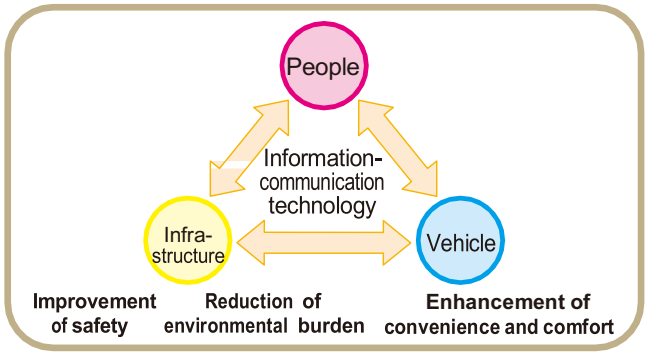
Standartization of ITS

ITS (Intelligent Transport Systems) is designed to rapidly improve road traffic safety, transport efficiency and comfort and to significantly contribute to energy and environmental conservation through traffic flow facilitation, such as elimination of traffic jams, by using communication technologies to link between people, infrastructure and vehicles.
Due to its wide variety of related technologies and its ability to drastically change social and economic structures, ITS has the potential to create new industries and markets.



Importance of participating in international standardization programs

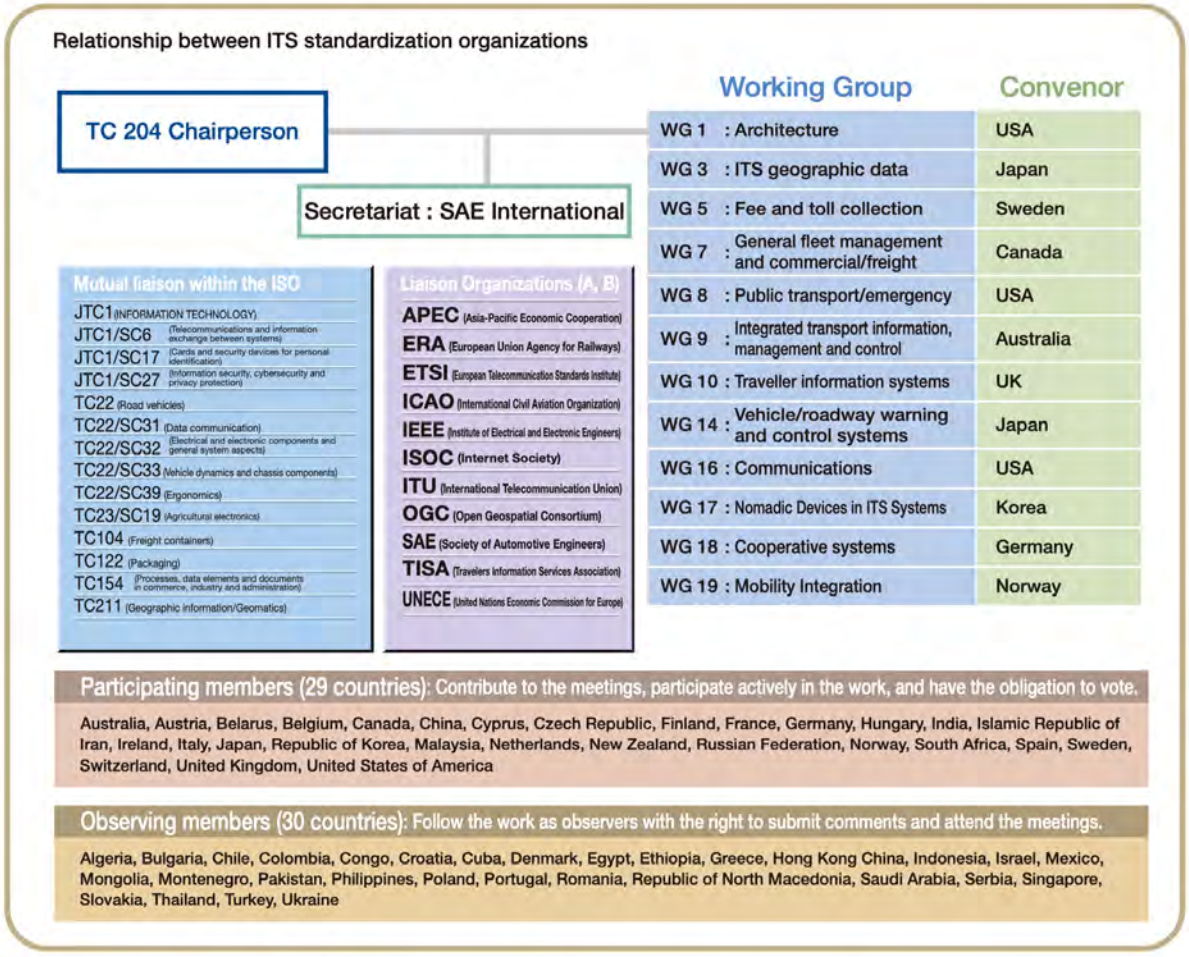
The WTO (World Trade Organization)'s TBT Agreement (Agreement on Technical Barriers to Trade) aims to eliminate unnecessary trade barriers by aligning various standards with international standards.
The GPA (Agreement on Government Procurement), an appendix of the TBT Agreement, requires countries party to the agreement to define a technical specification based on the applicable international standard (if one exists) when they carry out government procurement that exceeds a certain size. Even for international procurement, in addition to traditional evaluation indexes, including technological advantages, cost (cost performance), and international prevalence, it is increasingly required that the technology applied complies with an international standard in areas where global standards exist. Thus, to improve Japan's global competitive strength in the industrial field, it is essential for Japan to actively participate in international standardization programs and to position Japan's superior technologies as open and global standards in accordance with global trends.
Especially from the standpoint of ensuring user convenience, it is important to reduce costs while promoting international standardization of its various basic technologies without sacrificing the interoperability and expandability of the systems and, at the same time, smoothly enabling the social changes that will be fostered by ITS. In addition, more companies are expanding overseas as domestic markets shrink due to the aging population and low birthrate or are collaborating with foreign companies for development and application of advanced technologies. Under such circumstances, businesses are more likely internationalized or diversified across industries, so Japanese companies need to develop technologies accepted worldwide while completing or collaborating with foreign companies to maintain their presence.

Landscape of standardization of ITS (related standardization bodies)

ITS supports the movement of people and goods on a variety of levels. The core technologies of ITS are information and telecommunication technologies.
As shown in the next page, ITS international standardization is carried out by ISO, IEC, JTC and ITU. The TC 204 committee specializes in ITS standardization activities.
Under study at TC 204 are standardization proposals for (1) systems architecture, (2) interfaces (message sets, etc.), (3) frameworks (data dictionaries and message templates), (4) system performance requirements, and (5) test methods. This booklet describes the present state of ITS standardization, with a focus on TC 204 programs.

Framework for Standardization

TC 204, the technical committee for ITS standardization within the ISO was established in 1992, and held its first meeting the following year. Subcommittees (SCs) are often placed under technical committees (TCs), but within TC 204, working groups (WGs) are placed under the direct jurisdiction of the TC. Some working groups have been suspended or merged for over 26 years since the inception of TC 204, and there are currently 12 active working groups. Nine countries serve as lead countries for the working groups, with Japan leading two groups, and the U.S. leading three. As shown in the list below, TC 204 has published numerous international standards.



WG 1 Architecture

ITS is a large-scale collection of systems covering many areas of application, with a large number of people involved in its development over a long period. This makes it crucial to establish an architecture that ensures the expandability of the systems that comprise ITS as well as their interoperability and compatibility. WG 1 is developing standards for common information and methods in the ITS sector, including shared terminology, the standardization of data representation formats, architectures for sharing service and system concepts, as well as risk assessment methods and the benefits of services.
System architecture plays an important role in ensuring that everyone concerned shares a common understanding of the services and systems, and in guaranteeing the expandability of systems as well as their interoperability and compatibility. The ITS reference architecture (ISO 14813 series) was established for reference in developing architectures and as a model to compare architectures in different countries.
Continuous maintenance is required to deal with new services and systems arising from technological advances. Currently, the periodic review of Part 1, which specifies ITS's services, is being conducted with the cooperation of each WG. The remaining parts are also being revised or abolished sequentially in response to revisions to description languages and the 14817 series, taking advantage of the periodic review.

List of WG 1 Work Items

		Standardization themes	ISO Number	Content
	1	Privacy aspects in ITS standards and systems	TR 12859:2009	Guidelines for protecting privacy in the development of ITS standards and Systems
	2	Reference model architecture(s) for the ITS sector	WD 14813-1	Definitions of service domains (categories, groups)
			ISO 14813-5:2020	The terms and forms to be used when documenting or referencing the architecture
			ISO 14813-6:2017	The description of ASN.1 to be used as standardised syntax notation and its relation to other data description languages
	3	ITS central data dictionaries/Part 1: Requirements for ITS data definitions	ISO 14817-1:2015	Defines the requirements for data dictionaries that list the data definitions to be shared by the parties involved in ITS
	4	ITS central data dictionaries/Part 2: Governance of the Central ITS Data Concept Registry	ISO 14817-2:2015	Management procedures for data registration
	5	ITS data dictionaries/Part 3: Object identified assignments for ITS data concepts	ISO 14817-3:2017	OID structure
	6	Using UML for defining and documenting ITS/TICS interfaces	TR 17452:2007	Guidelines for UML use in defining and documenting ITS interfaces
★	7	Using web services (machine-machine delivery) for ITS service delivery -Part 1: Realization of interoperable web services	ISO 24097-1:2017	Stipulation of guidelines on the use of web services designed to support collaboration between internet-based systems
★	8	Using web services (machine-machine delivery) for ITS service delivery -Part 2: Elaboration of interoperable web services' interfaces	TR 24907-2: 2015	Technical guidelines to achieve web service interoperability in the context of ITS
★	9	Using web services (machine-machine delivery) for ITS service delivery -Part 3: Quality of services	TR 24097-3:2019	Quality of services in the context of ITS
★	10	Procedures for developing ITS deployment plans utilizing ITS system architecture	TR 24098:2007	Description of procedures to develop ITS deployment plans utilizing ITS system architecture
	11	Use of unified modelling language (UML) in ITS International Standards and deliverables	TR 24529:2008	Stipulation of rules and guidelines on the use of UML for ITS standards, data registries and data dictionaries
	12	Using XML in ITS standards, data registries and data dictionaries	ISO 24531:2013	Stipulation of rules on the use of XML for ITS standards, data registries and data dictionaries
	13	Harmonization of ITS data concepts	TR 25100:2012	Provision of guidelines for data concepts related to registration in data registries
	14	'Use Case' pro forma template	TR 25102:2008	Provision of a template to facilitate use case description
	15	Training requirements for ITS architecture	TR 25104:2008	Definition of requirements concerning training courses about ITS architecture
	16	Use of 'process-orientated methodology' in ITS International Standards and other deliverables	TR 26999:2012	Stipulation of rules for process (function) oriented methodologies for ITS standards, data registries and data dictionaries
	17	Cooperative ITS - Part 1: Terms and definitions	TR 17465-1:2014	Definition of Cooperative ITS
	18	- Part 2: Guidelines for standard documents	TR 17465-2:2014	Guidelines on the formulation of Cooperative ITS standards documents
	19	- Part 3: Release procedures for standards documents	TR 17465-3:2015	Release procedure for the development of standards documents on cooperative ITS
	20	Vocabulary	DTS 14812	Vocabulary Related to ITS
	21	Architecture - Applicability of data distribution technologies within ITS	DTR 23255	Report on possibility of application for the data delivery technology
	22	Identifiers – Processes	DIS 5345	Procedure for specifying ITS identifiers

★ Item(s) that Japan is / has been actively working on

WG 3 ITS geographic data

WG3 is working towards standardization of geographic data for navigation and automated driving. Most applications in ITS involve services relating to the movement of people, goods and vehicles. As they require information on starting point/ destination and routes in addition to data such as time or cost, these services use geographic data. The rapid growth of in-car navigation systems and the imminent deployment of cooperative ITS make the role of geographic data critical. In addition, information comprising high precision 3D images of the road environment and dynamic spatiotemporal information which supersedes the conventional concepts of geographic data are likely to play an important role in rapidly evolving automated driving technology.
WG 3 has been involved in standardizing exchange formats between geographic data providers, as well as compact storage formats allowing high-speed searching and location reference methods, etc. It has also worked on developing functional requirement specifications, data models, and data elements for geographic data. WG 3 has limited its scope to static geographic data for many years, but has started to include dynamic spatiotemporal information in its scope.

List of WG 3 work items

		Standardization themes	ISO Number	Content
★	1	Requirements and Logical Data Model for a Physical Storage Format (PSF) and an Application Program Interface (API) and Logical Data Organization for PSF used in Intelligent Transport Systems (ITS) Database Technology	TS 20452	Standardization of physical storage format for hard discs and etc. used for navigation
★	2	Navigation data delivery structures and protocols	ISO 24099	Standardization of data structures and protocols to transmit map data
★	3	Location referencing for geographic databases	ISO 17572-1 to 3	Standardization of location referencing when exchanging data between different applications or geographic databases
	4	Navigation systems – Application Programming Interface (API)	ISO 17267	Standardization of data access methods for application programs such as navigation systems
★	5	Extension of map database specifications for applications of cooperative ITS	ISO 14296	Building functional requirements and data models concerning the application of map databases in cooperative systems (including ADAS) within ITS
	6	Shareable geospatial databases for ITS applications	ISO 19297-1	Presenting the new framework which enables access to various geographic databases and data sharing between them
★	7	Geographic Data Files – GDF5.1 Part 1	ISO 20524-1	Standard (Part 1) for data exchange in geospatial databases for applications such as cooperative ITS, multi-modal navigation, and automated driving systems
★	8	Geographic Data Files – GDF5.1 Part 2	ISO 20524-2	Standard (Part 2) for data exchange in geospatial databases for applications such as cooperative ITS, multi-modal navigation, and automated driving systems
★	9	Precise Relative Location Referencing for Geographic Databases	ISO 17572-4	Addition of the forth profile that permits location referencing of "Which lane?" and "Where in the lane?" for the cooperation/automated driving system
★	10	Spatio-temporal Data Dictionary	TR 21718 V.2	Data dictionary second edition (TR) of static/dynamic data about spatio-temporal object for ITS and the cooperative/automated driving systems
★	11	Dynamic data and map database specification for connected and automated driving system applications	NP/TS 22726-1	Standardization of static, semi-static, and semi-dynamic map data elements and their data model used for applications of ADS and C-ITS systems (Part 1)
★	12	Dynamic data and map database specification for connected and automated driving system applications	NP/TS 22726-2	Standardization of static, semi-static, and semi-dynamic map data elements and their data model used for applications of ADS and C-ITS systems (Part 2)
	13	Shareable Geospatial Databases for ITS Applications	NP 19297-4	Specification for a common data structure that enables access to and sharing of various geospatial databases
	14	Shareable Geospatial Databases for ITS Applications	NP 19297-5	Specification for a data encoding method that enables access to and sharing of various geospatial databases

★ Item(s) that Japan is / has been actively working on

WG 5 Fee and Toll Collection

WG 5 is working on standardizing Electronic Fee Collection (EFC). Initially, all aspects of fees for roads, parking lots, ferries, etc. were targeted for standardization, but current work is focused on road charging systems. In addition to the Dedicated Short-Range Communications (DSRC) method used in Japan's ETC as communication methods between roadside unit and vehicle, there is also the GNSS/CN method that uses GNSS (Global Navigation Satellite System) and CN (Cellular Networks).

EFC standardization has focused on interoperability, which has been introduced individually in various European countries since around 1990. In April 2004, the European Commission issued the European Directive on the Interoperability of Electronic Road charging Systems (Directive 2004/52/EC). In October 2009, it introduced the European Electronic Toll Service (EETS) and Definition of Technical Elements (Decision 2009/750/ EC). These became the driving force for EFC standardization.

On the other hand, Japan's ETC system, which began full-scale operations in 2000, complied with the preceding European-led standards in the planning stage and then requested modifications to enable ETC to be used, such as IC card payment means. Since then, against the backdrop of the nationwide rollout of ETC and new tolling policies, active proposals for new items for development originating in Japan have been made in cooperation with Korea and China.

A new European Directive on EETS (Directive 2019/520/EC) was issued by the European Commission in March 2019. In addition to the conventional GNSS/CN (autonomous) and DSRC methods, ANPR (billing using number plate information) can also be used. ANPR is expected to be one of the solutions used to realize ETC dedicated expressway (cashless payments only), which is being implemented and deployed in Japan. Since ETC interoperability requires standardization of specific information to identify OBE, a new work item on the OBE setup methodology proposed by Japan was adopted at the 2020 plenary meeting.

List of WG 5 work items

		Standardization themes	ISO Number	Content
	1	EFC – Application interface definition for dedicated short-range communication	ISO 14906	Prescription of data structures, commands and other factors to ensure the interoperability of 1 EFC applications for DSRC based EFC
★	2	EFC – Test procedures for user and fixed equipment-Part 1 to 2	TS 14907	Part 1 defines procedures and conditions for tests of EFC-related equipment. Part 2 defines conformance tests for on-board equipment, conform-ing to the EFC application interface definition (ISO 14906).
	3	EFC – Systems architecture for vehicle-related tolling-Part 1 to 3	ISO 17573	Definition of reference architecture for the entire EFC system and prescription of frameworks of various EFC-related conditions
★	4	EFC – Guidelines for security protection profiles	TS 17574	Provision for EFC security establishment in reference to IEC 15408 (IT security evaluation standard)
★	5	EFC – Security framework	TS 19299	Prescribe the framework to develop EFC security system by risk assessment and definition of system model.
	6	EFC – Application interface definition for autonomous systems	ISO 17575	Prescription of data structures, commands and other factors to ensure the interoperability of 6 EFC applications for autonomous systems (GNSS/CN)
★	7	EFC – Interface Definition for on-board Account Using Integrated Circuit Cards	ISO 25110	Interface definition between roadside equipment and on-board equipment using IC cards 7 that enable reading and writing of EFC information and account information on IC cards
★	8	EFC – Compliance Checking of autonomous systems over DSRC	ISO 12813	Checking the correct charging of autonomous EFC OBE by down-loading the vehicle data via 8 DSRC initiated by roadside equipment.
	9	EFC – Information exchange between service provision and toll charging	ISO 12855	Describes the information flow between EFC service providers and parties who charge fees.
★	10	EFC – Localisation augmentation communication for autonomous systems	ISO 13141	Describes the communication requirements for enhancing the locating function of OBE for the autonomous system (GNSS/CN) using DSRC
	11	EFC – Evaluation of on-board and roadside equipment for conformity to ISO 12813-Part 1 & 2	ISO 13143	Defines conformity evaluation methods for the interfaces defined in TS 12813 (Compliance check 11 communication for autonomous systems) between OBE and roadside equipment
	12	EFC – Evaluation of on-board and roadside equipment for conformity to ISO 13141-Part 1 & 2	ISO 13140	Defines conformity evaluation methods for the interfaces defined in DTS 13141 (Localization augmentation communication for autonomous systems) between OBE and roadside equipment
	13	EFC – Evaluation of equipment for conformity to TS 17575-1 to 3	ISO 16407 TR 16401 ISO 16410	Conformity evaluation methods for TS 17575 (Application interface definition for autonomous systems) Part 1: Charging, Part 2: Communication and connection to the lower layers, Part 3: Context data
	14	EFC – Charging performance part 1 & 2	TS 17444	EFC performance standard (metrics) and inspection framework will be merged with parts 1 and 2 as ISO 37444, and work has begun on adding EFC using vehicle number plate information.
★	15	EFC – Interface definition between DSRC-OBE and external in-vehicle devices	TS 16785	Interface for extending DSRC OBE to autonomous systems (EFC using GNSS/CN)
★	16	EFC – Investigation of EFC standards for common payment schemes for multi-modal transport services	TR 19639	Scheme for the common use of cards and other media for transport services
★	17	EFC – Investigation of charging policies and technologies for future standardization	TR 21190	Proposing new work items based on research on new toll policy and corresponding technologies that are under consideration for adoption in all countries.
★	18	EFC – EFC support for traffic management	TS 21192	Define the data exchange between each entity relating to the architecture such as creating a common conceptual model for traffic management by charging.
★	19	EFC – Requirements for EFC application interface on common media	TS 21193	In accordance with the proposals in TR 19639, describes the requirement and data definition of common 19 media for allowing common usage among various modes of transportation.
★	20	EFC – EFC Personalization of onboard equipment-Part1 to 3	TS 21719-1 TS 21719-2 DTS 21719-3	Describes a method of setting up EFC on-board equipment: Part 1 defines its framework, Part 2 defines the setup via DSRC, and Part 3 defines the setup via IC card.
★	21	EFC using car number information Pre-study on the use of vehicle license plate information and ANPR technologies	ISO/PWI TR 6026	Technical report for further new proposals on EFC using Automatic Number Plate Recognition (ANPR) technology

★ Item(s) that Japan is / has been actively working on

WG 7 General Fleet Management and Commercial/Freight

In WG 7, the transport of hazardous goods and freight multi- modal transport have been standardized (a merger of previous WG 6 (General Fleet Management) and WG 7 (Commercial/Freight) agreed upon at the Montreal meeting in November 1999). Specific work items being discussed for standardization include the operational monitoring of commercial freight vehicles, data dictionary and message sets for international multi-modal transport, and commercial freight vehicle monitoring.

List of WG 7 work items

		Standardization themes	ISO Number	Content
	1	General fleet management and commercial freight operations – Data dictionary and message sets for electronic identification and monitoring of hazardous materials/dangerous goods transportation	ISO 17687	Definition of data dictionary and message sets supporting automatic identification, monitoring, and exchange of emergency response data for hazardous materials loaded on vehicles (SWG 7.1)
	2	Electronic information exchange to facilitate the movement of freight and its intermodal transfer – Road transport information exchange methodology	ISO 24533-1 CD 24533-2	Definition of data concept applied to freight multi-modal transport. Includes data exchanging message through transport interface along logistic chains. (SWG 7.2)
	3	Electronic information exchange to facilitate the movement of freight and its intermodal transfer – Governance rules to sustain electronic information exchange methods	TS 17187	Definition of governance rules for electronically conducting organization process inter-connected by business entities for electronic commerce under secure and open environment through a standard framework of the data exchange. (SWG 7.2)
★	4	Freight land conveyance content identification and communication	ISO 26683-1 ISO 26683-2 ISO 26683-3	Definition of application interface profiles and context for land transportation data exchange related to freight identification, package identification, container identification, and freight movement. (SWG 7.3)
★	5	Automotive visibility in the distribution supply chain – Part 1: Architecture and data definitions	ISO 18945-1	Establishes the framework and architecture of data collection, and provides data definition for visibility of vehicles, self-driving construction machines, and agriculture machines in distribution supply chains. (SWG 7.3)
★	6	Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV)	ISO 15638-1 to 25	Definition of collaborative telematics application of regulated commercial freight vehicles. (SWG 7.4)
★	7	Framework that uses TARV as a secure vehicle interface.	PWI 7815-1 PWI 7815-2	Definition of a framework for regulatory bodies to collect data without going through a service provider

★ Item(s) that Japan is / has been actively working on

WG 8 Public Transport and Emergency

WG 8 is responsible for the standardization of public transport. Public transport includes buses, trains, trams and emergency vehicles.
As one specific standardization item, CEN has led the standardiza- tion of Interoperable Fare Management Systems (IFMS). IFMS Parts 2 and 3 have been issued as TRs, and Part1 was reviewed from 2014 before being issued as an ISO in 2021.
The Public Transport User Information Part 1 proposed by Japan in autumn 2010, which encompasses the CEN TransModel, the U.S. PTCIP and Japanese standards on passenger information in public transport, was issued as an ISO in the spring of 2014.
Recently, interest in Mobility as a Service (MaaS) has been increas- ing globally, and MaaS services are also being gradually realized. Therefore, it is necessary to closely watch the situation.

List of WG 8 work items

		Standardization themes	ISO Number	Content
★	1	Data dictionary and message sets for pre-emption and prioritization signal systems for emergency and public transport vehicles (PRESTO)	ISO 22951	Standardization for data dictionary and message sets for traffic signal pre-emption and prioritization for emergency and public transport vehicles
★	2	Public transport – Interoperable fare management system – Part 1: Architecture	ISO 24014-1	Definition of conceptual architecture to establish a public transport fare management system that accommodates multiple operators and services
★	3	Public transport – Interoperable fare management system – Part 2: Business practices	TR 24014-2	Description of the set of rules necessary for installing IFMS based on the architecture specified in Part 1 and the relationship among the rules
	4	Public transport – Interoperable fare management system – Part 3: Complementary concepts to Part 1 for multi-application	TR 24014-3	Standardization for description of business practices within applications in multiapplication environments and interoperability between applications
	5	Public transport requirements for the use of payment applications for fare media	TR 14806	Standardization for IC cards and other payment methods
★	6	Public transport user information – Part 1: Standards framework for public information systems	ISO 17185-1	A comprehensive standard including public transport user information in various countries
	7	Public transport user information – Part 2: Public transport data and interface standards catalogue and cross reference	TR 17185-2	Standardization of public transport user information interfaces and use cases
★	8	Public transport user information – Part 3: Use cases for journey planning systems and their interoperation	TR 17185-3	A standard for use cases for journey planning systems and collaboration among them
	9	Public transport user information - Part 4: Safe journey planning use cases for multimodal travel for vulnerable road users	PWI 17185-4	A standard for travel plans to enable vulnerable road users to travel safely
	10	Emergency evacuation and disaster response and recovery – Part 1: Framework and concept of operation	TR 19083-1	Standardization of evacuation and restoration in emergencies
	11	Account-based ticketing state of the art report	TR 20526	Collection of latest trends in account-based ticketing
	12	Interoperability between IFM systems and NFC mobile devices	AWI 20527	Standardization for interoperability between IFMS systems and mobile equipment using near field communication devices
	13	Common transport service account systems – Part 1: Framework and use cases	DTR 21724-1	Definition of framework and use cases for the account system for public transport payment
	14	Performance testing for connectivity and safety functions of automated driving buses	NP 21734	Standardization pertaining to the connectivity and safety of automated driving buses that communicate with road infrastructure at signalized intersections, crosswalks, bus stops, etc.

★ Item(s) that Japan is / has been actively working on

WG 9 Integrated Transport Information, Management and Control

WG 9 is working on the standardization of traffic management (traffic information and control, etc.) Specifically, it is working on the systematization of information and standardization of communication systems between traffic management centers, between centers and roadside modules, and between roadside modules, to enable efficient data exchange and to provide information to outside organizations.

List of WG 9 work items

		Standardization themes	ISO Number	Content
	1	Data interfaces between centers for transport information and control systems – Part 1: Message definition requirement	ISO 14827-1	Definition of message forms between centers for transport information and control systems
	2	Data interfaces between centers for transport information and control systems – Part 2: DATEX-ASN application	ISO 14827-2	Definition of a DATEX-ASN-based communication protocol between centers for transport information and control systems
★	3	Data interfaces between centers for transport information and control systems Part3: Data interfaces between centers for intelligent transport systems (ITS) using XML (Profile A)	ISO 14827-3	Definition of an XML-based communication protocol between centers for transport information and control systems
	4	Data interfaces between centers for transport information and control systems Part3: Data interfaces between centers for intelligent transport systems (ITS) using XML (Profile B)	NP 14827-4	Definition of an XML-based communication protocol between centers for transport information and control systems
★	5	Data exchange involving roadside modules communication	ISO 15784-1, 2, 3	Application profile of communication between roadside modules
	6	Integrated transport information, management and control – Data quality in ITS systems	TR 21707	Definition of data quality for ITS
	7	Interface protocol and message set definition between traffic signal controllers and detectors (IPMSTSCD)	ISO 10711	Definition of interface and message set between vehicle detectors and traffic signal controllers
★	8	The use of simulation models for evaluation of traffic management systems – Input parameters and reporting template for simulation of traffic signal control systems	TR 16786	Specification of input parameters and report templates in evaluating signal control systems through simulation
★	9	Definition of data elements and data frames between roadside units and signal controllers for cooperative signal control	TS 19082	The definition of a use-case, requirements and data concepts for traffic signal control, incorporating probe data
	10	Data interfaces between centers for transport information and control systems – Platform independent model specifications for data exchange protocols for transport information and control systems	TS 19468	Platform independent model specifications for data exchange protocols for transport information and control systems
	11	Roadside modules SNMP data interface	ISO 20684-1, 2 3 to 7, 10	Definition of application interface using SNMP between roadside modules and the center
★	12	Roadside modules AP-DATEX data interface	DIS 22741-1, 2, 10	Definition of application interface using DATEX-ASN between roadside modules and the center

★ Item(s) that Japan is / has been actively working on

WG 10 Traveler Information Systems

Traveler information systems, subject to standardization by WG 10, constitute a core part of ITS. This working group has work items designed to study data dictionaries and message sets to provide information to drivers through various communication media, such as FM broadcasting, DSRC, and digital broadcasting. Recently, the Transport Protocol Experts Group (TPEG) has stepped up its UML modeling activities.

List of WG 10 work items

		Standardization themes	ISO Number	Content
	1	TTI messages via traffic message coding	ISO 14819-1	Coding protocol for the RDS-TMC
			ISO 14819-2	Event and information codes for the RDS-TMC
			ISO 14819-3	Location referencing for the RDS-TMC
			ISO 14819-6	Encryption and conditional access for the RDS-TMC
★	2	Intelligent transport systems – Graphic data dictionary	ISO 14823	Specification for road traffic signs and designs code data dictionary codes
			TR 14823-2	Example of road traffic signs and designs data dictionary codes transmission message description
	3	Traffic and Travel Information via Transport Protocol Experts Group	TS 18234-1	TPEG1 binary version; Introduction, numbering and versions
			TS 18234-2	TPEG1 binary version; Syntax, semantics and framing structure
			TS 18234-3	TPEG1 binary version; Services and network information
			TS 18234-4	TPEG1 binary version; Road Traffic Message (RTM) application
			TS 18234-5	TPEG1 binary version; Public Transport Information (PTI) application
			TS 18234-6	TPEG1 binary version; Location referencing applications
			TS 18234-7	TPEG1 binary version; Parking information
			TS 18234-8	TPEG1 binary version; Congestion and travel time application
			TS 18234-9	TPEG1 binary version; Traffic event compact
			TS 18234-10	TPEG1 binary version; Conditional access information
			TS 18234-11	TPEG1 binary version; Location Referencing Container
			TS 24530-1	TPEG XML version; Introduction, common data types and tpegML 1
			TS 24530-2	TPEG XML version; Location referencing
			TS 24530-3	TPEG XML version; Road traffic message
			TS 24530-4	TPEG XML version; Public Transport Information
			TS 21219-1	TPEG2 UML version; Introduction, numbering and versions
			TS 21219-2	TPEG2 UML version; UML modeling rules
			TS 21219-3	TPEG2 UML version; UML to binary conversion rules
			TS 21219-4	TPEG2 UML version; UML to XML conversion rules
			TS 21219-5	TPEG2 UML version; Service framework
			TS 21219-6	TPEG2 UML version; Message management container
			TS 21219-7	TPEG2 UML version, Location referencing container
			TS 21219-9	TPEG2 UML version; Service and network information
			TS 21219-10	TPEG2 UML version; Conditional access information
			TS 21219-14	TPEG2 UML version; Parking information application
			TS 21219-15	TPEG2 UML version; Traffic event compact
			TS 21219-16	TPEG2 UML version; Fuel price information application
			TS 21219-18	TPEG2 UML version; Traffic flow and prediction application
			TS 21219-19	TPEG2 UML version; Weather information
			TS 21219-21	TPEG2 UML version; Geographic Location Referencing
			TS 21219-22	TPEG2 UML version; OpenLR Location Referencing
			TS 21219-23	TPEG2 UML version; Road and multimodal routes application
			TS 21219-24	TPEG2 UML Version: Light encryption for TEPG
			TS 21219-25	TPEG2 UML Version: Electromobility charging infrastructure
			TS 21219-26	TPEG2 UML Version: Vigilance location information

Note: TTI: Traffic and Travel Information, RDS-TMC: Radio Data System-Traffic Message Channel
★ Item(s) that Japan is / has been actively working on

WG 14 Vehicle/Roadway Warning and Control Systems

WG 14 is working on the standardization of driving support systems and automated driving systems to reduce driver workload, improve conve- nience, raise awareness of danger, prevent accidents/mitigate damage and reduce CO2 using advanced technologies. Vehicles equipped with systems such as Adaptive Cruise Control (ACC) and Forward Vehicle Collision

Mitigation Systems (FVCMS)—standards created by WG 14—are avail- able on almost all new vehicles in many countries.

Chaired by Japan, WG 14 includes many participating countries and is internationally recognized as one of the most active groups in TC 204.

List of WG 14 work items

		Standardization themes	ISO Number	Content
	1	Adaptive Cruise Control systems (ACC)	ISO 15622	System for maintaining a certain distance from the vehicle ahead Consists of classification according to the existence of a clutch or active braking, and specification of control strategy, and driver intervention characteristics Revised to include ISO 22718 LSF (annulled) and ISO 22179 FSRA (annulled).
	2	Forward vehicle collision warning systems (FVCWS)	ISO 15623	System for preventing rear-end collisions by activating a warning whenever the vehicle in front is too close and prompting the driver to maneuver to avoid collision Consists of specification of detection range and performance, as well as evaluation methods concerning the vehicle ahead
★	3	Traffic Impediment Warning Systems (TIWS)	TS 15624	System that identifies obstacles in roads ahead of the vehicle through roadside sensors, and informs the driver using roadside message boards Has been established as TS as the infrastructure depends on unique factors that vary from one country to another
	4	Manoeuvring Aids for Low Speed Operation (MALSO)	ISO 17386	System to inform the driver of obstacles found at the rear or corners of the vehicle when backing up and turning at low speed Specification consists of classification based on detection areas, and specifications of system operation conditions, and test methods
★	5	Lane departure warning systems (LDWS)	ISO 17361	System to warn the driver of an actual or possible departure from a lane due to driver's inattention. Consists of specification of lane departure definition, warning conditions, and test methods
	6	Lane change decision aid systems (LCDAS)	ISO 17387	System to inform the presence of a vehicle in a blind spot or a vehicle approaching from behind when a driver is trying to change lanes Consists of classification based on areas covered, and specifications of warning conditions, and test methods
	7	Forward vehicle collision mitigation systems (FVCMS)	ISO 22839	System that automatically applies emergency braking to mitigate collision damage if there is a risk of collision with the vehicle ahead Operational concepts, system requirements, and evaluation procedures are specified
	8	Extended-range backing aid systems (ERBA)	ISO 22840	System to provide information on obstacles at the rear of the vehicle when backing up for a relatively long distance. Consists of specification of the obstacles concerned, detection area and system operation conditions, in comparison with MALSO
	9	Cooperative intersection signal information and violation warning systems (CIWS)	ISO 26684	System based on roadside and vehicle cooperation that displays current traffic light information on on-board equipment and uses it to activate a warning system if the driver is about to ignore a red light Specifies basic functions and information contents
	10	Curve speed warning systems (CSWS)	ISO 11067	System alerting the driver, using a navigation map for example, if a safe speed is exceeded as the vehicle approaches a curve Specifies system definition and required items
	11	Lane keeping assistance systems (LKAS)	ISO 11270	System that recognizes the lane markings and automatically controls steering to help keep the vehicle in it Specifies system definition and requirements
★	12	Assisted Parking System (APS)	ISO 16787	System that detects parking spaces and provides automatic steering while parking Specifies system definition and requirements
★	13	External hazard detection and notification systems (HNS)	ISO 18682	Specification of fundamental concepts for notifications and warnings in cooperative and autonomous systems
★	14	Pedestrian Detection and Collision Mitigation Systems (PDCMS)	ISO 19237	System that automatically applies emergency braking to mitigate collision damage if there is a risk of colliding with a pedestrian ahead Operation concepts, performance requirements, and evaluation procedures are specified
★	15	Report on standardization for vehicle automated driving systems (RoVAS)	TR 20545	A technical report with a broad view of automated driving functions, with items to standardize spanning many fields.
★	16	Road Boundary Departure Prevention Systems (RBDPS)	ISO 19638	The system will control the vehicle's braking and steering to prevent departure from the road boundary.
	17	Cooperative Adaptive Cruise Control (CACC)	ISO 20035	The system maintains a suitable distance to the vehicle ahead using V2V and V2I communication with multiple vehicles and the infrastructure.
★	18	Partially Automated Parking System (PAPS)	ISO 20900	The system controls both the longitudinal and lateral movement of the vehicle during parking maneuvers. The driver remains in the car in Type 1, and remotely supervised by the drive outside the car in Type 2.
	19	Emergency Electronic Break Light systems (EEBL)	ISO 20901	The system warns the driver against danger caused by emergency braking of forward vehicles on the upcoming road.
★	20	Partially Automated Lane Change Systems (PALS)	ISO 21202	The system recognizes lane markings and conditions around the vehicle through sensors, and changes lanes automatically upon receiving instructions or confirmation from the driver.
	21	Partially Automated In-lane Driving Systems (PADS)	ISO 21717	The system automatically controls the vehicle in longitudinal and lateral directions within the lane.
	22	Bicyclist detection and collision mitigation systems (BDCMS)	ISO 22078	System that automatically applies emergency braking to mitigate collision damage if there is a risk of colliding with a bicyclist ahead. Operation concepts, performance requirements, and evaluation procedures are specified.
	23	Low-Speed Automated Driving (LSAD) Systems for Predefined routes	ISO 22737	System that, in the limited operational design domain, automatically operates vehicles in low speed.
	24	Taxonomy and definitions for terms related to driving automation systems for on-road motor vehicles	ISO/SAE PAS22736	Public available specifications describing taxonomy and definitions for terms related to driving automation systems for on-road motor vehicles. ISO and SAE work collaboratively on revision of draft of SAE issued standard.
★	25	Automated Valet Parking System (AVPS) - Part 1: System Framework, requirements for automated driving, and communication interface	CD 23374-1	Defines a series of communication specifications for searching for parking facilities with available spaces, making reservations, and calling parked vehicles, as well as performance requirements and test methods for Level 4 automated driving in parking facilities.
★	26	Collision Evasive Lateral Manoeuvre system (CELM)	AWI 23375	System using in-vehicle sensors that detects an object to be avoided and controls the lateral movement of the vehicle to avoid colliding with the object.
	27	Vehicle to Vehicle Intersection Collision Warning system (VVICW)	PRF 23376	System using vehicle-to-vehicle communications that warns the driver if the vehicle is predicted to collide with another vehicle at an intersection in the direction that the vehicle is heading.
★	28	Motorway Chauffeur Systems - Part 1: Overall Structure and Necessary Requirements (MCS-1)	AWI 23792-1	Stipulates the overall framework of systems for Level 3 automated driving on limited-access highways (Part 1) and functional requirements and test procedures for automated driving within a lane.
★	29	Motorway Chauffeur Systems - Part 2: Discretionary Lane Change (MCS-2)	PWI 23792-2	Adds functional requirements for lane changing off systems for Level 3 automated driving on limited-access highways and stipulates a test method for it.
	30	Minimal Risk Maneuver (MRM)	AWI 23793-1 PWI 23793-2	A function to automatically achieve a minimal risk condition (MRC) when an automated driving system cannot continue to operate a vehicle. Part 1 stipulates the framework and common requirements. Part 2 stipulates the requirements for road shoulder shunting systems.
★	31	Truck Platooning Systems (TPS)	CD 4272	Specifies functions for joining and leaving a platoon, functions for platoon maintaining control and communication information, and evaluation and testing methods for systems that manage platoon driving (multiple trucks maintaining a certain distance while driving in the same lane).
	32	Automated Braking during Low Speed Maneuvering (ABLS)	AWI 4273	Requirements and test method for braking operations to prevent contact with obstacles while driving at speeds of approx. 10 km/h (comments are being submitted for 10 km/h or more) or less for the purpose of parking.
★	33	Remote assist system for Low-Speed Automated Driving (LSAD) system equipped vehicle — Performance requirements and test procedures	PWI 7856	Specifies requirements and test methods for mechanisms to support automated vehicles equipped with low-speed automated driving systems (LSADs), as standardized by ISO 22737, through remote driving or remote assistance.

★ Item(s) that Japan is / has been actively working on

WG 16: Communications

WG 16 is involved in standardizing the communication systems used in ITS. This working group is holding deliberations on ITS Station Systems used in ITS communication and the DSRC inherited from the now disbanded WG 15 (Dedicated Short Range Communications), in addition to probe data systems.

List of WG 16 work items

		Standardization themes	ISO Number	Content
★	1	Wide Area Communication - Protocol Management Information	ISO 15662	Defines a checklist for ITS applications in wide area communication systems between service centers and user terminals. Japan is taking the lead in preparing a draft standard
	2	Station and communication Architecture	ISO 21217	Describes the architecture that forms the basis of the overall ITS communication system using ITS station, and specifies the station concept, function outline, communication scenario, etc.
	3	ITS Station Management	ISO 24102	Specifies management of all management entities in ITS station, and management functions for communication between different media
	4	Hybrid communications - Access technology support	ISO 21218	Specifies interfaces for third layer connections between different ITS station communication media, and interfaces for connecting to communication interface management entities
	5	CALM 2G., CALM 3G	ISO 21212 ISO 21213	Standardization of interfaces for receiving ITS services via 2nd and 3rd generation mobile communications. References existing mobile telephony standards and specifies a framework that complies with CALM.
	6	CALM IR	ISO 21214	Standardization of interfaces for receiving ITS services via infrared. Japan's optical beacon is outside of its scope
	7	ITS-M5	ISO 21215	Standardization of interfaces for receiving ITS services via CALM M5 5 GHz band. Uses IEEE 802.11p as a base
★	8	CALM MM	ISO 21216	Standardization of interfaces for receiving ITS services via millimeter waves
★	9	CALM MAIL CALM Media Adapted Interface Layer	ISO 24103	Specifies media conversion for the use of ASL (Application Sub-Layer; ARIB STD-T88 and ITU-R M.1453- 2) functions with DSRC that comply with ISO 15628 (DSRC L7)
	10	CALM ITS using Public Wireless Networks - General Requirements	ISO 25111	Specifies interface requirements for receiving ITS services using Mobile Broadband Wireless Access (MBWA)
	11	CALM WiMAX	ISO 25112	Standardization of interfaces for receiving ITS services using WiMAX (IEEE 802.16)
★	12	CALM HC-SDMA	ISO 25113	Standardization of interfaces for receiving ITS services using HC-SDMA (iBurst, etc.)
	13	CALM Applications using Satellite	ISO 29282	Use of satellite communication for ITS
★	14	CALM IEEE 802.20	ISO 29283	Standardization of interfaces for receiving ITS services using IEEE 802.20
	15	CALM - Using broadcast communications	ISO 13183	Standardization concerning management interfaces and session connections required to receive broadcast communication in the CALM environment
	16	LTE	ISO 17515	Standardization of the use of LTE (Long Term Evolution) for ITS, and standardization of D2D and LTE-V2X communications
	17	CALM 6LowPAN	ISO 19079	Standardization for conformity between 6LowPAN, the Personal Area Network (PAN) network layer equivalent of short-range wireless networks, and CALM
	18	CALM CoAP	ISO 19080	Standardization for conformity between CoAP, a simplified, HTTP-like high level machine-to-machine (M2M) protocol, and CALM
★	19	IPv6 Networking	ISO 21210	Standard for functionality that achieves a seamless communication environment (handover between identical media, media switching, etc.) using IPv6
★	20	Non-IP networking	ISO 29281	Standardization of concepts, mechanisms and interfaces for non-IP communications in CALM
	21	Communication protocol messages for global usage	TS 16460	Method for interoperation and coexistence between WAVE (Wireless Access in Vehicular Environments) and CALM FAST
★	22	Application Management	ISO 24101	Specification of mechanisms and conformance test to add, modify, or delete ITS applications using ITS Station
★	23	DSRC - DSRC application layer	ISO 15628	Interface for roadside-to-vehicle communication equivalent to communication protocol Layer 7 (including some functions equivalent to Layers 3 to 6)
★	24	Vehicle Probe Data for Wide Area Communications	ISO 22837	Standardization of core data elements and typical probe messages for probe data services
★	25	Basic Principles for Personal Data Protection in Probe Vehicle Information Services	ISO 24100	Standardization of basic rules for the protection of personal information in probe data services
	26	Probe Data Reporting Management	TS 25114	Examination of commands for directing uplink conditions to probe vehicles
★	27	Event based Probe Vehicle Data	TS 29284	Standard concerning event-based probe data
★	28	Criteria for Privacy and Integrity protection in Probe Vehicle Information Systems	ISO 16461	Readjustment of anonymity requirements and evaluation criteria in probe data systems
★	29	Service Architecture of Probe Vehicle Systems	ISO 19414	Standardization of a service framework to examine the definition of service areas, use of common services and centralization of services in probe data systems Work item proposed by Japan
★	30	Pre-emption of ITS communication networks	TR 18317	Method for securing ITS communication networks during an emergency
	31	CALM Security considerations for lawful interception	TR 11766	Identification of the definition, architecture and mechanisms for lawful interception in ITS. Examination of elements (interfaces) for common use and general procedure for LI. TR (technical documents) issued
	32	Data retention for law enforcement	TR 11769	Identification of data retention methods associated with lawful interception. Examination of data types and schemes for retention TR (technical documents) also issued
	33	ITS Safety and emergency messages using any available wireless media - Data registry procedures	ISO 24978	Standardization of message data registry used for vehicle collision notification via wireless communications
	34	Optical camera communication	ISO 22738	V2X communications using visible light communications
★	35	Use cases for sharing of probe data	TR 4286	Describes usage cases in which probe data such as ETC 2.0 is shared by various services
	36	Lower layer protocols for usage in the European digital tachograph	ISO 4426	Lower layer standard for usage in European digital tachographs that use DSRC
	37	Bluetooth	PWI 7865	Regulations on the use of Bluetooth at ITS Stations
	38	LoRa	PWI 7869	Regulations on the application of LoRa/LoRaWAN at ITS Stations

★ Item(s) that Japan is / has been actively working on

WG 17 Nomadic Devices in ITS Systems

WG17 oversees the establishment of standards for ITS services that use nomadic devices such as smartphones and portable navigation devices (PNDs), which are becoming popular worldwide.
To use information that cars have, WG17 promotes the standard- ization of application interfaces, safety support system guidance protocols, information services for travelers with nomadic devices, and green ITS for transport, which considers CO2 emissions.
The figure on the right shows the work items subject to standardization in WG17, organized by group. WG17 considers nomadic devices as key ITS devices that connect people and modals, and is examining how to contribute the realization of services that can pro- vide various conveniences.

List of WG 17 work items

	Standardization themes	ISO Number	Contents
1	Use of nomadic and portable devices to support ITS service and multimedia provision in vehicles	TR 10992	Defines use cases to support ITS services and multimedia contents tor nomadic and mobile devices used in vehicles.
2	Use of nomadic and portable devices to support ITS service and multimedia provision in vehicles – Part 2: Definition and use cases for mobile service convergence	TR 10992-2	Definition and use case of platforms intended for various nomadic devices and Cloud utilizing services.
3	Vehicle interface for provisioning and support of ITS services – Part 1: General information and use case definition	TR 13185-1	Part 1 of the provisioning of ITS services related to vehicle interface. Defines general information and use cases for Vehicle ITS Station Gateway (V-ITS-SG)*
4	Vehicle interface for provisioning and support of ITS services – Part 2: Unified gateway protocol (UGP) requirements and specification for vehicle ITS station gateway (V-ITS-SG) interface	ISO 13185-2	Part 2 of the provisioning of ITS services related to vehicle interface proposed by WG 17. Defines requirements and specification of protocols for Vehicle ITS Station Gateway (VITS-SG).
5	Vehicle interface for provisioning and support of ITS Services – Part 3: Unified vehicle interface protocol (UVIP) server and client API specification	ISO 13185-3	Part 3 of the provisioning of ITS services related to vehicle interface. Defines the specification of UVIP, a type of application interface protocol, between nomadic devices as clients to vehicle information interface like Vehicle ITS Station Gateway (V-ITS-SG)*.
6	Guidance protocol via personal ITS station for advisory safety systems – Part 1: General information and use case definitions	TR 13184-1	Part 1 of the guidance protocol for safety support systems making use of the personal ITS station. Defines general information and use cases.
7	Guidance protocol via personal ITS station for advisory safety systems – Part 2: Road guidance protocol (RGP) requirements and specification	ISO 13184-2	Part 2 of the guidance protocols for safety support systems making use of the personal ITS station. Defines requirements and specifications of protocols (RGP).
8	Guidance protocol via personal ITS station for advisory safety systems – Part 3: Road guidance protocol (RGP) conformance test specification	ISO 13184-3	Part 3 of the guidance protocols for safety driving support systems making use of personal ITS stations. Stipulates guidelines for validation test suites for protocols (RGP).
9	The use of personal ITS station to support ITS service provision for travellers – Part 1: General information and use case definitions	ISO 13111-1	Defines use examples for provisions of ITS services intended for travelers to nomadic and mobile devices.
10	Use of nomadic and portable devices to support ITS service and multimedia provision in vehicles – Part 2: General requirements for data exchange between personal ITS station and other ITS stations	DIS 13111-2	Defines data exchange requirements and specifications for provisions of ITS services intended for travelers to nomadic and mobile devices.
11	Indoor navigation for personal and vehicle ITS station – Part 1: General information and use case definition	ISO 17438-1	Part 1 of the indoor navigation standardization jointly prepared by WGs 3, 8 and 18. Defines general information and use cases.
12	Indoor navigation for personal and vehicle ITS stations – Part 4: Requirements and specification for interface between Personal/Vehicle and Central ITS stations	ISO 17438-4	Part 4 of the indoor navigation standardization jointly prepared by WGs 3, 8 and 18. Defines the requirements and specification for interfaces between nomadic devices and ITS stations.
13	Urban mobility applications via nomadic device for green transport management –Part 1: Requirements for interface between ITS stations	ISO 18561-1	Defines general information and use cases in the aim of TR publication for route planning and management of Green (low CO2 emissions) transportation using nomadic devices in designated areas and road sections during international events such as the FIFA World Cup or the Olympic Games.
14	Intelligent transport systems - Framework for green ITS (G-ITS) standards – Part 1: General information and use cases definitions	TR 20529-1	Framework for using ITS to reduce CO2 emissions. Includes the concept of G-ITS, use examples, and guidelines.
15	Framework for Green ITS standards – Part 2: Integrated mobile service application and use case definition	FDIS 20529-2	Framework for using ITS to reduce CO2. Includes integration of mobile services and use example definition.
16	Information for emergency service support via Personal ITS station – General requirements and technical definition	ISO 20530-1	Requirements and technical definitions for sending automobile emergency information (such as on crashes) via nomadic devices
17	Framework architecture for plug & play (PnP) functionality in vehicles utilizing nomadic devices	TR 21735	Defines general information and use cases with the aim of TR publication for frameworks to manage the addition and deletion of automobile function using nomadic devices (plug & play).
18	Nomadic device service platform for micro mobility – Part 1: General information and use cases definition	TR 22085-1	Defines general information and use cases for a service platform using nomadic devices to utilize micro mobility with one or two passengers.
19	Intelligent transport systems – Collection of agent behavior information and sharing between ITS stations	PWI 22087	Aims to establish a framework for collecting environmental information and driving behavior data via nomadic devices to enable AI used in autonomous driving to learn them, and sharing the data with surrounding vehicles
20	Intelligent transport systems - Network based precise positioning infrastructure for land transportation – Part 1: General information and use cases definition	NP 22086-1	Aims to establish precise (about 20 - 30 cm accuracy) positioning infrastructure using a DGPS system with four ground-based reference stations based on the results from experimental tests in South Korea.
21	ITS - Network based precise positioning infrastructure for land transportation – Part 2: Functional requirements and data interface via nomadic device	NP22086-2	Aim to develop functional requirements and data interfaces for GPS systems using ground-based reference stations.
22	Vehicle interface for provisioning and support of ITS Services – Part 4: Unified vehicle interface protocol (UVIP) conformance test	ISO 13185-4	Aim to develop functional requirements and data interfaces for GPS systems using ground-based reference stations.
23	Nomadic device service platform for micro mobility – Part 2: Functional requirements and data set definitions	DIS 22085-2	Functional requirements and definition of used data sets for a service platform using nomadic devices to utilize micro mobility with one or two passengers.
24	Nomadic device service platform for micro mobility – Part 3: Data structure and data exchange procedures	DIS 22085-3	Data structure and replacement procedure for a service platform using nomadic devices to utilize micro mobility with one or two passengers.
25	Indoor navigation for personal and vehicle ITS stations – Part 2: Requirements and specification for indoor maps	NP 17438-2	Requirements and specifications for an indoor map as Part 2 of the indoor navigation standardization jointly prepared by WGs 3, 8 and 18.
26	Indoor navigation for personal and vehicle ITS stations – Part 3: Requirements and specification for indoor positioning references	NP 17438-3	Requirements and specifications for indoor location referencing as Part 3 of the indoor navigation standardization jointly prepared by WGs 3, 8 and 18.
27	Extracting trip data via nomadic device for estimating CO_2 emissions - Part 1: Fuel consumption determination for fleet management	DIS 23795-1	This specification stipulates estimating fuel consumption for managing the platooning of trucks, etc. through a nomadic device by comparing the speed while the vehicle is driving to the operation of a virtual vehicle.
28	Extracting trip data via nomadic device for estimating CO_2 emissions - Part 2: Information provision for eco-friendly driving behavior	CD 23795-2	As the necessary information for measuring carbon dioxide emissions relating to driving behavior, it stipulates the provision of information of different events (speed, rapid acceleration/deceleration, idling, fuel cut, eco-driving, etc.) from a nomadic device.
29	Urban mobility applications via nomadic device for green transport management - Part 2: Trip and modal choice applications and specification	CD 18561-2	Defines the transport mode selection application and specifications as Part 2 of trip planning and management regarding green (low CO2 emission) movement using nomadic devices in designated areas and road sections during international events such as the Olympics.
30	ITS -Urban mobility applications via nomadic device for green transport management –Part 3: Mobility integration service applications using hybrid V2X	PWI 18561-3	Specifies the mobility advancements based on the premise of a communication system called Hybrid V2X, including travel planning and management related to green (low CO2 emission) mobility using nomadic devices.
31	ITS – System requirements and Interfaces for seamless positioning between indoor & outdoor based on the personal ITS station – Part 1: General information and use cases	PWI 6029-1	The goal is to specify an interface for location positioning that can be used seamlessly outdoors and indoors.

* V-ITS-SG: Information gateway of vehicles that comply with ITS Station architecture proposed by WG 17

WG 18 Cooperative ITS

Cooperative ITS integrates vehicle-to-vehicle (V2V), vehicle-to- infrastructure (V2I) and infrastructure-to-infrastructure (I2I) communications, and simultaneously supports extensive ITS services via the communications system.

List of WG 18 work items

		Standardization themes	ISO Number	Contents
	1	Globally unique identification	ISO 17419:2018	Specification of unique identifiers to be used in cooperative ITS
	2	Data exchange specification for in-vehicle presentation of external road and traffic related data	TS 17425:2016	Data exchange specification for in-vehicle presentation of external road and traffic related data
	3	Contextual speeds	TS 17426:2016	A data exchange standard for in-vehicle presentation of regulated and recommended speeds according to road conditions
	4	ITS station facilities for the transfer of information between ITS stations	TS 17429:2017	Prescribes ITS station facilities for the transfer of information between ITS stations
	5	ITS station facility services — Part 1: Communication profile handler	PRF/TS 21176	Revised and divided TS 17429 into 3 parts
	6	ITS station facility services — Part 2: Facility services handler	AWI TS 17429-2	
	7	ITS station facility services — Part 3: Content subscription handler	AWI TS 17429-3	
	8	Local dynamic map	ISO 18750:2018	Standard for Local Dynamic Map (LDM)
	9	Using V2I and I2V communications for applications related to signalized intersections	TS 19091:2019	Road-to-vehicle communication messages (SPaT, MAP) for applications related to signal-controlled intersections
	10	Dictionary of in-vehicle information (IVI) data structures	TS 19321:2020	A data structure dictionary for in-vehicle information (IVI) applications
	11	ITS station security services for secure session establishment and authentication between trusted devices	TS 21177:2019 CD 21177	Specify ITS station security services for establishing and authenticating secure sessions between trusted devices
	12	Position, velocity and time functionality in the ITS station	TS 21176:2020	Prescribes ITS station functionality that provides information on the position, speed, and time
	13	Global transport data management (GTDM) framework	TS 21184:2021	Standard for a data dictionary used in the secure connection between an in-vehicle ITS station and the vehicle's information system
	14	Communication profiles for secure connections between trusted devices	TS 21185:2019	Standard for ensuring the security of communications between vehicles and ITS stations
	15	Guidelines on the usage of standards — Part 1: Standardization landscape and releases	TR 21186-1:2021	Guidelines for relations and application method of standards relating to collaborative ITS
	16	Guidelines on the usage of standards — Part 2: Hybrid communications	TR 21186-2:2021	
	17	Guidelines on the usage of standards — Part 3: Security	TR 21186-3:2021	
★	18	Automated valet parking systems (AVPS) — Part 2: Security integration	PWI 23374-2	Standard for integrated security of Automatic Valet Parking Systems (AVPS)

★ Item(s) that Japan is / has been actively working on

WG19 Mobility Integration

The creation of WG 19 was resolved at the TC 204 plenary meeting held in autumn 2018 in Budapest, and is positioned in ISO/TC 204 as a joint working group with CEN/TC 278/WG 17. The primary purpose and work items of this working group is defining international standard for mobility integration but it does not include the work items that fall into the scope of existing working groups. WG19 acts collaboratively and works on the items that cannot be performed by other working groups.

The scope of the working group is broad, including not just urban but also inter-urban mobility. The WG 19 meeting in Florida in April 2019 deter- mined the first work item to be third item in the table below, and subsequent- ly created new work items for which it is conducting specific standardization. To realize a society that utilizes automated driving systems in urban areas in order to solve population concentrations and mobility issues and provide mobility in sparsely populated areas, city administrators need tools/guidelines to tackle these issues. The working group aims to engage in activities to defining international standards that should be used and referred to for the implementation of ITS technology utilization for urban administration policies to improve the urban environment. Specific work on standardization started from the Brussels meeting in June 2019 until the Washington D.C. meeting in December 2019, in which face-to-face meetings were conducted. Standardization

work has been conducted by holding frequent web conferences. The meetings switched to online due to the COVID-19 pandemic, and deliberations on standardization for each work item has been conducted through frequently held online meetings.

List of WG19 Work Items

		Standardization Theme	ISO Number	Content
★	1	1 ITS- Role model of smart city ITS service application	TR 4445	Japanese proposal The role model for realizing smart city ITS service applications is summarized in TR
★	2	LSAD system service architecture	DTS 5255-1 PWI/TR 5255-2 PWI/TS 5255-3	Japanese proposal Compilation of service architecture that includes infrastructure support for low-speed automated driving systems
★	3	Intelligent transport systems – Mobility integration – Gap and overlap analysis of ISO/TC 204 work programme for mobility integration	DTR 23797	Gap and overlap analysis of standards relating to mobility integration and compilation of report.
★	4	Intelligent transport systems - Management for Electronic Traffic Regulations (METR) - Part 1: General concept and architecture/ connected rules of the road	PWI/TR 24315-1	Compilation of TS for concept and architecture for storage of road signs and regulatory information as static and dynamic electronic data. Comprised of 3 parts
★	5	Intelligent transport systems - Urban ITS - Models and definitions for new modes	PWI/IS or TS 24310	Compilation of definition and specifications for new transport mobility models, including shared mobility Work is temporarily on hold
★	6	Intelligent transport systems - Location referencing harmonization for Urban ITS - Part 1: State of the art and guidelines	PWI/IS or TS 24309-1	Compilation of specifications for transformation and harmonization of location referencing technologies as used in urban environments.
★	7	Intelligent transport systems - Location referencing harmonization for Urban ITS - Part 2: Transformation methods	PWI/IS or TS 24309-2	Compilation of specifications for transformation and harmonization of location referencing technologies as used in urban environments.
★	8	Intelligent transport systems – Urban ITS - Air quality management in urban areas	PWI/IS or TS 24312	Compilation of specifications for air quality management of exhaust gases in urban areas. Work on this specification has been cancelled and the specification has been removed.
★	9	Intelligent transport systems - Urban-ITS - 'Controlled Zone' management using C-ITS	PWI/IS or TS 24311	Compilation of specifications for 'controlled zone' management using vehicular access management in urban areas.
★	10	Intelligent transport systems – Architecture to Support Vehicle Automation	PWI/IS or TS 24318	Compilation of specifications for architecture, including infrastructure to support vehicle automation as a form of mobility.
★	11	Mobility Integration - Vulnerable users and light transport	PWI/ TR 24317	Compilation of specifications for safety information relating to pedestrians and light modes of transport.
★	12	Intelligent transport systems –Development of data standards for the parking sector	PWI 24321	Compilation of specifications for electronification of parking lot information. Harmonization with existing standards is an issue Work has been suspended and this item has been transferred to AWI/TS 5206-1
★	13	Mobility Integration concept	DTR 4447	TR that acts as a bridge between European MaaS and North American MOD
★	14	Ground-based automated mobility system	PWI/TS 4448	Defines roadside operations for automated vehicles Comprised of 11 parts
★	15	Parking – Part 1: Core data model	AWI/TS 5206-1	International standardization of industry APDS standards
★	16	ITS data management, access and mobility issues Governance using secure interfaces - High level specifications & supporting information resource	DTS 5616	Communication & data standards guidebook. Online collection of links.
★	17	Digital infrastructure service role and functional model	PWI/TR 7872	Japanese proposal Compiling a service that provides digital infrastructure information to ITS service providers
★	18	ITS data aggregation role and functional model	PWI XXXX	Japanese proposal Compiling a service that aggregates ITS data needed by ITS service providers.
★	19	Enterprise view	PWI/TR 7878	Norway Proposal: Compile role models for MaaS, MOD, and IFMS
★	20	Multimodal pricing	PWI/TR 7874	US Proposal: Compile multimodal payment rules

★ Item(s) that Japan is / has been actively working on

Working groups that have been discontinued

TC 204 has responded precisely to changes in the technological, social and business environment relating to ITS, and where it has implemented necessary revisions to working groups and their activities.
Below is a list of working groups that have been discontinued, including the contents that these groups dealt with, and the situation relating to changes made.

Working Groups that have stopped activities

WG Name	Main Activities	Change in Situation
WG2 Quality and Reliability	Considerations on standardization for quality and reliability relating to systems.	Effectively disbanded in 1998.
WG4 Automatic Vehicle and Equipment Identification	Considering automatic identification systems for cars or freight using on-board devices or simple media.	Disbanded in 2018
WG6 General Fleet Management	Considerations on standardization for general items relating to fleet management.	Integrated with WG7 in 1999 (General Fleet Management and Commercial/Freight)
WG11 Route Guidance and Navigation Systems	Considering data contents and communications methods relating to route guidance and navigation systems.	No activities since May 2004 and therefore effectively disbanded.
WG12 Parking Management	Considerations on standardization for parking lots.	Disbanded in 1998.
WG13 Man-Machine Interface	Considerations on standardization for the human factor and the machine interface.	Forum for activities transferred to TC 22 (Road Vehicles) in 1995 and disbanded under TC 204.
WG15 Dedicated Short-Range Communications	Considering standardization of dedicated short-range communication methods for roadside unit-to-vehicle	Disbanded in 2014. WG16 (Communications) has taken over responsibility for maintenance of already developed standards.

Introduction to Related Standardization Activities

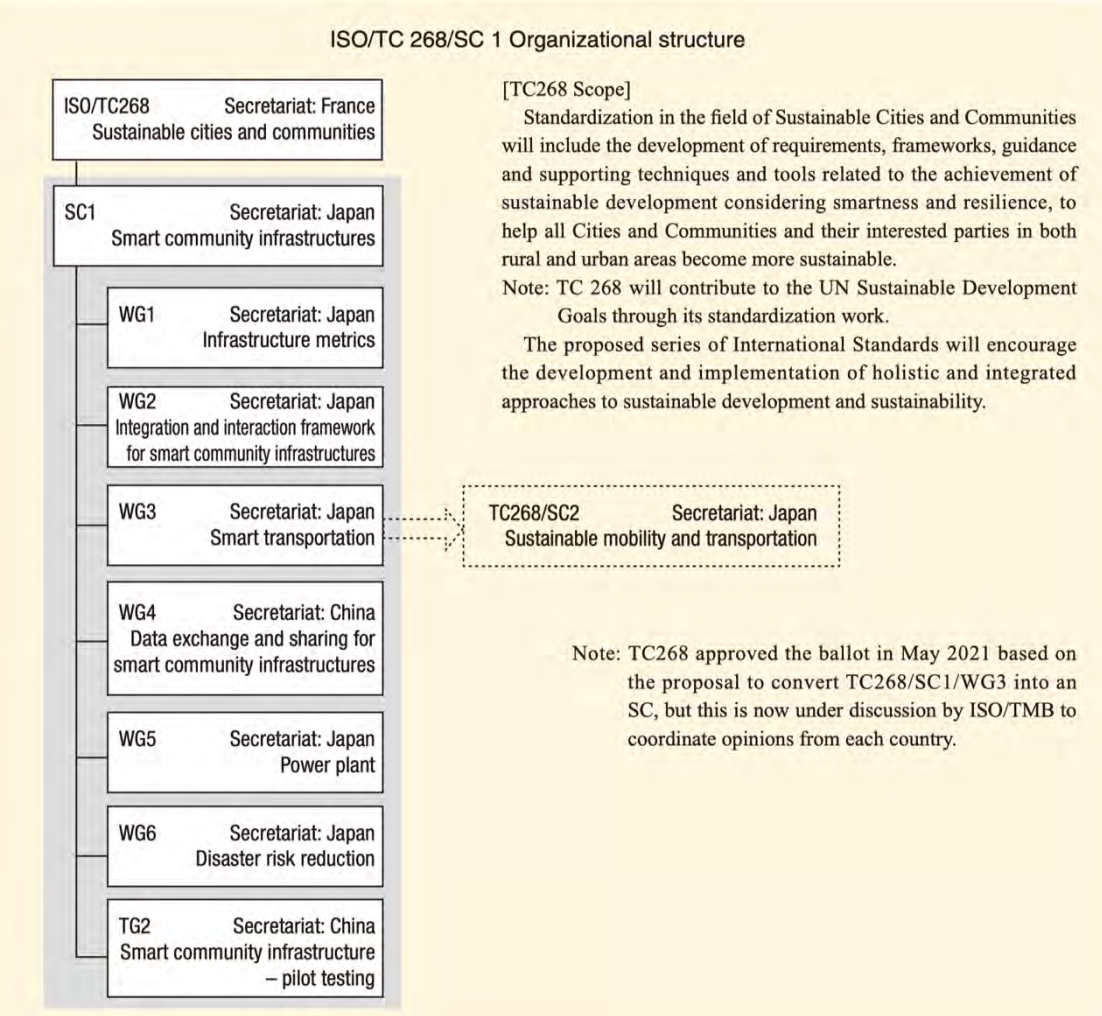
Standardization activities in ISO/TC268

In February 2012, ISO/TC268 (Sustainable Cities and Communities) was established, and international standardization activities in the field of sustainable cities and communities are proceeding.

TC268/SC1 (Smart community infrastructures)/WG3 (Smart Transportation) proposed to establish a new subcommittee in February 2020 to standardize infrastructures, services, and organizational issues in mobility and transportation options for cities and communities, including new technologies such as electricity, hydrogen, and automated driving. The proposal to establish a new SC was approved at the SC1 general meeting in November and TC268 general meeting in December. In the meantime, at the TC204 general meeting in October, the chairman of TC268 proposed a liaison agreement after establishing the new subcommittee. TC204 expressed concern about the overlap of scopes. However, the chairman replied that there was no overlap of scope with other TCs.

The ballot for establishing TC268/SC2 was held and approved in May 2021, but it is still under discussion by the ISO Technical Management Board (TMB) to coordinate opinions from various countries.

A TC268/SC2 domestic correspondence organization will be established with the Japanese Standards Association as its secretariat in Japan. In addition, at the request of JISC, there are plans to select members from the Vehicle Standardization Committee (TC22 Domestic Correspondence Organization) and the ITS Standardization Committee (TC204 Domestic Correspondence Organization) of the Society of Automotive Engineers of Japan to the TC268/SC2 Domestic Correspondence Organization, with future collaboration between the organizations expected.



ITS Standardization at CEN/TC 278

The CEN (European Standards Committee)/TC 278 is a European technical committee responsible for ITS which was established in 1992 before the creation of ISO/TC 204. Previously known as Road Transport and Traffic Telematics (RTTT), it was renamed as ITS at the TC 278 plenary meeting in March 2013. At CEN, standards are usually prepared according to the following procedure.

They are first formalized as technical specifications (TS), and then are subject to review before finally either becoming a European standard (EN) or being cancelled. Technical standards developed in European standard organizations such as CEN, are in principle, optional. However, the binding power of Directive 98/34/ EC - Procedures based on the New Approach, technical standards developed under the standardization directive become virtually mandatory European standards. European EN standards differ from ISOs in that: (1) once detailed work on an EN has started, similar standardization work in individual European countries ceases; (2) once an EN is established, any standard in individual European countries that no longer compatible with the new one is abolished; and (3) EN is mandatory in public procurement.

At present, CEN/ TC 278 has 14 active Working Groups (WGs) and TC 204 and CEN/TC 278 collaborate closely in working on standardization.
In addition, CID (Commission Implementing Decision) for promoting standardization of Urban ITS was issued in February 2016, and WG 17 was created within CEN/TC 278 in April.
Currently, EU funding is nearing completion and standardization work is almost complete. The results will be presented ISO/TC 204/ WG 19 and are being proposed as an ISO. Also, at the CEN/TC 278 Stockholm plenary meeting in September 2019, the name WG was changed to Mobility Integration and became the same as ISO/TC 204/ WG 19. The original name Urban ITS is no longer used in the EU as the expression is considered unsuitable. The WG 17 project team includes PT 1701 to PT 1711, and PT 1712, which was newly created in 2020. EU ICIP (European ITS communications and information protocols) deliberations have started. WG 17 aims to develop a toolkit for governments to realize smart cities. Joint WG meetings with WG 19 Mobility Integration, created at the ISO/TC204 Budapest plenary meeting in September 2018, are being held frequently.

List of CEN/TC 278 working groups

CEN/TC 278 Working Group	Working Group	Lead Country	Corresponding TC 204 Working Group
WG1	Electronic Fee Collection (EFC)	Sweden	WG5
WG2	Freight, Logistics and Commercial Vehicle Operations	United Kingdom	WG7
WG3	Public Transport	France	WG8
WG4	Traffic and Traveler Information	United Kingdom	WG10
WG5	Traffic Control Systems	United Kingdom	WG9
WG7	ITS Spatial Data	Germany	WG3
WG8	Road Traffic Data	Netherlands	
WG9	Dedicated Short-Range Communications (DSRC)	Germany	WG16 (abolished WG 15)
WG10	Human-Machine Interfacing	Germany	(TC22/SC13/W8)
WG12	Automatic Vehicle and Equipment Identification	Norway	W4 (abolished)
WG13	Architecture and Terminology	United Kingdom	WG1
WG14	Recovery of Stolen Vehicles	France	
WG15	eSafety / eCall	United Kingdom	
WG16	Cooperative ITS	Germany	WG18
WG17	Mobility inegration (formerly Urban ITS)	Norway	WG19

ISO/TC 22 (Road Vehicles) Standardization Activities

Founded at the same time as ISO in 1947, TC 22 is one of the oldest TCs.The following diagram shows its scope and structure. TC 22 plenary meetings are held every 18 months, and the following eight member countries regularly attend: France, Germany, USA, Japan, Italy, Sweden, South Korea and Malaysia. There are 964 TC 22-published international standards as of July 2021, and 226 draft standards are currently under development.

Scope and structure of TC 22

ISO/TC 22

Chair: France
P member: 36 countries
O member: 41 countries

Secretariat: AFNOR
International secretariat: BNA

[Scope]
All questions of standardization concerning compatibility, interchangeability and safety, with particular reference to terminology and test procedures (including the characteristics of instrumentation) for evaluating the performance of the following types of road vehicles and their equipment as defined in the relevant items of Article 1 of the convention on Road Traffic, Vienna in 1968 concluded under the auspices of the United Nations:
Moped (item m), Motor cycle (item n), Motor vehicle (item p), Trailer (item q), Semi-trailer (item r), Light trailers (item s), Combination vehicles (item t), Articulated vehicle (item u)

SC	Name	Chair
SC 31	Data communication	Germany/ France
SC 32	Electrical and electronic components/ systems	Japan
SC 33	Vehicle dynamics and chassis components	Germany
SC 34	Powertrain	U.S.
SC 35	Lighting and visibility	Italy
SC 36	Safety and impact tests	U.S.
SC 37	Electrically propelled vehicles	Germany
SC 38	Motorcycles and mopeds	Japan
SC 39	Ergonomics	U.S.
SC 40	Commercial vehicles, buses and trailers	Italy
SC 41	Gasoline engine vehicles	Italy

AFNOR: Association Française de Normalisation; BNA: Bureau de Normalisation de l'Automobile (France)

ETSI TC ITS Activities

ETSI (European Telecommunication Standards Institute) is a nonprofit organization approved by the EU (European Union) as ESO (European Standardization Organization). It is developing standards for the entire telecommunication field.
It is based in Sophia Antipolis, in the suburbs of Nice in southern France. Its logo "World Class Standards" represents the global influence of the organization, which has member companies and organizations in more than 60 countries.
Unlike the ISO membership structure in which each country is represented in the organization, any company, organization or individual paying the membership fee becomes a member of ETSI. It has numerous member companies and organizations in the United States and in Asian countries including Japan, in addition to countries in Europe.
Among more than 40 TCs (technical committees) including those for wireless, wired, broadcast and network, TC ITS is responsible for standardization of ITS. It comprises five working groups, that are developing standards corresponding to each technical field:

WG 1 Application requirements and services
WG 2 Architecture and cross-layer items
WG 3 Networking and Transport
WG 4 Communication media and media-related items
WG 5 Security

The cooperative ITS standardization directive (M453) was presented by European Commission in October 2009. ETSI and CEN (the Euroean Committee for Standardization) undertook the standardization. Consequently, even at the initial stage, called Release 1, more than 110 relevant standards were published. ETSI has published many standards related to communications for vehicle-to-vehicle and roadside-to-vehicle using 5.9 GHz band DSRC. Two European standards (ENs) shown in Table are especially well known.

EN 302 637-2	Specification of Cooperative Awareness Basic Service	Definition of transmission/reception, etc., of CAMs (Cooperative Awareness Message) to steadily provide other participants in traffic at a certain interval with data of positions, movement and attributions, etc., in vehicle-to-vehicle and roadside-to-vehicle communications to promote their awareness.
EN 302 637-3	Specifications of Decentralized Environmental Notification Basic Service	Definition of transmission/reception, etc., of DENMs (Decentralized Environmental Notification Message) to provide details at random times, mainly when dangerous incidents occur in road traffic.