



Intelligent Transport System

World of Standards

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17-11-2023

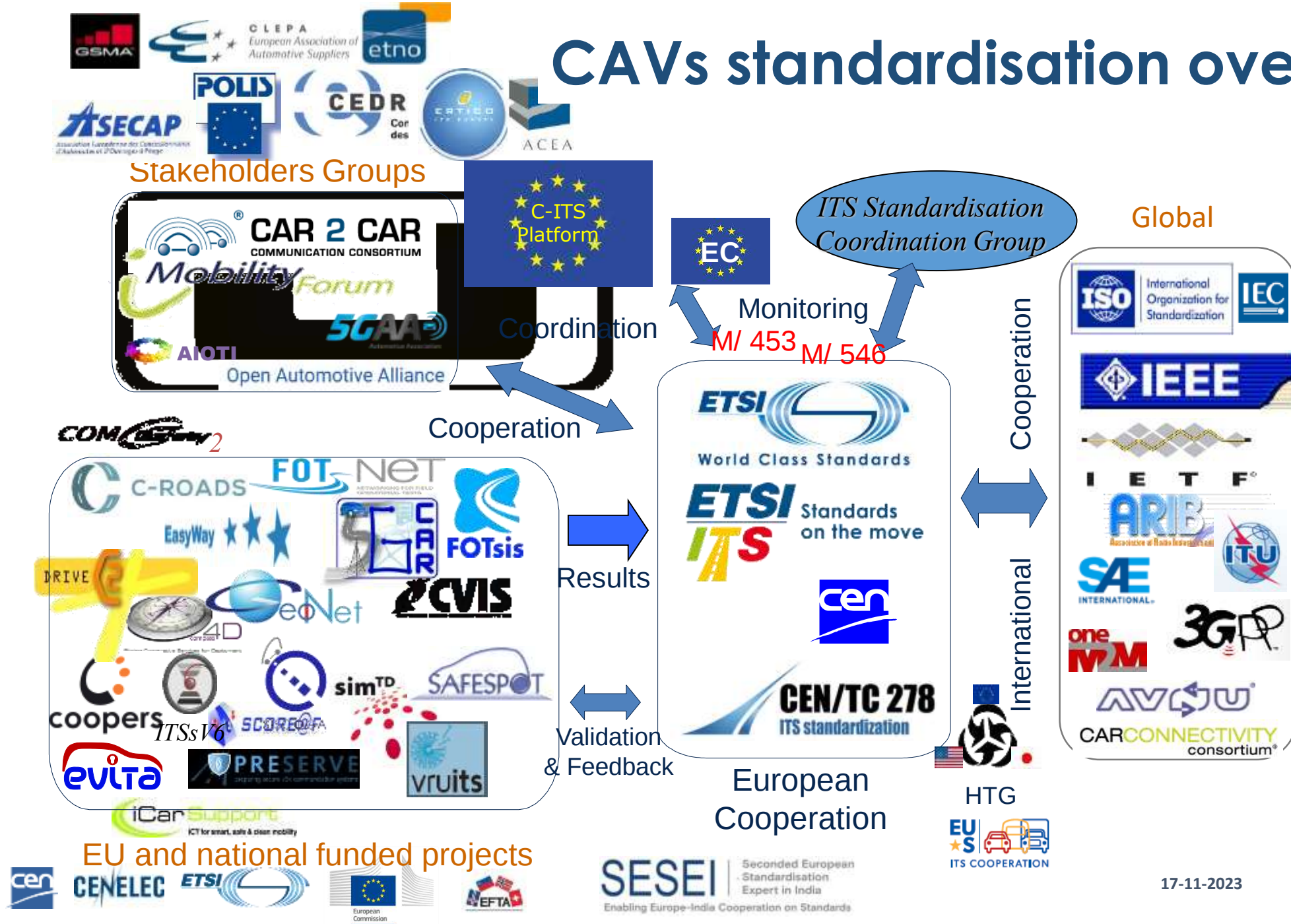
Slide 1

Europe/Global – Policy & Standards

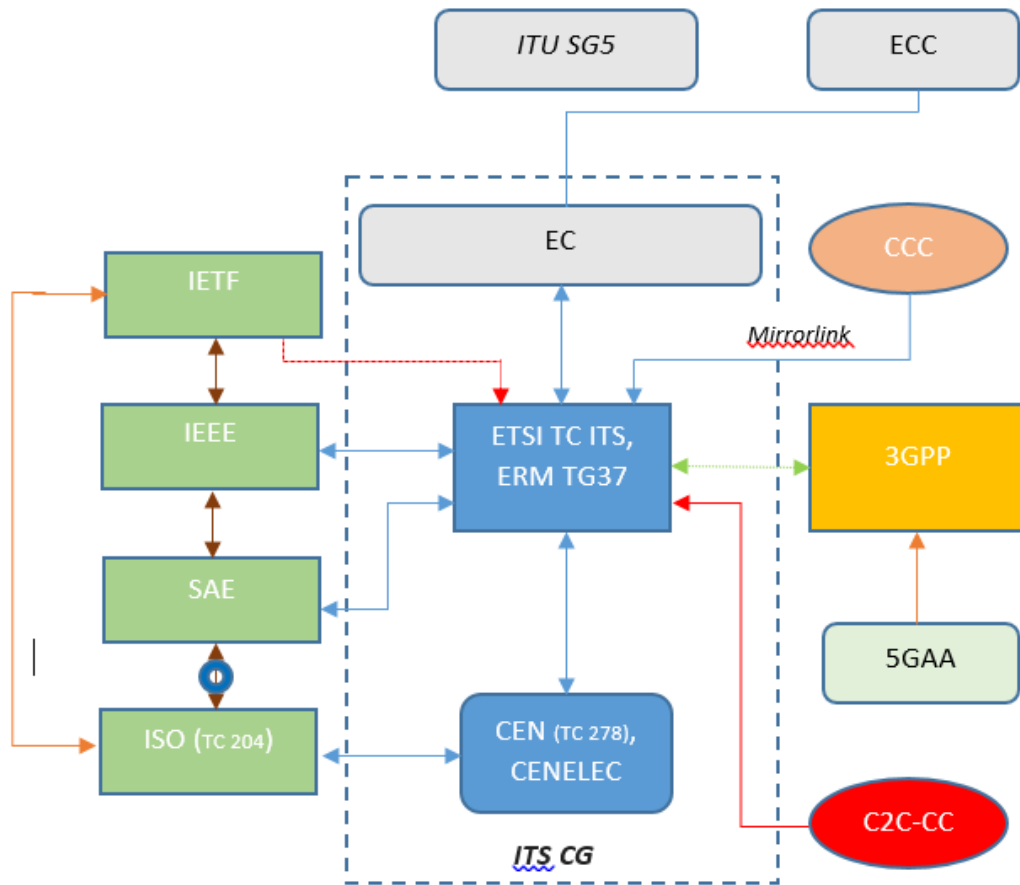
Enabling Technologies for Smart transport

- **Connectivity and Communications:** High speed wireless networks and vehicle to vehicle and vehicle to infrastructure communication system, enable real time information sharing, ensure efficient traffic management and improved safety.
 - ✓ **5G:** With 5G everything from smart sensors to smart mobility, self-driving cars will be able to communicate at incredibly fast speeds with low latency resulting in more efficient systems and resources for smart cities.
 - ✓ **Internet of Things (IoT):** IoT Devices, Sensors and connectivity enable the collection of real time data from vehicles, infrastructures and commuters, allowing for intelligent decision making and effective management of transportation networks.
 - ✓ **Artificial Intelligence & Machine Learning (AI & ML):** AI & ML algorithms analyze data to derive patterns, predict traffic flow, optimize routes, and make autonomous vehicles safer and more efficient
 - ✓ **Big Data analytics:** Advance analytics techniques process large volumes of data, providing valuable insights for transportation planning, traffic management and infrastructure development.

CAVs standardisation overview



ITS Standardisation world



- Coordination and international harmonization of standards with IEEE 802.11 and IEEE 1609 as well as SAE
- Coordination with CEN in ITS-CG
- Link to the EC via ITS-CG
- Link to CCC and C2C-CC
- Link to IETF WG IPWAVE (IP Wireless Access in Vehicular Environments)

CCC: Car Connectivity Consortium

C2C-CC: Car 2 Car Communication Consortium

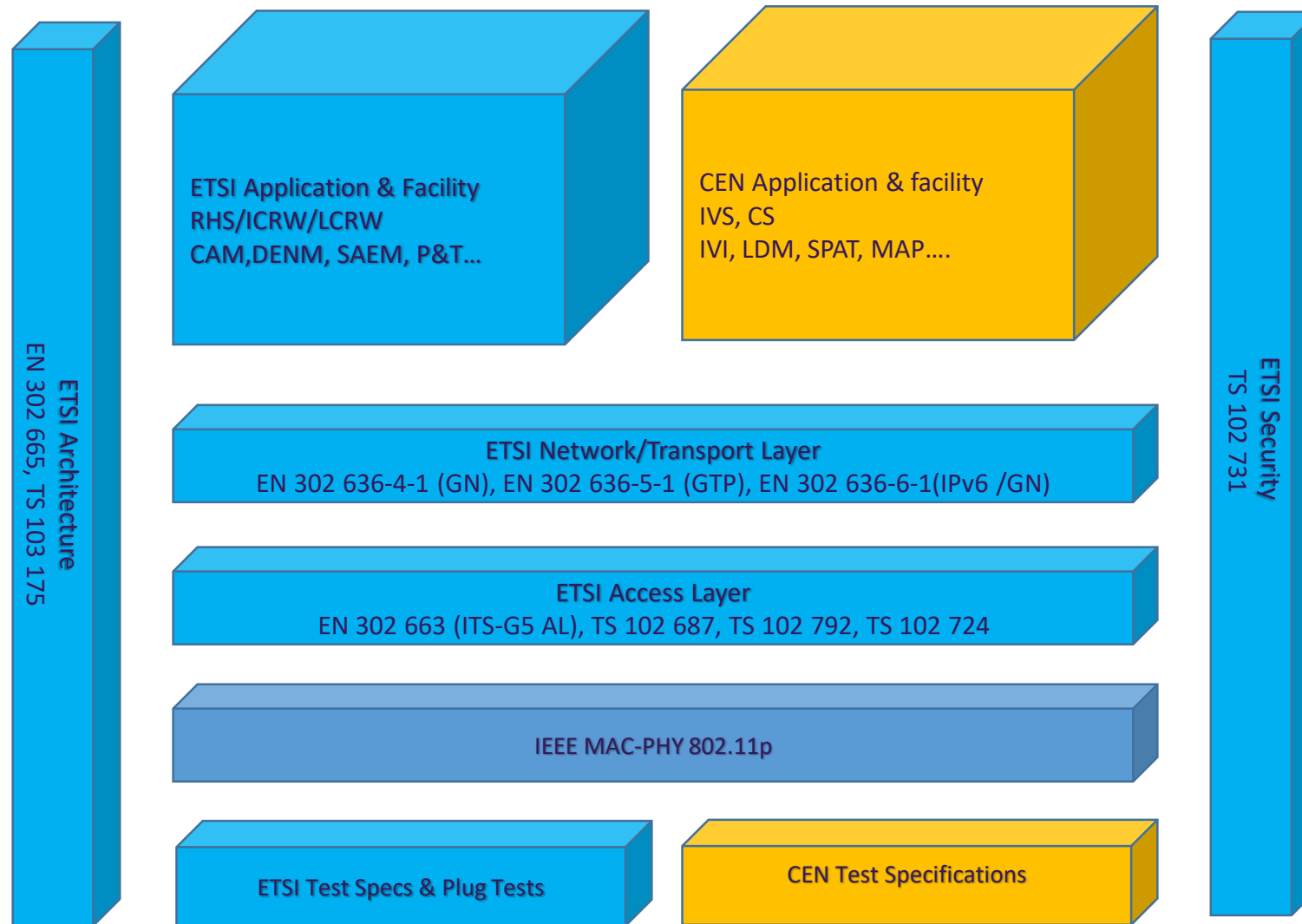
5GAA: 5G Automotive Association



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ITS: EU Standards & Specifications



C-V2X Technology



3GPP V2X specifications

- 3GPP continued to add functionality in its releases since release 14 to release 17 (as shown in Figure) and now further enhancing the sidelink communication to support vehicular devices used in V2X services in Release 18

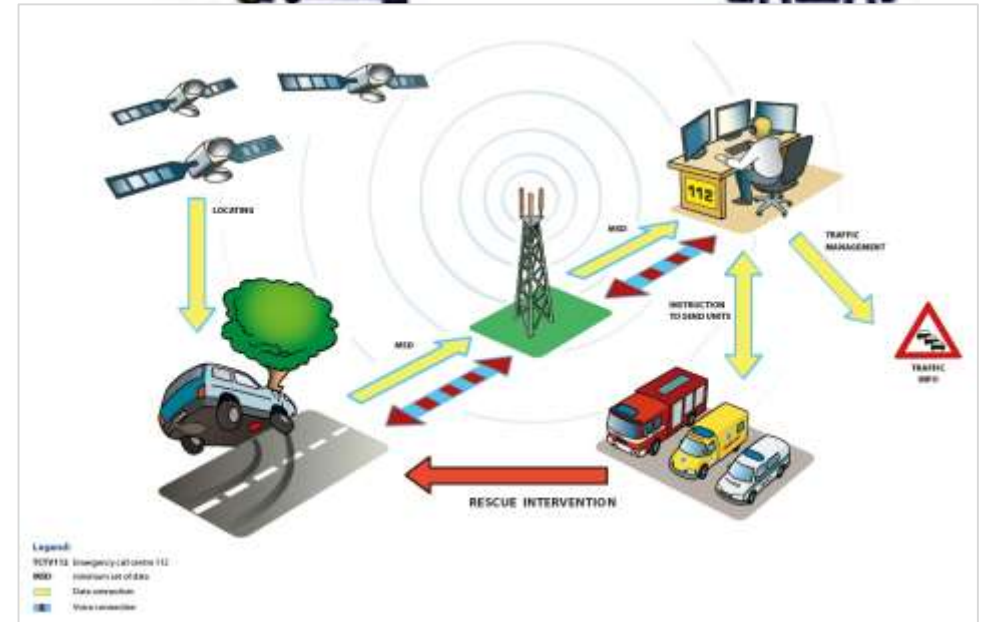
3GPP groups	Rel.14	Rel.15	Rel.16	Rel.17
SA1	TS 22.185: V2X service requirements	TS 22.186: Enhancements to V2X service requirements		
RAN1	TS 36.786: LTE V2X UE Tx and Rx	TS 36.788: LTE eV2X UE Tx and Rx	TS 38.xxx: NR V2X UE Tx and Rx	
RAN4		TS 36.787: LTE V2X CA Band Combination	TS 36.xxx: LTE- NR V2X – Cross RAT	TS 37.875: Concur Uu and V2X operation
SA2	TS 23.285: V2X service arch (EPS)		TS 23.287: eV2X service arch (EPS, 5GS)	
SA3	TS 33.185: V2X services sec (EPS)		TS 33.536: eV2X service sec (EPS, 5GS)	
SA6		TS 23.222: Common API Framework (CAPIF) (R15) and enhancements (R16)		
			TS 23.286: V2X Application Enabler Layer (R16) and enhancements	
			TS 23.434: Service Enabler Architecture Layer (R16) and enhancements	
				TS 23.558: EDGEAPP

[Source: 3GPP]

eCall – Emergency Call

eCall is a European initiative intended to bring rapid assistance to motorists involved in a collision anywhere in the European Union.

- ✓ eCall mandatory in all new cars and light commercial vehicles in the EU from 31st March 2018
- ✓ eCall is generated either manually by pushing a SOS button or automatically via in-vehicle sensors
- ✓ eCall car automatically calls the nearest emergency call centre through the 112 to report accident & location.
- ✓ Minimum Set of Data (MSD) is sent, containing info. regarding the vehicle, its location, direction of travel etc.



ITS Standardization – Europe

EC request for standards through [Mandate 453](#) for ITS:

- The Mandate is addressed to CEN, CENELEC and ETSI to support the interoperability of [co-operative Intelligent Transport System \(C-ITS\)](#) in the European Community.
- [CEN/TC 278](#) is responsible for preparation of standards in the field of ITS and to exchange knowledge, information, best practices and experiences in ITS.
 - WG 1: [Electronic Fee Collection](#), WG 3: [Public Transport](#), WG 7: [ITS Spatial Data](#), WG 8: [Road Traffic Data](#), WG 10: [Human - Machine Interfacing](#), WG 12: [Vehicle identification](#), WG 15: [e - safety / eCall](#), WG 16: [Cooperative ITS](#), WG17: [Urban- ITS](#)
- [ETSI TC ITS](#) develops standards related to the overall communication architecture, management (including e.g., Decentralized Congestion Control), security as well as the related access layer agnostic protocols.
 - WG 1: Application Requirements & Services , WG 2: Architecture & Cross Layer , WG 3: Transport & Network , WG 4: Media & Medium related , WG 5: Security

India – Policy & Standards

Policy Initiatives: India

- **National Digital Communication Policy (NDCP) 2018:**

- NDCP 2018 released by Department of Telecommunications, has mentioned about developing the market for IoT/ M2M connectivity services in sectors including **Intelligent Transport Networks**, Multimodal Logistics, Smart Cities, Agriculture, Smart Electricity Meter, Consumer Durables etc. incorporating international best practices.
- Government of India has already mandated to **install GPS/GRPS devices** with video camera and panic button in all public transport with cellular connectivity to police stations for woman safety in public transports under **AIS140/ IS16833**.
- **RFID based Electronic Toll Collection devices** are being deployed in India on various National Highways / Expressways, in the sub-GHz band 865 MHz – 867 MHz band.
- **Telecommunication Engineering Centre (TEC) has a dedicated working group on “ TECHNOLOGIES AND STANDARDS FOR INTELLIGENT TRANSPORT SYSTEM”**
 - WG has prepared and released a [technical report TEC 31218:2023 on “Technologies and Standards for Intelligent Transport System](#)
 - This report covers technologies and standards for the development of Intelligent Transport System including C-V2X, based on the study of national/international standards and guidelines released by ITU, 3GPP, APT, IEEE, ETSI, ISO-SAE, 5gAA etc. and use cases.
 - This technical report is a good reference for the related stakeholders as it provides the recommendations related to spectrum, security aspects and standards for the development of ecosystem for ITS in the country.

ITS Standardization: India

Bureau of Indian Standards (BIS):

- **TED 28-Intelligent Transport Systems Sectional Committee** is responsible for the:
 - a) Standardization of information, communication and control systems in the field of urban and rural surface transportation, including intermodal and multimodal aspects thereof, traveler information, traffic management, public transport, commercial transport, emergency services and commercial services in the intelligent transport systems
 - b) Co-ordination of work with ISO/TC 204 while excluding in-vehicle transport information and control systems (ISO/TC 22) and ISO/TC 241
 - c) Published around 20 standards

Automotive Research Association of India (ARAI): Government approved test agency to carry out mandatory certification testing

- Provides technical expertise in R&D, test, certification, homologation and framing of vehicles regulations: CMVR, UN WP29 etc.
- Published/drafted several standards that are related to electric/smart mobility
 - AIS-140 & Amd 1 and 2: Intelligent Transportation Systems (ITS) - Requirements for Public Transport Vehicle Operation

Telecommunication Engineering Centre (TEC):

- 3GPP Release 15, Release 16 and Release 17 have been adopted as National Standards in India by TEC



17-11-2023

Conclusion

- ITS Standardisation is happening at multiple places such as 3GPP, ISO, JTC1, oneM2M, ETSI etc. hence international cooperation and participation is important to get Indian requirement included
- ITS rollout based on standards shall ensure safety services for all users
 - e-Call is important solution to be considered for Policy and its implementation based on standards
- Wireless Communication will play an important role in ITS rollout, hence efficient & Technology neutrality of spectrum use is must

Thank you!

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