).

Each sample includes:

- a readme file for each sub-sample
- source and header files for each sub-sample

**Samples** package has one installer for all sub-samples.

## Software Requirements

### Hardware

- IA-32 or Intel® 64 architecture processors with support for Intel® Streaming SIMD Extensions 2 instructions.
- For S3D display functionality using `igfx_s3dcontrol` library (Video Decoding Sample, Transcoding Sample using Microsoft\* DirectShow\*):
  1. 2nd Generation Intel® Core™ Processors with Intel® HD Graphics 3000/2000 or later
  2. HDMI\* 1.4, eDP\* 1.1 or similar based monitor/TV as primary display
  3. Active shutter glasses

### Software

- Microsoft Windows\* 7, Microsoft Windows 8 or Microsoft Windows 8.1.
- For Microsoft DirectX\* 11 functionality - Microsoft Windows 8 or Microsoft Windows 8.1.
- Microsoft Visual C++\* 2005 with Service Pack 1, or later version of Microsoft Visual C++ (if exact version is not specified in particular sample readme).
- For samples - Microsoft Windows SDK for Windows 7 or Microsoft Windows SDK for Windows 8.
- For Microsoft DirectX 11 enabled samples - Microsoft Windows SDK for Windows 8.
- **Intel® INDE 2015 or Intel® Media Server Studio 2015**
- **Intel INDE Audio for Windows or Intel Media Server Studio – Audio Decoder & Encoder** to run Full Transcoding Sample with audio transcoding. If neither is available the sample can run video transcoding only.
- For **OpenCL User Plug-in, OpenCL Video Motion Estimation Sample and OpenCL Interoperability Sample - CodeBuilder** (part of **Intel® INDE** or **Intel® Media Server Studio 2015**) for compilation, OpenCL driver – to run the samples.
- For PTIR feature in **Video Processing Sample - Intel® Media Server Studio 2015 Professional** edition is needed.
- FFmpeg\*. See below section for details.

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

## Installation

Run the IntelMediaSamples.msi installer from the package to install all the samples.

## Build Instructions

### 1. INTELMEDIASDK\_WINSDK\_PATH environmental variable

- **Samples** depend on Microsoft\* Windows\* SDK include and library files.
- **Samples** installer will try to set INTELMEDIASDK\_WINSDK\_PATH environment variable used in sample project files to locate those include and library files.
- You may want to set (possibly to "") INTELMEDIASDK\_WINSDK\_PATH variable manually (possibly with the help of <install-folder>\samples\set\_INTELMEDIASDK\_WINSDK\_PATH.bat) in the following cases:
  - i. The variable was not set during installation due to no Microsoft Windows SDK installed or installed to a non-default location.
  - ii. Your Microsoft Visual Studio\* environment is already set up with Microsoft Windows SDK include and library directories (e.g. via registration script for Microsoft Visual C++\* 2005). Set the variable to "" or delete it in this case.
  - iii. You wish to use a different Microsoft Windows SDK version than was auto-detected and set at installation.

### 2. INTELMEDIASDKROOT environmental variable

- **Samples** depend on **SDK** external headers and **SDK** dispatcher library which are searched in folders INTELMEDIASDKROOT\include and INTELMEDIASDKROOT \lib\<arch> respectively.
- INTELMEDIASDKROOT is set by **SDK** installer and points to the **SDK** installation folder.

### 3. OpenCL headers and libraries for OpenCL User Plug-in, OpenCL Video Motion Estimation Sample and OpenCL Interoperability Sample

- These samples require OpenCL headers and libraries to be available. All needed files are located in **Code Builder** (part of **Intel® INDE** or **Intel® Media Server Studio 2015**). Please install **Code Builder** from the package and set up INTELCLSDKROOT environment variable to <code-builder-install-folder>\include\cl\ folder.

### 4. Microsoft DirectShow\* BaseClasses for Transcoding Sample using Microsoft DirectShow

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

- This sample requires Microsoft DirectShow BaseClasses (part of Microsoft Windows SDK Samples, version 7.1 or earlier) include and pre-built library files and locate them using  
INTELMEDIASDK\_DSHOWBASECLASSES\_PATH environment variable
- Use the batch file <install-folder>\sample\_dshow\_plugins\  
set\_INTELMEDIASDK\_DSHOWBASECLASSES\_PATH.bat to set the variable.
- You also need to build BaseClasses manually in advance.
- Note: you should build BaseClasses and **SDK** sample code with the same version of Microsoft Windows SDK.

## 5. Building with Microsoft Visual C++\*

Use provided with each sample solution file .sln with Microsoft Visual C++ version 2005 or later to build the respective sample. Locate the resulting executable file in the folder <install-folder>\\_build\<<PlatformName>\<ConfigurationName>.

## 6. Building samples with FFmpeg\* dependency: Full Transcoding Sample (and Splitters and Muxers Sample)

Create an environment variable INTELMEDIASDK\_FFmpeg\_ROOT and point it to FFmpeg\* root folder.

**Samples** were validated with prebuilt FFmpeg version 2.0.2 (shared libraries), downloaded from **Zeranoe FFmpeg** public website.

Binaries for win64 can be found here:

<http://ffmpeg.zeranoe.com/builds/win64/shared/ffmpeg-2.0.2-win64-shared.7z>

Binaries for win32 can be found here:

<http://ffmpeg.zeranoe.com/builds/win32/shared/ffmpeg-2.0.2-win32-shared.7z>

Headers can be found here:

<http://ffmpeg.zeranoe.com/builds/win64/dev/ffmpeg-2.0.2-win64-dev.7z>

NOTE: These binaries have GPL license according to the way they were built. You may rebuild FFmpeg from sources (link below) to produce LGPL compliant binaries. Please refer to [www.ffmpeg.org](http://www.ffmpeg.org) for more information on licensing.

<http://ffmpeg.zeranoe.com/builds/source/ffmpeg/ffmpeg-2.0.2.tar.xz>

## 7. Choosing Microsoft Direct3D\* version to build with

If version of the installed Microsoft Windows\* SDK is 8.0 or above, then Microsoft Direct3D\* 11.1 surfaces support will be enabled in sample by default. You can enable or disable it manually using MFX\_D3D11\_SUPPORT macros defined in <install-folder>\sample\_common\sample\_defs.h

# Run Instructions

## 1. Running Samples with FFmpeg\* dependency (Full Transcoding Sample)

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

- Add a path to FFmpeg's binaries to `PATH` variable

## **2. Running Samples with Intel OpenCL dependency**

- Make sure proper OpenCL driver is installed on the machine. Please refer to <https://software.intel.com/en-us/articles/opencl-drivers> for details.
- Add a path to `opencl.dll` from the driver installation above to `PATH` variable

## **3. Running Transcoding Sample using Microsoft\* DirectShow\***

- Run "`<install-folder>\_bin\<arch>\register_dshow_plugins.bat`" to register Sample Microsoft DirectShow Plug-Ins

## Legal Information

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND/OR USE OF INTEL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS OTHERWISE AGREED IN WRITING BY INTEL, THE INTEL PRODUCTS ARE NOT DESIGNED NOR INTENDED FOR ANY APPLICATION IN WHICH THE FAILURE OF THE INTEL PRODUCT COULD CREATE A SITUATION WHERE PERSONAL INJURY OR DEATH MAY OCCUR.

Intel may make changes to specifications and product descriptions at any time, without notice. Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. The information here is subject to change without notice. Do not finalize a design with this information.

The products described in this document may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.

Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order.

Copies of documents which have an order number and are referenced in this document, or other Intel literature, may be obtained by calling 1-800-548-4725, or by visiting [Intel's Web Site](#).

MPEG is an international standard for video compression/decompression promoted by ISO. Implementations of MPEG CODECs, or MPEG enabled platforms may require licenses from various entities, including Intel Corporation.

Intel and the Intel logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

### **Optimization Notice**

Intel's compilers may or may not optimize to the same degree for non-Intel microprocessors for optimizations that are not unique to Intel microprocessors. These optimizations include SSE2, SSE3, and SSSE3 instruction sets and other optimizations. Intel does not guarantee the availability, functionality, or effectiveness of any optimization on microprocessors not manufactured by Intel.

Microprocessor-dependent optimizations in this product are intended for use with Intel microprocessors. Certain optimizations not specific to Intel microarchitecture are reserved for Intel microprocessors. Please refer to the applicable product User and Reference Guides for more information regarding the specific instruction sets covered by this notice.

Notice revision #20110804

## Attributions

### FFmpeg\*

Usage of FFmpeg\* (<http://www.ffmpeg.org/>) in **Samples** is covered by the following exception *"If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work."*

### msinttypes

Copyright (c) 2006-2009 Alexander Chemeris  
All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

Neither the name of the <ORGANIZATION> nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

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