Envisioning Mobility in Green Digital Society

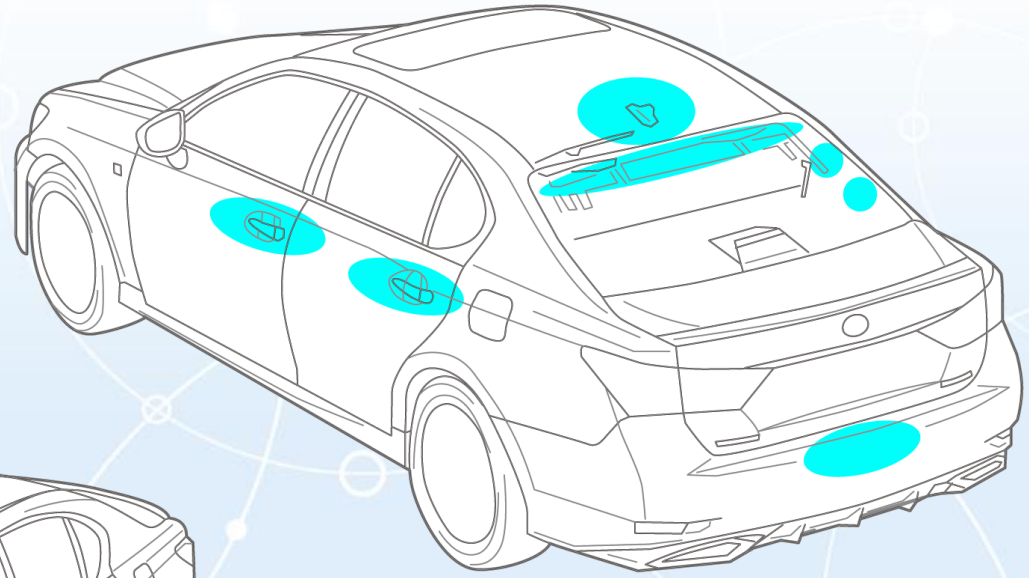
TOYOTA MOTOR CORPORATION
Ryokichi Onishi

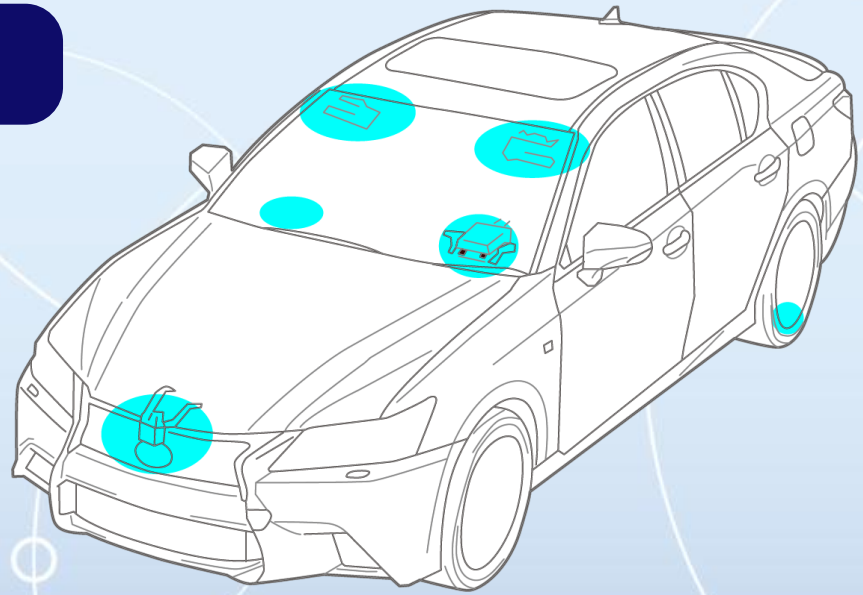
KDDI TOYOTA

Radio Systems in Cars

Communication

- Beacon — 2.5GHz, 350THz (850nm)
- GPS — 1.5GHz
- ITS — 760MHz
- Bluetooth Wi-Fi — 2.4GHz
- ETC — 5.8GHz
- Telematics Service — Sub 6GHz





Broadcast

- Satellite Radio — 2.3GHz
- DAB/DMB — 174~240GHz, 1.4GHz
- TV — 470~770MHz
- AM FM/VICS — 522~1629KHz 76~90MHz

Control

- Smart Entry Keyless Entry — 312MHz
- Garage Opener — 315MHz
- Immobilizer — 134.2KHz
- Tire Pressure Sensor — 315MHz
- Intruder Detection — 24.15MHz
- Radar — 76~77GHz

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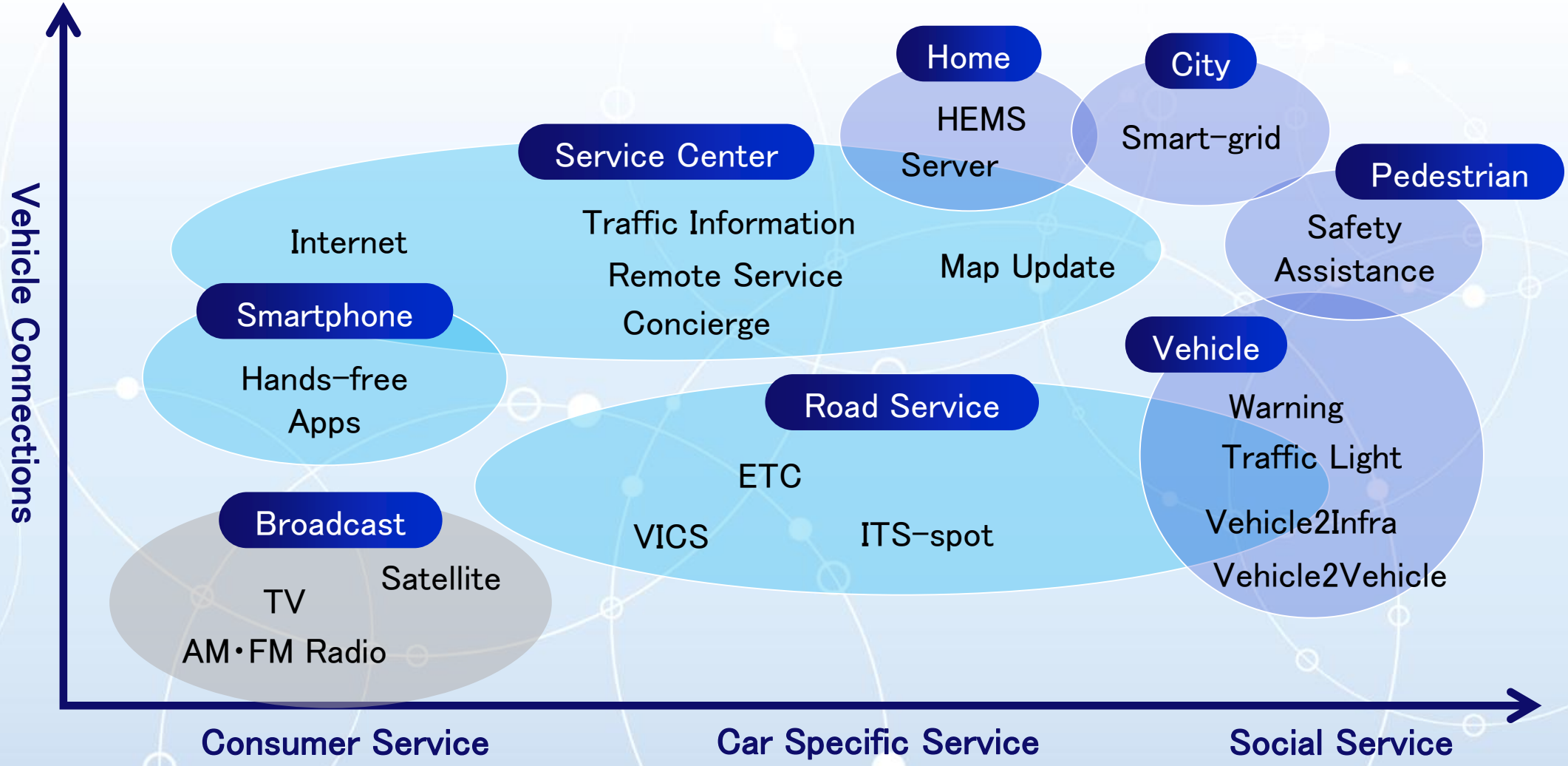
Car-to-X Connections



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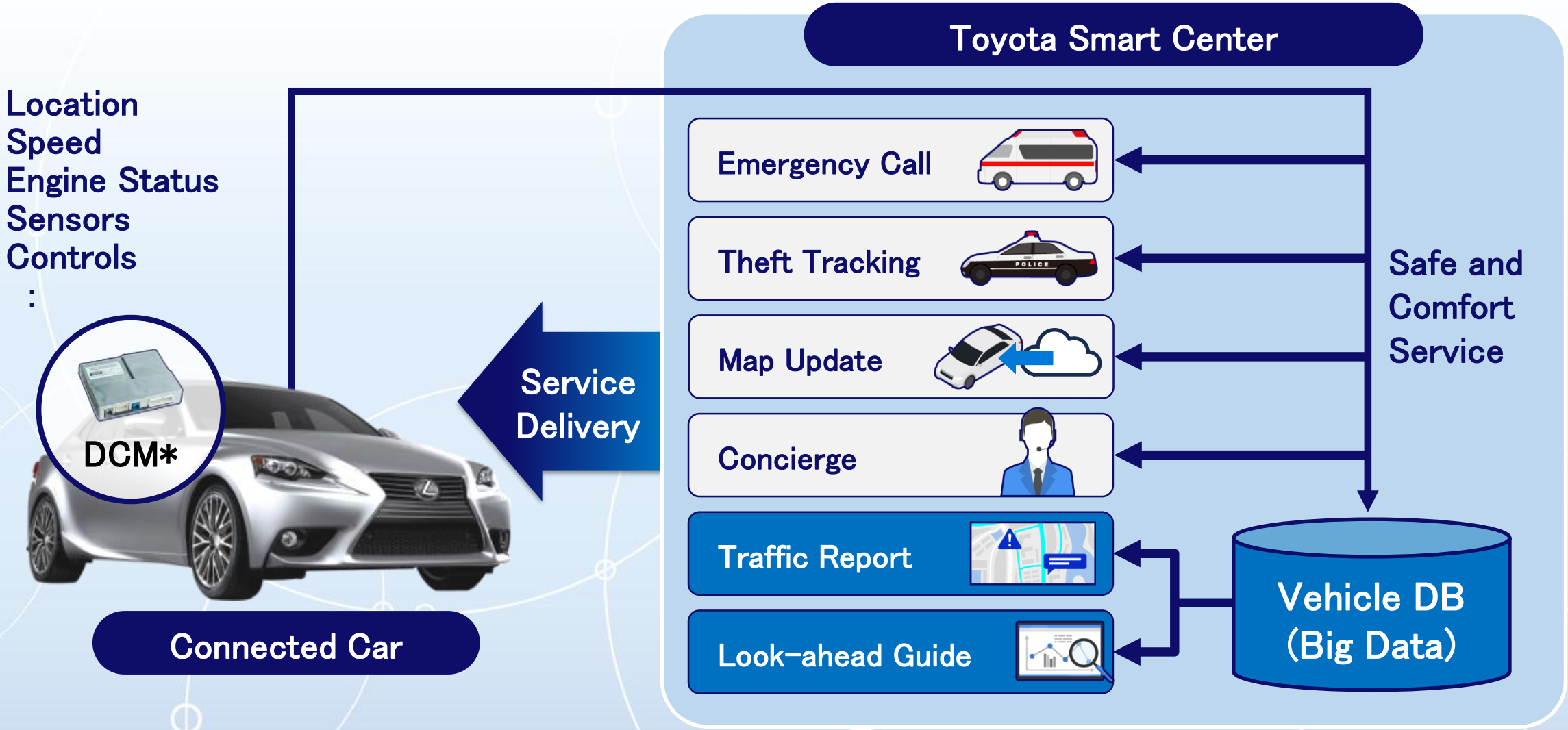
Telematics Services



*DCM: Digital Communication Module

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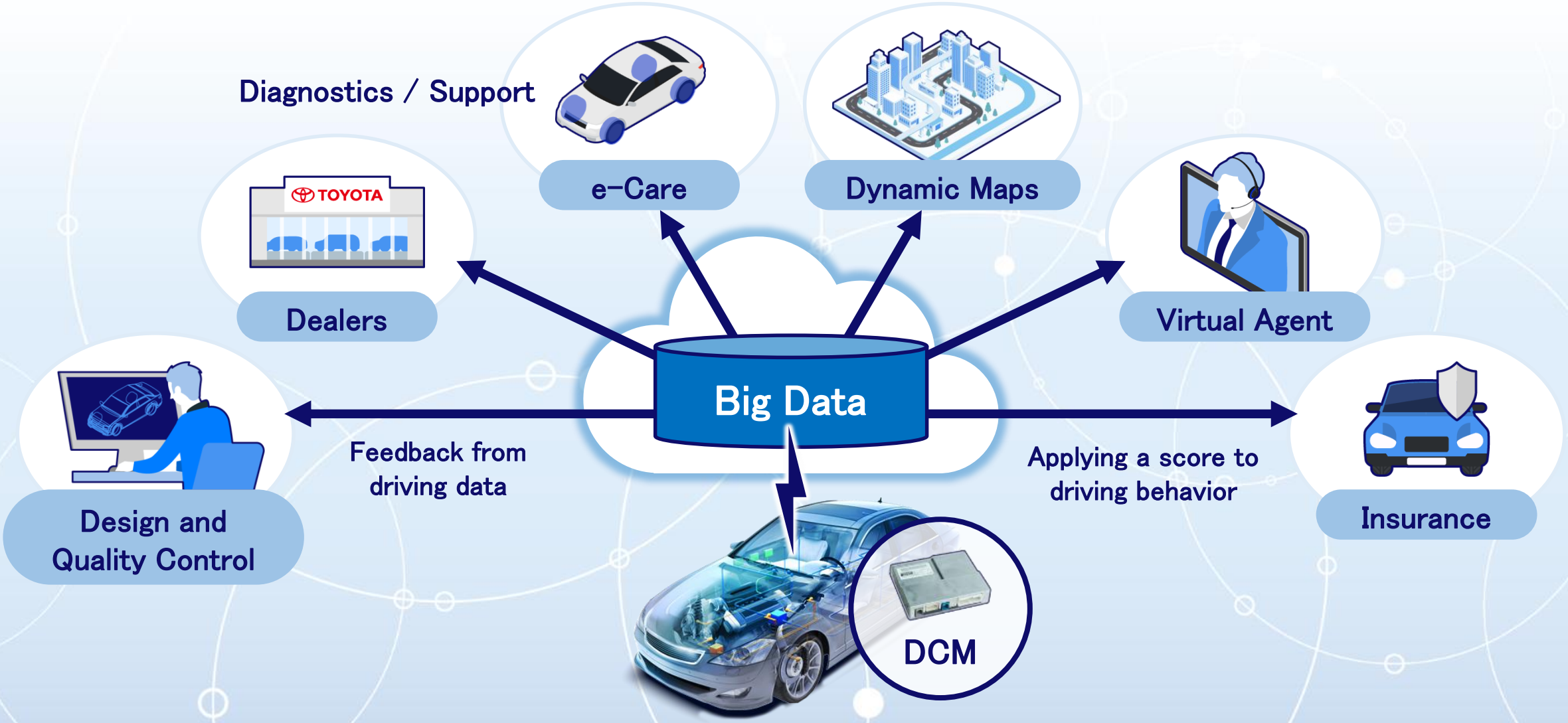
Automotive Big Data

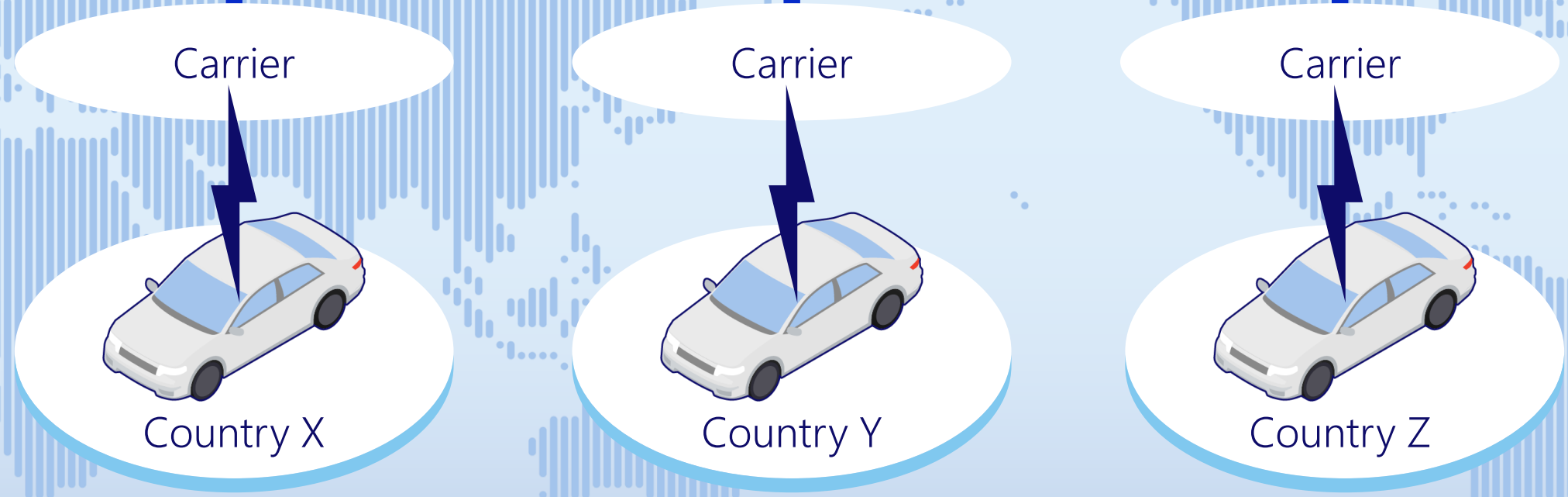


Global Communications Platform

Toyota Smart Center

Global communications platform

Integrated management and monitoring of communications networks



Mobility Service Platform

Service Providers

Insurance companies | Rideshare | Car-sharing | Rentals | Taxis | Logistics | Retail | Food & lodging | Govt. offices, Olympics & Paralympics

Mobility Service Platform (MSPF)

API (Vehicle management, fleet management, authentication functions, payment functions, etc.)

- Telematic insurance
- Flexible leasing
- Smart Key Box TransLog
- Vehicle information
- Operational information

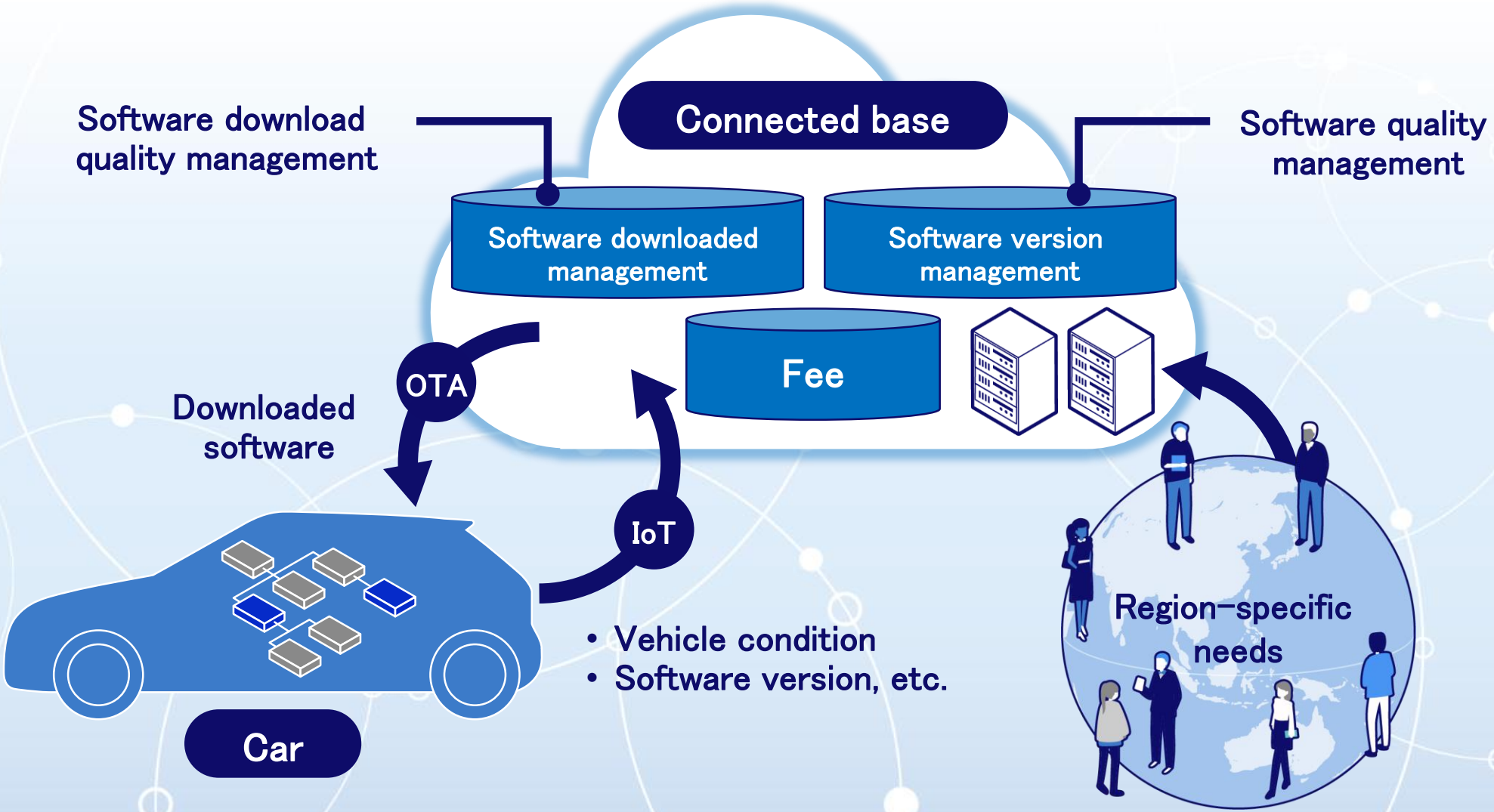
Toyota Smart Center (TSC)

- OTA updates of onboard software
- Individual device authentication
- Telematics services (map updates, agents...)
- Use of big data (CRM quality control)
- Big data (TBDC)

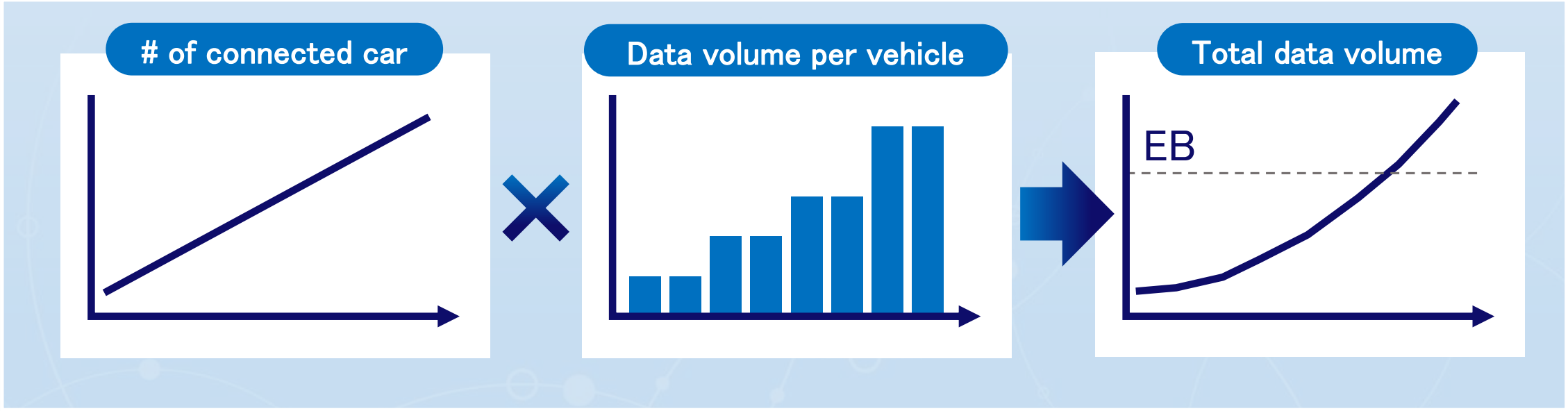
Global Communications Platform

Operator-assisted services

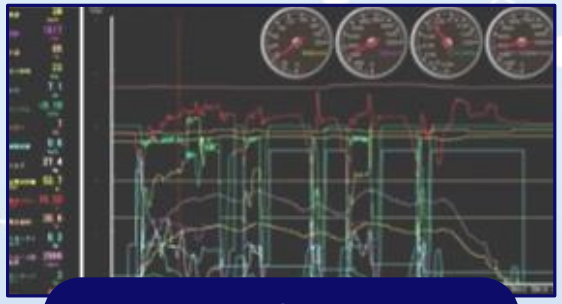
Vehicle IoT and OTA



Vehicle Data Volume



Mobility Condition


Vehicle Condition

High Definition Map

Object Detection

Alliance for All Connected

Jointly developing services and service platforms that ensure people's safety and security

Realize to enrich people's lives without being chained to the inside or outside of vehicles.

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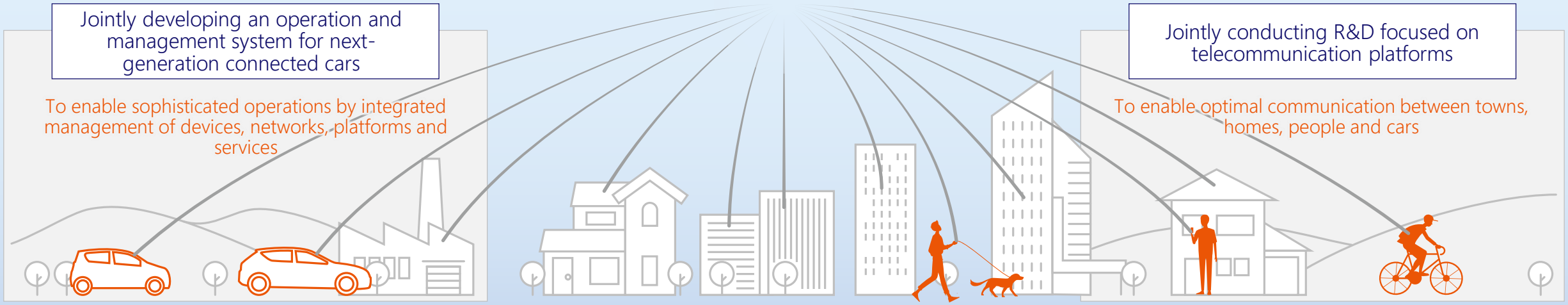
Jointly working to address social issues using big data

To solve social issues between urban and rural areas

Towns, Homes, People, and Cars are all connected

Jointly developing an operation and management system for next-generation connected cars

To enable sophisticated operations by integrated management of devices, networks, platforms and services



Jointly conducting R&D focused on telecommunication platforms

To enable optimal communication between towns, homes, people and cars

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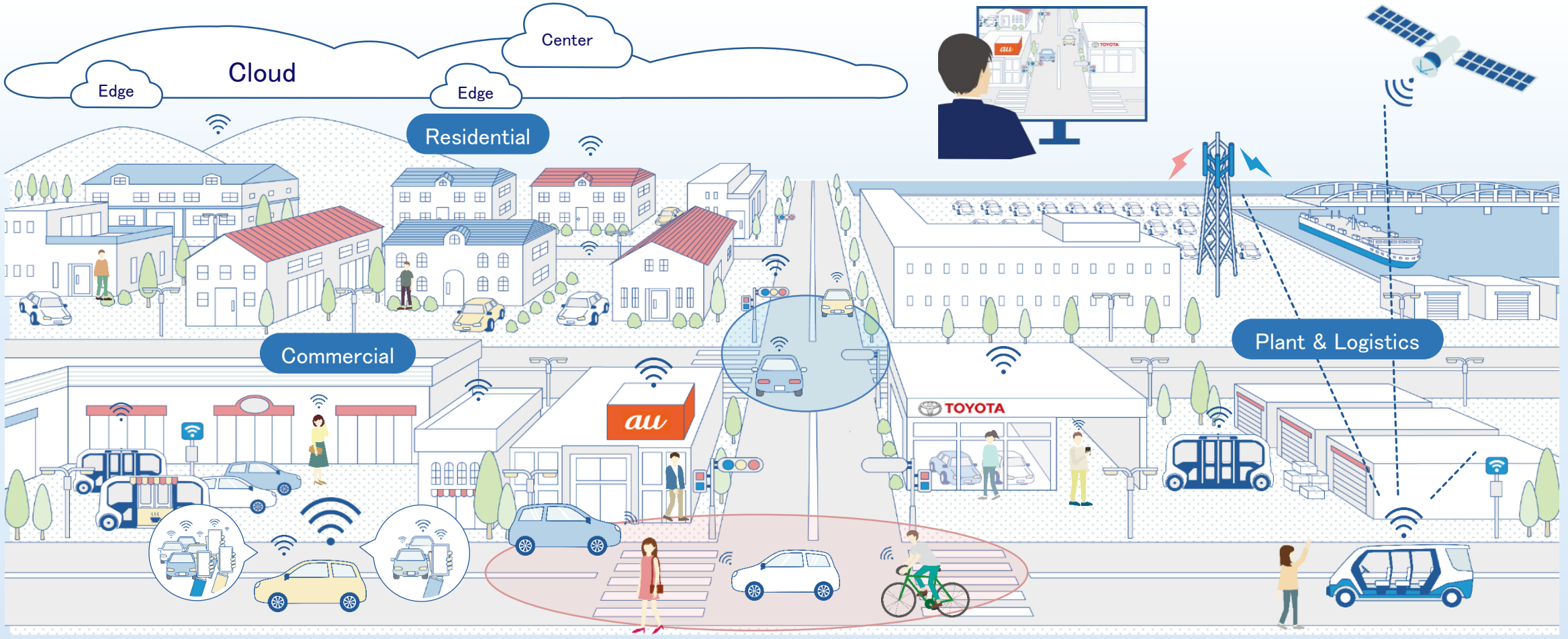
Beyond 5G: User-centricity



Optimized to Protect User Experience

Expanding Local User Experience

Software-defined Diversity and Innovation

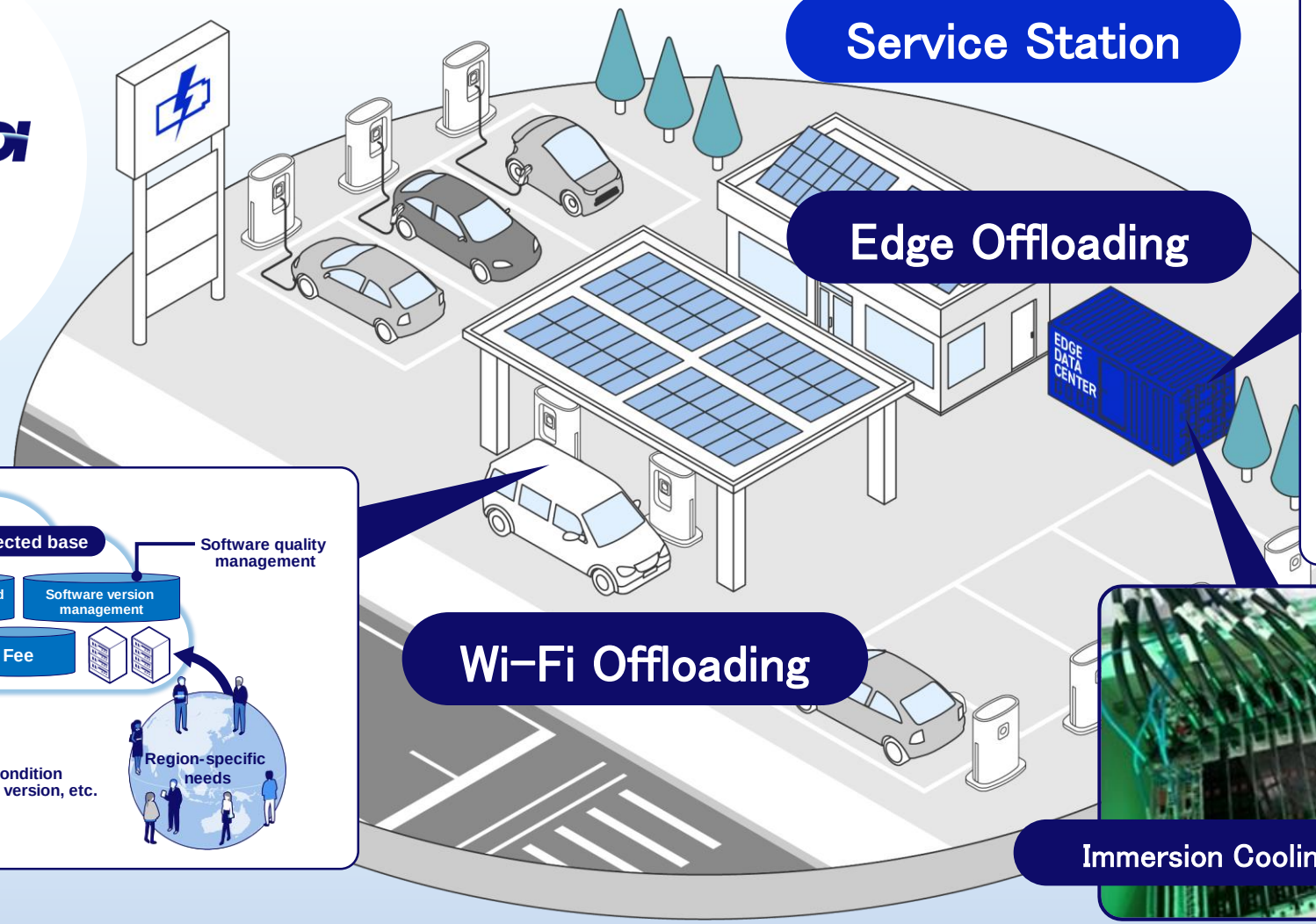
Green Digital Computing

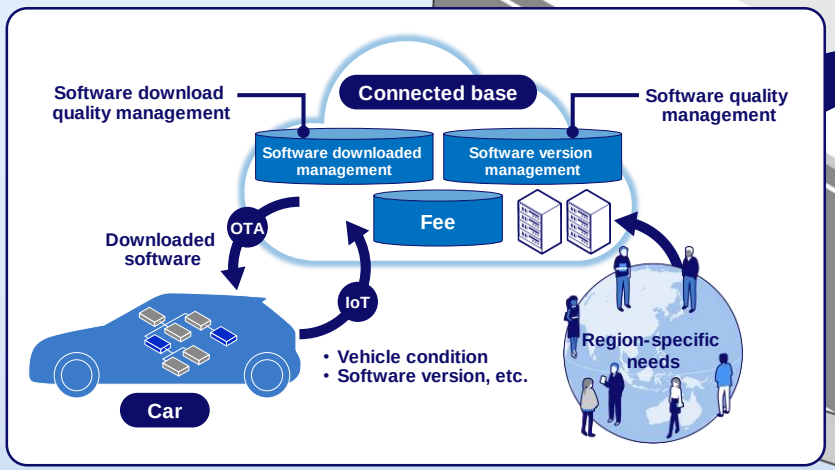
AECC
AUTOMOTIVE EDGE COMPUTING CONSORTIUM

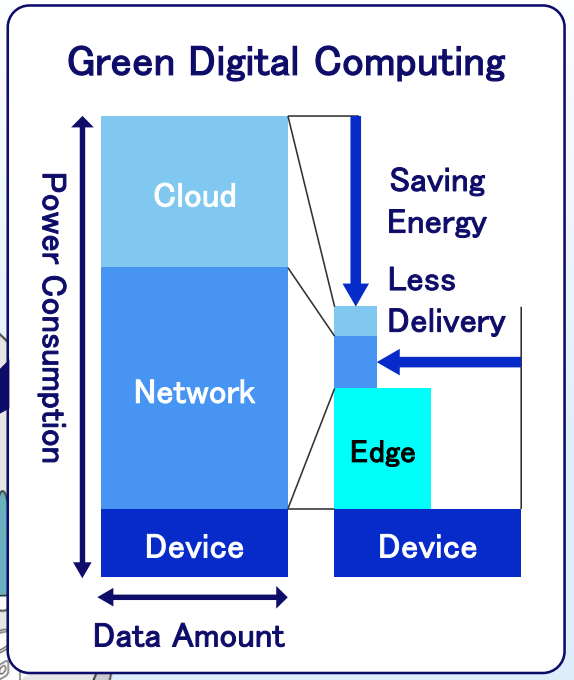
TOYOTA KDDI

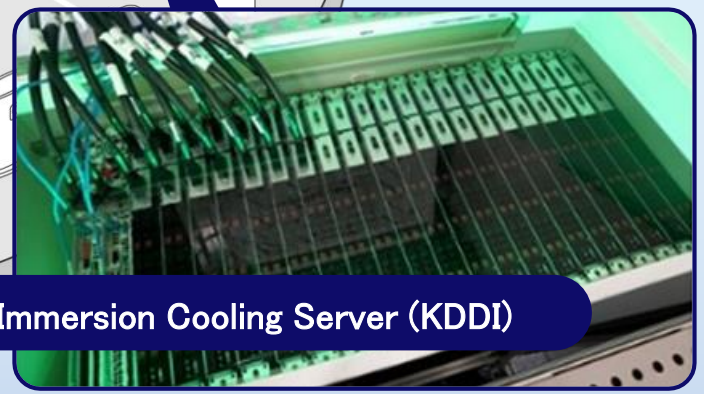
CISCO

https://aecc.org/

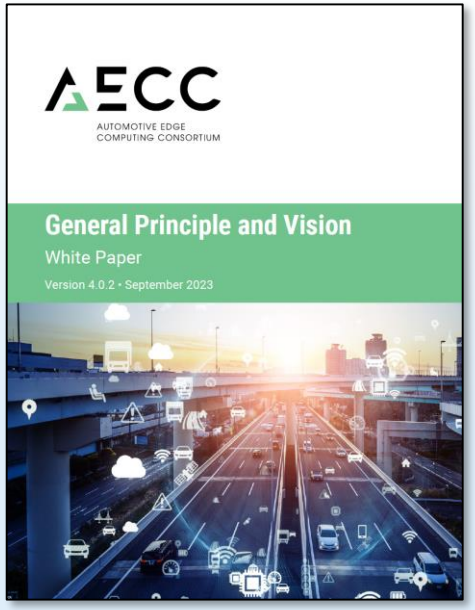




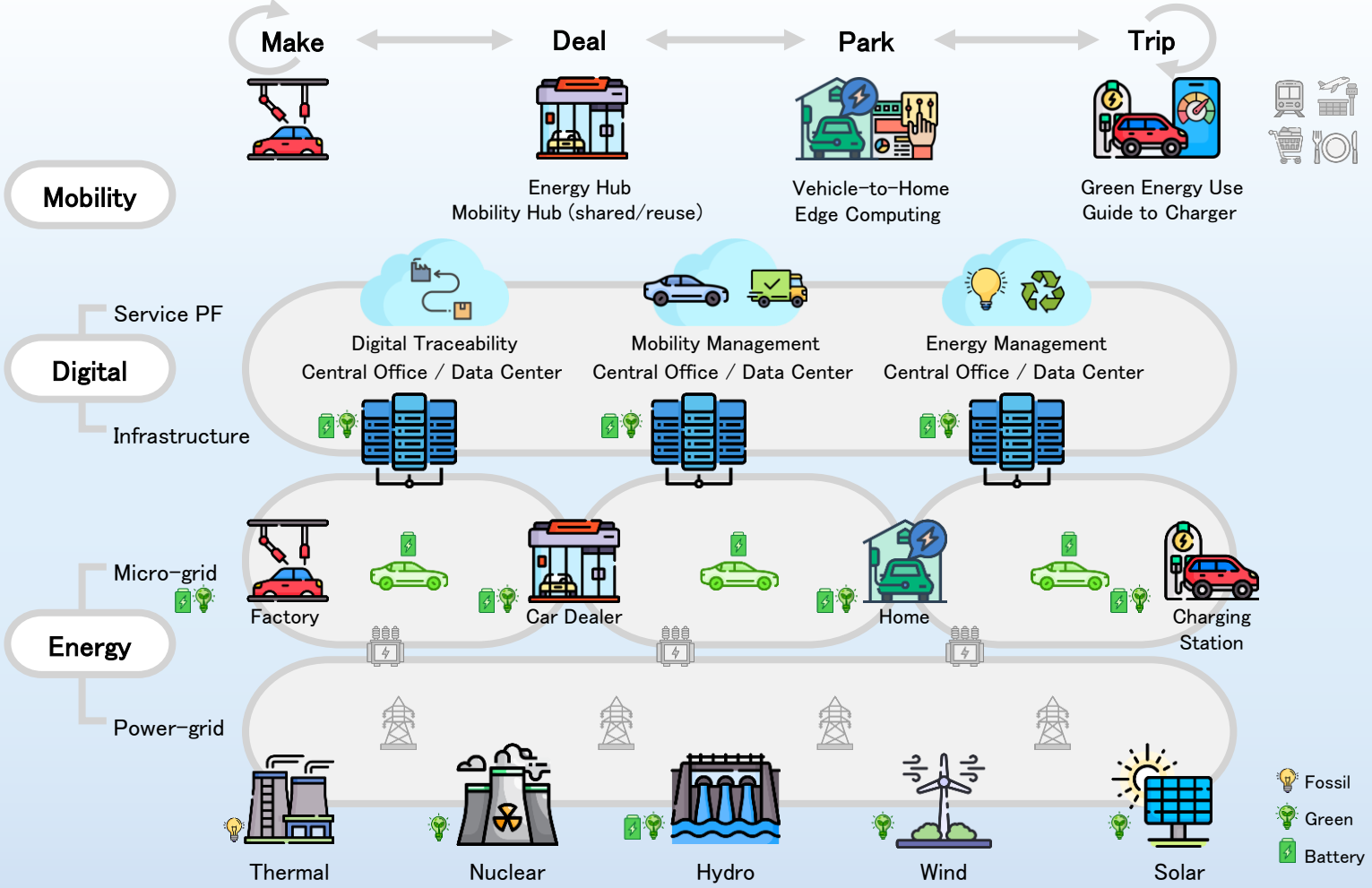




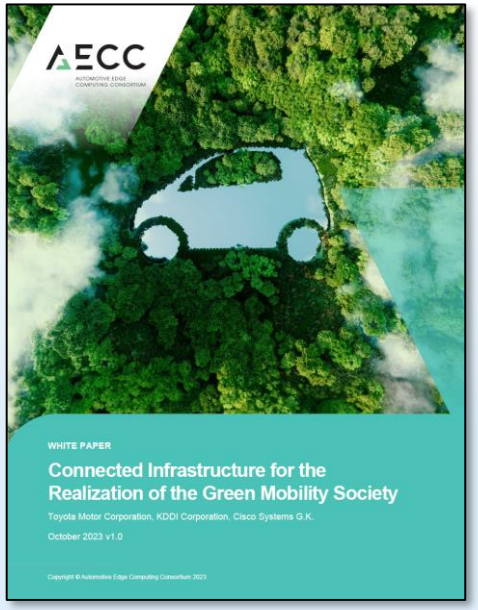
Mobility in Green Digital Society

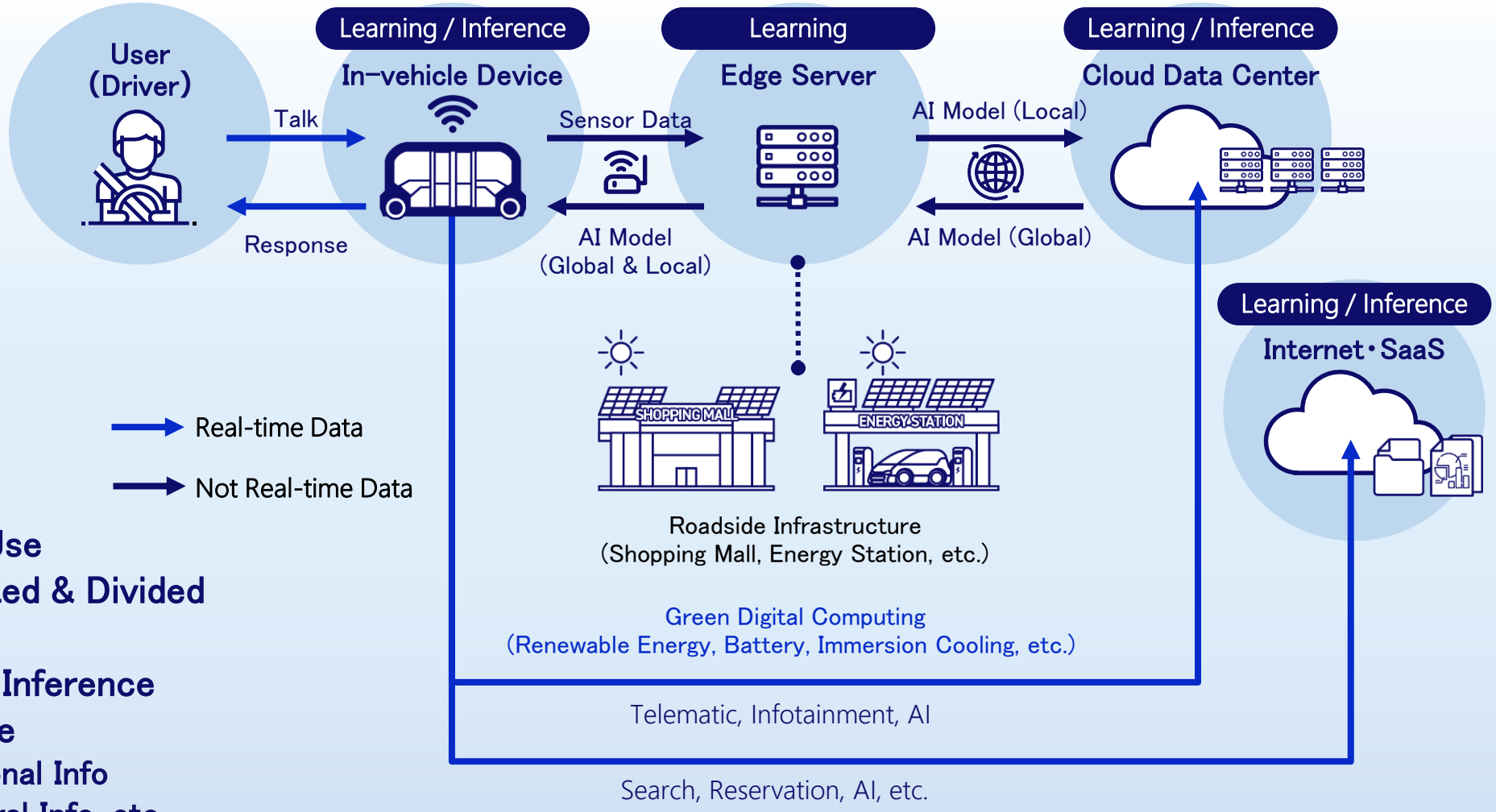


- Digital optimization of mobility and energy
- Local rationality for economy and environment
- Cars balancing energy supply and demand



Generative AI for Mobility





- Digital Infra: Own & Use
- Digital Infra: Distributed & Divided
- AI Model: Own & Use
- AI Model: Learning & Inference
- Data Types & Storage
  - Manual, Personal Info
  - Local Info, General Info, etc.

＊ Based on AECC materials, with additions by the author

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Envisioning Mobility in Green Digital Society Together!