Short report on Smart city in Europe

(Covering policy initiatives and standardization work)

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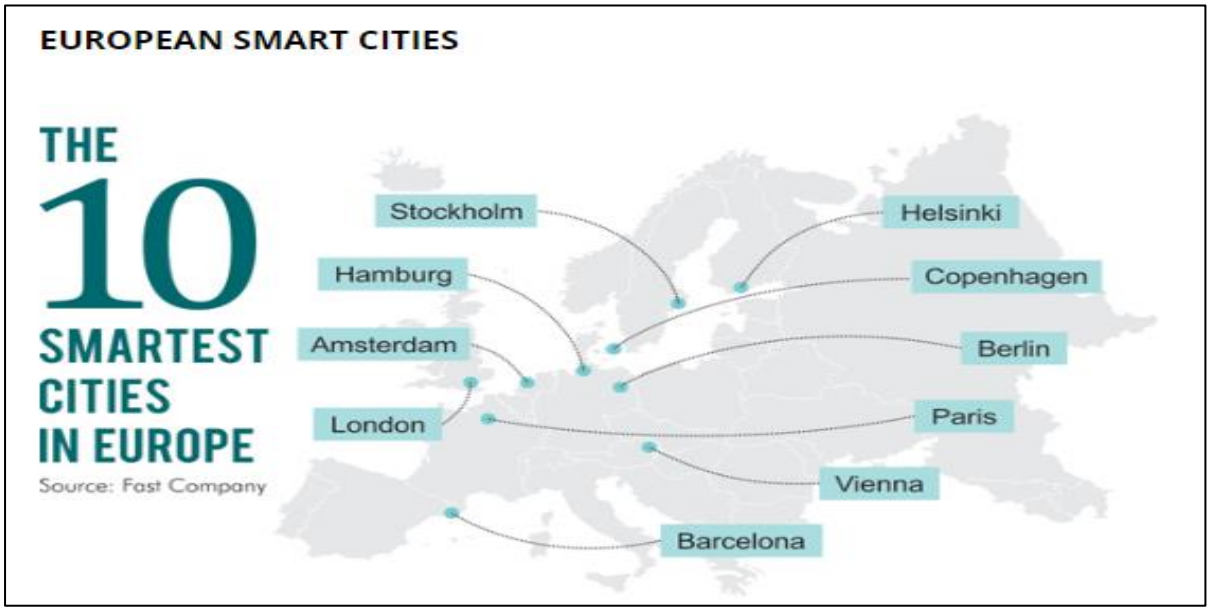
1. Introduction

Today, 78% of European Union's population lives in cities and this figure is expected to rise significantly in coming years. This places new demands on key city services and infrastructure such as **transport**, **energy**, **public safety**, **health care**, **water and waste management etc**. A smart city is a place where traditional networks and services are made more efficient with the use of Information and communication technologies (ICT) for the benefit of its inhabitants and business. It means smarter urban transport networks, upgraded water supply and waste disposal facilities and more efficient ways to light and heat buildings. It also means a more interactive and responsive city administration, safer public spaces and meeting the needs of an ageing population.

When it comes to smart cities, Europe is the model for the rest of the world to learn from. European cities tend to be denser, have better public transit, larger commitment to cycling and walking, a stronger focus on sustainability and low-carbon solutions, and perhaps most important, a culture and citizenry more engaged in the journey towards more sustainable and smarter cities.

Top 10 smart cities for Europe are illustrated below:



The European Union (EU) is investing in ICT research and innovation and developing policies to improve the quality of life of citizens and make cities more sustainable in view of Europe's 20-20-20 targets. The European Commission formally announced the European Innovation Partnership on Smart Cities and Communities (EIP SCC) in 2012, with a communication. Instead of directly providing funding, the EIP SCC is charged with fostering smart city development among cities, industry, citizens, financial institutions and other stakeholders, working together in six 'action clusters' (citizen focus; business models, finance and procurement; integrated infrastructures and processes; integrated planning, policy and regulations; sustainable districts and built environment; sustainable urban mobility). The creation of smart cities will only be achieved with a holistic approach, supported by globally acceptable standards that enable fully interoperable solutions that can be deployed and replicated at scale. In Europe, there is currently no 'standardization request' addressed to the European Standardization Organizations (i.e. CEN, CENELEC and ETSI). Nevertheless, the CEN-CENELEC-ETSI Sector Forum on Smart and Sustainable Cities and Communities' (SF-SSCC) is keen to be

involved in the European Innovation Partnership (EIP) on Smart Cities, a stakeholder-driven initiative, proposed by the EC in 2012

2. Policy Initiatives

2.1 HORIZON 2020 programme

Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. **INNOVATION AND NETWORKS EXECUTIVE AGENCY (INEA)** is running parts of Horizon 2020, the EU's €77 billion research and innovation programme for 2014-2020, in the areas of transport and energy.

The Agency is currently managing the Horizon 2020 calls for research & innovation projects proposals under the following themes:

Smart, green and integrated transport	**Secure, clean and efficient energy**
Over €2.3 billion in 2014-2020, of which €950 million in 2018-2020: • Mobility for Growth **OPEN! Calls for project proposals** • Green Vehicles • Automated Road Transport	Over €3 billion in 2014-2020, of which €1.3 billion in 2018-2020: • Competitive Low-Carbon Energy **OPEN! Calls for project proposals**
Smart cities and communities	**Next-generation batteries**
About €83 million in 2019: • Smart cities & communities (part of the *Secure, clean and efficient energy* budget) **OPEN! Calls for project proposals** • Funded projects	Over €114 million in 2019: • Next-generation batteries (*part of the Horizon 2020 energy and transport budgets*)
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy	**Funded Horizon 2020 projects**
• Blue Growth (*part of the Horizon 2020 energy and transport budgets*)	INEA has currently ca. **480 H2020 projects** in its portfolio. • **INEA's database** of H2020 energy and transport projects • **Project compendium** *(pdf, last update: June 2017)*

For more information please click here

2.2 European innovation partnership (EIP) on smart cities and communities (EIP-SCC)

In July 2012, the European Commission has initiated **EIP-SCC** combining ICT, **energy** management and **transport** management to come up with innovative solutions to the major environmental, societal and health challenges which are being faced by European cities today. With the aim of coming up

with scalable and transferable solutions to contribute to the EU's 20/20/20 climate action goals, it looks to reduce high energy consumption, green-house-gas emissions, bad air quality and congestion of roads.

EIP-SCC brings together European cities, industry leaders, small business (SMEs), banks, research and representatives of civil society to smarten up Europe's urban areas. It intends to:

- Improve citizens' quality of life
- Increase competitiveness of Europe's industry and innovative SMEs
- Make European cities more competitive and better places to live in
- Share knowledge to prevent mistakes being repeated
- Reach European energy and climate targets
- Support in finding the right partners and solutions, achieving social, environmental and economic sustainability for European cities.

So far, EIP-SCC has received some 350+ commitments to fund and develop smart solutions in the areas of energy, ICT and transport. These commitments involve more than 3,000 partners from across Europe and create a huge potential for making our cities more attractive, and create business opportunities. The focus of the EIP has shifted more recently towards investment. The **'Towards a Joint Investment for EU Smart Cities' white paper** sets out the market context and proposes a set of 21 more specific action lines that will help cities develop investable projects. In addition, the Marketplace has established a 'Matchmaking' process that brings project promoters together with investors to stimulate market action. Importantly, the European Commission has a major €500m budget programme to establish smart city demonstrators around some 100 cities throughout Europe. Alignment between the EIP-SCC Marketplace and these funded **'Lighthouse' programmes** offers scope for scale implementation. With the help of EIP SCC, 78 cities in Europe have undertaken smart city development. The EIP-SCC aim is to support projects in at least 300 cities with up to € 1 billion of investment, involving public and private investors and bank by the end of 2019.

The focus on **Smart Cities Lighthouse** projects will result in integrated commercial-scale solutions with a high market potential, in the field of energy, transport and ICT. The Horizon 2020 Work Programme for 2018-2020 (p. 105 - 109) provides you with more details on funding opportunities for Smart Cities & Communities. **For more information please click here**

European Network of City Policy Labs

The main goal is to create a European Network of Policy Labs to develop an urban structure for the participatory policymaking that will become the engine of the city's progress strategy. Read more

Space4Cities

The Space4Cities Initiative lead by Eurisy and the European Innovation Partnership on Smart Cities and Communities (EIP-SCC) aims at raising awareness on available satellite-based services for cities and at advocating for the development of services that actually respond to cities' needs and that are adapted to the operational processes of public administrations, SMEs and NGOs operating in cities. For more information please click here

2.3 European Energy Research Alliance (EERA) Joint Programme on Smart Cities

The **European Energy Research Alliance (EERA) Joint Programme on Smart Cities** aims to develop new scientific methods, concepts and tools designed to support European cities in their transformation into smart cities. The key focus is on large-scale integration of renewable energies and enhanced energy efficiency, enabled through smart energy management at city level.

The entire joint programme is structured in following 4 sub-programme:

I. Energy in Cities takes an integrated approach towards urban energy planning and transformation processes.
II. Urban Energy Networks concentrates on the intelligent planning, design and operation of thermal and electrical networks in cities.
III. Energy-efficient Interactive Buildings focuses on sustainable buildings as interactive elements of the urban energy system.
IV. Urban City-related Supply Technologies addresses renewable supply technologies and their integration into the urban infrastructure.

European Energy Research Alliance (EERA) Joint Programme on Smart Cities got a special issue "European pathways for the smart cities to come" in the TECHNE Journal of Technology for Architecture and Environment. **For more information please click here**

2.4 City VITAlity and Sustainability (CIVITAS)

The CIVITAS Initiative ('City-Vitality-Sustainability', or 'Cleaner and Better Transport in Cities') was launched in 2002. In the first phase of the project (2002 to 2006), 19 cities participated in 4 research and demonstration projects; in CIVITAS II (2005 to 2009), 17 cities participated across a further 4 projects, In CIVITAS plus (2008-12), 25 cities participated in 5 living lab projects and in CIVITAS plus II, only 8 cities participated in 2 living lab projects. The initiative is currently in its fifth phase, CIVITAS 2020 (2016-20), and 17 cities are now working together on three collaborative projects. Since it was launched by the European Commission in 2002, the CIVITAS Initiative has tested and implemented over 800 measures and urban transport solutions as part of demonstration projects in more than 80 Living Lab cities Europe-wide.

For more information please click here

2.5 Smart Cities Information System (SCIS)

The Smart Cities Information System (SCIS) is a knowledge platform to exchange data, experience and know-how and to collaborate on the creation of smart cities, providing a high quality of life for its citizens in a clean, energy efficient and climate friendly urban environment. SCIS brings together project developers, cities, research institutions, industry, experts and citizens from across Europe.

With a focus on smart cities, energy efficiency, transport and mobility and ICT, SCIS showcases solutions in the fields of sustainable building and district development, renewable energy sources for cities, energy efficiency and low-carbon technology applications. Launched with support from the European Commission, SCIS encompasses ongoing and future projects under the CONCERTO initiative, Smart Cities and Communities European Innovation Partnership (SCC EIP), Energy-efficient Buildings

Public Private Partnership (EeB PPP) and Smart Cities calls in Horizon 2020. EC-funded projects tracked by SCIS are available here and for more information please click here

A full list of policy/ new initiatives related to smart city domain is available here

3 Research & Development (R&D) projects

Here is the list of ongoing smart city projects funded by European Union's Horizon 2020 in the "Smart Cities & Communities" field:

Sharing Cities programme- Building smart cities together

The Sharing Cities 'lighthouse' programme is a proving ground for a better, common approach to making smart cities a reality. By fostering international collaboration between industry and cities, the project seeks to develop affordable, integrated, commercial-scale smart city solutions with a high market potential. The project partners work in close cooperation with **EIP-SCC** and with other `lighthouse` consortia. Sharing Cities offers a framework for citizen engagement and collaboration at local level, thereby strengthening trust between cities and citizens. The project draws on €24 million in EU funding. It aims to trigger €500 million in investment and to engage over 100 municipalities across Europe. Read more

Smarter Together

The SMARTER TOGETHER project's overarching vision is to find the right balance between smart technologies and organisational governance dimensions in order to deliver smart and inclusive solutions and to improve citizen's quality of life. The project gathers **the European Lighthouse cities Lyon, Munich, Vienna, the Follower cities Santiago de Compostela, Sofia, Venice as well as Kyiv and Yokohama as observer cities**, which bring the perspective of East Europe and Asia.

SMARTER TOGETHER delivers five clusters of co-created, smart and integrated solutions:

- living labs for citizens' engagement
- district heating and renewable energy sources (RES) for low energy districts
- holistic refurbishment for low energy districts addressing public and private housing
- Smart Data management platform and smart services
- e-mobility solutions for sustainable mobility. Read more

GrowSmarter – Transforming cities for smart, sustainable Europe

The project brings together the three lighthouse cities (Barcelona, Cologne and Stockholm) to demonstrate 12 smart, integrated solutions for city services such as renovation, heating, waste management, mobility and other, as a way of preparing for a wider market rollout. All the smart solutions are fit into the "Lighthouse cities" strategic development plans and the "Follower cities" replication plans. The solutions will involve five "Follower cities" and other European and international study groups.

The solutions solve common urban challenges such as:

- the renewal of existing buildings by demonstrating the cost efficient refurbishment of 100.000 square meters of nearly zero or low energy districts reducing energy demand by 70-90%;
- integrated infrastructures for ICT, street lighting, smart grids district heating and smarter waste handling;
- Sustainable urban mobility for both passenger and gods integrated in smart grids, biofuels from household waste thus reducing local air quality emissions by 60%.

The consortium includes industrial and research partners that will convert the solutions adopted into smart cities business case to be replicated in other EU cities. Read more

MySmartLife

The mySMARTLife project aims at making the three Lighthouse Cities of **Nantes, Hamburg and Helsinki** more environmentally friendly by reducing the CO_2 emissions and increasing the use of renewable energy sources. Activities are focusing on **"Inclusive Cities"**, offering a high quality of life to residents. **"Smart People"** are playing a vital role in their city's development. **"Smart Economy"** is an innovative and dynamic economic concept aiming at guaranteed employment and an adequate income, attracting talents and providing goods and services according to the actual requirements. Read more

REMO-URBAN (Regeneration Model for accelerating the smart URBAN transformation)

REMOURBAN will implement large scale interventions and intense dissemination initiatives to demonstrate the potential of the urban regeneration model in the energy, mobility and ICT sectors. The project is fully aligned with the Smart Cities European strategy and involves three lighthouse cities (**Valladolid in Spain, Nottingham in United Kingdom and Tepebasi/Eskisehir in Turkey)** and two follower cities (**Seraing in Belgium and Miskolc in Hungary**). Read more

RUGGEDISED- Designing smart, resilient cities for all

RUGGEDISED is a smart city project funded under the European Union's Horizon 2020 research and innovation programme. It brings together three lighthouse cities: Rotterdam, Glasgow and Umeå and three follower cities: Brno, Gdansk and Parma to test, implement and accelerate the smart city model across Europe. Through RUGGEDISED, six European cities are joining forces to accelerate the path towards a sustainable future by creating model urban areas. Read more

SmartEnCity

SmartEnCity is a project funded under EU's Horizon 2020 launched in 2016 with a vision to create Smart Zero Carbon Cities that are more sustainable and inclusive, improve citizens' quality of life, create jobs and wealth, and offer equal growth opportunities. The SmartEnCity concept will be defined, planned and implemented in the three Lighthouse demonstrators **Vitoria-Gasteiz** in Spain, **Tartu** in Estonia and **Sonderborg** in Denmark. The process will be replicated in the two Follower cities of **Lecce** (Italy), and **Asenovgrad** (Bulgaria). Under the coordination of TECNALIA Research & Innovation, 35 partners from six countries are joining forces on making Smart Zero Carbon Cities a reality in Europe. Read more

Triangulum – Demonstrate Disseminate Replicate

The three point project Triangulum is one of the European Smart Cities and Communities Lighthouse Projects, set to demonstrate, disseminate and replicate solutions and frameworks for Europe's future smart cites. The flagship cities Manchester (UK), Eindhoven (NL) and Stavanger (NO) serve as a testbed for innovative projects focusing on sustainable mobility, energy, ICT and business opportunities. This is a 5-year ongoing project which started on February 2015 and will continue until January 2020. It has a total budget of more than €29 million. Read more

REPLICATE (REnaissance of Places with Innovative Citizenship and TEchnolgy)

REPLICATE is a Smart City lighthouse project, aims at developing and implementing smart measures in 3 medium-sized European cities (San Sebastian, Bristol and Florence) to improve energy efficiency and mobility through innovation and ICT. Read more

IRIS- Integrated and Replicable Solutions for Co-Creation in Sustainable Cities

The IRIS project supports the so-called lighthouse cities of Utrecht (NL), Göteborg (SE) and Nice Côte d'Azur (FR) and the so-called follower cities Vaasa (FI), Alexandroupolis (GR), Santa Cruz de Tenerife (ES) and Focsani (RO) in delivering cheaper, better accessible and reliable energy and mobility services for a better and more sustainable urban quality of life. To achieve this, IRIS brings together a variety stakeholders in order to design innovative business models and demonstrate and quantify the value of integrated solutions across the energy, mobility and ICT domains. This is a 5-year ongoing project which started on October 2017 and will continue until September 2022. It has a total budget of more than €20 million. Read more

MAtchUP- MAximizing the UPscaling and replication potential of high level urban transformation strategies

The MAtchUP project deploys and demonstrates innovative solutions in the energy, mobility and ICT sectors in three so-called lighthouse cities (Antalya, Dresden and Valencia), and four so-called follower cities (Herzliya, Kerava, Ostend and Skopje). The objective is to develop a strong and replicable planning process for urban transformation, by means of substantially improved models for replication and upscaling, based on impact evaluation, and ensuring the bankability of the solutions by means of innovative business models. It will lead to realising a real deployment, going beyond pilots carried out in the lighthouse cities. This is a 5-year ongoing project which started on October 2017 and will continue until September 2022. It has a total budget of more than €19 million. Read more
Read more

STARDUST- HOLISTIC AND INTEGRATED URBAN MODEL FOR SMART CITIES

STARDUST serves as smart connector bringing together advanced European cities and citizens of Pamplona (ES), Tampere (FI) and Trento (IT) - with the associated follower cities of Derry (UK), Kozani (GR) and Litomerice (CZ). These six cities, collaborating with relevant industrial partners, including a variety of innovative local smart and medium enterprises (SMEs), and supported by academia and research centres, will deploy intelligent integration measures, test and validate technical solutions and innovative business models, and deliver blueprints for replication throughout Europe and abroad. This is a 5-year ongoing project which started on October 2017 and will continue until September 2022. It has a total budget of more than €21 million. Read more

List of ongoing IoT European large scale pilot (LSP) programme projects:

S.No.	Name of project	Description
1	**ACTivating InnoVative IoT smart living environments for AGEing well**	The main objective of this project is to build the first European IoT ecosystem across 9 Deployment Sites (DS) in seven European countries - Duration- January 2017 to June 2020 (2.5 yrs) - Total cost- > €2.5 billion - EU contribution: > €1.9 billion www.activageproject.eu
2	**(Management Of Networked IoT Wearables – Very Large Scale Demonstration of Cultural Societal)**	This project brings together 28 partners from 9 European countries with the objectives to provide a very large-scale demonstration of multiple existing and new Internet of Things technologies for Smarter Living. - Duration: from Jan 2017 to Dec 2019 (3 yrs) - Total Fund: > €17.5 million - EU contribution: about € 15 million www.monica-project.eu
3	**Internet of Food and Farm 2020**	IoF2020 brings together 70 partners from 16 EU countries with the objectives to to accelerate adoption of IoT for securing sufficient, safe and healthy food and to strengthen competitiveness of farming and food chains in Europe. - Duration: from Jan 2016 to Dec 2020 (5 yrs) - Total fund: > €3.4 billion - EU contribution: > € 2.9 billion www.iof2020.eu
4	**AUTOmated Driving Progressed by Internet Of Things**	AUTOPILOT brings together 43 partners from 14 European countries and 1 from South Korea with the objectives to increase safety, provide more comfort and create many new business opportunities for mobility services. - Duration: from Jan 2017 to Dec 2019 (3 yrs) - Total cost: > €2.6 billion - EU contribution: > € 19 million www.autopilot-project.eu
5	**SynchroniCity: Delivering an IoT enabled Digital Single Market for Europe and Beyond**	SynchroniCity brings together 33 partners from 9 EU countries and 1 from South Korea with the objectives to deliver a Single Digital City Market for Europe by piloting its foundations at scale in 11 reference zones – 8 European cities and 3 more worldwide cities. - Duration: from Jan 2017 to Dec 2019 (3 yrs) - Total Cost: > € 2 billion - EU contribution: > € 1.4 billion www.synchronicity-iot.eu

6	CREATE-IoT **CRoss fErtilisation through AlignmenT, synchronisation and Exchanges for IoT**	CREATE-IoT brings together 18 partners from 10 EU countries. The objectives are to stimulate collaboration between IoT initiatives, foster the take up of IoT in Europe and support the development and growth of IoT ecosystems based on open technologies and platforms. - Duration: from Jan 2017 to Dec 2019 (3 years) -Total cost: > €3.7 million - EU contribution:about € 3 million www.create-iot.eu
7	U4IoT **User Engagement for Large Scale Pilots in the Internet of Things**	U4IoT brings together 9 partners from 5 European countries. The objectives are to develop toolkit for LSPs end-user engagement and adoption, including online resources, privacy-compliant crowdsourcing tools, guidelines and an innovative privacy game for personal data protection risk assessment and awareness, online training modules. - Duration: from Jan 2017 to Dec 2019 (3 years) - Total cost: > € 1.8 million - EU contribution: € 998 625 www .u4iot.eu

Source: https://european-iot-pilots.eu/project/autopilot/

4 Standardization

CEN, CENELEC, and ETSI are the three recognised European Standards Organisations (ESOs). CEN is the European counterpart of ISO; CENELEC is the European counterpart of IEC; ETSI is more or less the European counterpart of ITU-T (but like its other European counterparts is non-governmental). ESOs have begun to identify and propose standards for activities and emerging technologies such as Artificial Intelligence (AI), Internet of thing (IoT), Machine to Machine (M2M) and Blockchain etc. associated with smart cities in close cooperation with ISO and IEC and with other SDOs. There are numerous technologies such as **smart home, smart transport, smart water management system, smart energy, smart data, smart IoT devices, smart manufacturing etc**. that make a smart city work. **Standardization work around above areas is as below:**

Since 2012, the CEN-CENELEC and ETSI Coordination Group 'Smart and Sustainable Cities and Communities' is in place to advice on European interests and needs related to standardization on Smart and Sustainable Cities & Communities. The final recommendations produced are publicly available in the specific webpage. In January 2017, the coordination group has been transferred into a long term joint group "CEN-CENELEC-ETSI Sector Forum on Smart and Sustainable Cities and Communities (SF-SSCC)" that acts as an advisory and coordinating body for European standardization activities related to smart and sustainable cities and communities.

The tasks of the group include:

- Liaise with relevant international initiatives (i.e. ISO, IEC and ITU) and prepare an overview on suitable standards already publicly available at national, European and international level

- Analyse and recommend standards for development, implementation, adaptation, or revision by CEN, CENELEC and ETSI
- Organize events on standardization activities for smart and sustainable cities open to relevant stakeholders in order to collect needs and share best practice
- Liaise and coordinate with relevant European initiatives (such as for example the European Innovation Partnership (EIP) on Smart Cities)
- Identify and give due consideration to European innovation/research projects which might have an impact
- Advise stakeholders on any strategic issues and developments concerning standardization on SSCC
- Inform on latest legislative developments occurring at the EC level (if any) and on the status of standardization work undertaken by relevant European Technical Bodies
- Propose actions to raise awareness of the ESOs on the importance of standards as a key element for a smart and sustainable development of cities and communities across Europe

The SF-SSCC activities are built upon the initial results and recommendations produced by the original Smart and Sustainable Coordination Group (SSCC-CG).

- ✓ Smart and Sustainable Coordination Group Report
- ✓ Smart and Sustainable Coordination Group Report

The CEN-CLC-ETSI Sector Forum on Smart Cities and Communities created a mapping which aims at listing relevant standardization activities and published standards, relevant for the development of Smart Cities. It lists also the different policy and research initiatives in this respect. This mapping is designed as a living document, to which any interested stakeholder can contribute.

- Download the mapping

CEN, CENELEC and ETSI have more than **100 technical committees** developing standards in support to the deployment of smart cities (energy management and energy efficiency, telecommunication, data management, transport, healthcare, construction, cybersecurity, household appliances, etc.). Moreover, CEN, through its members, supports the activities of ISO/TC 268 'Sustainable Cities and Communities'.

Following is the list of technical reports (TR) and Group specification (GS) published by ETSI related to smart city domain:

List of standards published by ETSI	
ETSI TR 103 506 V1.1.1 (2018-09)	SmartM2M; SAREF extension investigation; Requirements for Smart Cities
ETSI GS OEU 019 V1.1.1 (2017-08)	Operational energy Efficiency for Users (OEU); KPIs for Smart Cities
ETSI TR 103 290 V1.1.1 (2015-04)	Machine-to-Machine communications (M2M); Impact of Smart City Activity on IoT Environment

Work around smart home

A SmartHouse is described as a house that has intelligent systems, intelligent equipment and networks and has services that use the SmartHouse intelligence (from CLC/CWA 50487 – SmartHouse Code of Practice). The adoption of intelligent homes and the interoperability of products for commands and controls from multiple suppliers within homes involve an appropriate coordination of standards and

the further development of CEN and CENELEC activities in this area. After the development of EC funded **SmartHouse Roadmap Project (2010-11)**, the coordination of the standardization activities around SmartHouse were taken over by following technical committees:

- ✓ CLC/TC 205 'Home and Building Electronic Systems (HBES)' and
- ✓ CEN/TC 294 'Communication systems for meters and remote reading of meters',

For more information please click here

Work around Electric mobility

CEN and CENELEC established a Focus Group on European Electro-Mobility which produced in October 2011, as a reply to Mandate M/468 on charging of electric vehicles, a report on 'Standardization for road vehicles and associated infrastructure' that represents the specific standardization requirements for European Electro-mobility.

One of the main recommendations of the Focus Group was to establish a CEN-CENELEC Co-ordination Group on e-Mobility with the aim to support coordination of standardization activities during the critical phase of writing new standards or updating existing standards.

The CEN-CENELEC e-Mobility Co-ordination Group (eM-CG) was established in March 2012. The eM-CG is responsible for making sure that standards necessary for e-Mobility are being dealt with in a coherent manner by the relevant technical bodies. The eM-CG developed a work programme and a list of relevant standards for the charging of electric vehicles.

In March 2015, CEN and CENELEC received a standardization request (M/533 - Commission Implementing Decision C(2015)1330) on the implementation of the above directive 2014/94/EU. The coordination of the 'electric supply' part of M/533 has been allocated to the eM-CG.

As smart charging is seen as a necessity to optimize the use of electric grid for electric vehicles charging, the CEN-CENELEC e-Mobility Coordination Group established a specific working group which developed a report on smart charging . The European EV infrastructure standardization efforts are led by Germany, and they have published the German Standardization Roadmap for Electric Mobility 2020, which expects all the relevant EV infrastructure Standards to be placed by 2020 a for long term sustainable electric mobility.

- **CENELEC: TC 69X – Electrical systems for electric road vehicles**

  TC 69X is responsible to prepare European standards related to electrical systems for road vehicles, totally or partly propelled from self-contained power sources.

  CENELEC TC 69X Subcommittees and Working Groups:

Working Group	Title
WG 01	A.C. charging
WG 02	D.C. charging
WG 03	Inductive charging
WG 04	EMC

WG 05	Light Electric Vehicles
WG 06	Battery swap systems

List of published standards is available as Annexure 1.

- **CEN: TC 301 – Road Vehicles**

CEN TC301 is responsible for preparation of road vehicle European Standards answering essentially to European mandates. Since the automotive industry is acting globally, the international level (ISO/TC 22 Road vehicles) shall have top priority for any other standardization projects.

CEN/TC 301 Subcommittees and Working Groups:

Working group	Title
CEN/TC 301/WG 11	Safety of roller brake testers
CEN/TC 301/WG 14	Electricity Fuel labelling
CEN/TC 301/WG 15	Safety of machines for mounting and demounting vehicles tyres
CEN/TC 301/WG 16	Performance assessment of the Portable Emission Measuring Systems (PEMS)
CEN/TC 301/WG 6	M/421 Vehicle OBD, repair and maintenance information
CEN/TC 301/WG 7	Supplementary grip devices

List of published standards by CEN/TC 301 is available as Annexure 2.

- **CLC/TC 64: Electrical installations & Protection against electric shock**

CLC/TC 64 is responsible for preparation International standards concerning protection against electric shock arising from equipment, from installations and from systems without limit of voltage, for the design, erection foreseeable correct use and verification of all kind of electrical installations at supply voltage up to 1 kV a.c or 1,5 kV d.c., except those installations covered by the following IEC committees: TC 9X, TC 18X, TC 44X, TC 97, TC 99X, in co-ordination with TC 99X, concerning requirements additional to those of TC 99X for the design, erection and verification of electrical installations of buildings above 1 kV up to 35 kV. Working group 27 is focused on Electric Vehicles (EVs).

List of relevant standards for the charging of electric vehicles published by CLC/TC 64 is available as annexure 3.

- **CLC/TC 23BX: Switches, boxes and enclosures for household & similar purposes, plugs & socket outlets for d.c & for the charging of electrical vehicles including their connectors**

CLC/TC 23BX is responsible to prepare standards for:

- General purpose switches
- Switches and related accessories for use in Home and Building Electronic Systems (HBES)
- General purpose plugs and fixed and portable socket outlets
- General purpose boxes and enclosures for household devices
- Ancillary products which relate to/incorporate products covered by a), b), c), e.g. luminaire couplers, adaptors/cable reels, indicator light units, etc.

CLC/TC 23BX: Subcommittees and Working Groups:

Working Group	Title
WG 01	Requirements and tests on EN 60669 - Parts 2
WG 03	Boxes and enclosures for electrical accessories for household and similar fixed electrical installations
WG 04	Cable reels
WG 06	Luminaire Couplers
WG 07	WG on plug and socket-outlet system for d.c.
WG 08	Socket protectors
WG 10	Accessibility
WG 11	EN 60669-1
WG 12	Cord Extension Sets

List of relevant standards for electric vehicles published by CLC/TC 23BX is available as Annexure 4.

Work around Intelligent Transport System

The ITS directive is supported by mandate M/ 453, and even though this mandate has formally ended there are several standards activities still under support by M/453. Getting a good understanding of what is being standardised, who is working with what, and the importance and impact of the standardisation for ITS stakeholders is thus important.

Within ITS standardisation there are Technical Committees (TCs) of three Standards Development Organisations (SDOs) which are of special interest for the European domain. These are CEN TC 278, ETSI TC ITS, ERM TG37 and ISO TC 204.

- CEN TC 278: CEN/TC 278 is responsible for managing the preparation of standards in the field of Intelligent Transport Systems (ITS) in Europe. It serves as a platform for European stakeholder to exchange knowledge, information, best practices and experiences in ITS. CEN/TC 278 has a number of Working Groups (WG), each responsible for a specific ITS area:

  - 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

The following documents are relevant for the standardization work in CEN/TC 278:

- **Directive 2004/52/EC (EFC directive)** on the interoperability of electronic road toll systems in the Community.
- **Mandate M/338 on Electronic Fee Collection** in support of Interoperability of electronic road toll systems in Europe.
- **Commission Decision 2009/750/EC** on the definition of the European Electronic Toll Service and its technical elements
- **Directive 2010/40/EU (ITS directive)** on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport
- Mandate M/546 on Urban ITS on Intelligent Transport Systems (ITS) in urban areas in support of Directive 2010/40/EU on the framework for the deployment of Intelligent
- Transport Systems in the field of road transport and for interfaces with other modes of transport.
- **Mandate M/453 on Co-operative systems** for Intelligent Transport in the field of information and communication technologies to support interoperability of cooperative systems for intelligent transport in Europe.
- The EC **Rolling plan for ICT standardization** provides an overview of the needs for preliminary or complementary ICT standardisation activities to be undertaken in support of EU policy activities.

List of Standards developed by CEN TC 278 on intelligent transport systems (ITS) is available as Annexure 5.

- ETSI TC ITS: 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: the physical layer (e.g. with ITS-G5), Network Layer, Transport Layer (e.g. with the GeoNetworking protocol), Facility Layer, (e.g. with the definition of facility services such as Cooperative Awareness - CA, Decentralized Environmental Notification - DEN and Cooperative Perception – CP, used by the ITS applications).

  ETSI TC ITS has created five Working Groups (WGs) given below:
  - **WG1:** Application Requirements & Service
  - **WG2:** Architecture & Cross Layer
  - **WG3:** Transport & Network
  - **WG4:** Media & Medium related
  - **WG5:** Security

- ERM TG37: ERM TG37 covers ITS (road transport) Harmonised Standards and other relevant deliverables. ERM TG37 has a close relationship with TC ITS and acts as its vehicle into ERM related deliverables. ERM TG37 conducts their meeting as joint meetings with TC ITS WG 4 since maintenance work on the harmonised standards be carried out jointly managed between TC ERM and TC ITS.

List of latest published ETSI standards on intelligent transport systems is available as Annexure 6 and for work in progress see the ETSI **Work Programme**

The ITS Coordination Group (ITS-CG) between CEN and ETSI has been established to ensure on-going coordination of the standardization activities within these two SDOs.
ISO, IEC and ITU are global SDOs who standardise ITS on a global level. Many of the working groups (WGs) in CEN TC278 are overlapping with WGs in ISO TC 204. The figure below shows the alignment of the working groups.

To harmonise and obtain a good and fruitful cooperation CEN 278 and ISO TC 204 have joint meetings twice a year. Cooperation between regional and global ITS SDOs is important in order to achieve harmonised standards providing global interoperability. Detailed cooperation between the SDOs has been initiated in addition to the already existing cross participation by membership in the relevant organisations.

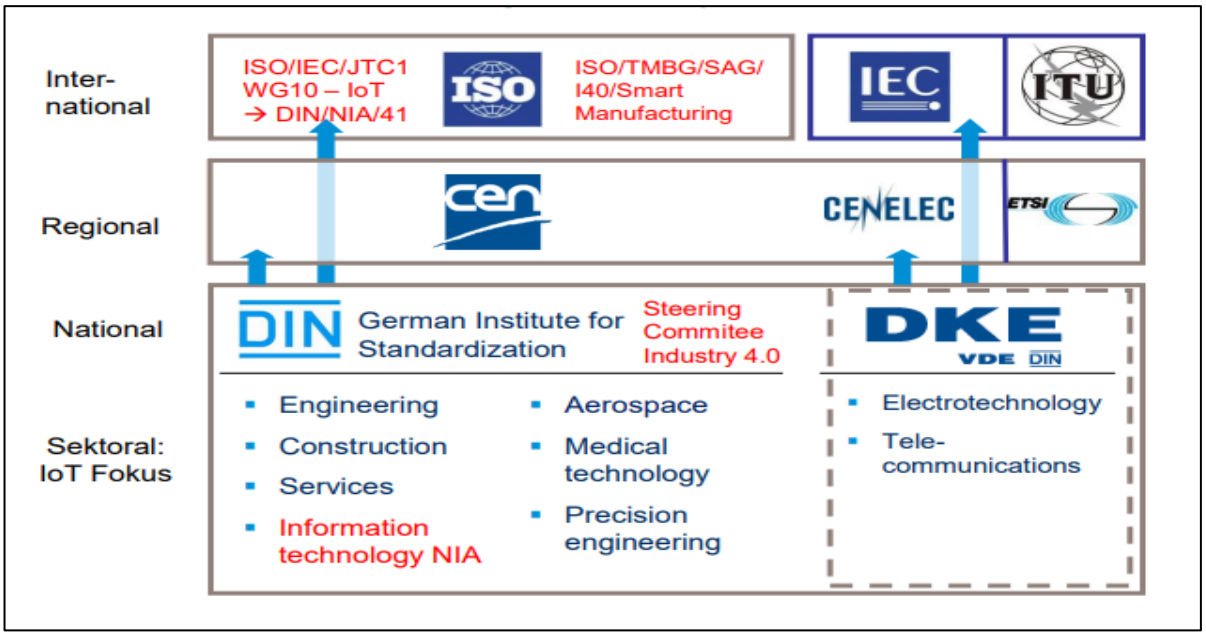
Work around smart manufacturing/Industry 4.0

For a successful implementation of Industry 4.0 across Europe, standardisation is crucial. To allow devices/equipment to communicate regardless of manufacturer, operating system or other

technological details, there should be standards for systems, platforms, protocols, connections and interfaces.

Currently, these standards are lacking. This is a considerable barrier for companies. In fact, for 21% the need for standardisation is the main challenge keeping them from implementing Industry 4.0 systems. The European Commission is now working on the development of European standards.

The development of standards and specifications takes place on a variety of levels (national, European and international). A suitable overview, showing the way in which the development of standards and specifications is organized on a national, European and international level can be found in the illustration below, which depicts the standards organizations and their interaction.



Note: DIN and DKE represent German interests in European and international standardization.

In addition to these officially mandated bodies, other groups are drawing up standards and guidelines for standardizing Industry 4.0.

The international standards organizations ISO and IEC have recognized that it is not enough for work on the complex topic of Industrie 4.0 to be left to single technical committees (TC) working in isolation. For that reason, a strategic body was set up **(ISO Smart Manufacturing Coordinating Committee (ISO/SMCC) and IEC System Committee Smart Manufacturing (IEC/SyC)),** which consists of representatives from all relevant TCs and which coordinates the standardization work throughout the organizations.

In Europe, the standardization work is being driven forward by various technical committees of CEN/CENELEC: these are,

- **CEN/TC 438 - Additive Manufacturing:** Standardization in the field of Additive Manufacturing (AM): The main objective of the committee is to standardize the processes of Additive Manufacturing, the test procedures, environmental issues, quality parameters and vocabularies.
  The new technical committee will have three main goals:
  - To provide a complete set of European standards, part of which will be developed based on the international standardization work of ISO;

- To strengthen the link between European research programs and standardization in AM;
- To ensure transparency and visibility of the European standardization in AM.

For more information please click here

- **CEN/TC 310 - Advanced automation technologies and their applications:** Standardization in the field of automation systems and technologies and their application and integration to ensure the availability of the standards required by industry for design, sourcing, manufacturing and delivery, support, maintenance and disposal of products and their associated services. **For more information about structure, work program and published standards please click here**

- **CLC/TC 65X: Industrial-Process measurement, control and automation**
  To contribute, support and coordinate the preparation of international standards for systems and elements used for industrial process measurement, control and automation at CENELEC level. To coordinate standardisation activities which affect integration of components and functions into such systems including safety and security aspects. This CENELEC work of standardisation is to be carried out for equipment and systems and closely coordinated with IEC TC65 and its subcommittees with the objective of avoiding any duplication of work while honouring standing agreements between CENELEC and IEC. **For more information please click here**

Nowadays, almost 90% of standardization work is geared towards the European and international levels, with DIN and DKE organizing the entire process of standardization on the national level and ensuring German involvement in the European and international processes through the corresponding national committees (see Table below):

Industrie 4.0: Relevant committees and consortia	
National committees and consortia	**Standards and specifications**
DIN/DKE	• DIN SPEC 27070 Reference architecture of a security gateway for the exchange of industry data and services • DIN SPEC 16593-1 • RM-SA – Reference Model for Industrie 4.0 Service architectures – Basic concepts of an interactionbased architecture • DIN SPEC 91345 Reference Architecture Model Industrie 4.0 (RAMI4.0) • DIN SPEC 16592 Combining OPC Unified Architecture and Automation Markup Language
VDI/VDE GMA	• VDI/VDE 3682 Formalized process description • VDI/VDE 3695 Engineering of facilities • VDI 4499 Digital Factory • VDI 5600 MES
CEN/CLC	• EN Standards

ETSI	• EN-Standards • SDR|VNF/Radio/ • 4G, 5G/Security/M2

DIN and DKE founded the Standardization Council Industrie 4.0 (SCI 4.0) 4 in conjunction with the industry associations BITKOM, VDMA and ZVEI. SCI 4.0 is responsible for orchestrating standardization activities and, in this role, acts as a point of contact for all matters relating to standardization in the context of Industrie 4.0. In collaboration with the Plattform Industrie 4.0, SCI 4.0 brings together the interested parties in Germany and represents their interests in international bodies and consortia. SCI 4.0 also supports the concept of practical testing in test centres by initiating and implementing new informal standardization projects tailored to meet specific needs.

Working Groups at DIN

Industrie 4.0 topics are handled by various committees at DIN. These include, among others:

- IT Security Coordination Office (KITS)
- DIN Standards Committee Services (NADL)
- DIN Standards Committee Mechanical Engineering (NAM)
- DIN Standards Committee technology of materials (NWT)
- DIN Standards Committee Machine Tools (NWM)
- DIN Standards Committee Tools and Clamping Devices (FWS)
- DIN Standards Committee Safety Design Principles (NASG)
- DIN Standards Committee Information Technology and selected IT Applications (NIA)
- DIN Standards Committee Ergonomics (NAErg)
- DIN Standards Committee Technical Fundamentals (NATG)

The work results from these committees all flow into the SCI 4.0. List of Standards published by CEN/CENELEC/DIN relevant for smart manufacturing is available as annexure 7.

Work around Accessibility:

Accessibility prevents or removes barriers to the use of mainstream products and services. It allows the perception, operation and understanding of those products and services by persons with functional limitations, including people with disabilities, on an equal basis with others. European Standardization Organizations have come out with following guidance documents in standardization related to Accessibility

- CEN-CENELEC Guide 6 (2014) 'Guide for addressing accessibility in standards' sets out a methodology for considering accessibility and integrating relevant requirements during the development and revision of standards for a wide variety of products, services and environments. It is intended for use by standards developers, as well as by designers, manufacturers, service providers, service users and policy makers. The new edition of CEN-CENELEC Guide 6 replaces the previous edition (published in 2002). CEN-CENELEC Guide 6:2014 is identical to ISO/IEC Guide 71:2014 which was published on 1 December 2014.

- ETSI Guide EG 202 116 : Guidelines for products and services 'Design for All' (DfA) is widely used and referenced by ICT companies, car manufacturers, standards bodies, the UN Committee on Human Rights, academic institutions, etc. Under the guidance, the Human Factors Technical Committee of ETSI seeks to apply the 'DfA approach' to all its standardization work.

List of technical bodies, which work is related to accessibility:

- CEN/CLC/JTC 12 - Design for All
- CEN-CENELEC Joint Working Group 6 - Accessibility in the built environment
- CEN-CENELEC-ETSI JWG eAccessibility
- CEN/TC 224/Working Group 6 - User Interface

CEN, CENELEC, and ETSI have jointly addressed the European Commission Mandate M/376, which was dealing in Phase II, with the development of a new European standard making ICT products and services accessible for all. In January 2014, CEN, CENELEC and ETSI published EN 301 549 'Accessibility requirements suitable for public procurement of ICT products and services in Europe', as the first European Standard for accessible ICT products and services. The EN 301 549 Standard itself also draws upon several other standards such as ETSI ETS 300 381: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids", W3C Recommendation (11 December 2008)/ISO/IEC 40500:2012: "Web Content Accessibility Guidelines (WCAG) 2.0 now upgraded to W3C "Web Content Accessibility Guidelines (WCAG) 2.1" for web content, electronic documents, and non-web software, such as native mobile applications, ISO 9241-171:2008: "Ergonomics of human-system interaction - Part 171: Guidance on software accessibility". Copy of latest version of EN 301 549 is available here. A complete list of standards that are essential for the application of EN301 549 as well as provide assistance to understand its provisions is also provided on the website and are given as annexure 8.

Work around Energy management & energy efficiency

CEN and CENELEC has created the Sector Forum 'Energy Management' in 2006 which was one of the recommendations of the CEN-CENELEC BT Joint Working Group on Energy Management (2002 - 2005). This sector forum in its final report identified a series of standardization priorities in the field of energy management and advised to create a platform to develop a common general strategy for the improvement of energy efficiency standardization. CEN and CENELEC are working towards developing standards in the area of **energy management** through their joint working groups/technical committees. ETSI accepted EC Mandate M/462 and is developing the standards on the environmental aspects of ICT equipment includes energy efficiency to support the EC's energy efficiency targets.

Working groups (WGs):

- CEN/CLC JWG1 - Energy Audits
- CEN/CLC JWG3 - Energy management and services- General requirement and qualification procedures (previously CEN/CLC/BT/TF 189)
- CEN/CLC JWG4 - Energy efficiency and saving calculation (previously CEN/CLC BT/TF 190)
- CEN/CLC JWG9 - Energy measurement plan for organisations

Technical Committees (TCs):

- CEN-CENELEC/JTC 14: 'Energy management, energy audits and energy savings'

- ✓ CEN/CLC/JTC 14/WG 1: Energy audits
- ✓ CEN/CLC/JTC 14/WG 4: Energy financial aspects

- CEN-CLC/JTC 15: Energy measurement plan for organizations
- CEN/SS F23 – Energy
- CEN/TC 371 - Energy Performance of Buildings project group

List of standards published by these joint technical committees is available as annexure 9 and list of standards published by ETSI is available here.

- **Smart grids**

In 2011, ESOs accepted Smart Grid Mandate M/490 which requests to develop a framework to enable ESOs to perform continuous standard enhancement and development in the smart grid field. In order to perform the requested work, the ESOs combined their strategic approach and established in July 2011, together with the relevant stakeholders, the CEN-CENELEC-ETSI Smart Grid Coordination Group (SG-CG), being responsible for coordinating the ESOs reply to M/490. End 2014, SG-CG finalized the following mandated reports:

- ✓ Extended Set of Standards support Smart Grids deployment
- ✓ Overview Methodology and its annexes: General Market Model Development, Smart Grid Architecture Model User Manual and Flexibility Management
- ✓ Smart Grid Interoperability and its tool
- ✓ Smart Grid Information Security

These reports were sent to the CEN, CENELEC and ETSI Technical Boards who approved their content in December 2014.

Following two reports have been prepared by Coordination Group on Smart Energy Grids (CG-SEG) to maintain transverse consistency and promote continuous innovation in the field of Smart Grids:

- ✓ Smart Grid Set of Standards report 1 : This report is the new release of the original "First set of standards" and proposes an updated framework of standards which can support Smart Grids deployment in Europe.
- ✓ Smart Grid Set of Standards report 2: It shows the applicability and interrelationship between these two groups of standards. Furthermore, the Smart Grid Information Security approach has been followed to show the applicability of different standards on the selected, specific use cases for Smart Energy Grid deployments.

CEN/CLC/ETSI/SEG-CG Subcommittees and Working Groups

Working Group	title
CEN/CLC/ETSI/SEG-CG/WG AHG CEP	CEN-CENELEC-ETSI Coordination Group on Smart Energy Grids - WG AHG Clean Energy Package
CEN/CLC/ETSI/SEG-CG/WG AHGI	CEN-CENELEC-ETSI Coordination Group on Smart Energy Grids - WG AHG Interoperability
CEN/CLC/ETSI/SEG-CG/WG DISS	CEN-CENELEC-ETSI Coordination Group on Smart Energy Grids - WG Dissemination
CEN/CLC/ETSI/SEG-CG/WG INTER	CEN-CENELEC-ETSI Coordination Group on Smart Energy Grids - WG Interoperability

CEN/CLC/ETSI/SEG-CG/WG METHO	CEN-CENELEC-ETSI Coordination Group on Smart Energy Grids - WG Methodology
CEN/CLC/ETSI/SEG-CG/WG RA	CEN-CENELEC-ETSI Coordination Group on Smart Energy Grids - WG Reference Architecture
CEN/CLC/ETSI/SEG-CG/WG SG	CEN-CENELEC-ETSI Coordination Group on Smart Energy Grids - WG Steering Group
CEN/CLC/ETSI/SEG-CG/WG SGIS	CEN-CENELEC-ETSI Coordination Group on Smart Energy Grids - WG Smart Grid Information Security
CEN/CLC/ETSI/SEG-CG/WG SP	CEN-CENELEC-ETSI Coordination Group on Smart Energy Grids - WG Sustainable Processes
CEN/CLC/ETSI/SEG-CG/WG STD	CEN-CENELEC-ETSI Coordination Group on Smart Energy Grids - WG Set of Standards

For additional information please click here

- **Smart metering**

In response to Mandate M/441, ESOs established a Coordination Group on Smart Meters (SM-CG) to combine their expertise and resources. This Coordination Group provides a focal point concerning smart metering standardization issues.

The **first phase** of the mandate requests the ESOs to produce a European standard for communications. In this context, the SM-CG produced a Technical Report, CEN-CLC-ETSI TR 50572:2011 'Functional reference architecture for communications in smart metering systems', which identifies the functional entities and interfaces that the communications standards should address. It is intended to support the development of software and hardware architecture and related standards. The **second phase** of Mandate M/441 focused on the development of European Standards containing harmonized solutions for additional functionalities within interoperable frameworks. The SM-CG completed the second phase of M/441 by producing a SM-CG report which summarizes the work undertaken during the period 2009-2012.

In 2013, 2014 and 2016 the SM-CG finalized the following reports:

- Smart Meters Co-ordination Group - Privacy and Security approach–part I
  The Report describes an approach to define privacy and security requirements for Smart Metering and the status of work carried out by CEN, CENELEC and ETSI on incorporation of security mechanisms to the standards
- Smart Meters Co-ordination Group - Privacy and Security approach – part II
  The document describes a repository of requirements applicable in different Member States and compares approaches on security certification schemes for Smart Metering.
- Smart Meters Co-ordination Group - Privacy and Security approach – part III
  The third report comprises a description of a repository of security threats, recommendations regarding security certification and an update of the status of work carried out by CEN, CENELEC and ETSI.
- Smart Meters Co-ordination Group - Privacy and Security approach – part IV
  The Report includes a summary of the minimum security requirements defined by the SM-CG Task Force Privacy & Security together with ESMIG, an update on the work of Expert

Group 2 of the Smart Grid Task Force and an update of the status of work carried out by CEN, CENELEC and ETSI related to security. The Smart Meters Co-ordination Group – Minimum Security Requirements for smart metering (pdf format) is also available. A repository (see the spreadsheet associated with the report, excel format) was created by the SM-CG in 2015 and now links the original requirements from member states with the minimum requirements.

The document can be used by Member States that still have to (re)define security requirements for Smart Metering and will be used by the SM-CG to start working on a security certification approach in 2016.

For more information please click here

Work around 5th Generation (5G):

ITU-R has set up a project called IMT-2020 to define the next generation of mobile communication networks for 2020. Much of 5G standardization work is being done at 3GPP in collaboration with other standardization bodies. ETSI's Technical bodies and ISG are providing inputs to 3GPP or collaborating with 3GPP. ETSI itself has a number of component technologies such as Network Functions Virtualization(NFV), Multi-access Edge Computing (MEC), Millimetre Wave Transmission (mWT) and Next Generation Protocols (NGP) which will be integrated into future 5G systems and can contribute to a successful launch of 5G (IMT2020) networks Read more

Work around Smart Body Area Networks (BAN):

Body Area Network (BAN) technology is the use of small, low power wireless devices which can be carried or embedded inside or on the body. Applications include:

- health and wellness monitoring
- sports training (e.g. to measure performance)
- personalized medicine (e.g. heart monitors)
- personal safety (e.g. fall detection)

A number of wireless BAN communication technologies have been implemented, based on existing radio technologies. However, if BAN technology is to achieve its full potential, there is need for a more specific and dedicated technology, optimized for BAN. For example, solutions for monitoring people during exercise one or two hours a day, a few days a week, may not be suitable for 24/7 monitoring as part of the Internet of Things (IoT).

Such a dedicated BAN technology would need features such as:

- ultra-low power radio, with a lower complexity Medium Access Control (MAC) protocol for extended autonomy
- enhanced robustness in the presence of interference
- interoperability when communicating over heterogeneous networks in the future IoT

A full list of related standards in the public domain is available here.

Work around smart card:

ETSI set up its Smart Card Platform Technical Committee (TC SCP) in 2000, to create a central focus point for the standardization of a common IC card platform for mobile telecommunication systems, allowing the participation from companies not necessarily involved in GSM & 3GPP Standards. It is responsible for creating a series of specifications for a Smart Card platform on which other bodies can base their system-specific applications to achieve compatibility between all applications resident on the Smart Card. **ETSI and 3GPP** have produced the most successful Smart Card to date - the **Subscriber Identity Module (SIM)**, of which there are currently more than 4 Billion cards in circulation. **A full list of related standards published by ETSI is available here**. Read more

Work around Smart appliances:

Smart Appliances have been specified on request of EC DG Connect. The Smart Appliances specifications are based on the oneM2M communication framework complemented with Smart Appliance REFerence (SAREF) ontology. SAREF work has contributed to the foundations of the base ontology of oneM2M Release 2. ETSI Smart Machine-to-Machine communications committee (TC SmartM2M) developed Smart Appliances' Reference Ontology and oneM2M Mapping standards and Smart Appliance testing standards. ETSI TC SmartM2M actively supports the oneM2M global initiative, especially in relation to European Commission (EC) driven activities, bridging the EC's needs in the M2M/IoT area and the technical work in oneM2M and other ETSI activities. Read more

A full list of related standards published by ETSI is available here.

Work around e-Health

CEN technical committee CEN/TC 251 'Health informatics' is committed to developing and delivering EU standards that are harmonized and consistent with the existing international framework.

CEN/TC 251 Subcommittees and Working Groups

- ✓ CEN/TC 251/WG 1: Enterprise and Information
- ✓ CEN/TC 251/WG 2: Technology and Applications

Most of the committee's standards address aspects of information representation, message standards, electronic health records, and some areas of communication specifications between medical devices. Part of the committee's charge is to address the European Commission's health interoperability mandate – Mandate 403. The response to M/403 was in the form of the 'eHealth-INTEROP report' giving a set of recommendations related to interoperability in the Health informatics domain. **List of published standards by CEN/TC 251 is available** here

ETSI through its **ETSI project e-Health** is also involved in creating an eHealth work programme for standards in the Information and Communications Technology (ICT) sector that touch health issues. EP eHEALTH works in close co-operation with all relevant TCs, EPs and SCs within ETSI, 3GPP, and others. Vital aspects to be considered by EP eHealth are: security of systems and data, quality of services, interoperability and validation by testing, usability. List of published standards in this domain is available here.

Work around Bloackchain and ledger Technologies

CEN and CENELEC jointly created in 2017 a Focus Group on Blockchain and Distributed Ledger Technologies (DLT). The primary objective of the Focus Group has been to identify specific European needs and requirements for the implementation of Blockchain and DLT in Europe, and to map these needs against the work items of ISO/TC 307 'Blockchain and distributed ledger technologies'.

The identification of such specific requirements has been formalized in the CEN-CENELEC White Paper 'Recommendations for Successful Adoption in Europe of Emerging Technical Standards on Distributed Ledger/Blockchain Technologies', which has been developed by the Focus Group and approved by the CEN and CENELEC Technical Boards in October 2019. The White Paper provides 26 recommendations, addresses topics as sustainable development, digital identity, privacy and data protection, and highlights specific European use cases. This CEN-CLC White Paper is a first milestones in the activity of the Focus Group, which will continue to release further editions of the White Paper, according to the latest state of the art. Read more

Work on Public safety & emergency communications

A significant part of the Standards work related to Public Safety is in the need for emergency communications, which includes many scenarios ranging from a minor road traffic accident to a major incident like a passenger train crash, a terrorist incident or a natural disaster such as an earthquake or tsunami. **ETSI Special Committee Emergency Communications (EMTEL)** is responsible for the capture of European requirements concerning emergency communication services. The committee revises regularly four of its deliverables that are considered as the basis of EMTEL work, i.e. governing communications in times of emergency, covering communication of citizens with authorities, from authorities to citizens, between authorities and amongst citizens. In addition EMTEL deals with topics like location, total conversation and alerting. For more information please click here and for the list of standards published by ETSI please click here

4 Glossary

S.No.	Acronym	Expansion
1	ICT	Information and communication technologies
2	EU	European Union
3	EIP-SCC	European Innovation Partnership on Smart Cities and Communities
4	CEN	European Committee for Standardization
5	CENELEC	European Committee for Electro-Technical Standardization
6	ETSI	European Telecommunications Standards Institute
7	SF-SSCC	Sector Forum on Smart and Sustainable Cities and Communities'
8	EC	European Commission

9	SMEs	Small and Medium Entreprises
10	NGOs	Non-Government Organizations
11	EERA	European Energy Research Alliance
12	CIVITAS	City-Vitality-Sustainability'
13	SCIS	Smart Cities Information System
14	ITU	Internatioanl Telecommunication Union
15	IEC	Internatioanl Electro-Technical Commission
16	ISO	International Organization for Standardization
17	ESOs	European Standardization Organizations
18	TC	Technical Committee
19	GS	Group Specification

5 Annexures

5.1 Annexure 1: List of Standards by CENELEC: TC 69X:

S. No.	Reference, title	Status
1	EN 61851-1:2011 (pr=22334) Electric vehicle conductive charging system - Part 1: General requirements	Published
2	EN 61851-21-1:2017/AC:2017-11 (pr=66195) Electric vehicle conductive charging system - Part 21-1: Electric vehicle on-board charger EMC requirements for conductive connection to an AC/DC supply	Published
3	EN 61851-21-1:2017 (pr=59580) Electric vehicle conductive charging system - Part 21-1: Electric vehicle on-board charger EMC requirements for conductive connection to an AC/DC supply	Published
4	EN 61851-21:2002 (pr=14255) Electric vehicle conductive charging system - Part 21: Electric vehicle requirements for conductive connection to an a.c/d.c. supply	Published
5	EN 61851-22:2002 (pr=14256) Electric vehicle conductive charging system - Part 22: AC electric vehicle charging station	Published
6	EN 61851-23:2014/AC:2016-06 (pr=62786) Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station	Published
7	EN 61851-23:2014 (pr=24554) Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station	Published
8	EN 61851-24:2014 (pr=24517)	Published

	Electric vehicle conductive charging system - Part 24: Digital communication between a d.c. EV charging station and an electric vehicle for control of d.c. charging	
9	EN 61851-24:2014/AC:2015 (pr=60940) Electric vehicle conductive charging system - Part 24: Digital communication between a d.c. EV charging station and an electric vehicle for control of d.c. charging	Published
10	EN 62576:2010 (pr=22094) Electric double-layer capacitors for use in hybrid electric vehicles - Test methods for electrical characteristics	Published
11	EN IEC 62576:2018 (pr=63480) Electric double-layer capacitors for use in hybrid electric vehicles - Test methods for electrical characteristics	Published

5.2 Annexure 2: List of Standards published by CEN/TC 301

S. No.	Reference, Title	Status
1	CR 1955:1995 (WI=00301014) Proposals for the braking of electrical vehicles	Published
2	EN ISO 15118-1:2015 (WI=00301034) Road vehicles - Vehicle to grid communication interface - Part 1: General information and use-case definition (ISO 15118-1:2013)	Published
3	EN ISO 15118-2:2016 (WI=00301035) Road vehicles - Vehicle-to-grid communication Interface - Part 2: Network and application protocol requirements (ISO 15118-2:2014)	Published
4	EN ISO 15118-3:2016 (WI=00301033) Road vehicles - Vehicle to grid Communication interface - Part 3: Physical and data link layer requirements (ISO 15118-3:2015)	Published
5	EN ISO 17409:2017 (WI=00301036) Electrically propelled road vehicles - Connection to an external electric power supply - Safety requirements (ISO 17409:2015, Corrected version 2015-12-15)	Published
6	EN ISO 18246:2017 (WI=00301049) Electrically propelled mopeds and motorcycles - Safety requirements for conductive connection to an external electric power supply (ISO 18246:2015)	Published
7	FprEN ISO 18243 (WI=00301055) Electrically propelled mopeds and motorcycles - Test specifications and safety requirements for lithium-ion battery systems (ISO 18243:2017)	Under Approval
8	prEN 17186 (WI=00301056)	

	Identification of vehicles and infrastructures compatibility - Graphical expression for consumer information on EV power supply	Under Approval
9	prEN ISO 19363 (WI=00301048) Electrically propelled vehicles - Magnetic field wireless power transfer - Safety and interoperability requirements	Under Drafting

5.3 Annexure 3: List of published standards by CLC/TC 64

S. No.	Reference	Title	Status
1	HD 60364-7-722:2016 (pr=24483)	Low voltage electrical installations - Part 7-722: Requirements for special installations or locations - Supply of electric vehicle	Published
2	EN 61140:2002 (pr=13844)	Protection against electric shock - Common aspects for installation and equipmen	Published
3	EN 61140:2002/A1:2006 (pr=16044)	Protection against electric shock - Common aspects for installation and equipmen	Published
4	EN 61140:2016 (pr=24640)	Protection against electric shock - Common aspects for installation and equipmen	Published

5.4 Annexure 4: List of published standards by CLC/TC 23BX

S. No.	Reference	Title	Status
1	FprEN 62196-1:2014/FprAA (pr=58649)	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements	Approval stage

5.5 Annexure 5: List of standards published by CEN TC 278

S. No.	Reference, Title	Status
1	(WI=00278352) Intelligent transport systems - Data interfaces between centres for transport information and control systems - Platform independent model specifications for data exchange protocols for transport information and control systems	Under Drafting

2	(WI=00278491) Intelligent transport systems - Urban ITS - Models and definitions for new modes	Under Drafting
3	(WI=00278429) Public transport - Operating raw data and statistics exchange	Under Drafting
4	(WI=00278457) Public transport - Network and Timetable Exchange (NeTEx) - Passenger information european profile	Under Drafting
5	(WI=00278475) Public transport - Reference data model - Part 9: Informative documentation	Under Drafting
6	(WI=00278473) Intelligent Transport Systems - Location Referencing Harmonisation for Urban-ITS - Part 2: Translation methods	Under Drafting
7	(WI=00278477) Public transport - Reference data model part 4-8	Under Drafting
8	(WI=00278496) Intelligent transport systems - Cooperative ITS - Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma for CEN ISO TS 17426	Under Drafting
9	CEN ISO/TR 16401-1:2018 (WI=00278417) Electronic fee collection - Evaluation of equipment for conformity to ISO/TS 17575-2 - Part 1: Test suite structure and test purposes (ISO/TR 16401-1:2018)	Published
10	CEN ISO/TR 17424:2015 (WI=00278269) Intelligent transport systems - Cooperative systems - State of the art of Local Dynamic Maps concepts (ISO/TR 17424:2015)	Published
11	CEN ISO/TR 24014-2:2013 (WI=00278222) Public transport - Interoperable fare management system - Part 2: Business practices (ISO/TR 24014-2:2013)	Published
12	CEN ISO/TR 24014-3:2013 (WI=00278339) Public transport - Interoperable fare management system - Part 3: Complementary concepts to Part 1 for multi-application media (ISO/TR 24014-3:2013)	Published
13	CEN ISO/TS 14907-1:2015 (WI=00278388) Electronic fee collection - Test procedures for user and fixed equipment - Part 1: Description of test procedures (ISO/TS 14907-1:2015)	Published
14	CEN ISO/TS 14907-2:2016 (WI=00278410) Electronic fee collection - Test procedures for user and fixed equipment - Part 2: Conformance test for the on-board unit application interface (ISO/TS 14907-2:2016)	Published
15	CEN ISO/TS 16407-2:2012 (WI=00278276)	Published

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16	CEN ISO/TS 16410-2:2012 (WI=00278278) Electronic fee collection - Evaluation of equipment for conformity to ISO/TS 17575-3 - Part 2: Abstract test suite (ISO/TS 16410-2:2012)	Published
17	CEN ISO/TS 17425:2016 (WI=00278287) Intelligent transport systems - Cooperative systems - Data exchange specification for in-vehicle presentation of external road and traffic related data (ISO/TS 17425:2016)	Published
18	CEN ISO/TS 17426:2016 (WI=00278289) Intelligent transport systems - Cooperative systems - Contextual speeds (ISO/TS 17426:2016)	Published
19	CEN ISO/TS 17427:2014 (WI=00278286) Intelligent transport systems - Cooperative systems - Roles and responsibilities in the context of cooperative ITS based on architecture(s) for cooperative systems (ISO/TS 17427:2014)	Published
20	CEN ISO/TS 17429:2017 (WI=00278288) Intelligent transport systems - Cooperative ITS - ITS station facilities for the transfer of information between ITS stations (ISO/TS 17429:2017)	Published
21	CEN ISO/TS 17444-1:2017 (WI=00278432) Electronic fee collection - Charging performance - Part 1: Metrics (ISO/TS 17444-1:2017)	Published
22	CEN ISO/TS 17444-2:2017 (WI=00278433) Electronic fee collection - Charging performance - Part 2: Examination framework (ISO/TS 17444-2:2017)	Published
23	CEN ISO/TS 17574:2017 (WI=00278416) Electronic fee collection - Guidelines for security protection profiles (ISO/TS 17574:2017)	Published
24	CEN ISO/TS 18234-10:2013 (WI=00278324) Intelligent transport systems - Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format - Part 10: Conditional access information (TPEG1-CAI) (ISO/TS 18234-10:2013)	Published
25	CEN ISO/TS 18234-11:2013 (WI=00278313) Intelligent transport systems - Traffic and Travel Information (TTI) via transport protocol experts group, generation 1 (TPEG1) binary data format - Part 11: Location Referencing Container (TPEG1-LRC) (ISO/TS 18234-11:2013)	Published
26	CEN ISO/TS 18234-1:2013 (WI=00278322)	Published

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27	CEN ISO/TS 18234-2:2013 (WI=00278326) Intelligent transport systems - Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format - Part 2: Syntax, semantics and framing structure (TPEG1-SSF) (ISO/TS 18234-2:2013)	Published
28	CEN ISO/TS 18234-3:2013 (WI=00278312) Intelligent transport systems - Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format - Part 3: Service and network information (TPEG1-SNI) (ISO/TS 18234-3:2013)	Published
29	CEN ISO/TS 18234-4:2006 (WI=00278150) Traffic and Travel Information (TTI) - TTI via Transport Protocol Expert Group (TPEG) data-streams - Part 4: Road Traffic Message (RTM) application (ISO/TS 18234-4:2006)	Published
30	CEN ISO/TS 18234-5:2006 (WI=00278159) Traffic and Travel Information (TTI) - TTI via Transport Protocol Expert Group (TPEG) data-streams - Part 5: Public Transport Information (PTI) application (ISO/TS 18234-5:2006)	Published
31	CEN ISO/TS 18234-6:2006 (WI=00278160) Traffic and Travel Information (TTI) - TTI via Transport Protocol Expert Group (TPEG) data-streams - Part 6: Location referencing applications (ISO/TS 18234-6:2006)	Published
32	CEN ISO/TS 18234-7:2013 (WI=00278321) Intelligent transport systems - Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format - Part 7: Parking information (TPEG1-PKI) (ISO/TS 18234-7.2013)	Published
33	CEN ISO/TS 18234-9:2013 (WI=00278323) Intelligent transport systems - Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format - Part 9: Traffic event compact (TPEG1-TEC) (ISO/TS 18234-9:2013)	Published
34	CEN ISO/TS 19091:2017 (WI=00278396) Intelligent transport systems - Cooperative ITS - Using V2I and I2V communications for applications related to signalized intersections (ISO/TS 19091:2017)	Published
35	CEN ISO/TS 19299:2015 (WI=00278358) Electronic fee collection - Security framework (ISO/TS 19299:2015)	Published

36	CEN ISO/TS 19321:2015 (WI=00278360) Intelligent transport systems - Cooperative ITS - Dictionary of in-vehicle information (IVI) data structure (ISO/TS 19321:2015)	Published
37	CEN ISO/TS 21719-1:2018 (WI=00278455) Electronic fee collection - Personalization of on-board equipment (OBE) - Part 1: Framework (ISO/TS 21719-1:2018)	Published
38	CEN ISO/TS 21719-2:2018 (WI=00278456) Electronic fee collection - Personalization of on-board equipment (OBE) - Part 2: Using dedicated short-range communication (ISO/TS 21719-2:2018)	Published
39	CEN ISO/TS 24530-1:2006 (WI=00278161) Traffic and Travel Information (TTI) - TTI via Transport Protocol Experts Group (TPEG) Extensible Markup Language (XML) - Part 1: Introduction, common data types and tpegML (ISO/TS 24530-1:2006)	Published
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41	CEN ISO/TS 24530-3:2006 (WI=00278163) Traffic and Travel Information (TTI) - TTI via Transport Protocol Experts Group (TPEG) Extensible Markup Language (XML) - Part 3: tpeg-rtmML (ISO/TS 24530-3:2006)	Published
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43	CEN/ISO TR 16401-2:2018 (WI=00278418) Electronic fee collection - Evaluation of equipment for conformity to ISO/TS 17575-2 - Part 2: Abstract test suite (ISO/TR 16401-2:2018)	Published
44	CEN/TR 12896-9:2016 (WI=00278387) Public transport - Reference data model - Part 9: Informative documentation	Published
45	CEN/TR 15762:2008 (WI=00278215) Road transport and traffic telematics - Electronic fee collection (EFC) - Ensuring the correct function of EFC equipment installed behind metallised windshield	Published
46	CEN/TR 16040:2010 (WI=00278251) Electronic fee collection - Requirements for urban dedicated short-range communication	Published
47	CEN/TR 16092:2011 (WI=00278252)	Published

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48	CEN/TR 16152:2011 (WI=00278250) Electronic fee collection - Personalisation and mounting of first mount OBE	Published
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50	CEN/TR 16427:2013 (WI=00278309) Intelligent transport systems - Public transport - Traveller Information for Visually Impaired People (TI-VIP)	Published
51	CEN/TR 16690:2014 (WI=00278315) Electronic fee collection - Guidelines for EFC applications based on in-vehicle ITS stations	Published
52	CEN/TR 16742:2014 (WI=00278314) Intelligent transport systems - Privacy aspects in ITS standards and systems in Europe	Published
53	CEN/TR 16959:2016 (WI=00278389) Public transport - Network and Timetable Exchange (NeTEx) - Examples, guidelines and explanatory materials	Published
54	CEN/TR 16968:2016 (WI=00278381) Electronic Fee Collection - Assessment of security measures for applications using Dedicated Short-Range Communication	Published
55	CEN/TR 17143:2017 (WI=00278454) Intelligent transport systems - Standards and actions necessary to enable urban infrastructure coordination to support Urban-ITS	Published
56	CEN/TS 13149-3:2007 (WI=00278196) Public transport - Road vehicle scheduling and control systems - Part 3: WorldFIP message content	Published
57	CEN/TS 13149-6:2005 (WI=00278125) Public transport - Road vehicle scheduling and control systems - Part 6: CAN message content	Published
58	CEN/TS 13149-7:2015 (WI=00278380) Public transport - Road vehicle scheduling and control systems - Part 7: System and Network Architecture	Published
59	CEN/TS 13149-8:2013 (WI=00278332) Public transport - Road vehicle scheduling and control systems - Part 8: Physical layer for IP communication	Published
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61	CEN/TS 15504:2007 (WI=00278195)	Published

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62	CEN/TS 15531-4:2011 (WI=00278218) Public transport - Service interface for real-time information relating to public transport operations - Part 4: Functional service interfaces: Facility Monitoring	Published
63	CEN/TS 15531-5:2016 (WI=00278383) Public transport - Service interface for real-time information relating to public transport operations - Part 5: Functional service interfaces situation exchange: Situation Exchange	Published
64	CEN/TS 16157-1:2011 (WI=00278225) Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 1: Context and framework	Published
65	CEN/TS 16157-2:2011 (WI=00278226) Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 2: Location referencing	Published
66	CEN/TS 16157-3:2011 (WI=00278227) Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 3: Situation Publication	Published
67	CEN/TS 16157-4:2014 (WI=00278318) Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 4: Variable Message Sign (VMS) Publications	Published
68	CEN/TS 16157-5:2014 (WI=00278320) Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 5: Measured and elaborated data publications	Published
69	CEN/TS 16157-6:2015 (WI=00278351) Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 6: Parking Publications	Published
70	CEN/TS 16331:2012 (WI=00278272) Electronic fee collection - Interoperable application profiles for autonomous systems	Published
71	CEN/TS 16405:2017 (WI=00278350) Intelligent transport systems - Ecall - Additional data concept specification for heavy goods vehicles	Published
72	CEN/TS 16406:2013 (WI=00278319) Intelligent transport systems - Public transport - Indirect Fulfilment for Rail	Published
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74	CEN/TS 16614-2:2014 (WI=00278308) Public transport - Network and Timetable Exchange (NeTEx) - Part 2: Public transport scheduled timetables exchange format	Published
75	CEN/TS 16614-3:2016 (WI=00278330) Public transport - Network and Timetable Exchange (NeTEx) - Part 3: Public transport fares exchange format	Published
76	CEN/TS 16702-1:2014 (WI=00278282) Electronic fee collection - Secure monitoring for autonomous toll systems - Part 1: Compliance checking	Published
77	CEN/TS 16702-2:2015 (WI=00278338) Electronic fee collection - Secure monitoring for autonomous toll systems - Part 2: Trusted recorder	Published
78	CEN/TS 16794-1:2017 (WI=00278404) Public transport - Communication between contactless readers and fare media - Part 1: Implementation requirements for ISO/IEC 14443	Published
79	CEN/TS 16794-2:2017 (WI=00278405) Public transport - Communication between contactless readers and fare media - Part 2: Test plan for ISO/IEC 14443	Published
80	CEN/TS 16986:2016 (WI=00278348) Electronic Fee Collection - Interoperable application profiles for information exchange between Service Provision and Toll Charging	Published
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82	CEN/TS 17118:2017 (WI=00278420) Intelligent transport systems - Public transport - Open API for distributed journey planning	Published
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88	EN 12896-1:2016 (WI=00278371) Public transport - Reference data model - Part 1: Common concepts	Published
89	EN 12896-2:2016 (WI=00278367) Public transport - Reference data model - Part 2: Public transport network	Published
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91	EN 13149-1:2004 (WI=00278169) Public transport - Road vehicle scheduling and control systems - Part 1: WORLDFIP definition and application rules for onboard data transmission	Published
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96	EN 15213-1:2013 (WI=00278333) Intelligent transport systems - After-theft systems for the recovery of stolen vehicles - Part 1: Reference architecture and terminology	Published
97	EN 15213-2:2013 (WI=00278335) Intelligent transport systems - After-theft systems for the recovery of stolen vehicles - Part 2: Common status message elements	Published
98	EN 15213-3:2013 (WI=00278336)	Published

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100	EN 15213-5:2013 (WI=00278337) Intelligent transport systems - After-theft systems for the recovery of stolen vehicles - Part 5: Messaging interface	Published
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102	EN 15531-1:2015 (WI=00278340) Public transport - Service interface for real-time information relating to public transport operations - Part 1: Context and framework	Published
103	EN 15531-2:2015 (WI=00278341) Public transport - Service interface for real-time information relating to public transport operations - Part 2: Communications	Published
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105	EN 15722:2015 (WI=00278376) Intelligent transport systems - ESafety - ECall minimum set of data	Published
106	EN 15876-1:2016 (WI=00278406) Electronic fee collection - Evaluation of on-board and roadside equipment for conformity to EN 15509 - Part 1: Test suite structure and test purposes	Published
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111	EN 16312:2013 (WI=00278285) Intelligent transport systems - Automatic Vehicle and Equipment Registration (AVI/AEI) - Interoperable application profile for AVI/AEI and Electronic Register Identification using dedicated short range communication	
112	EN 16454:2015 (WI=00278349) Intelligent transport systems - ESafety - ECall end to end conformance testing	Published
113	EN 28701:2012 (WI=00278317) Intelligent transport systems - Public transport - Identification of Fixed Objects in Public Transport (IFOPT)	
114	EN ISO 12813:2015 (WI=00278362) Electronic fee collection - Compliance check communication for autonomous systems (ISO 12813:2015)	Published
115	EN ISO 12813:2015/A1:2017 (WI=00278411) Electronic fee collection - Compliance check communication for autonomous systems - Amendment 1 (ISO 12813:2015/Amd 1:2017)	Published
116	EN ISO 12855:2015 (WI=00278353) Electronic fee collection - Information exchange between service provision and toll charging (ISO 12855:2015)	Published
117	EN ISO 13140-1:2016 (WI=00278390) Electronic fee collection - Evaluation of on-board and roadside equipment for conformity to ISO 13141 - Part 1: Test suite structure and test purposes (ISO 13140-1:2016)	Published
118	EN ISO 13140-2:2016 (WI=00278413) Electronic fee collection - Evaluation of on-board and roadside equipment for conformity to ISO 13141 - Part 2: Abstract test suite (ISO 13140-2:2016)	Published
119	EN ISO 13141:2015 (WI=00278363) Electronic fee collection - Localisation augmentation communication for autonomous systems (ISO 13141:2015)	Published
120	EN ISO 13141:2015/A1:2017 (WI=00278412) Electronic fee collection - Localisation augmentation communication for autonomous systems - Amendment 1 (ISO 13141:2015/Amd 1:2017)	Published
121	EN ISO 13143-1:2016 (WI=00278391) Electronic fee collection - Evaluation of on-board and roadside equipment for conformity to ISO 12813 - Part 1: Test suite structure and test purposes (ISO 13143-1:2016)	Published
122	EN ISO 13143-2:2016 (WI=00278392)	Published

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123	EN ISO 14814:2006 (WI=00278157) Road transport and traffic telematics - Automatic vehicle and equipment identification - Reference architecture and terminology (ISO 14814:2006)	Published
124	EN ISO 14815:2005 (WI=00278172) Road transport and traffic telematics - Automatic vehicle and equipment identification - System specifications (ISO 14815:2005)	Published
125	EN ISO 14816:2005 (WI=00278173) Road transport and traffic telematics - Automatic vehicle and equipment identification - Numbering and data structure (ISO 14816:2005)	Published
126	EN ISO 14816:2005/prA1 (WI=00278384) Road transport and traffic telematics - Automatic vehicle and equipment identification - Numbering and data structure - Amendment 1 (ISO 14816:2005/DAmd 1:2017)	Under Approval
127	EN ISO 14819-1:2013 (WI=00278300) Intelligent transport systems - Traffic and travel information messages via traffic message coding - Part 1: Coding protocol for Radio Data System - Traffic Message Channel (RDS-TMC) using ALERT-C (ISO 14819-1:2013)	Published
128	EN ISO 14819-2:2013 (WI=00278197) Intelligent transport systems - Traffic and travel information messages via traffic message coding - Part 2: Event and information codes for Radio Data System - Traffic Message Channel (RDS-TMC) using ALERT-C (ISO 14819-2:2013)	Published
129	EN ISO 14819-3:2013 (WI=00278301) Intelligent transport systems - Traffic and travel information messages via traffic message coding - Part 3: Location referencing for Radio Data System - Traffic Message Channel (RDS-TMC) using ALERT-C (ISO 14819-3:2013)	Published
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132	EN ISO 14825:2011 (WI=00278256)	Published

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133	EN ISO 14906:2011 (WI=00278234) Electronic fee collection - Application interface definition for dedicated short-range communication (ISO 14906:2011)	Published
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135	EN ISO 14906:2011/AC:2013 (WI=00278C06) Electronic fee collection - Application interface definition for dedicated short-range communication - Technical Corrigendum 1 (ISO 14906:2011/Cor 1:2013)	Published
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137	EN ISO 15006:2011 (WI=00278271) Road vehicles - Ergonomic aspects of transport information and control systems - Specifications for in-vehicle auditory presentation (ISO 15006:2011)	Published
138	EN ISO 15007-1:2014 (WI=00278280) Road vehicles - Measurement of driver visual behaviour with respect to transport information and control systems - Part 1: Definitions and parameters (ISO 15007-1:2014)	Published
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140	EN ISO 16407-1:2017 (WI=00278408) Electronic fee collection - Evaluation of equipment for conformity to ISO 17575-1 - Part 1: Test suite structure and test purposes (ISO 16407-1:2017)	Published
141	EN ISO 16410-1:2017 (WI=00278409) Electronic fee collection - Evaluation of equipment for conformity to ISO 17575-3 - Part 1: Test suite structure and test purposes (ISO 16410-1:2017)	Published
142	EN ISO 17261:2012 (WI=00278263) Intelligent transport systems - Automatic vehicle and equipment identification - Intermodal goods transport architecture and terminology (ISO 17261:2012)	Published
143	EN ISO 17262:2012 (WI=00278264)	Published

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144	EN ISO 17262:2012/AC:2013 (WI=00278C09) Intelligent transport systems - Automatic vehicle and equipment identification - Numbering and data structures - Technical Corrigendum 1 (ISO 17262:2012/Cor 1:2013)	Published
145	EN ISO 17262:2012/prA1 (WI=00278385) Intelligent transport systems - Automatic vehicle and equipment identification - Numbering and data structures - Amendment 1 (ISO 17262:2012/DAmd 1:2017)	Under Approval
146	EN ISO 17263:2012 (WI=00278265) Intelligent transport systems - Automatic vehicle and equipment identification - System parameters (ISO 17263:2012)	Published
147	EN ISO 17263:2012/AC:2013 (WI=00278C10) Intelligent transport systems - Automatic vehicle and equipment identification - System parameters - Technical Corrigendum 1 (ISO 17263:2012/Cor 1:2013)	Published
148	EN ISO 17264:2009 (WI=00278228) Intelligent transport systems - Automatic vehicle and equipment identification - Interfaces (ISO 17264:2009)	Published
149	EN ISO 17264:2009/prA1 (WI=00278386) Intelligent transport systems - Automatic vehicle and equipment identification - Interfaces - Amendment 1 (ISO 17264:2009/DAmd 1:2017)	Under Approval
150	EN ISO 17287:2003 (WI=00278128) Road vehicles - Ergonomic aspects of transport information and control systems - Procedure for assessing suitability for use while driving (ISO 17287:2003)	Published
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152	EN ISO 17423:2018 (WI=00278459) Intelligent transport systems - Cooperative systems - Application requirements and objectives (ISO 17423:2018)	Published
153	EN ISO 17575-1:2016 (WI=00278356) Electronic fee collection - Application interface definition for autonomous systems - Part 1: Charging (ISO 17575-1:2016)	Published
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156	EN ISO 18750:2018 (WI=00278403) Intelligent transport systems - Co-operative ITS - Local dynamic map (ISO 18750:2018)	Published
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158	EN ISO 24534-1:2010 (WI=00278229) Automatic vehicle and equipment identification - Electronic Registration Identification (ERI) for vehicles - Part 1: Architecture (ISO 24534-1:2010)	Published
159	EN ISO 24534-2:2010 (WI=00278230) Automatic vehicle and equipment identification - Electronic Registration Identification (ERI) for vehicles - Part 2: Operational requirements (ISO 24534-2:2010)	Published
160	EN ISO 24534-3:2016 (WI=00278302) Intelligent transport systems - Automatic vehicle and equipment identification - Electronic registration identification (ERI) for vehicles - Part 3: Vehicle data (ISO 24534-3:2016)	Published
161	EN ISO 24534-4:2010 (WI=00278232) Automatic vehicle and equipment identification - Electronic Registration Identification (ERI) for vehicles - Part 4: Secure communications using asymmetrical techniques (ISO 24534-4:2010)	Published
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164	EN ISO 25110:2017 (WI=00278434) Electronic fee collection - Interface definition for on-board account using integrated circuit card (ICC) (ISO 25110:2017)	Published
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166	ENV 12694:1997 (WI=00278077) Public transport - Road vehicles - Dimensional requirements for variable electronic external signs	
167	ENV 12796:1997 (WI=00278079) Road transport and traffic telematics - Public transport - Validators	Published
168	ENV 13093:1998 (WI=00278078) Public transport - Road vehicles - Driver's console mechanical interface requirements - Minimum display and keypad parameters	Published
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170	FprCEN/TR 17249-1 (WI=00278466) Intelligent transport systems - eSafety - Part 1: Extending eCall to other categories of vehicle	Approved
171	FprCEN/TR 17297 (WI=00278474) Intelligent Transport Systems - Location Referencing Harmonisation for Urban-ITS - Part 1: State of the art and guidelines	Under Drafting
172	FprCEN/TR 17311 (WI=00278451) Public transport - Interoperable fare management system - Bluetooth low energy ticketing use cases and guidelines	Under Approval
173	FprCEN/TS 17154-1 (WI=00278421) Electronic Fee collection - Conformity evaluation of implementation to CEN/TS 16986 - Part 1: Test suite structure and test purposes	Under Drafting
174	FprCEN/TS 17154-2 (WI=00278422) Electronic Fee collection - Conformity evaluation of implementation to CEN/TS 16986 - Part 2: Abstract test	Under Drafting
175	FprCEN/TS 17182 (WI=00278453) Intelligent transport systems - eSafety - eCall via an ITS-station	Approved
176	FprCEN/TS 17234 (WI=00278463) Intelligent transport systems - eSafety - eCall: Tests to enable PSAPs to demonstrate conformance and performance	Under Approval
177	FprCEN/TS 17240 (WI=00278460) Intelligent transport systems - ESafety - ECall end to end conformance testing for IMS packet switched based systems	Under Approval

178	FprCEN/TS 17241 (WI=00278478) Intelligent transport systems - Traffic management systems - Status, fault and quality requirements	Under Drafting
179	FprCEN/TS 17249-2 (WI=00278467) Intelligent transport systems - eSafety - Part 2 : eCall for HGVs and other commercial vehicles	Under Approval
180	FprCEN/TS 17249-3 (WI=00278468) Intelligent transport systems - eSafety - Part 3: eCall for Coaches and buses	Under Approval
181	FprCEN/TS 17249-4 (WI=00278469) Intelligent transport systems - eSafety - Part 4: eCall for UNECE Category T, R, S agricultural/forestry vehicles	Under Approval
182	FprCEN/TS 17249-5 (WI=00278470) Intelligent transport systems - eSafety - Part 5: eCall for UNECE Category L1 and L3 powered two-wheeled vehicles	Under Approval
183	FprCEN/TS 17249-6 (WI=00278471) Intelligent transport systems - eSafety - Part 6: eCall for UNECE Category L2, L4, L5, L6 and L7 tricycles and quadricycles	Under Approval
184	FprCEN/TS 17268 (WI=00278479) Intelligent transport systems - ITS spatial data - Data exchange on changes in road attributes	Under Approval
185	FprCEN/TS 17312 (WI=00278476) Intelligent transport systems - eSafety - eCall via satellite	Under Approval
186	FprCEN/TS 17313 (WI=00278401) Intelligent transport systems - ESafety - Interoperability and user choice in eCall aftermarket and third party eCall services	Under Approval
187	FprEN 16157-1 (WI=00278423) Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 1: Context and framework	Under Approval
188	FprEN 16157-2 (WI=00278398) Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 2: Location referencing	Under Approval
189	FprEN 16157-3 (WI=00278399) Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 3: Situation Publication	Under Approval
190	FprEN 16157-7 (WI=00278424) Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 7: Common data elements	Under Approval

191	FprEN ISO 14906 (WI=00278425) Electronic fee collection - Application interface definition for dedicated short-range communication (ISO/FDIS 14906:2018)	Under Approval
192	FprEN ISO 17427-1 (WI=00278393) Intelligent transport systems - Cooperative ITS - Part 1: Roles and responsibilities in the context of co-operative ITS architecture(s) (ISO/FDIS 17427-1:2018)	Approved
193	prCEN ISO/TR 21186 (WI=00278436) Intelligent transport systems - Cooperative ITS - Guidelines on the use of C-ITS standards for hybrid communications	Under Drafting
194	prCEN ISO/TS 19091 rev (WI=00278461) Intelligent transport systems - Cooperative ITS - Using V2I and I2V communications for applications related to signalized intersections	Under Drafting
195	prCEN ISO/TS 21176 (WI=00278437) Intelligent transport systems - Cooperative ITS - Position, velocity and time functionality in the ITS station	Under Drafting
196	prCEN ISO/TS 21177 (WI=00278438) Intelligent transport systems – ITS-station security services for secure session establishment and authentication between trusted devices	Under Drafting
197	prCEN ISO/TS 21184 (WI=00278439) Intelligent transport systems -- Management of messages containing information of sensor and control networks specified in data dictionaries	Under Drafting
198	prCEN ISO/TS 21185 (WI=00278440) Intelligent transport systems -- Communication profiles for secure connections between trusted devices	Under Drafting
199	prCEN/TS 16614-1 rev (WI=00278489) Public transport - Network and Timetable Exchange (NeTEx) - Part 1: Public transport network topology exchange format	Under Drafting
200	prCEN/TS 16614-2 rev (WI=00278490) Public transport - Network and Timetable Exchange (NeTEx) - Part 2: Public transport scheduled timetables exchange format	Under Drafting
201	prCEN/TS 16614-3 rev (WI=00278488) Public transport - Network and Timetable Exchange (NeTEx) - Part 3: Public transport fares exchange format	Under Drafting
202	prCEN/TS 16702-1 rev (WI=00278465) Electronic fee collection - Secure monitoring for autonomous toll systems - Part 1: Compliance checking	Under Drafting
203	prCEN/TS 16702-2 rev (WI=00278486)	Under Drafting

	Electronic fee collection - Secure monitoring for autonomous toll systems - Part 2: Trusted recorder	
204	prCEN/TS 16794-1 rev (WI=00278481) Public transport - Communication between contactless readers and fare media - Part 1: Implementation requirements for ISO/IEC 14443	Under Drafting
205	prCEN/TS 16794-2 rev (WI=00278482) Public transport - Communication between contactless readers and fare media - Part 2: Test plan for ISO/IEC 14443	Under Drafting
206	prEN (WI=00278494) Intelligent transport systems - eSafety - eCall OAD for multiple Optional Additional Datasets	Under Drafting
207	prEN 15722 rev (WI=00278493) Intelligent transport systems - eSafety - eCall minimum set of data	Under Drafting
208	prEN 24014-1 rev (WI=00278435) Public transport - Interoperable fare management system - Part 1: Architecture	Under Drafting
209	prEN ISO 12813 rev (WI=00278495) Electronic fee collection - Compliance check communication for autonomous systems	Under Drafting
210	prEN ISO 16407-2 (WI=00278414) Electronic fee collection - Evaluation of equipment for conformity to ISO 17575-1 - Part 2: Abstract test suite (ISO/DIS 16407-2:2017)	Under Approval
211	prEN ISO 16410-2 (WI=00278415) Electronic fee collection - Evaluation of equipment for conformity to ISO 17575-3 - Part 2: Abstract test suite (ISO/DIS 16410-2:2017)	Under Approval
212	prEN ISO 17429 (WI=00278462) Intelligent transport systems - Cooperative ITS - ITS station facilities for the transfer of information between ITS stations	Under Drafting
213	prEN ISO 17573-1 (WI=00278485) Electronic fee collection - System architecture for vehicle related tolling - Part 1: Reference model	Under Approval
214	prEN ISO 22418 (WI=00278492) Intelligent transport systems - Fast service announcement protocol (FSAP) (ISO 22418:2018)	Under Drafting

5.6 Annexure 6: List of standards published by ETSI TC ITS:

The following is a list of the 20 latest published ETSI standards on intelligent transport systems.

S. No.	Standard No.	Title	Status
1	TS 101 539-2	Intelligent Transport Systems (ITS); V2X Applications; Part 2: Intersection Collision Risk Warning (ICRW) application requirements specification	Published
2	TS 102 941	Intelligent Transport Systems (ITS); Security; Trust and Privacy Management	Published
3	TR 103 415	Intelligent Transport Systems (ITS); Security; Pre-standardization study on pseudonym change management	Published
4	TS 102 687	Intelligent Transport Systems (ITS); Decentralized Congestion Control Mechanisms for Intelligent Transport Systems operating in the 5 GHz range; Access layer part	Published
5	TS 102 940	Intelligent Transport Systems (ITS); Security; ITS communications security architecture and security management	Published
6	EN 300 674-2-2	Transport and Traffic Telematics (TTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5 795 MHz to 5 815 MHz frequency band; Part 2: Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU; Sub-part 2: On-Board Units (OBU)	Published
7	TS 103 097	Intelligent Transport Systems (ITS); Security; Security header and certificate formats	Published
8	TS 103 544-1	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 1: Connectivity	Published
9	TS 103 544-10	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 10: UPnP Client Profile Service	Published
10	TS 103 544-11	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 11: UPnP Notification Server Service	Published
11	TS 103 544-12	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 12: UPnP Server Device	Published
12	TS 103 544-13	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 13: Core Architecture	Published
13	TS 103 544-14	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 14: Application Certificates	Published
14	TS 103 544-15	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 15: Application Programming Interface (API) Level 1 & 2	Published
15	TS 103 544-16	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 16: Application Developer Certificates	Published
16	TS 103 544-17	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 17: MirrorLink over Wi-Fi Display (WFD)	Published

17	TS 103 544-18	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 18: IEEE 802.11TM Car Connectivity Consortium (CCC) Information Element	Published
18	TS 103 544-19	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 19: Network Information Data Service	Published
19	TS 103 544-2	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 2: Virtual Network Computing (VNC) based Display and Control	Published
20	TS 103 544-20	Publicly Available Specification (PAS); Intelligent Transport Systems (ITS); MirrorLink; Part 20: Internet Accessibility	Published

A full list of related standards in the public domain by ETSI is Available here

5.7 Annexure 7: List of Standards published by CEN/CENELEC/DIN relevant for smart manufacturing:

List of Standards relevant for Smart Manufacturing	
Document No.	**Title**
EN ISO 6385	Ergonomic principles in the design of work systems
EN ISO 9001	Quality management systems -- Requirements
EN 16710-2	Ergonomics methods - Part 2: A methodology for work analysis to support design
EN 614-2	Safety of machinery - Ergonomic design principles - Part 2: Interactions between the design of machinery and work tasks
EN ISO 10218	Robots and robotic devices - Safety requirements for industrial robots
EN 894-1	Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 1: General principles for human interactions with displays and control actuators
EN ISO 12464	Light and lighting - Lighting of work places
EN ISO 9241-960	Ergonomics of human-system interaction - Part 960: Framework and guidance for gesture interactions (ISO 9241-960:2017)
EN ISO 9241-125	Ergonomics of human-system interaction - Part 125: Guidance on visual presentation of information (ISO/DIS 9241-125:2016)
EN 1005-1-5	Safety of machinery - Human physical performance -Part 1-5

EN 614-1-2	Safety of machinery - Ergonomic design principles - Part 1-2
EN 894-1-4	Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 1- 4
EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN ISO 13857	Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
EN 13861	Safety of machinery - Guidance for the application of ergonomics standards in the design of machinery
EN ISO 26800	Ergonomics - General approach, principles and concepts
EN ISO 14738	Safety of machinery - Anthropometric requirements for the design of workstations at machinery
EN 349	Safety of machinery - Minimum gaps to avoid crushing of parts of the human body
EN 547-1	Safety of machinery - Human body measurements - Part 1: Principles for determining the dimensions required for openings for whole body access into machinery
EN ISO 15265	Ergonomics of the thermal environment - Risk assessment strategy for the prevention of stress or discomfort in thermal working conditions
EN ISO 7730	Ergonomics of the thermal environment - Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria
DIN ISO 45001	Occupational health and safety management systems - Requirements with guidance for use
DIN ISO/TS 15066	Robots and robotic devices - Collaborative robots
DIN CWA 16649	Managing emerging technology-related risks

These standards should make it easier for companies to connect their existing and new equipment, regardless of their service provider. Therefore, the publication of European standards is expected to drive the further rollout of Industry 4.0 in the coming years. Although such standards are voluntary, you should comply because they allow you to sell your products across Europe. A collection of standards published by CEN/DIN/ISO/IEC/W3C/IEEE relevant for smart manufacturing (Industry 4.0) can be downloaded from **here**

5.8 Annexure 8: list of standards that are essential for the application of EN301 549

- ETSI EN 301 549 : http://mandate376.standards.eu/standard

- ISO/IEC 40500 (W3C Web Content Accessibility Guidelines, known as WCAG 2.0): https://www.w3.org/TR/WCAG20/
- IEC TC 100: Audio, video and multimedia systems and equipment, prepares international publications in this field. https://iecetech.org/issue/2014-09/Dedicated-to-improving-quality-of-life
- ITU-D, Study group 16: https://www.itu.int/en/ITU-T/Pages/default.aspx

Normative References

The following referenced documents are necessary for the application of the present document.

1. ETSI ETS 300 381: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids".
2. ETSI ES 200 381-1: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids Part 1: Fixed-line speech terminals".
3. ETSI ES 200 381-2: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids; Part 2: Cellular speech terminals".
4. W3C Recommendation (11 December 2008)/ISO/IEC 40500:2012: "Web Content Accessibility Guidelines (WCAG) 2.0 ".

Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

1. ANSI/IEEE C63.19 (2011): "American National Standard Method of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids".
2. ANSI/TIA-4965: "Receive volume control requirements for digital and analogue wireline terminals".
3. European Commission: "Standardization Mandate to CEN, CENELEC and ETSI in support of European accessibility requirements for public procurement of products and services in the ICT domain".
4. ETSI EG 201 013: "Human Factors (HF); Definitions, abbreviations and symbols".
5. ETSI ES 202 975: "Human Factors (HF); Harmonized relay services".
6. ETSI ETS 300 767: "Human Factors (HF); Telephone Prepayment Cards; Tactile Identifier".
7. CEN/CENELEC/ETSI TR 101 550: "Documents relevant to EN 301 549 "Accessibilityrequirements suitable for public procurement of ICT products and services in Europe".
8. CEN/CENELEC/ETSI TR 101 551: "Guidelines on the use of accessibility award criteria suitablefor publicly procured ICT products and services in Europe".
9. ETSI TR 102 612: "Human Factors (HF); European accessibility requirements for public procurement of products and services in the ICT domain (European Commission Mandate M 376, Phase 1)".

10. ETSI TS 126 114: "Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS); Multimedia telephony; Media handling and interaction (3GPP TS 26.114)".
11. ETSI TS 122 173: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Core Network Subsystem (IMS) Multimedia Telephony Service and supplementary services; Stage 1 (3GPP TS 22.173)".
12. ETSI TS 134 229: "Universal Mobile Telecommunications System (UMTS); LTE; Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); User Equipment (UE) conformance specification (3GPP TS 34.229)".
13. IETF RFC 4103 (2005): "RTP Payload for Text Conversation".
14. ISO/IEC 17007:2009: "Conformity assessment - Guidance for drafting normative documents suitable for use for conformity assessment".
15. ISO 9241-11:1998: "Ergonomic requirements for office work with visual display terminals (VDTs) - Part 11: Guidance on usability".
16. ISO 9241-110:2006: "Ergonomics of human-system interaction - Part 110: Dialogue principles".
17. ISO 9241-171:2008: "Ergonomics of human-system interaction - Part 171: Guidance on software accessibility".
18. ISO 26800:2011: "Ergonomics - General approach, principles and concepts".
19. ISO/IEC 13066-1:2011: "Information technology - Interoperability with assistive technology (AT) - Part 1: Requirements and recommendations for interoperability".
20. Recommendation ITU-T E.161 (2001): "Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network".
21. Recommendation ITU-T G.722 (1988): "7 kHz audio-coding within 64 kbit/s".
22. Recommendation ITU-T G.722.2 (2003): "Wideband coding of speech at around 16 kbit/s using Adaptive Multi-Rate Wideband (AMR-WB)".
23. Recommendation ITU-T V.18 (2000): "Operational and interworking requirements for DCEs operating in the text telephone mode".
24. TIA-1083-A (2010): "Telecommunications; Telephone Terminal equipment; Handset magnetic measurement procedures and performance requirements".
25. US Department of Justice: "2010 ADA Standards for Accessible Design".
26. W3C Working Group Note 5 September 2013: "Guidance on Applying WCAG 2.0 to Non-Web Information and Communications Technologies (WCAG2ICT) ".

Other related standards:

- Draft ETSI EN 300 743: Digital Video Broadcasting (DVB); Sub-titling systems
- ETSI EN 300 468: Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems

- Draft ETSI EN 300 401: Radio Broadcasting Systems;Digital Audio Broadcasting (DAB) to mobile,portable and fixed receivers
- Draft ETSI EN 303 560: Digital Video Broadcasting (DVB); TTML subtitling systems
- ETSI ES 202 975: Human Factors (HF); Requirements for relay services
- ETSI ES 202 076: Human Factors (HF); User Interfaces; Generic spoken command vocabulary for ICT devices and services
- ETSI ES 202 642: Television systems; Specification of the domestic video Programme Delivery Control system (PDC)
- ETSI ETS 300 381: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids".
- ETSI ES 200 381-1: "Telephony for hearing impaired people; Inductive coupling of telephoneearphones to hearing aids Part 1: Fixed-line speech terminals".
- ETSI ES 200 381-2: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids; Part 2: Cellular speech terminals".
- ETSI - TS 101 154 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR THE USE OF VIDEO AND AUDIO CODING IN BROADCAST AND BROADBAND APPLICATIONS
- ISO/IEC 13818-1:2018 Information technology -- Generic coding of moving pictures and associated audio information -- Part 1: Systems
- ISO/IEC 15948:2004 Information technology -- Computer graphics and image processing -- Portable Network Graphics (PNG): Functional specification

5.9 Annexure 9: List of standards published by CEN/CLC/JTC 14, CEN/CLC/JTC 15 and CEN/SS 23

S.No.	Reference, title
1	EN 15900:2010 (WI=JT014006)
	Energy efficiency services - Definitions and requirements
2	EN 16212:2012 (WI=JT014010)
	Energy Efficiency and Savings Calculation, Top-down and Bottom-up Methods
3	EN 16231:2012 (WI=JT014008)
	Energy efficiency benchmarking methodology
4	EN 16247-1:2012 (WI=JT014001)
	Energy audits - Part 1: General requirements
5	EN 16247-2:2014 (WI=JT014002)
	Energy audits - Part 2: Buildings
6	EN 16247-3:2014 (WI=JT014003)
	Energy audits - Part 3: Processes
7	EN 16247-4:2014 (WI=JT014004)
	Energy audits - Part 4: Transport
8	EN 16247-5:2015 (WI=JT014005)
	Energy audits - Part 5: Competence of energy auditors
9	EN ISO 50001:2018 (WI=JT014011)

	Energy management systems - Requirements with guidance for use (ISO 50001:2018)
10	EN ISO/IEC 13273-1:2016 (WI=CSF23006)
	Energy efficiency and renewable energy sources - Common international terminology - Part 1: Energy efficiency (ISO/IEC 13273-1:2015)
11	EN ISO/IEC 13273-2:2016 (WI=CSF23007)
	Energy efficiency and renewable energy sources - Common international terminology - Part 2: Renewable energy sources (ISO/IEC 13273-2:2015)

6 Source

European Telecommunications Standards Institute (ETSI) - Smart Cities
https://www.etsi.org/technologies-clusters/technologies/smart-cities

CEN-CENELEC – Smart Cities
https://www.cencenelec.eu/standards/Sectors/SmartLiving/smartcities/Pages/default.aspx

CEN-CENELEC-ETSI Sector Forum on Smart and Sustainable Cities and Communities
https://www.cencenelec.eu/standards/Sectors/SmartLiving/smartcities/Pages/SSCC-CG.aspx

Top 10 Smartest Cities in Europe
https://www.fastcompany.com/3024721/the-10-smartest-cities-in-europe

Europe aims to have 300 smart cities by end of next year
https://energypost.eu/europe-aims-to-have-300-smart-cities-next-year/