BRAV Series

Edge Computing for
Automation &
Advanced “Intelligent” Projects

1 Market Trends & Industry Directions

Brief History

(Cloud & Edge Computing for IOT *Source: Bosch.IO*)

1990
Akamai CDN
- Images and videos delivered closer to consumer.

1997
Pervasive Computing
- Speech recognition & cyber foraging for improved energy consumption.

2001
Peer to Peer
- Proximity-routing in overlay P2P networks to avoid long-distance links.

2006
Cloud Computing
- Amazon's Elastic Compute Cloud (EC2) service.

2009
Cloudlets
- Cloudlets offer lower latency and allow to offload work.

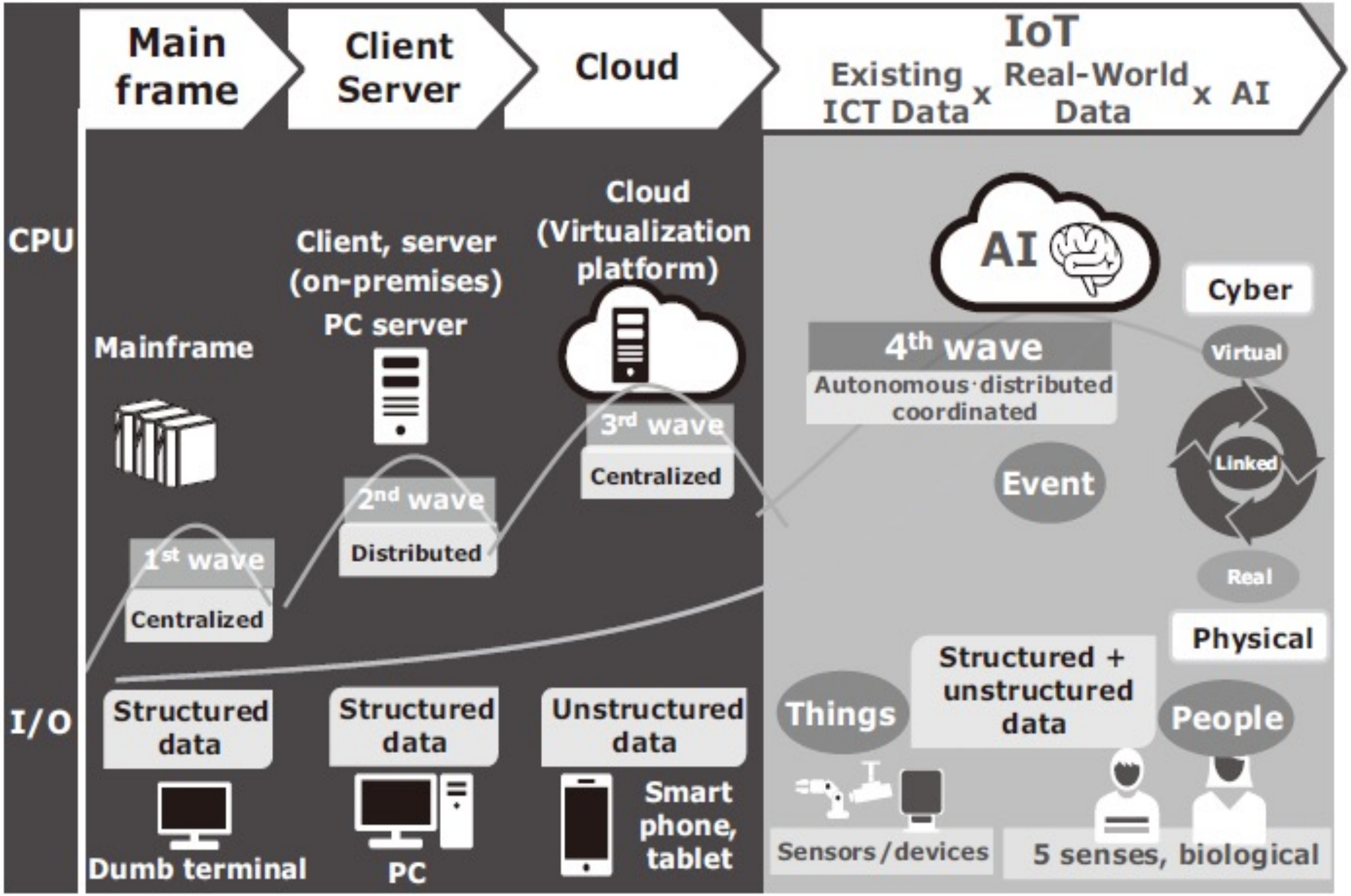
2012
Fog Computing
- Introduced by Cisco, focuses on scalability and latency in IoT.

Today
Cloud and edge computing
Complementing both worlds.

- Offline & online mode
- Polyglot protocol support
- Edge analytics
- Flexibly deployable applications (cloud vs. edge) with zero downtime
- Local processing i.e., filtering, aggregation, de/coding, etc.
- Rich API support for easy integration of heterogeneous local and remote services
- Simplified device access and unified application APIs
- Digital twin support and synchronization between device, edge and cloud
- Support for different IoT domain needs

Brief History

Source: NEC technical Journal



EDGE Computing

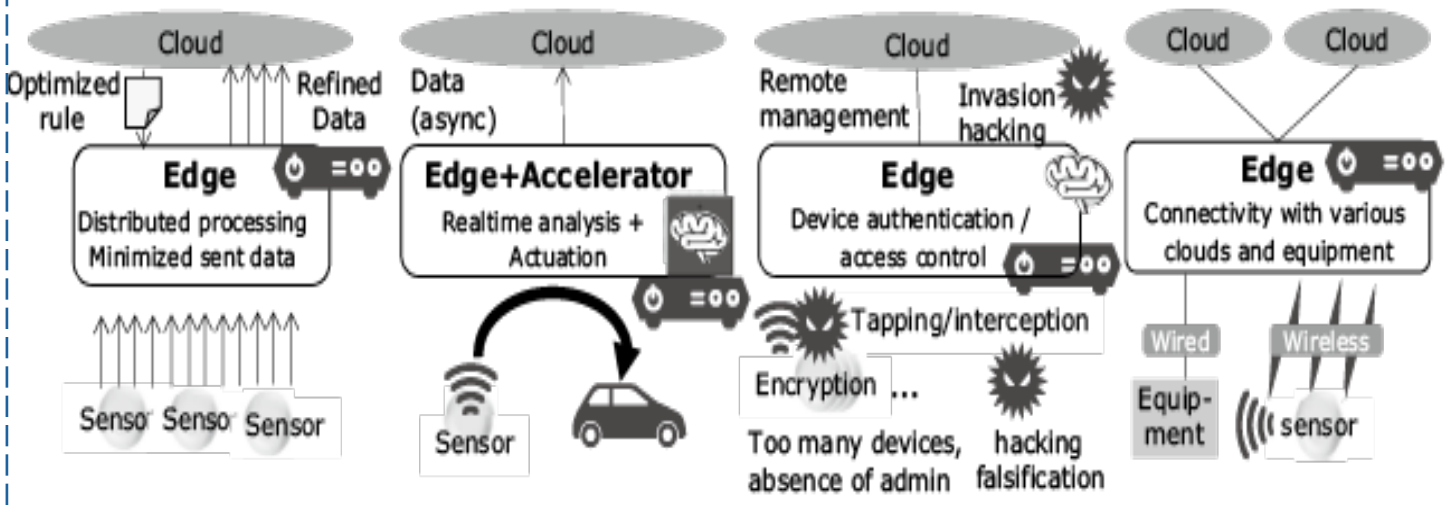
Advantages & Disadvantages

Efficient system resourses use

Real-time actuation

Security & Privacy Protection

Connectivity for High availability



Autonomous distributed coordination technology

Acceleration Technology

IoT Security Technology

Connectivity Technology

Standartization

Security

Deployment & Scalability

Management & Maintanance

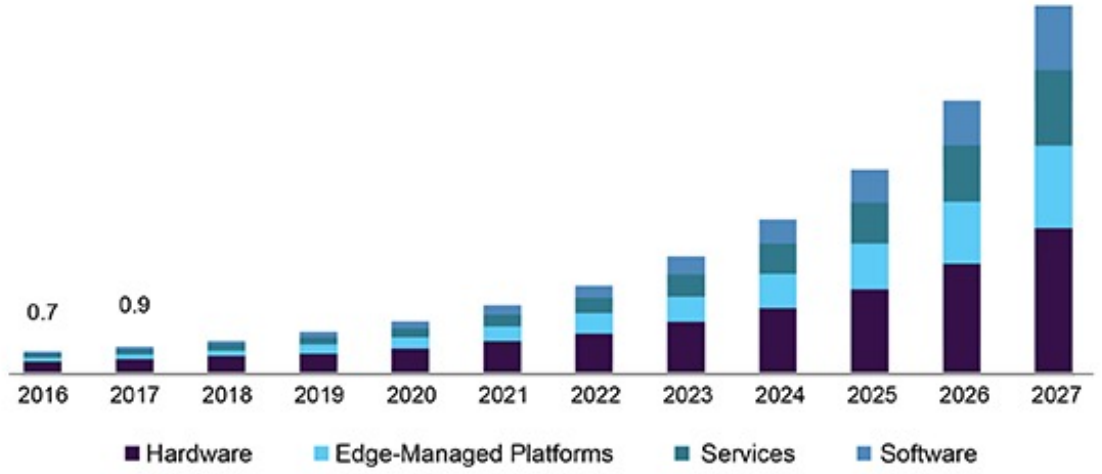
Investment (infra + design)

Business Model

Market Overview

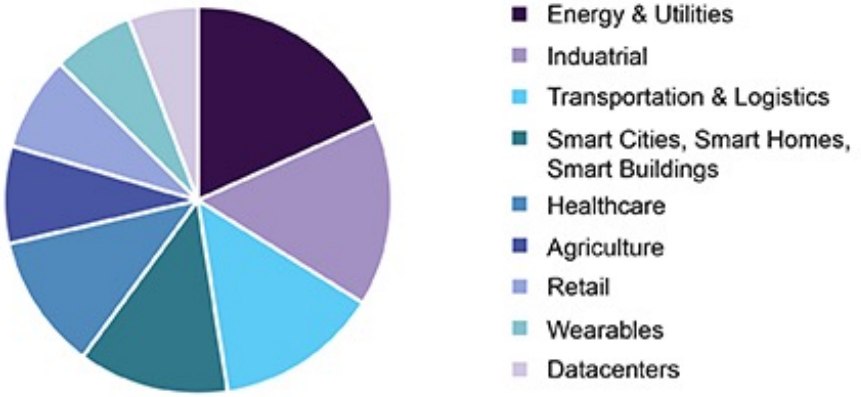
Edge Computing Market Worth $43.4 Billion By 2027 | CAGR: 37.4%

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



Source: www.grandviewresearch.com

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



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.

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–$11 B
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).

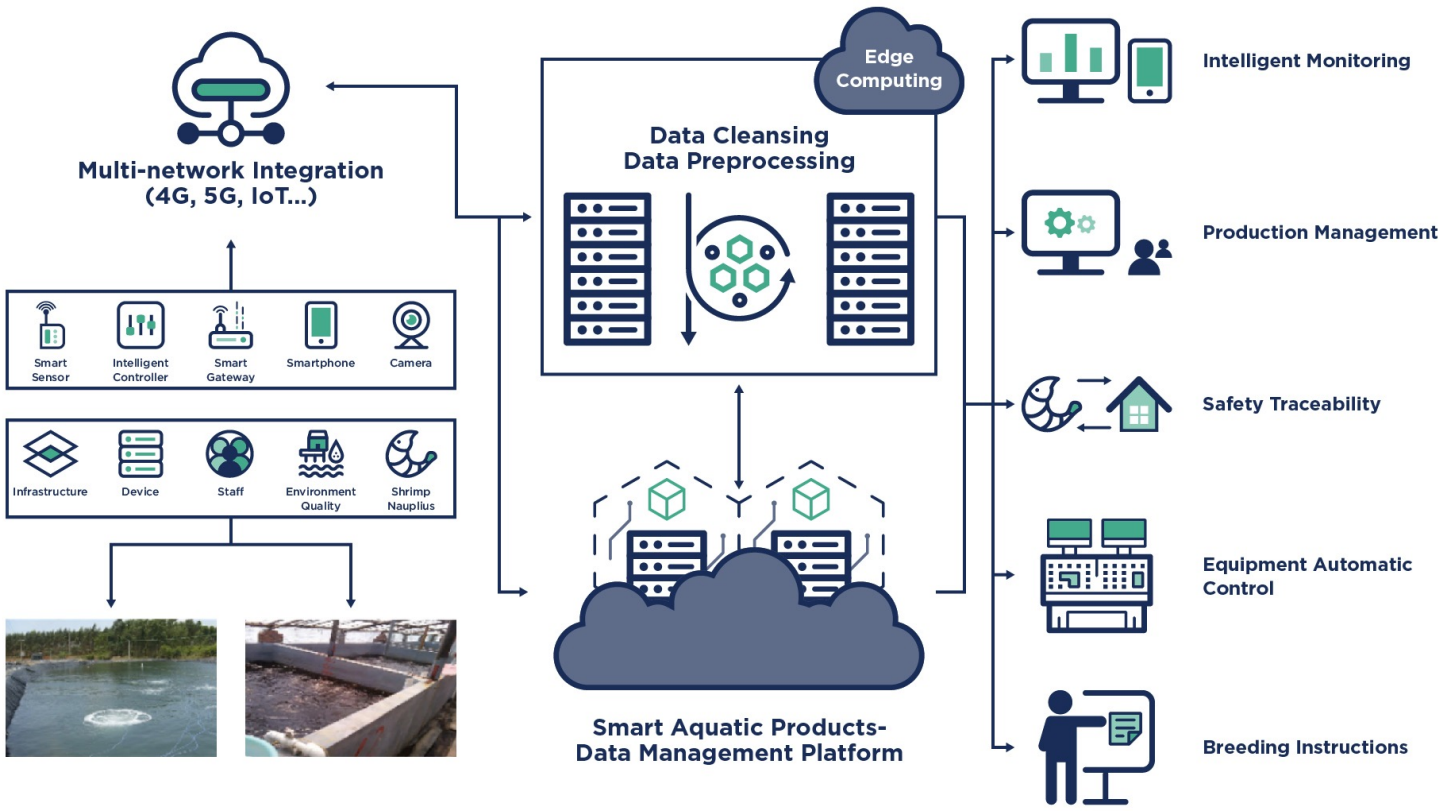
Multi Access Edge Computing

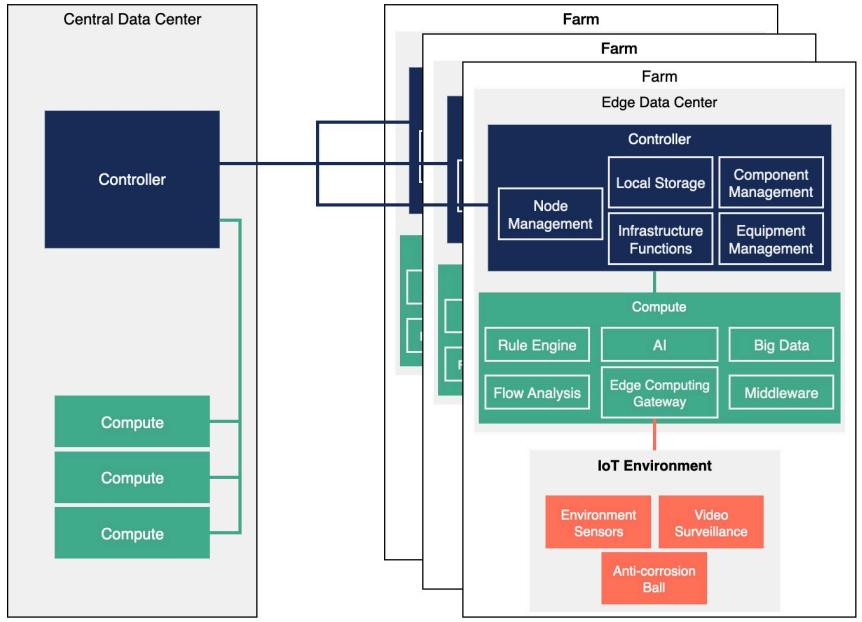
- Video Analytics
- Data Monitoring
- xIox (AIoT; IIoT; IoV etc)
- Data Cashing
- Advanced Analytics
- Location Services
- Optimized local content

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

Cross Vertical Project Example

Edge Computing for Intelligent Aquaculture





Source: OpenStack.org

EU Initiative Example

Concept → Framework → Project → Solution

IoT

IoV

IIoT

AIoT

Trust IoT

IoHT

Private

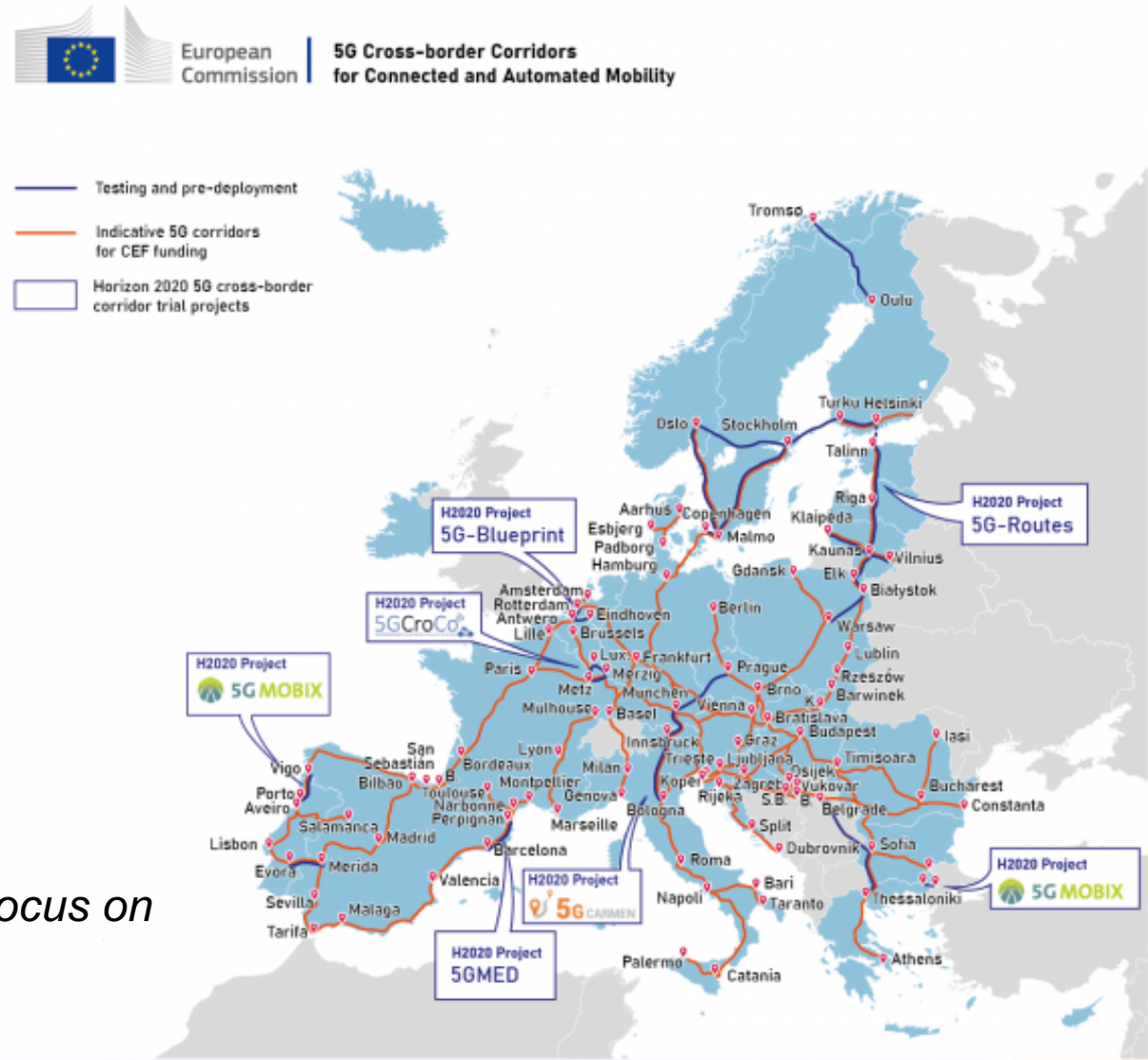
Gov-t

OpenSource

NVIDIA EGX™ AI Platform

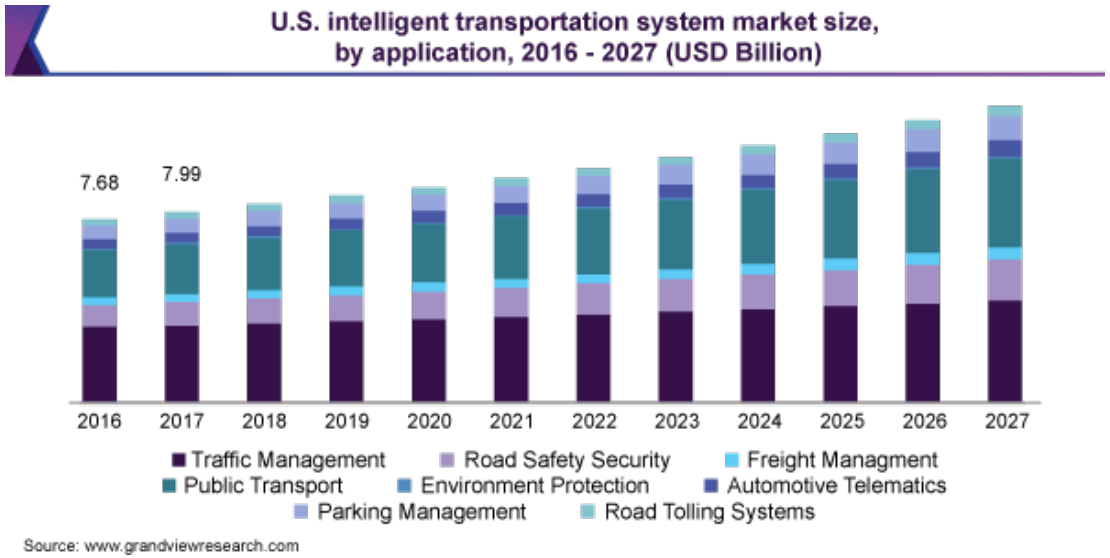
JHC Edge Tech

JHC Partnership Ecosystem

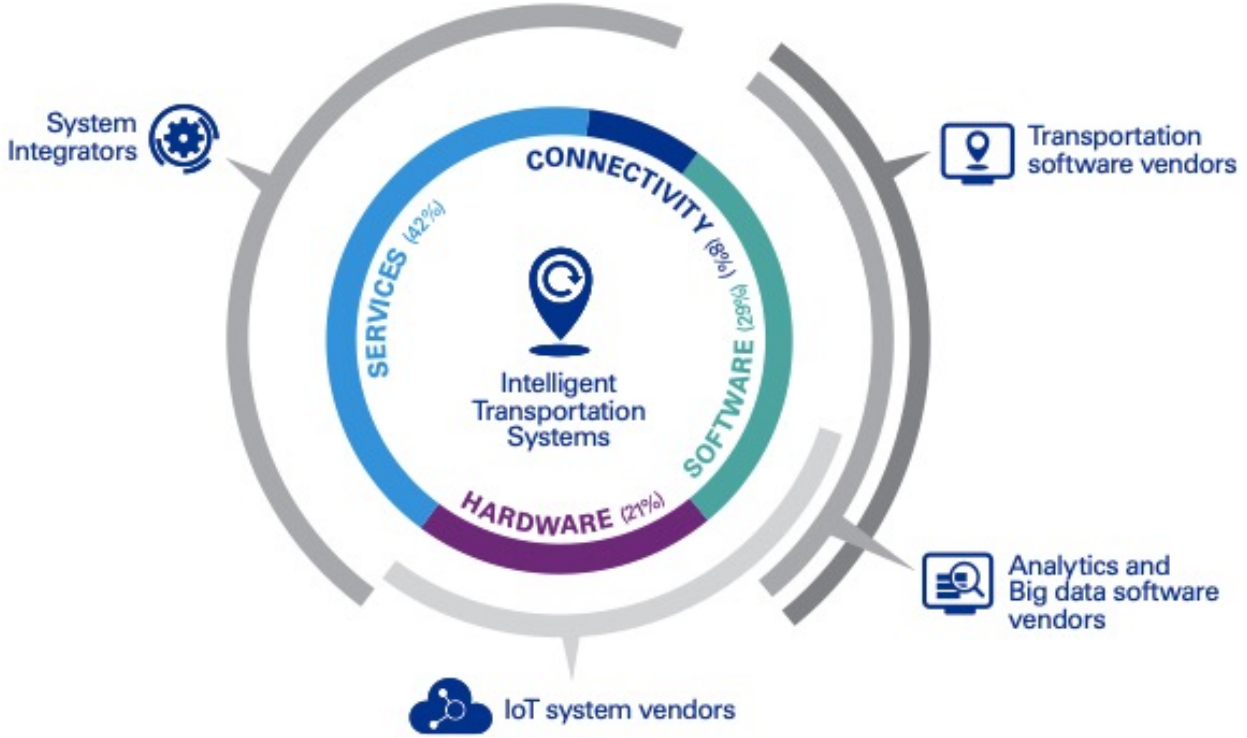


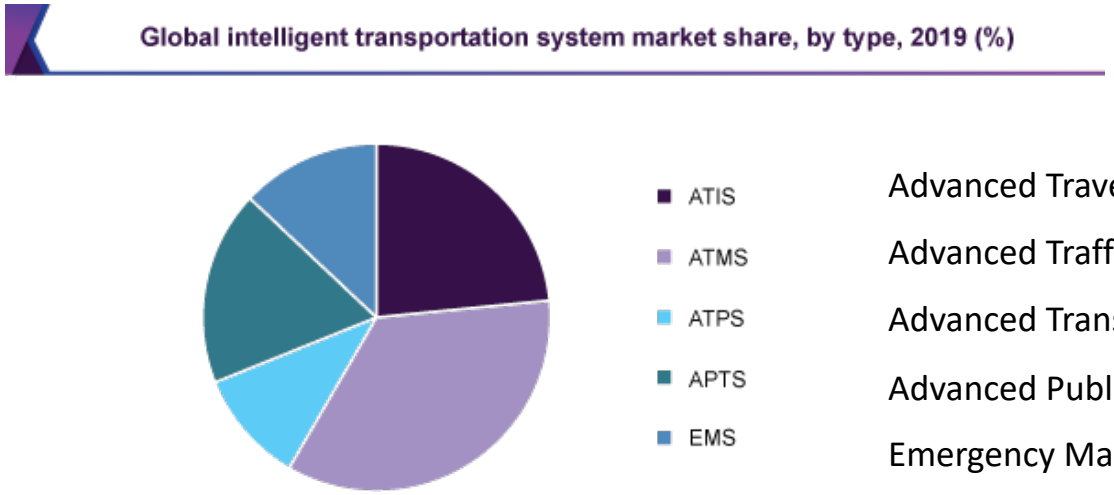
Europe boosts investment with €70 million in 5G with strong focus on connected transport by launching 11 new projects

Intelligent Transportation Market



Source: www.grandviewresearch.com





Source: www.grandviewresearch.com

Advanced Traveler Information System (ATIS)

Advanced Traffic Management System (ATMS).

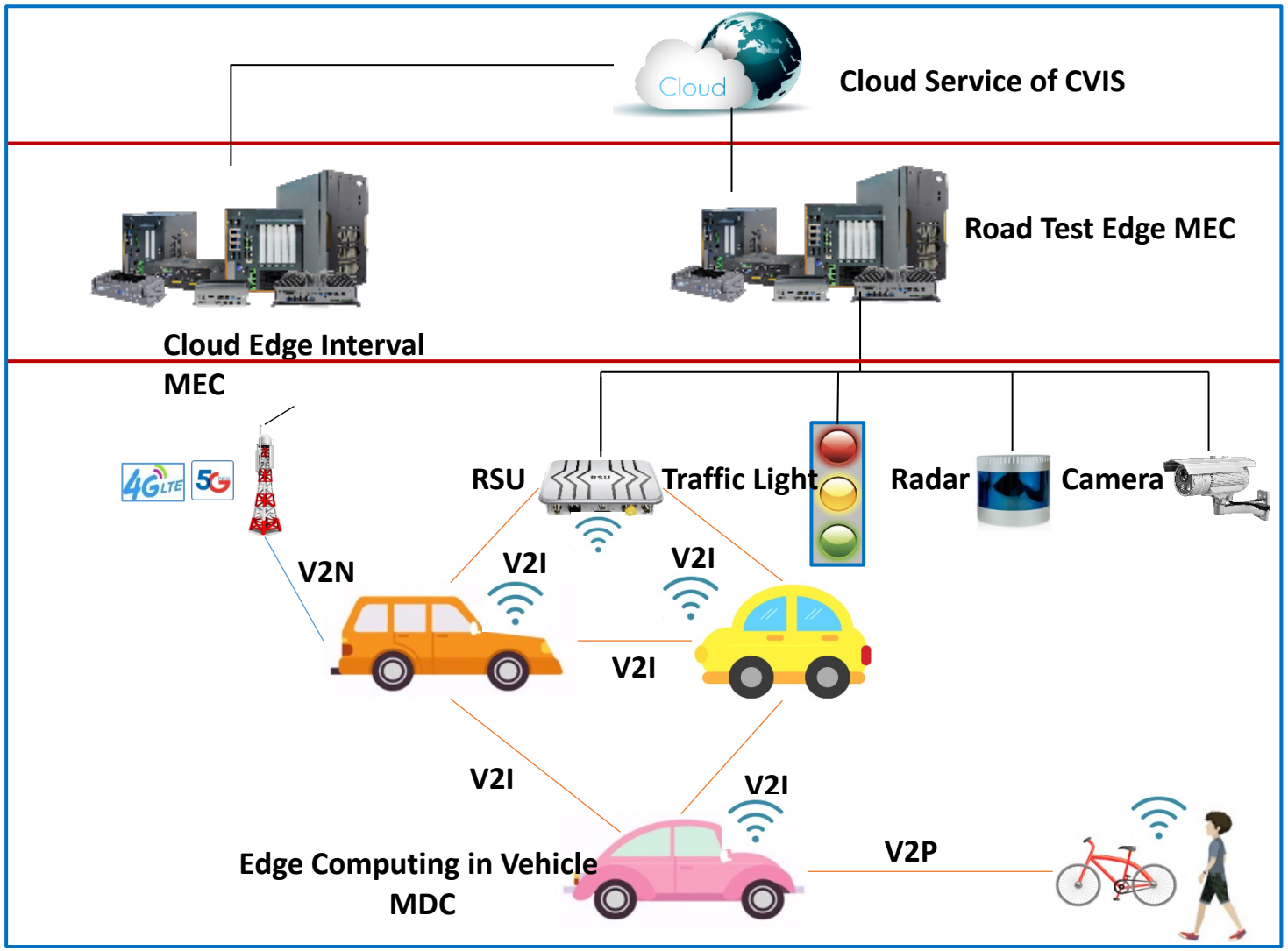
Advanced Transportation Pricing Systems (ATPS)

Advanced Public Transportation System (APTS)

Emergency Management System (EMS)

2 Applications & Case Scenarios

C-V2X System Architecture of Internet of Vehicles



C-V2X System Architecture of Internet of Vehicles

Expressways

- 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

City Road Level

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

Complete City wide solution

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

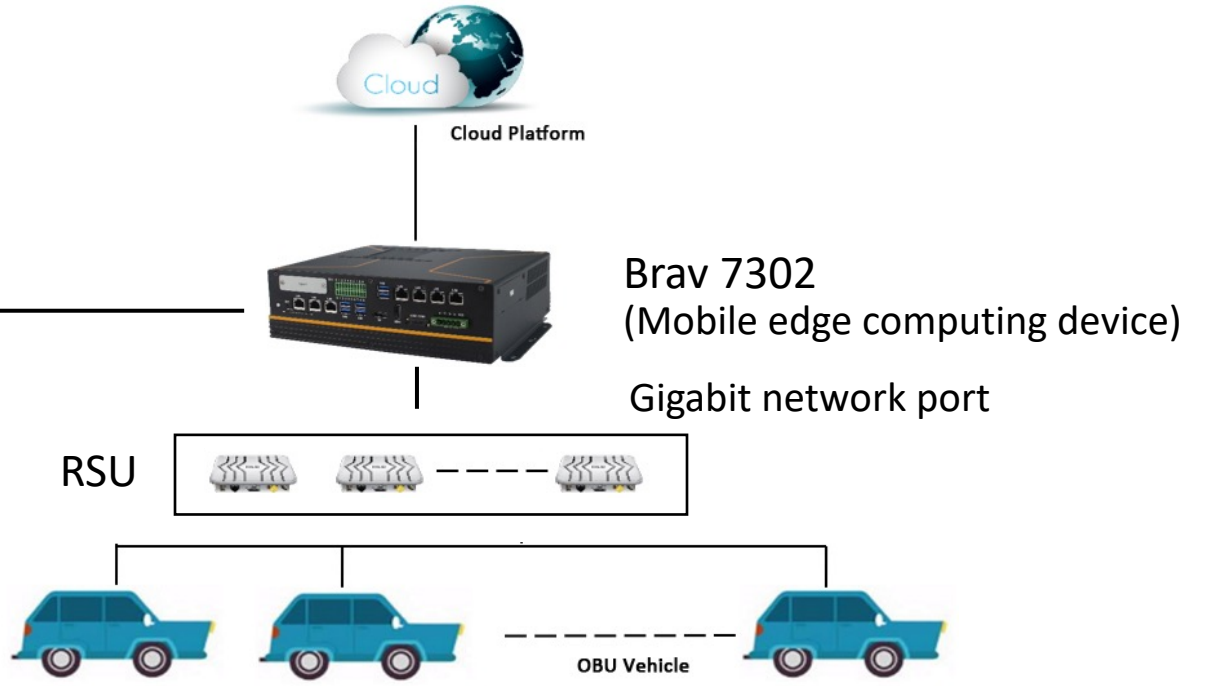
Optimizing urban traffic efficiency

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

Solution for CVIS*

Mobile Edge Computing

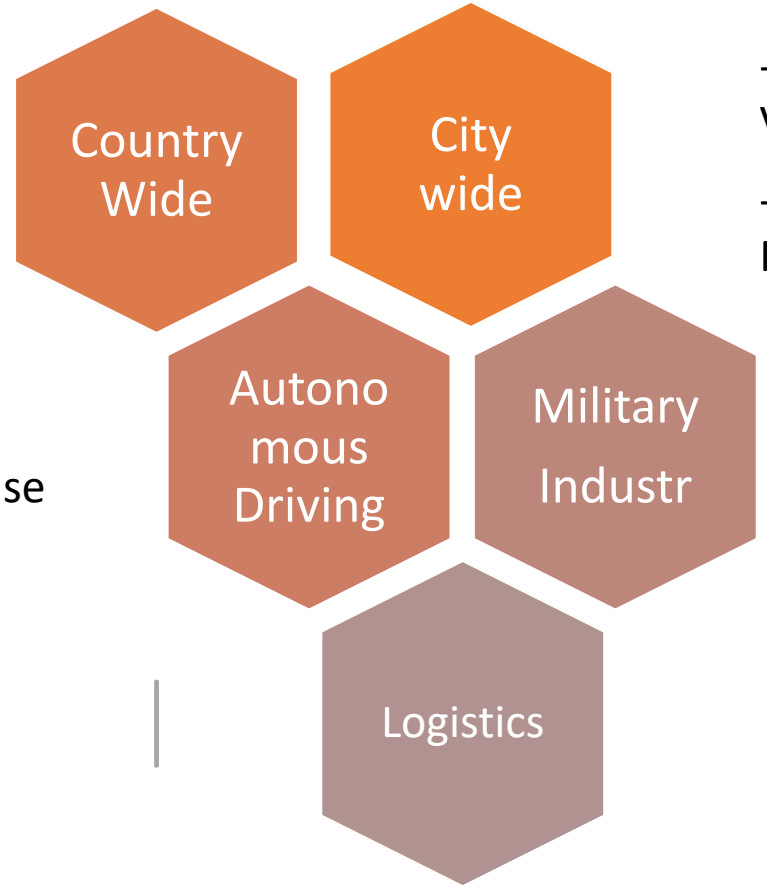
- PTZ camera
- Traffic Light
- Police Radar
- Gigabit netw.



*CVIS - Cooperative Vehicle-Infrastructure Systems

A few notable projects by JHC solution team

-Intelligent Traffic Network for Expressway
-Shandong Expressway Infra Project



-City Wide Internet of Vehicles Network set up

-Road Traffic Vehicle Real-time Monitoring Project

-Tourist Autonomous Driving Vehicle
-Advanced real time video analytics & response
-Autonomous Driving - Test Zone Projects

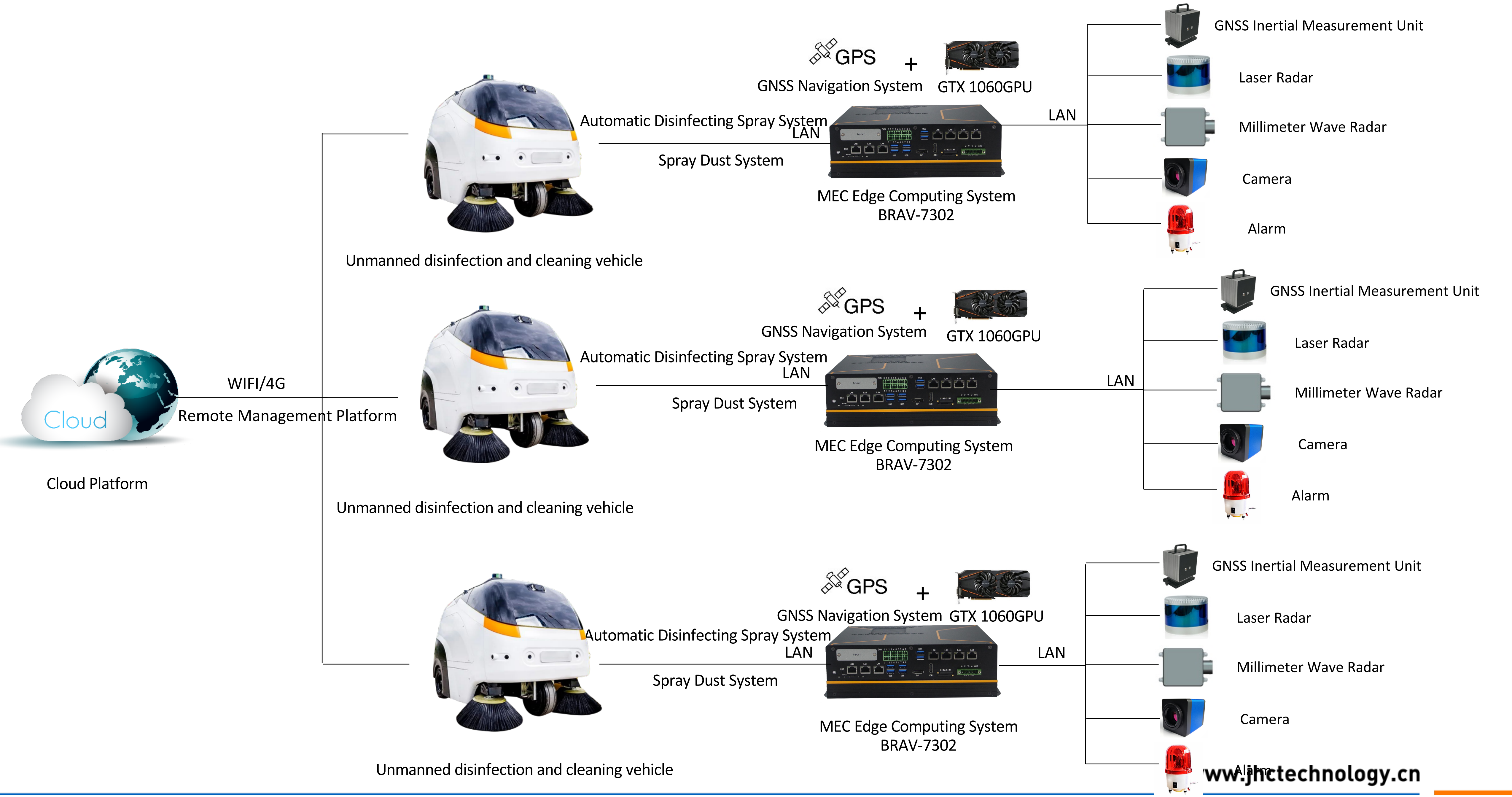
-Closed site Autonomous security robots
-Energy station surveilance vehicles

-Warehouse robotics projects
-Cold chain country wide logistics

JHCTECH and Harbin Institute of Technology to create Intelligent Environmental Protection Robots

----Application of MEC edge computing system BRAV-7302 in Disinfection and Sweeping Driverless Vehicle

LINK: http://www.jhctechnology.cn/sou_show.php?id=122&lm=20


GNSS Inertial Measurement Unit
Laser Radar
Millimeter Wave Radar
Camera
Alarm
GPS
GNSS Navigation System
+
GTX 1060GPU
LAN
Automatic Disinfecting Spray System
LAN
Spray Dust System
MEC Edge Computing System
BRAV-7302
Unmanned disinfection and cleaning vehicle
GPS
GNSS Navigation System
+
GTX 1060GPU
GNSS Inertial Measurement Unit
Laser Radar
Millimeter Wave Radar
Camera
Alarm
Automatic Disinfecting Spray System
LAN
LAN
Spray Dust System
MEC Edge Computing System
BRAV-7302
Cloud
WIFI/4G
Remote Management Platform
Cloud Platform
Unmanned disinfection and cleaning vehicle
GPS
GNSS Navigation System
+
GTX 1060GPU
GNSS Inertial Measurement Unit
Laser Radar
Millimeter Wave Radar
Camera
Alarm
Automatic Disinfecting Spray System
LAN
LAN
Spray Dust System
MEC Edge Computing System
BRAV-7302
Unmanned disinfection and cleaning vehicle

Project site example

Traffic monitoring system for congestion analysis and city-wide re-routing

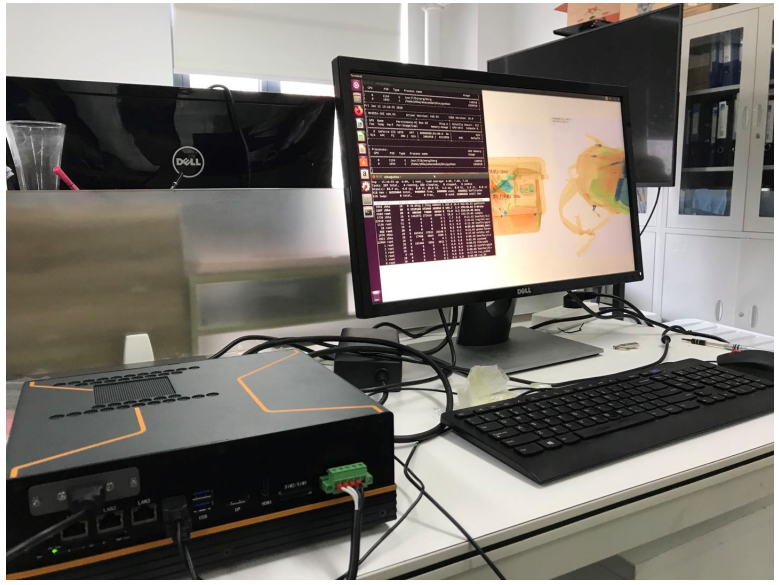


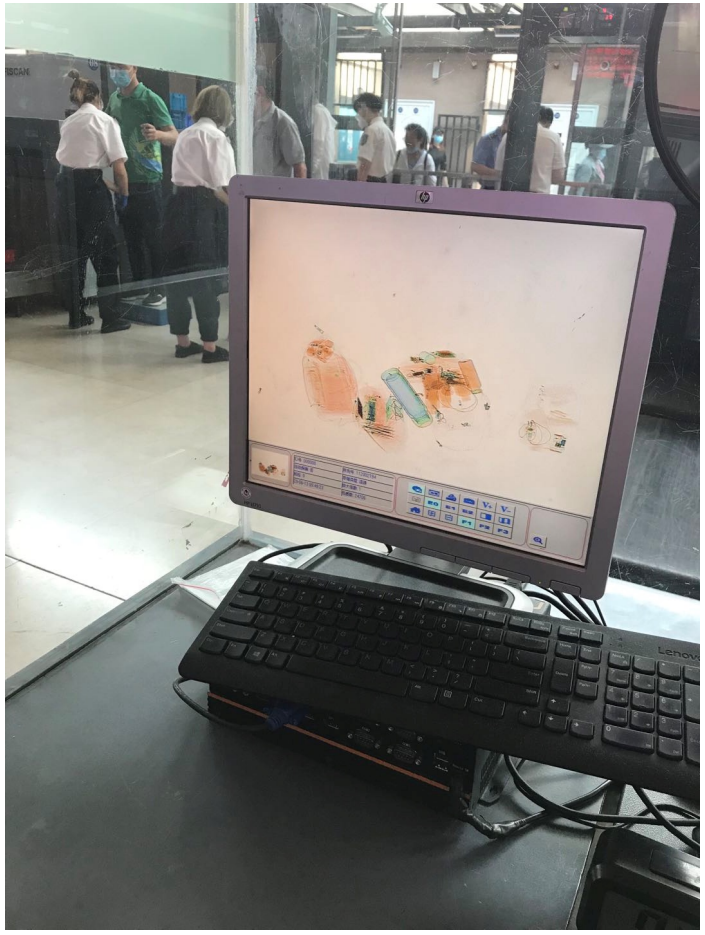

Railway station upgrades

Example – Beijing Railway Station project

1. Luggage & Person Scanners
2. Railway Station Video Surveialance
3. Railway Track monitoring and analytics (weather / issues / illegal activities)
4. Railway station ticket gates & Media termilans

- Cost Sensitive
- Integration of NEW software with Older systems
- High Security & Performance requirements



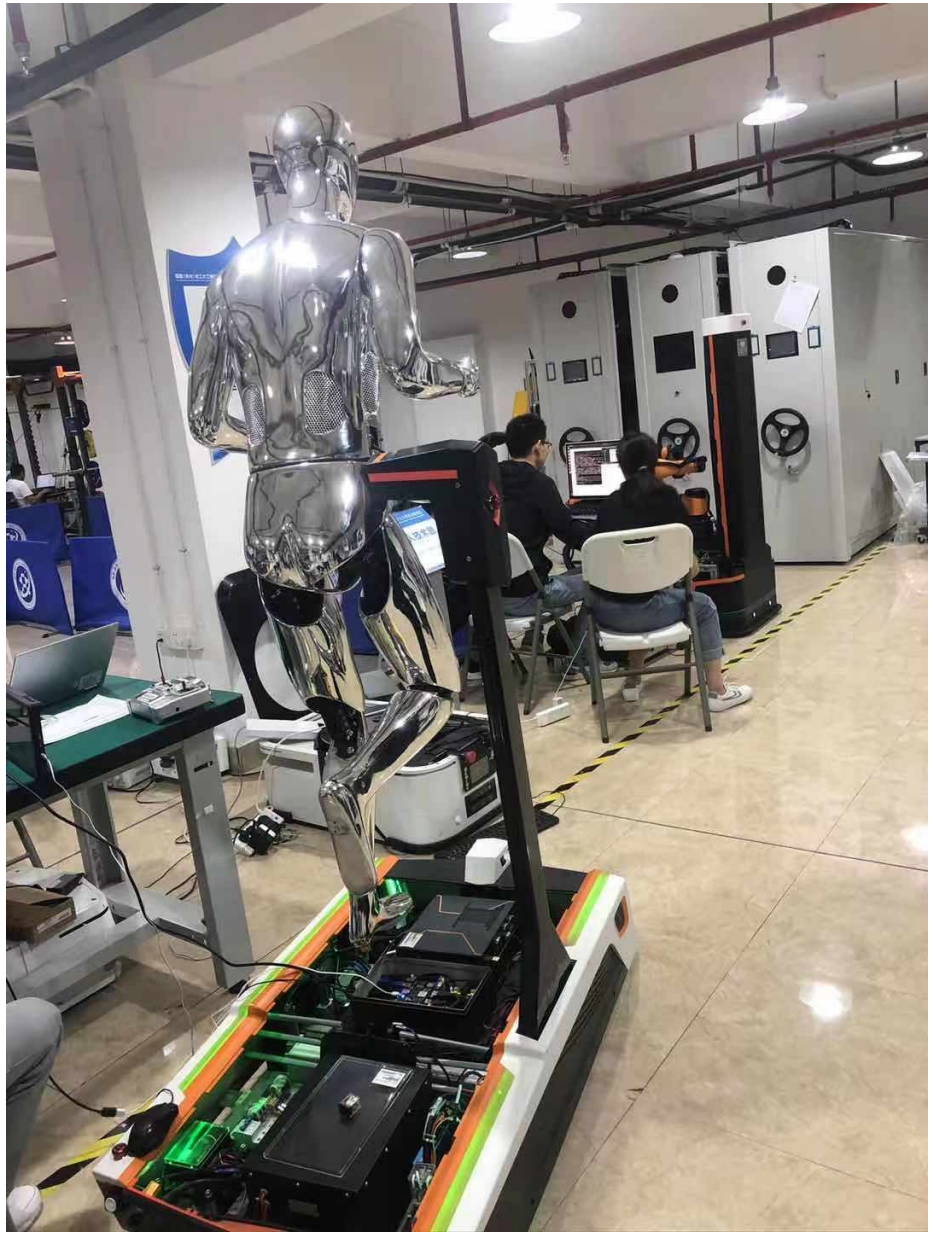


Video Based Fitness Training platform
International Athlete training

High Performance requirements

- 3D Motion Cameras
- Variaty of Sensors on the Machine & Wearables (accelerometers, HRV etc)
- Real Time Anaytics and Corrective suggestions
- INTEL EDGE

Example of the similar system (source. Marsystems)



3

BRAV Edge Solutions

BRAV Series Edge Computing

JHCTECH MEC product solution specification sheet							
No	Modle No.	CPU	AI Accelerator	AI hashrate	power dissipation	IO function	heat-dissipating method
Solution 1	KMDA-3602	Skylake/Kabylake-S series 4core	1*MXM Accelerator	16TOPS	65W	7*Gig LAN+4G	fanless BOX
	BRAV-7302		1*MXM Accelerator	128TOPS	175W	7*Gig LAN+4G	Air cooling heat dissipation BOX
Solution 2	BRAV-7201	Skylake/Kabylake-U series ULT dual core	1*MLU220-M.2	8TOPS	25W	5*Gig LAN+4G	fanless BOX
Solution 3	BRAV-7501	Coffeelake-S series 8 core	2*PCIeX16 Accelerator	264TOPS	225W	3*Gig LAN+4*10G LAN+4G	Air cooling heat dissipation BOX
Solution 4	BRAV-7520	Coffeelake-R series 8 core	1*PCIe/M.2 Accelerator	128TOPS	110W	3*Gig LAN+4*10G LAN+5G+4G	Active and passive heat dissipation BOX
	BRAV-7521	Coffeelake-R series 8 core	2*PCIe/M.2 Accelerator	264TOPS	195W	3*Gig LAN+4*10G LAN+5G+4G	Active and passive heat dissipation BOX
Solution 5	BRAV-7601	Comet lake/Rocket lake series 10core	MXM3.1 Accelerator	128TOPS	145W	3*Gig LAN+4*10G LAN+5G+4G	Active and passive heat dissipation BOX

Product feature

Compact Size | Multiple Cards | Low Power consumption | Low Latency | intel ARRIA 10 inside | intel ENPIRION inside | intel IoT Solutions Alliance

intel MOVIDIUS | NVIDIA

AIot Multiple Architecture

X86+AI Architecture

AI Accelerator

Support different levels of numeracy

Intel® X86 CPU

Flexible Support Core/Xeon

Efficient Heat Dissipation+Modularization

Workstation Grade Performance

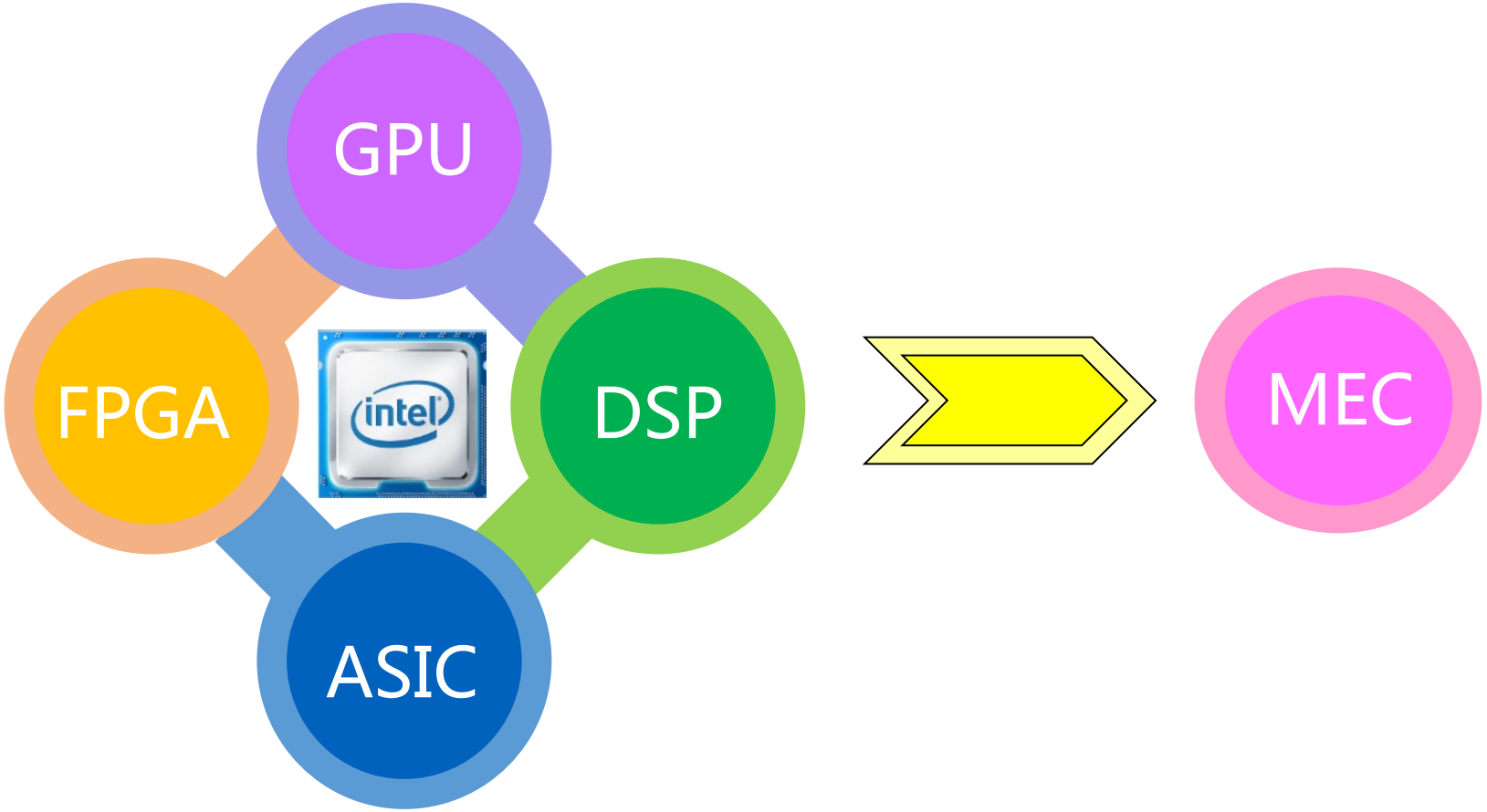
Industrial Grade Reliability

GPU Air Duct

CPU Air Duct

AIoT Architecture

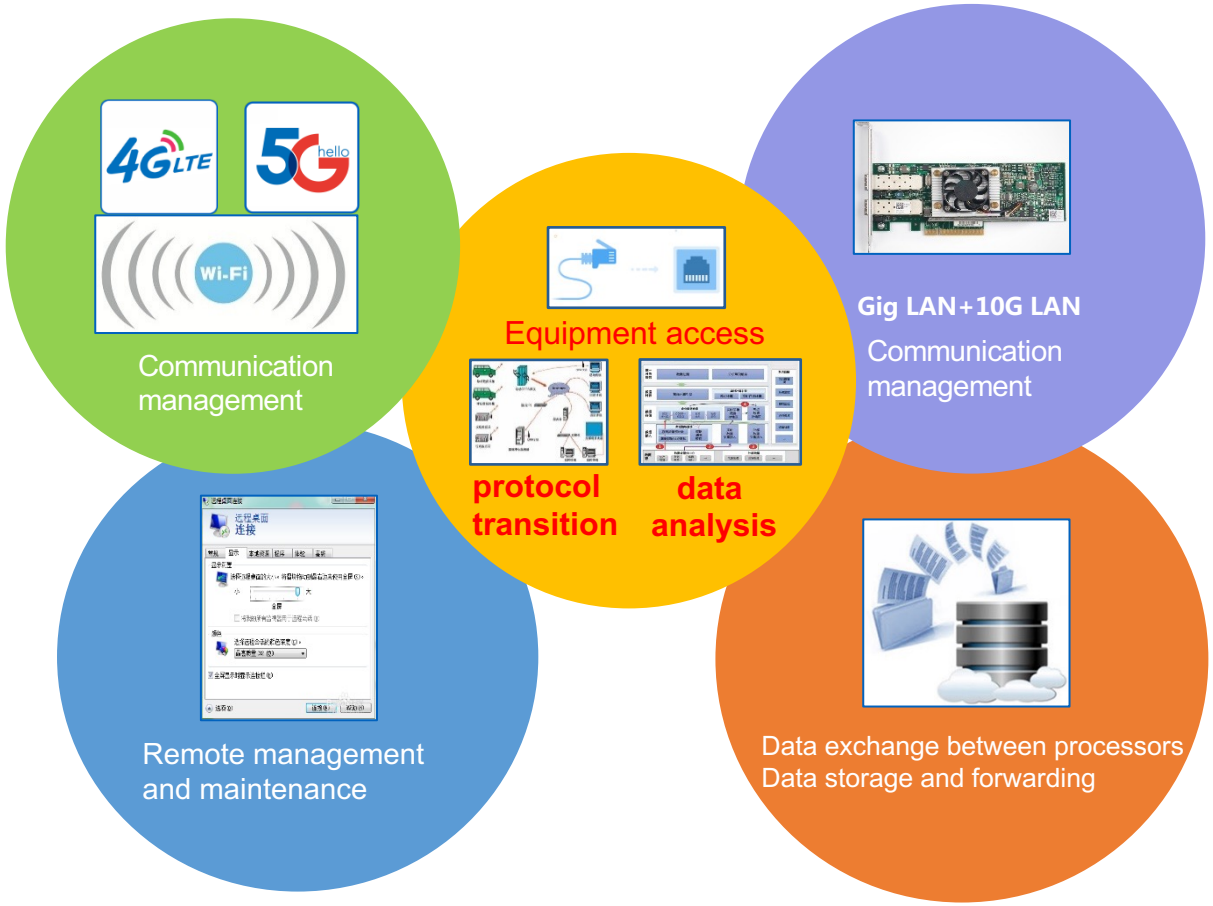
- Intel X86 The common processor serves as the infrastructure
- GPU、FPGA、DSP and ASIC Coprocessors act as heterogeneous architectures for accelerated computing

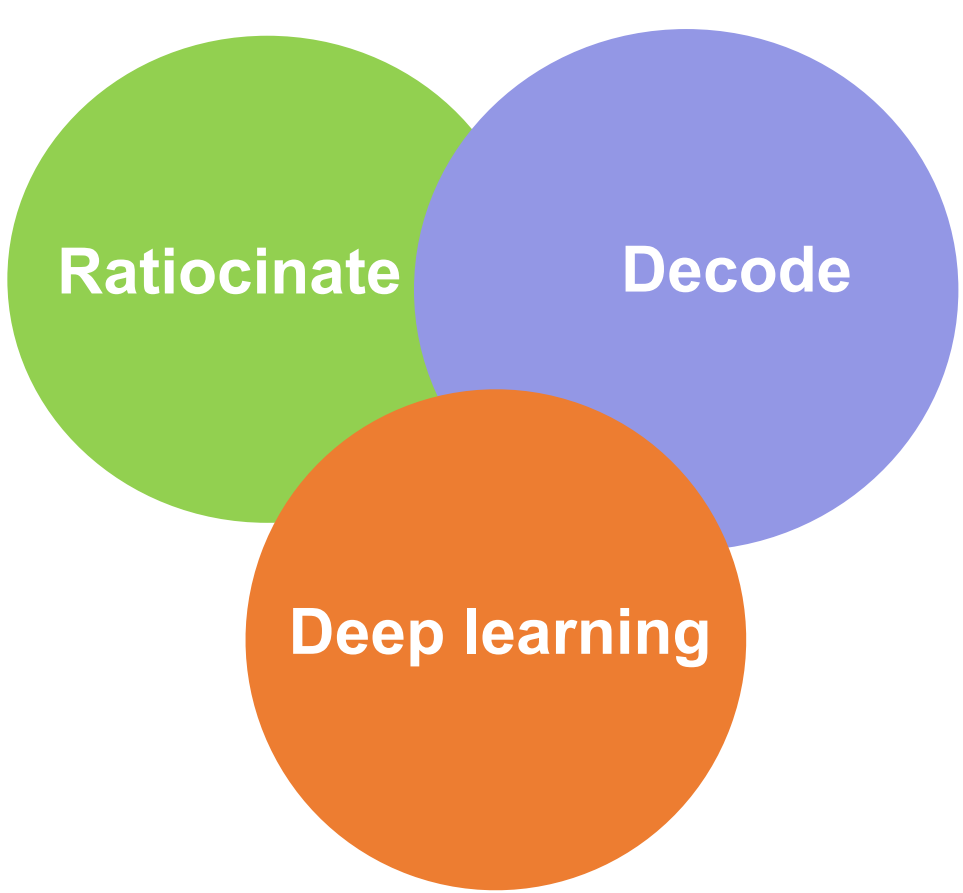


JHCTECH MEC function

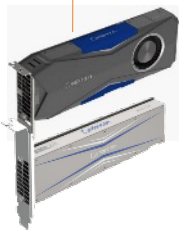
Intel® X86 CPU
Support Core/Xeon

AI Accelerator
Supports different calculation force levels



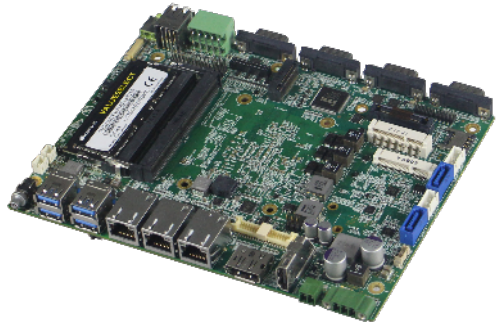


JHC AIoT combo offers

Sky/kabylake-U	Sky/kabylake-S	Sky/kabylake-S	Coffeelake-R	Coffeelake-R
				 
M.2 Accelerator	MXM Accelerator	MXM Accelerator	PCIe Accelerator	M.2 PCIe Accelerator
				 
BRAV-7201 Fanless Box Computer	KMDA-3602 Fanless In-Vehicle Computer	BRAV-7302 Edge Computing System	BRAV-7520 Edge Computing System	BRAV-7501 BRAV-7521 Edge Computing Workstation

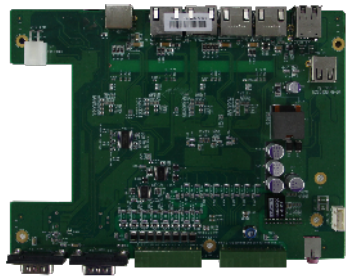
X86 general-purpose processor is used as the basic architecture, and Cambricon's MLU220 and MLU270 smart accelerator cards are used as the accelerated computing architecture

Skylake/Kabylake-U+M.2 Accelerator



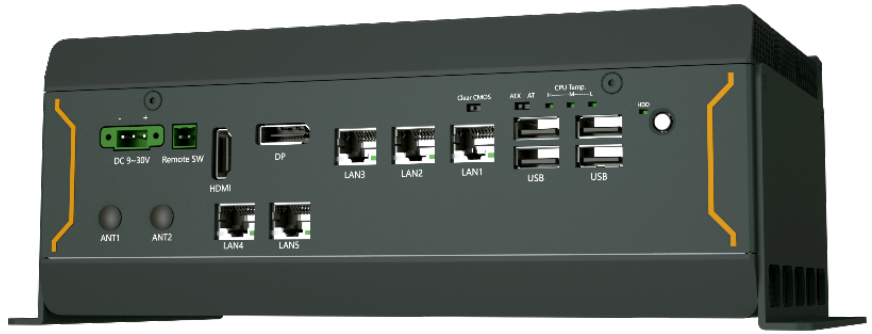
STX-I902 Mainboard

4G Module



ECB-158 Daughter card

M.2 Accelerator

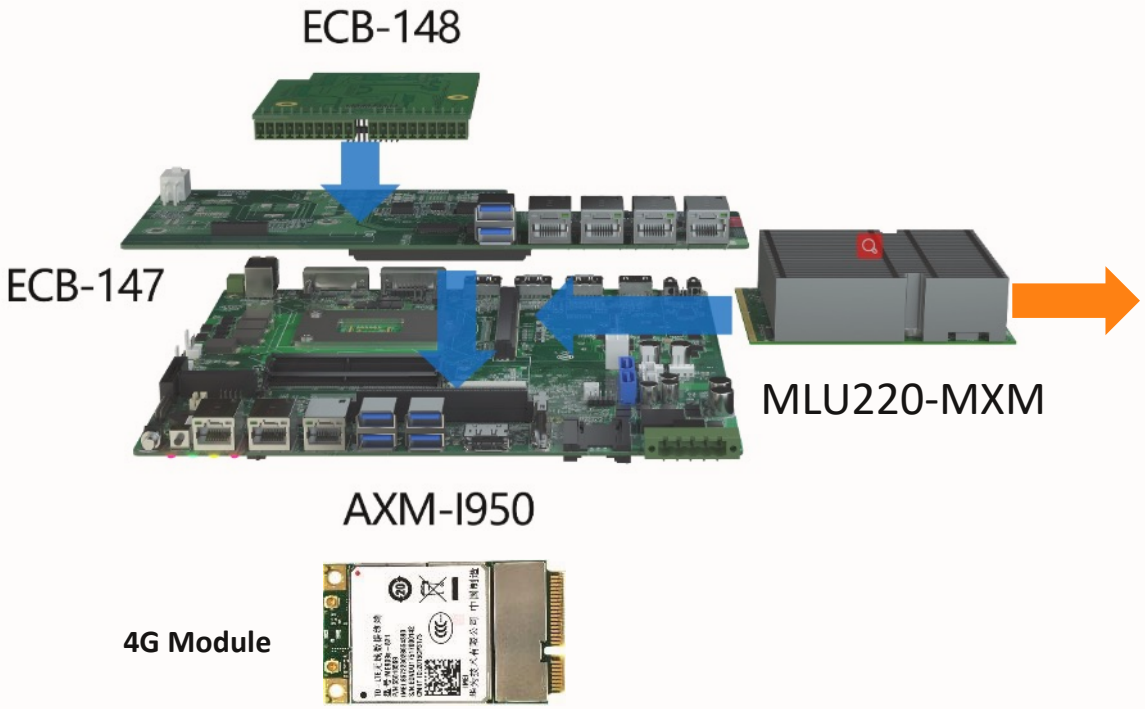


Fanless Box Computer
BRAV-7201

ULT Dual Core CPU + 8 TOPS Computing Power, High Energy Efficiency 25W TDP, Full IO Function (5 Gigabit Network + 4G), Compact Fanless Box

It is widely used in artificial intelligence, machine vision and robot industries

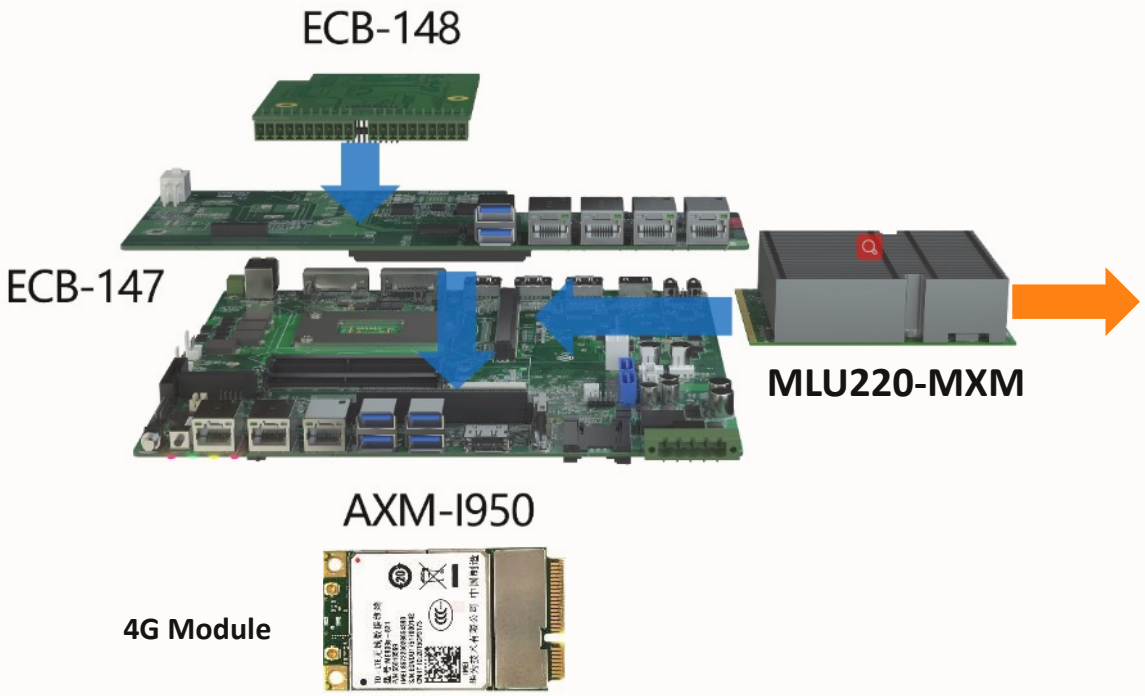
Skylake/Kabylake-S+MXM Accelerator



Fanless In-Vehicle Computer
KMDA-3602

4-Core CPU + 16 TOPS Computing Power, High Energy Efficiency 55W TDP, Rich IO Functions (7 Gigabit Network + 4G), Fanless Box

Skylake/Kabylake-S+MLU220-MXM



Edge Computing System
BRAV-7302

4-Core CPU + 16 TOPS Computing Power, High Energy Efficiency 85W TDP, Rich IO Functions
(7 Gigabit Network + 4G), Air-cooled Cooling Box

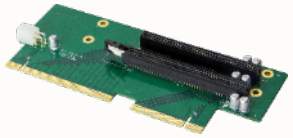
Coffeelake-R +MLU270-S4

AXM-I960 Mainboard

4G Module

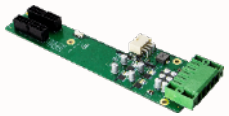
5G Module

10 Gigabit Optical Port Card



ECX-255

ECB-9600



OFX-1000

MLU270-S4(F4)

Edge Computing System
BRAV-7520

8-Core CPU + 128 TOPS Computing Power, High Energy Efficiency 110W TDP, Comprehensive IO Function (3GB + 40,000 + 5g + 4G), Active and Passive Cooling Box

Coffeelake-R+2*MLU270-S4 + MLU220-M.2

AXM-I960 Mainboard

4G Module

5G Module

10 Gigabit Optical Port Card

ECX-254

ECB-9600

OFX-1000

MLU220-M.2

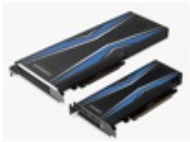
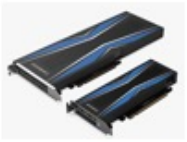
2*MLU270-S4(F4)

Edge Computing Workstation

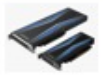
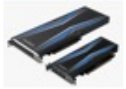
BRAV-7521

8-Core CPU + 264 TOPS Computing Power, 195W TDP, Rich IO Functions (3GB + 40,000 + 5G + 4G), Active and Passive Cooling Box

Accelerators Supported by BRAV Series

Modle	GTX-1080Ti	GTX-1660	RTX-2060	RTX-2070	RTX-2080Ti	
NVIDIA GeForce						
NVIDIA Quadro	P1000	P2000	P4000	P5000	P6000	RTX-4000/5000/6000/8000
						
NVIDIA MXM	1060M/1070M	GTX-1650/1660	P3000/P5000	EGX-MXM-RTX3000	EGX-MXM-RTX5000	EGX-MXM-T1000/T2000
						
Intel FPGA	Mustang-F100-A10			Intel VPU	Mustang-V100-MX8	
						
Cambricon 寒武纪 Accelerator Card	MLU100-C AI Accelerator Card		Siyuan 270 AI Accelerator Card		Siyuan 220 AI Accelerator Module		JHC AI Accelerator Module
	MLU100-C	MLU100-D	MLU 270-S4	MLU 270-F4	System On Module (SOM)	MLU220-M.2	MLU220-MXM
							

Cambricon AI Accelerators SPEC

Cambricon full series AI accelerator card	Cambricon Siyuan 100 Smart Accelerator Card		Cambricon Siyuan 270 Smart Accelerator Card		Cambricon Siyuan 220 Edge Computing Module		JHC AI Acceleration Module
	MLU100-C	MLU100-D	SY270-S4	SY270-F4	System On Module (SOM)	MLU220-M.2	MLU220-MXM
							
Type	Cloud Smart Accelerator Card	Cloud Smart Accelerator Card	Cloud Smart Accelerator Card Data Center level	Cloud Smart Accelerator Card Data Center level	Edge End Intelligent System Module	Edge End Smart Accelerator Card	AI Acceleration Module
RAM	8GB/16GB	8GB/16GB	16GB DDR4	16GB DDR4	LPDDR4x 64bit, 4GB	LPDDR4x 64bit, 4GB	8GB, LPDDR4x 64bit
AI Computing Power (FP16)	16 TFLOPS (Dense) / 64 TFLOPS (Sparse)						
AI Computing Power (INT8)	32 TOPS (Dense) / 128 TOPS (Sparse)		INT8The theory of peak/TOPS: 128	INT8The theory of peak /TOPS: 128	16TOPS (INT8)	8TOPS (INT8)	16TOPS (INT8)
Codec capability	available	Not available	80 H.264, 2.5x performance improvement New JPEG codec, decoding performance up to 2500 frames per second	80 H.264, 2.5x performance improvement New JPEG codec, decoding performance up to 2500 frames per second	Support H.264, HEVC (H.265), VP8, VP9 JPEG decoding, maximum picture resolution 8192 x 8192	Support H.264, HEVC (H.265), VP8, VP9 JPEG decoding, maximum picture resolution 8192 x 8192	Support H.264, HEVC (H.265), VP8, VP9 codec JPEG, maximum picture resolution 8192 x 8192B Decoding performance 820fps@FHD Encoding performance 800fps@FHD
Interface	x16 PCIe Gen.3	x16 PCIe Gen.3	x16 PCIe Gen.3	x16 PCIe Gen.3	PCIe3.0 1X4 or 2X2, EP or RC; SDIO3.0	M.2 2280, B+M key (PCIe3.0 X2)	MXM 3.1 (PCIe3.0 X2)
Shape	Full height and full length, single slot	Half height and half length, single slot	Half height and half length, single slot	Full height, full length, double slots	87X50mm	Length 80mm, width 22mm, height 7.3mm (no heat dissipation) /21.3mm (with heat dissipation)	Length 82mm, width 70mm (without radiator)
Heat Dissipation	Passive cooling	Passive cooling	Passive cooling	Active cooling	Active cooling	Passive cooling	Passive cooling
Power consumption	110W	75W	150W (160W TBP)	70W		8.25W	16.5W
Core Advantages	Good versatility High energy efficiency and high reliability Perfect software development environment		New Cambricon MLUv02 architecture Inference performance goes a step further Computing flexibility and programmability		Small size, can provide excellent performance and energy efficiency Can realize independent embedded system scheme Embedded system Introducing modern AI, deep learning and reasoning in a highly efficient manner	High data security: local intelligent data processing, desensitization upload Processing low latency: real-time data analysis, real-time feedback of results High bandwidth utilization: data edge cleaning, intelligent distribution, and effective upload	Cambricon MLUv02 architecture Small head big smart Computing flexibility and programmability
Application	Cloud reasoning, supporting highly diversified artificial intelligence applications such as vision, speech, natural language processing, and traditional machine learning		Supports diverse artificial intelligence applications such as vision, speech, natural language processing, and traditional machine learning		Suitable for a large number of edge computing applications, such as AI network video recorders (NVR), smart control and smart quality inspection in the field of smart manufacturing, and autonomous mobile robots (AMR), etc.	It can be widely used in edge computing scenarios such as smart transportation, smart grid, smart manufacturing, smart finance, and drones. Supports diversified artificial intelligence applications such as vision, voice, natural language processing, and traditional machine learning, and realizes edge-end intelligent solutions for various services.	Can be widely used in mobile edge computing applications such as robotics, machine vision, artificial intelligence, etc.

BRAV 7302

Key Specification

- CPU and GPU fan cooling, independent air passage Intel®
- Kabylake-S/Skylake-S Core I3/I5/I7 CPU 2*DDR4
- 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

RoHS COMPLIANT 2002/95/EC CE FCC

Wide 6~48V DC Power | NVIDIA GEFORCE GTX | 4K Ultra HD | 4G LTE | RAID

BRAV 7501

Key Specification

- Intel® Xeon® E or 9th/8th-Gen Core™ i7/i5/i3 processor
- Intel® Q370/C246 Chipset
- 4*DDR4 2400/2666MHz DIMM, Up to 128GB
- 2*DP+1*HDMI, Support 3 independent displays
- 3*LAN, 4*USB3.1, 2*COM, 8-bit DIO
- 1*PCIeX16 or 2*PCIeX8 +2*PCIeX4 expansion
- 1*Mini PCIe & SIM slot, support 4G/WiFi/GSM/BT
- 2/4*SATA3,1*M.2 2280 M-Key(NVMe)
- Support AMT12.0, Intel® iVpro and TPM2.0
- ATX 600W Power supply

BRAV 7520

Key Specification

- Intel coffee lake-r 8-core CPU has no fan passive cooling design, and the accelerator card adopts high-efficiency air duct active cooling design. The two cooling methods are independent, efficient and stable;
- Q370 or c246 chipset, CPU flexibility optional core and Xeon 468 core;
- Maximum 128GB ECC or non ECC DDR4 dual channel low-voltage memory;
- M. 2 2280m key nvme high-speed system disk and 2 * 2.5 "sata3 data storage disk support RAID 0 / 1. The system disk data disk is separated independently to ensure system stability and data security;
- It can support a 128tops computing power accelerator card to realize training + reasoning operation;
- Dual i210 Gigabit Network + Dual 10G Optical interface network card, multi-channel ultra-high bandwidth network, 80 channel edge side network sensing signals (network ultra-high definition camera, lidar and RSU) can be accessed at the same time, and 10g forwarding and uploading bandwidth can be guaranteed on the upper side ；
- I219lm network port supports iamt12.0, vPro technology and RM view software for remote management;
- At the same time, it supports 5g and 4G wireless networks, as well as Gigabit WiFi 6 and high bandwidth wireless networks;
- 1000W DC power supply design, to ensure a 350W accelerator card full load power supply needs;
- Expand the backplane for independent auxiliary power supply design, single pciex16 can support 75W power supply at most, and ensure the power supply stability of accelerator card without auxiliary power supply;
- The internal PCB components to the hard disk box are modular docking, and the acceleration card is reinforced with flexible and extensible strips. The main bracket of the case is made of 1.5mm SGCC steel plate. The whole system is solid and reliable with good seismic resistance;
- Foldable handle, ergonomic design, easy to transfer;
- The fan and dust screen cover can be removed without dismantling the machine to clean the dust and replace the fan, which is convenient for on-site maintenance.

RoHS COMPLIANT 2002/95/EC CE FCC

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

BRAV 7521

Key Specification

- Intel coffee lake-r 8-core CPU has no fan passive cooling design, and the accelerator card adopts high-efficiency air duct active cooling design. The two cooling methods are independent, efficient and stable;
- Q370 or c246 chipset, CPU flexibility optional core and Xeon 468 core;
- Maximum 128GB ECC or non ECC DDR4 dual channel low-voltage memory;
- M. 2 2280m key nvme high-speed system disk and 2 * 2.5 "sata3 data storage disk support RAID 0 / 1. The system disk data disk is separated independently to ensure system stability and data security;
- It can support a 128tops computing power accelerator card to realize training + reasoning operation;
- Dual i210 Gigabit Network + Dual 10G Optical interface network card, multi-channel ultra-high bandwidth network, 80 channel edge side network sensing signals (network ultra-high definition camera, lidar and RSU) can be accessed at the same time, and 10g forwarding and uploading bandwidth can be guaranteed on the upper side ；
- I219lm network port supports iamt12.0, vPro technology and RM view software for remote management;
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- The fan and dust screen cover can be removed without dismantling the machine to clean the dust and replace the fan, which is convenient for on-site maintenance.

Competitive Product Analysis

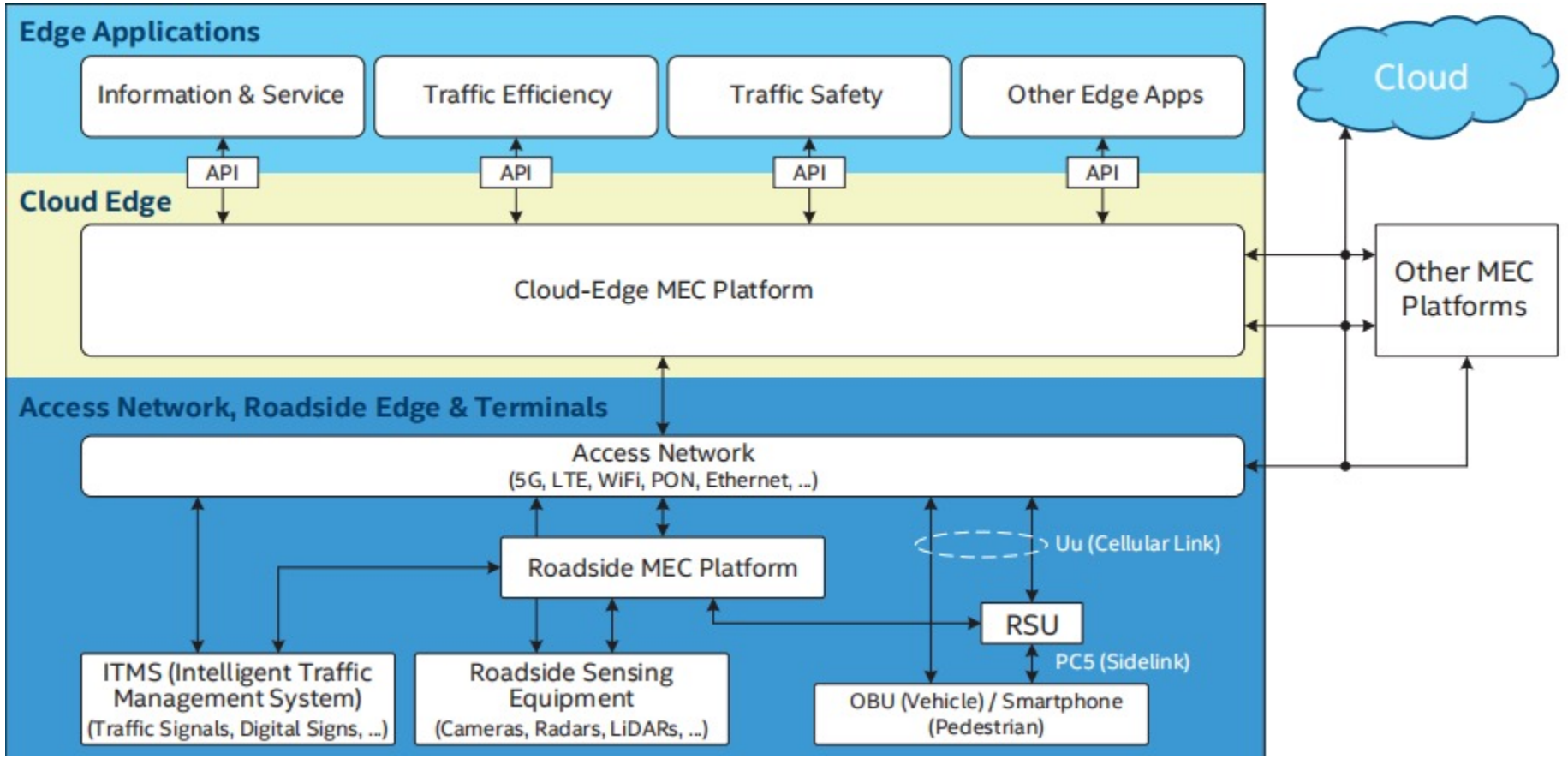
Brand	Vecow		Neousys		Advantech	JHC
Model	RCX-1500	GPC-1000	nuvo-8208gc	Nuvo-8108GC	MIC-770+75G30	**BRAV-7520/7521**
CPU	Intel® Xeon® E or Core i7/i5/i3 CPU C246PCH	Intel® Xeon® E or Core i7/i5/i3 CPU C246PCH	Intel® Xeon E/8th/9th-Gen CPU C246PCH	Intel® Xeon® E and 8th/ 9th-Gen CPU C246PCH	Intel® 8th/9th Generation Core™ i Desktop CPU Q370/H310 PCH	**Intel® Xeon® E or Core 9th/8th-Gen CPU C246PCH&Q370 PCH**
LAN	2	2	2	2	2	**3**
5G	Not available	Not available	Not available	Not available	Not available	**M.2 3052 B-key support 5G module**
Extension	2*Full size mini PCIe 1*M.2 E-key 2*PCIeX8 1*PCIeX4 1*PCIeX1	2*Full size mini PCIe 1*M.2 E-key 1*PCIeX16 2*PCI	2*Full size mini PCIe 1*M.2 B-Key 2x PCIe x8 slot 2x PCIe x4 slot 1x PCIe x1 slot	2*Full size mini PCIe 1*M.2 B-Key 2x PCIe x8 slot 2x PCIe x4 slot	2*PCIe X8 1*PCIe X4	**1*Full size mini PCIe 1*M.2 E-key 1*M.2 B-Key 3052,support 5G 2*PCIe X8 2*PCIe X4**
Any auxiliary power supply for PCIe expansion slots	None	None	None	None	None	**Yes**
Heat dissipation design of the combination of active and passive acceleration card	Not available	Not available	Not available	Not available	Not available	**Support Full-height AI accelerator card adopts active heat dissipation without air duct. Half height and half length AI accelerator card adopts independent air duct for heat dissipation**
Storage	4 SATA III Support RAID 0, 1, 5, 10 2个mSATA III (Mini PCIe Type) One M.2 Slot (Key : M)	4 SATA III Support RAID 0, 1, 5, 10 2个mSATA III (Mini PCIe Type) One M.2 Slot (Key : M)	2x2.5” HDD/ SSD 1xM.2 2280 M key support NVMe 2x Full height mSATA port	2x2.5” HDD/ SSD support RAID0/1 1xM.2 2280 M key support NVMe 2x Full height mSATA port	3*2.5" HDD/SSD support Raid 0/1/5/10 H310: 1 Msata	**4*2.5”SATA3 support Raid 0/1/5/10 1*M.2 2280 M-key support NVMe**
Input Voltage	DC IN 6-36V	DC IN 6-36V	DC IN 8-35V	DC IN 8-48V	DC IN 9-36V	**DC IN 12V**
Cooling Fan	No easy disassembly design	No easy disassembly design	No easy disassembly design	No easy disassembly design	Easy disassembly design	**Easy disassembly design**
Installation Method	Desktop installation	Desktop installation	Desktop installation	Desktop installation	Desktop installation	**Desktop installation**

4 Intel® White Paper Based on JHCTECH® MEC Equipment


Solution
intel
JHCTECH® MEC Equipment Based on Intel®
Architecture Accelerate V2X Commercial Deployment

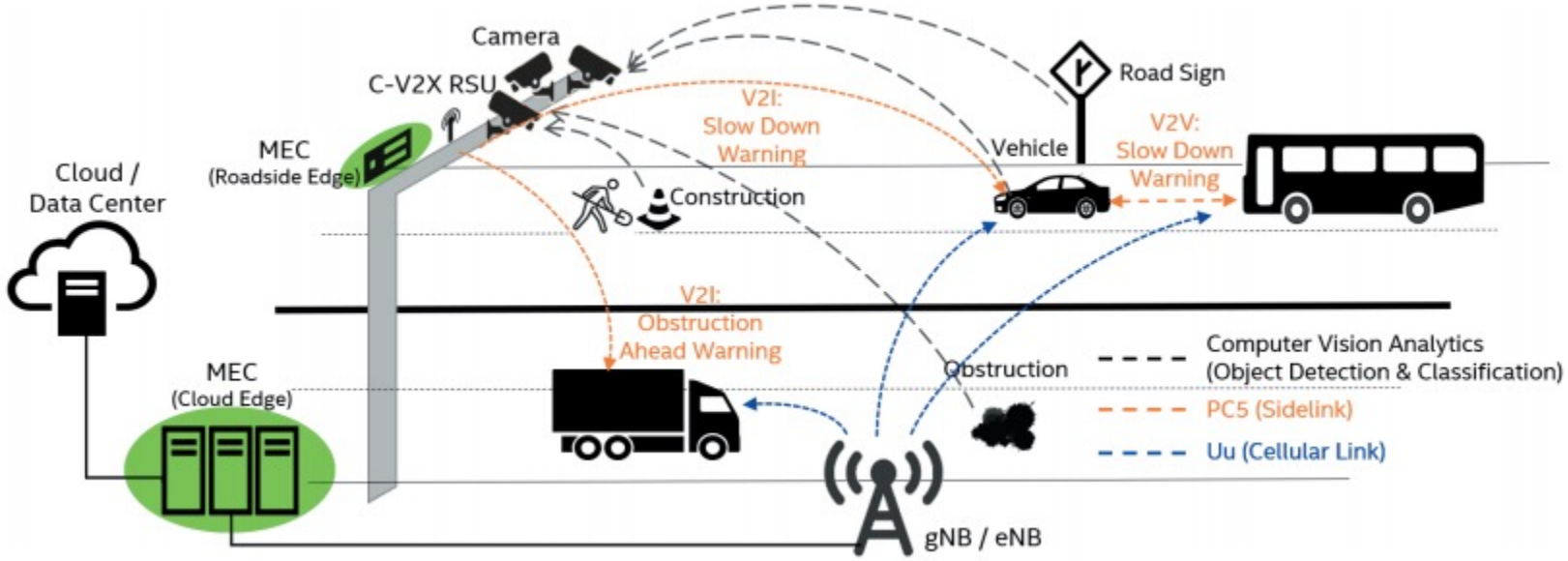
Overview

As a new type of industry that integrates technologies such as automobiles, semiconductors, wireless communications and transportation, the Internet of Vehicles (AKA. V2X: Vehicle to-Anything) has the great potential to improve the experiences of road users. The rapid development of 5G, Artificial Intelligence (AI) and edge computing is also driving the enrichment of V2X functions and enhancement of performance. V2X is steadily advancing to the commercial deployment.



System architecture for the integration of MEC and C-V2X

Background: Deep Integration of MEC and V2X Enables a Variety of Intelligent Transportation Services



Deployment scenario of MEC platforms for C-V2X

Challenges: Design of MEC equipment for V2X

In order to support V2X, the Roadside MEC Equipment and the Cloud-Edge MEC Equipment respectively carry the important roles of computing, storage and forwarding of data on the roadside and cloud edge, and need to meet the following performance requirements.

- Powerful capabilities of general-purpose computing and AI computing
- Flexible system hardware and software configuration and scalability
- Excellent connectivity and compatibility

For the MEC equipment deployed at the roadside, the following features are also required.

- Ruggedness to overcome harsh environmental impacts

Main functional modules of OpenVINO™ toolkit

Model	BRAV-7302	BRAV-7501	BRAV-7520	BRAV-7521
Picture				
Usage Scenarios	Roadside MEC Equipment	Roadside MEC Equipment & Cloud-Edge MEC Equipment		
Processor	Intel® Core™ i3, i5 or i7 (Including Skylake S & Kabylake S)	Intel® Xeon® E or Intel® Core™ i3, i5, i7 or i9 (Including Coffee Lake S & Coffee Lake Refresh S)		
Processor Graphics	Intel® HD Graphics	Intel® UHD Graphics		
Chipset	Intel® H110 or Intel® Q170	Intel® C246 or Intel® Q370		
Memory	Maximum 32 GB, DDR4 2400MHz x 2	Maximum 128 GB, DDR4 2666MHz x 4		
Massive Storage Interfaces	SATA 3.0 x 2, mSATA x 1	SATA 3.0 x 4, M.2 2280 NVME x 1	SATA 3.0 x 2, mSATA x 1, M.2 2280 NVME x 1	SATA 3.0 x 4, mSATA x 1, M.2 2280 NVME x 1
AI Processor	Myriad™ X VPU x 4	Myriad™ X VPU x 34	Myriad™ X VPU x 36	
Expansion Slots	MXM 3.1 x 1, Mini-PCIe x 1	PCIe X8 x 2, PCIe X4 x 2, Mini-PCIe x 1	Mini-PCIe x 1, M.2 E-Key 2230 x 1, M.2 B-Key 3052 x 1, PCIe X16 x 1, PCIe X4 x 1	Mini-PCIe x 1, M.2 E-Key 2230 x 1, M.2 B-Key 3052 x 1, PCIe X8 x 2, PCIe X4 x 2
Ethernet Controllers & Interfaces	Intel® I219-LM x 1, Intel® I210-AT x 6, RJ45 x 3~7	Intel® I219-LM x 1, Intel® I210-AT x 2, RJ45 x 3, Intel® 82599ES x 1, Intel® X710-DA2 x 1, SFP+ x 2		
Intel® vPro®	JHCTECH® Remote Management View software based on Intel® vPro® platform			
RAID	RAID 0, 1	RAID 0, 1, 5, 10	RAID 0, 1	RAID 0, 1, 5, 10
Display Interfaces	DP x 4, HDMI x 1, VGA x 1	DP x 2, HDMI x 1	DP x 2, VGA x 1	
Serial Port Interfaces	(RS-232 or RS-422 or RS-485) x 2, RS-232 x 2	(RS-232 or RS-422 or RS-485) x 2	(RS-232 or RS-422 or RS-485) x 2, RS-232 x 2	
Audio I/O	Audio-out x 1, MIC 3.5 x 1			
DIO	16-bit	8-bit	16-bit (with Optical Isolation)	
Operating Temperature	-35~70 ℃			

Thanks to the excellent performance of the Intel® architecture, JHCTECH® MEC equipment have the advantages of strong processing power, low power consumption, scalable performance, high security and high reliability. They also support the remote management and maintenance. They can fully meet the requirements of various V2X scenarios. The models, application scenarios and technical parameters of this series of MEC equipment products are shown in Table 1.

Models, usage scenarios and technical parameters of JHCTECH® BRAV™ MEC equipment.

Effects: MEC equipment actively empowers the V2X ecosystem

Figure 4. Deployment scenarios of Roadside MEC Equipment (in pole-mounted cabinet).

Figure 5. Deployment scenarios of Roadside MEC Equipment (in roadside cabinet).

JHCTECH® MEC equipment have been deployed in the V2X scenarios of roadside and cloud edge. The roadside deployment scenarios are shown in Figure 4 and Figure 5, and the Roadside MEC Equipment are located in the pole-mounted and roadside cabinets respectively.

The practice has proved that this series of JHCTECH® MEC equipment has excellent performance and fully meets the requirements of edge computing in V2X.

5

Q&A Session

Thank you

More product information can be found at:

Website

Youtube

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