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MOBILITY AND C-ITS SYSTEMS

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Mobility and C-ITS systems



- ITS regulatory framework
- C-ITS standardization mandate M/453
- ITS reference model
- Next ITS Services: standardization activities

ITS REGULATORY FRAMEWORK

ITS regulatory framework in EU

Cooperative-ITS framework

EU C-ITS Strategy

C-ITS in ISO, CEN and ETSI

ITS regulatory framework in EU



The European transport policies are mature, with good penetration in the market and are well defined:

- **Directive 2010/40/EU**
- **eCall type appr.**
- **Directive 2004/52 / EC and Decision 2009/750 / EC**
- **EU regulation on the Digital Tachograph : Regulation 165/2014**
- **EU Regulations on Weight & Dimensions 2015/719**
- **Directive Eurovignette: Directive 2011/76/UE**



Cooperative-ITS framework



Directive 2010/40/EU: Describe the common framework to implement interoperability services across all the European countries.

EC Decision 2008/671/EC : introduced throughout Europe a new frequency bandwidth (5 875 to 5 905 GHz) for safety-related ITS applications

EC request for standards Standardisation Mandate 453 for Intelligent Transport Systems: The Mandate is addressed to CEPT, CEN and ETSI to support the interoperability of C-ITS systems in the European Community.



C-ITS in ISO, CEN and ETSI



ITS are defined as a a group of technologies and applications that allow data exchange vehicle-to-vehicle or V2V or vehicle-to-infrastructure or V2I/I2V and with the objective of improving safety, sustainability, efficiency and comfort beyond the scope of stand-alone systems.

A co-operative Intelligent Transport System (C-ITS) is a subset of the overall ITS that

- communicates and
- shares information

between ITS Stations to

- give advice or
- take actions with the objective of improving safety, sustainability, efficiency and comfort beyond the scope of stand-alone ITS

C-ITS STANDARDIZATION MANDATE M/453

M/453: ESOs related activities

Execution of M/453

Basic set of ITS applications

Day 1 services list

Frequencies allocations

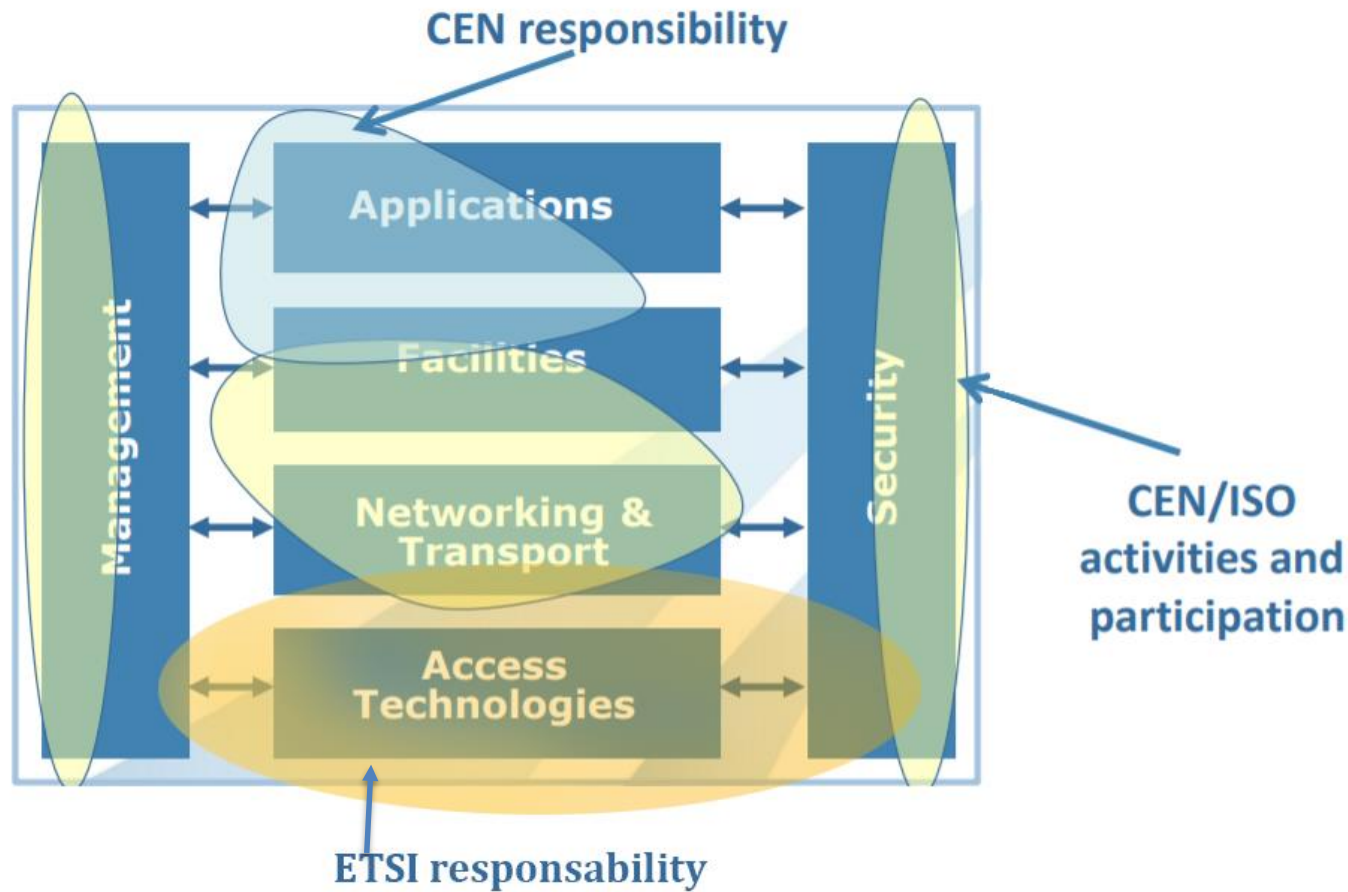
C-ITS standardization mandate M/453



Standardization mandate was addressed to CEN, CENELEC and ETSI in the field of Information and Communication Technologies to support the interoperability of C-ITS in the European Community Objective and address the ESOs to prepare a coherent set of standards, specification and guidelines to support European Community wide implementation and deployment of Co-operative ITS systems.

The results of the last required studies are expected before August 2018.

M/453: ESOs related activities



Execution of M/453



C-ITS scope at CEN

- V2V (5.9 GHz) active safety
- V2I/I2V (5.9 GHz) and V2I/I2V (3G/4G) active safety, traffic management, traffic control, traffic information, traffic guidance

ETSI TC ITS, CEN/TC278 and ISO/TC204 WG's commit to fulfill all M/453 requirements

CEN has the responsibility for the harmonization of C-ITS standards according to the EU-U.S. Research Cooperation in Cooperative Systems

Basic set of ITS applications



The basic set of ITS applications are grouped in ETSI TR 102 638 :

- road safety,
- traffic efficiency,
- co-operative local services,
- global internet services.



ITS safety-related applications, defined by the European Regulator in the **day 1 services**, will use the band **5875-5905 MHz**, realise the V2X I2X communication.

Day 1 services list



1. Emergency electronic brake light
2. Emergency vehicle approaching
3. Slow or stationary vehicle(s)
4. Traffic jam ahead warning
5. Hazardous location notification
6. Road works warning
7. Weather conditions
8. In-vehicle signage
9. In-vehicle speed limits
10. Probe vehicle data
11. Shockwave damping
12. GLOSA / TTG
13. Signal violation/Intersection safety
14. Traffic signal priority request by designated vehicles
15. Off street parking information
16. On street parking information and management
17. Park & Ride information
18. Information on AFV fuelling & charging stations
19. Traffic information and smart routing
20. Zone access control for urban areas
21. Loading zone management
22. Vulnerable road user protection
23. Cooperative collision risk warning
24. Motorcycle approaching indication
25. Wrong way driving

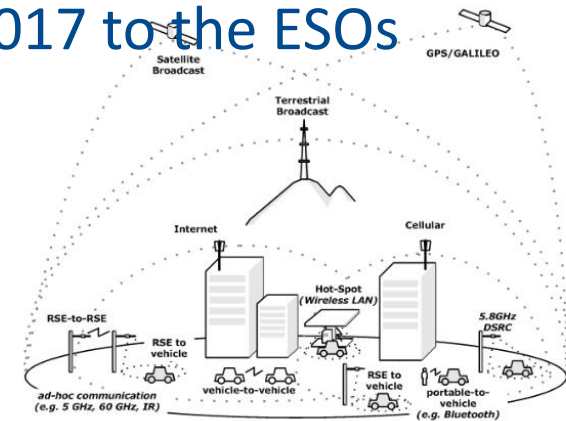
Frequencies allocations



Due to the fact that safety services will be exchanged between C-ITS devices in the 5.9 GHz frequency band, telco stakeholders are working in different tables to introduce the use of 5.9GHz frequency for the LTE-V2X (PC5).

This may cause probably problems of coexistence and interoperability.

EC under the M453 addressed in September 2017 to the ESOs (CEPT, CEN, ETSI) to study a possible solution.



ITS REFERENCE MODEL

ITS station architecture

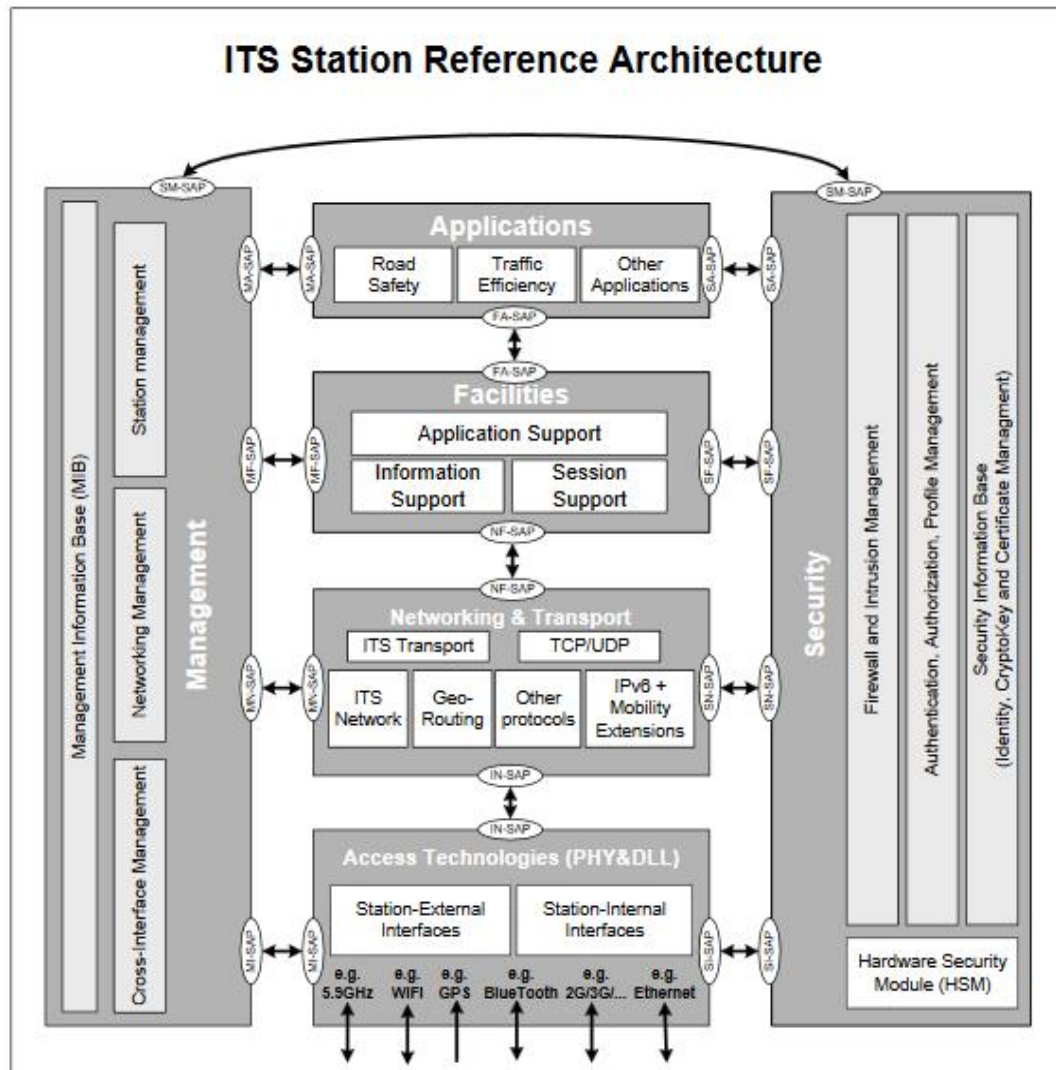
System Architecture and Interfaces

C-ITS vision

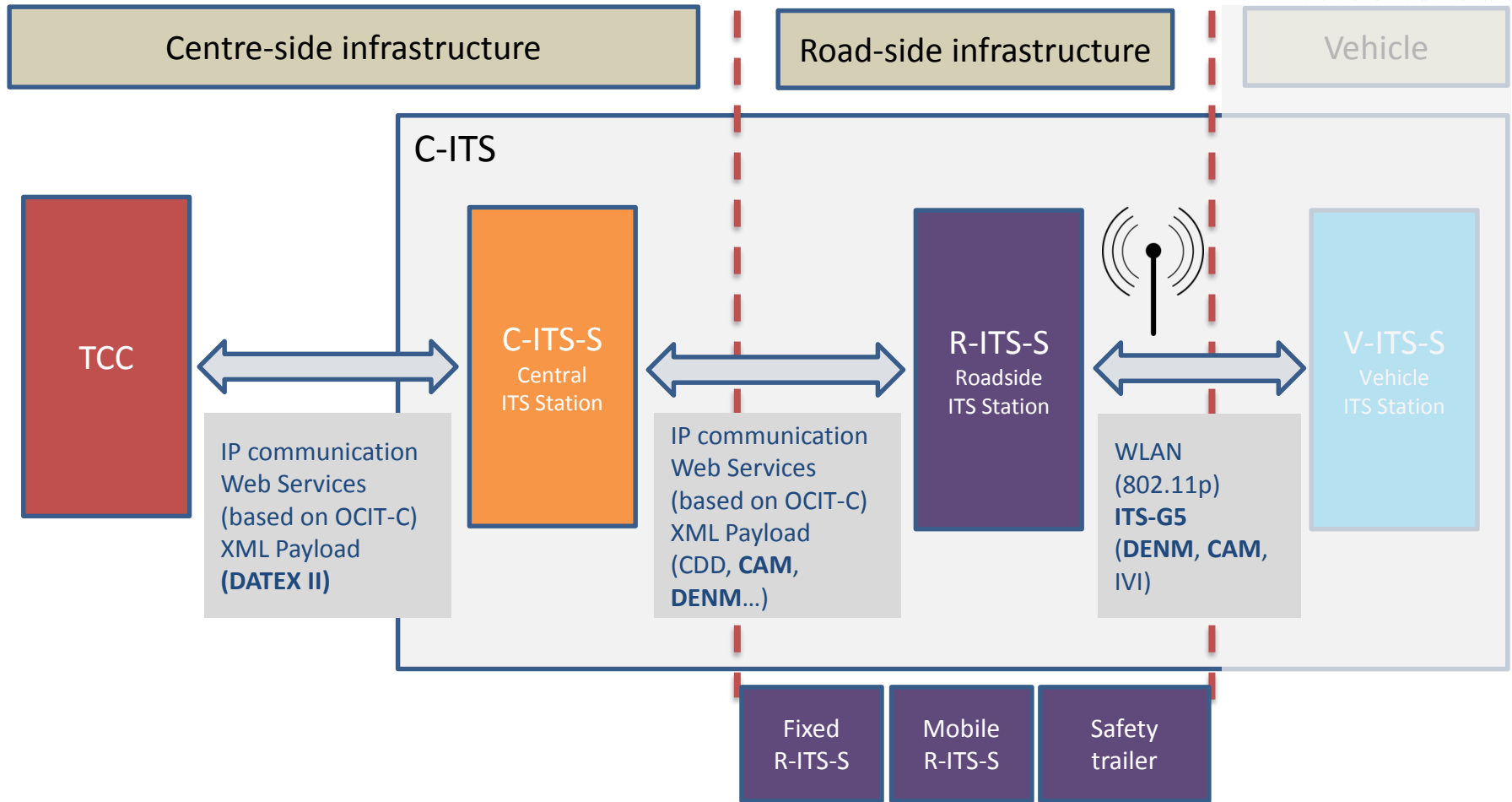
Use Case example

C-ITS and new “connected” vehicles

ITS station architecture



System Architecture and Interfaces



C-ITS Vision



Driver's perspective today



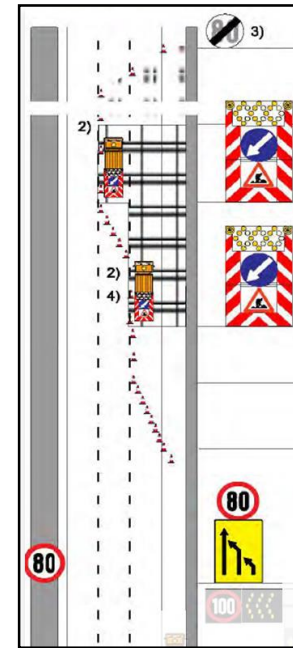
Driver's perspective tomorrow

Use Case example

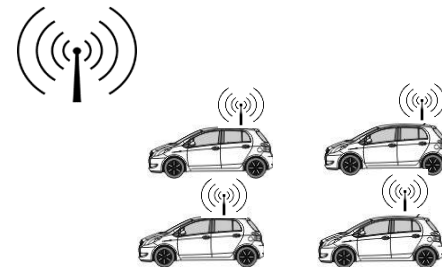
- Use Case
 - Roadworks Warning (RWW)
- Provide
 - In-Vehicle Information (IVI)
 - Intersection Safety (ISS)
 - Other DENM Applications: Events



RWW

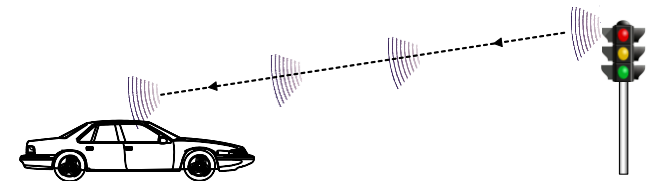


PVD



IVI

ISS



C-ITS and new “connected” vehicles



Cars circulating in the European market:
about **400 million**

Cars registered each year in the EU:
About **16 million**

starting from 2019
1 new “connected vehicle” car
=
1 C-ITS-OBU on the road



NEXT ITS SERVICES STANDARDIZATION ACTIVITIES

ITS Fast Service Announcement
VAS for next generation vehicles

ITS Fast Service Announcement



ISO TC 204 WG 16 and CEN TC 278 WG16 are working to develop the standard for the provisioning of ITS services at specific locations on the road network requires awareness of the availability and the purpose of such services in order to allow a road network user deciding on the potential consumption of such a service. Awareness of services can be achieved by pull and push mechanisms:

- **Pull mechanisms** - requiring a-priori knowledge of an available intended service - are well understood and deployed for non-time-critical usage, several ITS services' use cases depend on a push mechanism.
- **Push mechanisms** support also "mandatory services" that may be locally and dynamically applicable and defined by local policies rather than global regulations.

CEN TC 278 WG 16 is about to publish an EN standard for Fast Service Announcement services



VAS for next generation vehicles



Car makers:

- Customization of the assistance services
- Assistance in case of detection of problems on the vehicle
- Remote car management
- Car software update
- Verification of the electric vehicles charge
- Aftermarket services



Services Providers:

- Personalized services (local and time based):
- Dynamic routing
- Reservation and payment application



“it alwas seems impossible until is done.” N. Mandela

Thanks

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