総務省

To realize Connected Vehicle Society

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Services provided by Connected Vehicle

Vehicle × 5G V2X → Connected Vehicle × Big Data AI

Machine Fault Diagnosis

Location Information

Dynamic Map

Traveling Distance

Drive Recorder

AI

Driving Diagnostic

Authentication

Dangerous place

→ Maintenance Service

→ Agent Service

→ Insurance For Automobile

→ Driving Safety Support

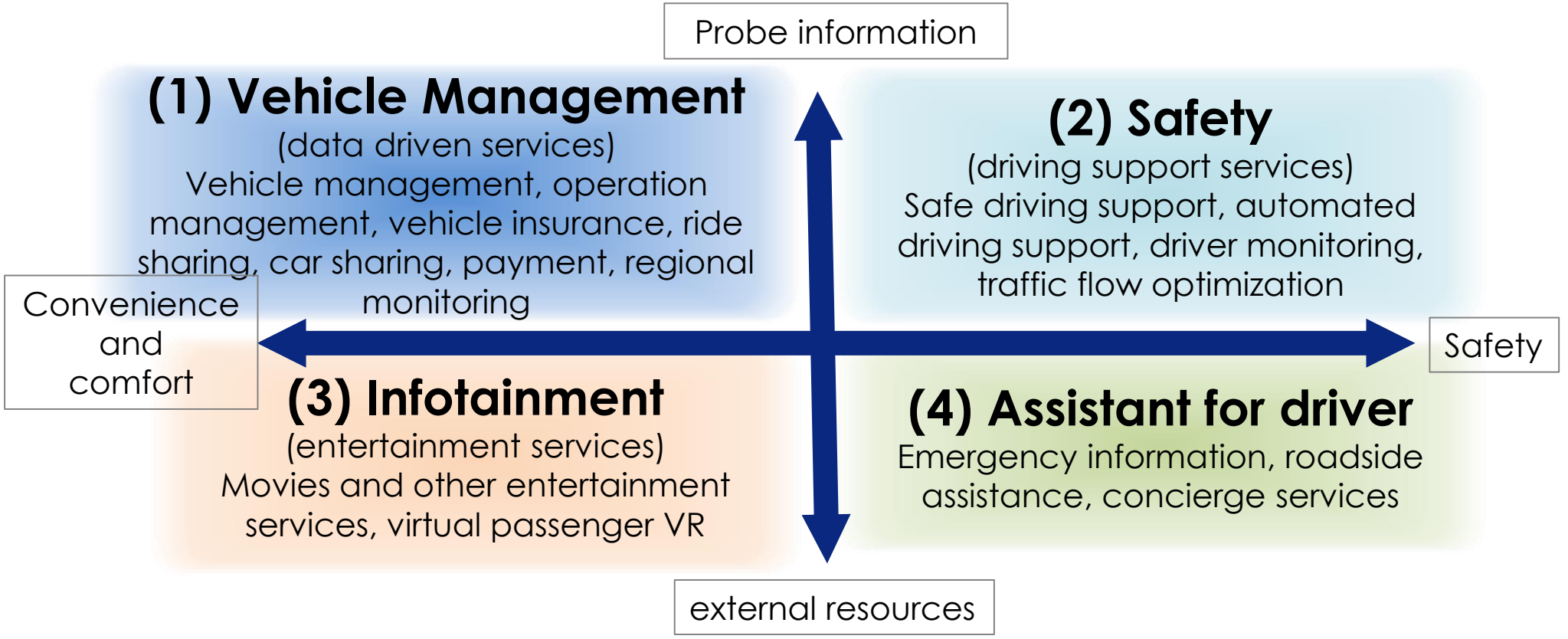
Cloud System for Connected Vehicle

security and privacy protection technology

Networks for services

High speed/ hot-spot communication (e.g. DSRC, Millimeter-wave)

Highly reliable/ direct communication (e.g. DSRC)



Wide area communication (LTE, 5G, etc.)

5G Automotive Association (5GAA)

- Founding members:
  AUDI, BMW, Daimler, Ericsson, Huawei, Intel, Nokia, Qualcomm
- “global, cross-industry organization of companies from the automotive, technology, and telecommunications industries (ICT), working together to develop end-to-end solutions for future mobility and transportation services.”

http://5gaa.org/membership/our-members/

cross-industry cooperation (example 1)

Press Releases

January 12, 2018

Leading Automotive, Telecom and ITS Companies Unveil First Announced Cellular V2X Trials in Japan

— Continental, Ericsson, Nissan, NTT DOCOMO, OKI and Qualcomm Technologies join forces to host C-V2X trials in Japan in 2018 to validate and demonstrate C-V2X benefits —

TOKYO, JAPAN, January 12, 2018 --- Continental, Ericsson, Nissan, NTT DOCOMO, INC., OKI and Qualcomm Technologies, Inc., a subsidiary of Qualcomm Incorporated (NASDAQ: QCOM), announced today plans to carry out their first Cellular Vehicle-to-Everything (C-V2X) trials in Japan. The objective is to validate and demonstrate the benefits of C-V2X using direct communication technology defined by the 3rd Generation Partnership Project (3GPP) in their Release 14 specifications. The trials are designed to show the enhanced range, reliability and latency benefits of C-V2X direct communications operated in 5 GHz band. Additionally, the C-V2X Trials are designed to demonstrate the complementary benefits of network-based comm (LTE-A). The trial results will help develop the ecosystem by providing inputs including ITS-related organizations and government agencies, as we prepare

https://www.nttdocomo.co.jp/english/info/media_center/pr/2018/0112_00.html

RENAULT NISSAN MITSUBISHI

Renault-Nissan-Mitsubishi and Google join forces on Next-Generation infotainment

- World's leading automotive alliance signs a global multiyear agreement to partner with Google to equip Renault, Nissan and Mitsubishi vehicles with intelligent infotainment systems
- The Alliance will utilize Android, world's most popular operating system, to offer customers a new array of services including Google Maps, Google Assistant and Google Play Store
- These services will be combined with Alliance Intelligent "Cloud based" remote software upgrades and vehicle diagnostics

https://newsroom.nissan-global.com/releases/release-860852d7040eed420ffbaebb22094eb4-180918-01-e?year=2018

Projects for realization of Connected Vehicle Society

safer, secure and comfortable society

solve social problems

convenient and comfortable

competitiveness

Reliable, real-time wireless network

Utilization of data

Environment for Innovation

security

Network Project

Data & Platform Project

Security Project

Frequency Allocation for ITS

Roadside Broadcasting (Highway radio)

79GHz Band High-resolution Radar

60/76 GHz Band Long-distance Radar

Vehicle Information and Communication System (VICS)

1620kHz

76~90MHz

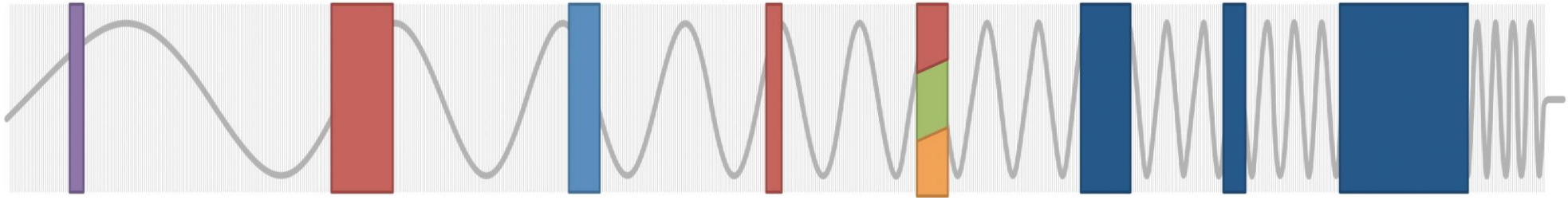
2.5GHz

5.8GHz

60~61GHz

76~77GHz

77~81GHz



755.5~764.5MHz

5.8GHz

22~29GHz

700MHz Band Driving Safety Support System

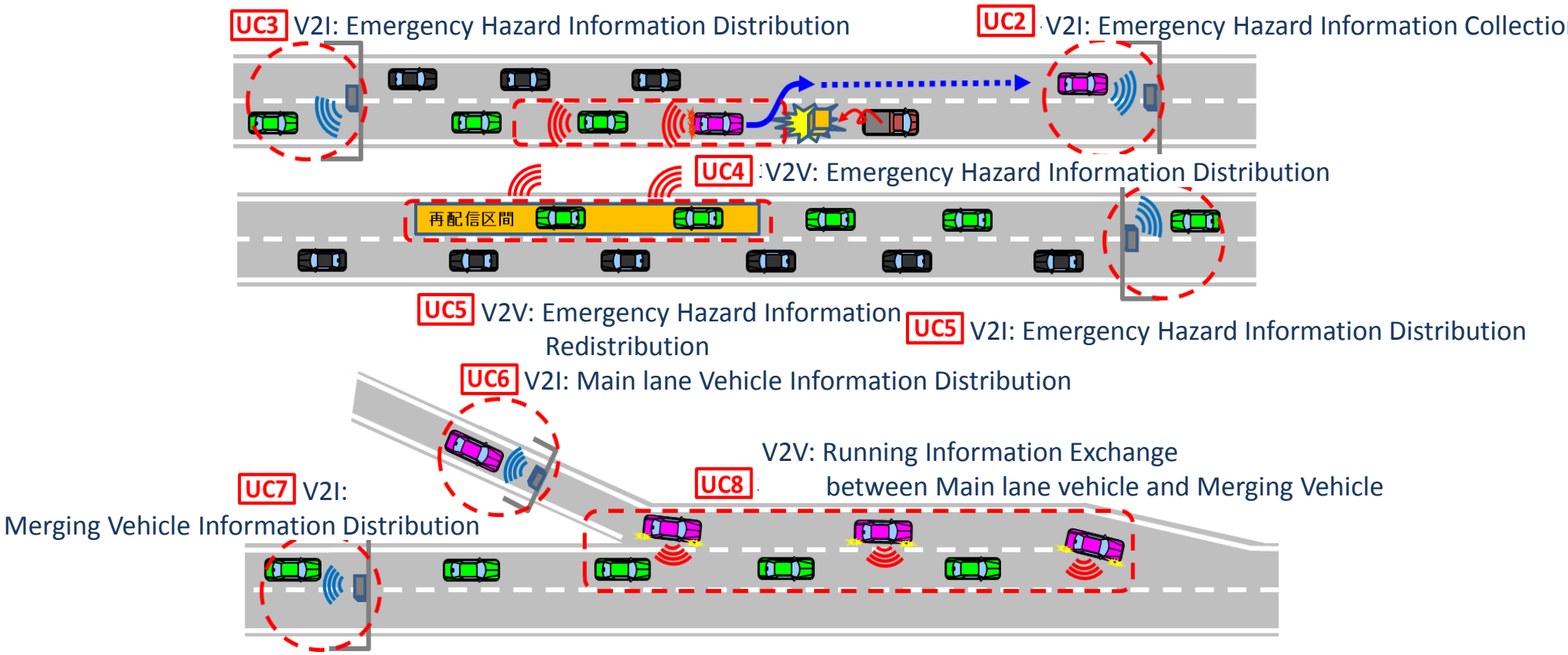
24/26 GHz Band UWB Radar

Electronic Toll Collection System (ETC)

Dedicated Short Range Communication (DSRC / ETC2.0)

Advancement of Current ITS wireless systems

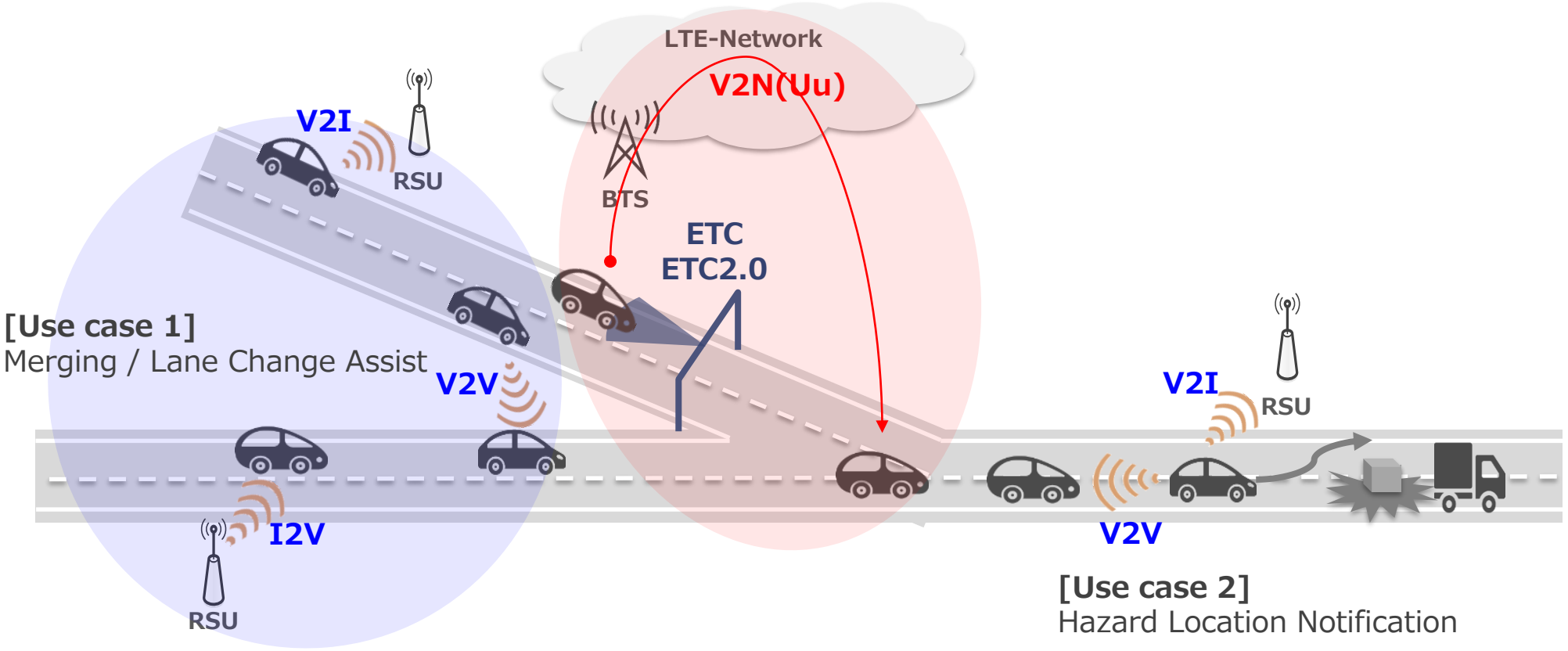
To meet the requirements of communication for connected vehicle, this project will find out the way to advance the current ITS wireless systems (760MHz band DSRC) and coexistence with other wireless systems.



Refer to UCs considered by Japan Automobile Manufacturers Association, Inc. (JAMA) in January 2018.

NEW V2x technology

New V2X technology such as application of cellular technologies are discussed all over the world.
This project will investigate the feasibility of introducing new V2X technology.

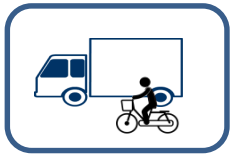


Millimeter-wave V2x

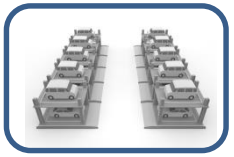
To realize new communication(e.g. exchange image, video, 3D map), demands for large capacity communication for connected vehicles are increasing.
This project will investigate the possibility of large capacity millimeter-wave communication for V2X.

V2I (Vehicle to Infrastructure)

- Safety support; blind spot video shearing
- Instant contents delivery; 3D map etc.
- Huge data collecting; recorded driving data

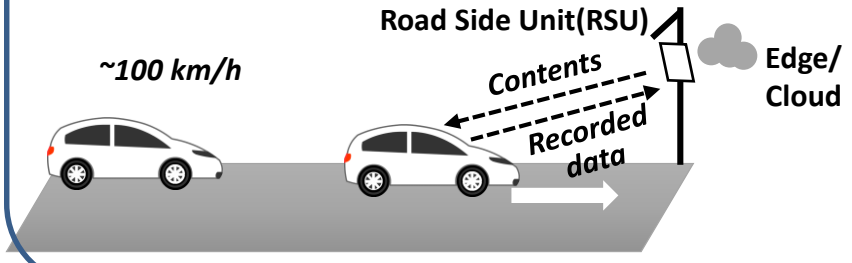


Blind spot obstacles



3D map

Recorded sensor data



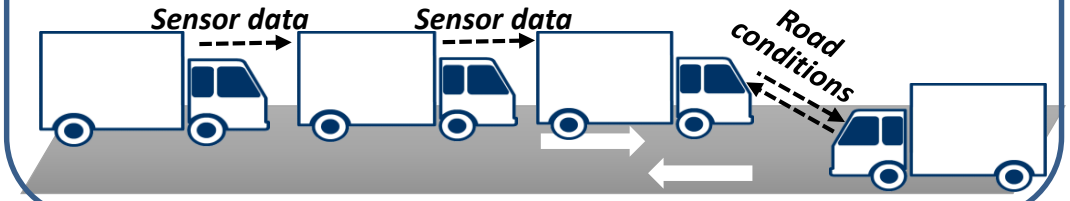
V2V (Vehicle to Vehicle)

- HD image/sensor sharing; platooning trucks
- Instant data sharing; surrounding road conditions

Radar/Lidar Sensor sharing

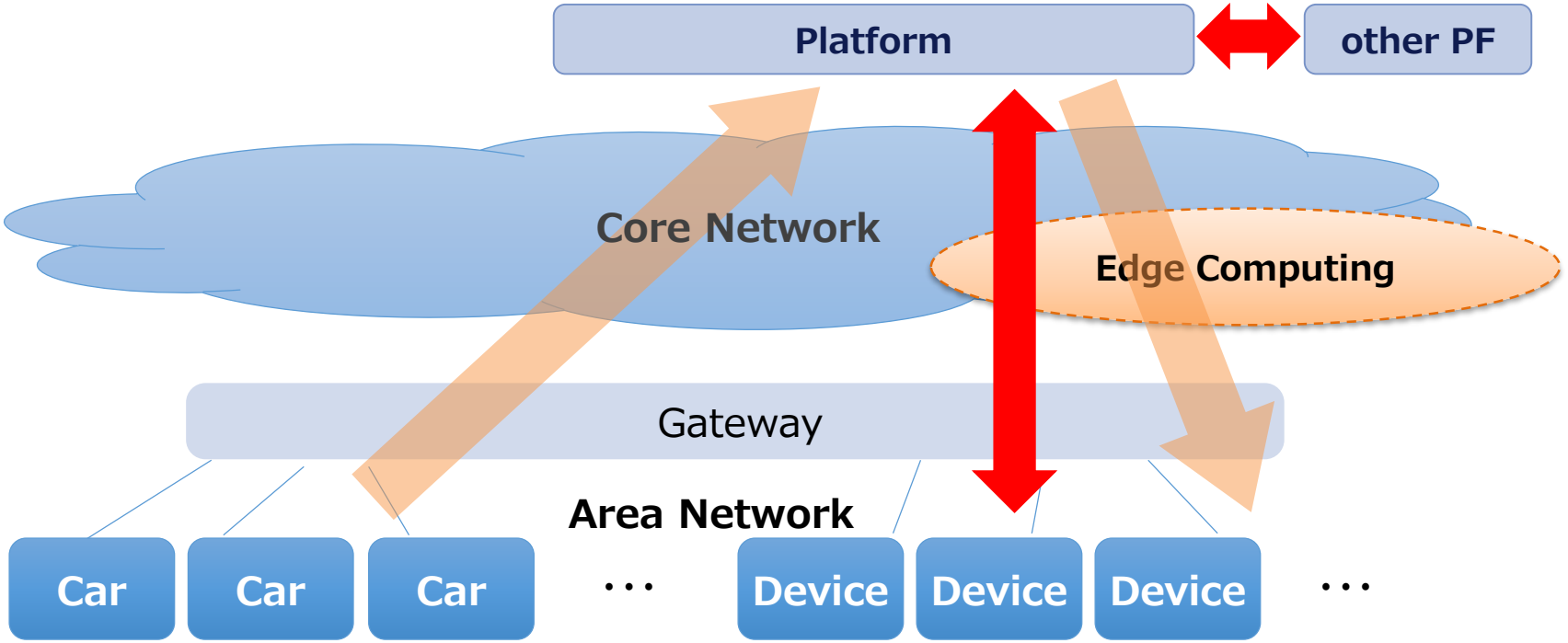
HD Video streaming

Forehand Road conditions



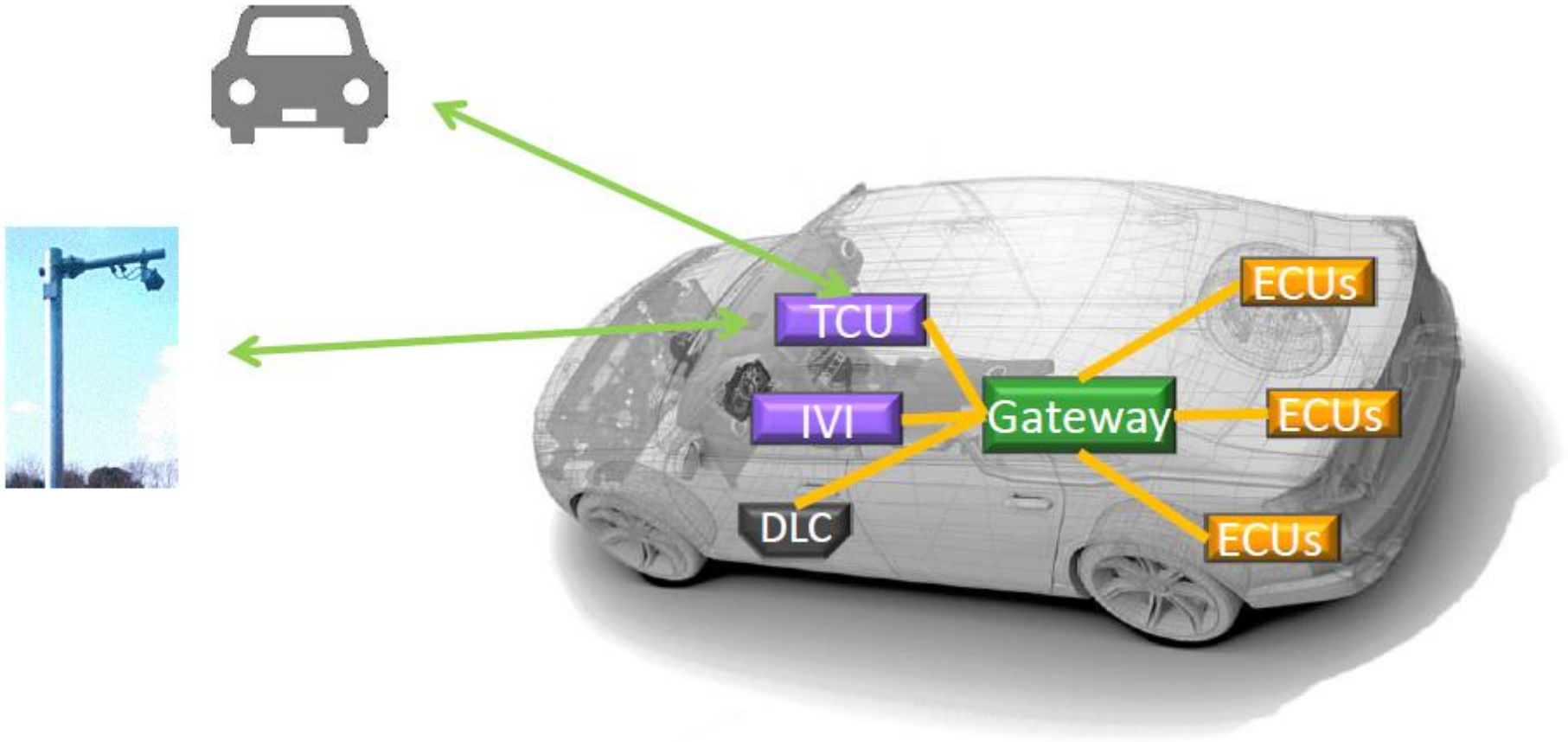
Data & Platform

One of the big theme to realize connected vehicles society is how to manage data. We will have to manage rapid expanding data for new services provided in Connected Vehicle Society.
For Connected Vehicle Society, a new platform to integrate various wireless systems and manage data is necessary. This project investigates, develops and demonstrates the prototype of such platform.



Security

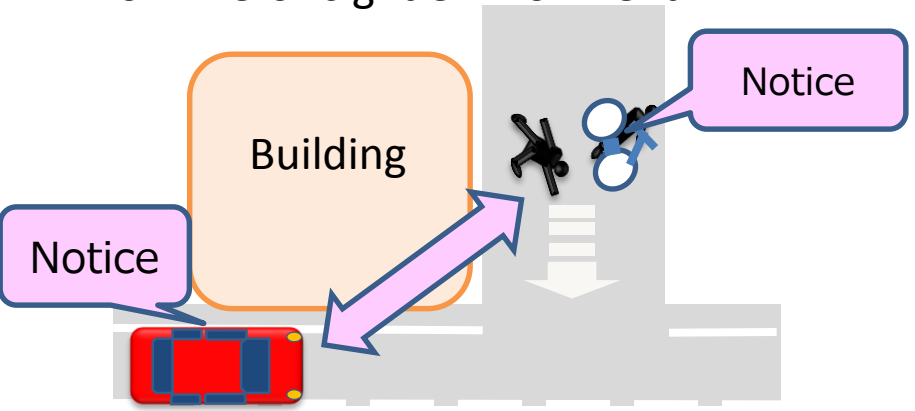
Wireless system may has cyber security risk for Connected Vehicle Society, if we do not tackle this issue.
This project will examine the security risks and investigate the requirements for secure wireless systems.



V2P

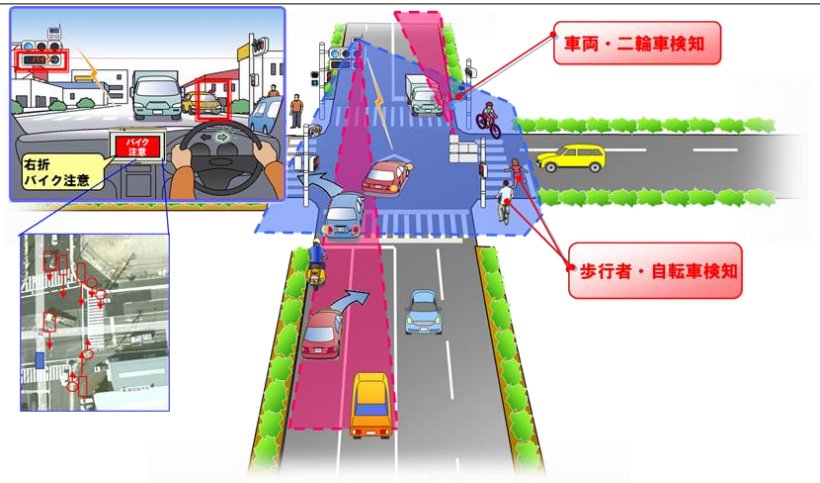
- Notification to car and pedestrian for safety

non-line-of-sight environment



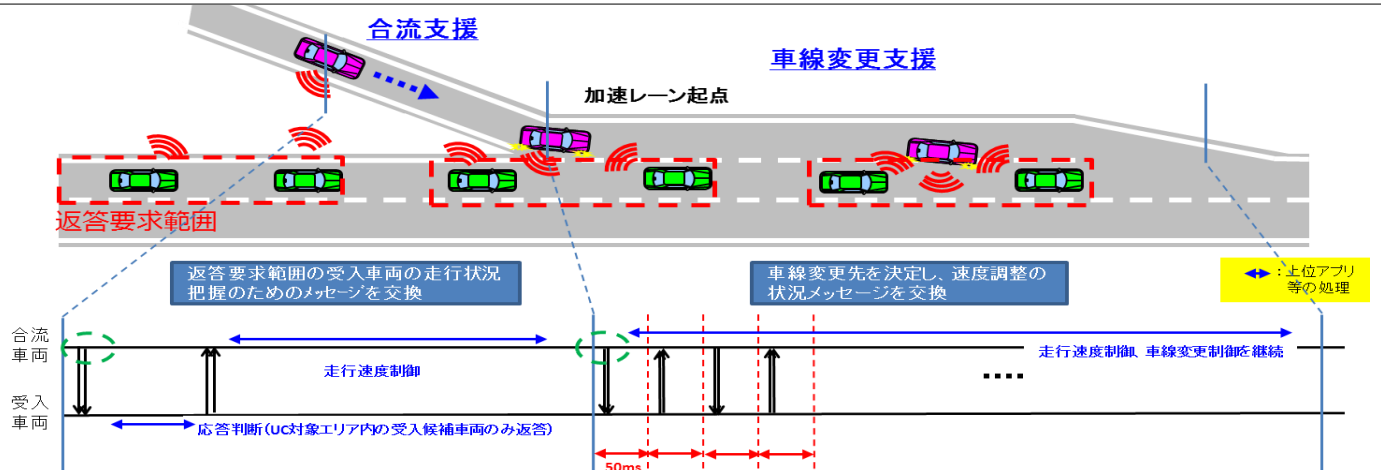
radar

- Advanced Radar set up on streets

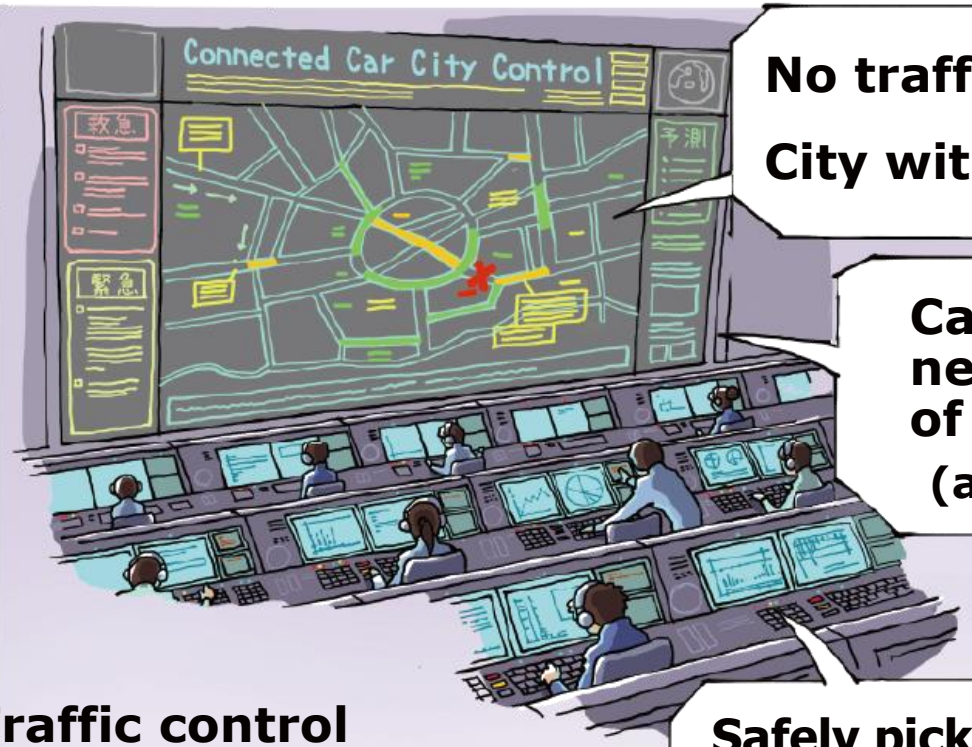


message set and protocol

- What type of message set and protocol are needed for Merging / Lane Change Assist



Connected vehicles creating smart city with no traffic jams



No traffic jam zone

City with no parking meters and toll booths

Cars will no longer need to wait in front of train stations

(and other crowded areas)

Traffic control through quantum computing

Safely picking up children from school