THE MEDIA LANDSCAPE
RUNS ON INTEL

CONTENT CREATORS

Digital artistry
Rendering
Ray-tracing

CLOUD SERVICES

Encode/Transcode
Media Streaming
CDN
Storage
Media analytics
AI quality analysis
Digital rights & security

CORE

NETWORK EDGE

Content caching
Cloud gaming
Edge analytics
Cloud Graphics
Edge Encode/Transcode
CDN
Immersive Media

ACCESS

Endpoint rendering
Smart IoT
Endpoint intelligence

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Tests document performance of components on a particular test, in specific systems. Differences in hardware, software, or configuration will affect actual performance. Consult other sources of information to evaluate performance as you consider your purchase. For more complete information about performance and benchmark results, visit www.intel.com/performance.

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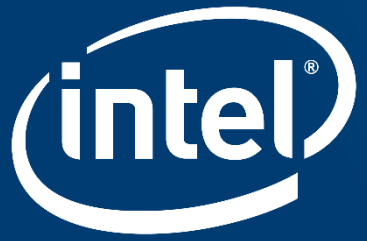
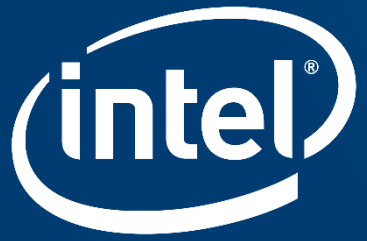


ENHANCE VIDEO PERFORMANCE USING INTEL HARDWARE AND SOFTWARE

Agenda

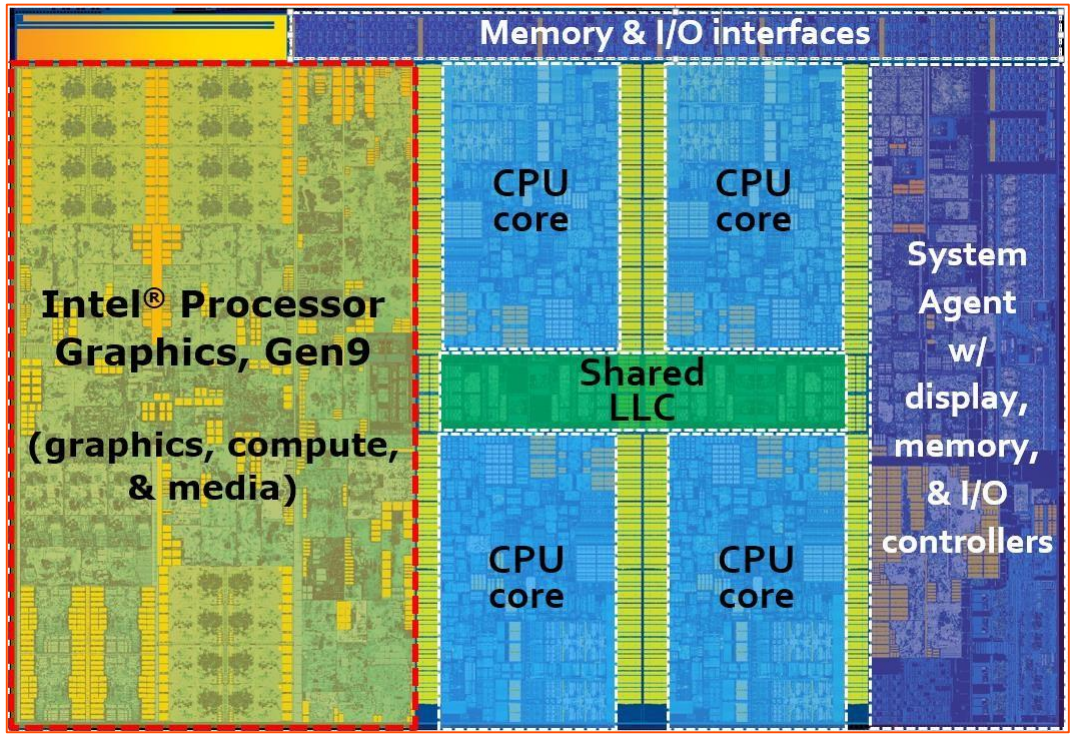
- ✓ Intel® Media SDK/Media Server Studio Overview
- ✓ Lab Overview



GPU VS CPU

Discrete GPU vs Integrated GPU

Intel Hardware is Heterogeneous



CPUs

- Awesome general purpose performance
- Large software ecosystem

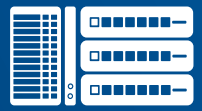
Other Programmable Intel Hardware

- GPU (shown here)
- IPU
- FPGA

See Technical Specifications for System Requirements - Select SKUs of Intel® Xeon® & Core™ processor-based platforms apply.

Optimize Video/Vision Solutions from Edge to Cloud

Deliver Fast, Efficient, High Quality Video/Computer Vision Processing End to End

Smart Cameras	Video Gateways	Data Center and Cloud	Clients
			

Intel® Software Tools Help Developers Accelerate, Innovate, and Differentiate

Speed Video Encode/Decode and Image Processing, Compression

Intel® Media Server Studio & Intel® Media SDK

Accelerate Computer Vision Solutions, Integrate Deep Learning Inference

Open VINO™ Toolkit

Customize Solutions, Optimize Compute, Heterogeneous Programming

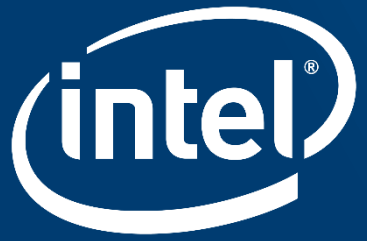
Intel® SDK for OpenCL™ Applications & Intel® FPGA SDK for OpenCL™ software technology

Boost Performance & Power Efficiency

Intel® System Studio | **Intel® Media Server Studio/ Intel® System Studio** | **Intel® Media Server Studio** | **Intel® System Studio**

ACHIEVE

- High Performance
- Low Power Consumption
- Programmability Across Hardware Blocks
- Fast Time-to-Market



INTEL® MEDIA SERVER STUDIO OVERVIEW

Intel® Media SDK & Intel® Media Server Studio

Deliver fast, high quality video transcoding from camera to cloud

What it is: An API to access Intel® Quick Sync Video hardware-accelerated encode/decode & processing

- H.265 (HEVC)
- H.264 (AVC)
- MPEG-2, VP9 & more
- Resize, Scale, Deinterlace
- Color Conversion, Composition
- Denoise, Sharpen & more

Benefits

- **Boost media and video application performance** with hardware-accelerated codecs & programmable graphics on Intel® processors.**
- **Speed transition to higher frame rates & resolutions**.
- **Improve video quality, innovate cloud graphics & media analytics**.
- **Reduce infrastructure & development costs**.

FREE Downloads

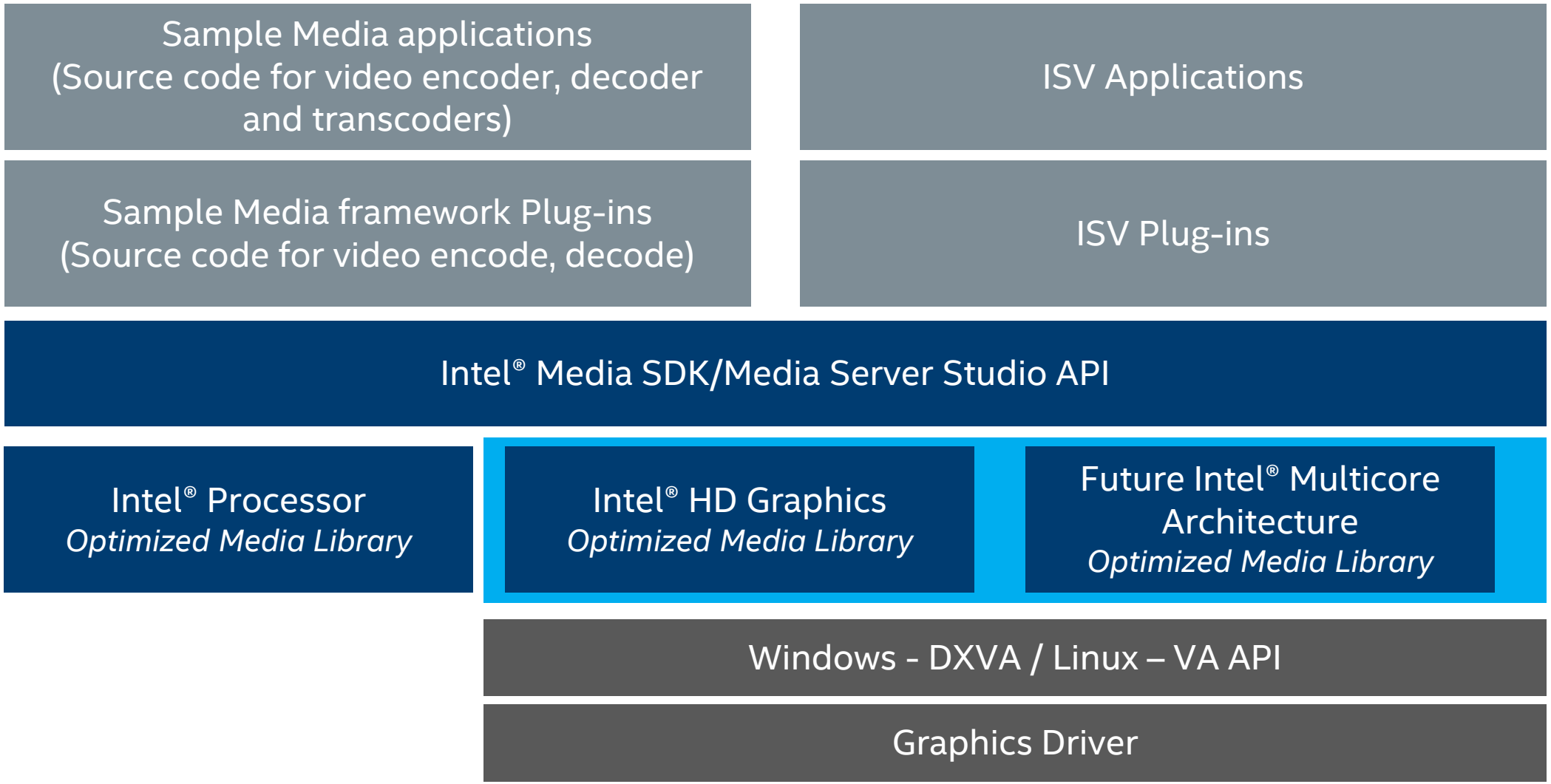
software.intel.com/tools-by-segment/media

**For hardware support see Intel Media Server Studio Details and Intel Media SDK.

Intel® Media SDK Developer value proposition

- **Optimized routines** for delivering maximum video performance on a variety of platforms
- **Improved productivity** for development teams through greater efficiency
- **Built-in future proofing** of video applications with support for upcoming platforms

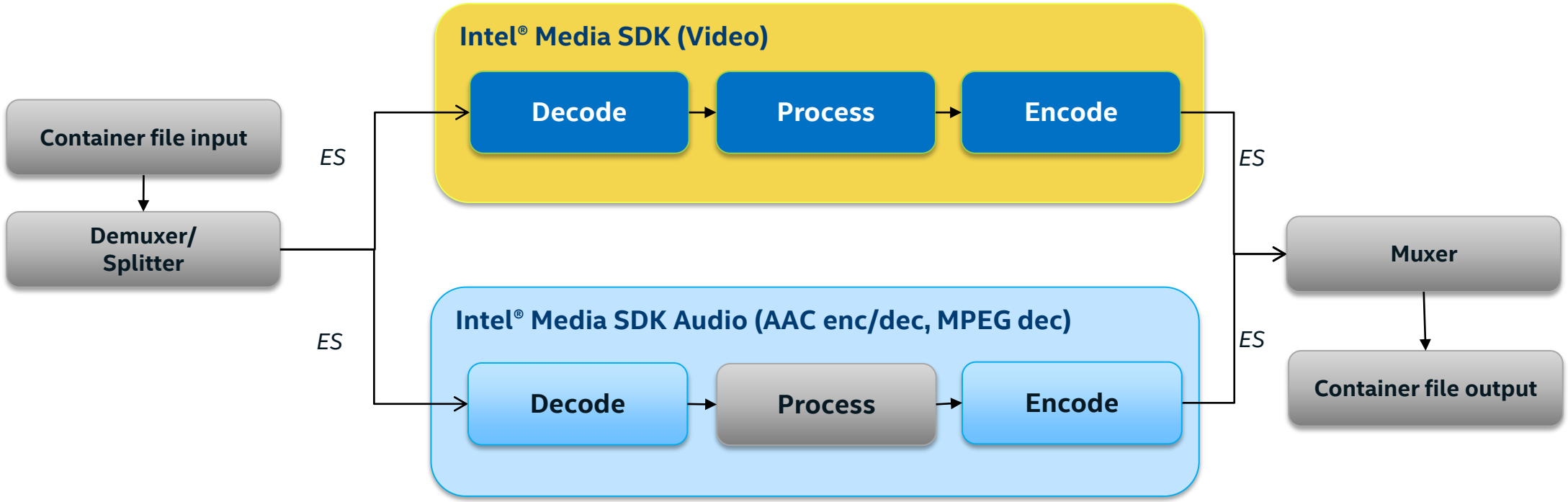
Intel® Media SDK/Server Studio Architecture



Supported Video Processing Features

- N:1 Frame Composition
- Resizing
- Color Conversion
- Deinterlacing
- Denoising
- Frame Rate Conversion
- Brightness/Contrast/Saturation
- Sharpening

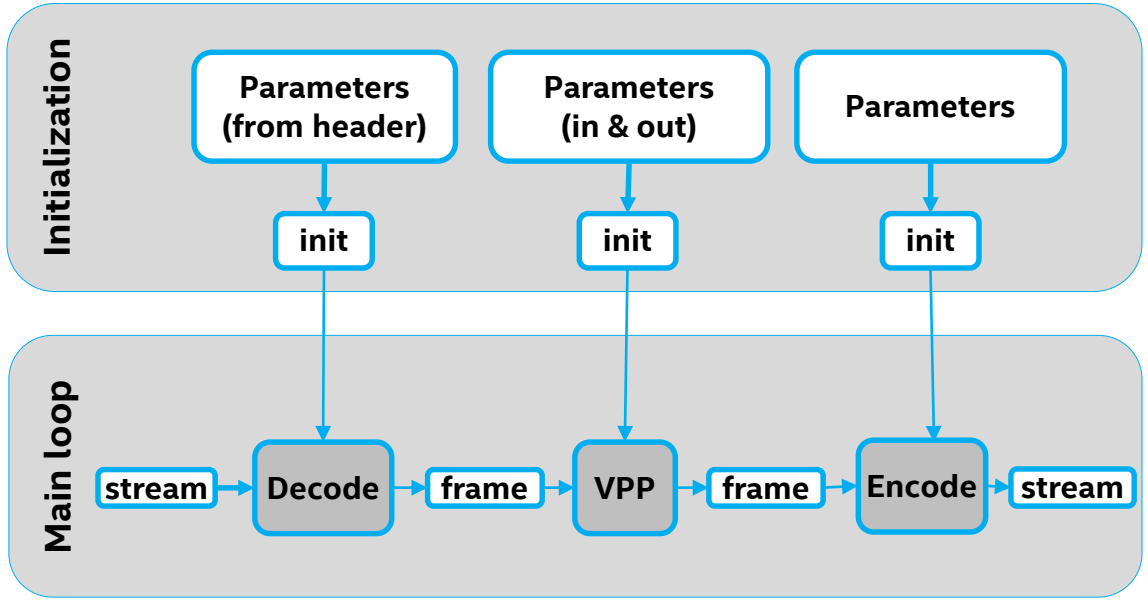
Media Software Scope Diagram



	Intel Media SDK/Intel® Media Server Studio focus
	Limited support
	Out of scope/external component

ES = Elementary stream

Intel® Media SDK / Intel® Media Server Studio



Media accelerator framework
Codec based
High level/parameter interface
3 operations

Links to More Information

- Media Server Studio
- Media SDK
- Intel Media Code Samples

Simple Encoding and Decoding

The following two pseudo-code examples illustrate the simplicity and efficiency of the Intel® Media SDK.

Decoding Procedures

```
Create SDK session
Initialize DECODE
Allocate I/O buffers
While (!EOF || FramesRemaining) do
      If !EOF, read bitstream from file
      Locate available frame buffers
            DECODE::DecoderFrameAsync
            CORE::SyncOperation
      Write output frames to file
Done
De-allocate I/O buffers
Close DECODE
Close SDK session
```

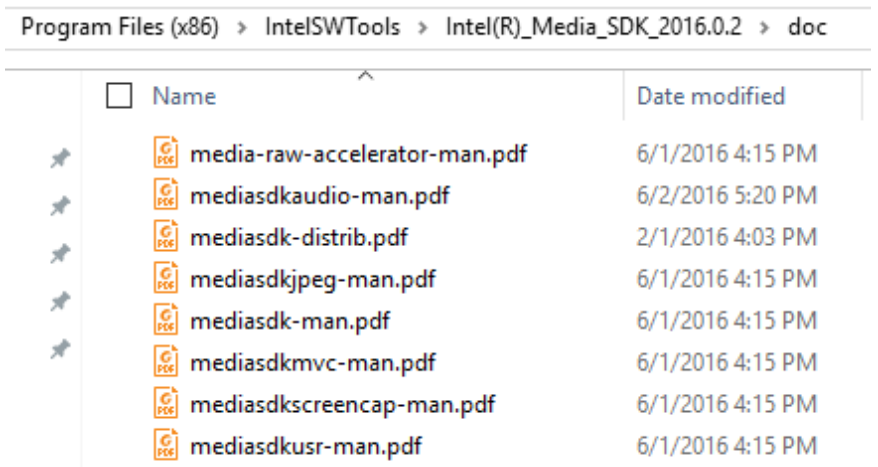
Encoding Procedures

```
Create SDK session
Initialize ENCODE
Allocate I/O buffers
For each frame do
      Locate available frame buffers
      Read raw frames from file
            ENCODE::EncodeFrameAsync
            CORE::SyncOperation
      If output bitstream available, then
            Write bitstream to file
      Endif
Done
De-allocate I/O buffers
Close ENCODE
Close SDK session
```

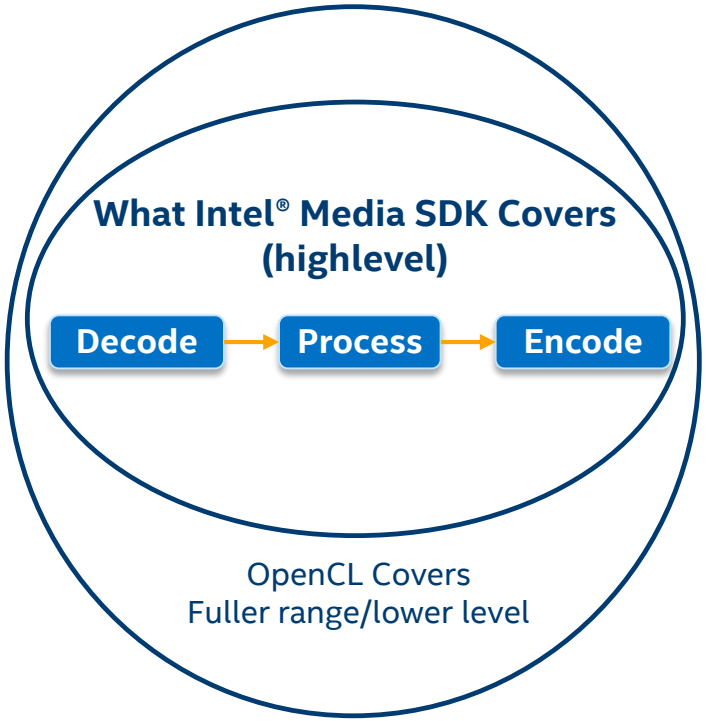
Decoding sample code

```
MFXVideoDECODE_DecodeHeader(session, bitstream, &init_param);
MFXVideoDECODE_QueryIOSurf(session, &init_param, &request);
allocate_pool_of_frame_surfaces(request.NumFrameSuggested);
MFXVideoDECODE_Init(session, &init_param);
sts=MFX_ERR_MORE_DATA;
for (;;) {
      if (sts==MFX_ERR_MORE_DATA && !end_of_stream())
            append_more_bitstream(bitstream);
      find_unlocked_surface_from_the_pool(&work);
      bits=(end_of_stream())?NULL:bitstream;
      sts=MFXVideoDECODE_DecodeFrameAsync(session,bits,work,&disp,&syncp);
      if (sts==MFX_ERR_MORE_SURFACE) continue;
      if (end_of_bitstream() && sts==MFX_ERR_MORE_DATA) break;
      … // other error handling
      if (sts==MFX_ERR_NONE) {
            MFXVideoCORE_SyncOperation(session, syncp, INFINITE);
            do_something_with_decoded_frame(disp);
      }
}
MFXVideoDECODE_Close();
free_pool_of_frame_surfaces();
```

```
mfxVersion ver = { {1, 1 }}; // minimum API version which supports multiple de
MFXInit(MFX_IMPL_HARDWARE_ANY, &ver, &auxSession);
```



OpenCL + Intel® Media SDK?



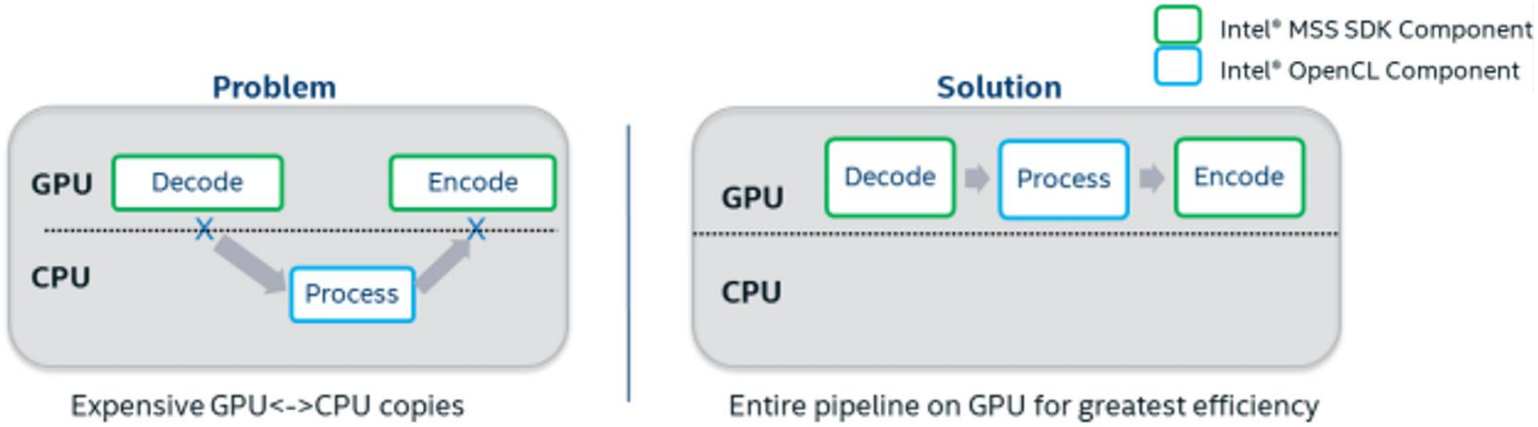
Media SDK provides optimized implementations for:

- Codecs
- Frame Processing Operations

For video processing tasks not in Media SDK's scope, extend with OpenCL

- Make use of growing GPU capabilities
- Keep pipelines on GPU

Example uses: color conversions, custom bit rate control



Media Solution Success Stories

REAL-TIME HEVC HDR BROADCASTING

Fast, high-quality, video broadcasting on-the-go to inform world of fast-changing events

Mobile Viewpoint

OMNI-DIRECTIONAL SMART CAMERA

84% CPU utilization reduction for decoding, display up 25 Full HD or 4 UHD streams

Milestone

360/VIRTUAL REALITY EXPERIENCE

Live streamed a 360-degree VR jazz concert using hardware-assisted 4K video

Wowza, Rivet VR: intel.ly/2cTCIfg

SPORTS VIDEO REPLAYS

Instant high-quality video replays from **18** cameras showing angles, slow motion, or zoom

Slomo.tv videoReferee* systems

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What's New in Intel Media Software Tools – 2018 Release

Intel® Media Server Studio for Linux*

- **Enhances AVC compression & video quality** features
- **Improves HEVC video encode quality** & **CPU performance** for multiple simultaneous media sessions
- **Expands API parameters** for more control over the codecs
- **Increases performance** significantly for **Sessions Joining API**
- Supports **CentOS 7.4**

More details

Intel® Media SDK for Embedded Linux*

- **Supports new 8th gen Intel® Core™, Celeron® & Pentium® processors for IOT solutions**, which includes a fully validated media stack for building robust solutions
- Common usages: digital surveillance, retail, smart cities, industrial, health care, & more

More details: intel.ly/2q6s09a

Intel® Media SDK for Windows*

- Provides **encoding features** from Intel® Media Server Studio Professional Edition **now FREE**[1], adds support for **data center, visual cloud, broadcasting** & **embedded**[2]
- Includes **Video Quality Caliper**[1], an easy to use tool to view **PSNR, SS**IM
- Supports **HEVC** within codec components[1]
- **AVC:** Supports weighted predictions for P-frames & B-frames
- **HEVC:** Provides max frame size bitrate control

More details

[1]Previously available only with a paid license – **now available for FREE!**
[2]In addition to current desktop, client, mobile support.

Call to Action / More Resources

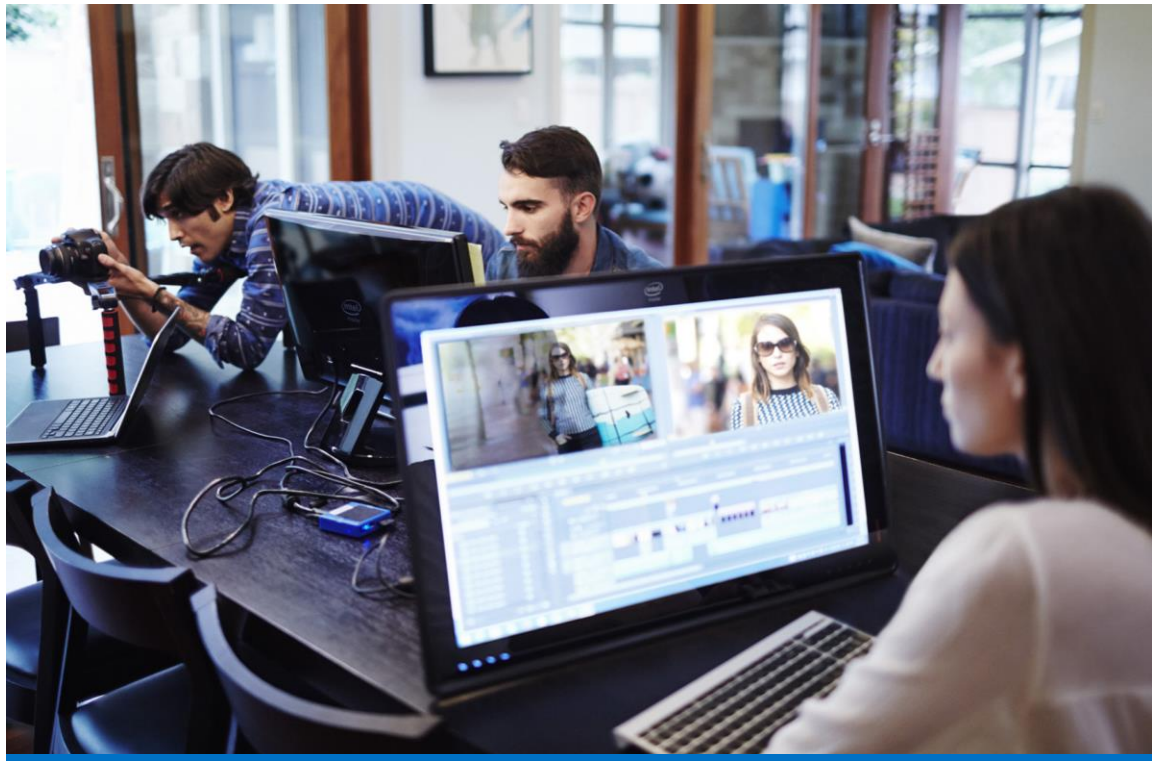
Download Now

Intel® Media Server Studio Free Community

Intel® Media SDK Free Download

More Tools & Resources

- Intel® Media Server Studio
- Intel® Media SDK
- Open VINO™ Toolkit
- Intel® SDK for OpenCL™ Applications
- Whitepaper: *Deliver High Quality, High Performance HEVC via Intel® Media Server Studio*
- Webinar Replay: *Get Amazing Intel GPU Acceleration for Media Pipelines*
- Intel Visual Cloud Computing
- Intel Smart Video for IoT
- Intel® System Studio
- Intel® Collaboration Suite for WebRTC



Learn More: software.intel.com/tools-by-segment/media

LAB OVERVIEW

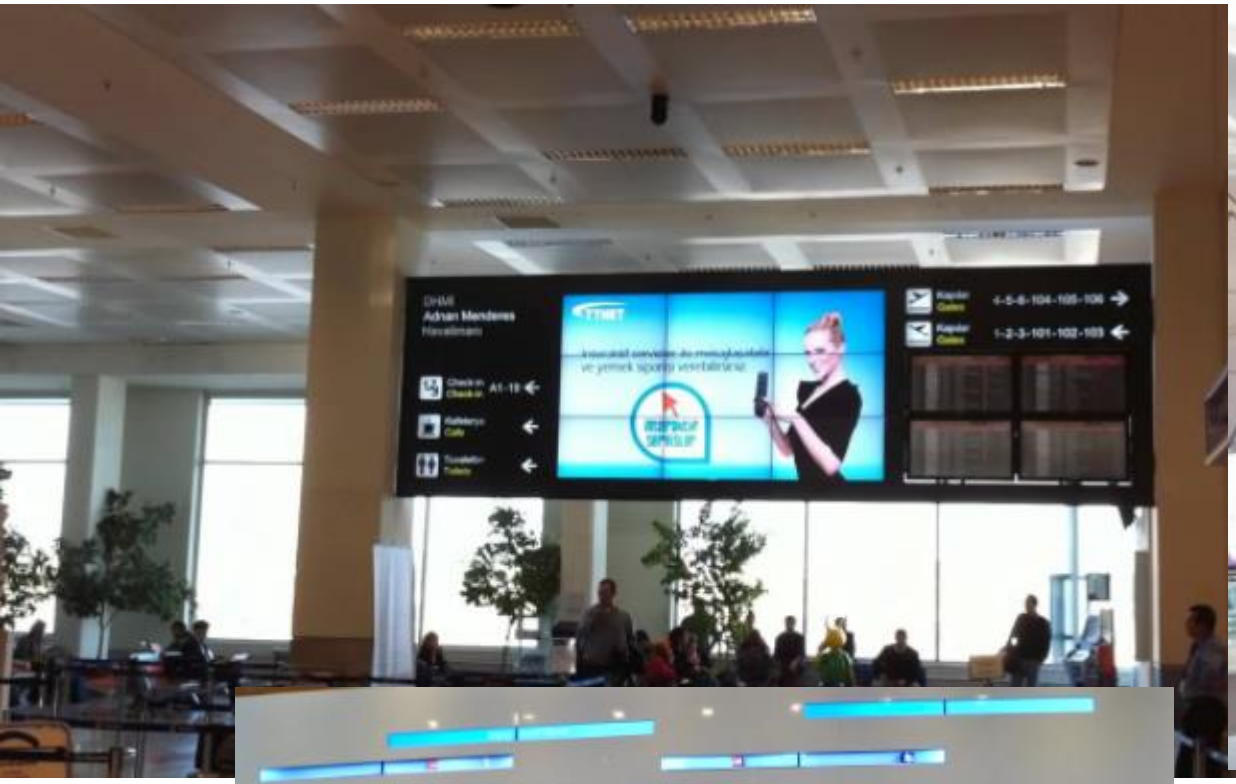
What are we trying to solve?

Customer Requirement

- Need HD quality digital signage in our Retail store for various marketing activities
- Need faster service and lower downtime
- Real-time analytics on number of people looking at my signage

ISV/SI Business Requirement

- Reduced TCO
  - Lower service visit
  - Lower network bandwidth usage
  - Easy maintenance and Centralized control
  - Easy system upgrade
- Faster time to market



Optimiz

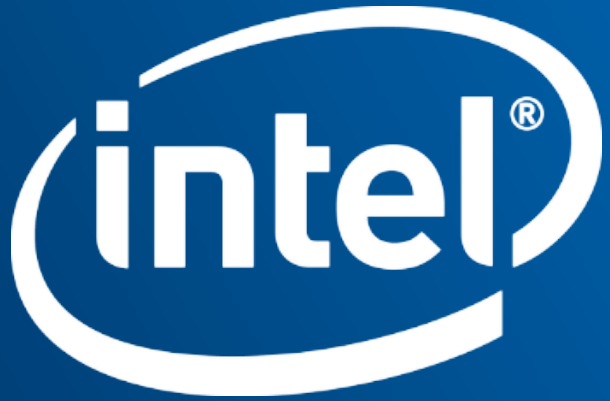
Workshop Setup

Lab documentation:
https://github.com/SSG-DRD-IOT/intel_retail_workshop

Cloud

Cloud Server URL: http://<ip address>:9002

LET'S GET STARTED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