ADLINK
LEADING EDGE COMPUTING

Hybrid OR Visualization- from Diagnosis to Cure

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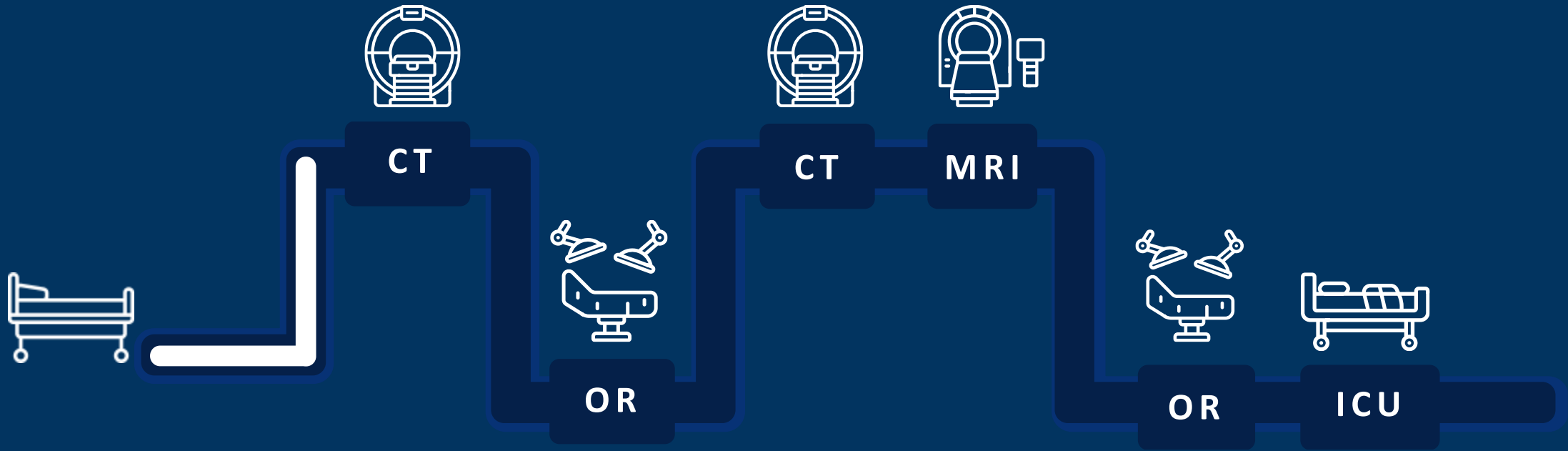
General Diagnosis to Cure Process



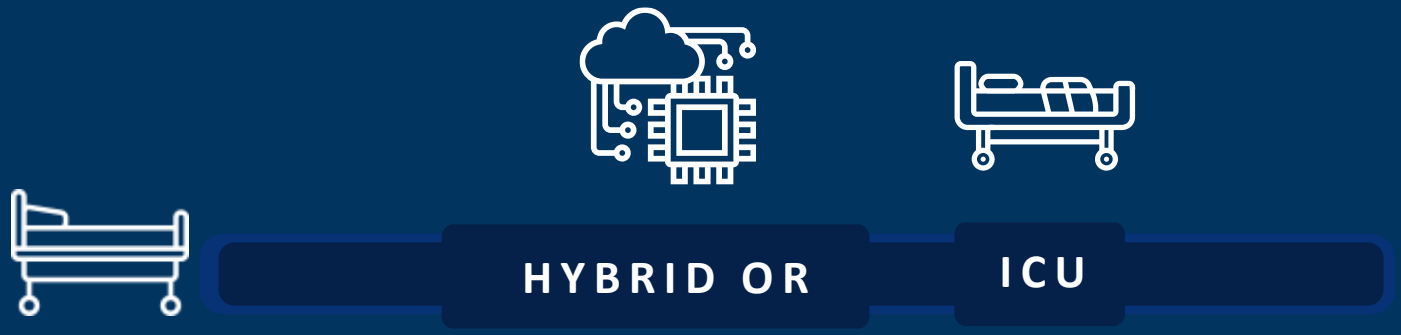
Uncomfortable experience

Long operating time

Increase risk of infection

Inefficient work process (Doctor)

Hybrid OR



Including medical imaging modalities, such as CT, MRI, etc.

Challenges

Complex cables routing

Video transfer Latency

Image quality

Can we do smarter?

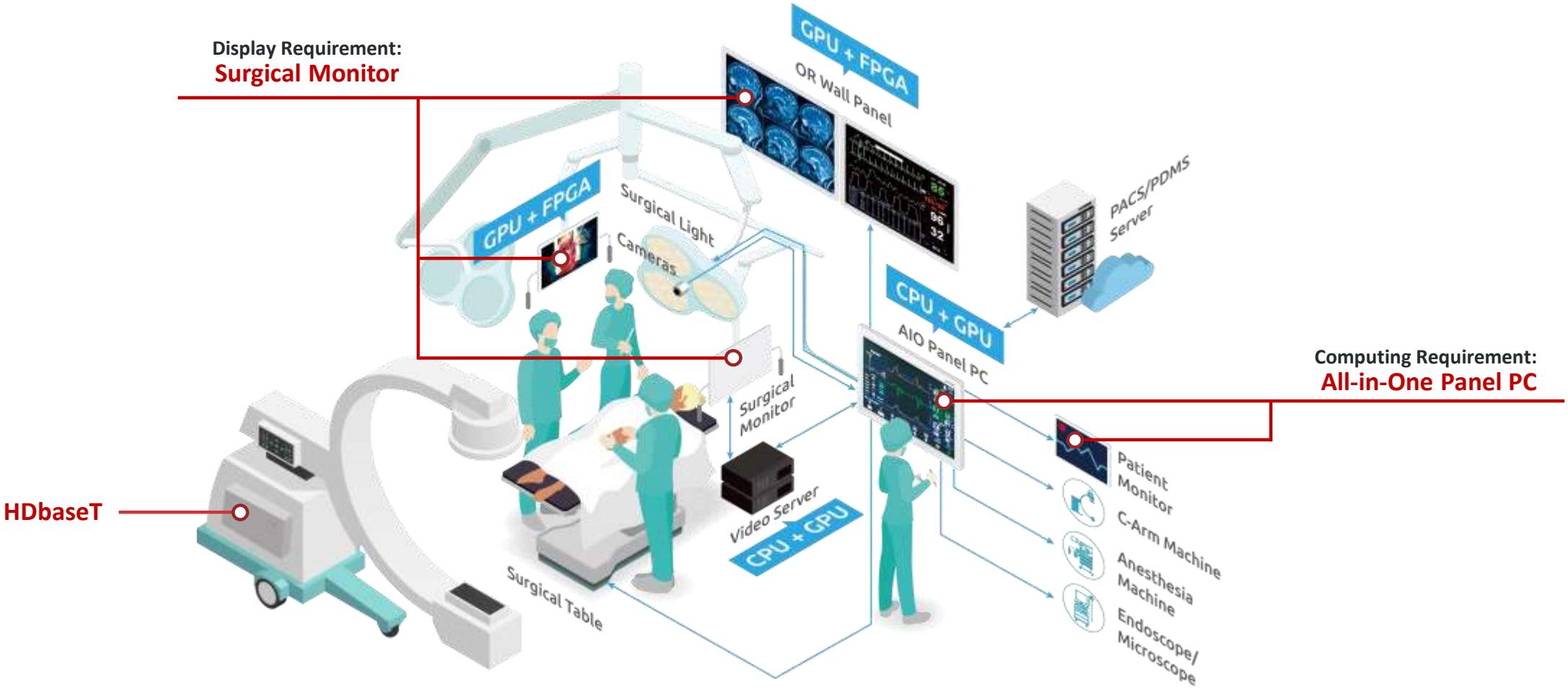
Hybrid OR Visualization

High-Quality Imaging
Accurate image and color visualization
Hygienic design

AI-Assisted Diagnosis
Improve speed & accuracy in medical Imaging
AI prediction

Real-Time Transmission
Low latency
Less cables

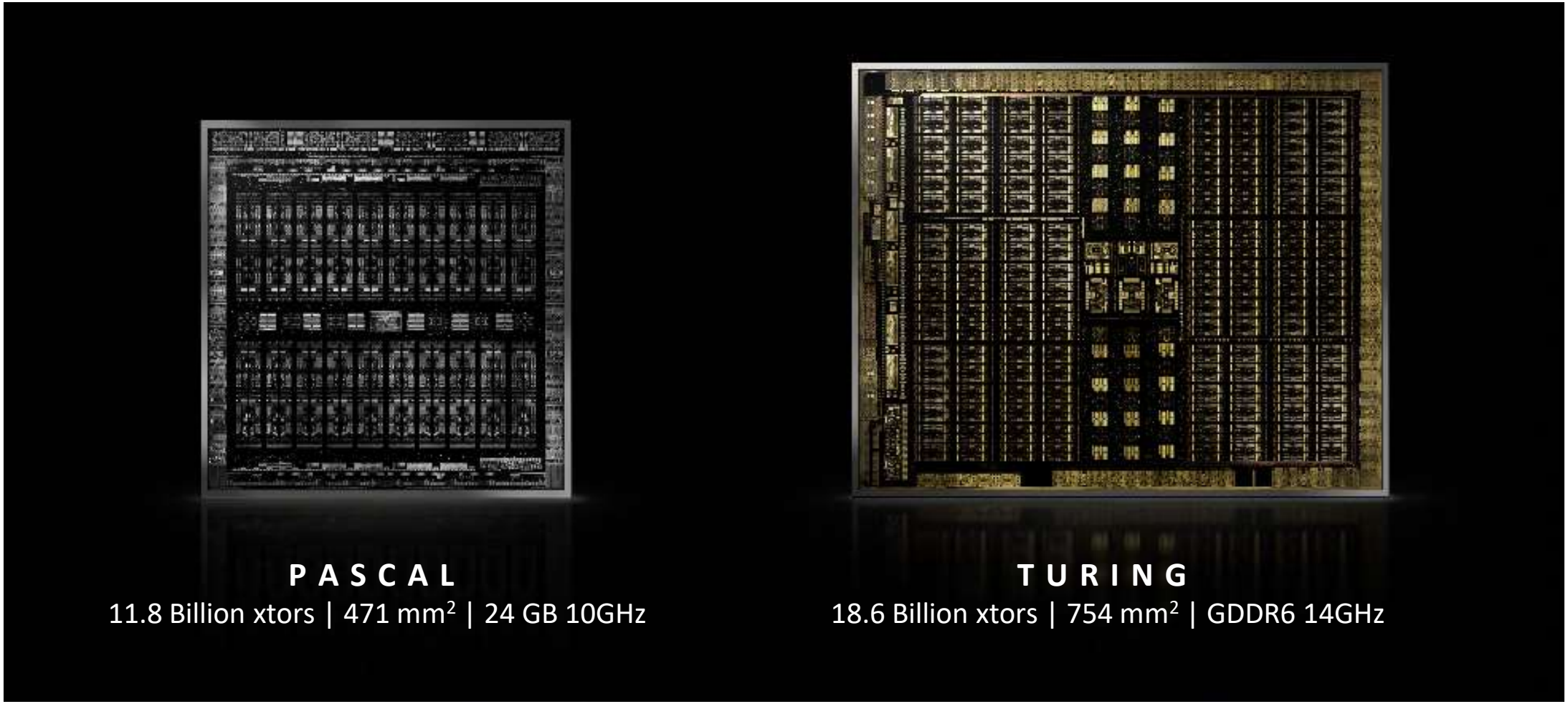
Future Diagnosis to Cure Process



Hybrid OR Visualization

AI-Asissted Diagnosis

Giant leap

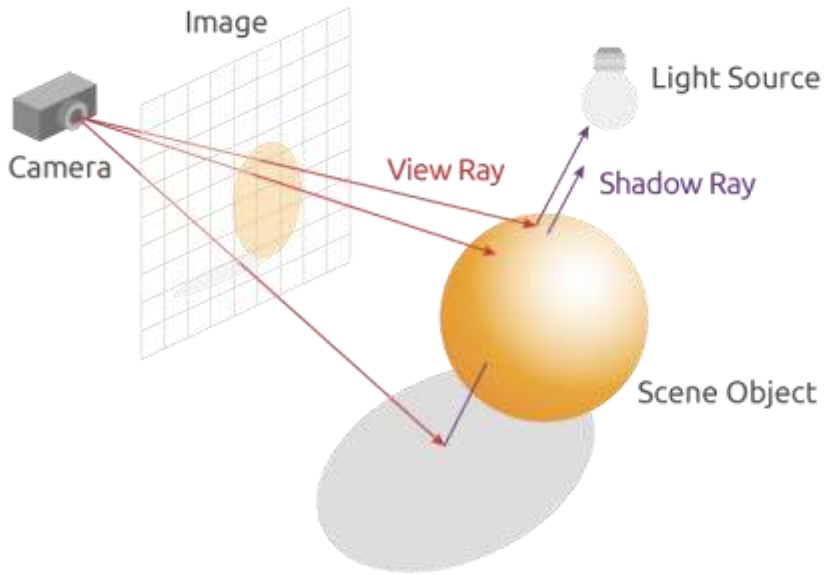

P A S C A L
11.8 Billion xtors | 471 mm2 | 24 GB 10GHz
T U R I N G
18.6 Billion xtors | 754 mm2 | GDDR6 14GHz

Giant leap


SHADER | COMPUTE
FP32
or
INT8
PASCAL
TENSOR CORE
FP16
INT8
INT4
RT CORE
7
Giga
Rays/Sec
SHADER | COMPUTE
FP32 + INT8
TURING

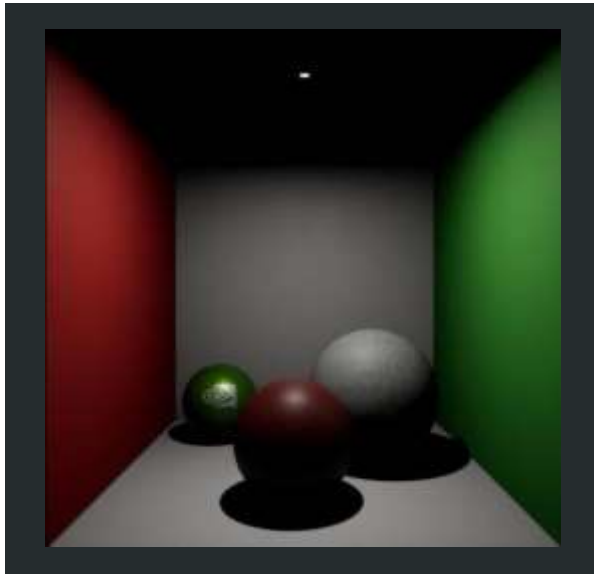
RT Core = Real-Time Ray Tracing

Turing RTX with R for Ray – Ray tracing

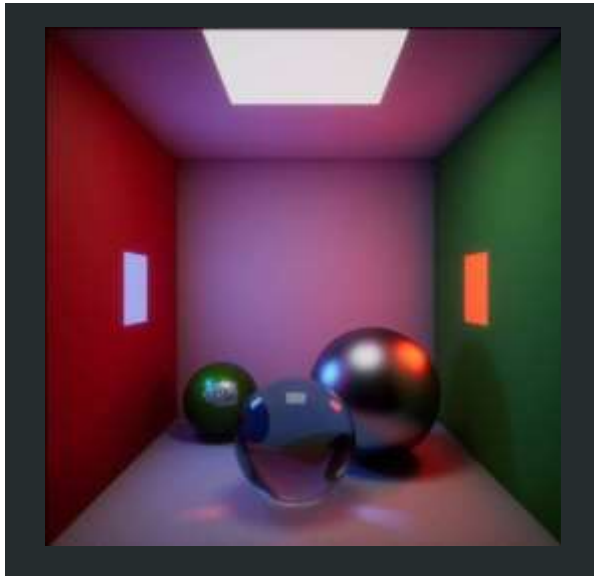


- Ray tracing is a software technique to draw realistic image from computer generated graphic
- Ray tracing previously calculate by software (PhysicX) using CUDA cores
- In Turing RTX cards, ray tracing is calculated by RT Cores -> Speed up

> Ray Tracing **OFF**



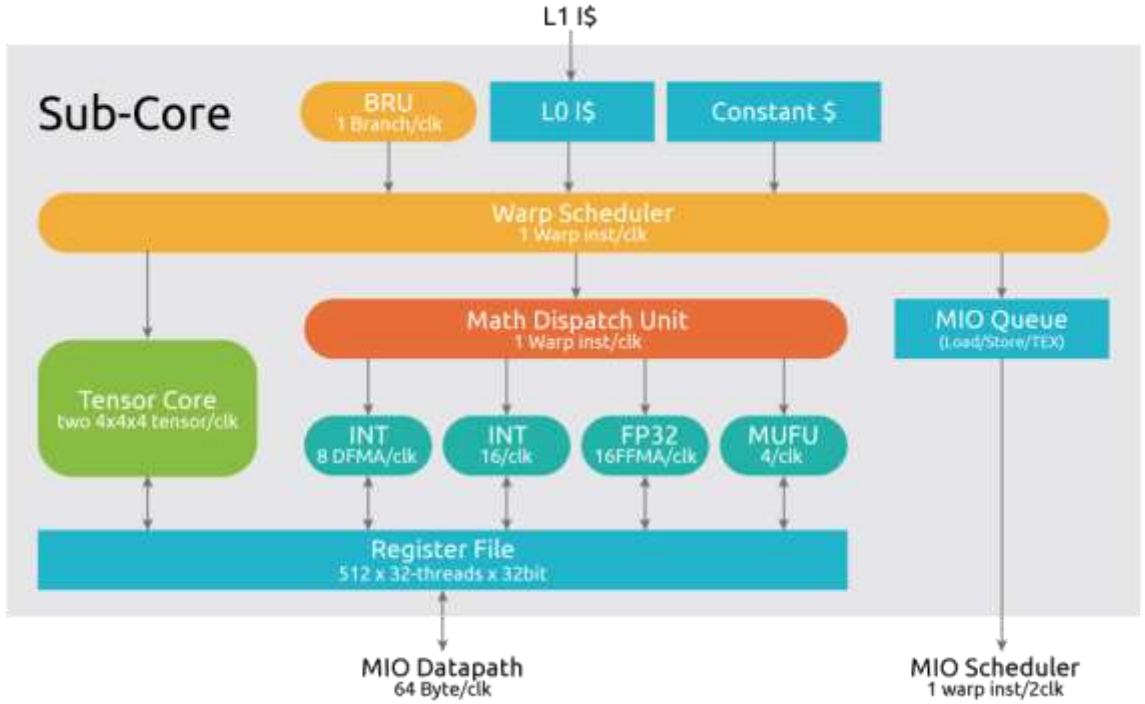
> Ray Tracing **ON**

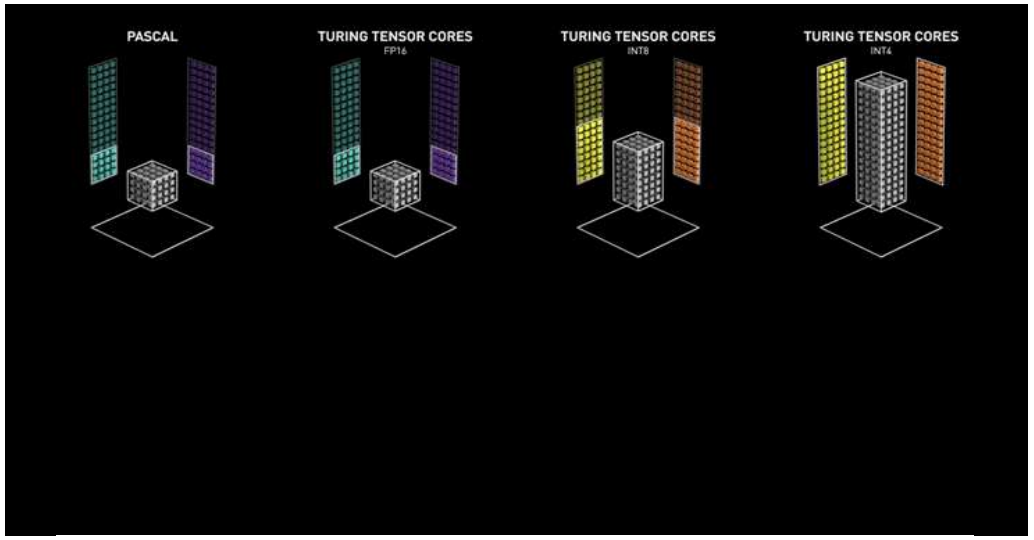


Tensor Core = Matrix Operation Acceleration

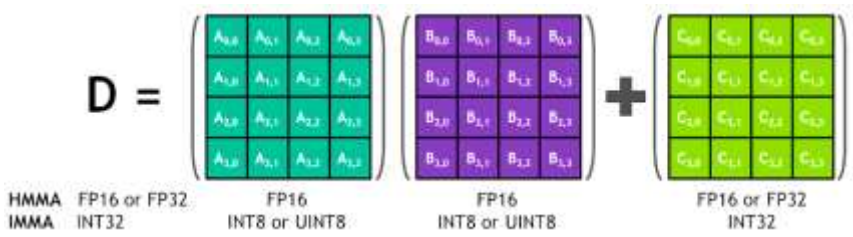
Turing RTX with T for Tensor

- Tensor cores is for DL application
- Optimized for matrix calculation





Tensor Core 4x4x4 Matrix-Multiply ACC



Credit: NVIDIA

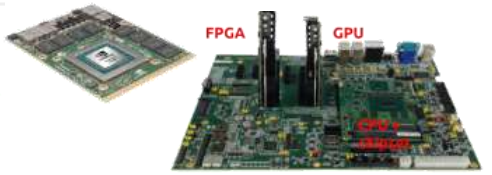
Quadro w/ RDMA

Bandwidth & Latency, TCO

GPUDirect Remote DMA to solve the data moving effort between CPU/mem <-> Device <-> GPU

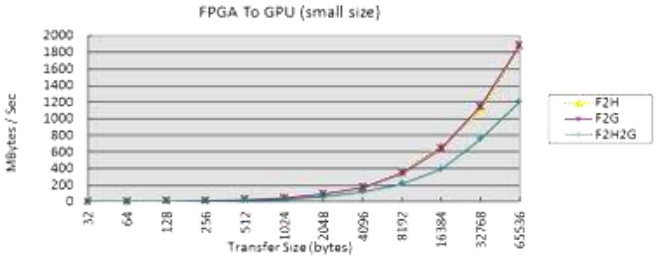
QUADRO DESKTOP/QUADRO

Version:	R418 U2 (419.17) WHQL
Release Date:	2019.2.22
Operating System:	Windows 10 64-bit
Language:	English (US)
File Size:	395.71 MB



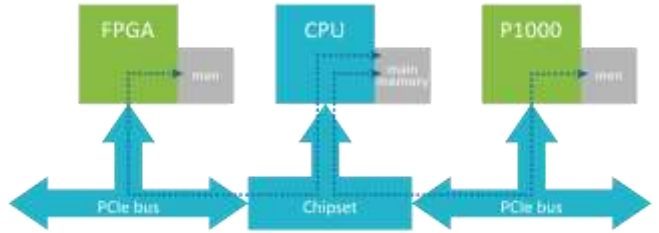
bytes	f->h (us)	f->h (bw)	f2g (us)	f2g (bw)	f2h2g (us)	f2h2g (bw)
32	29.916	1.1129	24.913	1.298	45.57	0.8
64	27.498	2.361	25.271	2.5615	38.8	1.7
128	25.205	5.1275	25.654	5.0444	37.42	3.4
256	24.256	10.671	25.134	10.2393	39.05	6.7
512	23.686	21.7569	24.053	21.3753	34.52	15.1
1024	23.393	44.1447	23.59	43.6214	34.71	29.9
2048	23.238	89.5081	22.602	91.5629	33.64	61.5
4096	25.663	161.4439	24.367	169.4371	34.73	118.8
8192	23.368	352.6403	24.044	342.0086	38.03	218.5
16384	25.092	659.0361	25.537	643.5034	41.97	392.7
32768	29.894	1103.2207	28.822	1139.4692	43.81	753.2
65536	35.29	1868.9243	34.983	1877.4366	54.63	1203.1
64k	34.79	1902.5652	37.49	1753.6	54.63	1203.1
128K	46.36	2832.8406	50	2645.2	78.64	1671.8
256K	67.51	3890.7825	74.6	3520.1	122.17	2154
512K	106.41	4928.0646	127.4	4117.3	229.15	2293.6
1M	191.41	5478.7215	242.28	4340.3	435.92	2406.6
2M	361.59	5800.021	456.12	4601.1	805.64	2605.2
4M	687.71	6100.7858	894.28	4693.3	1489.65	2816.4
8M	1382.34	6068.4941	1707.91	4912.2	2830.62	2963.7
16M	2855.41	5875.7703	3343.57	5017.9	5855.16	2865.5
32M	5785.48	5805.0848	6605.82	5079.6	11632.37	2884.6
64M	11328.17	5931.9302	13127.71	5112	23291.86	2881.3
128M	22420.01	5994.9526	26140.67	5134.5	46717.12	2873

Transfer	Bus Master	Bus Slave	Max. Bandwidth (MB/s) @ Transfer size
FPGA to GPU	FPGA	GPU	6556.9 @ 128 MB
FPGA to Host to GPU	F2H: FPGA H2G: GPU	F2H: CPU H2G: CPU	3651 @ 128 MB

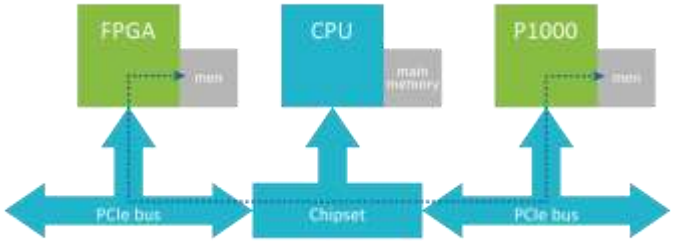


Throughput increases up to 79% *(3651MB/S –> 6556MB/S)*

Latency decreases up to 64 % *(41.94uS –> 14.95uS)*



Conventional data transfer path

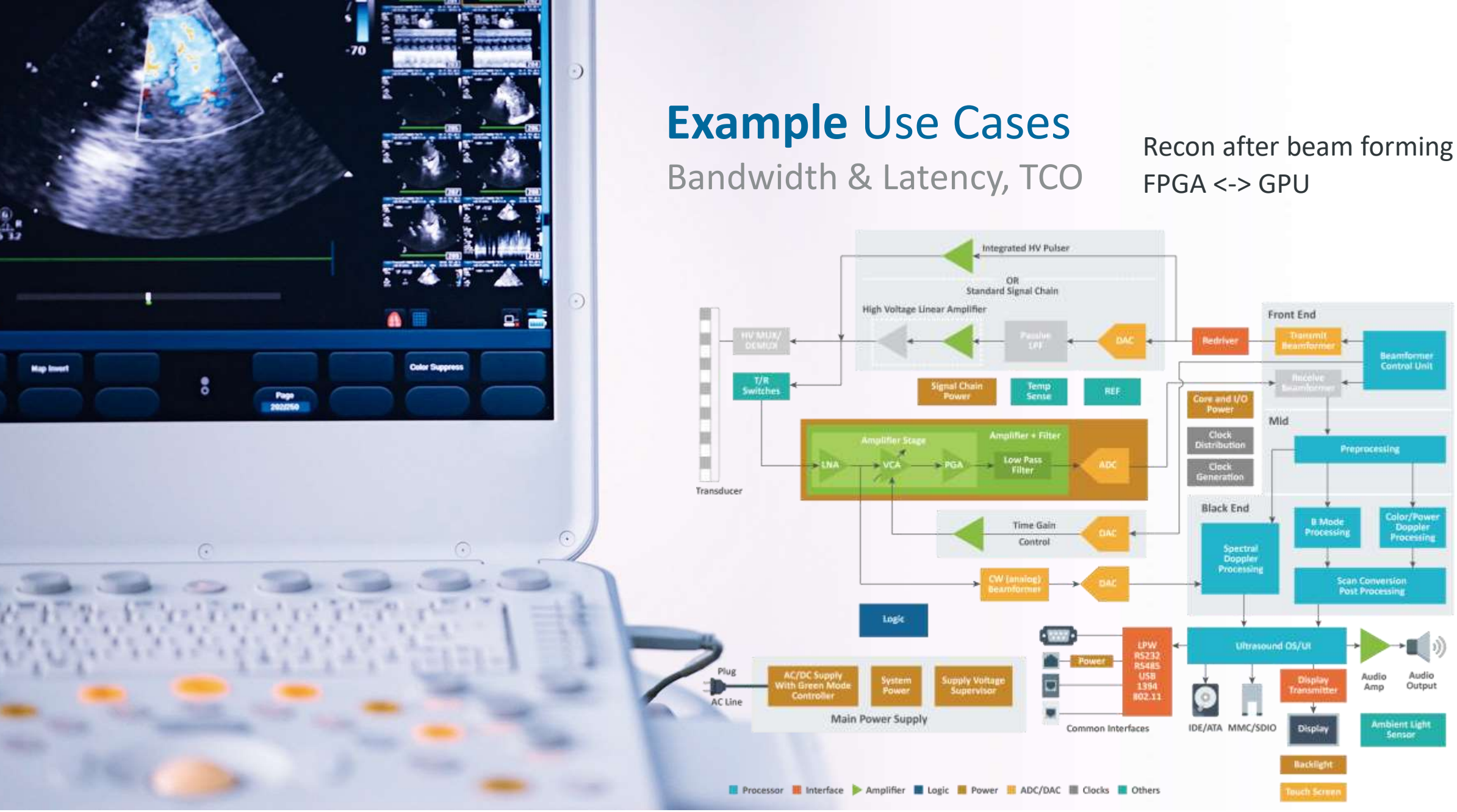


RDMA enabled data transfer path

Example Use Cases

Bandwidth & Latency, TCO

Recon after beam forming
FPGA <-> GPU



ADLINK Medical Imaging Product Portfolio

Embedded MXM Modules

EGX-MXM-T1000

EGX-MXM-P1000

EGX-MXM-P2000

EGX-MXM-RTX3000

EGX-MXM-RTX5000

EGX-MXM-P3000

EGX-MXM-P5000

Edge Platforms/Boards Support MXM Modules

DLAP-3000-CF

DLAP-3100-CF

DLAP-3200

AmSTX-CF

MVP-6100-MXM

MVP-6100-MXM

MVP-5100-MXM

Jetson GPU-based

ADLINK Medical Imaging Product Portfolio

DLAP-201-JT2

Inference Platform for
Edge AI Applications based
on NVIDIA® Jetson™ TX2

DLAP-211-Nano

Edge AI Platform
based on NVIDIA®
Jetson Nano™

DLAP-301-Nano

Industrial-Grade
AI NVR based on
NVIDIA® Jetson Nano™

Coming Soon

DLAP-401-Xavier

Edge AI Platform
based on
NVIDIA® Jetson AGX Xavier™

DLAP-211-JNX

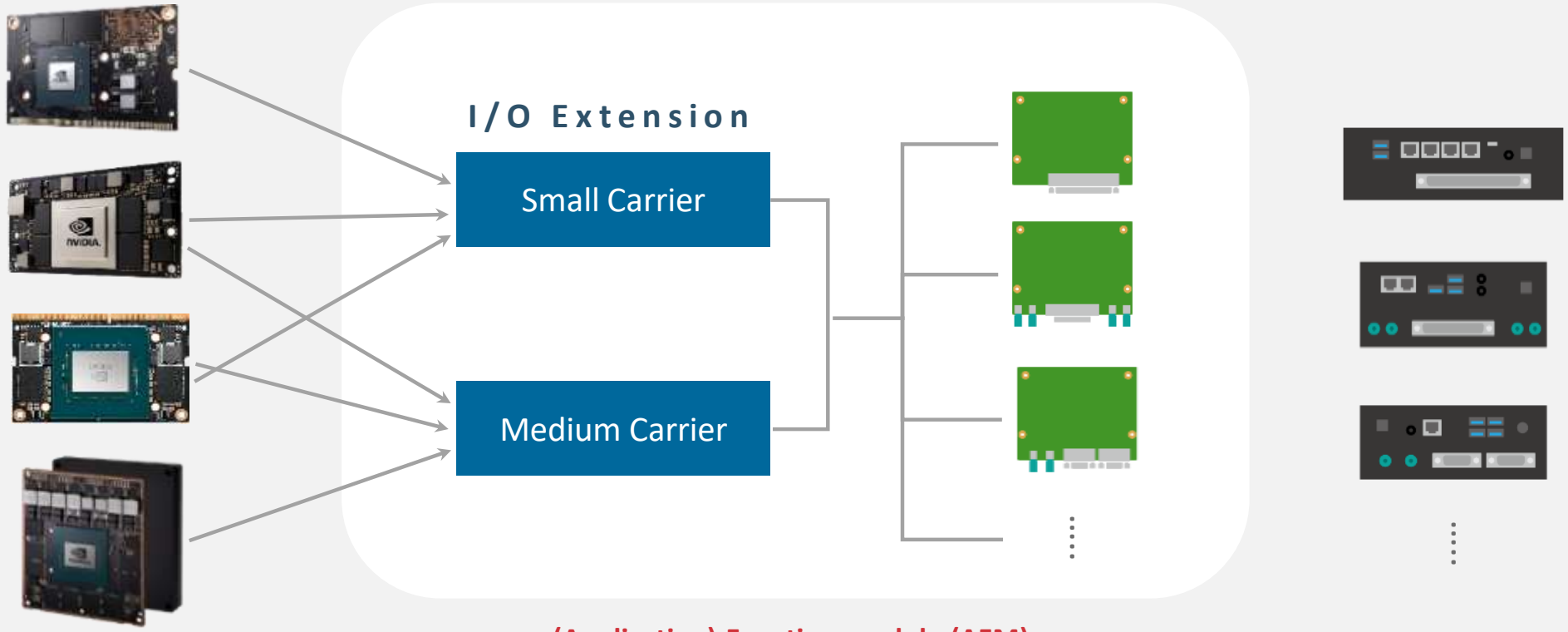
Inference Platform for
Edge AI Applications
based on NVIDIA®
Jetson Xavier™ NX

DLAP-301-JNX

Edge AI Platforms
based on NVIDIA® Jetson
Xavier™ NX for AI NVR

Design AI-Assisted Diagnosis for Hybrid OR Visualization

Flexible Customization for SWaP-Constrained



(Application) Function module (AFM)
to support sensors, devices, and cameras

Medical Endoscope

For advanced endoscope operation, adding the vision as one of the guiding for symptom in movement to increase the accuracy in diagnosis

ADLINK's Solution

- COMe + MXM carrier, complete system
- Dedicated Video Input interfaces SDI/Analog/HS-USB for probes and image combination
- Passive cooling operating temperature

Values to Customers

- Medical equipment demands longevity support
- ADLINK's engineering team helps customer to reduce the latency between front end device to GPU (< 50ms)
- High performance & low power consumption in compact size

Mobile X-ray, C-ARM

For Mobile X-ray / C-ARM Equipment Builder, Central controller's size, weight and performance (SWaP) is a key consideration when building up the machine

ADLINK's Solution

- Socket CPU + MXM carrier, complete system
- World smallest Industrial GPU system (3.2L)
- Active cooling with low noise (<40 db)

Values to Customers

- Medical Equipment demands longevity support
- High performance & low power consumption in compact size

Next Gen Ultrasound

Modern approach of next gen ultrasound machine with direct memory access enabled to boost data throughput for higher resolution/channel # of probes

ADLINK's Solution

- COMe + MXM, carrier & modules
- Direct data from FPGA to GPU
- Passive cooling operating temperature

Values to Customers

- Medical equipment demands longevity support
- High performance embedded GPU but with 1/3 dimension
- GPU Direct RDMA boosts up data throughput

Dental 3D Scan

For dental 3D scanner using to provide invisible braces. Customer uses MXM panel PC to provide compact, good mobility device while Quadro GPU serves better performance for 3D modeling with lower power consumption.

ADLINK's Solution

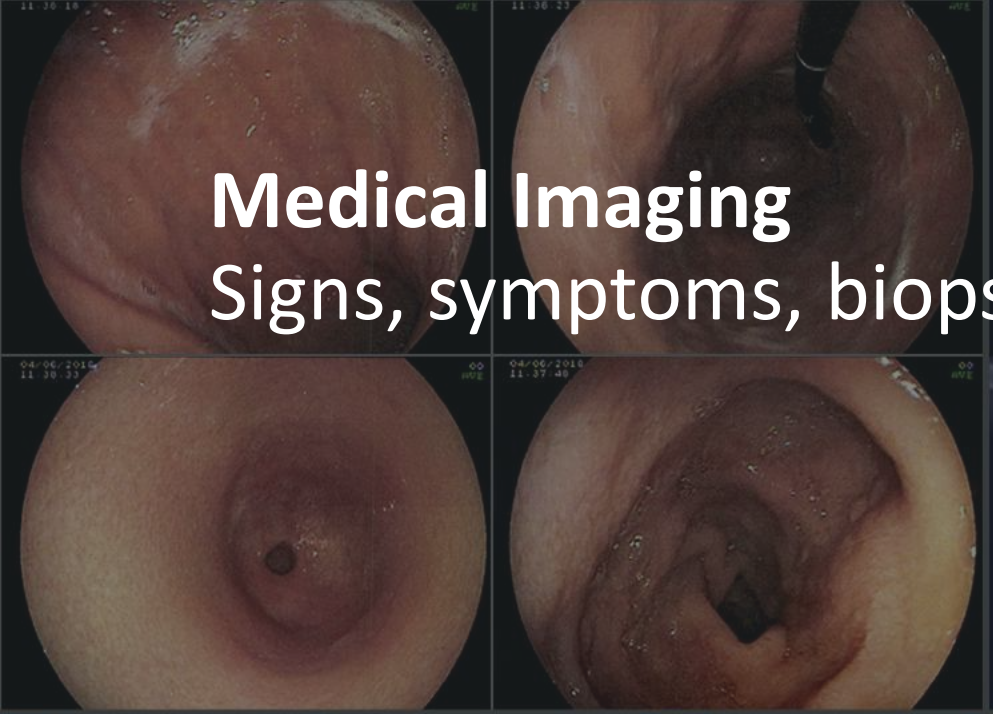
- NVIDIA® Quadro embedded T1000
- MXM 3.1 TypeA
- Passive Cooling, zero noise

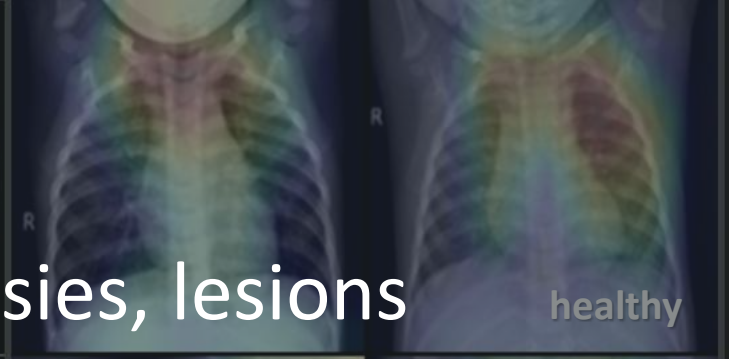
Values to Customers

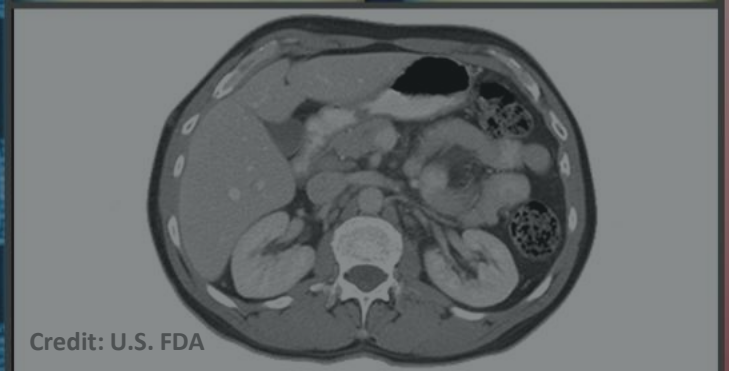
- Compact solution and lower power consumption for easier thermal design
- Only NVIDIA embedded solution – Quadro
- Longevity support
- Better 3D digital creation performance

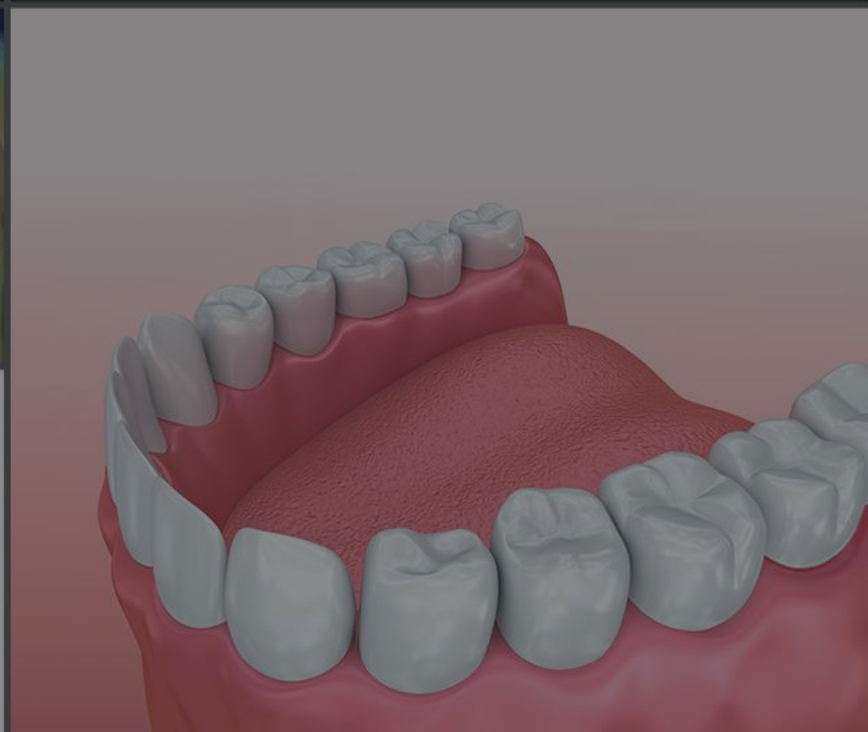
Medical Imaging

Signs, symptoms, biopsies, lesions







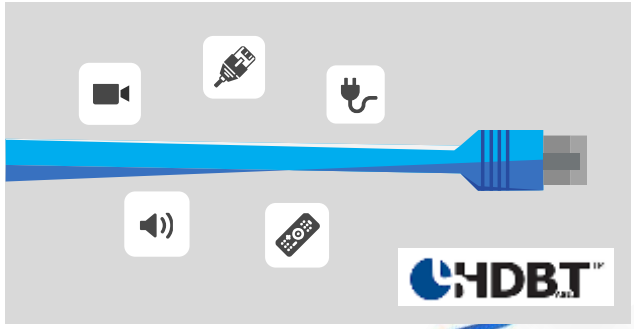


Real-Time Transmission

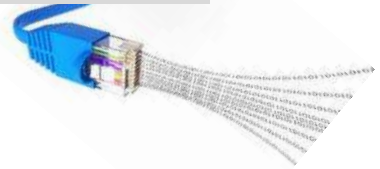
Innovation Concept

Reduce cables routing in mission critical area (OR, ICU, …, etc.)

Before

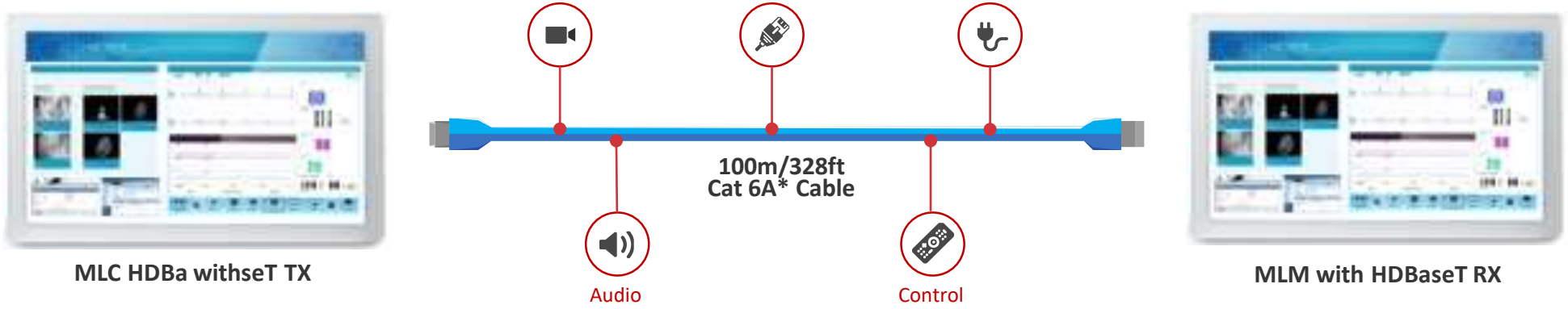


After



Reduce cables routing in mission critical area (OR, ICU,..., ETC)

HCBaseT **Saves customer's effort in installation and maintenance and hazardous concern**



Advantage:

-Significantly reduces cable count - USB, HDMI, Ethernet, DC power carried on with one CAT5e/6 cable

Application:

-Any place

Technology Partner:

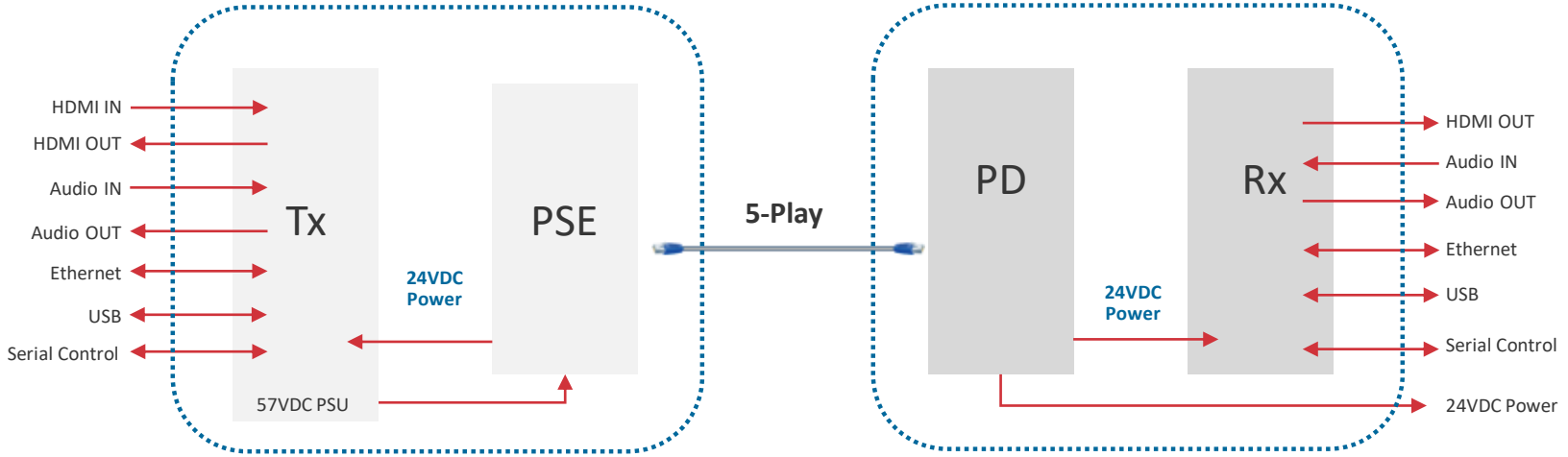
-HDBaseT Alliance – ADLINK is an Alliance Member
-Valens Semiconductor (silicon vendor)

Scenario 1

High Power POH Implementation

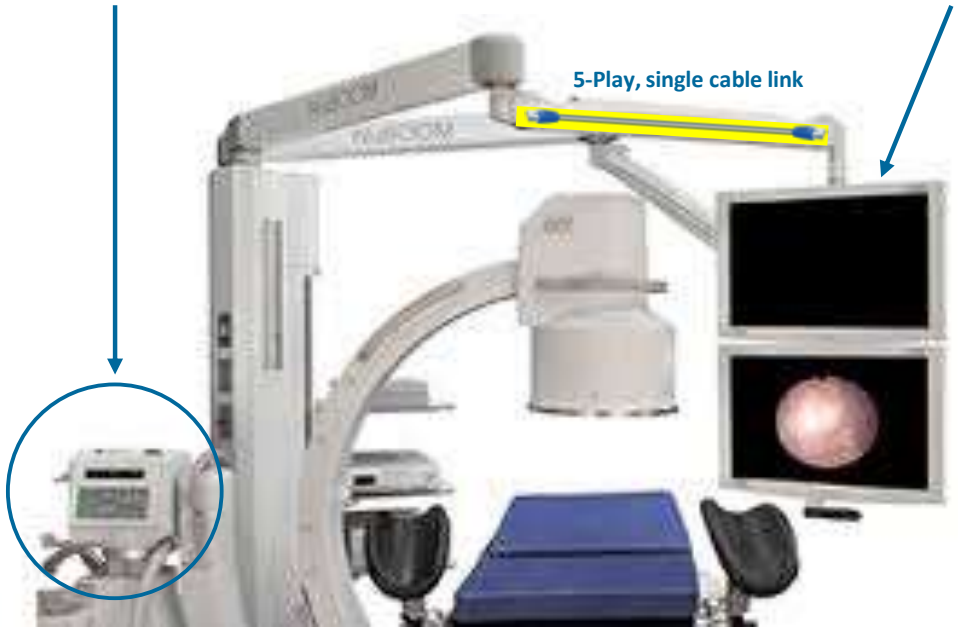
SOURCE DEVICE

Endoscope, C-arm, other modality



SINK DEVICE

Monitor, boom arm mounted



C-Arm

HDBaseT™ technology makes interfacing to the C-ARM easier.

ADLINK's Solution

- Medical HDBaseT™ RX/TX

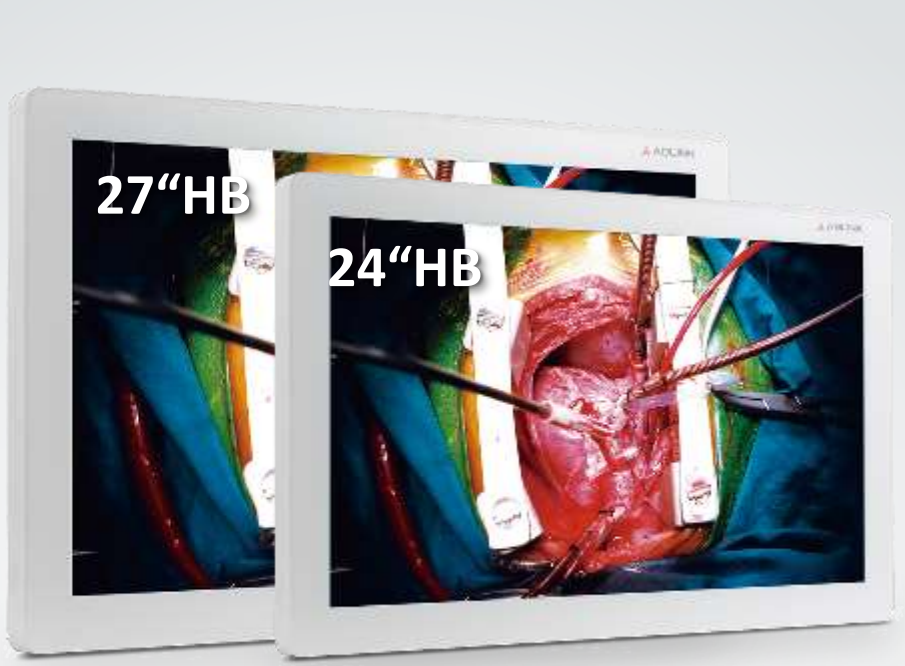
Values to Customers

- Lower latency video transmission
- Simplified cabling by combining multiple, high-speed signals into a single cable


Hybrid OR Visualization
High-Quality Imaging

ADLINK Healthcare Visualization Product Portfolio

ADLINK Surgical Monitors



1080P FULLHD

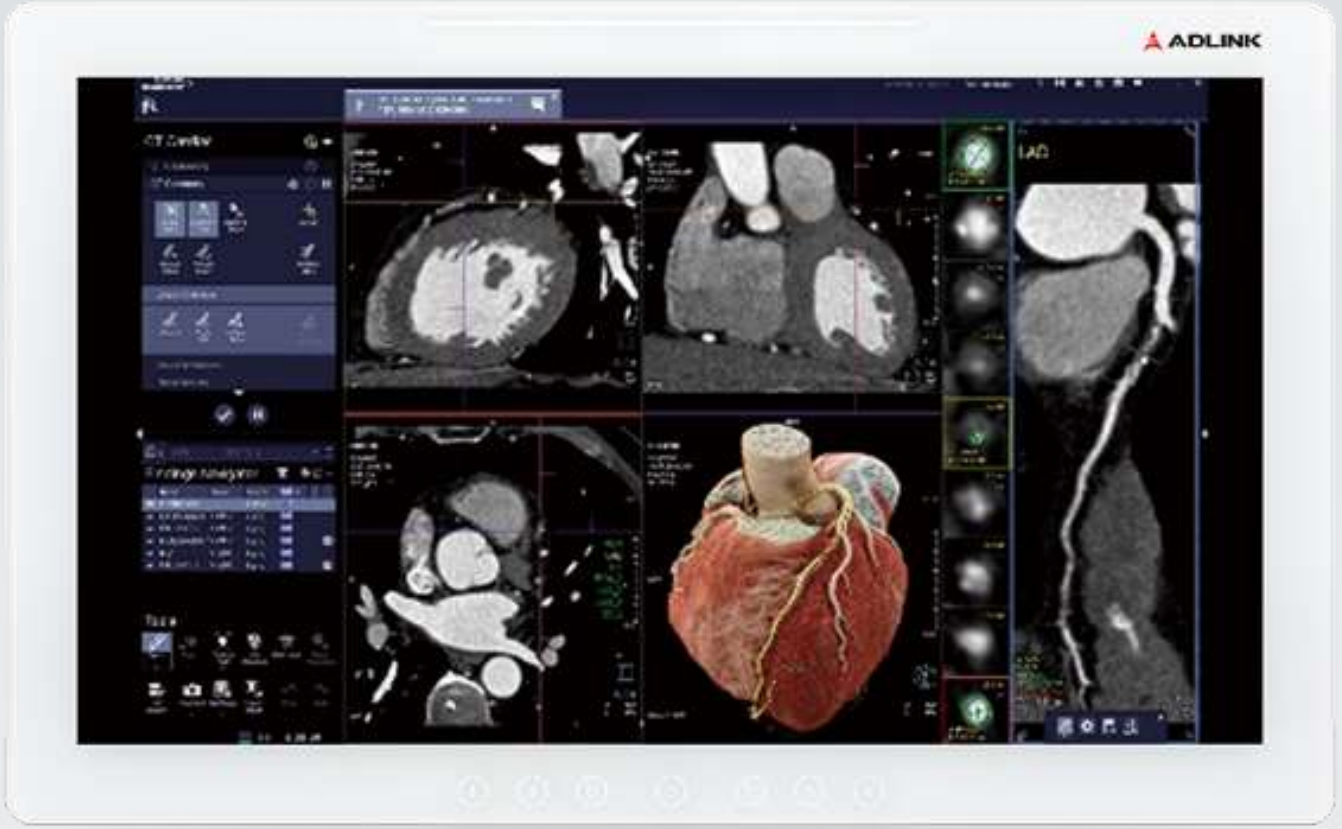
ULTRA HD

ADLINK Surgical Monitors

High quality imaging solutions

ADLINK surgical monitors (ASMs) offer medical practitioners important features not available from typical desktop display screens, including:

- Medical Devices Regulation (MDR)-certified
- Superior safety and hygiene
- Excellent image and color visualization
- Precise signal processing for more accurate diagnoses and better treatment



Operation Room

Intensive Care Unit

Emergency Room

Examination Room

High-Precision Monitors

ADLINK surgical monitors (ASMs) serve as operating room console for visualization and documentation to support picture archiving and communication system (PACS) and health information system (HIS) applications in the OR. Their high-precision image quality offers excellent viewing for surgeons and caregivers before or during surgery.

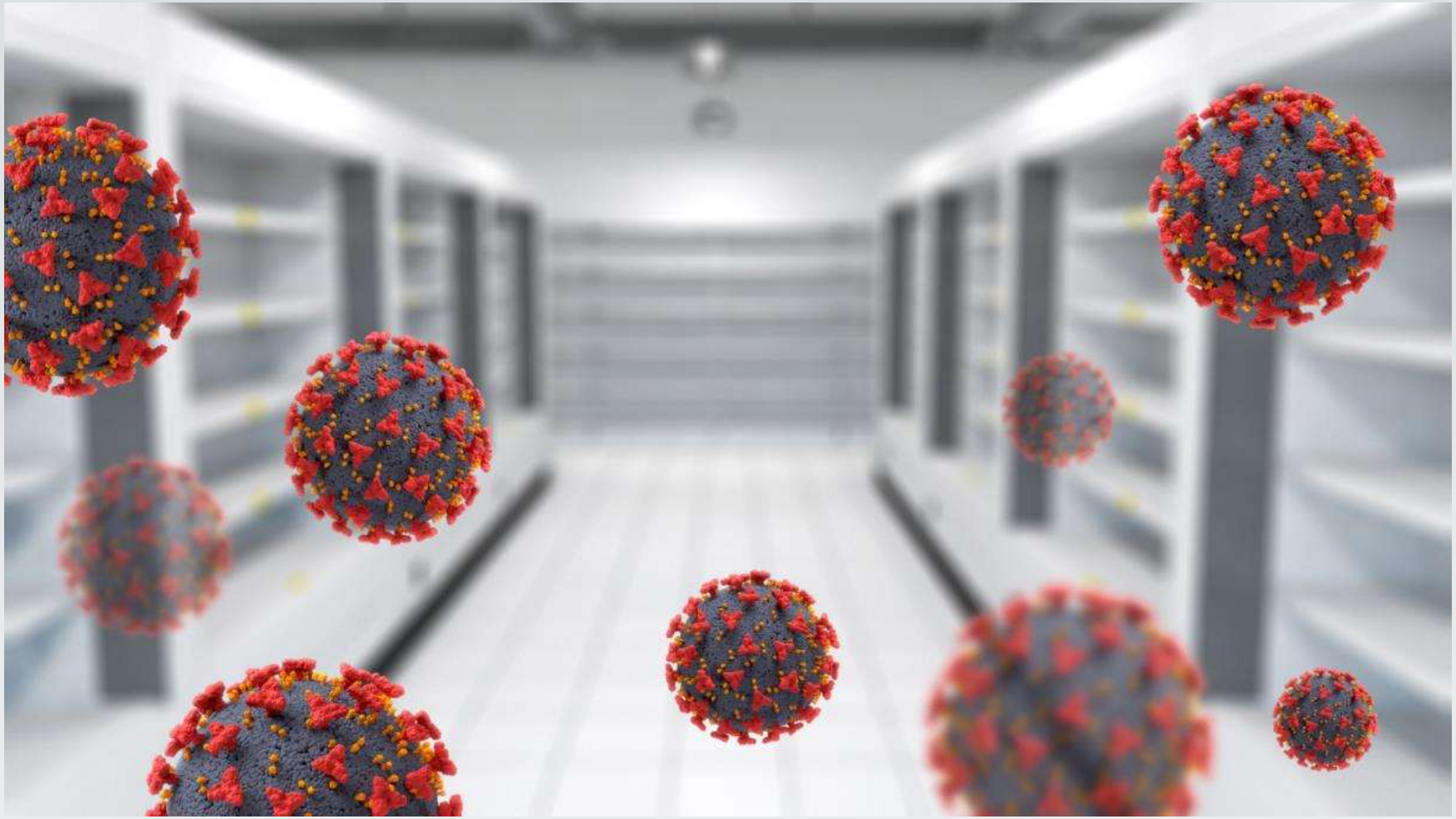
ADLINK's Solution

- Medical Devices Regulation (MDR)-certified ASM surgical monitor

Values to Customers

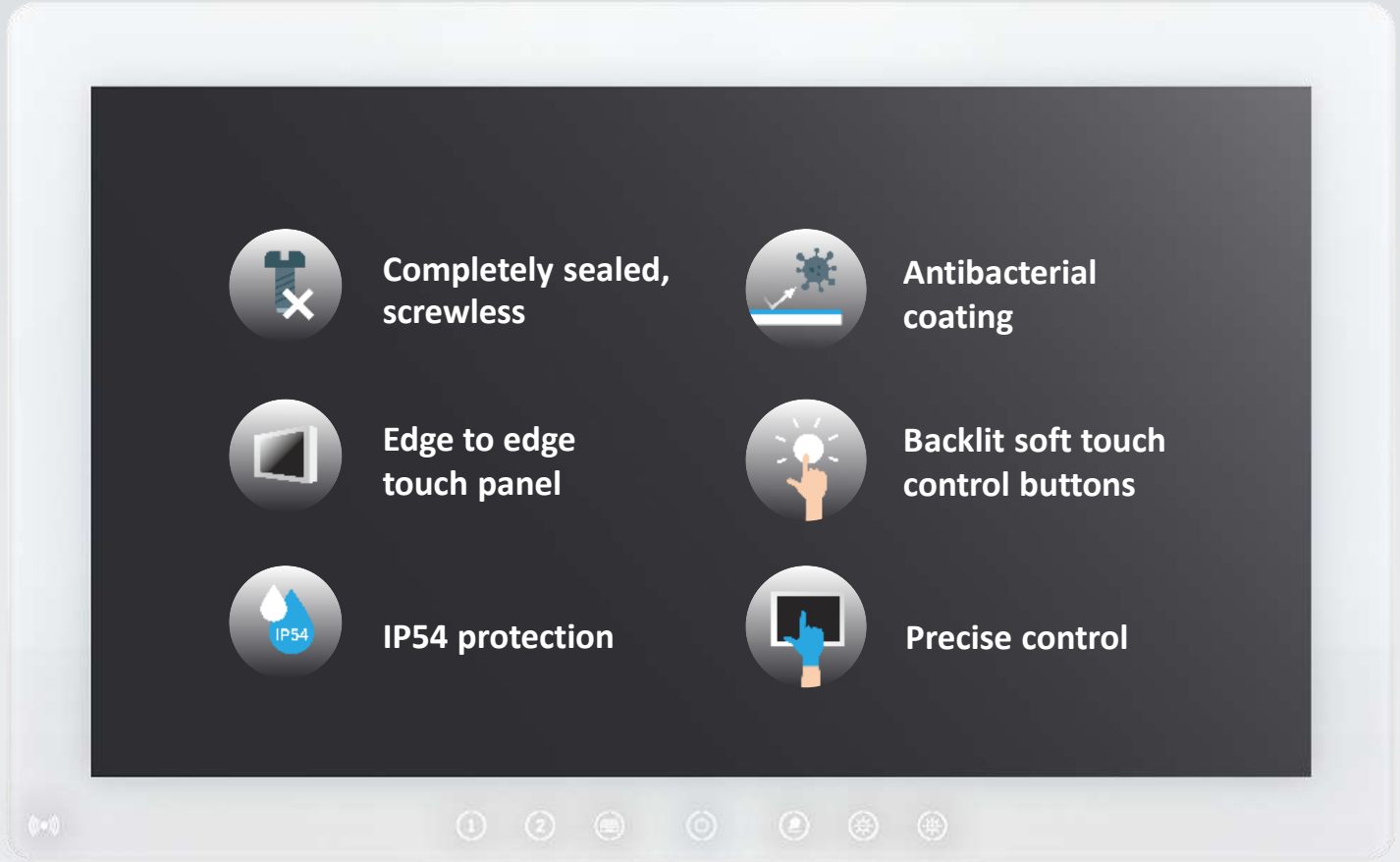
- Excellent picture quality
- High quality of gamma calibration
- Hygienic concept

Infection



Box photo created by kjpargeter - www.freepik.com

Unique Hygienic Design



ADLINK All-in-One PCs

MLC 8 maximum performance for the critical enviroment

ADLINK All-in-One PCs

MLC 8 – Where it is used

Operation Room

Intensive Care Unit

Emergency Room

Examination Room

The ADLINK medical All-in-One medical computers have proven to be essential device for medical documentation tasks:

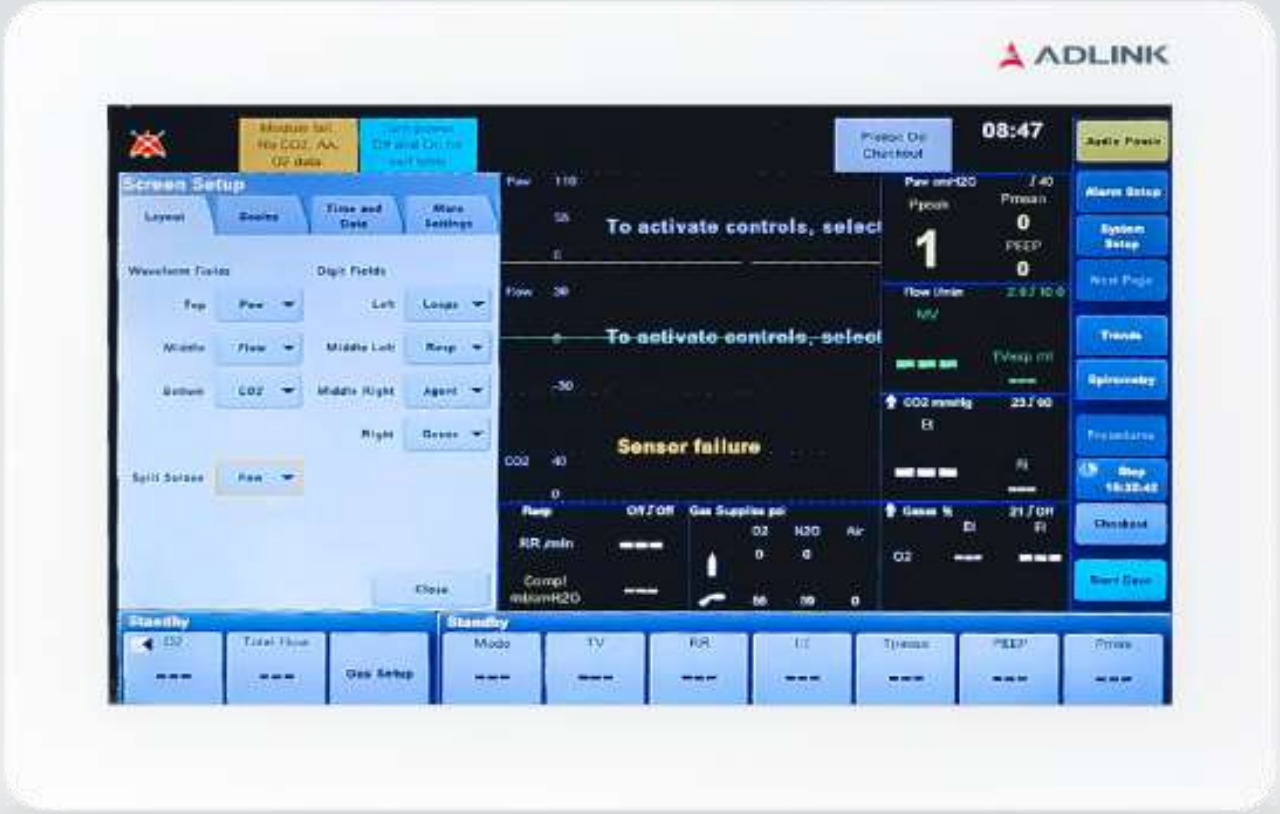
- Clinical information systems
- Anesthesiology documentation
- Patient data management systems
- Radiology information systems
- Control and data processing of/from medical devices
- Other medical IT tasks

ADLINK All-in-One PCs

MLC AL/MLC-KL- Where it is used

The MLC-AL and MLC-KL help streamline patient care by supporting a range of systems. Information from different sources can be aggregated and visualized to manage, for example, operating theatre videos, inventories, and documentation

Mobile X-rays, ventilators…etc.
Blood and tissue analysis
Vital sign monitoring



Operation Room

Intensive Care Unit

Emergency Room

Examination Room

Mobile Medical Cart

Designed for hospitals facilitates safe, contactless doctor-patient communication and medical data access by combining gesture recognition and video conferencing.

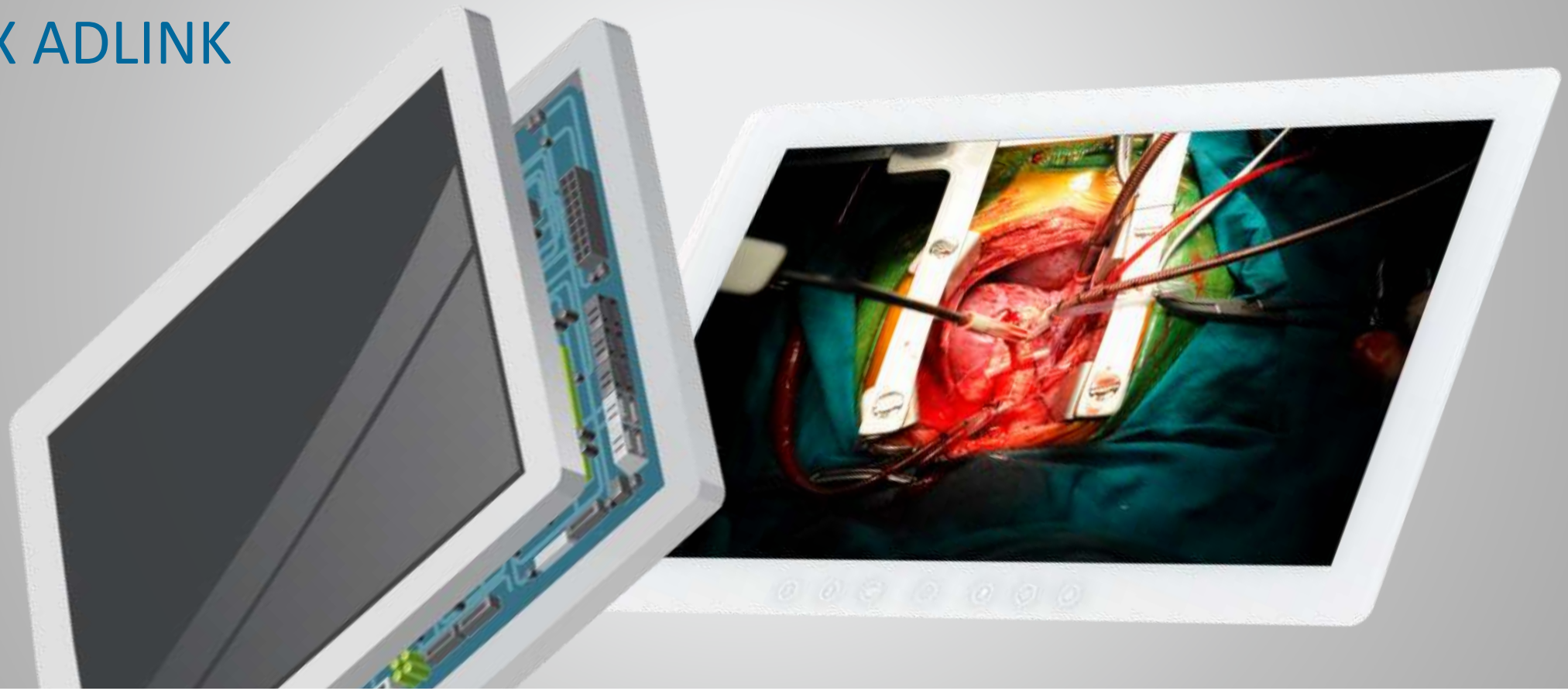
ADLINK's Solution

- MLC-AL/MLC-KL incorporated imedtac gesture technology guest

Values to Customers

- Hygienic design prevents the spread of infection
- Clear image and high flexibility to increase productivity for medical personnel

AUO X ADLINK



LONGEVITY | OPTICAL QUALITY | FLEXIBLE CUSTOMIZATION

AUO Display+

ADLINK LEADING EDGE COMPUTING

AUO X ADLINK

LONGEVITY | OPTICAL QUALITY | FLEXIBLE CUSTOMIZATION

AUO Display+

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