Intel Video AI Box—Converging AI, Media and Computing in a Compact and Open Platform

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Vision and AI at the Edge Market Trends
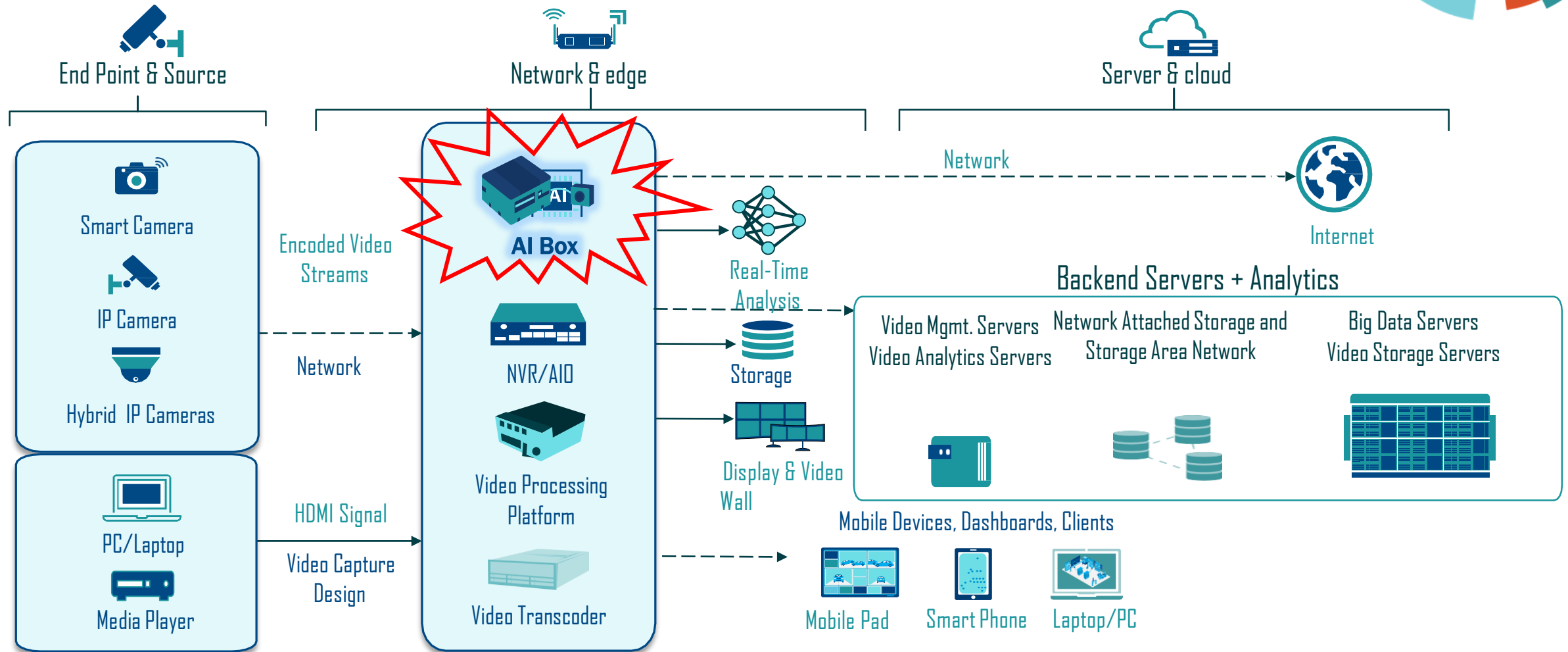
- Market Challenges and Gaps

  - Edge compute for efficient AI workload and video analytics

  - Form factor for edge needs

  - Need for a standardized software stack

  - AI Workloads for windows-based ecosystem

  - Meet surging demand for intelligent video at the edge

- Intel® Video AI Box as a Solution

  - Flexible, scalable, compact form factor for AI at the edge

  - Open software architecture and framework

  - Multiple industries and use cases with Intel's security

  - EFLOW for containers-based VMS software running in a Windows environment

  - Potential lower total cost of ownership, easier development, faster deployment

Vision Ecosystem and Growing Demand for Analytics

End Point & Source

- Smart Camera
- IP Camera
- Hybrid IP Cameras

- PC/Laptop
- Media Player

Encoded Video Streams

Network

HDMI Signal

Video Capture Design

Network & edge

AI Box

NVR/AIO

Video Processing Platform

Video Transcoder

Server & cloud

Network

Internet

Real-Time Analysis

Storage

Display & Video Wall

Backend Servers + Analytics

Video Mgmt. Servers
Video Analytics Servers

Network Attached Storage and
Storage Area Network

Big Data Servers
Video Storage Servers

Mobile Devices, Dashboards, Clients

- Mobile Pad
- Smart Phone
- Laptop/PC

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Edge Video Devices from Intel

Intel® Video AI Box

Flexible AI capacity at the edge; ref VA pipeline for quick development

Video Transcoder

Providing media transcoding & streaming capacity

Media Codec
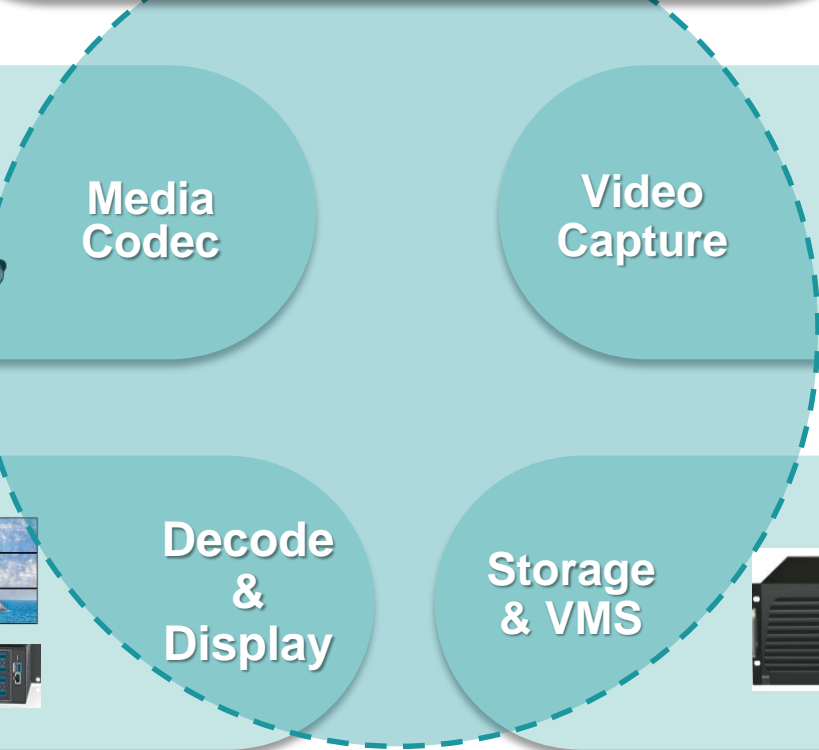
Video Capture

Video Capture Design

Capable of capturing and processing video streams from HDMI input

Video Processing Platform

Integrating multiple decoding, composition & display workloads with time-synchronization tech
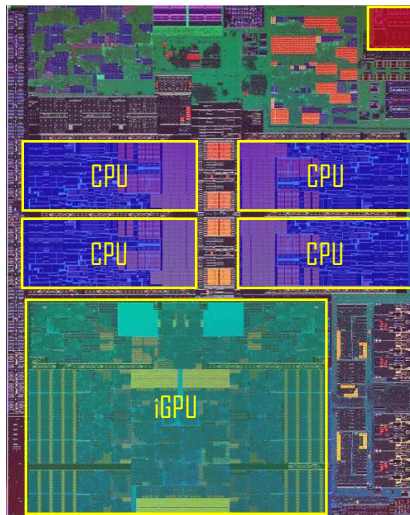
Decode & Display

Storage & VMS

NVR/AIO*

Comprehensive capacity of camera mgmt, video streaming, storage, decoding, display, transcoding and others.

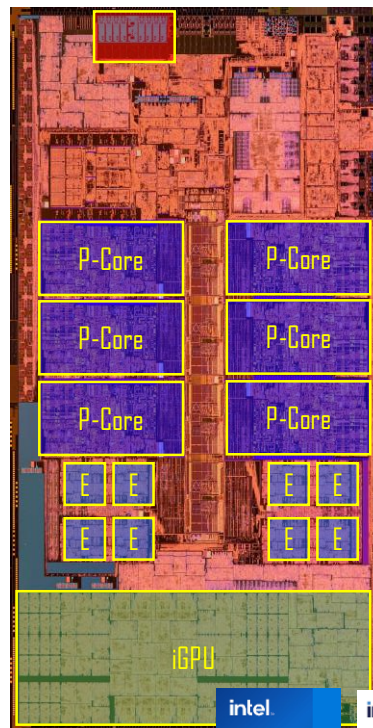# Cutting Edge Compute for Intel® Video AI Box

11th Gen Intel® Core™
Code Name Tiger Lake

Intel® DL Boost

12th Gen Intel® Core™
Code Name Alder Lake

Intel® DL Boost

Comparing with 11th Gen Intel® Core™ processors[1]

Up to **1.07x faster** single-thread performance

Up to **1.29x faster** multithread performance

Up to **2.47x faster** graphics performance

Up to **2.77x faster** in GPU image classification inference performance

Up to **4x 4K60** HDR Displays

iGPU clock frequency
1.35GHz in Intel® Core i7-1185G7
1.45GHz in Intel® Core i7-1280P

1. Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. Learn more at www.Intel.com/PerformanceIndex and https://software.intel.com/content/www/ca/en/products/docs/processors/embedded/12th-gen-iot-mobile-processors-brief.html

Intel® NUC Pro / Rugged

NUC Pro
- Based on Intel® Xeon, Intel® Core™ i7 vPro™, Core™ i5 vPro™ and Intel® Core™ i9, i7, i3 processors
- Space-saving designs
- Validated for 24/7 operation* and other industry-leading Intel reliability tests

NUC Rugged
- Fanless / dust-resistant*
- Customizable IO
- Validated for 24/7 operation and other industry-leading Intel reliability tests
- Board-level robustness against dirty (oscillating) DC input*
- 0-40ºC external ambient operating temperature tolerance

*Varies by product

Target Usage Scenarios

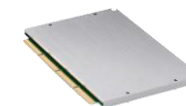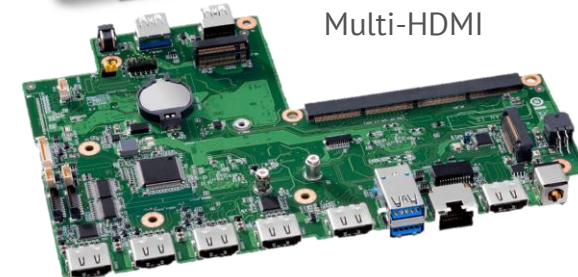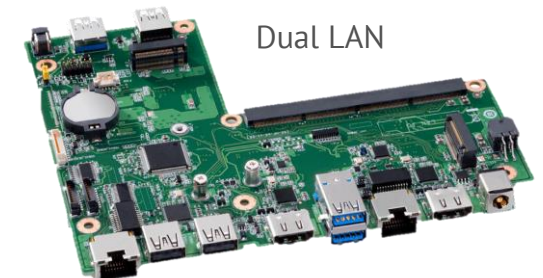| Video + AI Solutions	Generic Business Logics	Visualization / Videowall

NUC Pro

NUC Rugged

Compute Element

NUC Pro Board

Multi-HDMI

Dual LAN

Base Board

Intel® Video AI Box Architecture
Intel® CPU and pre validated SW Stack

CLOUD

Azure

GitHub   docker

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| Pipeline Composer |
| Smart Video AI Workload(RI) |
| Edge Software Device Qualification Tool |

DEVICE

User Applications

AI + Media Pipeline Stack

| Azure IoT Edge Hub | AWS IoT Greengrass |

OpenVINO™ toolkit Integration with TensorFlow Bridge

OpenVINO™ toolkit

SQL Lite	InfluxDB	TensorFlow	OpenCV --- OpenCL	DL Streamer			Web Services
				Gstreamer	FFMPEG	RTSP	MQTT	
				OneVPL / Media SDK				

Base Stack for Docker and Kubernetes

Base Image(Pre-provisioning)/User Space Driver/OS Specific Lib (DirecX/DD, OGL)

BaseOS (Ubuntu, Windows) / Device Driver

Base CPU (+ iGPU / dGPU) / HW / Platform BSP

| Hardware |
| Software |
| Available in future releases |

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No-code Inference for Faster Development

Pipeline Setup	Pipeline Flow Setup	Recommendation	Playback	Query	Dashboard

Web App (frontend) – Main Web UI

Web App (backend) – Management API

Grafana	AI Pipeline Co-pilot	Web Server	OVC- OWT Server	Influx / Mongo DBM	Deployment Tool

Task Manager

Container Builder
(conformant to Istio / KNnative / KFServing)

Prometheus | **Graph-to-Syntax/Code Compiler**

Pipeline Zoo		VA Serving	Decode	File	Camera	Security	Metadata	Detect
Flask			Encode	Input	RTSP	Surface	Hetero	Classify
Model Manager	Pipeline Manager		Watermark	Time	Hypervisor	Compose	Display	OT
NN library	Pipeline library		Framework API			Native API		

MQTT Server	RTSP Server	DL Streamer	FFMPEG	TensorFlow / PyTorch
	Gstreamer			
	OpenVINO			

Docker Composer

Linux	Windows

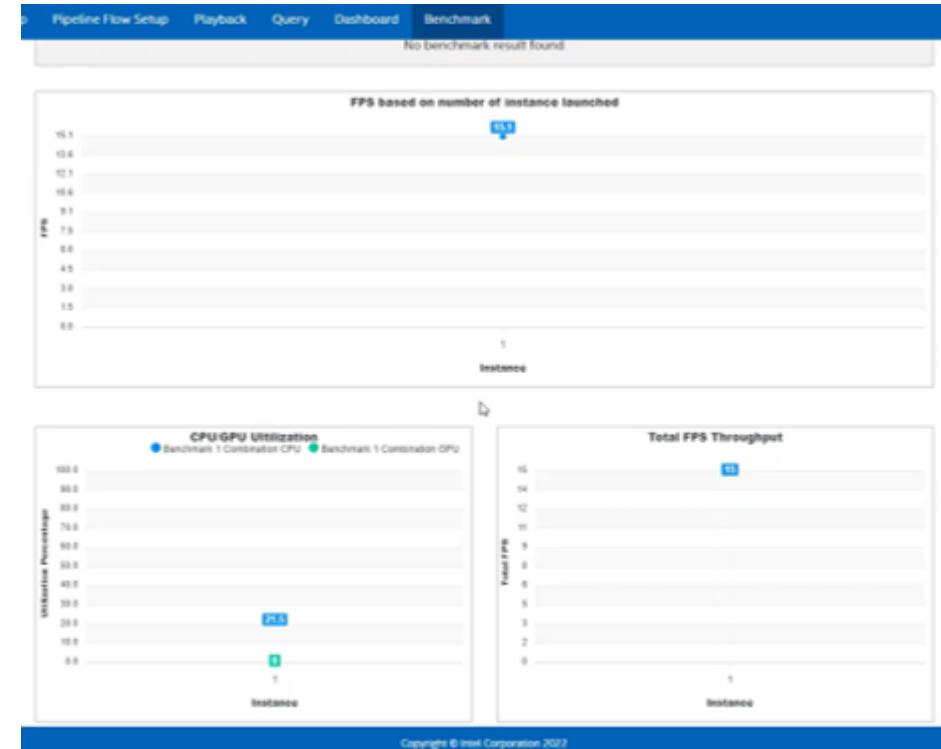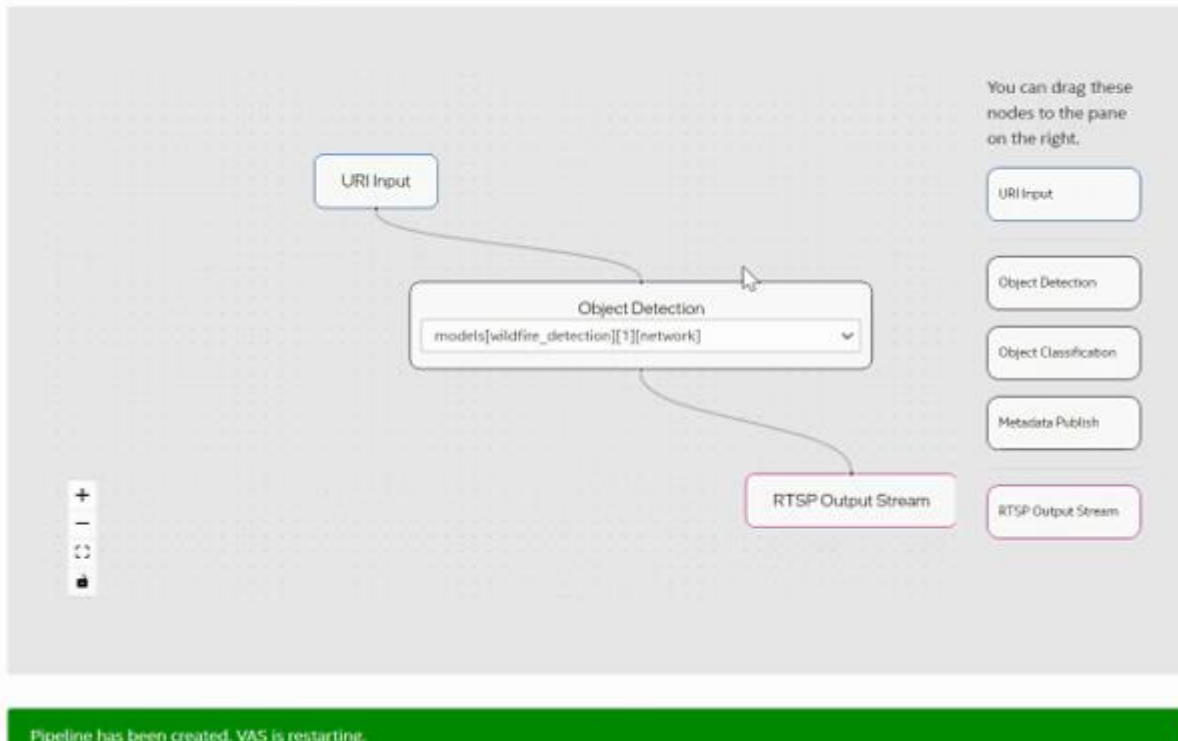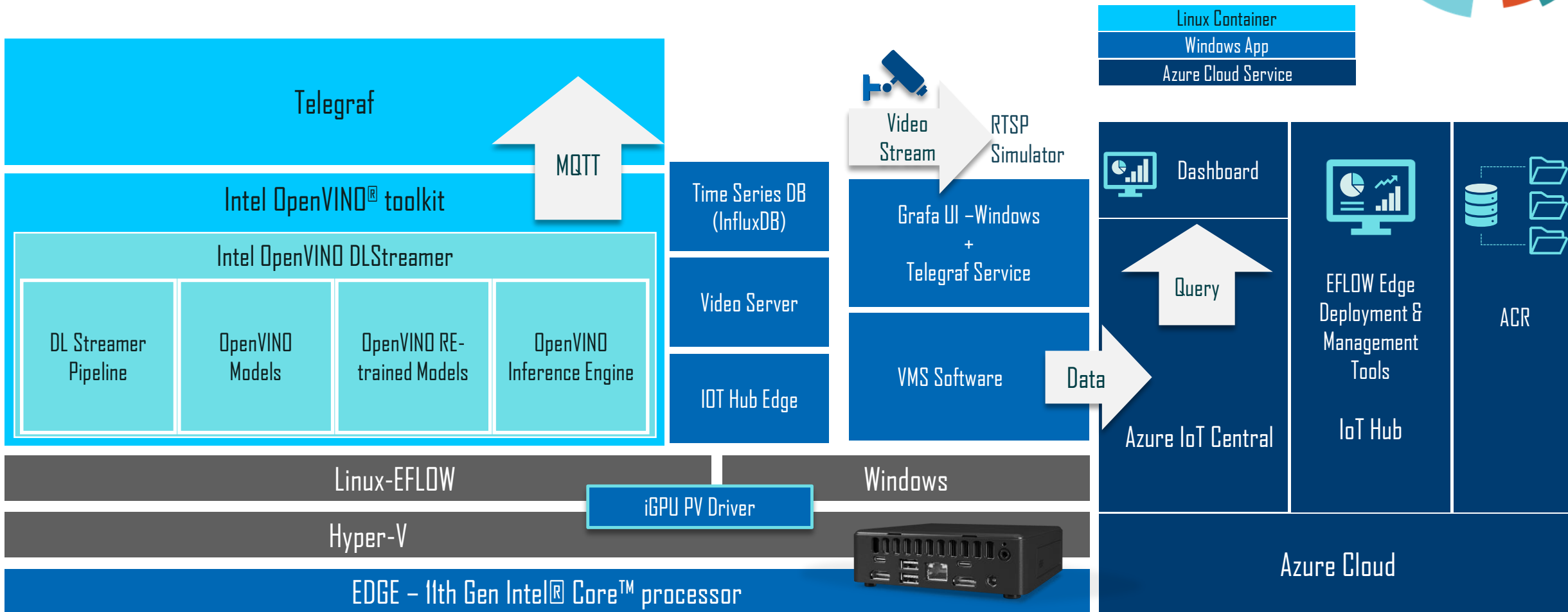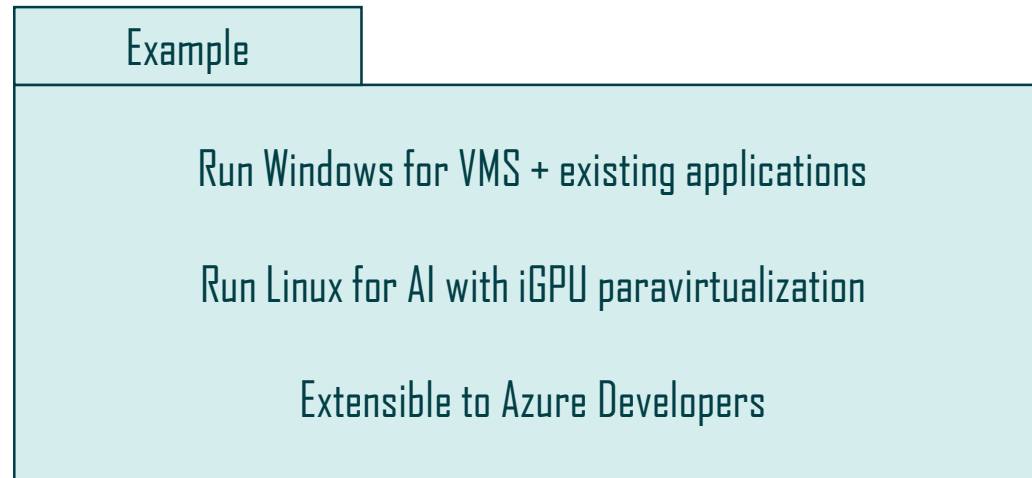| Primary functional tab on UI	Scope of new tool
Intel-owned open-source tool	Component subset
3rd party tool/open-source project	

Pipeline Composer Demo – A No-code Journey

EFLOW
Windows and Linux Apps Come Together in AI Box

Legend:
- Linux Container
- Windows App
- Azure Cloud Service

Telegraf

MQTT

Intel OpenVINO® toolkit

Intel OpenVINO DLStreamer

DL Streamer Pipeline	OpenVINO Models	OpenVINO RE-trained Models	OpenVINO Inference Engine

Time Series DB (InfluxDB)

Video Server

IOT Hub Edge

Video Stream → RTSP Simulator

Grafa UI –Windows + Telegraf Service

VMS Software

Data →

Dashboard

Query

Azure IoT Central

EFLOW Edge Deployment & Management Tools

IoT Hub

ACR

Linux-EFLOW

Windows

iGPU PV Driver

Hyper-V

Azure Cloud

EDGE – 11th Gen Intel® Core™ processor

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How Intel Platform Differentiate with EFLOW

- Launching AI Box with EFLOW enables both Windows and Linux applications

- Intel's iGPU paravirtualization to run heavy workloads in Linux containers

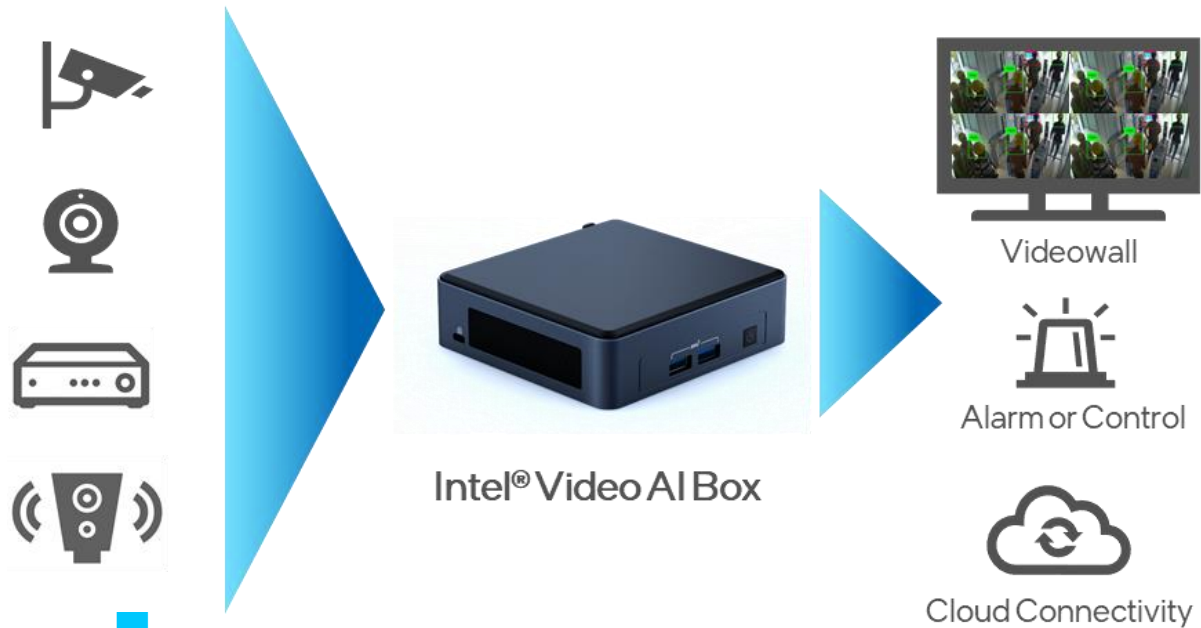- Combining the ecosystems together sharing the resource in the same system

Example

Run Windows for VMS + existing applications

Run Linux for AI with iGPU paravirtualization

Extensible to Azure Developers

Connecting Edge AI to the Azure Cloud

Intel® Video AI Box For Your Video Analytics Needs at the Edge

Intel® Video AI Box

Videowall

Alarm or Control

Cloud Connectivity

Intel® Video AI Box

Bring analytics to the edge with powerful and scalable compute in a compact form factor for flexible performance. Get to market faster with cutting edge AI applications.

Flexible AI at the Edge
Adaptable to expanding solution needs for input streams and AI requirements in diverse industries

Ease of Solution Development
Get to market faster with optimized AI performance based on Intel® OpenVINO®, and pre-validated base software ingredients

Near Real-time Analysis & Insights
Available at the edge for critical applications that demand high-speed processing and low-latency deterministic computing

Scalable Solution of Choice
Supports cloud-native deployments & EFLOW for rich partner ecosystem powered by Intel CPUs & graphics and integrated AI acceleration

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Key Takeaways

- **Edge AI Box for Video Analytics** provides the foundation for new applications

  - Faster time-to-market, open platform, secured and scalable

  - Pipeline Composer – a no-code journey

  - Automated test tools

- **Intel® Iris® Xe Graphics** delivers transformational GPU accelerated media and inference performance built-in **Intel® Core™ Processors** that make **Intel® Video AI Box** possible

- EFLOW empowers users to securely deploy Linux containers onto Windows-based devices, accelerating innovations and creating inexpensive solutions in **Intel® Video AI Box**

Resources

- Intel® NUC
  https://www.intel.com/content/www/us/en/products/details/nuc.html

- Edge AI Box for Video Analytics
  https://software.intel.com/iot/edgesoftwarehub/download/home/ri/edge_ai_box_for_video_analytics

- Reference Implementation of EFLOW
  https://www.intel.com/content/www/us/en/developer/articles/technical/deploy-reference-implementation-to-azure-iot-eflow.html

- Contact your Intel Rep today to learn more!

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