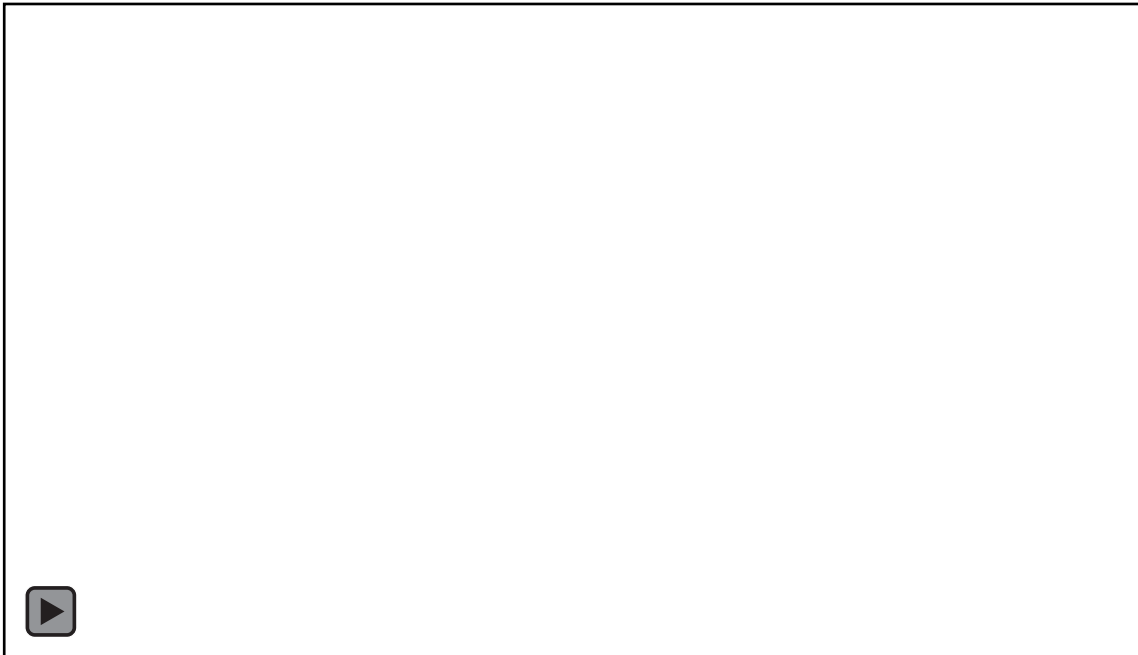JHCTECH

+

LSLIDAR

Advanced Intelligent Transportation Systems Based

on High Performance Lidar Technologies

JHC + INTEL AIoT Collaboration

Sameer Sharma
Global GM at Intel
Smart Cities and Transportation

Suman Sehra
Global Director, IOT Smart Cities & Intelligent
Transportation

Agenda

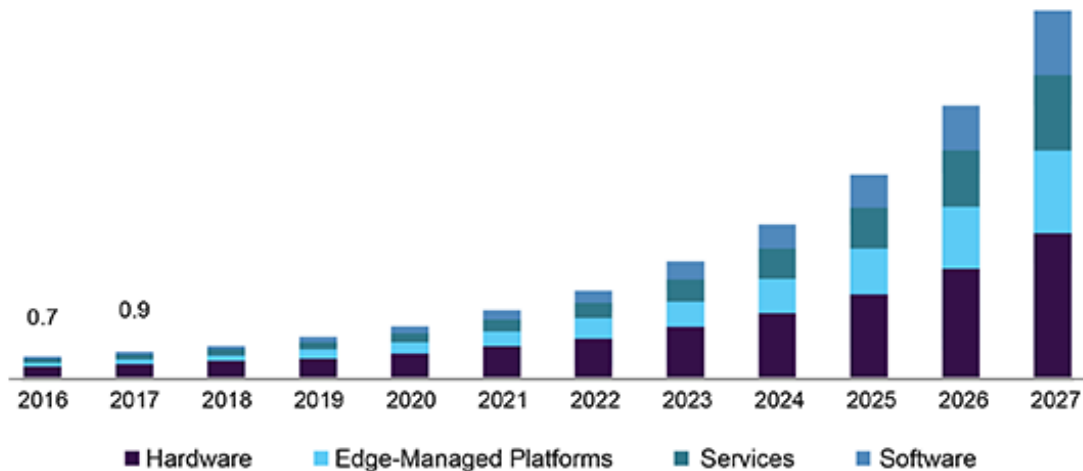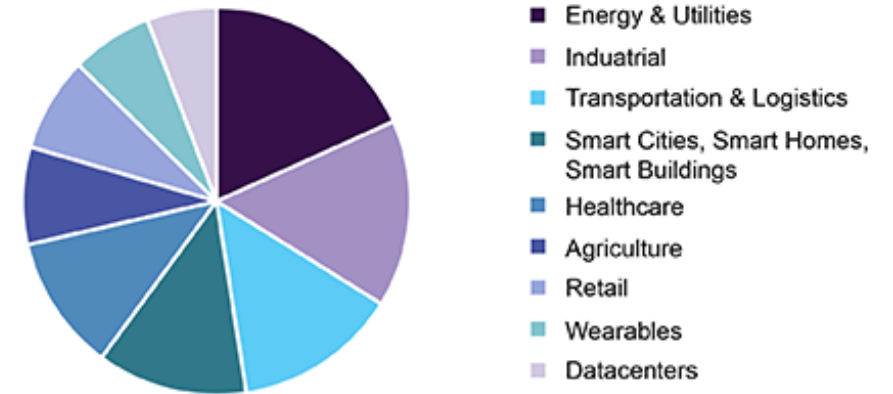|	
16:00 ~ 16:05	**Opening** Ruslan Salimov, ,Business Development Manager
16:05 ~ 16:20	**Discussion of the current challenges from ITS** Ruslan Salimov, ,Business Development Manager
16:20 ~ 16:40	**LS LiDAR: LiDAR & Applications** Zoe/Millie, Sales Managers
16:40 ~ 17:00	**JHCTECH: Edge Computer & Applications** Gary Shu, Customer Solution Manager
17:00 ~ 17:10	**Q&A**

1 ITS Segment and Major Challenges

Market Overview

Edge Computing Market Worth $43.4 Billion By 2027 | CAGR: 37.4%

U.S. edge computing market size, by component, 2016 - 2027 (USD Billion)

0.7   0.9

2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027

■ Hardware   ■ Edge-Managed Platforms   ■ Services   ■ Software

Source: www.grandviewresearch.com

Global edge computing market share, by industry vertical, 2019 (%)

■ Energy & Utilities
■ Induatrial
■ Transportation & Logistics
■ Smart Cities, Smart Homes, Smart Buildings
■ Healthcare
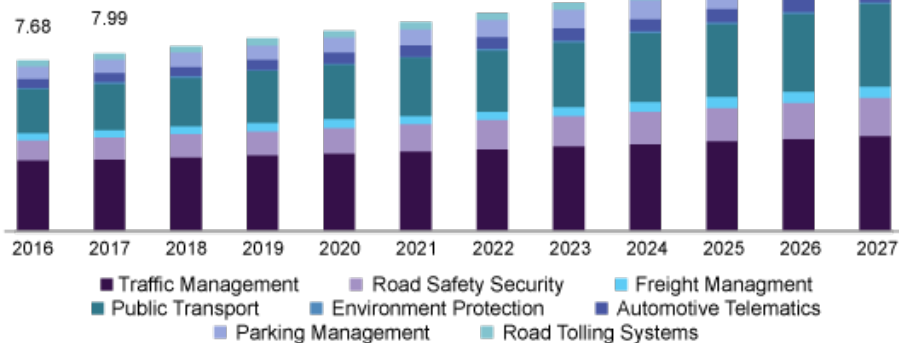■ Agriculture
■ Retail
■ Wearables
■ Datacenters

Source: www.grandviewresearch.com

Machine Learning (AI) | Video Analytics | Local Advanced Analytics (Tech/Biz) | Data Management
By 2023, 5G will make up around one-fifth of all mobile data traffic, where 25% of the use-cases will depend on edge computing capabilities.
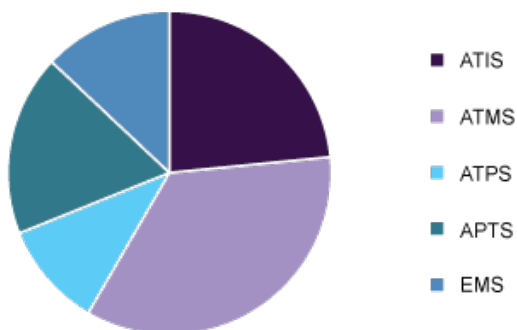
Major Trends

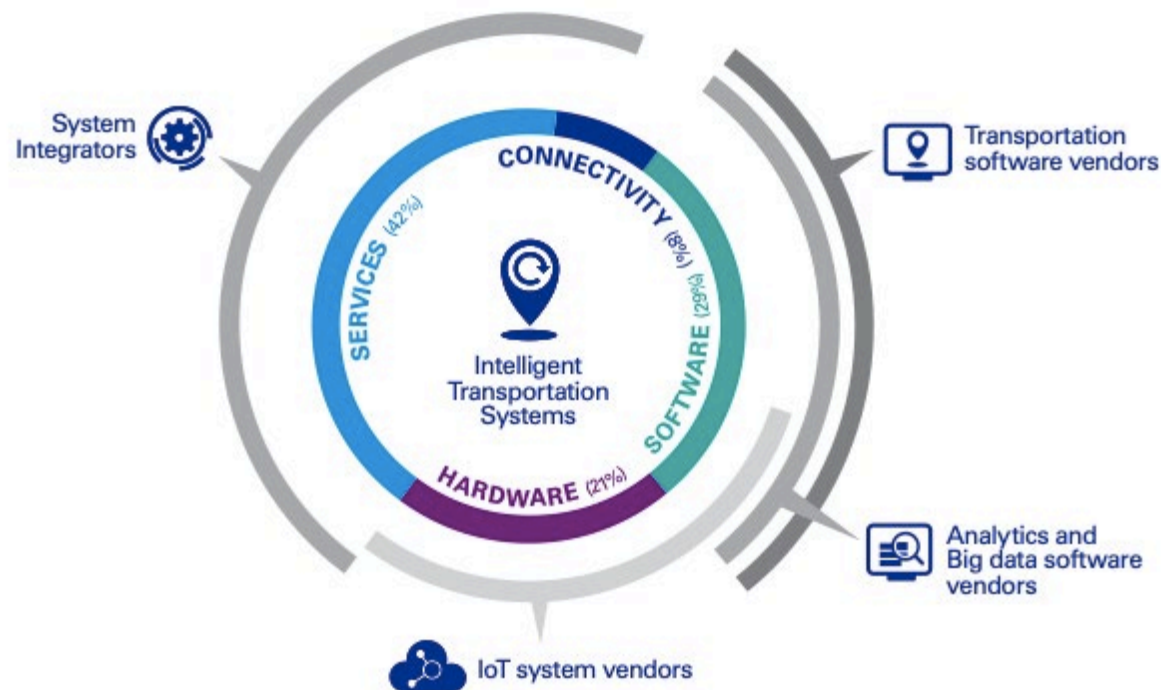U.S. intelligent transportation system market size, by application, 2016 - 2027 (USD Billion)

7.68 7.99

2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027

■ Traffic Management ■ Road Safety Security ■ Freight Managment
■ Public Transport ■ Environment Protection ■ Automotive Telematics
■ Parking Management ■ Road Tolling Systems

Source: www.grandviewresearch.com

Global intelligent transportation system market share, by type, 2019 (%)

- ATIS
- ATMS
- ATPS
- APTS
- EMS

Source: www.grandviewresearch.com

System Integrators

Transportation software vendors

CONNECTIVITY (8%)

SERVICES (42%)

SOFTWARE (29%)

Intelligent Transportation Systems

HARDWARE (21%)

Analytics and Big data software vendors

IoT system vendors

❖ **Advanced Traveler Information System (ATIS)**

❖ **Advanced Traffic Management System (ATMS).**

❖ Advanced Transportation Pricing Systems (ATPS) !

❖ Advanced Public Transportation System (APTS) !

❖ Emergency Management System (EMS) !

www.jhctechnology.cn

Market Overview

Industry	% of total edge use cases	2025 hardware value[1]
Travel, transport, and logistics	24%	~$35B–$43B
Cross-vertical	9%	~$32B–$40B
Retail	10%	~$20B–$28B
Media and entertainment	1%	~$17B–$25B
Public sector and utilities	10%	~$16B–$24B
Global energy and materials	13%	~$9B–$17B
Advanced industries	10%	~$5B–$13B
Healthcare	10%	~$5B–$13B
Infrastructure	6%	~$4B–$11B
Chemicals and agriculture	5%	~$4B–$11B
Banking and insurance	1%	~$2B–$7B
Consumer	4%	~$1B–$5B

Total: ~$175B–$215B

[1]Hardware value includes opportunity across the tech stack (ie, the sensor, on-device firmware, storage, and processor) and for a use case across the value chain (ie, including edge computers at different points of architecture).

Multi Access Edge Computing

- Video Analytics
- Data Monitoring
- xIox (AIoT; IIoT; IoV etc)
- Data Cashing
- Advanced Analytics
- Location Services
- Optimized local content

Source: JM Chabas, Chandra Gnanasambandam, Sanchi Gupte, and Mitra Mahdavian |McKinsey & Company

www.jhctechnology.cn

ITS Challenges

General Data without the value	Purpose Driven Analytics
Unclear Monetisation schemes	Service Based Project Development. Tax & Government Expenses optimization | Anti-coruption strategy
Privacy Issues | Malicious attacs Personal Freedoms and Personal Security	Encrypted protocols | store-less data processing | red-flag data only
Bandwith limitations Low Performance Technology solutions	Edge Computing; LiDAR sensing; In-Vehicle Diagnostics
No Fixed Topology	Modular, extendable solutions. Easy access to raw data for SW customisation
Decentralisation	Open Collaboration between suppliers and project owners to design a trustworthy infrastructure

Major Drivers
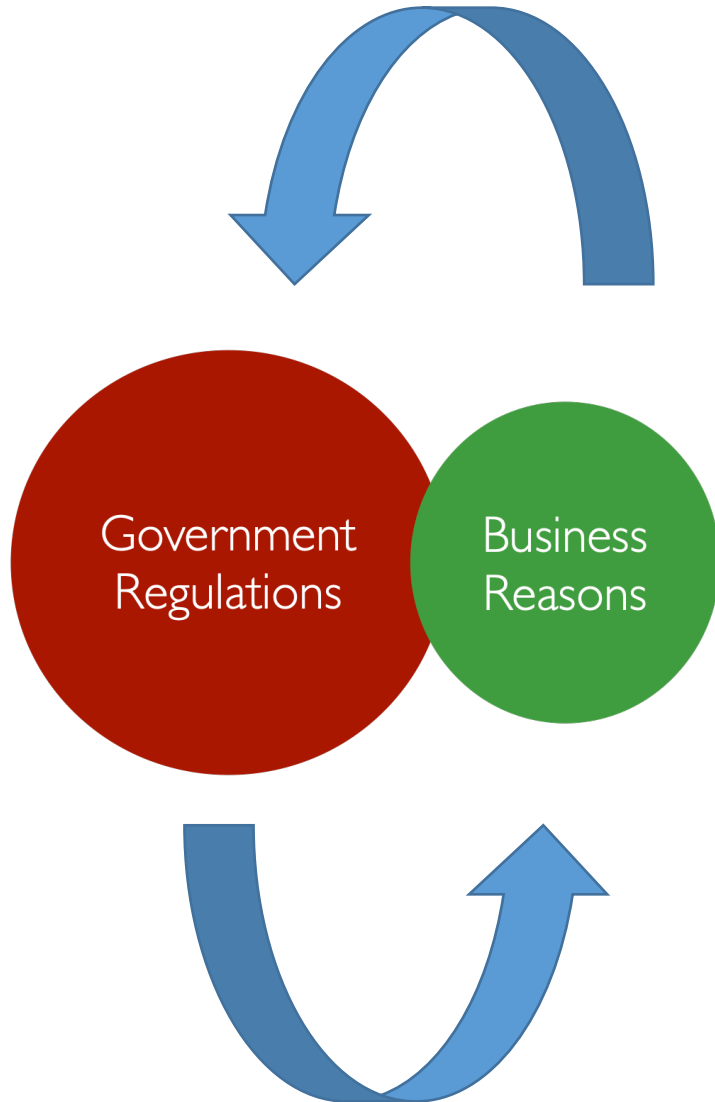
Public Sector – Safety / Un-manned operations / Transparency / Optimization

- Government investments in smart transportation
- Traffic Monitoring System
- Traffic Signal Control Systems
- Parking Convenience Systems
- Traffic Enforcement Cameras
- Accident-Avoidance Systems

Private - Compliance / Cost Reduction (operations) / Automation for scalability

- Fleet Management
- Asset Monitoring (warehousing)
- Logistics

Barriers - mostly related to legacy projects and systems

- Huge capital requirement
- Big data increases complexity
- Long downtime for replacing the existing system
- Immature market conditions

Government Regulations

Business Reasons

Inevitability of MEC and V2X Integration
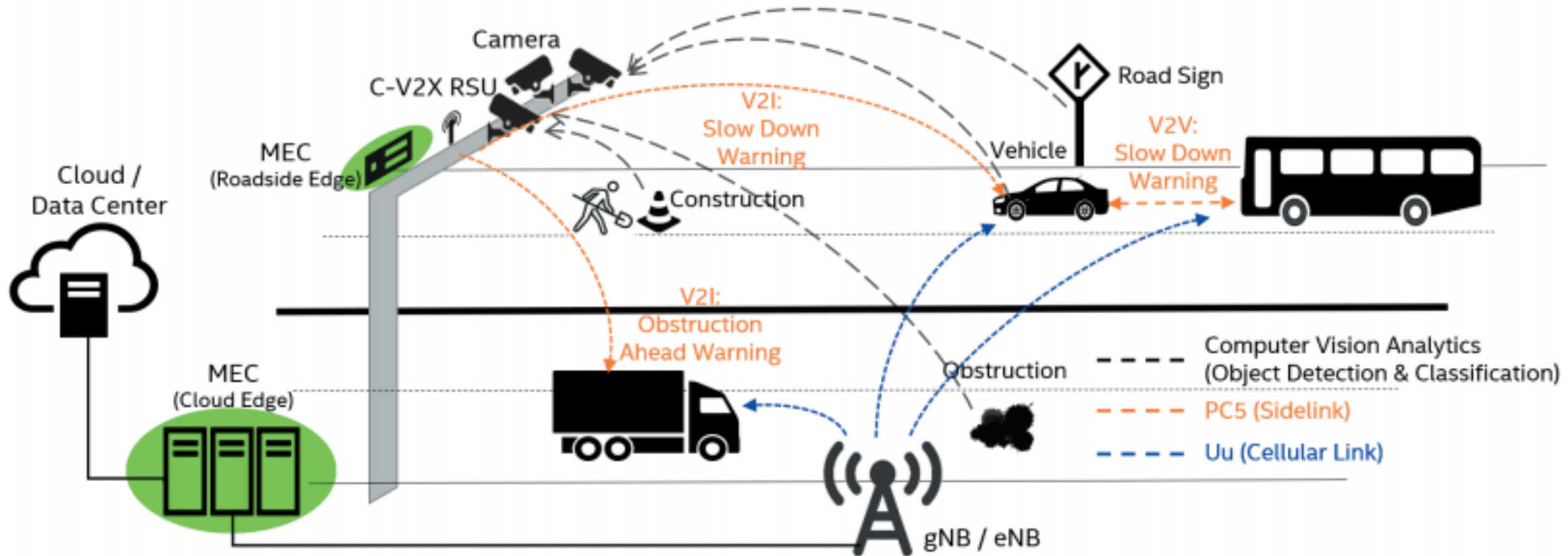
Deployment scenario of MEC platforms for C-V2X
Service Oriented Application Development

Inevitability of MEC and V2X Integration
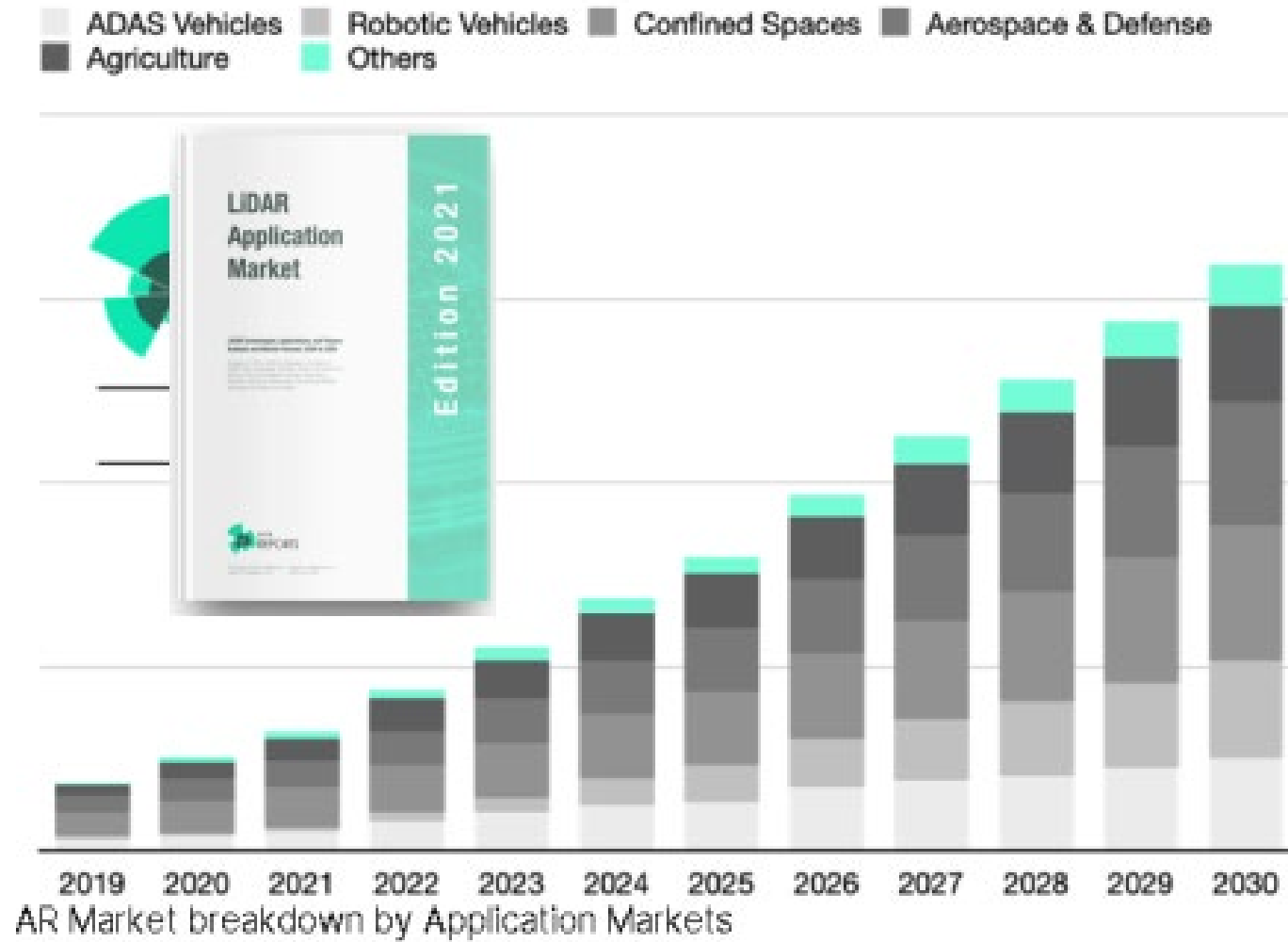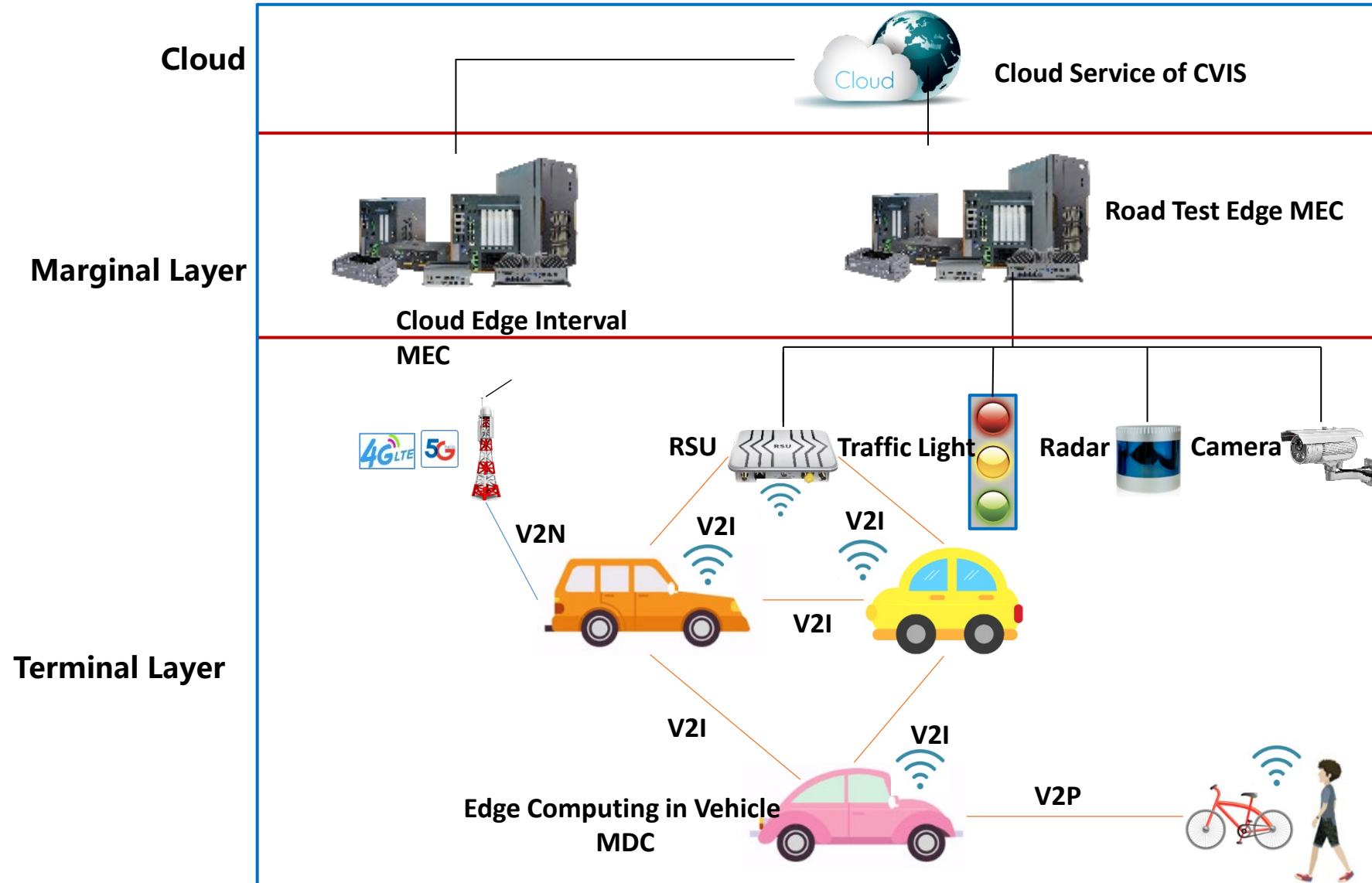

LiDAR Application Market

2 LS LiDAR: LiDAR & Applications

3 JHCTECH: Edge Computer & Applications

C-V2X System Architecture

Cloud

Cloud Service of CVIS

Marginal Layer

Road Test Edge MEC

Cloud Edge Interval
MEC

Terminal Layer

4G LTE 5G

V2N

RSU   Traffic Light   Radar   Camera

V2I   V2I

V2I

V2I   V2I

Edge Computing in Vehicle
MDC   V2P

C-V2X System Architecture

Expressways

City Road Level

Complete City wide solution

- Sensing detection at a ramp confluence point;
- Real time situation and vehicle status analysis (people/obstacles);

Data distribution to vehicles in real time

- Improve the perception/visibility of the surrounding environment ;

and reduce the occurrence of traffic accidents

- Sensor Detection at intersection
- Analyze and predict human information and status in real time, data distribution
- Optimizing parameters of traffit lights

- City wide data collection and analysis
- Unified dispatching of vehicles in a certain area
- Developing city level map navigation application,
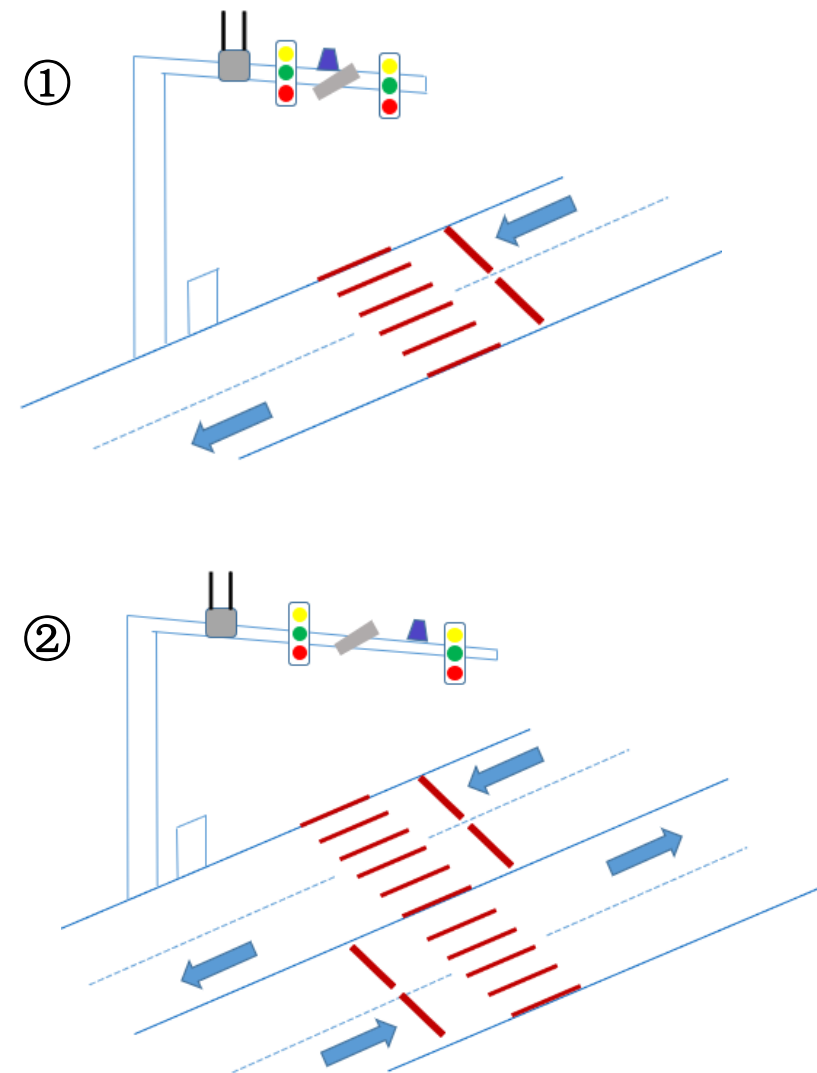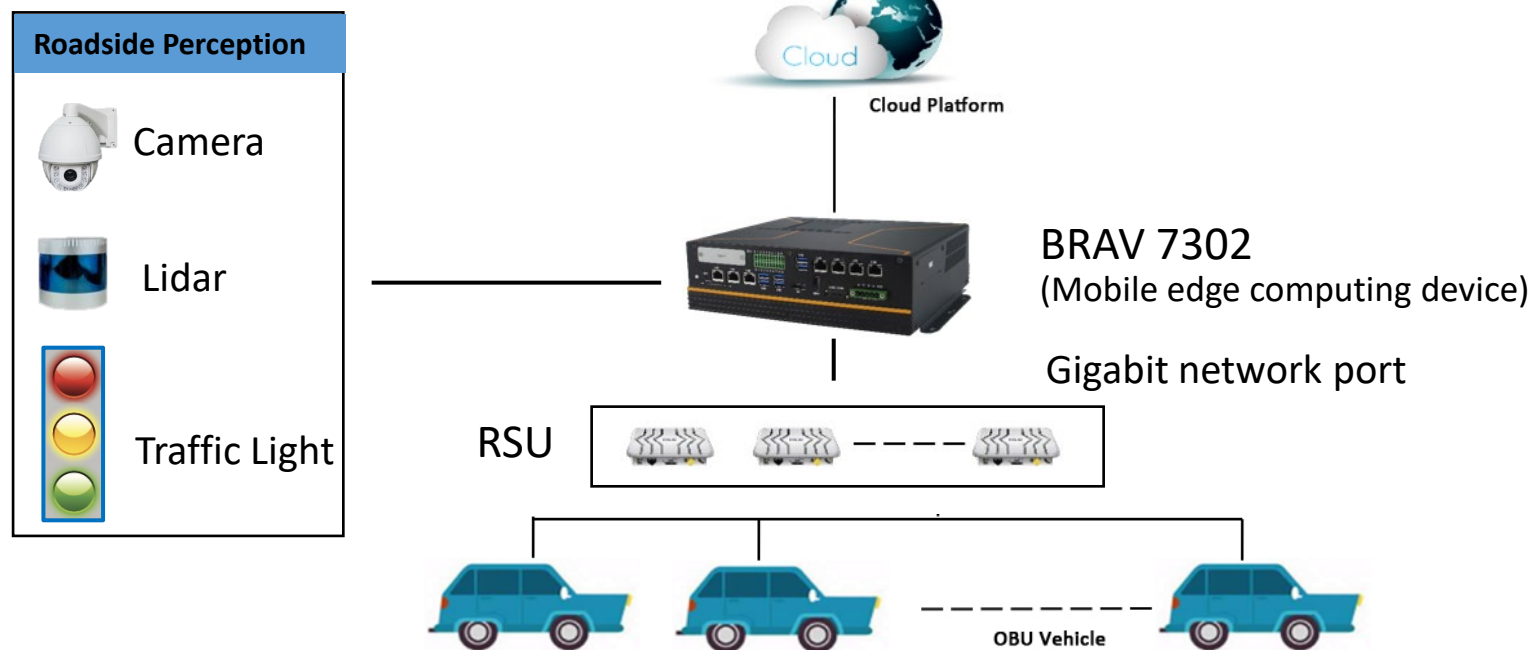
Optimizing urban traffic efficiency

The ultimate goal of the Internet of vehicles concept is to achieve full automated driving through continuous improvement of safety & system performance

MEC Function Architecture Diagram Applied to V2X

10G optical fiber

optical modem

Management ports

2.5G GigE Lan

RS485

Traffic light controller

MEC

| Intel Core series multi-core processor | AI Accelerator /module PCIex16 / MXM3.1 |
| DDR4 Dual channel up to 128GB | NVMe high-speed system disk RAID data storage disk |

4G&5G

mobile base station

2.5G GigE LAN

RS232

Intelligent control cabinet

SWITCH

6-24*LAN port

Lidar

Camera

RSU
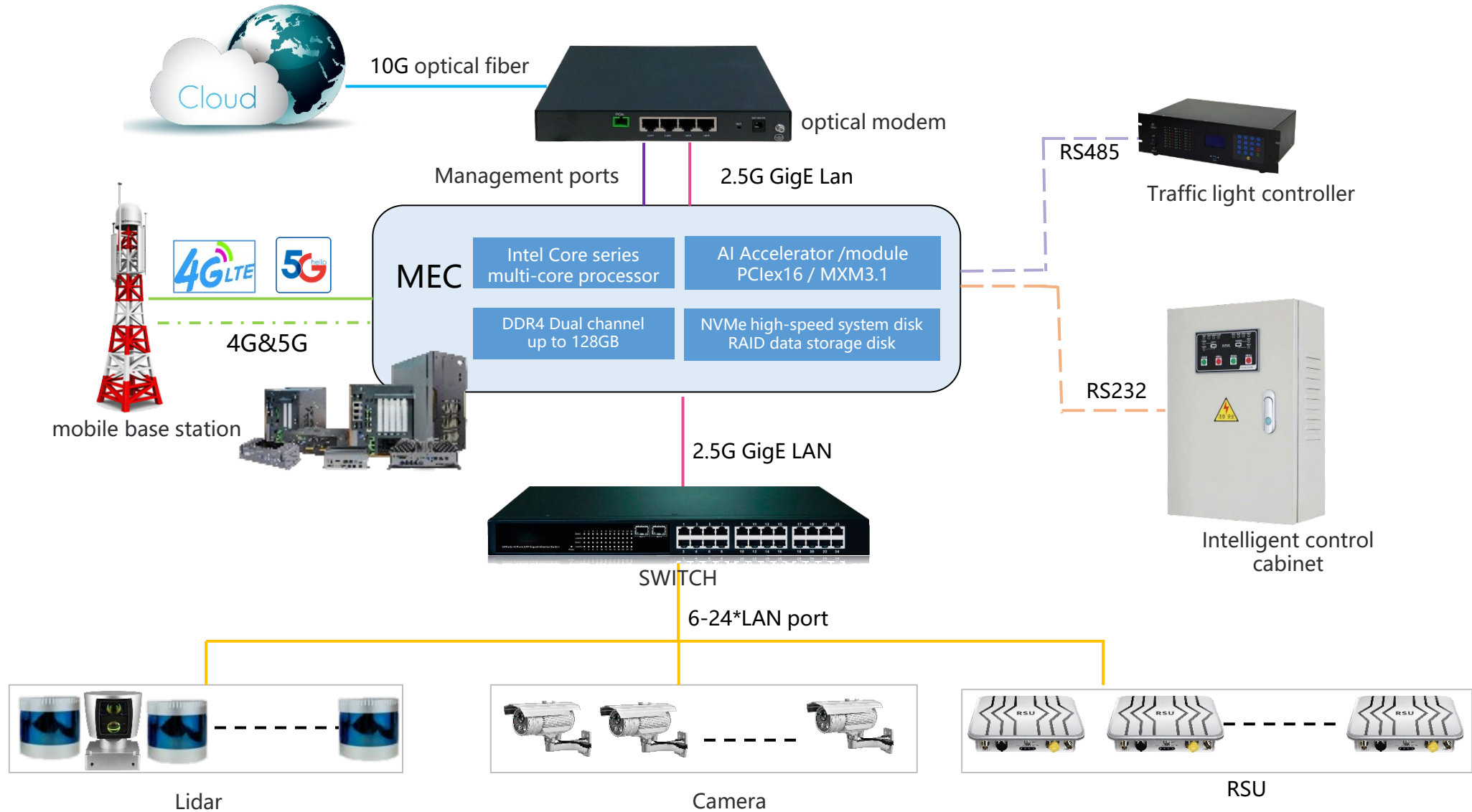
MEC Application-- Roadside Unit

✓ CVIS---Traffic Light Roadside Unit;

✓ Straight Intersection;

✓ One-way/two-way sensor fusion scheme, full coverage；

Roadside Perception

Camera

Lidar

Traffic Light

Cloud

Cloud Platform

BRAV 7302
(Mobile edge computing device)

Gigabit network port

RSU

OBU Vehicle

①

②

*CVIS - Cooperative Vehicle-Infrastructure Systems

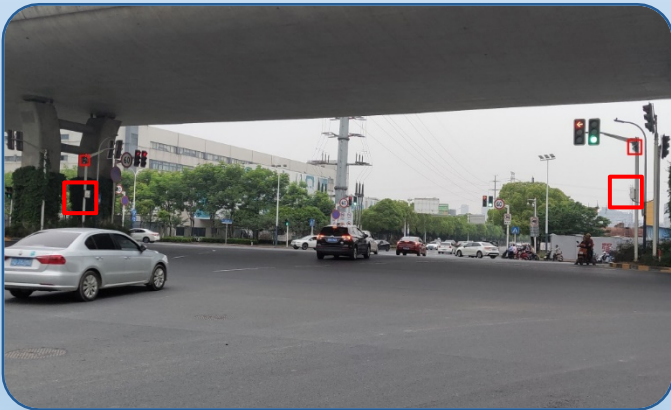## MEC Application
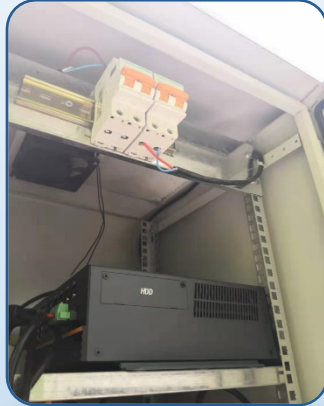

RSU

Lidar

Camera

5G CPE

MEC Unit

BRAV-7302

OBU
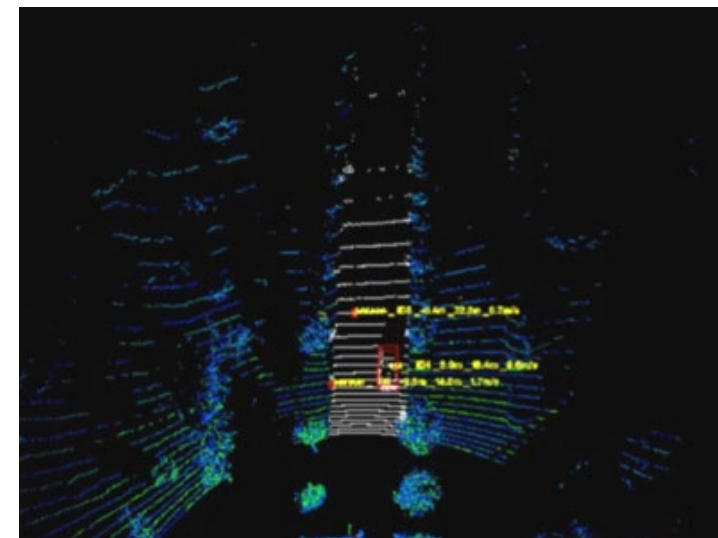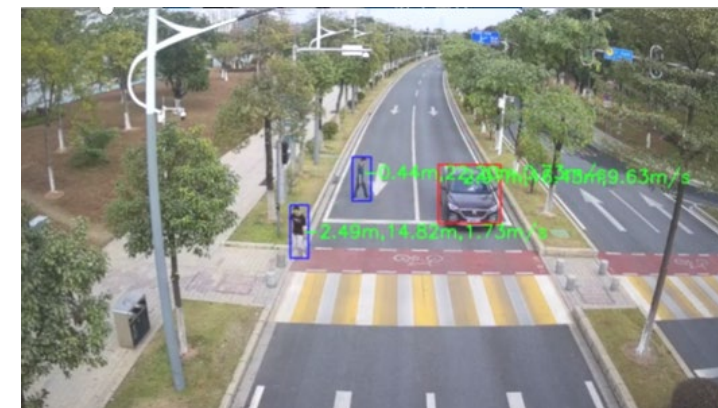
MEC Application

✓ Roadside RSUs are online, and the on-board OBU will receive all data from the roadside stations before entering the intersection；
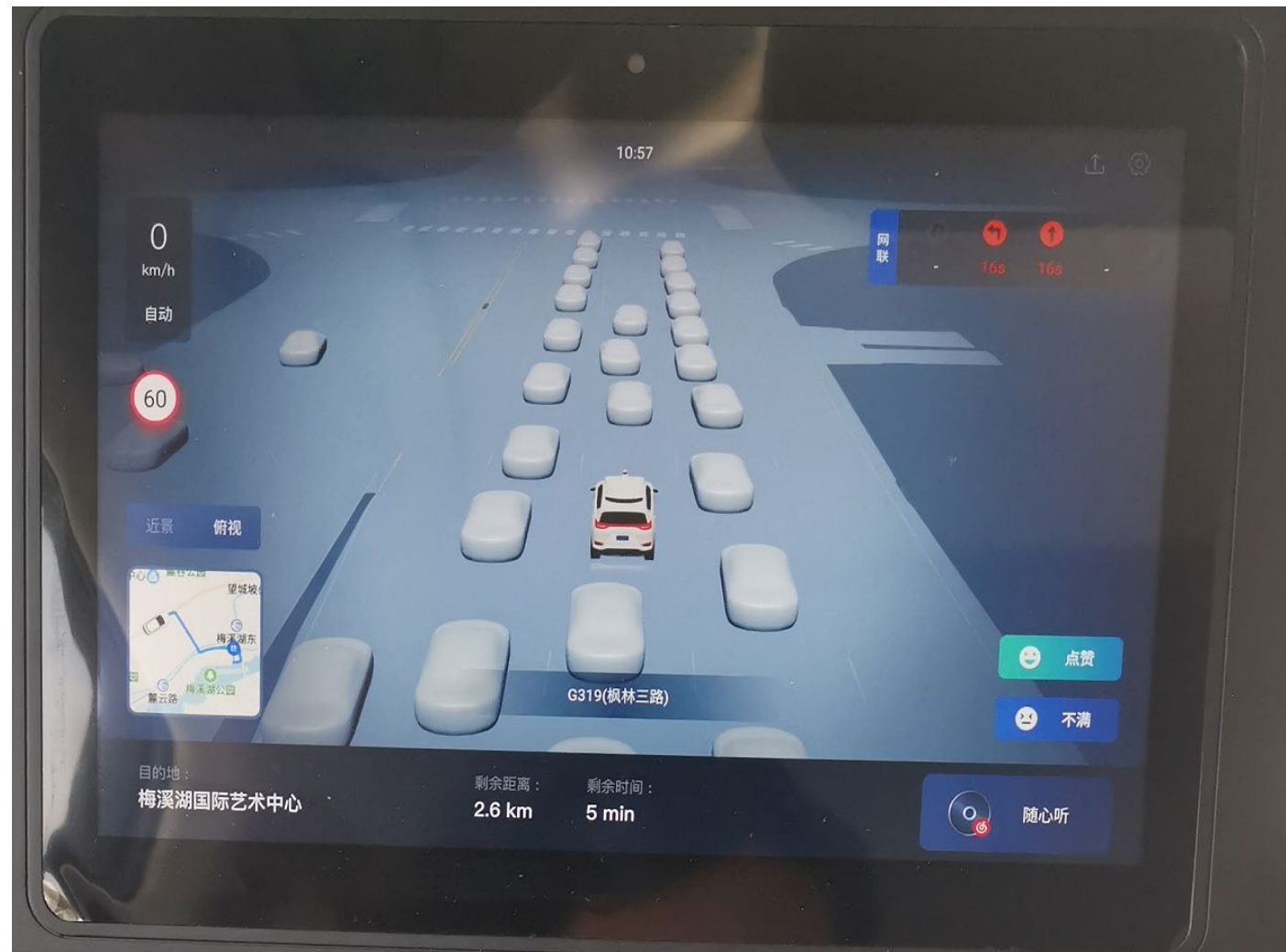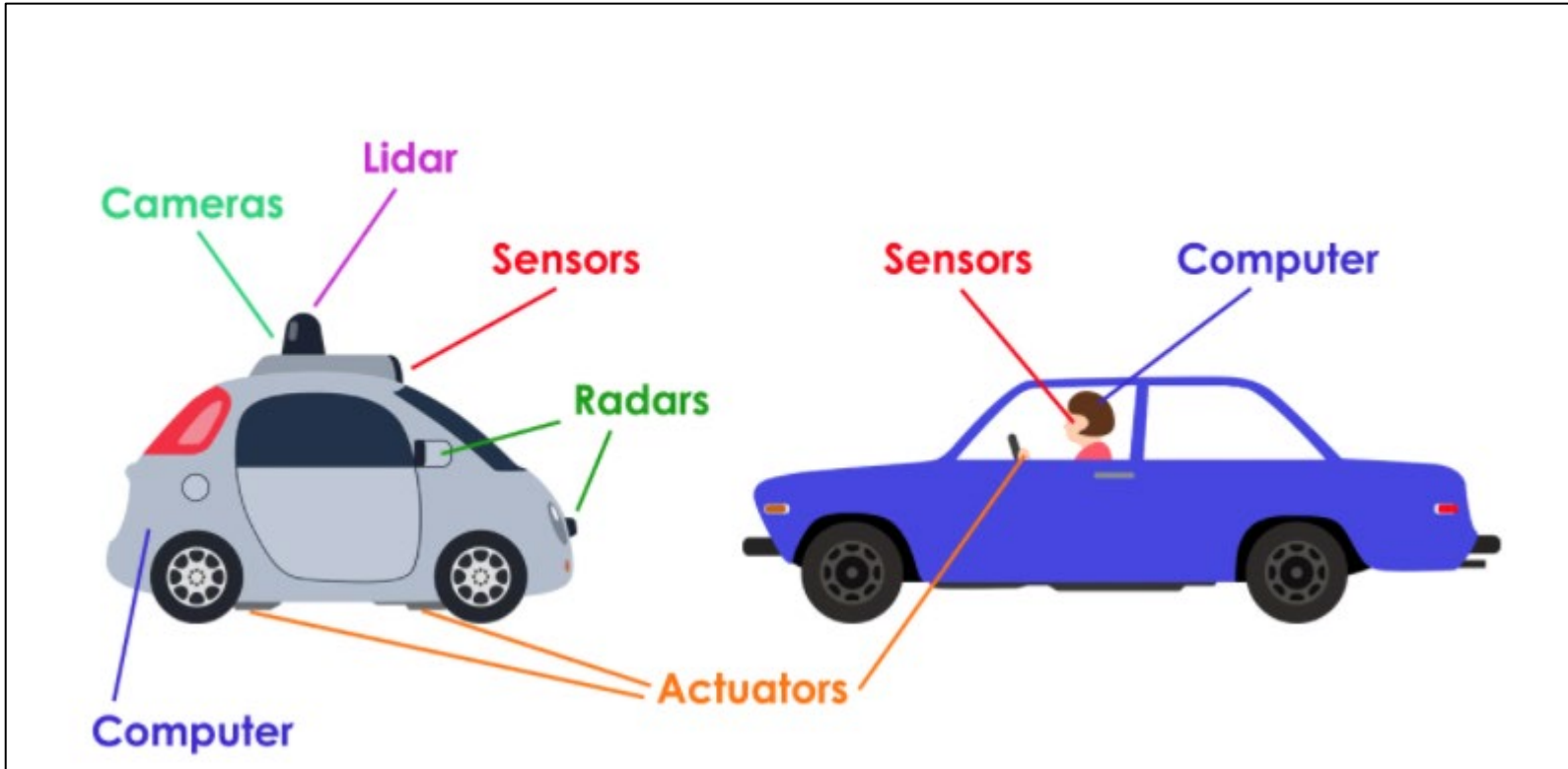
JHC V2X Projects
Traffic monitoring system for congestion analysis and city-wide re-routing

Self-driving Car Application -- Edge Computering in Vehicle

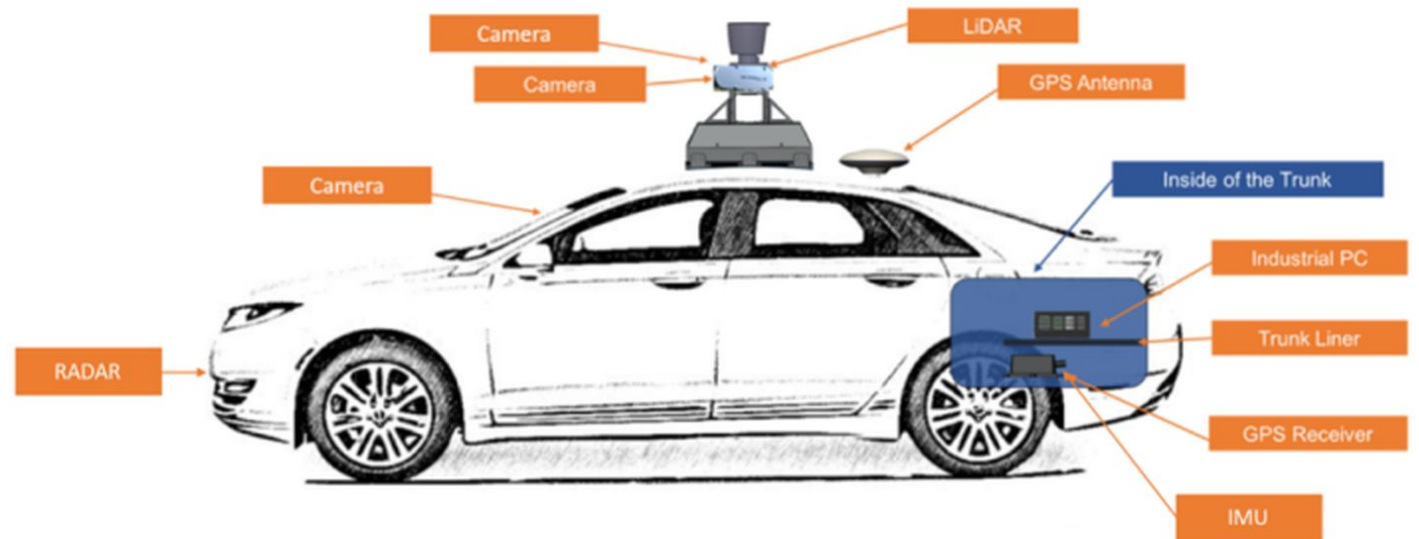**Self-driving Car**   **Driver**

According to The Telegraph, the driverless technology industry is expected to be globally worth £900 billion by 2025 and is said to be growing annually by a whopping 16 per cent.

Image from Youngwonks

Self-driving Car Edge Computering Architecture

Here's how self-driving car works:

- Sensor data collection at the edge

- Sensor fusion at the edge

- Virtual world model update at the edge

- AI action plan determined at the edge

- AI issues car-control commands at the edge

- Self-driving executes the car-control commands at the edge

Image from Apollo

JHC's Edge Computing Products used for Self-driving Car and Roadside Perception System

Shenzhen Future Intelligent and Connected Transportation System Industrial Innovation Center
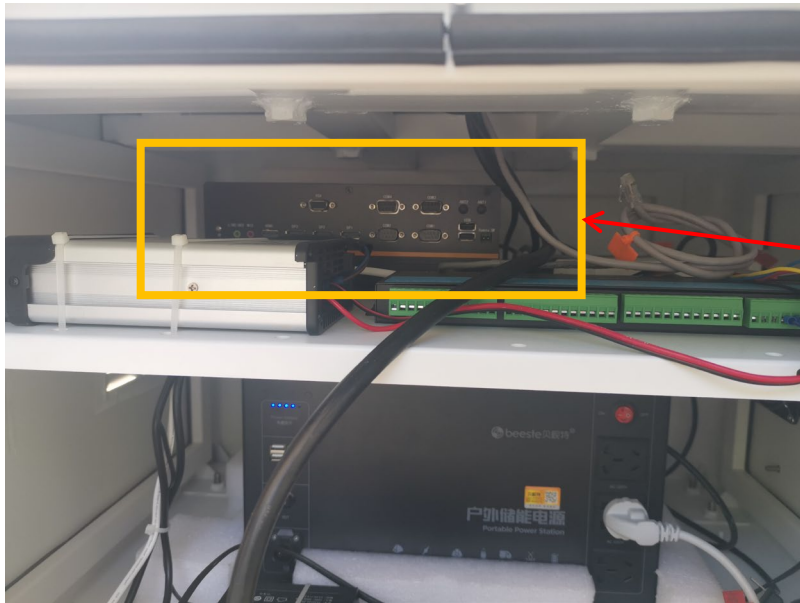
JHC Edge Computering in Self-driving Car
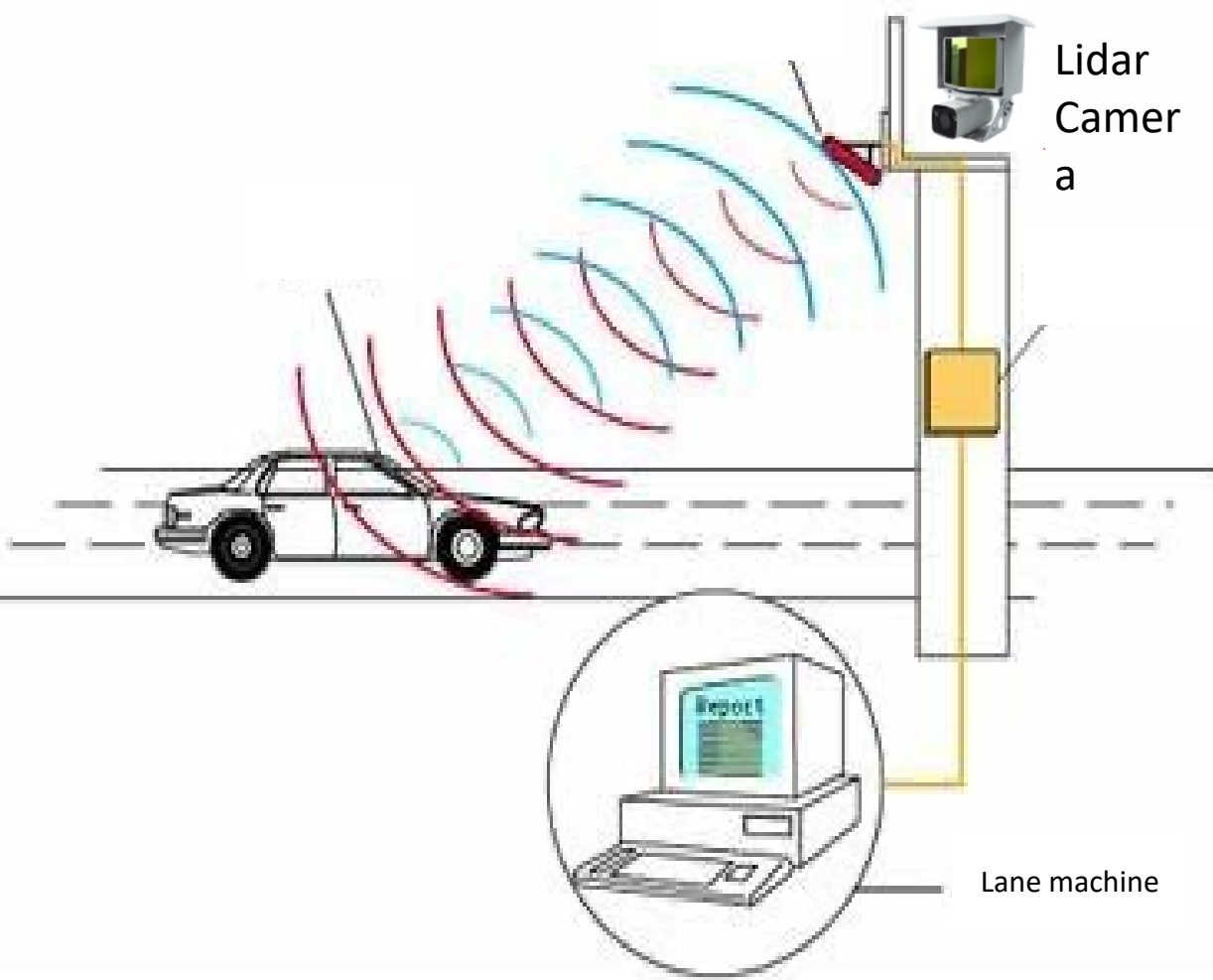

Edge Computering in vehicle
BRAV-7520-WP

Lidar

JHC Edge Computering in Traffic Light Roadside Unit

MEC Unit-BRAV-7302

ETC Application

Lidar Camera

Lane machine

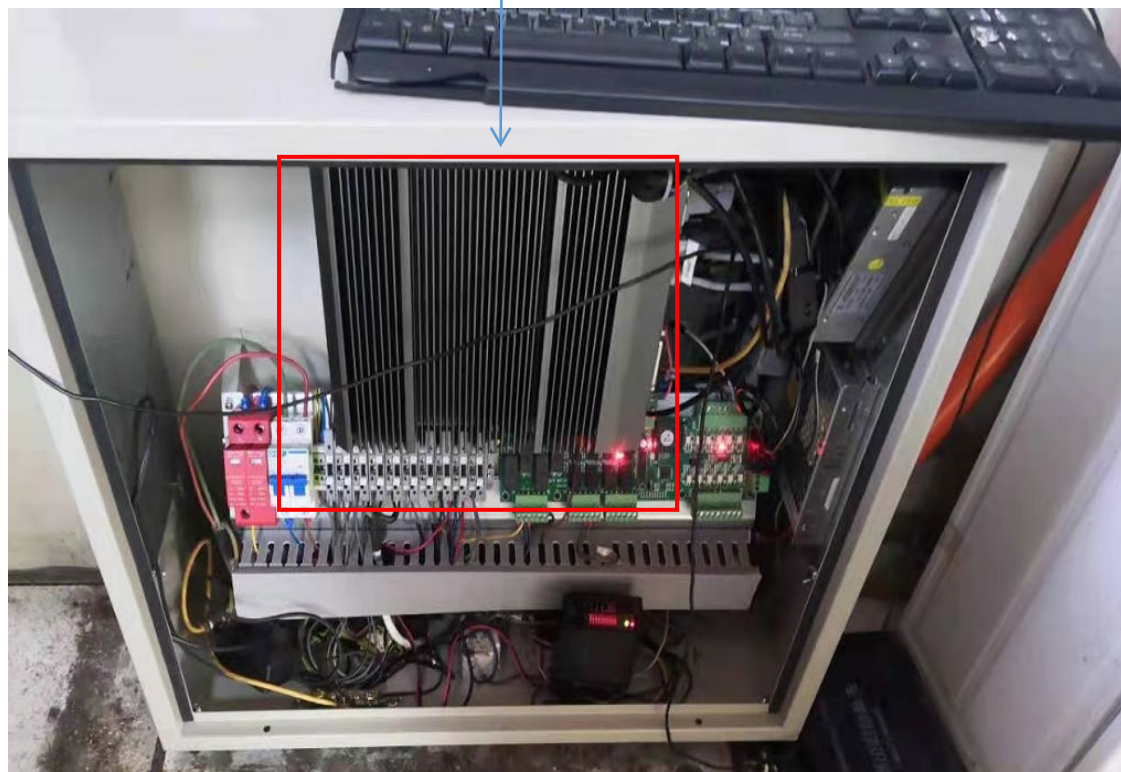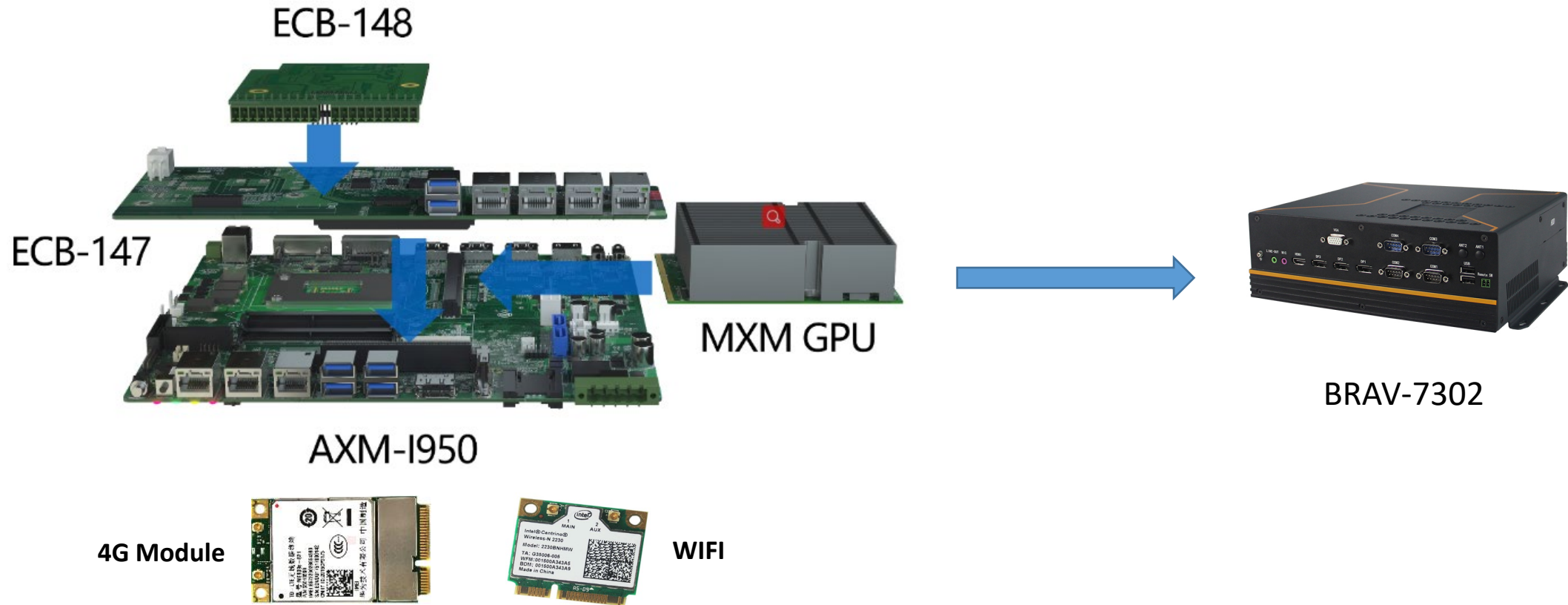|	
Moisture-proof Dustproof Wide operation temperature	7*24 hours non-stop
Multiple OS Easy for maintenance	Extensible PCI/PCIE slot

ETC Lane Controller

KMDA-3921/S001

JHCTECH Product Offering

4

Skylake/Kabylake-S+MXM GPU(1050Ti,1060,1070)

ECB-148

ECB-147

AXM-I950

MXM GPU

4G Module

WIFI

BRAV-7302

BRAV 7302

Key Specification

- CPU and GPU fan cooling, independent air passage
- Intel® Kabylake-S/Skylake-S Core I3/I5/I7 CPU
- 2400/2133MHz SODIMM, Up to 32GB
- 1*MXM 3.1 socket, support NVIDIA/AMD GPU Intel
- 1*DP+1*HDMI+1*VGA, GPU 3*DP+1*HDMI
- 3/7*LAN, 6*USB3.0, 3*USB2.0, 4*COM,16DIO,Audio
- 1*Mini PCIe(PCIe+USB),1*M.2 2242 B-Key
- 1*mSATA, 1/2*2.5" SATA, suppprt Raid0,1 Support Intel® iVpro and TPM2.0
- DC 6~48V Wide Power Input

BRAV 7521
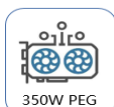
Key Specification

- Intel® Xeon® E or 9th/8th-Gen Core™ i7/i5/i3 processor

- Intel® Q370/C246 Chipset

- Large memory, 4*DDR4 up to 128G ECC/non-ECC

- UHD dual 4K and 3 independent displays,2*DP+1*VGA

- 3*Gig-LAN,Opt. Multi-ch 10Gig-SFP

- Multi-ch PCIe standard slot,supports multiple high -speed extension interface modules

- Super storage configuration,2*SATA3.0, 1*M.2 2280 M-Key

- Support AMT, Intel® iVpro and TPM2.0

- CPU fanless, AI/GPU efficient fan cooling design

- Super deep learning ability, support 350W GPU/ 75W PGPU/AI acceleration card

BRAV 7520

Key Specification

- Intel® Xeon® E or 9th/8th-Gen Core™ i7/i5/i3 processor

- Intel® Q370/C246 Chipset

- Large memory, 4*DDR4 up to 128G ECC/non-ECC

- UHD dual 4K and 3 independent displays,2*DP+1*VGA

- 3*Gig-LAN,Opt. Multi-ch 10Gig-SFP

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- CPU fanless, AI/GPU efficient fan cooling design

- Super deep learning ability, support 350W GPU/ 75W PGPU/AI acceleration card

RoHS COMPLIANT 2002/95/EC   C E   FCC

intel Coffee Lake | 350W PEG | RAID | nvm EXPRESS | 10Gig LAN | 5G | Wi-Fi 6

KMDA-3920

Key Specification

- Chipset H110/Q170

- Intel®Kabylake-S/Skylake-S Core I3/I5/I7 CPU

- 2*DDR4 2400/2133MHz SODIMM, up to 32GB

- DP+HDMI+VGA, Optional 3 independent displays(Q170)

- 2/4*LAN, 4*USB3.0, 3*USB2.0,4*COM,8-bit DIO

- 1*Mini PCIe(PCIe+USB),1*M.2 2242 B-Key

- PCIe X16+PCIe X4 or 2*PCI expansion

- 1*mSATA, 2*2.5" SATA, suppprt Raid0,1 (Q170)

- Support Intel® iVpro(Q170) and TPM2.0

- DC 12~24V Wide Power Input

KMDA-3921

Key Specification

- Chipset H110/Q170

- Intel® Kabylake-S/Skylake-S CPU

- 2*DDR4 2400/2133MHz SODIMM, Up to 32GB

- DP+HDMI+VGA, Optional 3 independent displays

- 2/4 LAN, 4*USB3.0, 3*USB2.0, 4*COM,8-bit DIO

- 1*PCIe X16+1*PCIe X1+2*PCI expansion

- 1*Mini PCIe(PCIe+USB),1*M.2 2242 B-Key

- 1*mSATA, 2*2.5" SATA, suppprt Raid0,1(Q170)

- Support Intel® iVpro and TPM2.0

- DC 12~24V Wide Power Input

KMDA-3610

Key Specification

- Chipset H110/Q170

- Intel® Kabylake-S/Skylake-S CPU

- 2*DDR4 2400/2133MHz SODIMM, Up to 32GB

- DP+HDMI+VGA, Optional 3 independent displays

- 2/4 LAN, 4*USB3.0, 3*USB2.0, 4*COM,(8+16)bit DIO

- 1*Mini PCIe(PCIe+USB),1*M.2 2242 B-Key

- 1*mSATA, 2*2.5" SATA, suppprtRaid0,1(Q170)

- Support Intel® iVpro andTPM2.0

- DC 12~24V Wide Power Input

5 Q&A

JHCTECH

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