

Valens Semiconductor Update

- **Company Introduction**
- **HDBaseT**
- **MIPI A-PHY**



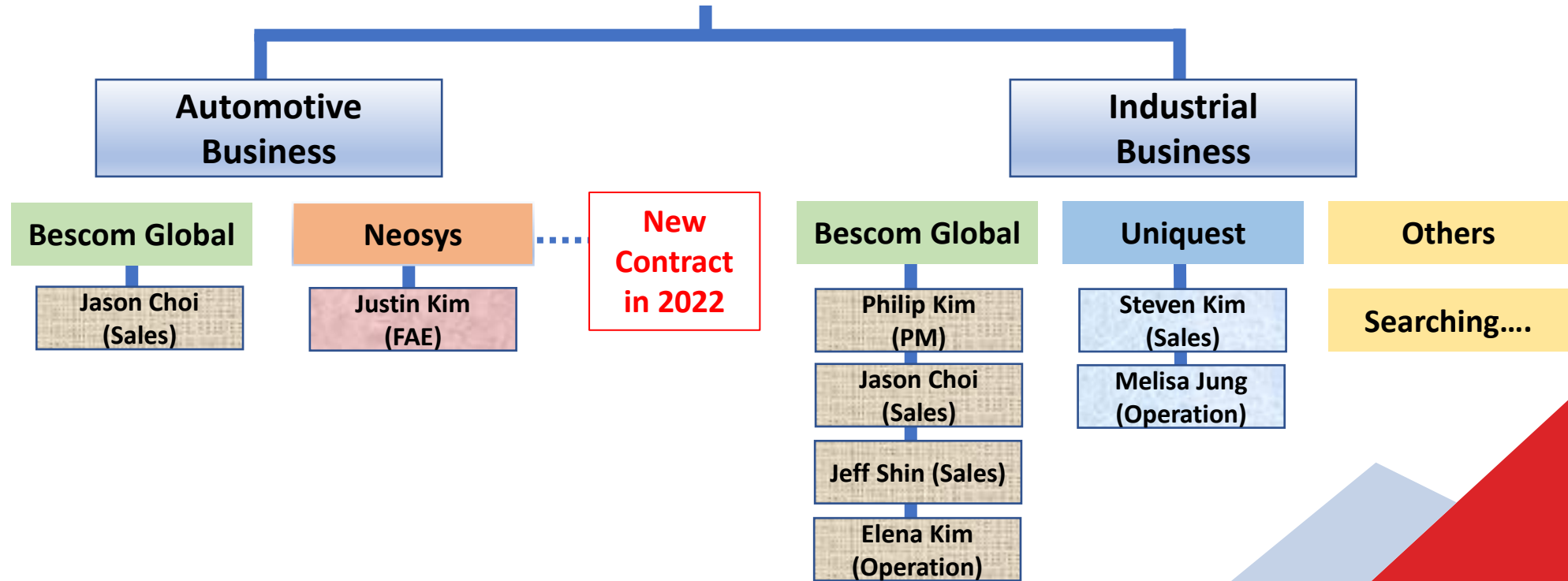
발렌스 세미컨덕터 (Valens Semiconductor)

- 2006년 설립된 이스라엘 '**팍리스**'반도체 회사
- 국제 통신표준인 '**HDBaseT**'의 제정사
- **유선용** 초고속/광대역 통신용 반도체 전문 회사 (산업용+자동차)
- 애플, 골드만삭스, 삼성전자, 오픈하이머, 린스캐피탈 등에서 투자
- 2021년 9월 : 뉴욕주식거래소(NYSE)에 '**VLN**' 으로 상장

Valens Korea Organization Update



Eric Yoon
한국 지사장



'HDBaseT 표준' 창립 멤버



HDBaseT™

Defining industry global standard
for ultra-high-definition,
digital connectivity

+

Advancing interoperability
& HDBaseT ecosystem

The HDBaseT Alliance Worldwide (250여개 회원사들)

250+ members, addressing Pro-Audiovisual, Consumer Electronics, Automotive, Industrial PCs, Medical and more



What is HDBaseT?_(1)

개요

HDBaseT 란 ?

HD급(4K)의 비디오와 오디오, 이더넷, 제어, USB 단순 케이블을 이용해 전송 가능한 글로벌 표준 100W 급까지의 파워를 전송할 수 있는 기술

HDBaseT 장점

- 압축하지 않은 데이터를 8Gpbs로 전송
- zero latency로 영상, 데이터 지연없이 전송
- EMC, EMI 강점
- UTP 케이블, CAT6 케이블 사용 최대 100m까지 전송
- 많은 cable을 단순화 할 수 있는 시스템
- 응용분야 : ProAV, 의료, 산업, 자동차 전분야에 사용되어지고 있음

OSI 7 Layer 비교

풀 스택 테크놀로지

T-Adaptors

- native data interfaces support
- added at the application layer

네트워크 계층은 복잡한 토폴로지 지원

- Daisy-chains (Point-to-Multipoint)
- Multipoint-to-Multipoint

The PHY layer 대역폭 요구 사항을 지원 가능

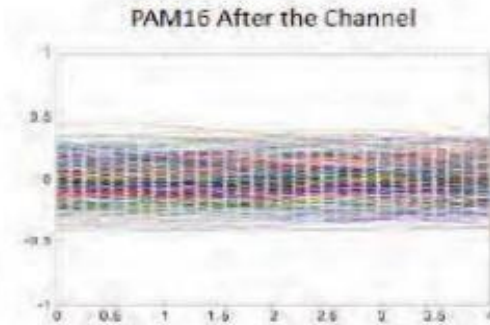
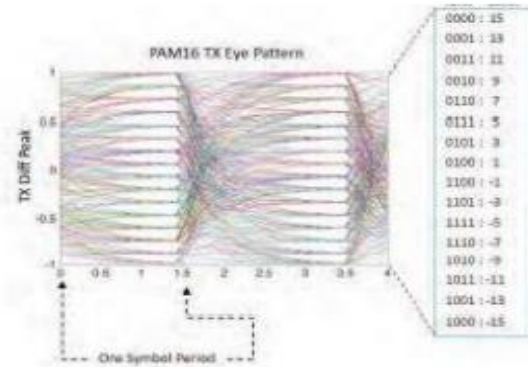
OSI 7 Layers	HDBaseT Implementation
Application	HDBaseT T-Adaptors for Video, Audio, USB and Control
Presentation	HDBaseT protocol for secured and reliable delivery
Session	
Transport	HDBaseT Session Multiplexing
Network	HDBaseT Network (Switching) Layer
Data Link	HDBaseT Link Layer
Physical	HDBaseT Copper/Fiber PHY

What is **HDBaseT**?_(2)

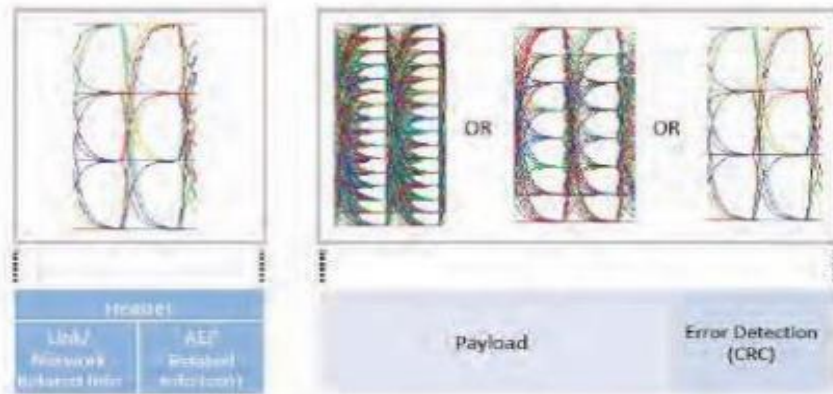
전송 방식

PHY Layer - Pulse Amplitude Modulation

- HDBaseT는 PAM16 심볼 방식 사용
- 각각 4비트의 데이터를 나타내는 16개의 차동 전압 레벨 중 하나를 사용하여 전송



HDBaseT Link - Dynamic Subset Modulation



- Differential Transfer Quality via PAM- 16
- subset modulation on packet level (PAM 8, PAM 4, PAM 2) for optimized QoS
- Applied on both headers and payload
- No packet drops when error is detected (CRC)



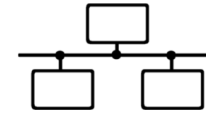
HDMI



RCA
AUDIO



S/PDIF
OPTICAL AUDIO



RS 232
485





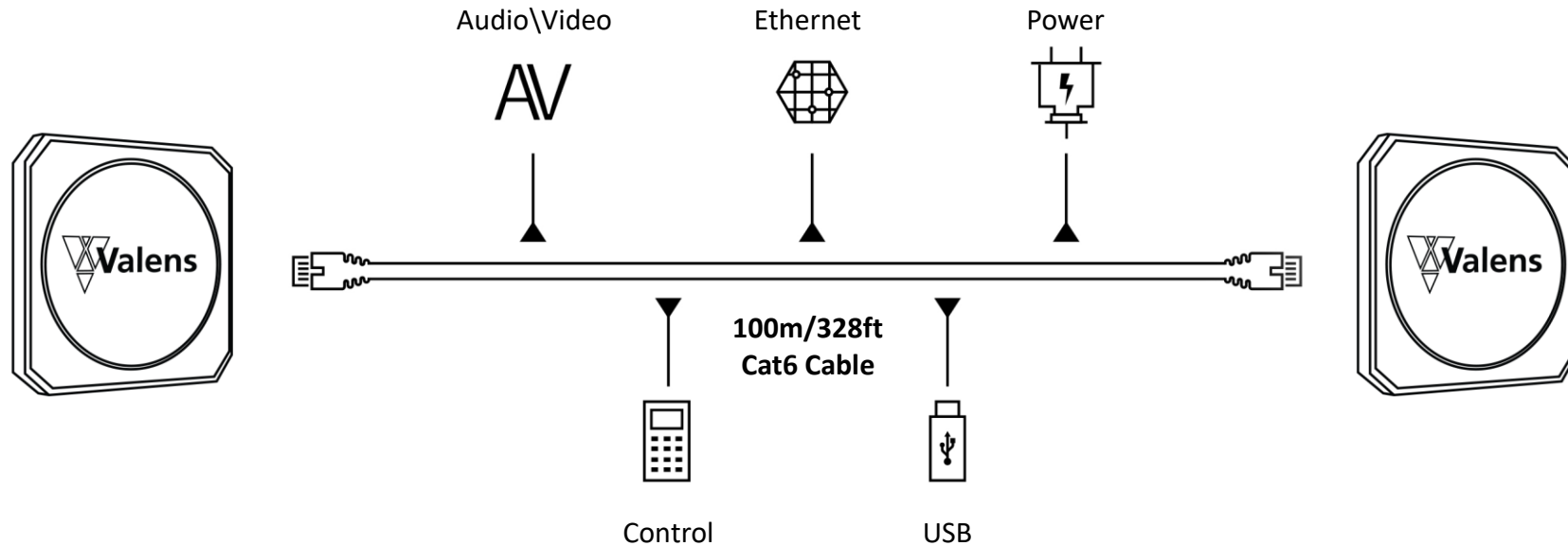
The Ultimate Standard of Digital

Connectivity



Over a Single Cable

HDBaseT – 5Play Convergence Over a Single Cable



Ultra HD Video & Audio, Ethernet, USB, Controls and Power on a single Cat cable, up to 100m/328ft long

Valens Audio-Video: Product Selection Table

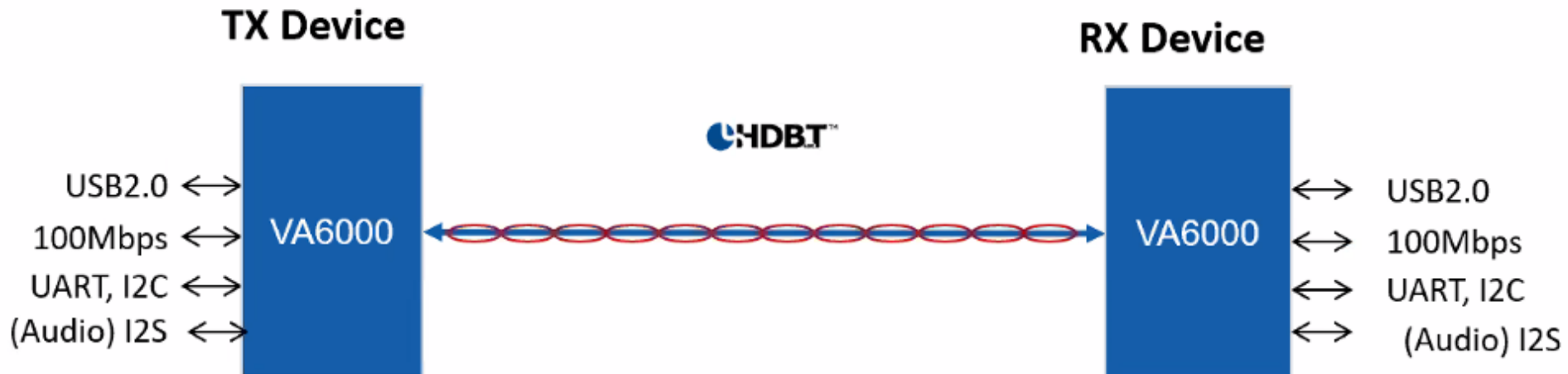
	VS1xx 8/0.15Gbps		Valens Colligo VS2xxx 8/0.3Gbps						Valens Stello VS3xxx 16/2Gbps		ProAV 667/667Mbps
Feature	VS100	VS010	VS2310	VS2000	VS210	VS200	VS2010	VS2110	VS3000	VS300	VA6000
Cable length [m]	100m	1080p, 70m 4K/30, 40m	100m*	100m	1080p, 70m 4K/30, 40m	1080p, 70m 4K/30, 40m	100m	30m	4K/60 100m	4K/30, 70m 4K/60, 40m	100m
Compatibility (VS 1/2/3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Long Reach	150m	No	150m	150m	No	No	150m	No	150m	No	N/A
HDMI Video	4K/30	4K/30	4K/30	4K/30	4K/30	4K/30	4K/30	Up to 165 MHz	4K/60	4K/60	N/A
DSC support	No	No	Yes	Yes	Yes	Yes	No	Yes	N/A	N/A	N/A
D/HDI/LVDS	No	No	Yes	No	HDI	HDI	No	Yes	DHDI	DHDI	No
HDCP	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	N/A
USB 2.0	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes
UART	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
MSIO/PDIF	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
I ² C	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethernet	100M	No	100M	100M	No	No	No	No	Yes	No	100M
I ² S	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
S/PDIF	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No

*Fiber extension for up to 10km when coupled with the VS2311 chipset

The VA6000

Distribution of USB 2.0; Ethernet; I2S Audio; I2C and UART over **Single Unshielded Twisted Pair !!**

- **Distance:** Symmetrical 500Mbps transmission: USB + I2S + I2C + 100Mbps (ETH) - ~**100m**
- **Connector:** RJ45 (1 pair used)
- **Topology:** Point to point or Daisy chain

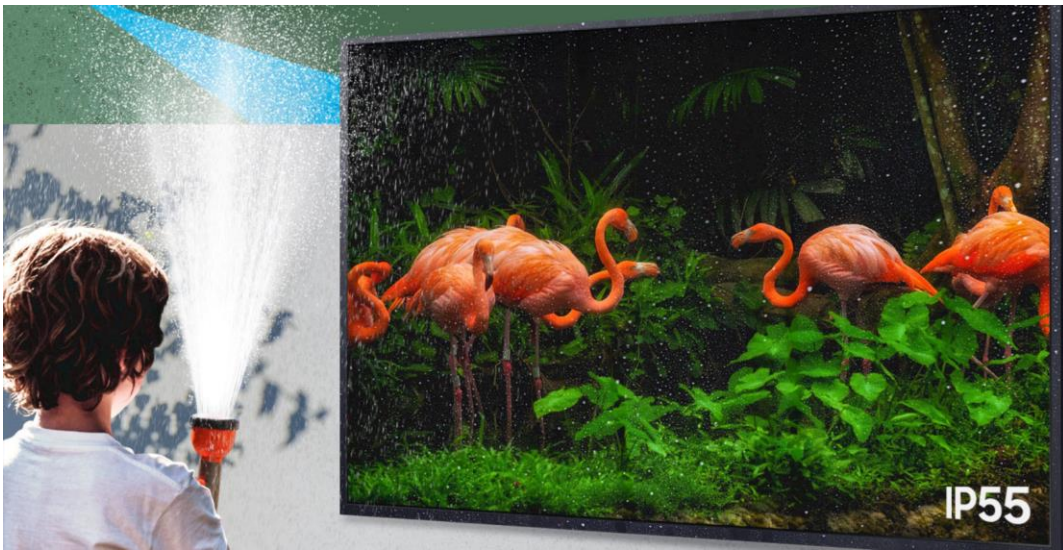


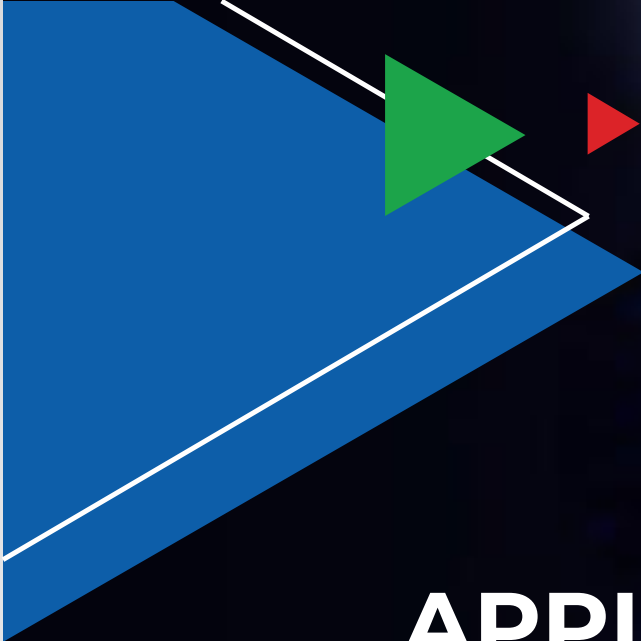
Valens and HDBaseT in Action



코엑스, 서울

Samsung's 1st Outdoor TV, 'The Terrace (더 테라스)' (May, 2020)

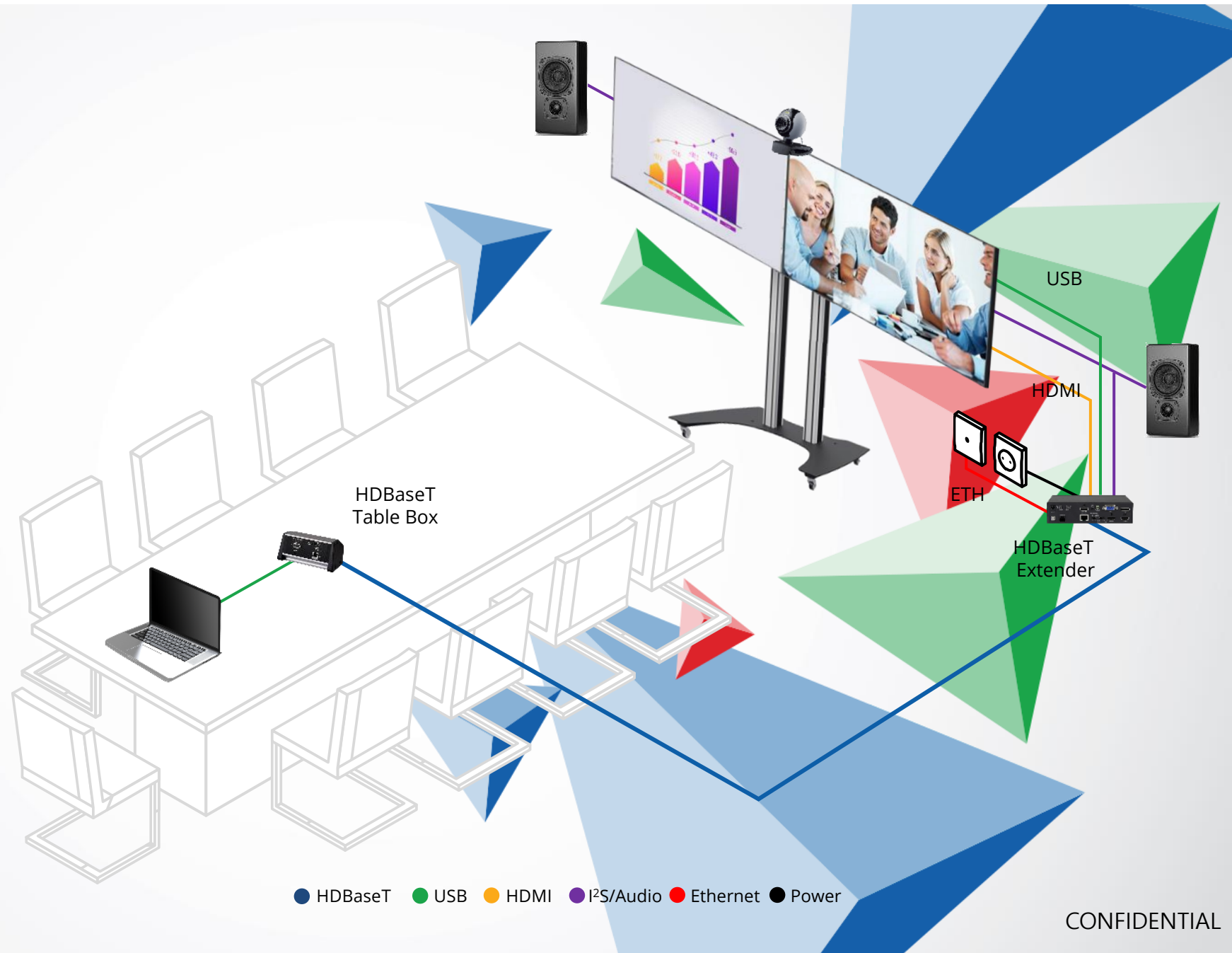




APPLICATIONS/ USE CASES

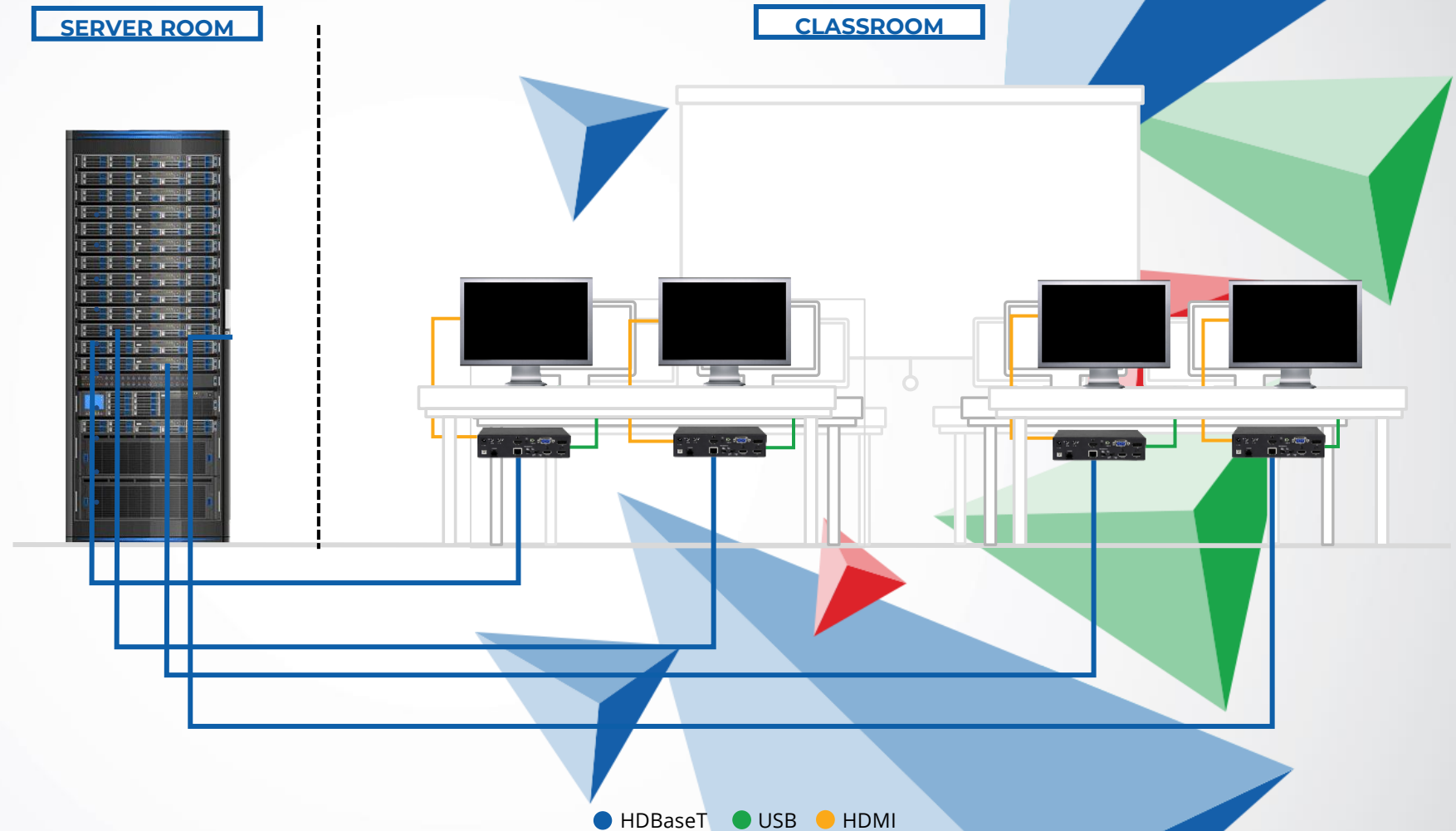
Superior Connectivity in Conference Rooms for Virtual Meetings

- Plug-and-play for easy connectivity, regardless of device or VC platform
- High performance, no latency
- Largest existing install base (enabling re-use)



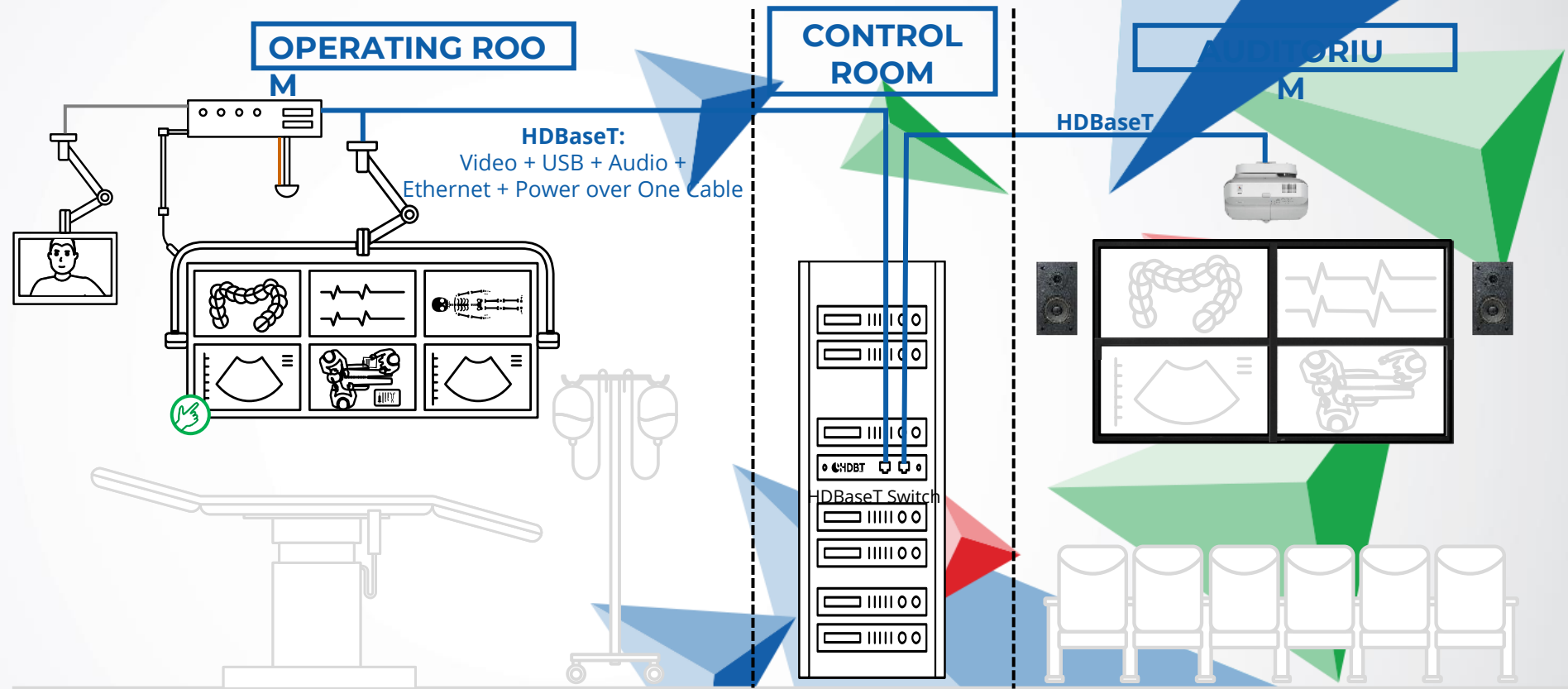
University: Top-Tier Education with HD BaseT

- High performance with the flexibility to reach different rooms/spaces even over long-distance
- Integration with new and legacy sources
- Addressing lecture halls, regular classrooms and collaborative learning facilities



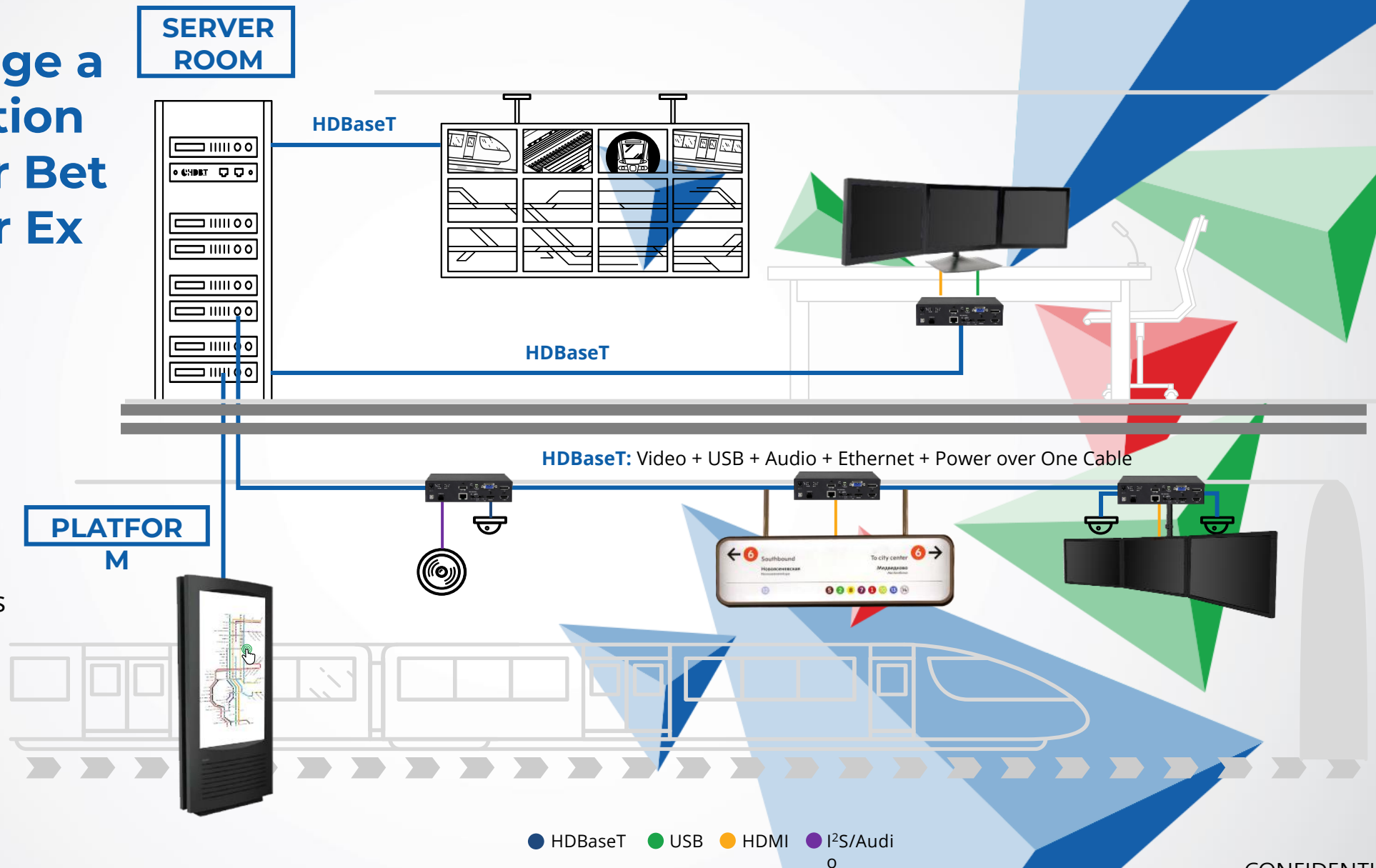
HDBaseT Connectivity Benefits for Healthcare Installations

- Performance
 - Highest resolution
 - Uncompressed video
 - Zero latency
- Reduction of cable clutter & complexity
- USB extension for interactive applications



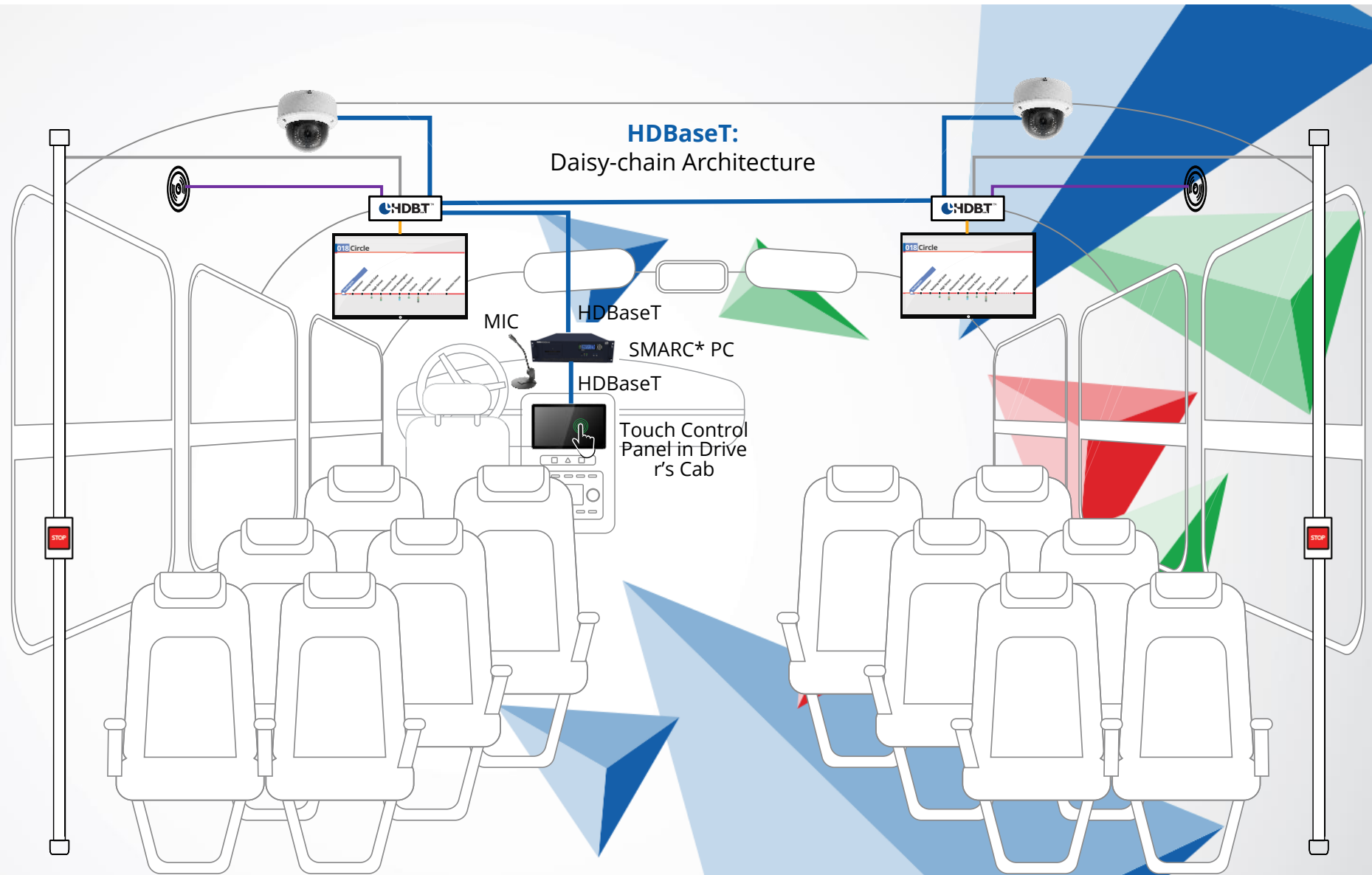
Digital Signage at Transportation Platforms for Better Customer Experience

- Convergence of multiple interfaces on the same infrastructure
- Interactive displays
- Daisy chaining - reducing system costs



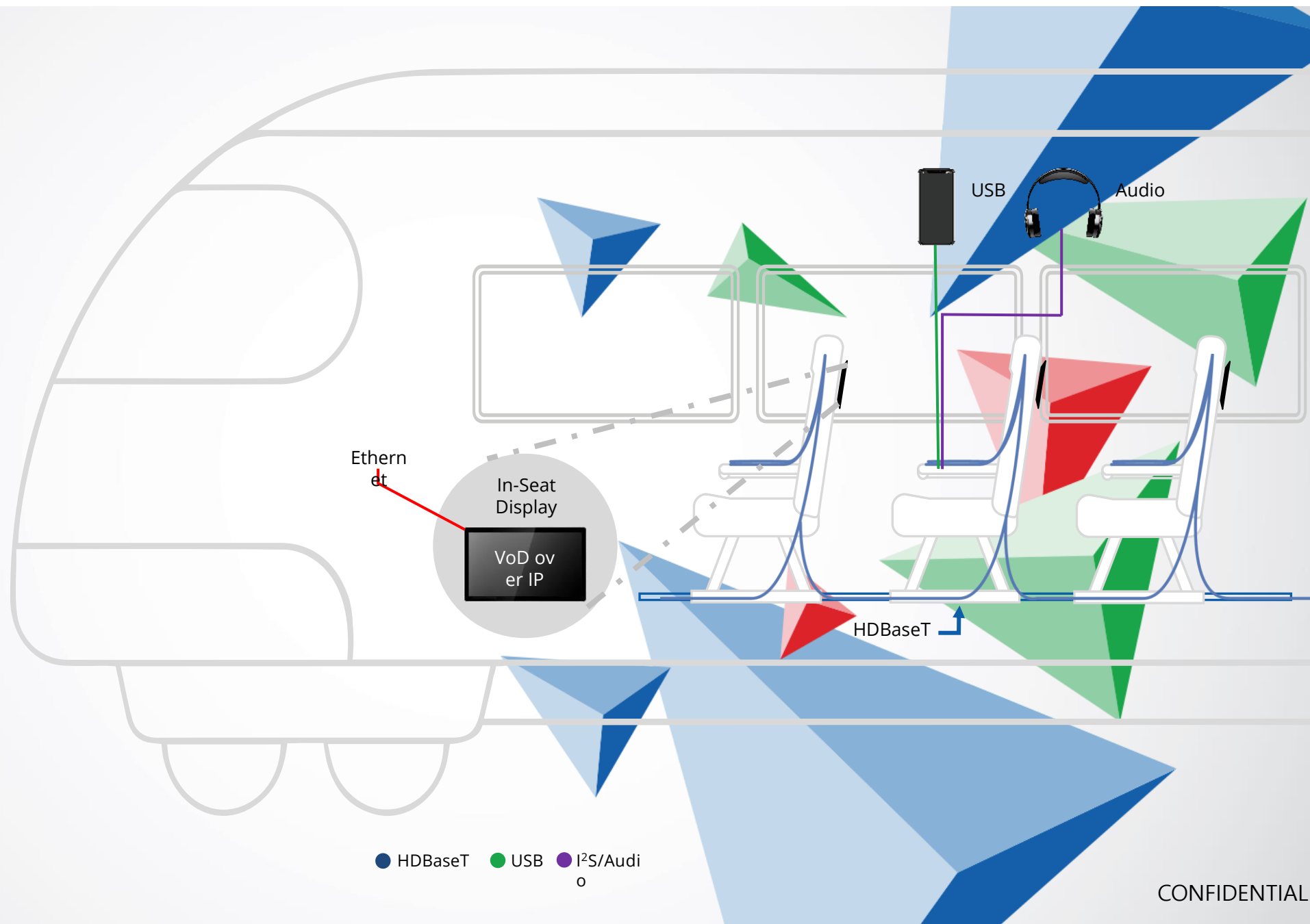
In-Vehicle Digital Signage: Better Servicing Customers in Buses & Trains

- Convergence of multiple interfaces
- No cable clutter – easy to retrofit cabins

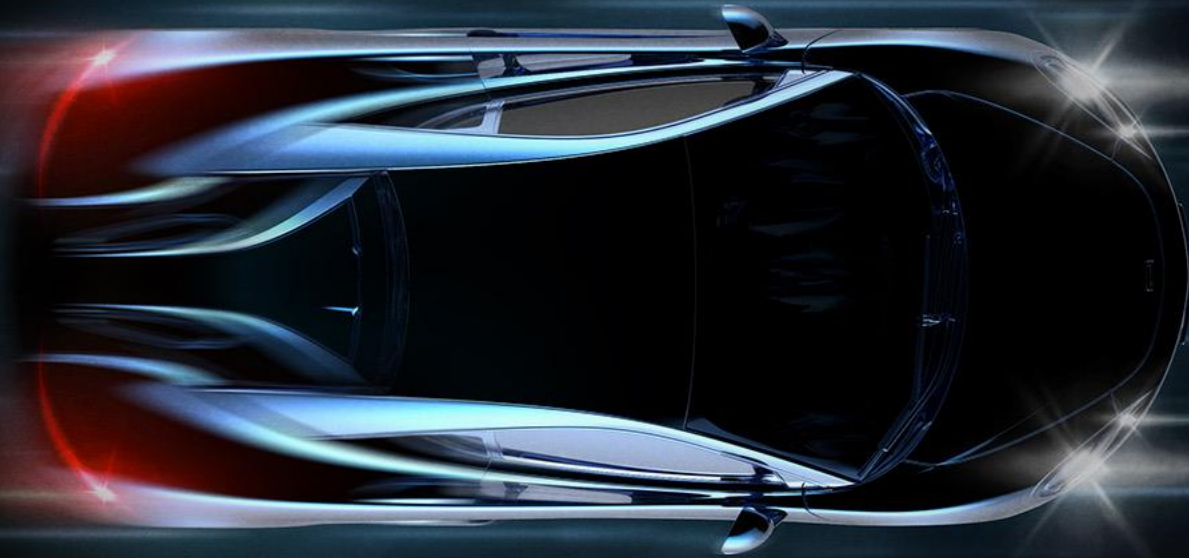


In-Train Infotainment for Superior Customer Experience

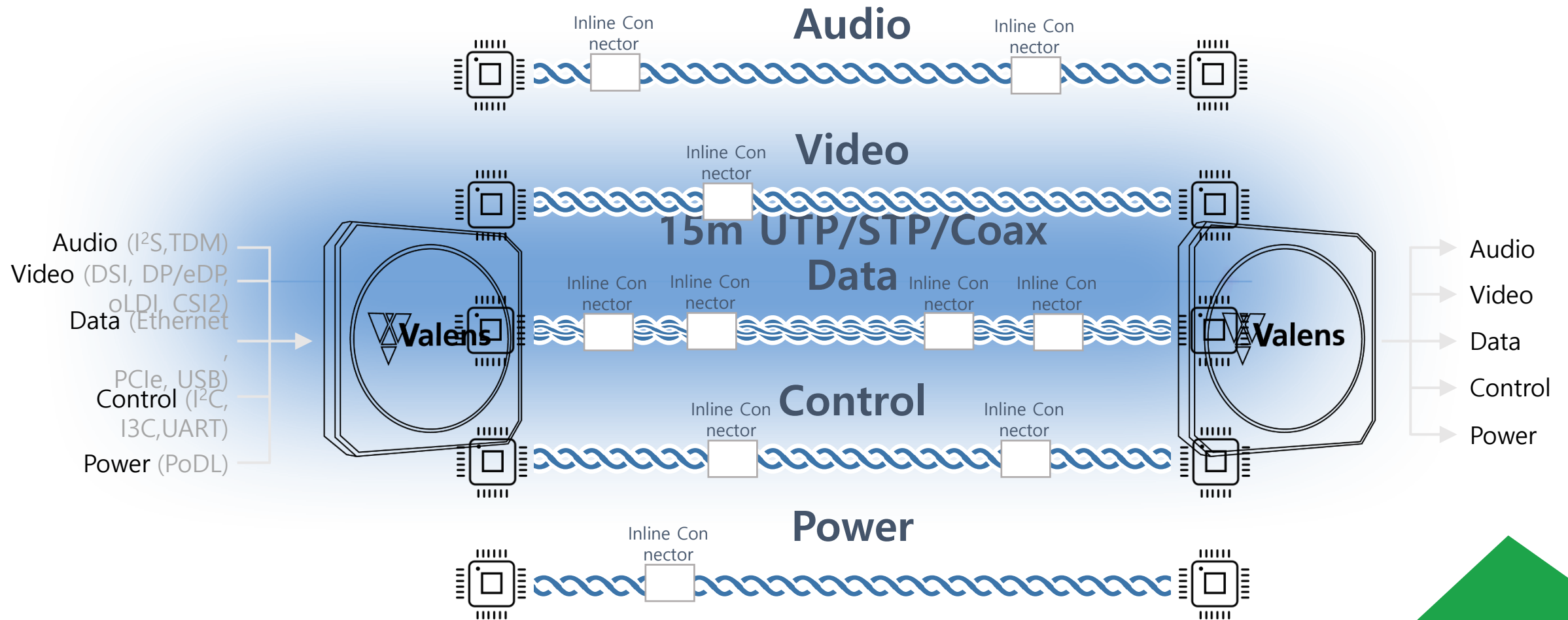
- Daisy chaining and convergence of multiple interfaces
- Simplifying display implementation
- Reduced costs, cable clutter & weight



HDBaseT Automotive



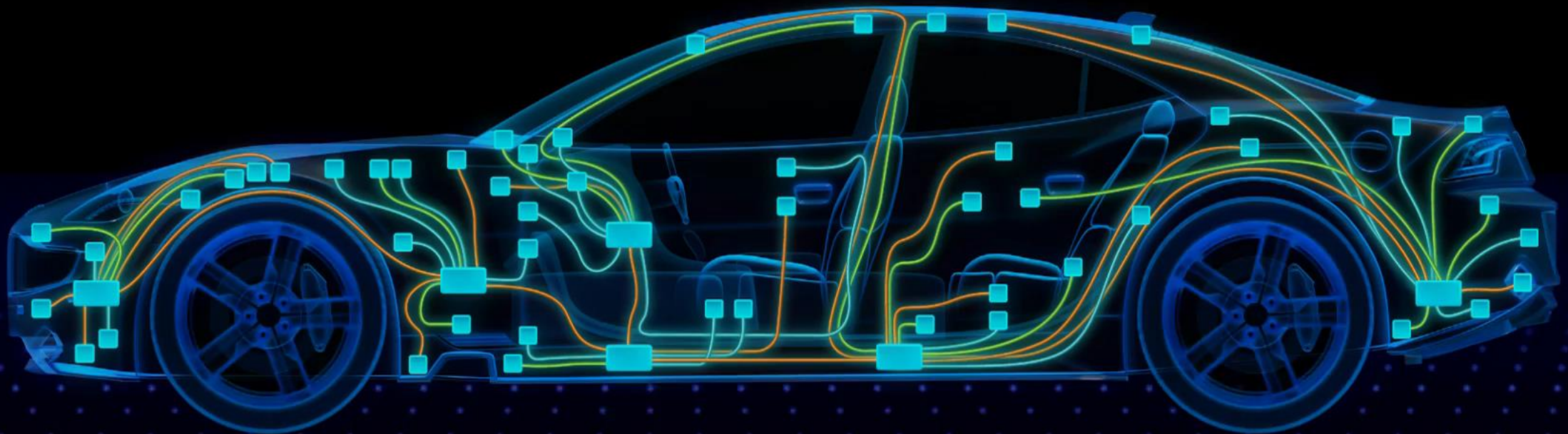
HDBaseT Solution over Simple Cabling Infrastructure



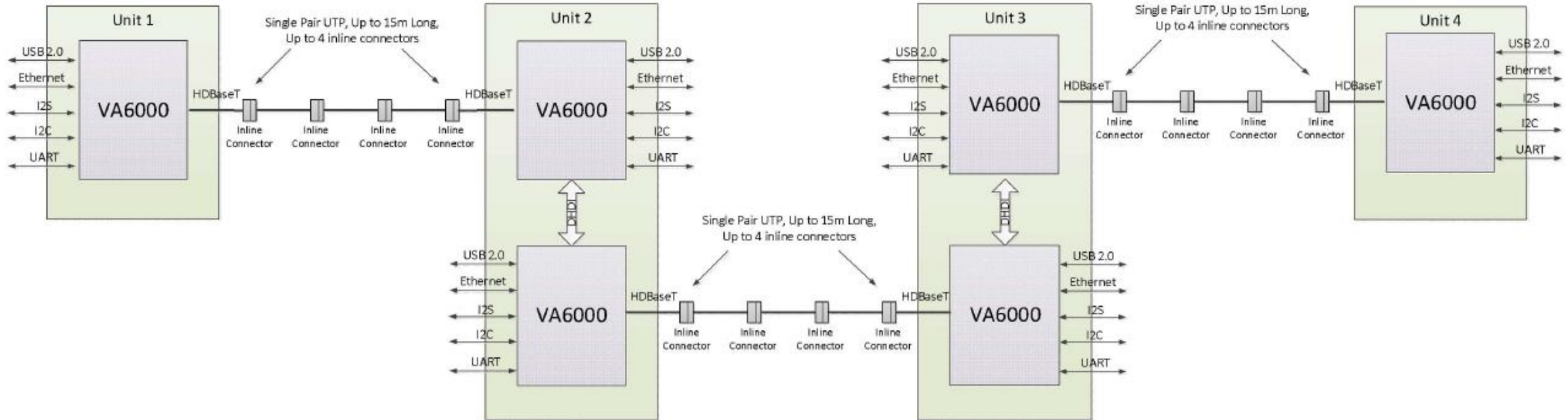
The Valens Edge:

Simplifying In-Vehicle Architecture with Safe & Resilient High-Speed Connectivity

► Fewer Devices ► Fewer Connectors ► Fewer Cables ► Less Complexity ► Lower BOM



HDBaseT Automotive Chipset over Simple Cabling



Creating a Daisy Chain Network using the VA6000 IC

Mercedes-Benz & Valens Semiconductor

1G Ethernet
USB2.0
Audio
UART



2Gbps/2Gbps

Automotive PHY
15m Unshielded Twisted
Pair (UTP)
4 in-line connectors

The Mercedes-Benz User Experience (MBUX)
Infotainment system



New C-Class



Valens and Daimler Partner to Optimize In-Car Connectivity

At the forefront of in-vehicle connectivity today, Daimler has selected HDBaseT Automotive as the technology of choice to guarantee high performance of advanced infotainment, ADAS, and telematics systems. Valens, as the inventor of HDBaseT and founder of the HDBaseT Alliance, brings the technology and expertise to accomplish the goal of commercializing HDBaseT-enabled vehicles in the near future.

“Valens has led the revolution in digital connectivity in the AV sector, and we are looking forward to repeating this success in the automotive market. Over the years, Daimler has led the market with the integration of innovative technologies to maximize the driving experience, and we are honored to be part of the efforts in optimizing in-vehicle connectivity.”

Dror Jerushalmi, CEO, Valens

“One of Daimler’s strategic focus is to be a technological leader – in ‘green’ technologies, safety, autonomous driving and connectivity. HDBaseT Automotive is a perfect fit as its architectural benefits, reliability and robustness lead to a superior driving experience to our customers.”

Dr. Jan Bauer, Daimler



New S-Class

PARTNERING WITH MARKET LEADERS

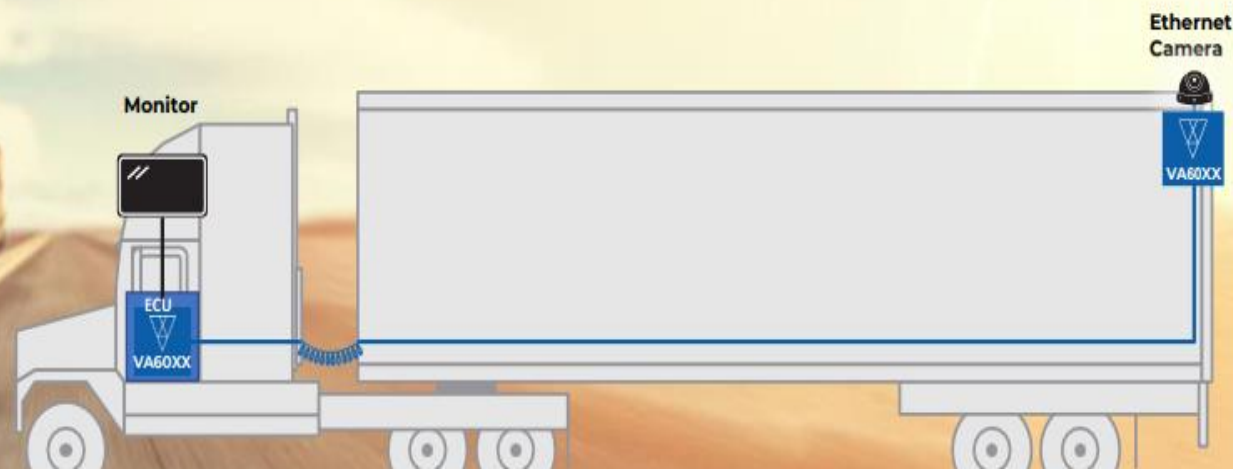


"Paired with Stoneridge cameras, this connectivity solution by Valens opens the door for the development of technologies and capabilities that will continue to transform the commercial vehicle safety environment and reduce operating costs for the fleets."

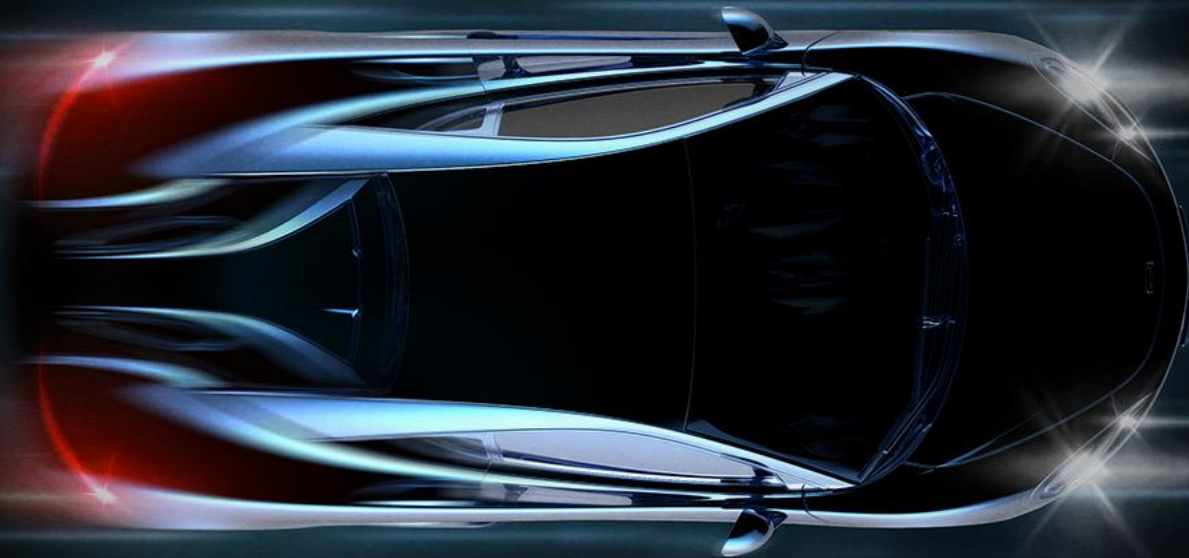
Jon DeGaynor, president and CEO of Stoneridge

SOLVING A CRITICAL SAFETY HAZARD AND SAVING LIVES

- Connectivity of the trailer rear camera to the vehicle cabin display
- Valens supports high-speed data links of up to 40m in a very rough and noisy environment



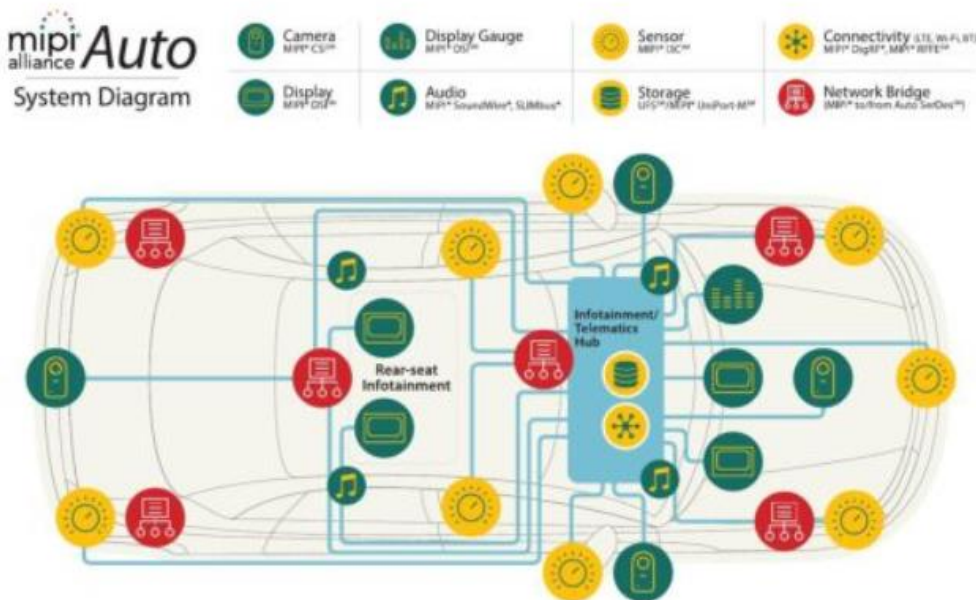
MIPI A-PHY



MIPI 얼라이언스

- **MIPI : Mobile Industry Processor Interface**
- '스마트폰'의 카메라 및 디스플레이 인터페이스 표준 : MIPI Organization에 의해 제정 (표준화)
- **고속자동차 표준 제정을 위해 A-PHY Working Group 설립 (2017, 10월12일)**
 - ✓ 고속자동차 표준 : Camera, Radar, LiDAR의 데이터를 12-24Gbps로 이동시키는 피지컬 레이어 사양
 - ✓ 실제수요는 9-16대의 Camera, Radar, LiDAR를 갖춘 ADAS 및 자율주행 차량을 위한 것

MIPI Alliance의 전무이사, 릭위펠트 "모바일 빠른 속도로 도착하고 뛰어나지만, 15cm 길이를 보고, 자동차는 15미터가 필요합니다"



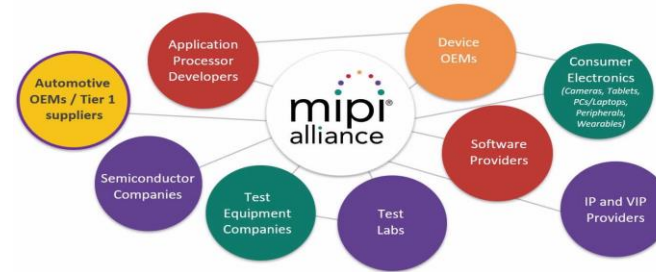
MIPI Alliance Members

Analog Devices, Inc., Analogix Semiconductor, Inc., BitfEye Digital Test Solutions GmbH, Cadence Design Systems, Inc., Fraunhofer IIS, Intel Corporation, Keysight Technologies Inc., L&T Technology Services, MediaTek Inc., Microchip Technology Inc., Mixel, Inc., Mobileye, an Intel Company, NXP Semiconductors, OmniVision Technologies, Inc., ON Semiconductor, Parade Technologies Ltd., Prodigy Technovations Pvt. Ltd., Qualcomm Incorporated, Robert Bosch GmbH, Samsung Electronics Co., Ltd., Socionext Inc., Sony Corporation, STMicroelectronics, Synopsys, Inc., Tektronix, Inc., Teledyne LeCroy, Toshiba Corporation, University of New Hampshire InterOperability Lab, Valens Semiconductors and others.

MIPI 얼라이언스 현황 업데이트

MIPI Alliance 현황

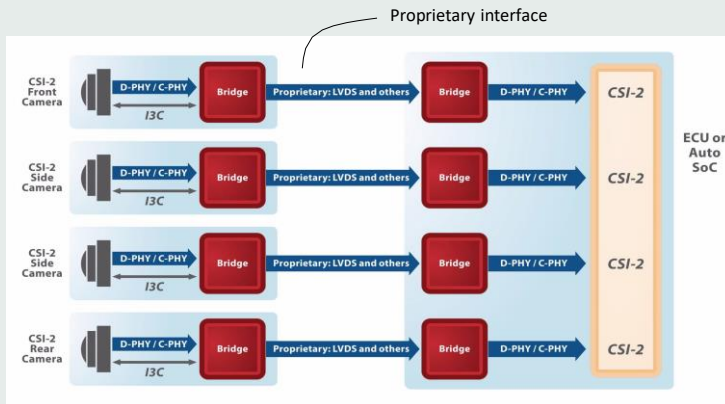
- 27개 국가 활동
- 전장분야 전체 55%
- 가입 member : 400여사



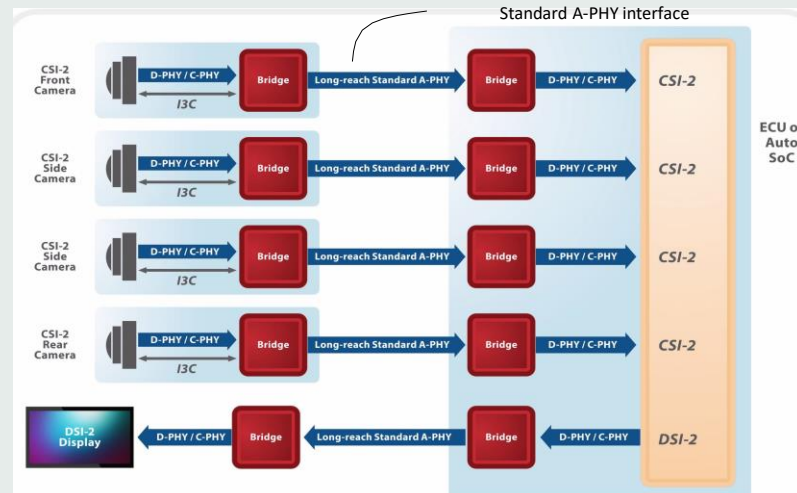
MIPI A-PHY 개념

- 모든 카메라 센서 애플리케이션, 인포테인먼트 디스플레이 애플리케이션을 타겟으로 하는 Physical Layer 사양
- MIPI A-PHY Spec 1.0은 15미터 도달 범위와 2-16Gbps의 데이터 전송 속도를 제공
→ MIPI A-PHY Spec 1.1 : 최대 32Gbps 전송이며 2022년 출시
- MIPI A-PHY는 네이티브 카메라(CSI-2) 및 디스플레이(DSI-2) 인터페이스를 지원하는 전세계 유일한 '표준 카메라 인터페이스'

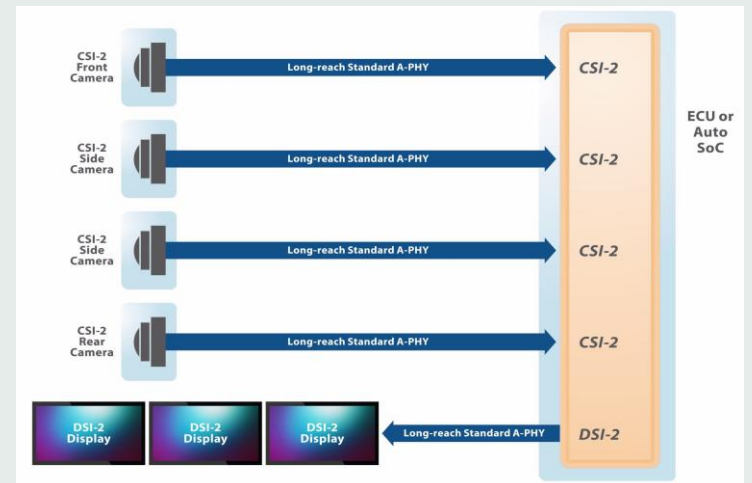
TODAY'S PROPRIETARY INTERFACE BRIDGE SOLUTIONS



TOMORROW A-PHY STANDARD INTERFACE BRIDGE SOLUTIONS



FUTURE INTEGRATED A-PHY (NO BRIDGES: Lower cost, weight, power)



mipi alliance Automotive Ecosystem

COMPANIES CONTRIBUTING TO MIPI A-PHY DEVELOPMENT



ADOPTING DP and eDP ADAPTATION LAYER FOR A-PHY



ADOPTED BY IEEE STANDARDS ASSOCIATION



MIPI Liaisons:



Collaboration w / Sensor makers

Integration of Sensors from Leading Vendors



SONY

OmniVision.



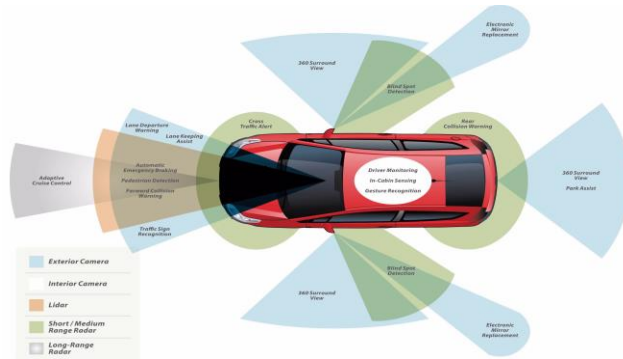
ON Semiconductor



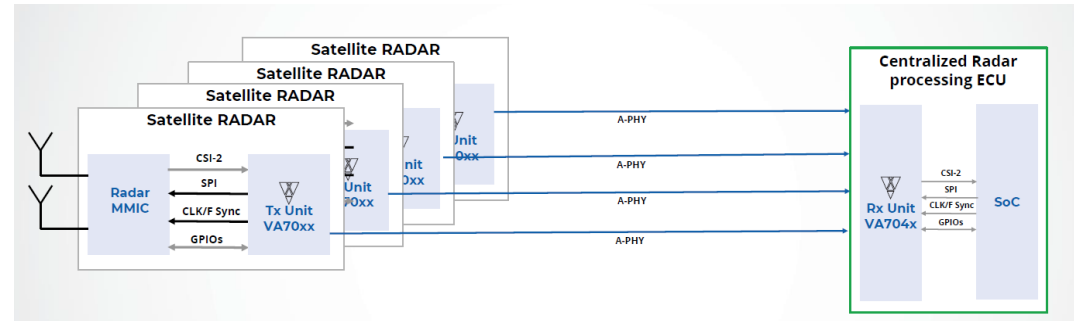
■ MIPI A-PHY 개발 현황 (예)

- MIPI-APHY 자동차, 선박, 스마트 공장, 스마트 시티, 의료 등의 다양한 분야 적용 확대 중
- 現 월드와이드 65개 이상의 신규 프로젝트가 진행 중

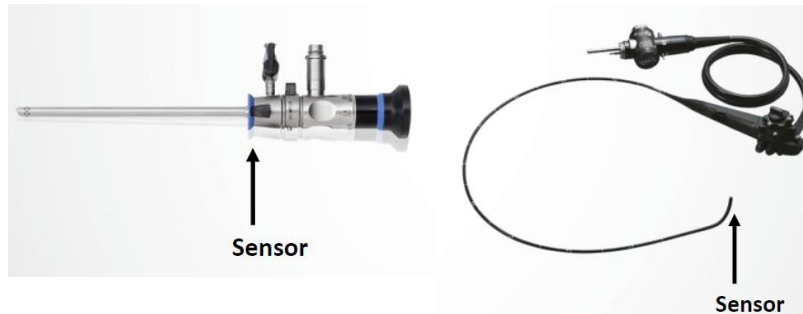
자동차 ADAS, ADS 외 카메라 적용



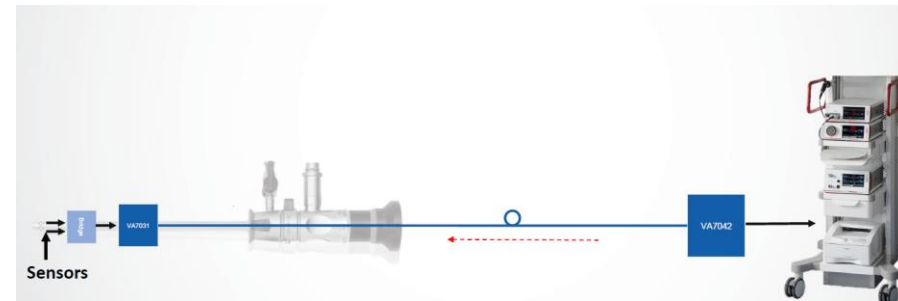
자동차, 로봇드족의 레이더 분야



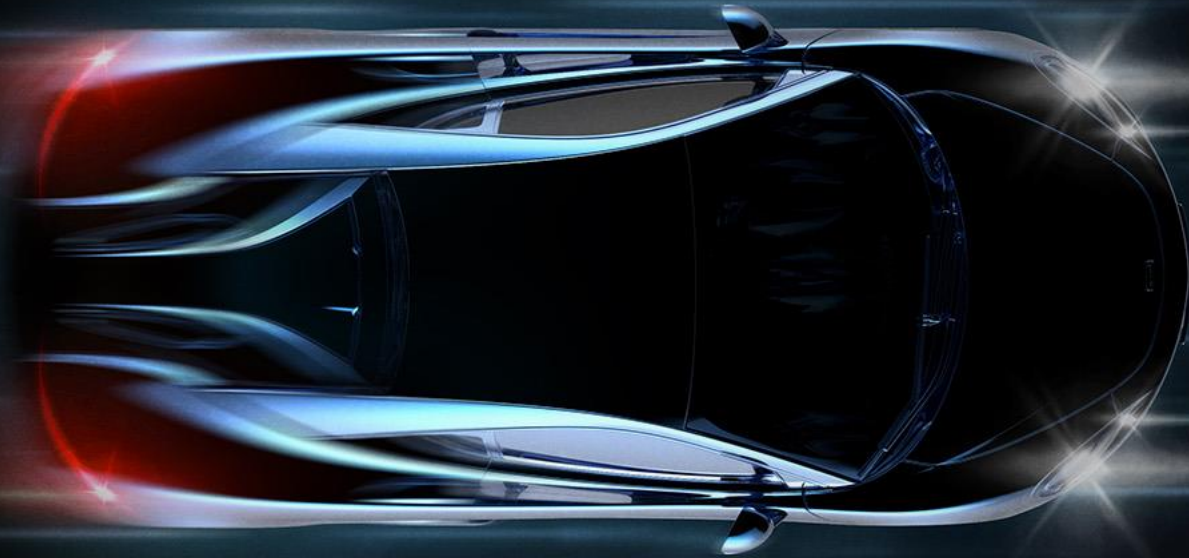
의료용 내시경 카메라 시장



Dual Sensor from Camera Sensor to Imaging system



MIPI A-PHY 솔루션



Concept of MIPI A-PHY Chipset

Sensor Connectivity: Accelerating the ADAS and Autonomous Vision



Chip features

Link Type:

Asymmetric

Bandwidth:

4Gbps, 8Gbps, 12Gbps, 16Gbps

Physical Channel:

UTP, Coax, SDP

Application:

Sensors

SoCs

Key Highlights

- MIPI A-PHY-compliant: the only standard for long-reach sensor connectivity
- Unprecedented bandwidth with a roadmap to 32Gbps
- Industry-lowest packet error rate of 10^{-19}

The VA7000 Chipset Family



VA7021 Serializer

Input: 1 x CSI-2
Output: 1 x 4Gbps A-PHY



VA7031 Serializer

Input: 1 x CSI-2
Output: 1 x 8Gbps A-PHY



VA7042 Deserializer

Input: 2 x 8Gbps A-PHY,
1 x CSI-2
Output: 2 x CSI-2



VA7044 Deserializer

Input: 4 x 8Gbps A-PHY,
1 x CSI-2
Output: 2 x CSI-2

High-speed 8Gbps links for remote sensor connectivity

- › UTP for speeds up to 4Gbps per link
- › SDP, Coax for speeds up to 8Gbps per link
- › Tunneling of CSI-2, GPIO, SPI, I²C
- › DSI to CSI connectivity (SoC-to-SoC)
- › Extremely low packet error rate $<1e^{-19}$

Best-in-Class Connectivity for Any High-Speed Application



INFOTAINMENT CONNECTIVITY:
POWERING THE NEXT
GENERATION OF IMMERSIVE
EXPERIENCES

VA6000

CHIPSET FAMILY



SENSOR CONNECTIVITY:
ACCELERATING THE ADAS
AND AUTONOMOUS VISION

VA7000

CHIPSET FAMILY

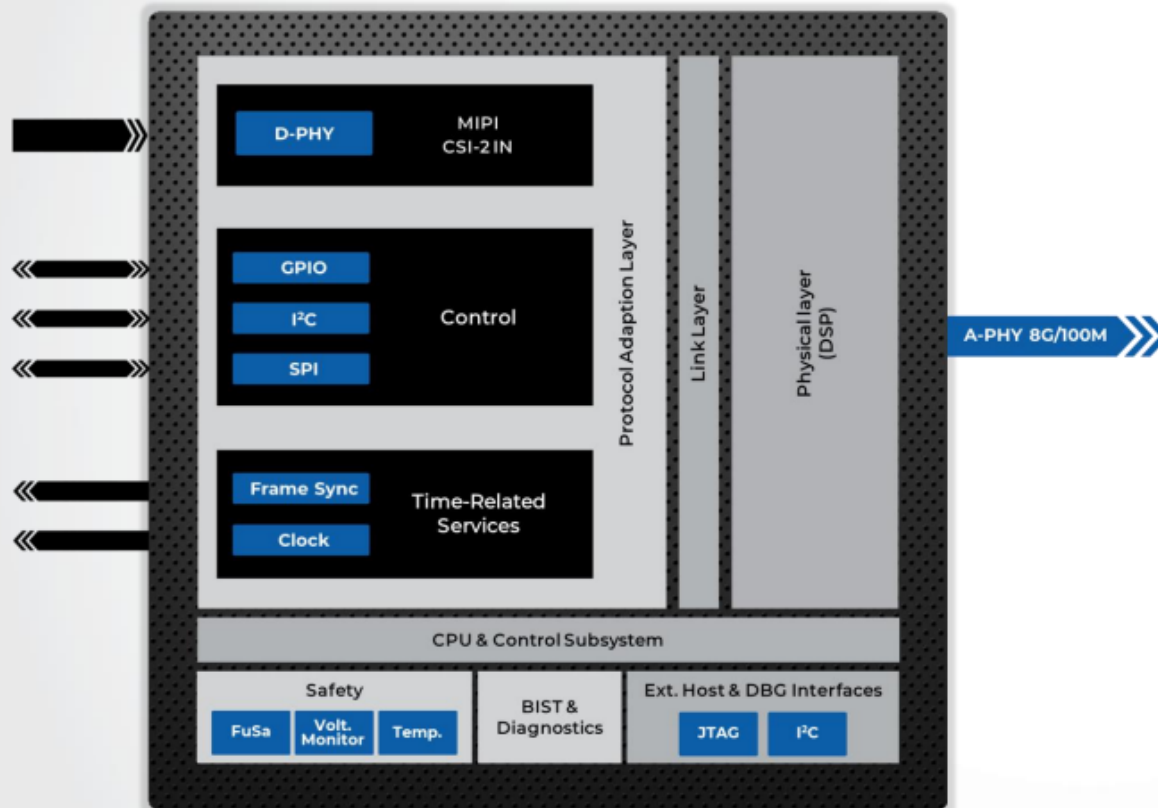


DISPLAY CONNECTIVITY:
STEERING THE FUTURE
OF THE DIGITAL COCKPIT

VA8000

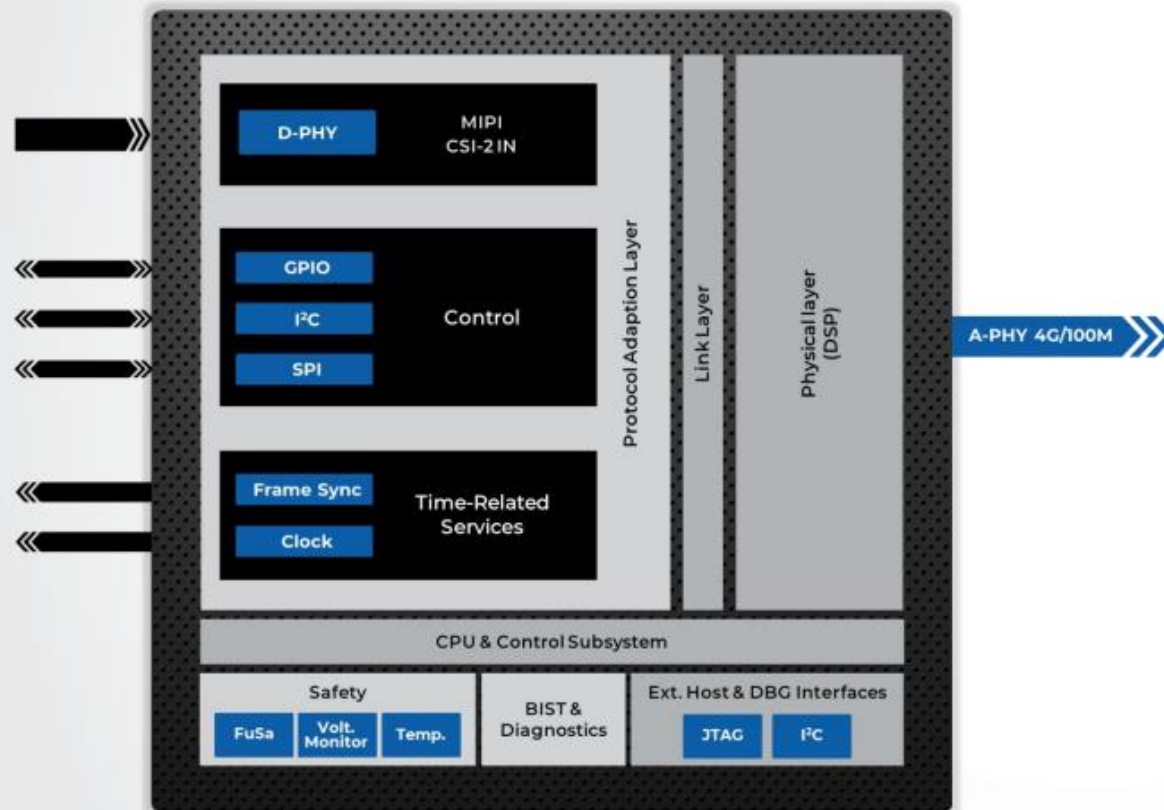
CHIPSET FAMILY

VA7031: Serializer, 8Gbps Link



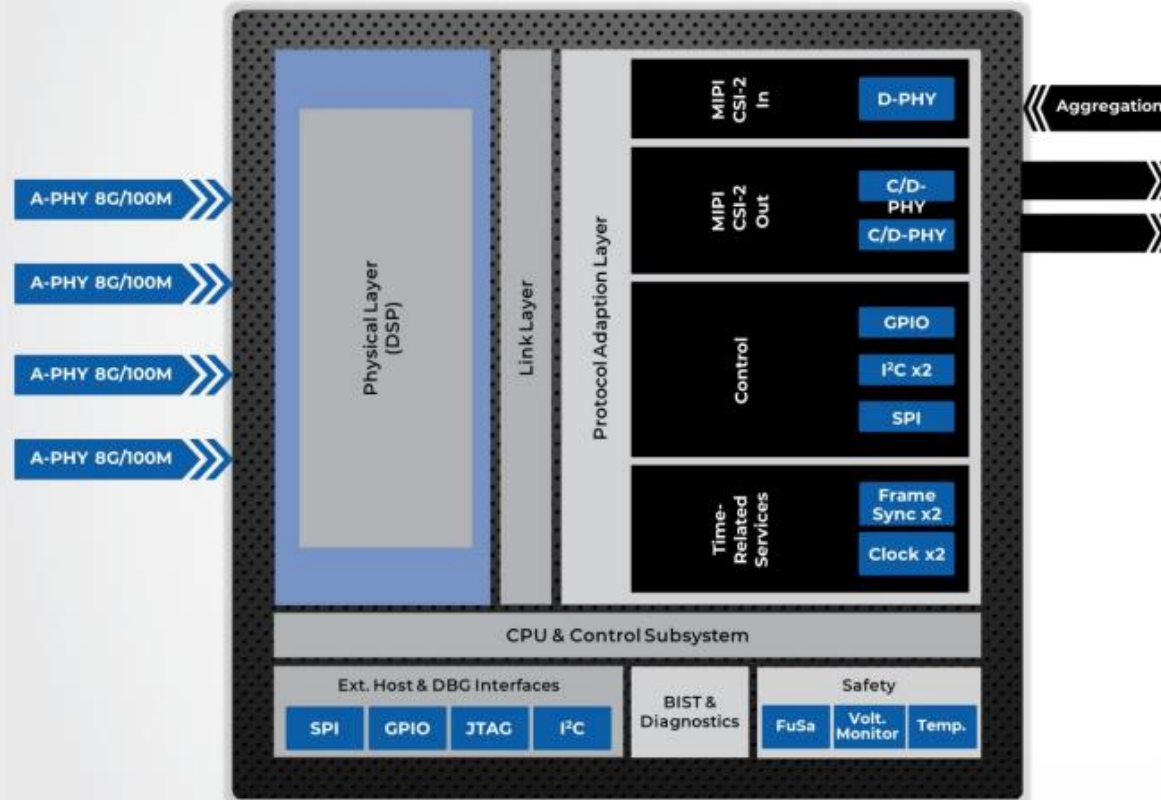
Link	MIPI A-PHY Version 1.0
Configurable PHY	- Main channel: 2Gbps, 4Gbps, 8Gbps - Return channel: 100Mbps
Infrastructure	Operating over the MIPI® A-PHY channel - Coax cable - Up to 15 meters/50 feet with up to four inline connectors - Shielded differential pair (SDP) cable - Up to 10 meters/33 feet with up to four inline connectors - Special mode for working over Unshielded Twisted Pair (UTP) channel at up to 4Gbps
MIPI CSI-2	- D-PHY, CSI-2 Input 4 data lanes - Up to 2.5 Gbps per lane - Supporting up to 16 virtual channels
I ² C	- Incorporating I²C control channel for remote management over A-PHY - Option for local host management 100KHz-1MHz
Clock output	- Local precision clock output - Generated locally or via a remote centralized clock
Synchronized Outputs	Outputting remotely generated synchronized signals
GPOs/GPIOs	- Up to 3 general purpose output pins - Up to 4 general purpose I/O pins
Safety	ISO-26262, ASIL-B
Power Consumption	Typical <300mW
Package	6mmx6mm FO-CLP (with functional balls only on the outer rows. Low-cost PCB design)

VA7021: Serializer, 4Gbps Link



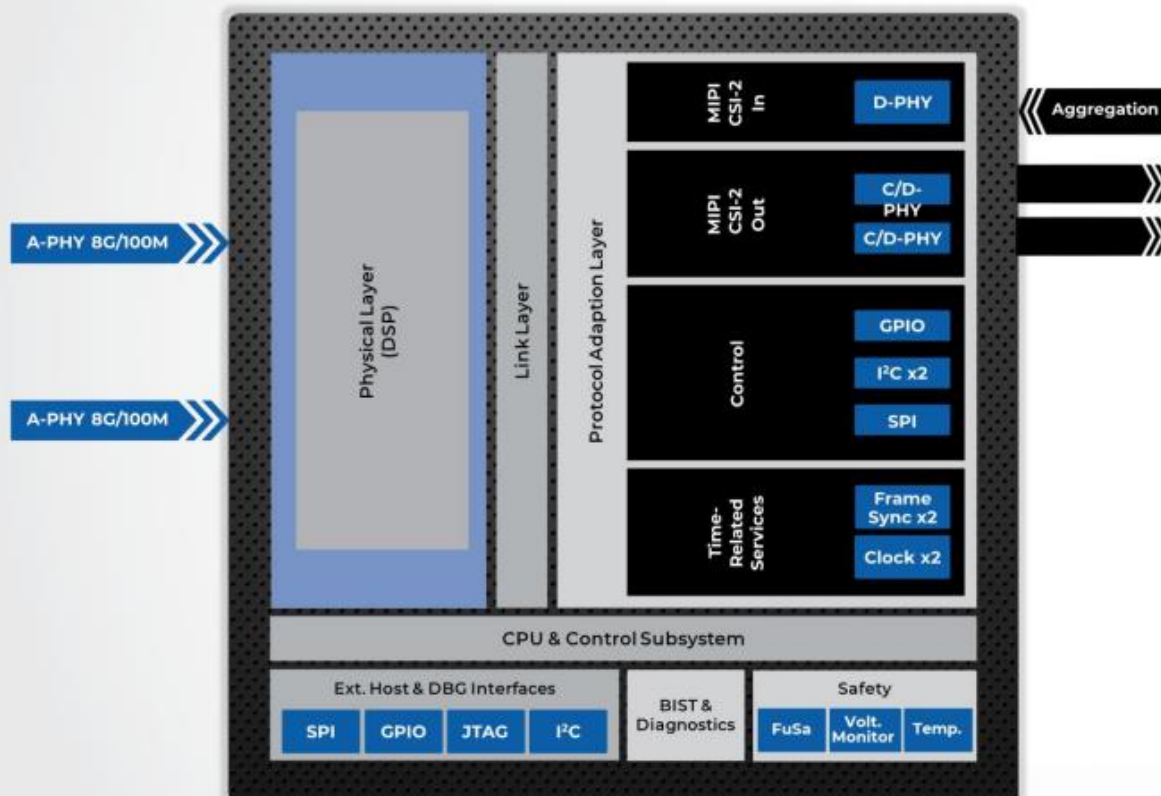
Link	MIPI A-PHY Version 1.0
Configurable PHY	- Main channel: 2Gbps, 4Gbps - Return channel: 100Mbps
Infrastructure	Operating over the MIPI® A-PHY channel - Coax cable - Up to 15 meters/50 feet with up to four inline connectors - Shielded differential pair (SDP) cable - Up to 10 meters/33 feet with up to four inline connectors - Unshielded Twisted Pair (UTP) cable - Up to 10 meters/33 feet with up to four inline connectors
MIPI CSI-2	- D-PHY, CSI-2 Input 4 data lanes - Up to 2.5 Gbps per lane - Supporting up to 16 virtual channels
I²C	- Incorporating I²C control channel for remote management over A-PHY - Option for local host management 100KHz-1MHz
Clock output	- Local precision clock output - Generated locally or via a remote centralized clock
Synchronized Outputs	Outputting remotely generated synchronized signals
GPOs/GPIOs	- Up to 3 general purpose output pins - Up to 4 general purpose I/O pins
Safety	ISO-26262, ASIL-B
Power Consumption	Typical <300mW
Package	6mmx6mm FO-CLP (with functional balls only on the outer rows. Low-cost PCB design)

VA7044: Quad Deserializer, 8Gbps Links



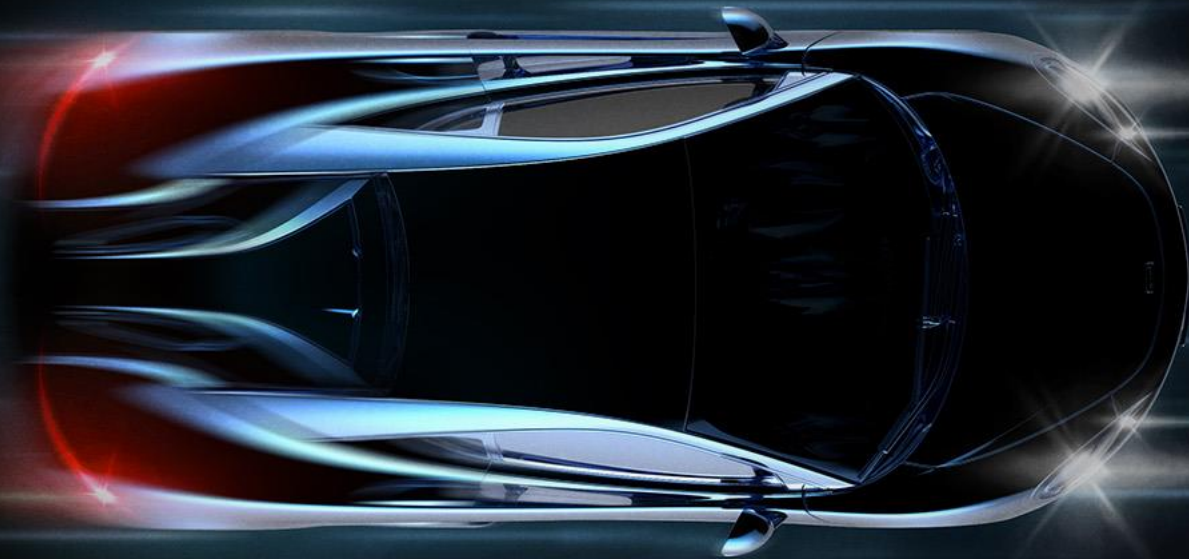
Feature	Description
Link	4 x MIPI A-PHY Version 1.0
Configurable Link Speed (per link)	- Main channel: 2Gbps, 4Gbps, 8Gbps - Return channel: 100Mbps
Infrastructure	Operating over the MIPI® A-PHY channel - Coax cable - Up to 15 meters/50 feet with up to four inline connectors - Shielded differential pair (SDP) cable - Up to 10 meters/33 feet with up to four inline connectors - Special mode for working over Unshielded Twisted Pair (UTP) channel at up to 4Gbps per link
MIPI CSI-2 Output ports	2 x CSI-2 Output ports - Configurable D PHY or C PHY I/F per each port 4 data lanes (D-PHY) with up to 2.5 Gbps on each lane 3 data lanes (C-PHY) with up to 5.7 Gbps on each lane - Flexible virtual channel routing scheme, including duplication
MIPI CSI-2 Input Port	1 x CSI-2 Input port 4 data lanes (D-PHY) with up to 2.5 Gbps on each lane - Supporting up to 16 virtual channels
I²C	2 Independent I²C control channels for device management and remote device management 100KHz-1MHz
Clock output	Tunneling of clock signal to remote devices with precision reconstruction of clock signal at the remote ends
Synchronized Outputs	Outputting remotely generated synchronized signals
GPOs/GPIOs	- Up to 13 general purpose output only pins - Up to 12 general purpose I/O pins - Support for multiple remote synchronous distribution
Safety Power	ISO-26262, ASIL-B
	<2 1W Typical

VA7042: Quad Deserializer, 8Gbps Links



Link	2 x MIPI A-PHY Version 1.0
Configurable Link Speed (per link)	• Main channel: 2Gbps, 4Gbps, 8Gbps • Return channel: 100Mbps
Infrastructure	Operating over the MIPI® A-PHY channel • Coax cable - Up to 15 meters/50 feet with up to four inline connectors • Shielded differential pair (SDP) cable - Up to 10 meters/33 feet with up to four inline connectors • Special mode for working over Unshielded Twisted Pair (UTP) channel at up to 4Gbps per link
MIPI CSI-2 Output ports	2 x CSI-2 Output ports • Configurable D PHY or C PHY I/F per each port • 4 data lanes (D-PHY) with up to 2.5 Gbps on each lane • 3 data lanes (C-PHY) with up to 5.7 Gbps on each lane • Flexible virtual channel routing scheme, including duplication
MIPI CSI-2 Input Port	1 x CSI-2 Input port • 4 data lanes (D-PHY) with up to 2.5 Gbps on each lane • Supporting up to 16 virtual channels
I²C	• 2 Independent I²C control channels for device management and remote device management • 100KHz-1MHz
Clock output	• Tunneling of clock signal to remote devices with precision reconstruction of clock signal at the remote ends
Synchronized Outputs	• Outputting remotely generated synchronized signals
GPOs/GPIOs	• Up to 13 general purpose output only pins • Up to 12 general purpose I/O pins • Support for multiple remote synchronous distribution
Safety	ISO-26262, ASIL-B
Power Consumption	<1.6W, Typical

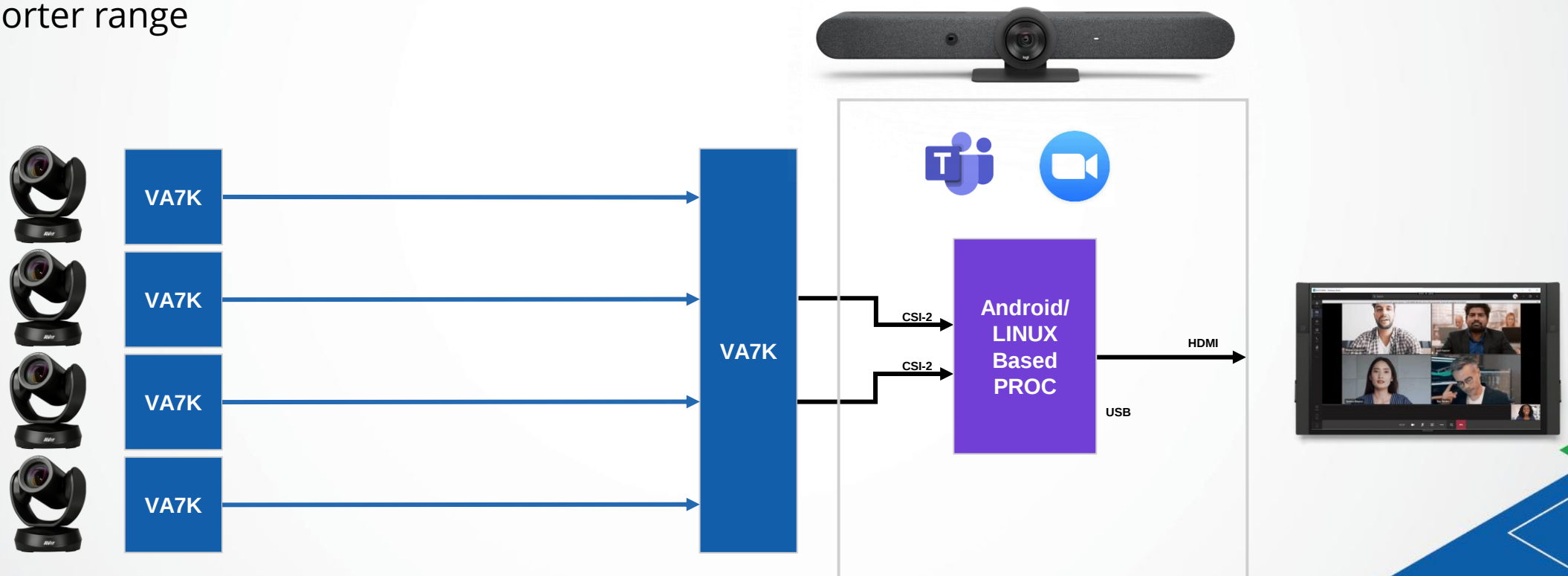
MIPI A-PHY 적용 예



VA7K based camera extension

All-In-One Android/LINUX

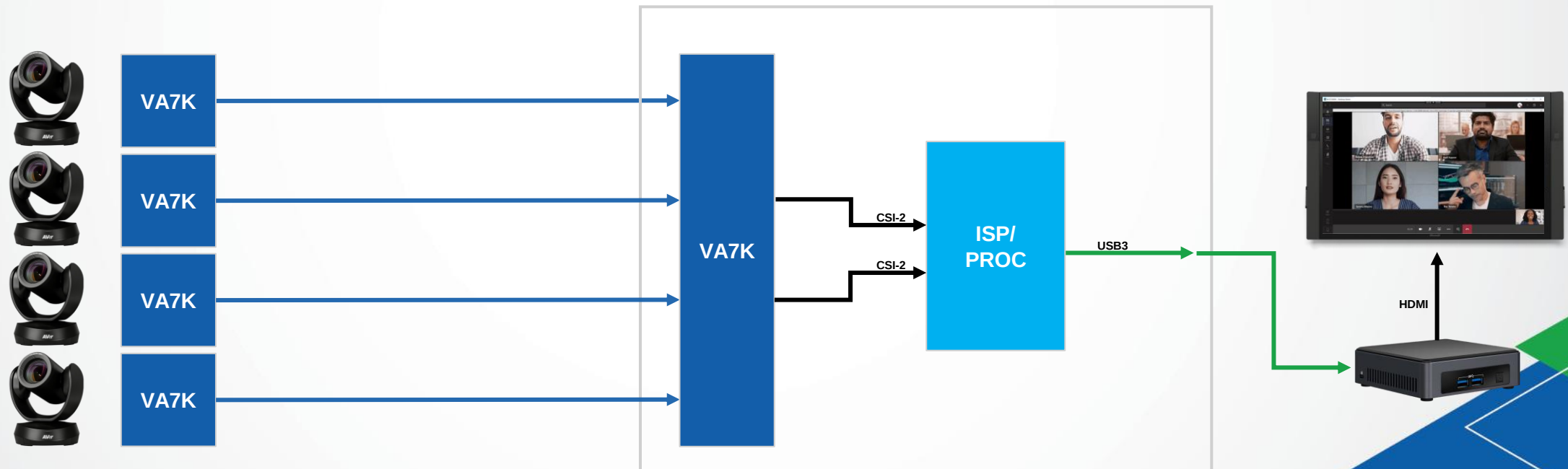
- › Low cost solution based on VA7K
- › Smallest form factor, low power
- › Shorter range



VA7K based camera extension

Camera ISP or Processor

- › Low cost solution based on VA7K
- › Smallest form factor, low power
- › Shorter range



VA7K in Smart City



CCTV Camera Challenges

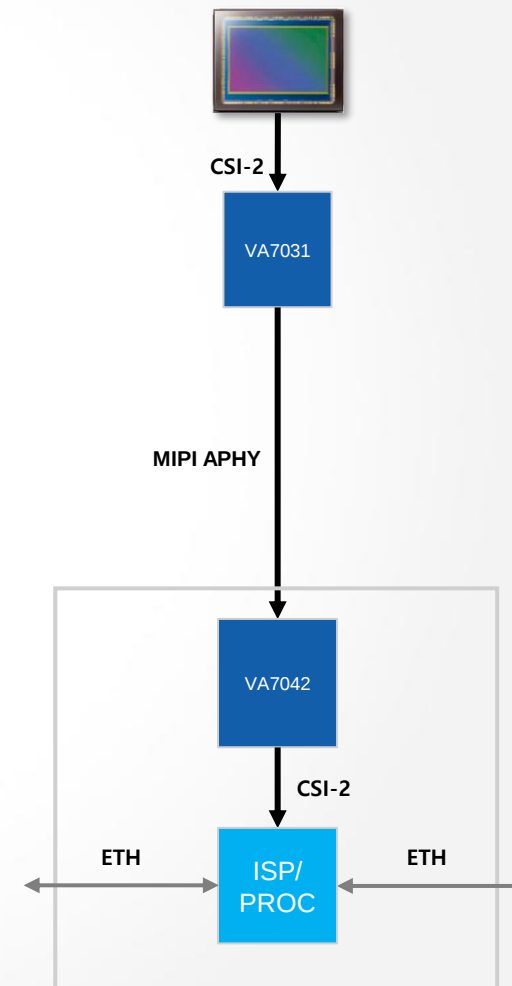
- › Extreme temperature environment
- › Size / integration
- › Installation
- › Maintenance
- › MTBF – Mean Time between Failures
- › Less mechanical parts
- › Cost
- › Power consumption



Smart City Camera Poles

- › Small form factor, better heat
- › Circuit board in accessible location

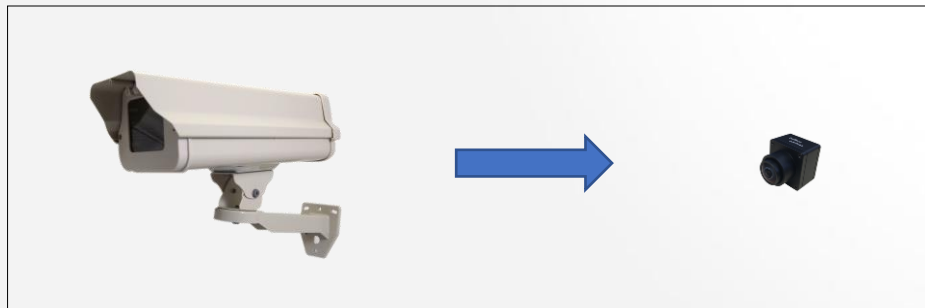
Sensor
No need for creative solutions for camera maintenance



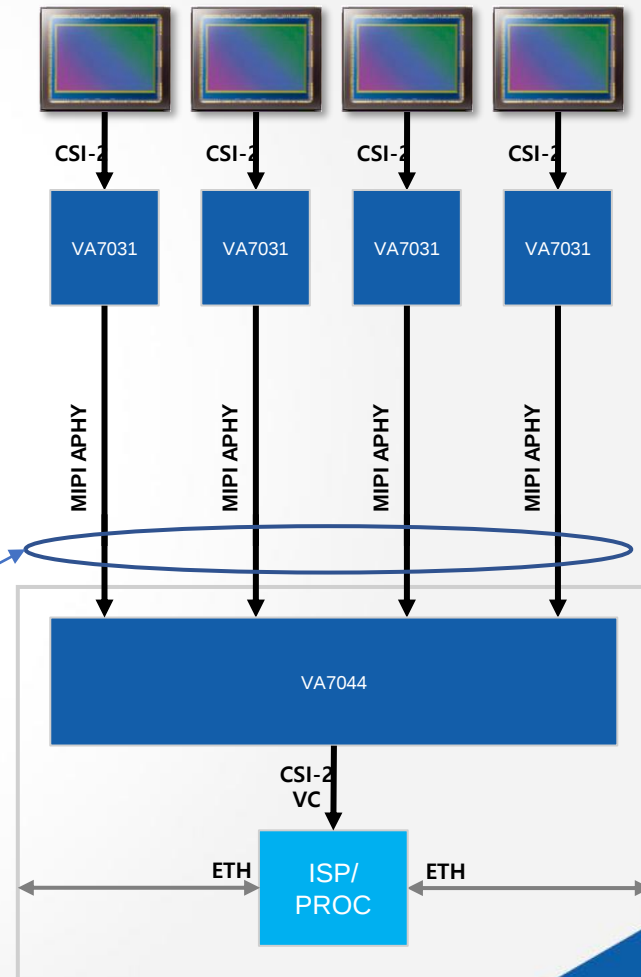
Multi camera poles over single catX FTP cable

e

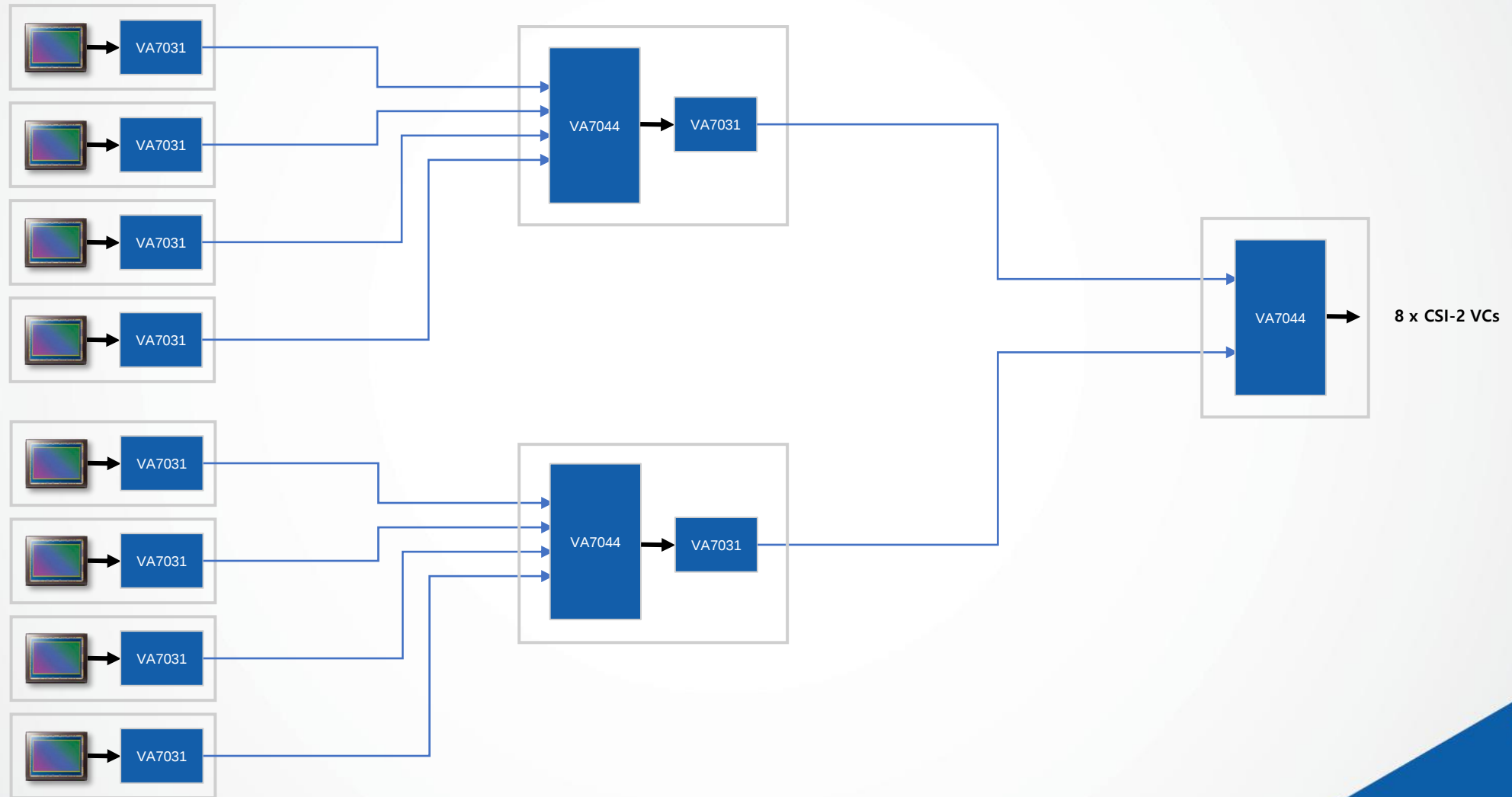
- › Minimized camera design
- › Reduced BOM cost
- › Easy maintenance
- › One category cable for 4 cameras



4 pairs
catX FTP
cable

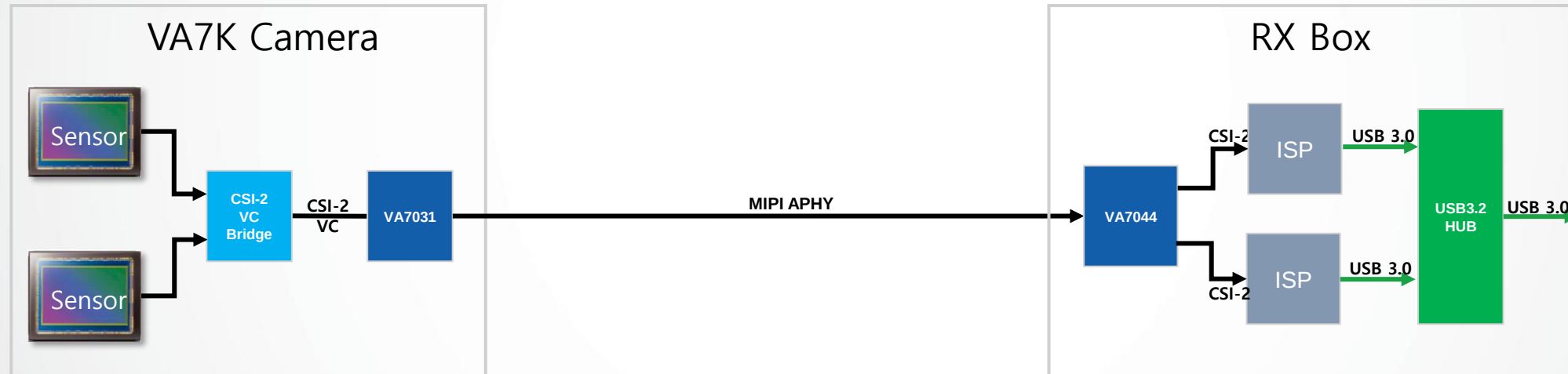


Leveraging Virtual Channels for up to 16 Cameras aggregation



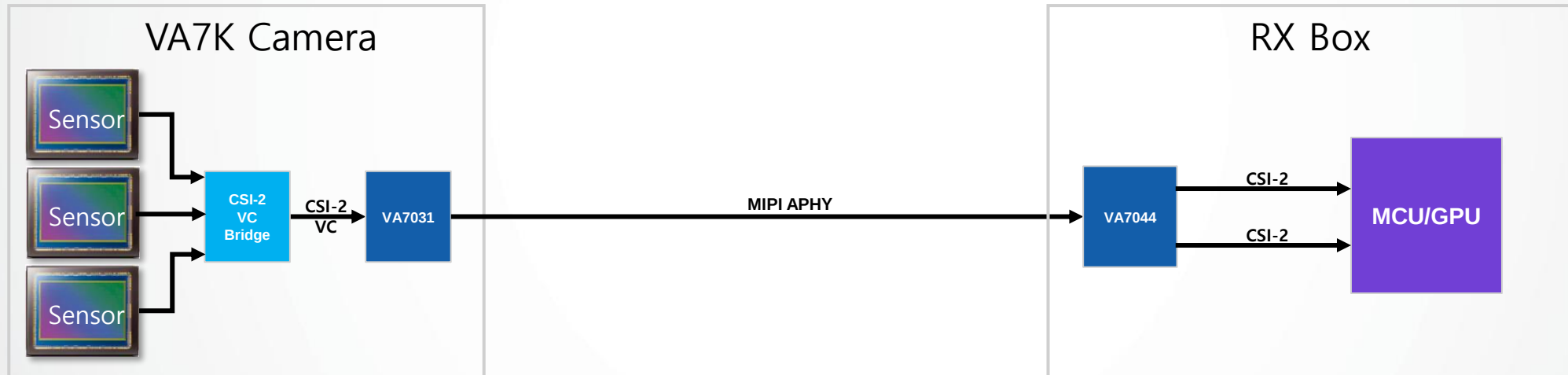
Dual Sensor over single link

Using CSI-2 Virtual-Channels (VC)



3D Camera over single link

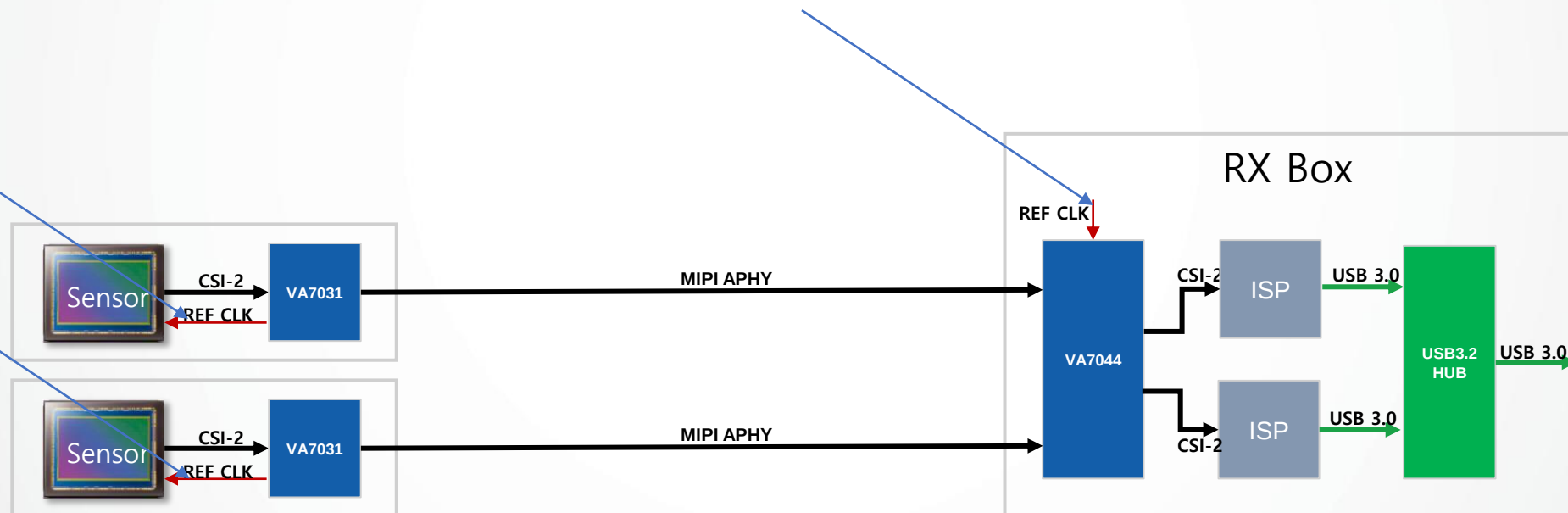
Using CSI-2 Virtual-Channels (VC)



Multiple Cameras Synchronization

Sensors Clock Synchronization

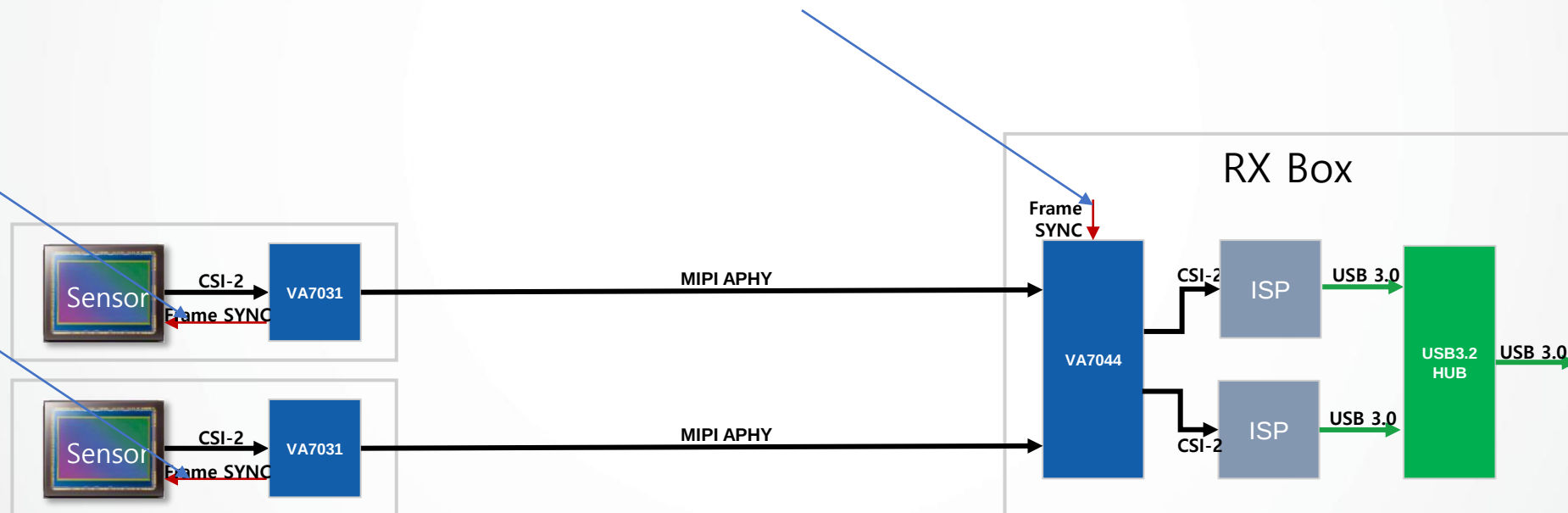
- › No need for Frame Sync and keeping frame buffers to overcome sync issues between multiple cameras



Multiple Cameras Synchronization

Sensors Frame Synchronization

- › Frame Sync – alternative option to the accurate clock SYNC

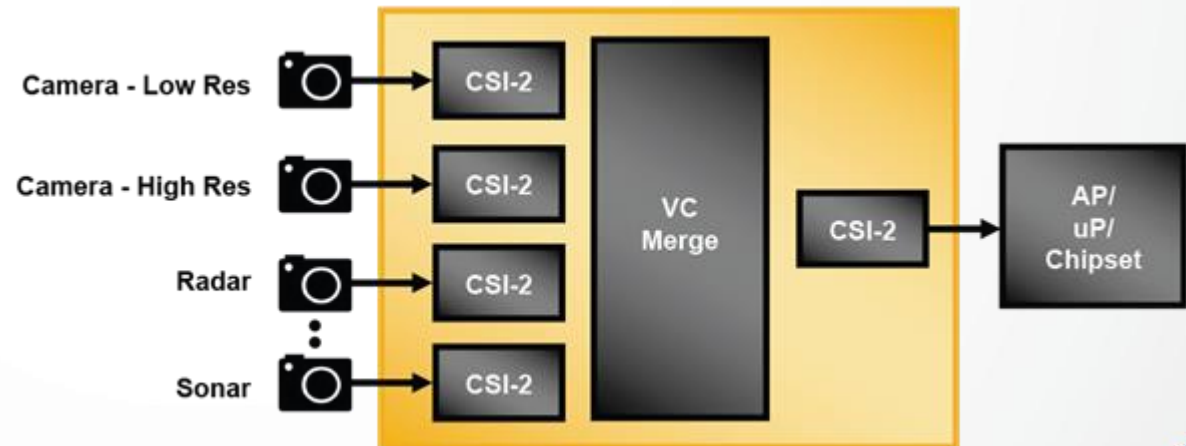


CSI-2 Virtual Channels Aggregation



- › **CrossLink** – Support up to 1.5Gbps per lane, 6Gbps on 4 lanes
- › **CrossLink-NX** – Support up to 2.5Gbps per lane, 10Gbps on 4 lanes (TX side)

More info can be found [here](#)



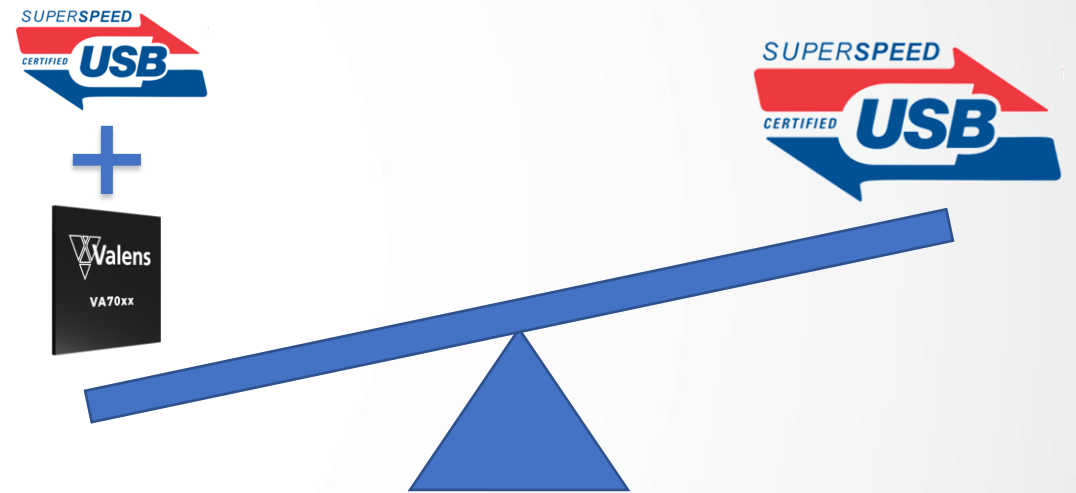
VA7K Advantages

- › Use standard USB3.0 interface
 - No need for expensive frame grabber!
 - No need for PCIe slot – USB3.0 port is available in almost any IPC
- › Single pair cable
- › Up to 15m with 4 inline connectors
- › Up to 8Gbps using COAX / Up to 4Gbps using UTP
- › Support for up to 16 virtual channels
- › Power consumption in camera side – 0.35W
- › Serializer chip size 6mm x 6mm – fits very small camera designs
- › Robust link – built for challenging EMC environment
- › Field terminated cables and connectors
- › Clock synchronization from RX to camera
- › Advanced diagnostics capabilities – good for production tests and also for maintenance

VA7K USB3.0 camera advantages

Comparing to standard USB3.0 camera

- › Longer cable length
- › Smaller camera size
- › Camera low power consumption
- › Re-use of RX side for any VA7K Camera
- › Field terminated cables and connectors



VA7K USB3.0 camera advantages

Comparing to CoaxPress

- › Smaller camera size
- › Lower camera power consumption
- › Lower cables cost – optional UTP cable
- › Re-use of RX side for any VA7K Camera
- › Field terminated cables and connectors
- › Standard connection to the IPC using USB3.0
- › No need for PCIe form factor capture card
 - Smaller PC size
 - Lower power consumption



CoaxPress®



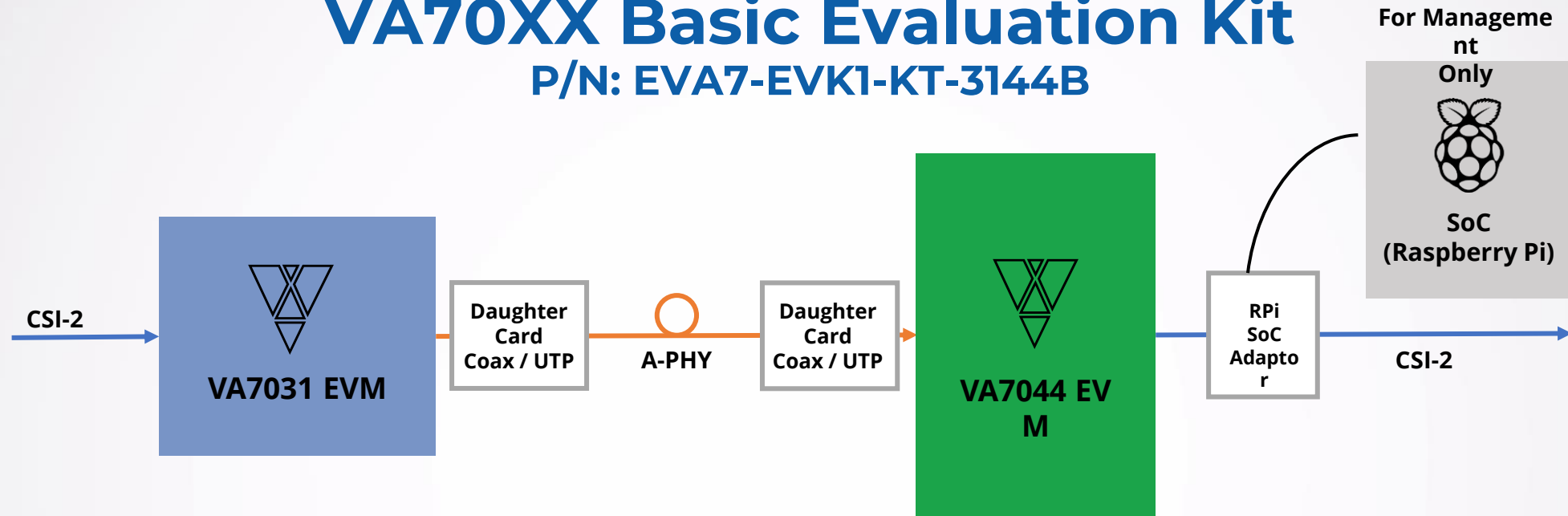
VA7K EVK



Confidential

VA70XX Basic Evaluation Kit

P/N: EVA7-EVK1-KT-3144B



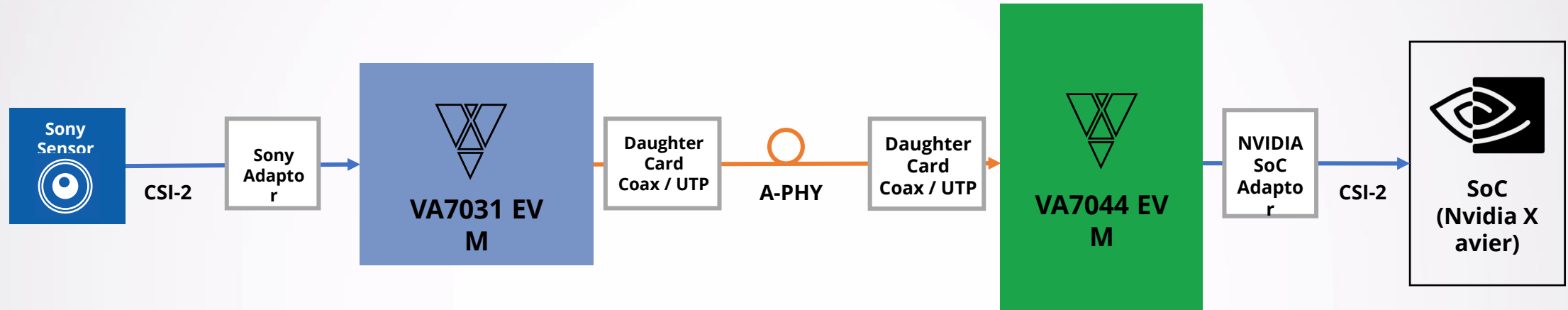
Kit's Content	
VA7031 EVM	VA7044 EVM Power Supply
VA7044 EVM	USB cable
Coax daughter card (x2)	Tripod
UTP daughter card (x2)	Raspberry Pi 4 + PS
Coax cable (3m)	SOC adaptor for RPi 4
UTP cable (3m)	SDK
VA7031 EVM Power Supply	ValUE Application

Who is it for?

- > Customers checking A-PHY technology using video generator and video analyzer
- > Customers with their own SoC, own image sensors

VA70XX Extended Evaluation Kit

P/N: EVA7-EVK1-KT-3144E



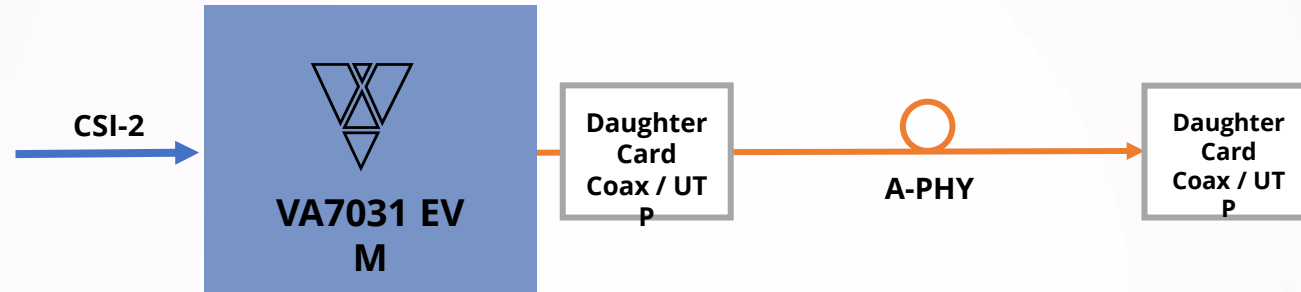
Kit's Content	
VA7031 EVM	USB Cable
VA7044 EVM	Tripod
Coax daughter card (x2)	LI/Sony IMX 424 Sensor
UTP daughter card (x2)	LI/Sony sensor adaptor
Coax cable (3m)	Nvidia Jetson Xavier Dev. Kit
UTP cable (3m)	SOC adaptor for Nvidia Xavier
VA7031 EVM Power Supply	SDK
VA7044 EVM Power Supply	ValUE Application

Who is it for?

- › Customers that want to get a complete set working "out-of-the-box"

VA7031 Serializer Module Add-On

P/N: EVA7-EVK1-KT-7031



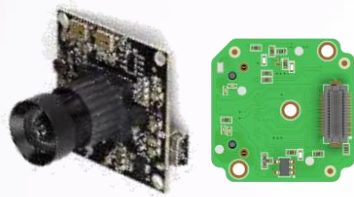
Kit's Content	
VA7031 EVM	UTP cable (3m)
Coax daughter card (x2)	VA7031 EVM Power Supply
UTP daughter card (x2)	USB cable
Coax cable (3m)	Tripod

Who is it for?

- > VA7031 Serializer Module Add-On is intended for users who would like to evaluate the functionality of more than one A-PHY link connected to the VA7044 De-serializer

Accessories

SONY



Sony Image Sensor – P/N: AVA7-ACC-KT-SNY

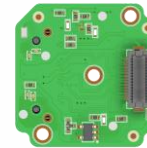
Sony IMX424 sensor (LI)

Sony(LI) sensor adaptor

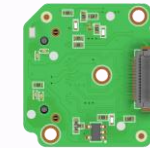
Who is it for?

- › Users seeking to evaluate the Sony 8MP IMX424 sensor with the VA7031 EVM

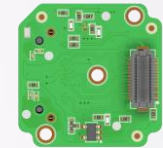
SONY



OmniVision.



ON Semiconductor®



Sensor Adaptors

Sony(LI) sensor adaptor

P/N: AVA7-ADPT-00-CSI2-SNY

OmniVision sensor adaptor

P/N: AVA7-ADPT-00-CSI2-OVT

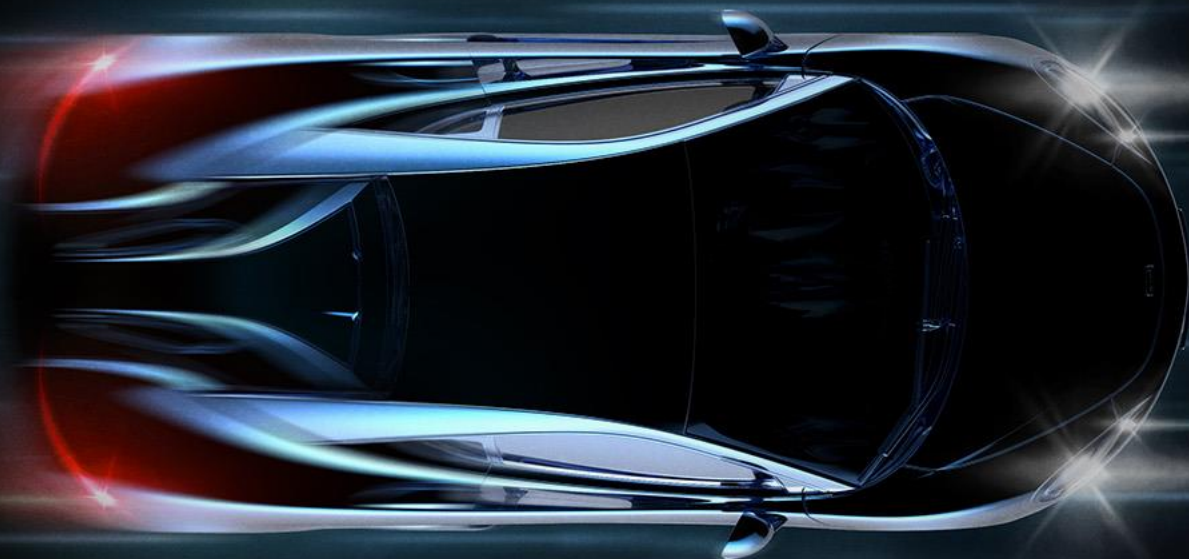
ON-Semi sensor adaptor

P/N: AVA7-ADPT-00-CSI2-ON

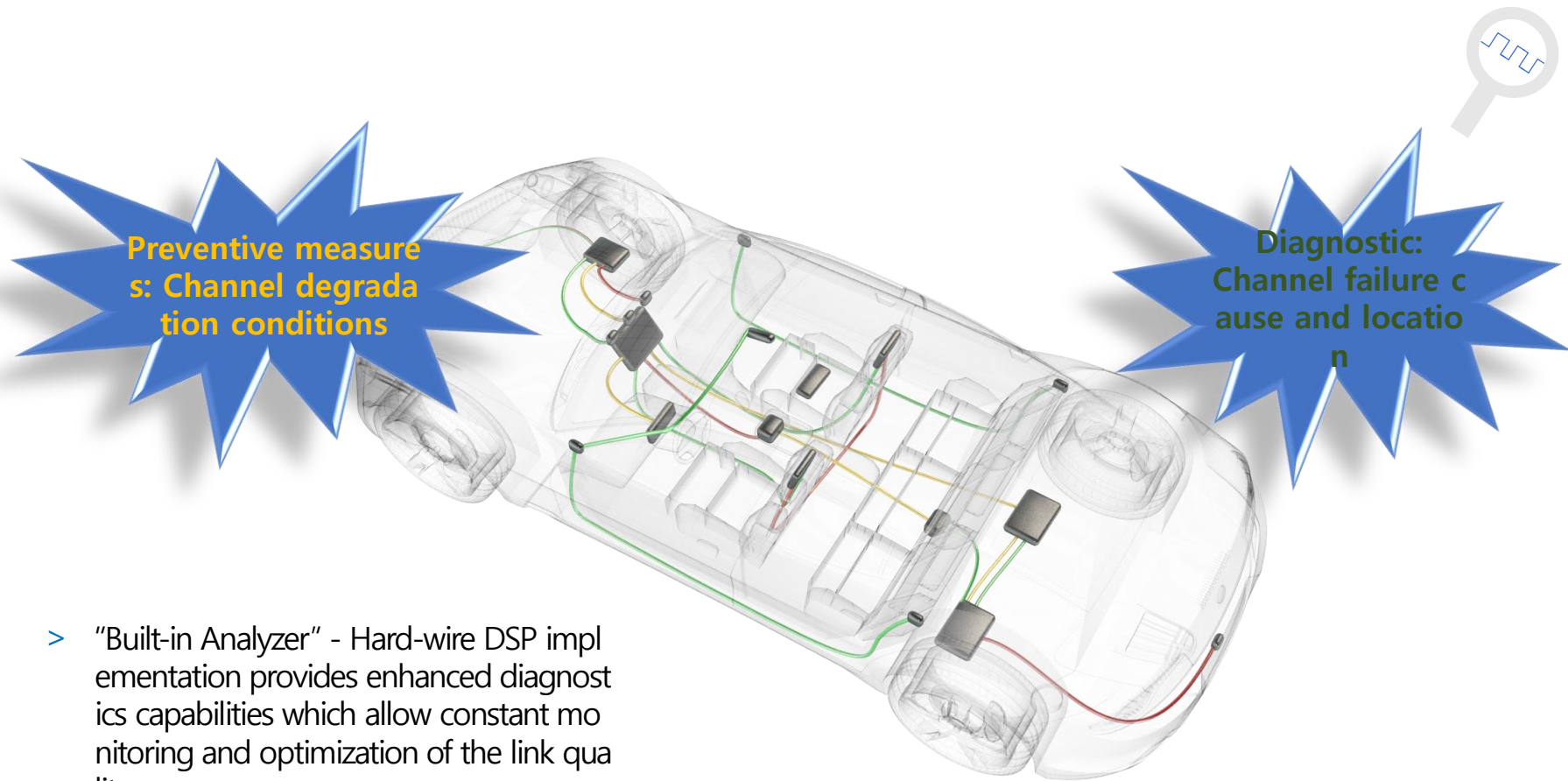
Who is it for?

- › Users seeking to evaluate additional sensors with the VA7031 EVM

강력한 진단 기능 (Diagnostics)



각 링크간 품질 모니터링 및 분석 기능



- > "Built-in Analyzer" - Hard-wire DSP implementation provides enhanced diagnostics capabilities which allow constant monitoring and optimization of the link quality

케이블 상태 모니터링

Diagnostic Mode:

- Impedance discrepancy
 - High impedance
 - Low impedance
- Broken cable
 - Single wire open
 - Differential pair open
 - Single wire short to GND or battery
 - Differential pair short

케이블상의 여러 이슈를
0.5미터 단위로 진단후 보고함.

링크의 성능모니터링

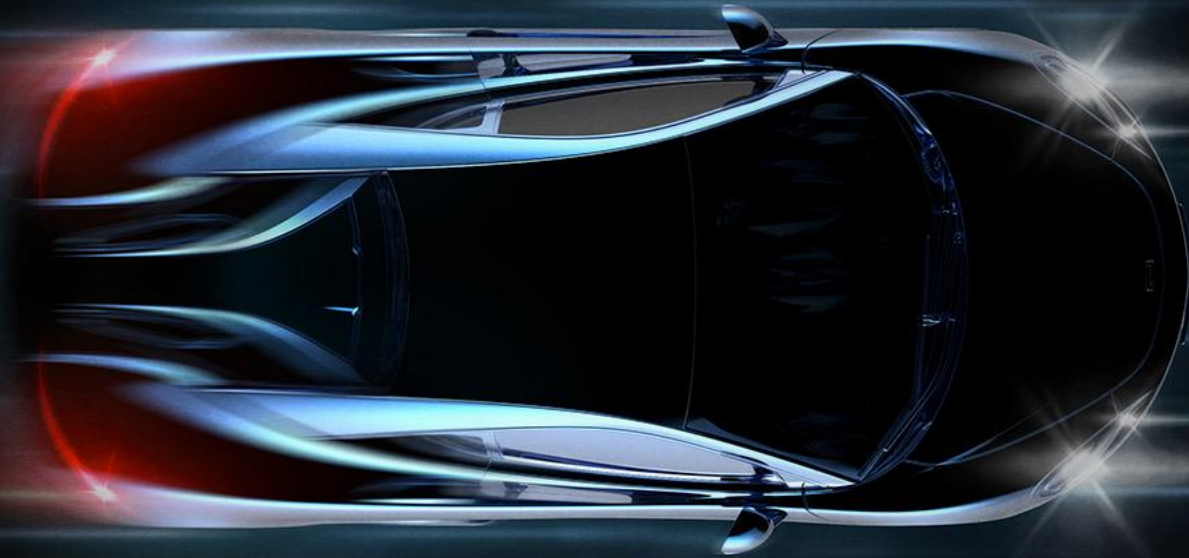
Monitoring Mode:

- Loss of link
- Re-transmission rate
- Number of error packets
- PER (Packet Error Rate)
- MSE – Mean Square Error
- Number of Tx/Rx packets per Application

차량 시스템 ON 상황에서
링크 성능 데이터 추출

+ **Built-In Self Test (BIST) for link performance measuring**

Roadmap



Valens Product Roadmap

Technology

16Gbps

PHY
Proto
16nm

32Gbps

PHY
Proto
5nm

Displays (A-PHY)

16Gbps

ES: Q4/23
MP: TBD

VA80XX

DSI
OLDI
HDCP
I2S
I2C/SPI

ASIL-B

16Gbps

ES: Q4/24
MP: TBD

VA81XX

DP/eDP
HDCP
DSC
I2S
I2C/SPI

ASIL-B

Sensors (A-PHY)

8Gbps

ES: Q4/21
MP: Q2/23

VA70XX

CSI-2
SPI / I2C
GPIO

ASIL-B

16Gbps

ES: Q3/23
MP: TBD

VA71XX

CSI-2
SPI / I2C
GPIO

ASIL-B

Infotainment

2Gbps/2Gbps

ES: now
MP: now

VA6000

1GbE
USB2.0
I2S
GPIO/UART

Lower power
+ Cost reduction

1.5Gbps/1.5Gbps

ES: Q2/22
MP: Q2/23

VA6003

1GbE
I2S
GPIO/UART

2021

2022

2023

2024



Confidential

Valens Product Roadmap

Technology

16Gbps

PHY
Proto
16nm

32Gbps

PHY
Proto
5nm

Displays (A-PHY)

MIPI A-PHY Solution

16Gbps

ES: Q4/23
MP: TBD

VA80XX

DSI
OLDI
HDCP
I²S
I²C/SPI

ASIL-B

16Gbps

ES: Q4/24
MP: TBD

VA81XX

DP/eDP
HDCP
DSC
I²S
I²C/SPI

ASIL-B

Sensors (A-PHY)

8Gbps

ES: Q4/21
MP: Q2/23

VA70XX

CSI-2
SPI / I²C
GPIO

ASIL-B

16Gbps

ES: Q3/23
MP: TBD

VA71XX

CSI-2
SPI / I²C
GPIO

ASIL-B

Infotainment

2Gbps/2Gbps

ES: now
MP: now

VA6000

1GbE
USB2.0
I²S
GPIO/UART

Lower power
+ Cost reduction

1.5Gbps/1.5Gbps

ES: Q2/22
MP: Q2/23

VA6003

1GbE
I²S
GPIO/UART

2021

2022

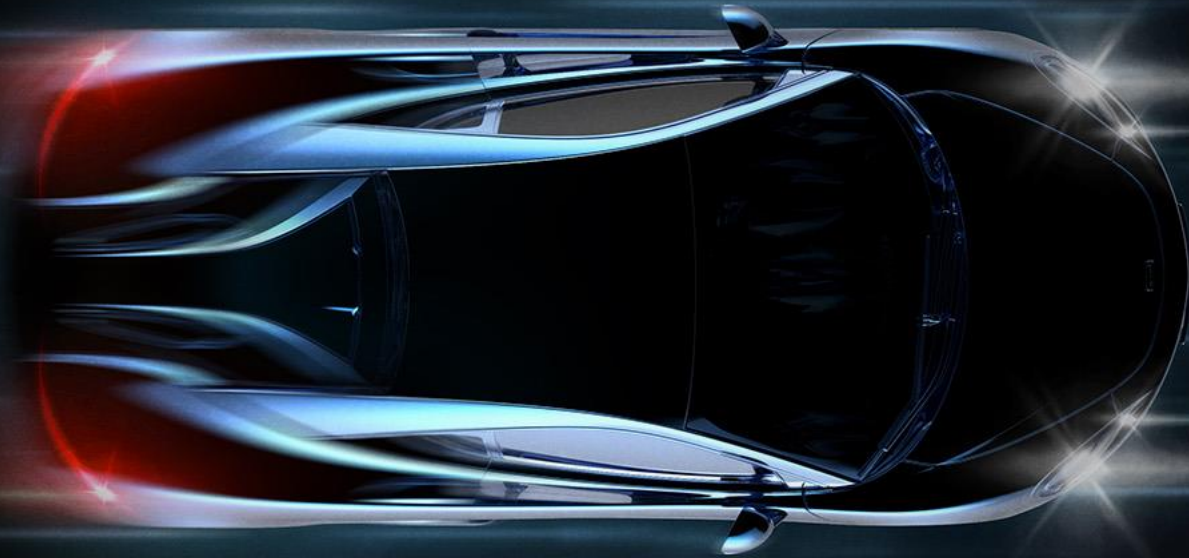
2023

2024



Confidential

MIPI A-PHY 요약



MIPI A-PHY 특징_#1

Gear and Profile

Gear Data Rate	Modulation [One modulation per Gear]	Symbol Rate [GBaud]	Net Application Data Rate [Gbps]
G1 2 Gbps	NRZ-8b/10b	2	1.5
G2 4 Gbps	NRZ-8b/10b	4	3
G3 8 Gbps	PAM4	4	7.2
G4 12 Gbps	PAM8	4	10.8
G5 16 Gbps	PAM16	4	14.4
Uplink, All Gears 100Mbps	NRZ-8b/10b	0.1	0.055(55Mbps)

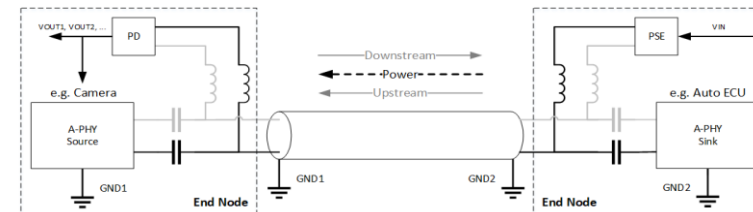
- 다운링크 기어당 One data rate, line-code, modulation
- Single uplink gear 100Mbps
- A-PHY Device supporting Gear N (i.e., N could be 1-5) : 낮은 기어들도 모두 지원 해야 함
- Two noise/performance profiles (with full inter-profile interoperability):
 - Profile 1 : 적은 noise immunity and target BER of $<10^{-12}$ 이며, 저비용, 저전력 구현에 용이 함
 - Profile 2 : 높은 noise immunity and target PER of $<10^{-19}$ 이며, 차량 수명에 최적화 되어 있음

Noise Immunity

- A-PHY 두 프로파일은 최소한의 소음 내성을 목표하는 업체, 엄격한 요구를 원하는 업체 두가지 소음 내성을 제공
- Profile 1은 SERDES 솔루션과 유사하며, G1,G2에 적용
- Profile 2은 자동차 수명 기간의 예상 소음 수준에 대한 MIPI Alliance 분석에 기반하여 매우 높은 수준의 소음 내성을 가지고 있음
- MIPI는 독립적인 실험실에서 기계적 응력과 노화 이후 소음 수준과 차폐 효과 저하를 평가하는 여러 가지 테스트를 수행

Interconnect

- A-PHY는 싱글 레인, 포인트 투 포인트 시리얼 통신 기술 임
- 다양한 케이블 타입을 지원 : SDP/Coax 등
- POC 지원
- 4개의 인라인 커넥터로 최대 15m 전송



MIPI A-PHY 특징_#2

Tx Amplitude

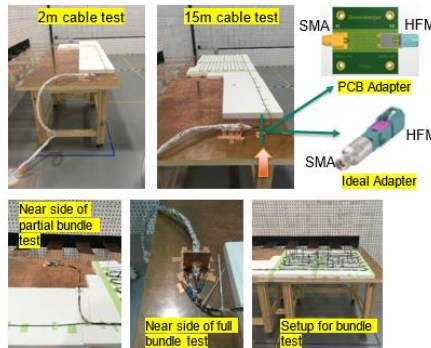
Gear	Downlink [mVp-p]	Uplink [mVp-p]
1	250	500
2	350	500
3	250	500
4	500	250
5	500	250

- A-PHY는 Low PSD 최적화 되어 있는 Amplitude
- TX Amplitudes to over 50Ω Coax channel
- 4Gbps 다운링크 TX 전압 솔루션 비교(싱글 엔드)
 - A-PHY G2 : 350mVp-p
 - FPD Link III (DS90UB953-Q1) – 575mVp-p
 - GMSL (MAX9277-9281) – 500mVp-p

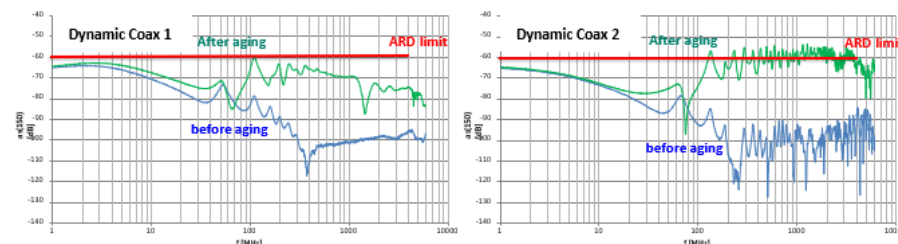
Noise Immunity Level

Interference	P1 [mVpeak]	P2 [mVpeak]	비고
RF Ingress	5	40	Based on the ALSE method ISO 11452-2, CW/AM/PM modulation scheme
Bulk Current Injection	21	40	Based on ISO 11452-4, CW/AM modulation scheme
Fast Transient	15	150	Based on ISO7637-2/3, with modifications for higher frequency pulses

- 테스트 환경 : 2m, 15m Coax 케이블
- 노이즈 레벨은 worst 케이블을 사용 할 때 수신기 패드에서 정의
- P2 한계는 IEEE 연구 논문에 표시된 유사한 결과와 일치
- 40mVpeak는 89dBuV RMS에 해당



Screening Attenuation Test Result



Thank You!

- Eric Yoon -