


## 차량 인터페이스 표준화 동향

- ISO TC22 SC31, ISO TC204 WG17, SAE Vehicle Inf. 최근 표준화 동향

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윤 현 정

# 목차

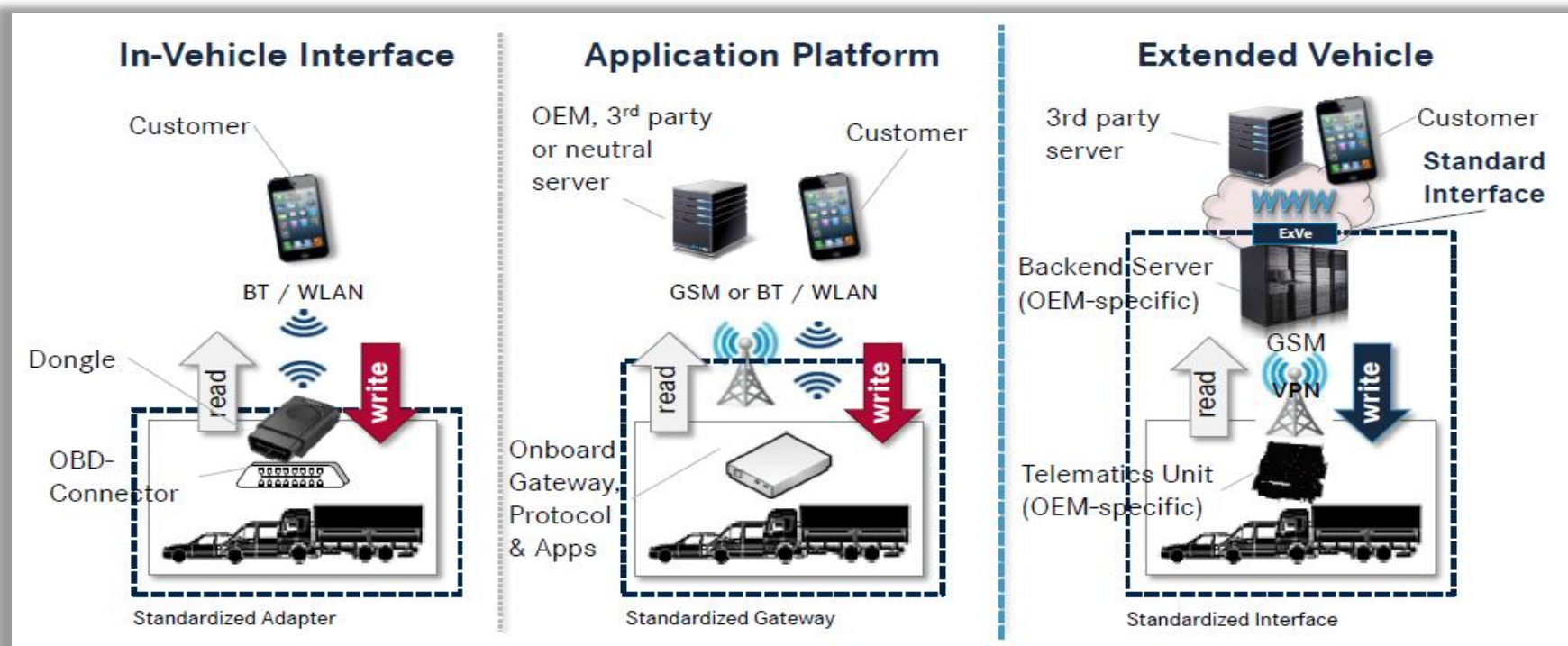


○	개요
○	ISO TC22 SC31 Vehicle Interface
○	ISO TC204 Vehicle Interface
○	SAE Vehicle Interface
○	ISO TC204 WG17 표준화 동향

# 개요

## 스마트카는 단독형 시스템에서 협력형 시스템으로 발전

차량 내부 네트워크와 인프라 네트워크 결합을 위한  
IVN-V2X 게이트웨이 기술 개발 및 표준화 진행 중

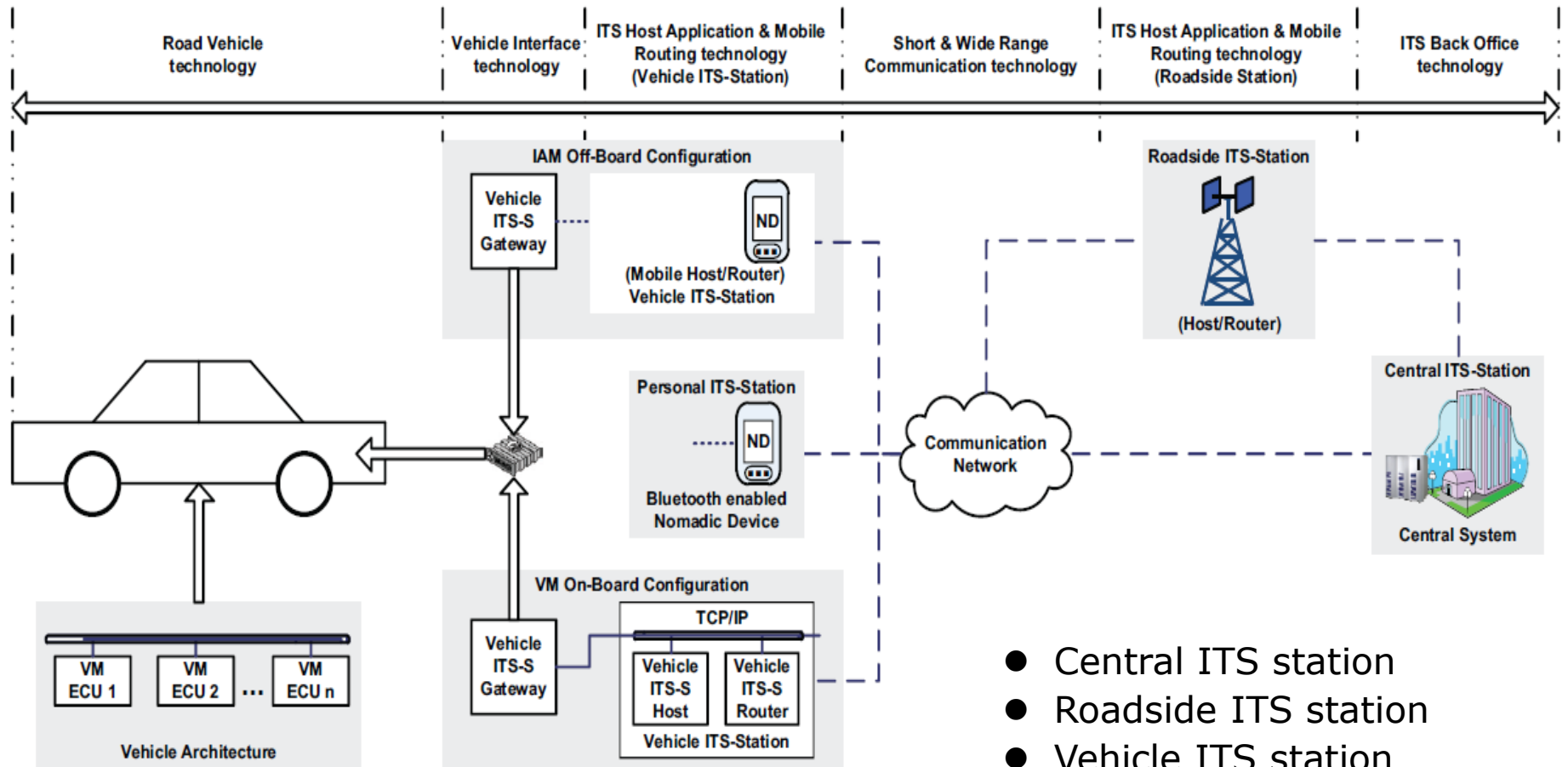


ISO TC22 SC31 WG2

ISO TC204 WG17, 18

ISO TC22 SC31 WG6

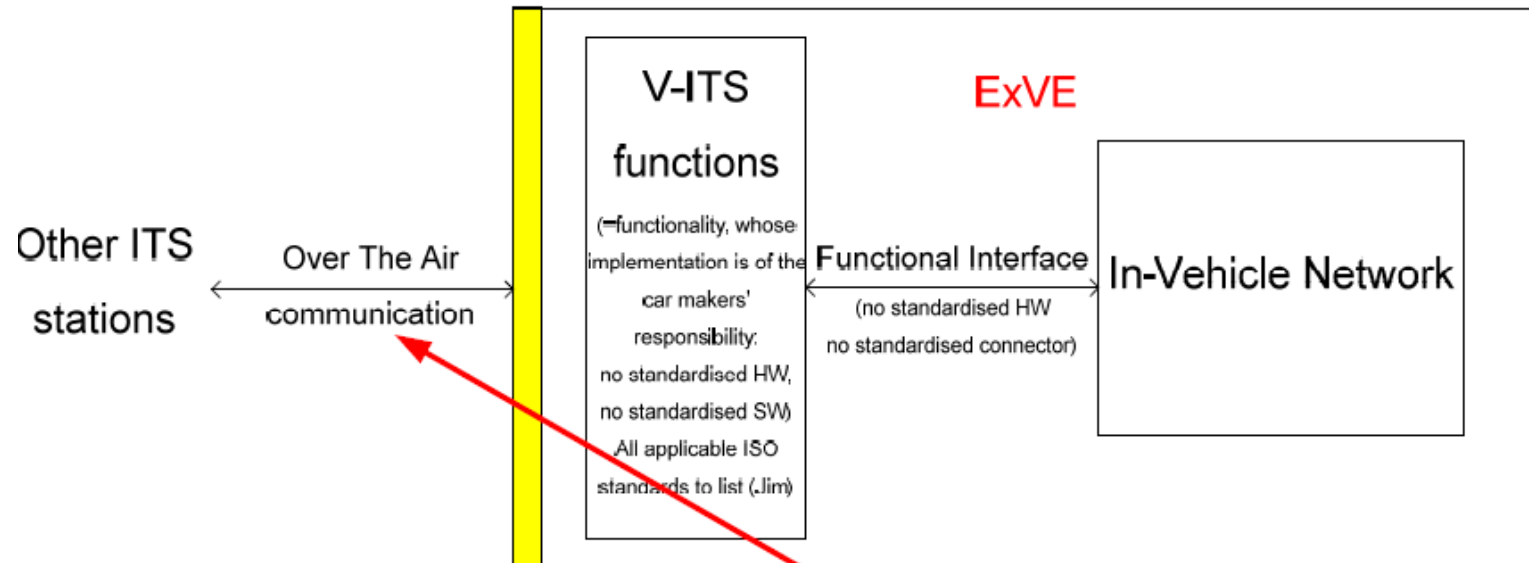
# ITS Stations (ISO TC204)



- Central ITS station
- Roadside ITS station
- Vehicle ITS station
- Vehicle ITS Station Gateway
- Personal ITS station

# V-ITS Interface Global functional diagram

## □ TC22 Proposal



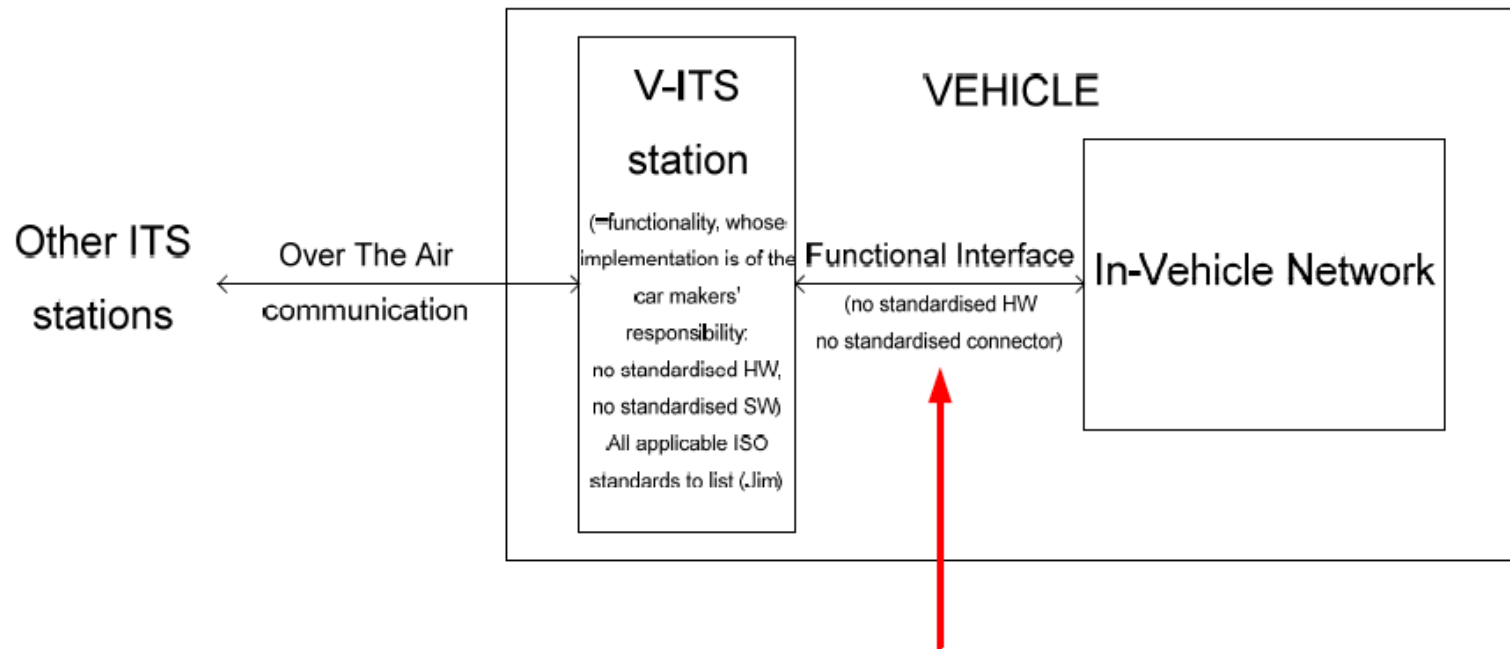
Place of the work of the TF = specification of the V-ITS interfaces

*with other ITS stations*

+ ExVE boundary: V-ITS function inside the Extended Vehicle

# V-ITS Interface Global functional diagram

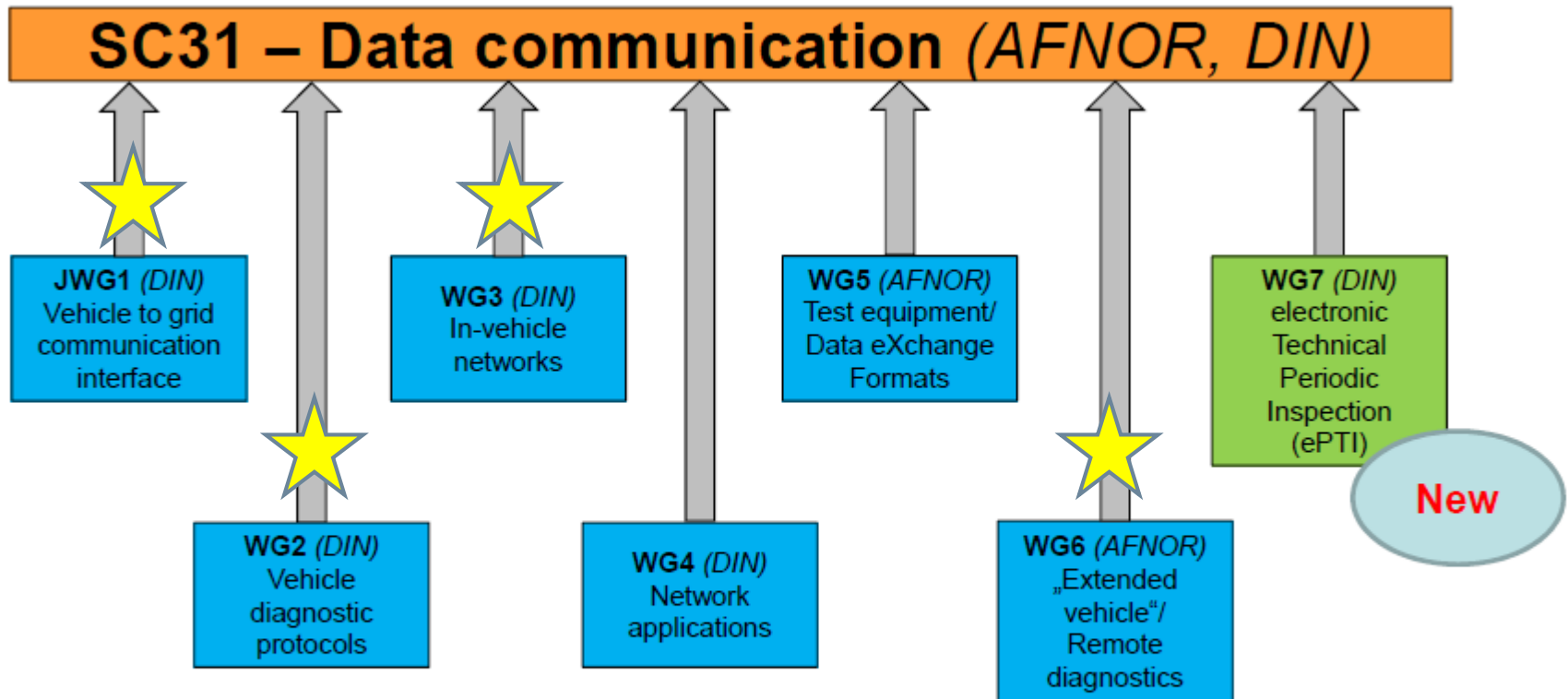
## □ TC204 Proposal



Place of the work of the TF = *specification of the V-ITS function*  
inc. abstraction avoiding specification of HW/SW  
+ ExVE boundary: *V-ITS function inside the Extended Vehicle*

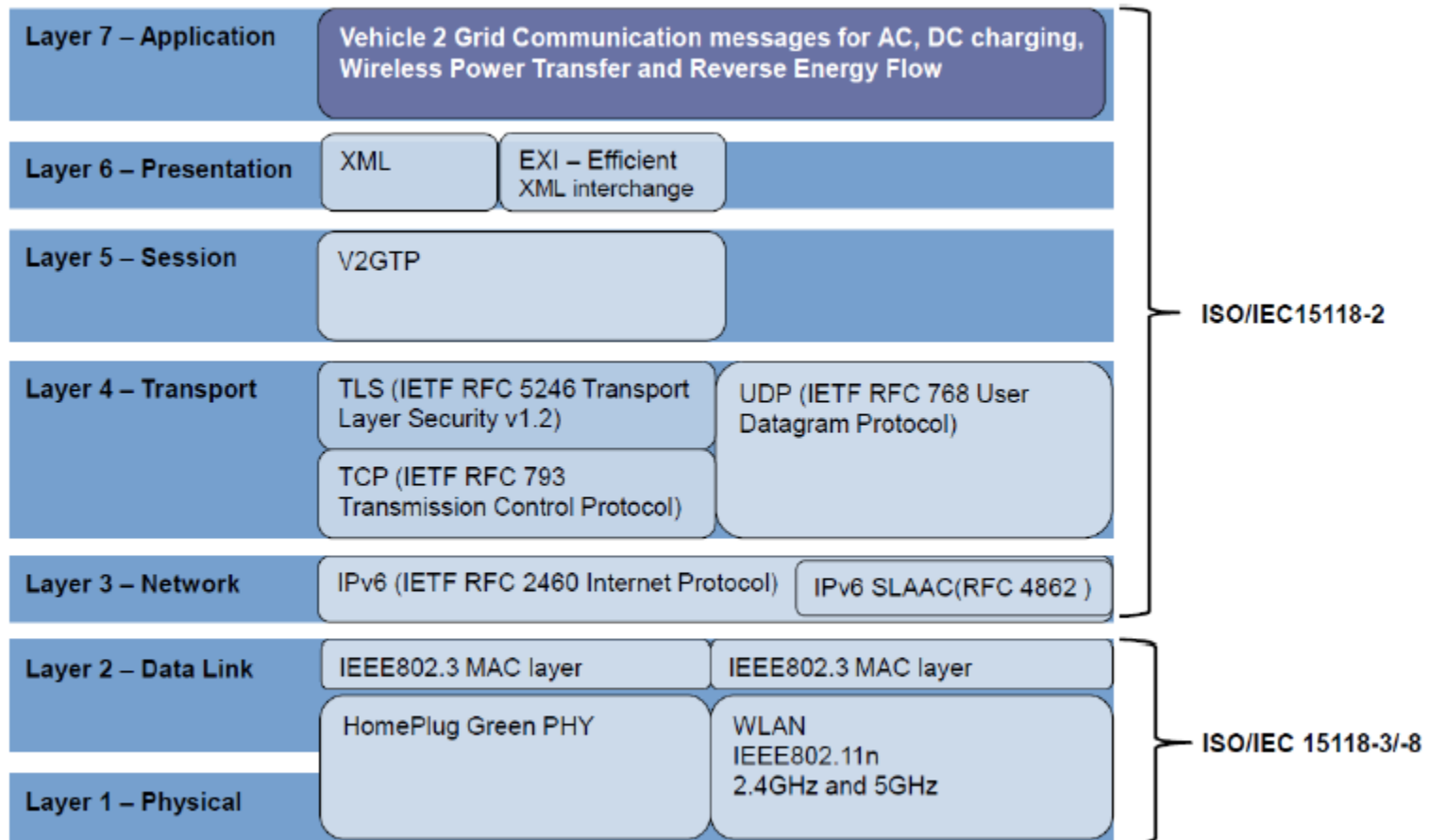
# ISO TC22 SC31 Data Communication

## □ Structure



# ISO TC22 SC31 Data Communication

## □ JWG1 Major Projects



(ISO/IEC 15118 Road vehicles- V2G Communication interface)



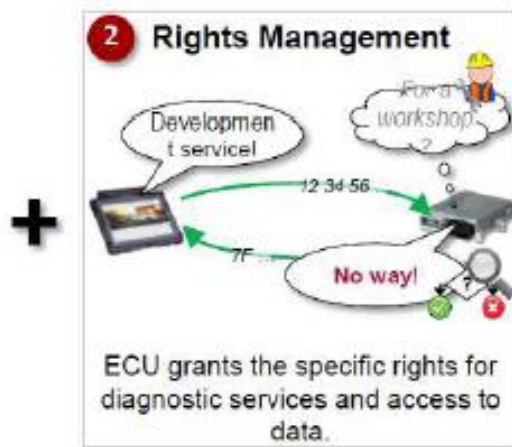
# ISO TC22 SC31 Data Communication

## □ WG2 Major Activity (Secure vehicle diagnosis)

Secure Diagnosis has three main components:



... is the base for Rights Management and Secure Communication.



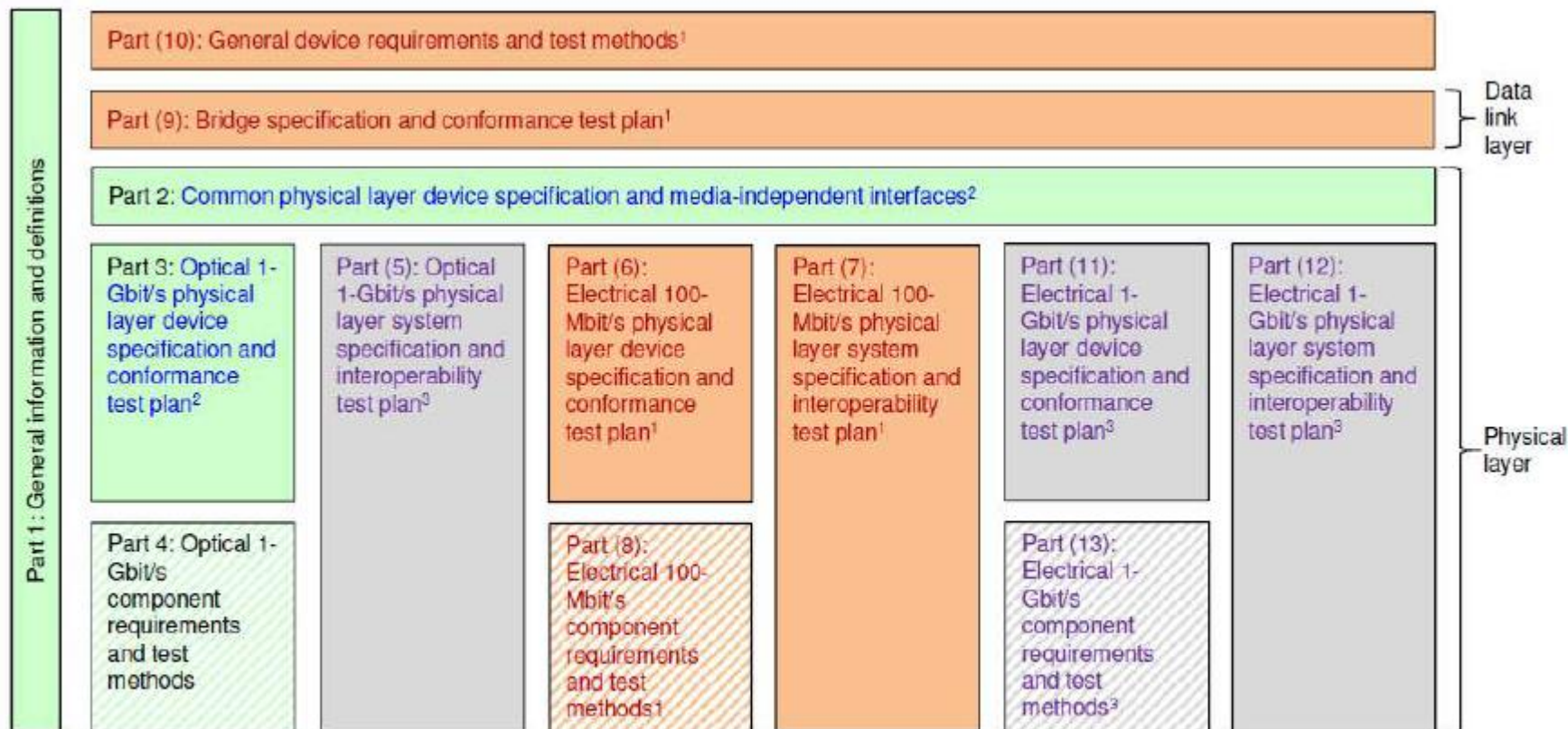
... is the base for controlling access rights.



... is the base for a secure rights management.

# ISO TC22 SC31 Data Communication

## □ WG3 Major Activity (In-vehicle Ethernet)



<sup>1</sup> New work item proposal to be submitted 2017   <sup>2</sup> Part title to be changed   <sup>3</sup> Requires NWIP, submission by other parties or at other times

## □ **WG6 Major Activity (Extended Vehicle)**

### ■ Active projects

- ISO/FDIS 20077-1; Road Vehicles -- Extended vehicle (ExVe) methodology -- Part 1: General information
- ISO/DIS 20077-2; Road Vehicles -- Extended vehicle (ExVe) methodology -- Part 2: Methodology for designing the extended vehicle

### ■ Projects in preparation for CD-ballot

- ISO/CD 20078-1; Road vehicles -- Extended vehicle (ExVe) 'web services' -- Part 1: ExVe content
- ISO/CD 20078-2; Road vehicles -- Extended vehicle (ExVe) 'web services' -- Part 2: ExVe access
- ISO/CD 20078-3; Road vehicles -- Extended vehicle (ExVe) 'web services' -- Part 3: ExVe security
- ISO/CD 20078-4; Road vehicles -- Extended vehicle (ExVe) 'web services' -- Part 4: ExVe control
- ISO/WD 20080; Road vehicles -- Information for remote diagnostic support -- General requirements, definitions and use cases

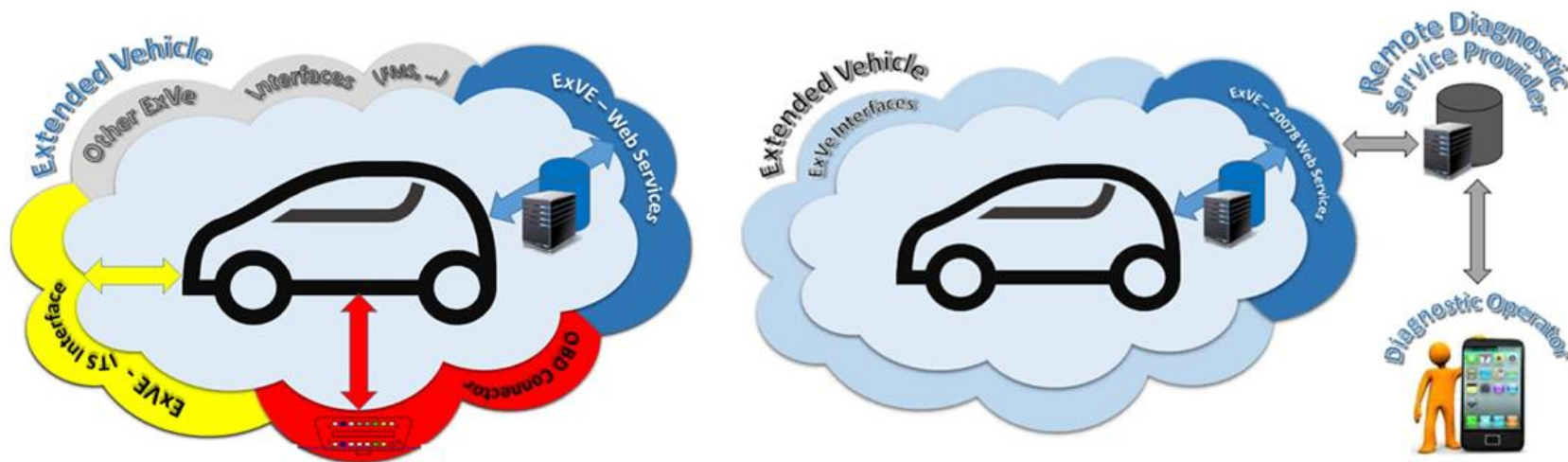
# Extended Vehicle Concept

## ■ ExVe

Elements required by the VM manufacturer to ensure his liability

An entity, still in accordance with the specifications of the vehicle manufacturer, that extends beyond the physical boundaries of the road vehicle and consists of

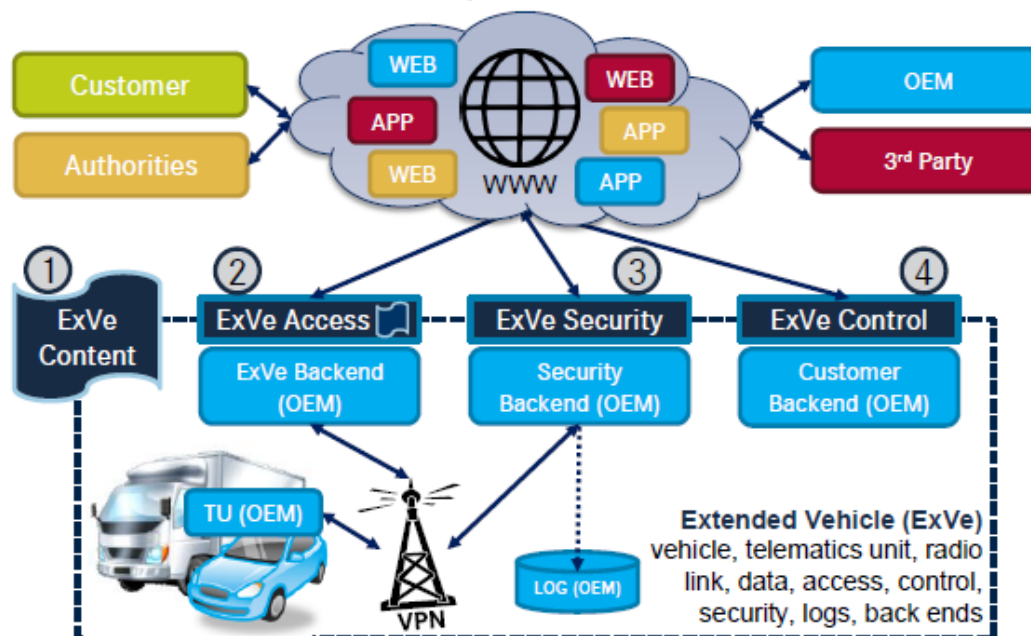
- the road vehicle;
- off-board systems;
- external interfaces;
- the data communication between road-vehicle and the off-board systems.





# ExVe Web Services

## The Extended Vehicle New Standardization Project ISO 20078

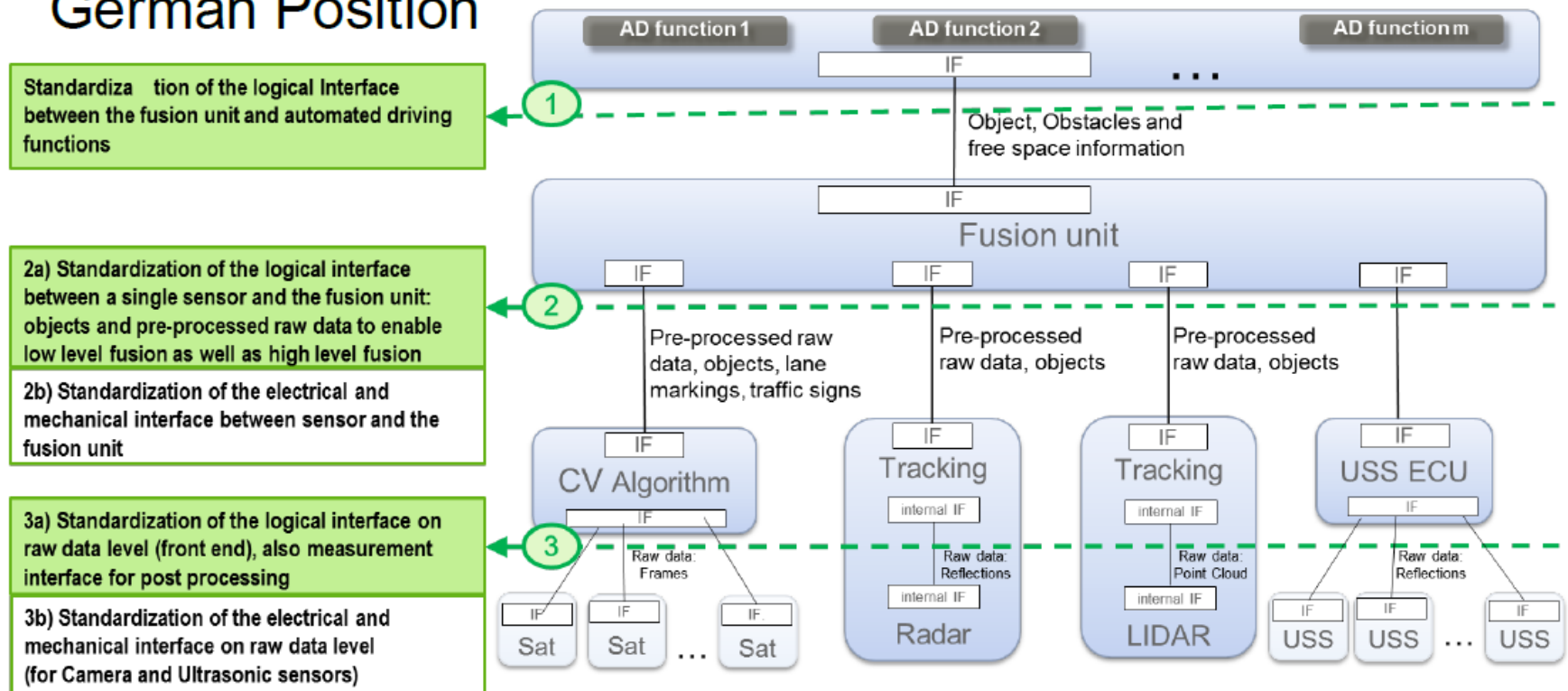


- ① **ExVe Content:** Defining the data content by a human readable data format; e.g. XML.
- ② **ExVe Access:** Defining the mechanism to read and alter data; e.g. https by WWW.
- ③ **ExVe Security:** Defining an end-2-end security mechanism; e.g. a timed certificate for each vehicle.
- ④ **ExVe Control:** Defining the customer portal; protection of data privacy and OEM's representation.

# ISO Standardization of DAS Sensors

## ISO Standardization of DAS Sensors German Position

VDA



# ISO Standardization of DAS Sensors

## ISO Standardization of DAS Sensors German Position



Area	Topic	Pro Standardization	Con Standardization
<b>Sensor Interfaces (IF)</b>  (see attached diagramm for details about the different IF 1, 2, and 3)	Logical	<ul style="list-style-type: none"> <li>Standardized output IF w.r.t. vertical data flow e.g. objects or pre-processed raw-data</li> </ul>	Complete, fixed data formats not possible <ul style="list-style-type: none"> <li>too OEM specific</li> <li>innovation requires new or extended formats</li> </ul>
	Electrical	Reduce variants and development effort e.g. <ul style="list-style-type: none"> <li>preferred IF for Radar and Video are CAN-FD or Ethernet (no FlexRay)</li> <li>Video-out without compression losses</li> <li>USS with 3-wire-IF with digital data line</li> </ul>	Different OEM-specific E/E architectures and safety concepts could require more than one electrical interface
	Mechanical	Unified connector type	Sensor size & vehicle assembly standardization not recommended due to large differences (limits innovation and cost optimization)
	Vehicle data (downlink)	Information demand of sensor system <ul style="list-style-type: none"> <li>parameters like vehicle movement, status, etc.</li> <li>quality, tolerances, update rates, etc.</li> </ul>	different OEM-specific E/E architectures and logical interfaces

## **ISO TC204**

- **Vehicle Interface**

**WG17: ISO 13185 series**

**WG18: ISO/AWI 21177, 21184, 21185**



# Vehicle interface (1)

- ISO 13185 ITS- Vehicle interface for provisioning and support of ITS services – Part 1: General information and use cases definition

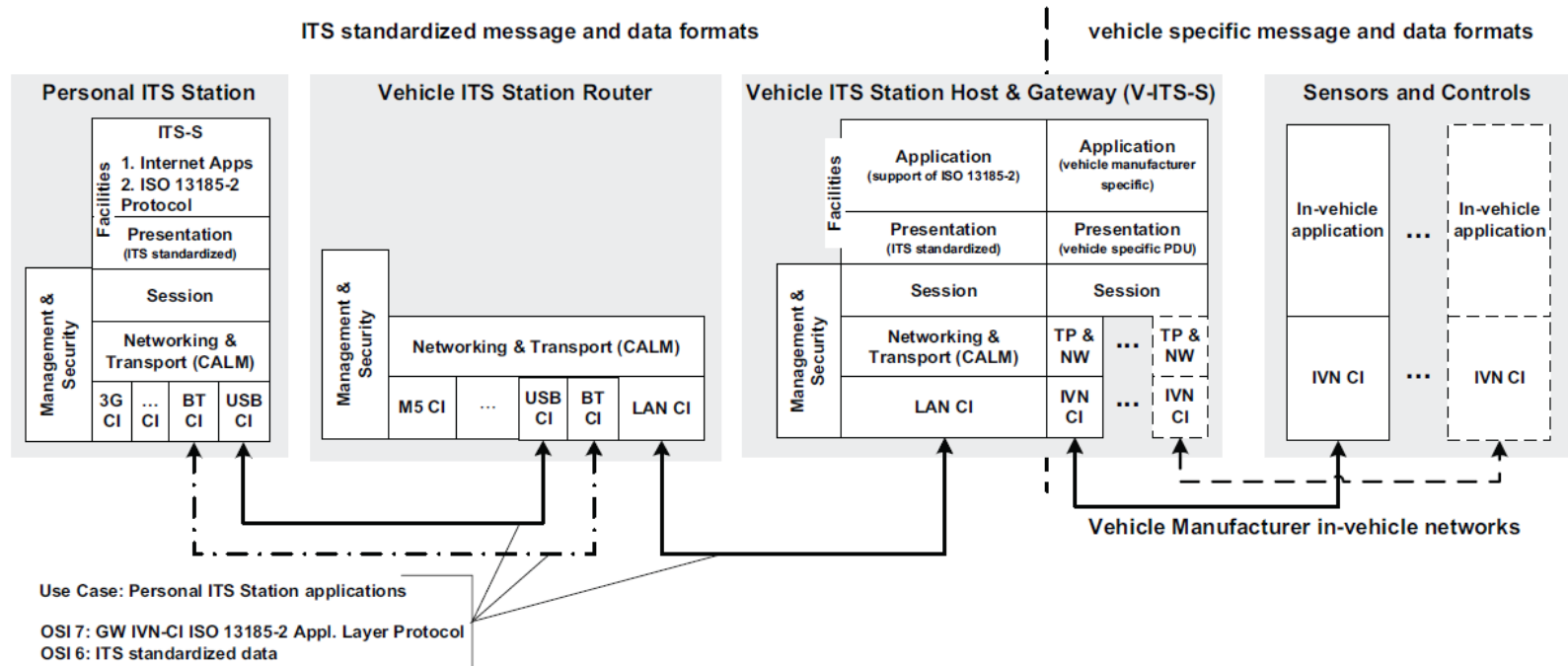


Figure 2 — Vehicle-ITS-Station Gateway implementation based on CALM architecture

# Vehicle interface use cases

- ISO 13185 ITS- Vehicle interface for provisioning and support of ITS services – Part 1: General information and use cases definition

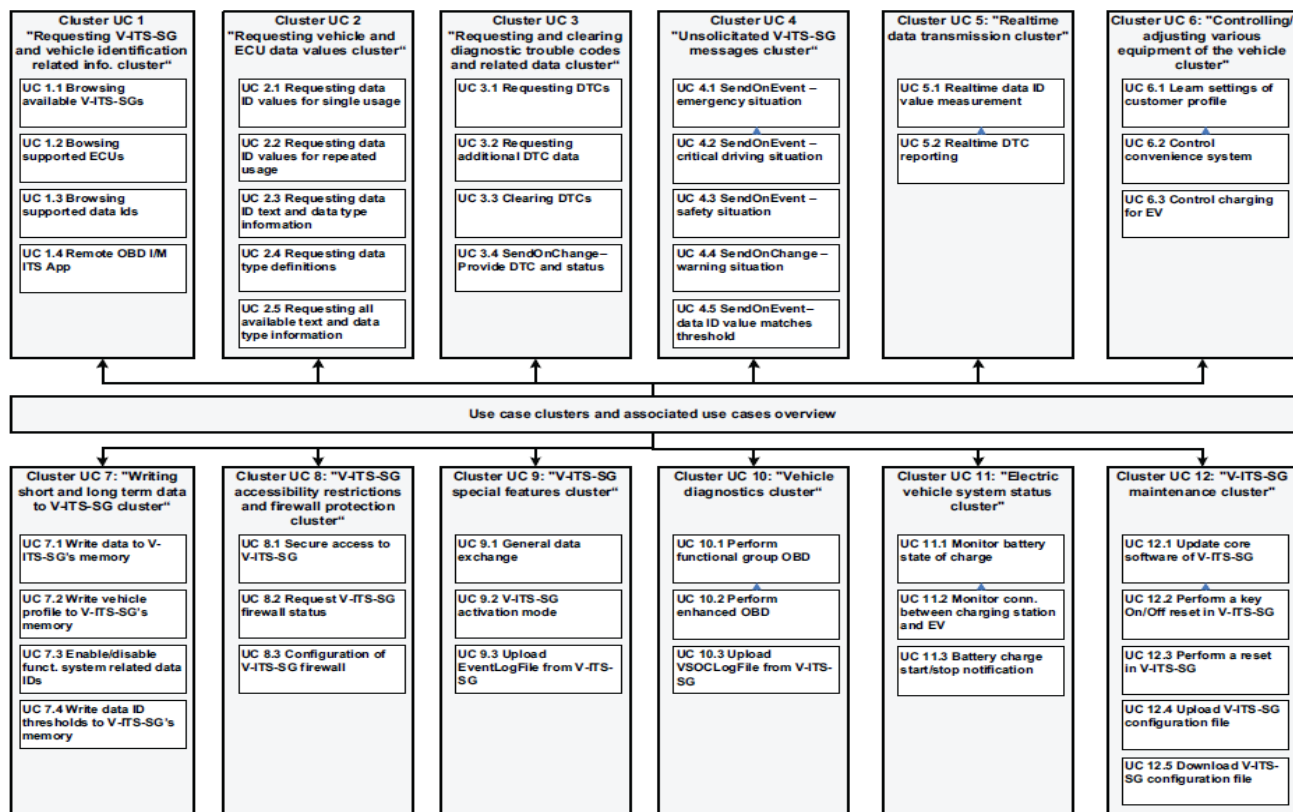


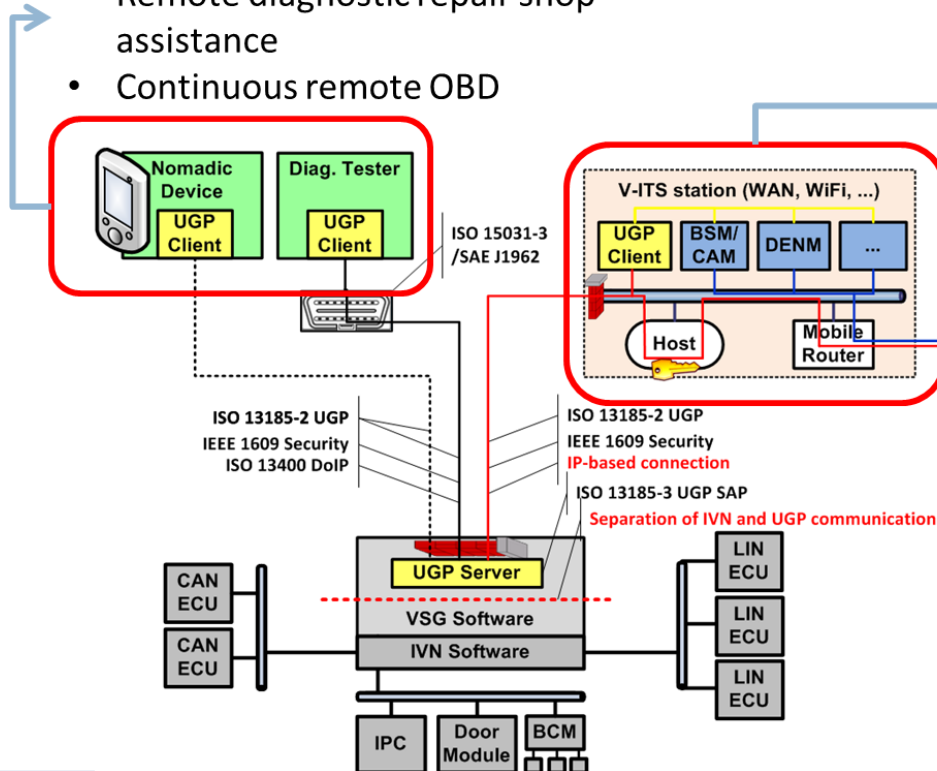
Figure 14 — Use case workflow and dependencies

# UVIP: Standardized Gateway

- ISO 13185 ITS- Vehicle interface for provisioning and support of ITS services – Part 2: Unified Vehicle Interface Protocol(UVIP) requirements and specification

- **Type1**

- Remote diagnostic repair shop assistance
- Continuous remote OBD

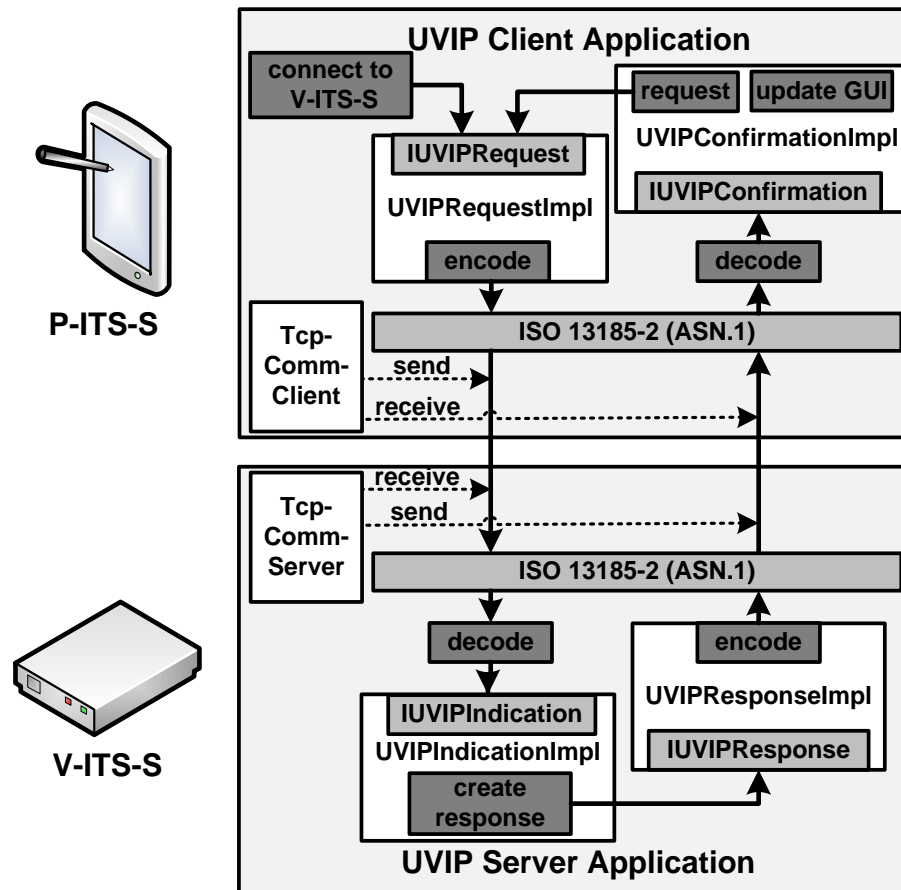


- **Type2**

- Real-time to in-vehicle data for safety of life and property application(e.g. collision avoidance)
- Real-time access to in-vehicle data for event notification(DENM)

# UVIP Server and Client APIs

- ISO 13185 ITS- Vehicle interface for provisioning and support of ITS services – Part 3: Unified Vehicle Interface Protocol(UVIP) server and client APIs



# ISO TC204 WG18 New Work Items

- ISO/NP 21185: Intelligent Transport Systems -- Secure vehicle interface -- Communication profiles for secure connection between an ITS-station and a vehicle
- ISO/NP 21184: Intelligent Transport Systems -- Secure vehicle interface -- Data dictionary of vehicle-based information for C-ITS applications
- ISO/NP 21177: Intelligent Transport Systems -- Secure vehicle interface -- ITS-station security services for secure session establishment and authentication

# ISO TC204 WG18 New Work Items

- ISO/NP 21185: Intelligent Transport Systems -- Secure vehicle interface -- Communication profiles for secure connection between an ITS-station and a vehicle
  - This International Standard contains specifications for the use of existing ISO standardized communication protocols to connect an ITS-station to a vehicle enabling secure low-latency information exchange.
  - These specifications will be in the form of profiles for using existing protocols at the various OSI layers (physical, data link, network, transport, and session) for communication between the vehicle (IVN gateway) and the ITS station.
  - Such exchanges are essential for many C-ITS applications and services including time-critical safety applications and automated driving.

# ISO TC204 WG18 New Work Items

- ISO/NP 21184: Intelligent Transport Systems -- Secure vehicle interface -- Data dictionary of vehicle-based information for C-ITS applications
  - This International Standard contains specifications for the dictionary of data elements to be exchanged between an ITS-station and a vehicle using secure low-latency communication resources.
  - These specifications will include ASN.1 specifications of data elements along with an encoding scheme (e.g. DER) which will provide a “common language” for IVN data exchange between a vehicle (IVN gateway) and an ITS station.
  - Such exchanges are essential for many C-ITS applications and services including time-critical safety applications and automated driving.



# ISO TC204 WG18 New Work Items

- ISO/NP 21177: Intelligent Transport Systems -- Secure vehicle interface -- ITS-station security services for secure session establishment and authentication
  - This International Standard contains specifications for a set of security services required to ensure the authenticity and integrity of information exchanged between a vehicle and a V-ITS-S.
  - These services include authentication and secure session establishment which are required to exchange information between a vehicle and a V-ITS-S in a trusted and secure manner.
  - These services are essential for many C-ITS applications and services including time-critical safety applications and automated driving



# **SAE Vehicle Interface**

2020 Vehicle Interface Methodology

# Vision – Similar to ISO vehicle gateway standard

## **WHY**

A common approach to add OBE (On-Board Equipment) to new and existing light and commercial vehicle electrical systems.

## **GAP**

The OBDII diagnostic port and its associated interface standards are being used for purposes that go beyond its intended use and capabilities.

Various vehicle interfaces for adding safety and mobility related hardware and software including applications, gateways, etc. have been developed, are being developed, or are under consideration.

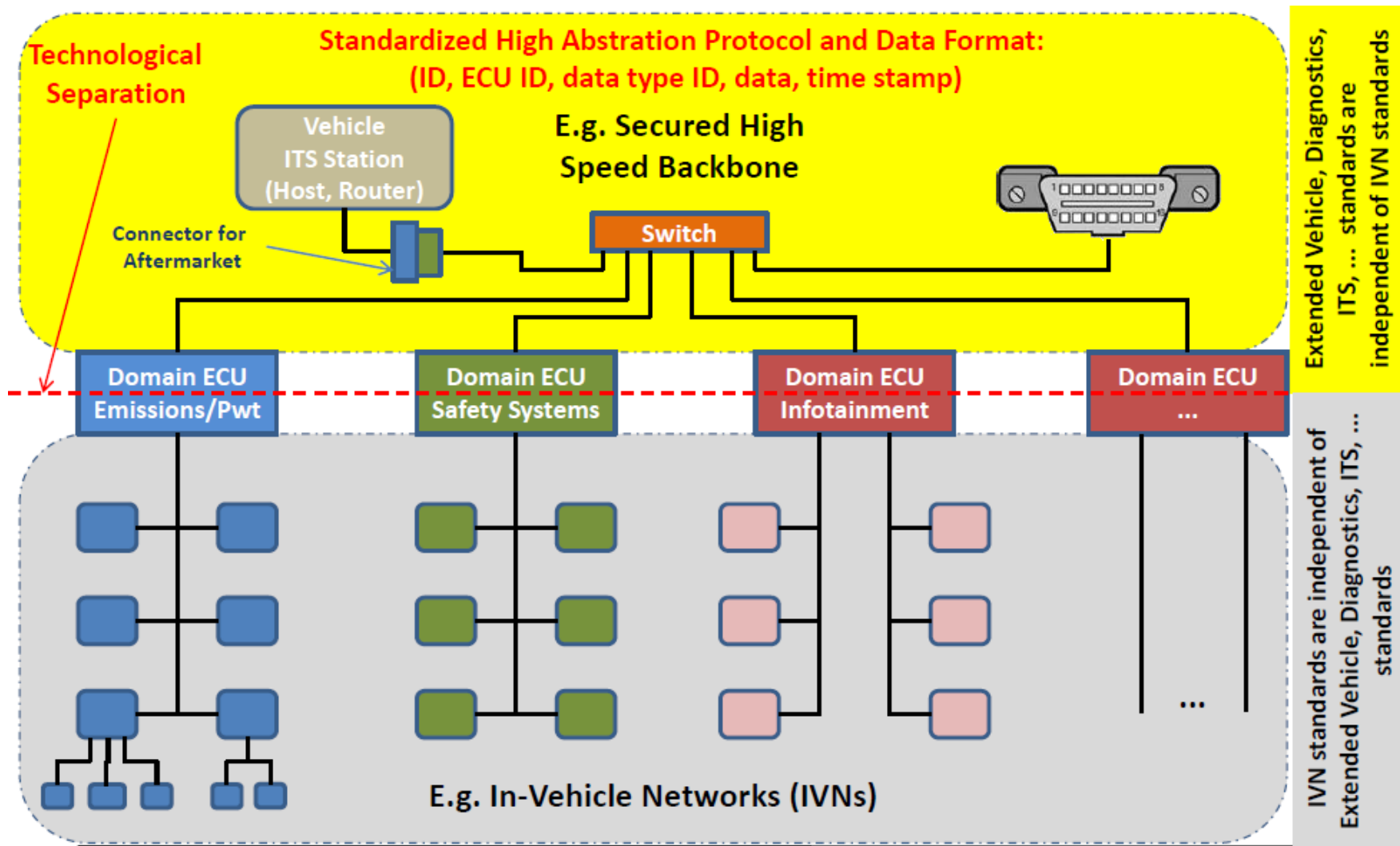
## **PURPOSE**

To address the mechanical, electrical, signal level, and software data message interfaces required to equip new vehicles and to retrofit existing vehicles with various ITS applications such as V2X, automated driving, IoT, etc.

# How to accomplish Technological Separation

- **Maintain/Simplify competitive B2B of secured in-vehicle data access**
  - In-vehicle network protocol and data format details should not be part of the future B2B (VMs and IOs/Aftermarket)
  - The future B2B must be based on high level abstract protocol and standardized data format, ...
- **Reduction and simplification of standards required for external test equipment (diagnostic connector) and remote applications (Telematics)**
  - Single protocol with high abstraction of services and data format
- **Support of ITS real-time Use Cases**
  - Active safety with V2I/I2V
  - ADAS
  - Traffic Management data submission
  - ...
- **Standards support for new and retrofit vehicles**
  - Define the mechanical, electrical, signal level, and software data message interfaces required to equip new vehicles and to retrofit existing vehicles with various ITS applications such as V2X, automated driving, IoT, etc.

# Example of technological separation of in-vehicle systems and external test equipment/remote application (ExVe)



## **ISO TC204 WG17**

NP 21735: Plug & Play (PnP) functionality in vehicles

PWI 22086-1: Network-based Precise Positioning Infrastructure

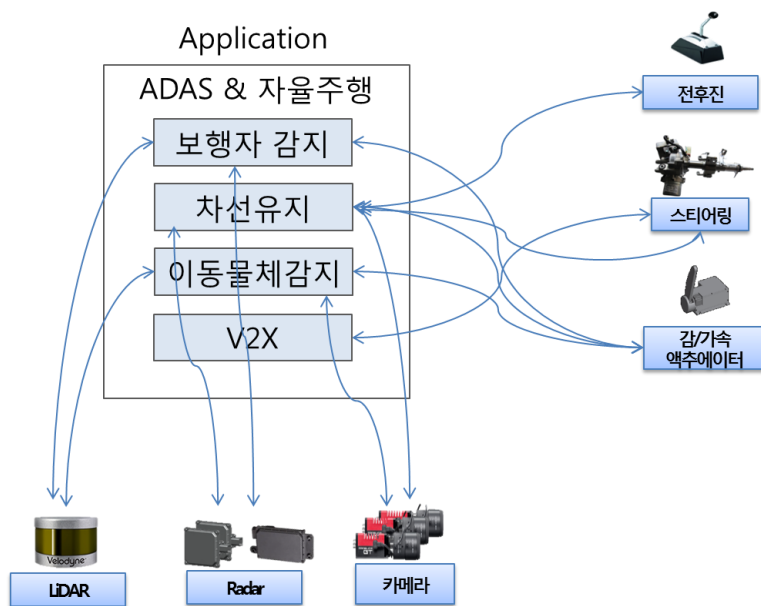
CD 20530: Emergency service support via P-ITS station

CD 17348: Indoor Navigation

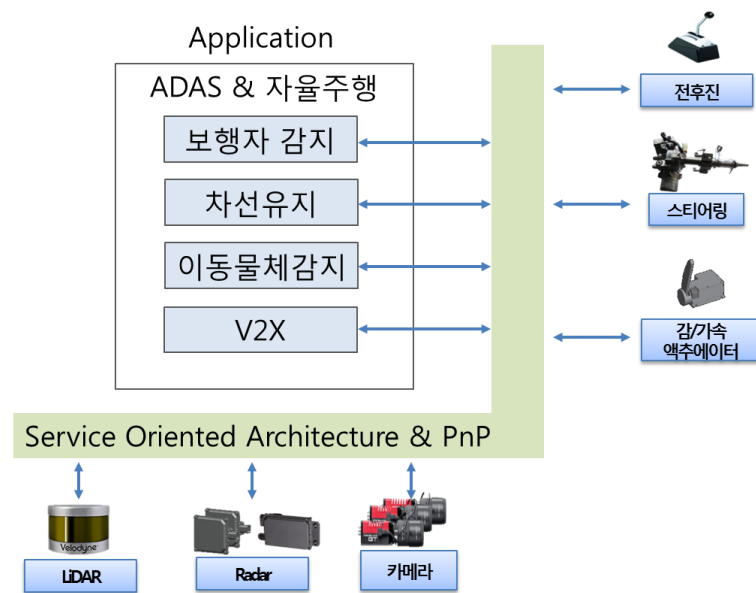
# Plug & Play (PnP) functionality in vehicles

ISO/NP 21735

- Future architecture of vehicle electronics – PnP
  - Definition of plug and play in a vehicle
    - Freely attaching/detaching/switching devices in a vehicle both at before/after market
    - PnP available devices: sensors, actuators, head unit, etc.



응용과 부품간 연결 복잡 (Strong dependency)



응용과 부품간 연결 복잡 (Strong dependency)

PG905 Meeting

Service Oriented Architecture & PnP

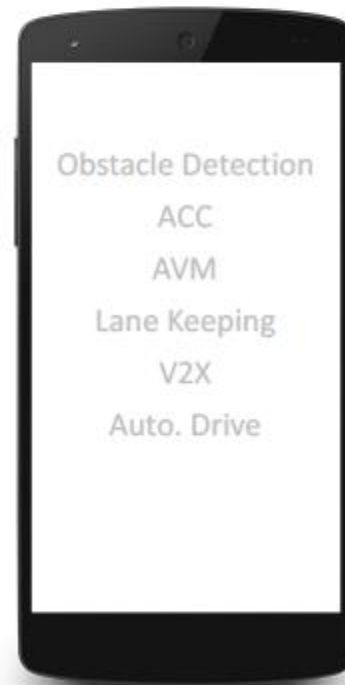
# Use Case: PnP Vehicle to Nomadic Device

ISO/NP 21735



## Use Case: PnP Vehicle to Nomadic Device

Radar



TC204 WG17 Paris Meeting 2017

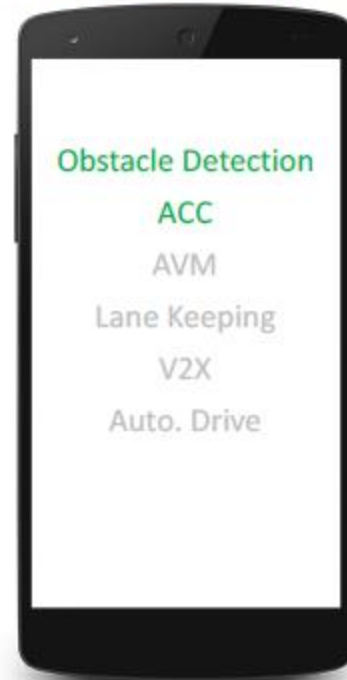
# Use Case: PnP Vehicle to Nomadic Device

ISO/NP 21735

## Use Case: PnP Vehicle to Nomadic Device



Radar  
CAM



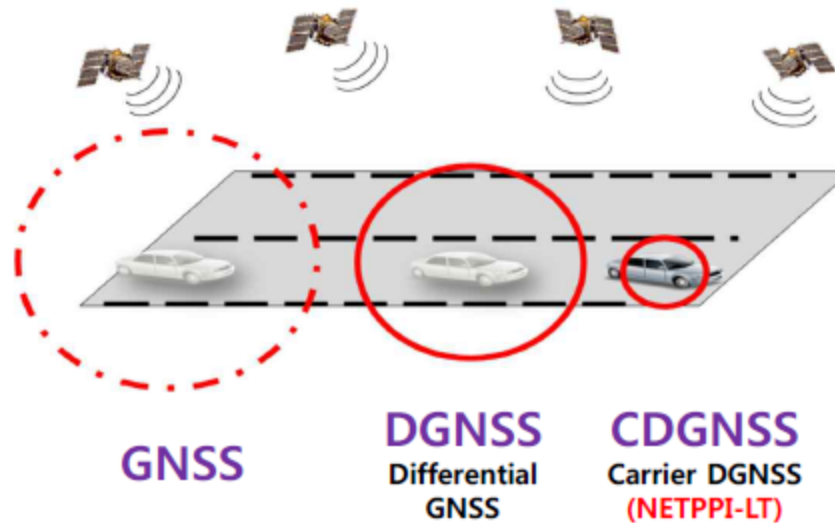
TC204 WG17 Paris Meeting 2017



# Network-based Precise Positioning Infrastructure

ISO/PWI 22086-1

- This project provides the framework guidelines **to identify lane-level positioning technologies using satellite navigation and related standards** required to deploy, manage, and operate NETPPI-LT.
- NETPPI-LT provides the GNSS carrier phase measurement correction and integrity information to users carrying nomadic devices, equipped with low-cost (single frequency) GNSS receivers and wireless communication devices, to perform lane-level positioning and integrity monitoring.

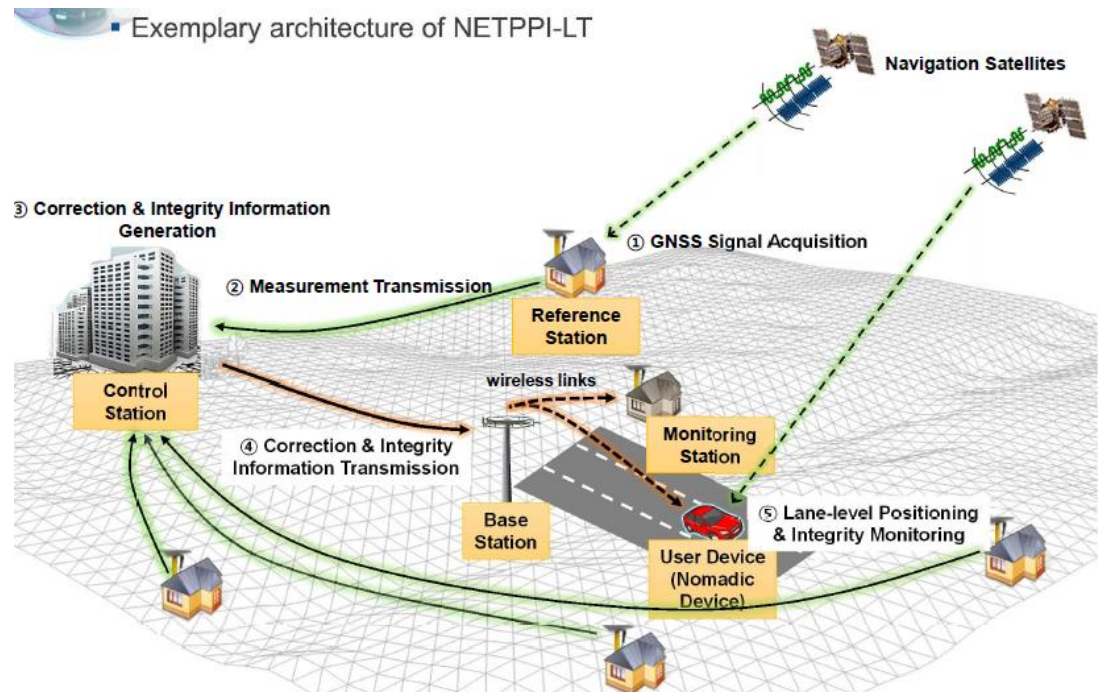


# Network-based Precise Positioning Infrastructure

ISO/PWI 22086-1

The framework described in this standard includes

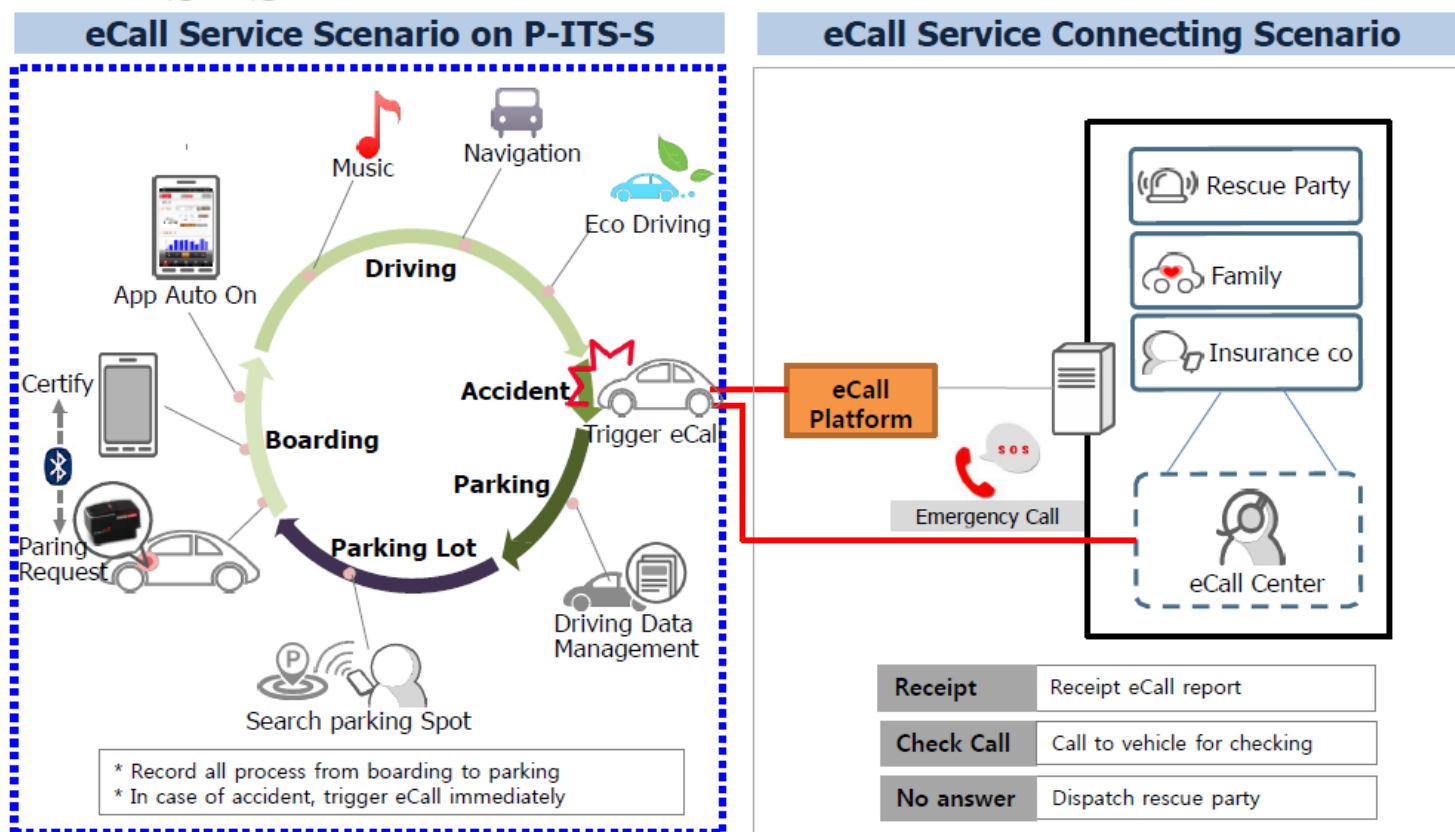
- Exemplary architecture for NETPPI-LT enabling lane-level positioning and integrity monitoring on nomadic devices
- Guidelines for providing a real-time lane-level positioning service by NETPPI-LT based on GNSS
- Guidelines to facilitate the practical implementation of NETPPI-LT including related use cases



# Emergency service support via P-ITS station

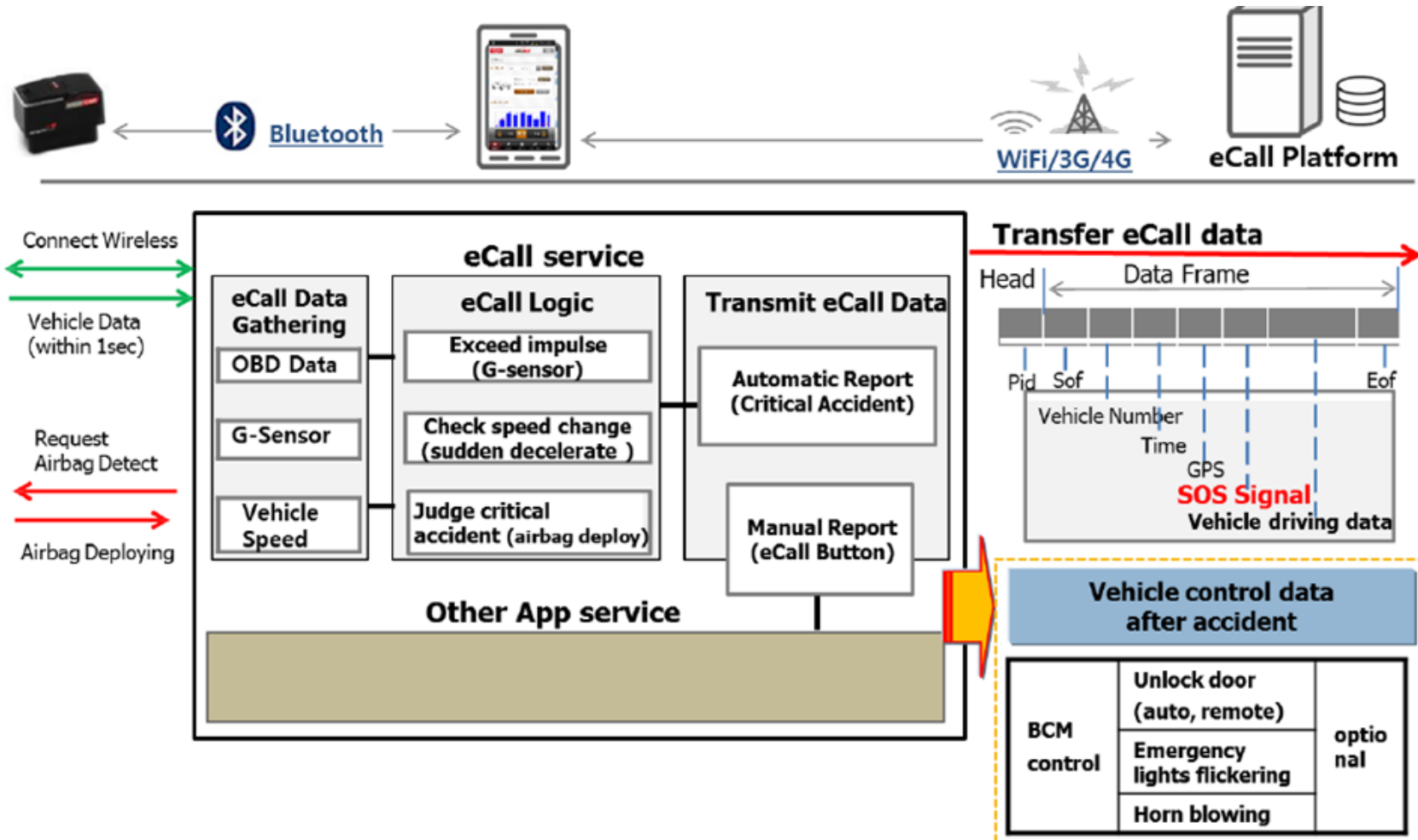
ISO/CD 20530

- Information for emergency service support via Personal ITS station – General requirements and technical definition



# Analyzing the vehicle data & Judgement

ISO/CD 20530



## □ Existing EU Standards

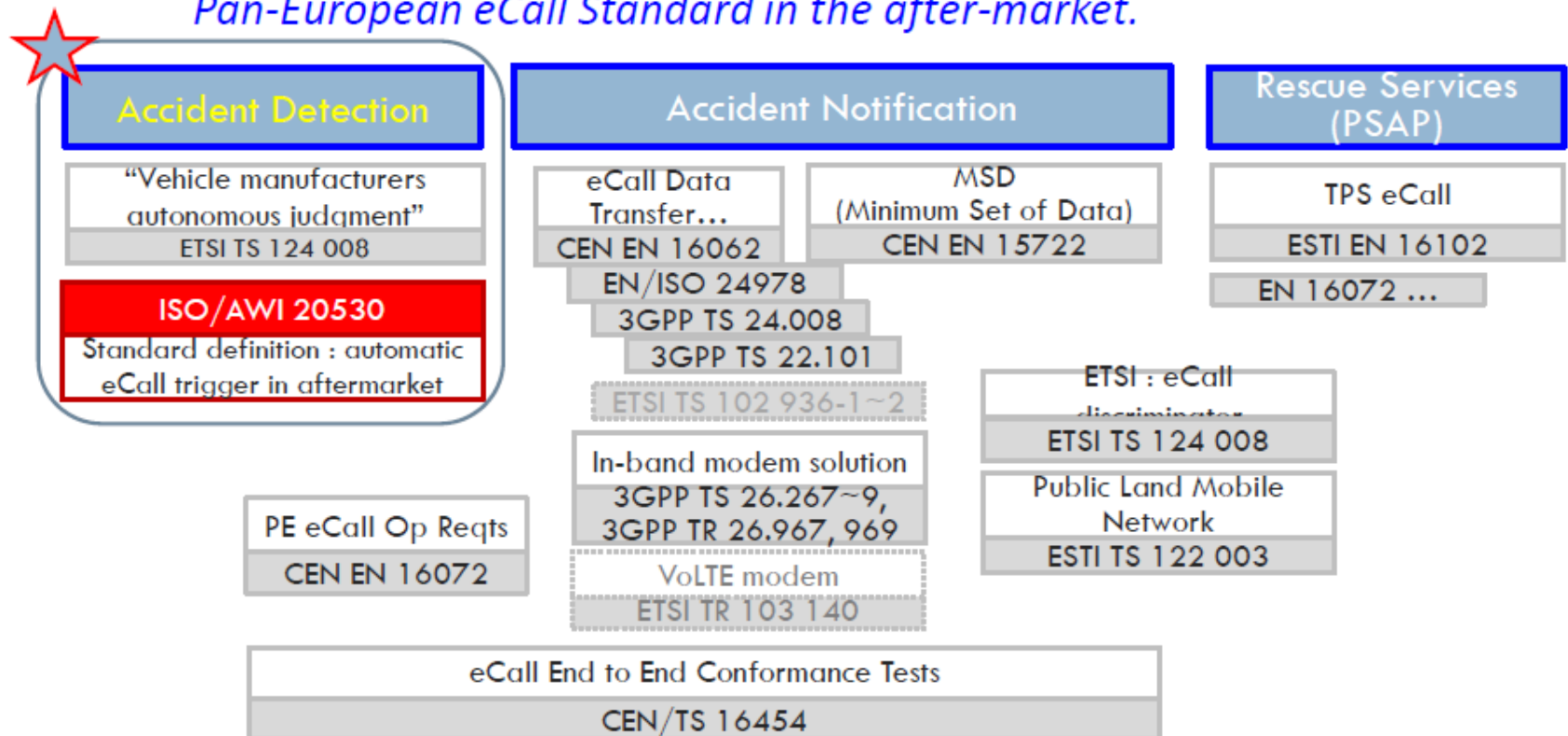
- eCall service can be classified into Accident Detection, Accident Notification, and Emergency Service. However according to existing Pan-European eCall Standard, it only focuses on Accident Notification and Emergency Service.
- The only service technical requirement from guidelines is differentiating 112 calls and between manually and automatically triggered eCall. The requirements for in-vehicle system has not stated how an accident detection should be decided.

## □ Purpose of ISO 20530

- Purpose of ISO/NP 20530 is to set a standard of an accident detecting system for after-market manufacturer. According to **HEERO eCall guidelines v1.1**, it has stated that after-market needs to put responsibility to design the eCall in-vehicle system that can obtain the necessary information.
- The standard shall define fundamental accident determination logic and requiring data such as Speed, Impact, and Airbag deployment to determine an accident.

## □ Gap Analysis between existing ETSI · CEN standards for eCall and ISO/AWI 20530

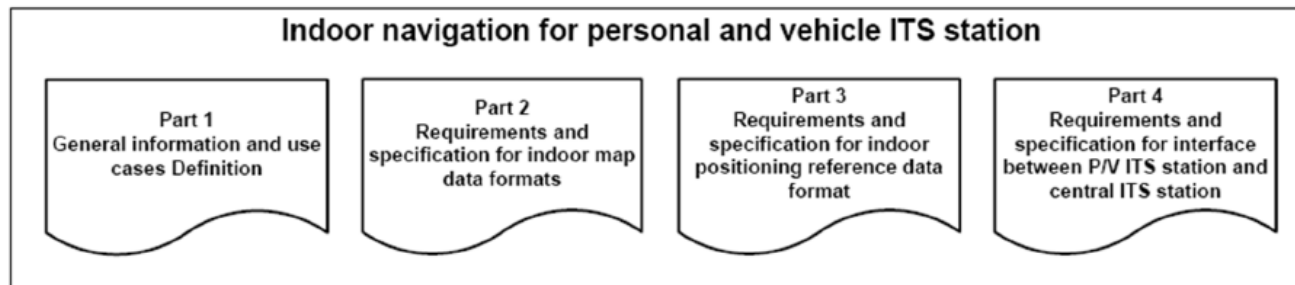
- *ISO/AWI 20530 defines accident detection that is not stated in the Pan-European eCall Standard in the after-market.*





## Overview ISO 17438

- ❖ ISO 17438: Intelligent transport systems(ITS) – Indoor navigation for personal and vehicle ITS station
- ❖ Purpose
  - To Provide service interfaces and specifications for ITS/Telematics applications via nomadic devices to enable the functionality of indoor navigation
- ❖ Proposed Structure
  - Part 1: General information and use cases definition
  - Part 2: Requirements and specification for indoor map data format
  - Part 3: Requirements and specification for indoor positioning reference data format
  - Part 4: Requirements and specification for interfaces between P/V and central ITS station

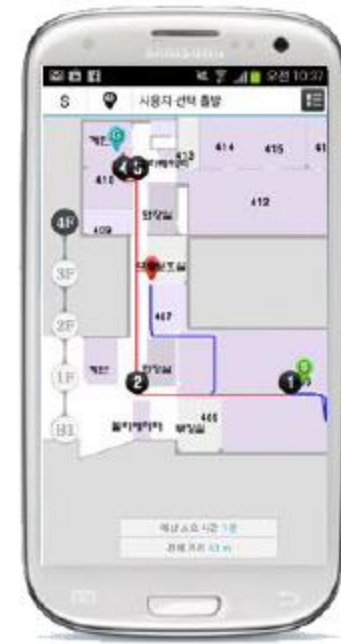
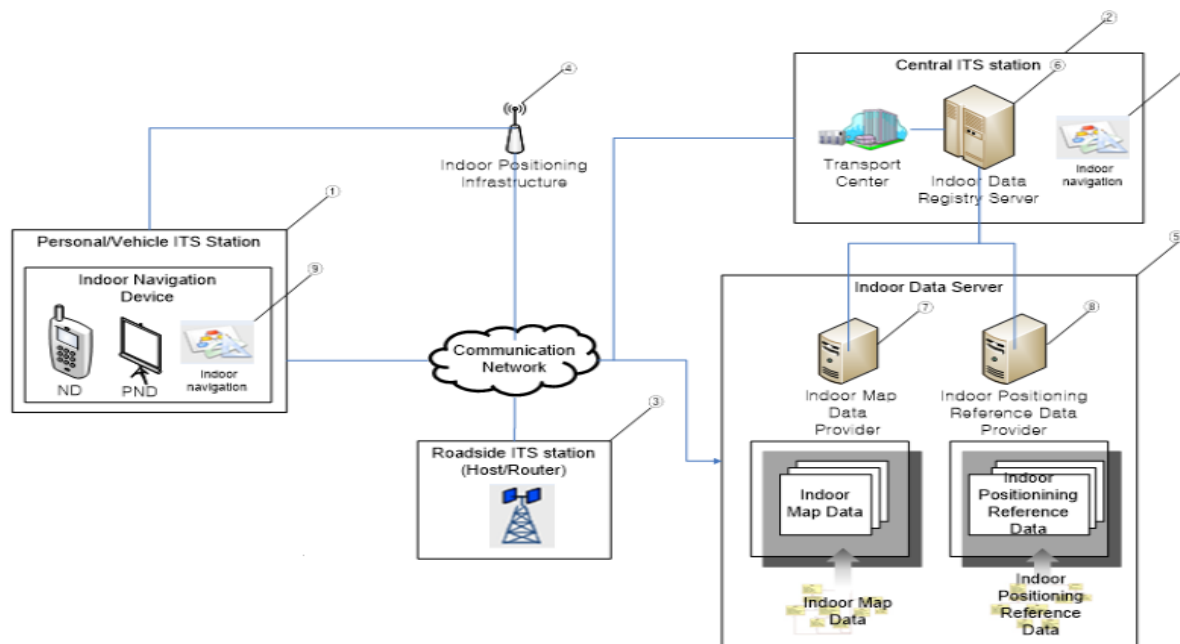




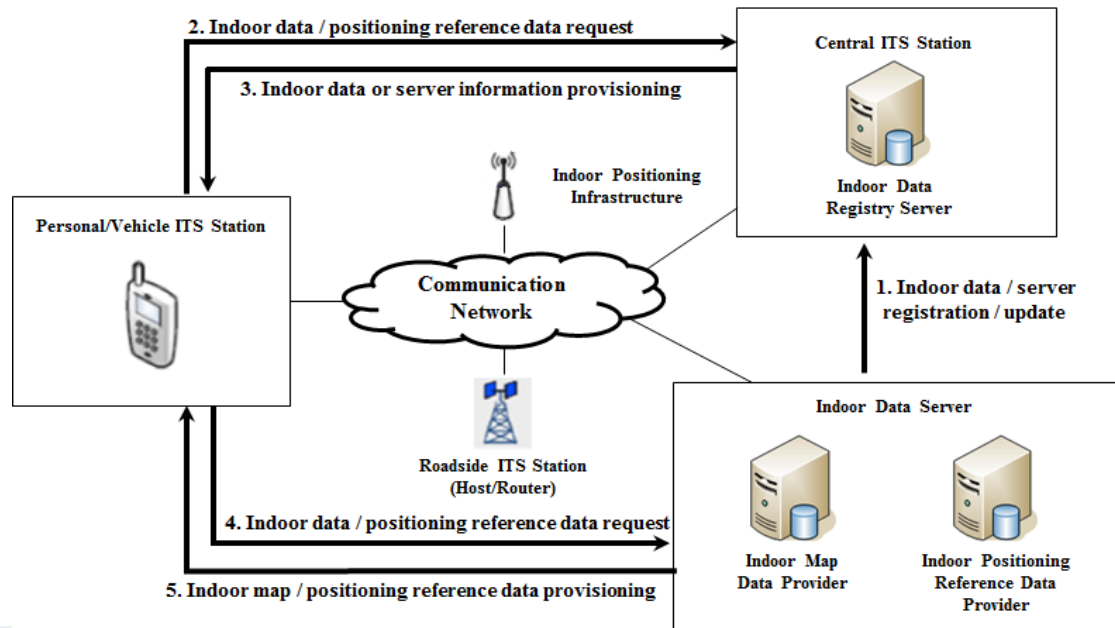
# Indoor Navigation

ISO/CD 17438

- IS 17438-1: Indoor navigation for personal and vehicle ITS stations – Part 1: General information and use cases definition
- CD 17438-4 : Indoor navigation for personal and vehicle ITS stations – Part 4: Interface between PV-ITS-S to Local Center



- *Scope: to specify interface requirements and spec. for map and indoor positioning infrastructure data related to the P/V and Central ITS stations*
  - How to publish indoor navigation data
  - How to find indoor navigation data for a specific indoor space
  - How to access the specific indoor navigation data





# 감사합니다

*If you have any questions,  
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