FUTURE INTERNET PPP

Instant Mobility

Multimodality for people and goods in urban areas

FP7 . CP 284906

WP7 – Instant Mobility standardization and regulation recommendations – preliminary version

March 2012

Editor: T. Nagellen / France Telecom

Project funded by the European Commission under the 7th European Framework Programme for RTD - ICT theme of the Cooperation Programme.

Instant Mobility WP7

Instant Mobility standardization and regulation recommendations – preliminary version

WPXX	Deliverable title
Authors	T. Nagellen – France Telecom
Short Description	This document provides a first overview of main standards which could support Instant Mobility services.
Dissemination level (select)	PU Public
Date	30 march 2012 (final version)
Status	Deliverable
Contributions by:	Thierry Nagellen – France Telecom Thierry Milin – France Telecom
Internal review by	Jean-Marie Dautelle - Thales
Internally accepted by	Merja Penttinen (WP7 leader)
Date of acceptance	30 march 2012

Document history

Version	Date	Author /Reviewer	Description
0.1	12/2011	T. Nagellen	ToC
0.2	28/02/2012	T. Nagellen	First SDO descriptions
0.3	19/03/2012	T. Nagellen	Inputs from D4.X
0.4	25/03/2012	T. Nagellen	NFC part
0.5	26/03/2012	T. Milin	ITS and ETSI TC ITS part
0.6	27/03/2012	T. Nagellen	EPC Global part

Deliverable Abstract (1 page)

This document describes the status of the relevant parts of the global standardization landscape, and plans related to Instant Mobility activities. These standards would be used in order to make the most efficient use of past developments and help move technologies to the market.

To understand the broad range of topics covered, it is sufficient to note that the Instant Mobility has described thirty-seven elementary services and is now working on three scenarios:

- Personal Travel Companion
- Smart City Logistics
- Transport Infrastructure as a Service

In this first version of this document, related Standardization Organizations are described with their associated and most interesting standards.

Regulation recommendations will be developed in the future version including results from on-going acceptability surveys and feedback from the cities involved in Instant Mobility project.

Table of Content

Table of Figures

1. Introduction

Instant Mobility Project partners continually study the actual standards and consider when/how to contribute Instant Mobility research into new standards/protocols in order to make the most efficient use of past developments, and help move technology state-of-the-art towards the advantages inherent in Instant Mobility.

This document describes the status of the relevant parts of the global standardization landscape, and plans related to Instant Mobility activities. It is a "living document" which will be updated as work progresses during the life of the project.
The high-level goal of the Instant Mobility project is to address defined scenarios for multi-modal services using Future Internet technologies.
To understand the broad range of topics covered, it is sufficient to note that the Instant Mobility has described thirty-seven elementary services and is now working on three scenarios:

- Personal Travel Companion
- Smart City Logistics
- Transport Infrastructure as a Service

Based on these scenarios, technical teams have provided a first view of the components and message flows (e.g. sequences diagrams) related to the envisaged seven enablers sets, each of them targeting some dedicated standardization issues:

- Multimodal Journey optimisation enabler set
- Driver & traveller enabler set
- Vehicle & handheld devices enabler set
- Public transport operators' enabler set
- Goods transport operators' enabler set
- Traffic management enabler set
- Mobile Payment enabler set

It is expected that deployment diagrams showing connections between execution environments identify the standard protocol being used for such communication.

In this first version of this document, we are describing what could be the most interesting standards and the related Standardization Organizations (SDO). Each partner have in charge to analyze the relevant standards and to represent their companies to support Instant Mobility vision.

Regarding the regulation issues, they will be described in the second version of this document based on:

- Acceptability surveys analysis, (WP 6.1)
- Data business cases and how cities involved as partners of Instant Mobility expect to deploy some services for their citizen, (WP 6.2)
- Results of Security and Privacy analysis (WP6.3)

2. Instant Mobility enabler sets and standardization

Standardization issues are directly targeted by technical specifications each Instant Mobility enabler set's team are describing. In this first version of this document, we provide a dedicated view for these issues per enabler set while the final version should provide a consolidated view with common issues for Instant Mobility project, but also common topics with FI-Ware project. These common topics should emerge based on identification of FI-Ware Generic Enablers by Instant Mobility technical team and after technical exchange with relevant FI-ware technical people.

2.1 Multi-modal journey optimization enabler set

This enabler set is dealing with major issues related to data collection from lots of transports operators and how these data could be provided in an homogeneous way to end-users (travellers or drivers).
Here are the list of potential standards for exchange format the Instant Mobility team has analyzed:

Standard	Description
TRANSMODEL1.(Reference Data Model For Public Transport, EN12896)[1]	The European Reference Data Model for Public Transport Information. It provides an abstract model of common public transport concepts and structures that can be used to build many different kinds of public transport information system, including for timetabling, fares, operational management, real time data, etc.
NeTEx2	NeTEX2 is a prCEN Technical Standard currently in development. The goal of NeTEX is to provide an efficient European wide standard for exchanging Public Transport schedules and related data. NeTEX is intended to be a general purpose format capable of exchanging timetables for Rail, Bus, Coach, and Ferry, Air or any other mode of public transport. It includes full support for rail services and can be used to exchange UIC (International Union Of Railways) data. NeTEx is based on TRANSMODEL which specifies a Conceptual model for Public Transport data, extended with additional concepts for stops and stations from the CEN Technical standard IFOPT (Identification of Fixed Objects in Public Transport).
IFOPT Identification of Fixed Objects in Public Transport	IFOPT is a prCEN standard which defines a model and identification principles for the main fixed objects related to public access to Public Transport (e.g. stop points, stop areas, stations, connection links, entrances, etc.).
SIRI (Service Interface for Real Time Information)	When the operators wish to update the timetables that they have provided to the platform, they use standardized SIRI3 messages. SIRI is an XML protocol to allow distributed computers to exchange real-time information about public transport services and vehicles. The protocol is a CEN standard, developed with initial participation by France, Germany (Verband Deutscher Verkehrsunternehmen), Scandinavia, and the UK (UK Real Time Interest Group). SIRI is based on TRANSMODEL. It allows the exchange of structured real-time information about schedules, vehicles, and connections. It is

[1] http://www.transmodel.org/en/cadre1.html

	also possible to use SIRI to provide general information about the operation of the services.

Instant Mobility team chooses to base the external interface on both TRANSMODEL and SIRI because they are the most mature European standards.
There is however still a need to define a more precise format both for TRANSMODEL representations and SIRI exchanges. Indeed, TRANSMODEL is a generic and very rich model that can fit virtually any type of public transport use case. But it still needs to be optimized for the type of service that is planned. Also, it is always necessary to define an "exchange profile" or local agreement for SIRI messages when developing a specific service.
The SIRI technical specification has to be defined more precisely to be concretely applied: certain classes might prove useless, others might need to be specified and their attributes qualified (id, type, unit, time calculation, methods and protocols taking place, etc.) In future versions, Instant Mobility will have to choose a local agreement based on SIRI and a sub-model of TRANSMODEL that are optimized for the specific context of Instant Mobility.

Data format for data provided by Road Transport Operators is another major issue especially regarding geographical data. These data are described using the European standard GDF[2] (Geographic data file). GDF is an interchange format for geographic data, used to describe and transfer road networks and road-related data. It provides rules on how to capture the data as well as how the features, attributes and relations are defined.
Again, together with theses quasi-static information, road operators have to provide dynamic information about traffic related data (traffic status, disturbances, dynamic speed limits, weather conditions, etc.). To this end, the operators should use the European standard Datex II[3] to interact with the MMT platform.

To provide all relevant data to travellers and drivers, Instant Mobility services require also data from road operators.
In the road sector, the DATEX standard was developed for information exchange between traffic management centres, traffic information centres and service providers and constitutes the reference for applications that have been developed in the last 10 years. The second generation DATEX II specification now also pushes the door wide open for all actors in the traffic and travel information sector.
DATEX II is a multi-part Standard, maintained by CEN Technical Committee 278, CEN/TC278, (Road Transport and Traffic Telematics). The first three parts of the CEN DATEX II series (CEN 16157) have already been approved as Technical Specifications. These three Parts deal with the most mature and widely used parts of DATEX II: the modelling methodology (called Context and framework) as Part 1, Location referencing as Part 2 and the most widely used DATEX publication for traffic information messages (called Situation publication) as Part 3. A fourth Part of CEN DATEX II series, VMS publications, is currently being prepared for standardization to CEN/TC278 and a fifth part on measured and elaborated data is currently proposed as work item. More parts are to follow as new content requirements emerge.

From end-users point of view, travellers and drivers will interact with the platform using standard communication protocols from the Open Mobile Alliance (OMA) to optimize how services are delivered on mobile devices and for any brand of mobile and their related Operating System.
These mobile devices have also to provide their position to the Instant Mobility system. For this purpose, Mobile Location Protocol (MLP) protocol is used. This is an application-level protocol for receiving the position of Mobile Stations (mobile phones, wireless devices, etc.) independent of underlying network

[2] http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=30763
[3] http://datex2.eu

technology. The MLP serves as the interface between a Location Server and a location-based application. Basic MLP Services are based on location services defined by 3GPP.

GPS data and European approach:

To support real-time geographical location, the new European service EGNOS[4] could be in the future one of the most promising approach. EGNOS could be a de facto standard for next generation of European location based services.

The European Geostationary Navigation Overlay Service (EGNOS) is the first pan-European satellite navigation system.

Consisting of three geostationary satellites and a network of ground stations, EGNOS achieves its aim by transmitting a signal containing information on the reliability and accuracy of the positioning signals sent out by GPS. It allows users in Europe and beyond to determine their position to within 1.5 metres.

The EGNOS Open Service has been available since 1 October 2009. EGNOS positioning data are freely available in Europe through satellite signals to anyone equipped with an EGNOS-enabled GPS receiver.

2.2 Driver and traveller enabler set

NFC offers possibilities in ticket buying, mobile payments and mobile wallets, which store credit or debit card details on the Smartphone, enabling payments by tapping the phone on a scanner. Travels could be effectively ticketless when using an NFC-compatible Smartphone to gain access to a multi-modal solution, a multi-part ticket with several financial tenancies.

As well as buying travel products, travellers and drivers will be able to validate subpart of a multimodal journey, including security mechanisms as authentication, without paper tickets or even ID document. The NFC technology could be used to wirelessly check in the traveller in the car, and using external third-party, identify him to the driver. NFC will also allow driver to check in himself as the expected counterpart for ride-sharing service.

The NFC is a short range communication standard working at the frequency of 13.56 MHz and transferring data between two devices, an initiator and a target, at a distance equal or less than 4 cm. This standard is compatible with the RFID standard, that means that can read RFID tag; the main functional difference between these two technologies is that the NFC is designed for a bidirectional communication, while typically, in the RFID communication, there is a reader and a tag that “is read” from the device.

The possible communication modes are the “passive mode” and the “active mode”; in the first case the initiator generates an RF field on the RFID passive tag. Since this is not powered by an internal battery, it answers simply by modulating this electromagnetic field. In general the object investigated by the initiator is called target and when it is battery-powered it can instantiate a peer-to-peer communication with the initiator. In the second case both the initiator and the target communicate each other by alternating the transmission and reception phases.

The NFC tags are usually read-only but they can be re-writable, especially if protected by custom-specific security codes; they can securely store personal data, like for example the payment references for applications related to the virtual ticketing, networking contacts but also product related information.

According to the standard, the maximum data transfer rate reachable with NFC is 424 Kbit/s.

2.3 Vehicle and handheld devices enabler set

This enabler set target new communication mode inside vehicles and how to merge automotive and infotainment issues. The approach is first based on how to provide applications for travellers and drivers and second how to provide always-on connectivity.

Applications inside vehicles will be supported by GENIVI alliance technical environment when other ICT standards will support always-on connectivity.

[4] http://egnos-portal.gsa.europa.eu/

An additional topic is digital authentication inside vehicle and Instant Mobility team is focusing its effort on the use of NFC technologies as described in the previous section.

The GENIVI alliance proposes an Open Source environment to implement terminal mode where travellers and drivers could use their mobile devices as communication gateways. This type of connection could be used for the implementation of the MirrorLink functionality (previously known as Terminal Mode), which needs a communication channel between the On-Board Unit and the handheld device.
The MirrorLink technology enables the replication of the screen of the phone to a head unit and will also connect the phone to the car's audio system. The head unit, which is generally made up of a dashboard mounted touch screen and associated buttons, can send input to the phone. In addition, the phone can also use the car sensors (e.g. GPS and microphones), to augment its own built in sensors.
this means that key phone functionality and applications appear to be fully integrated into the car's own systems, going a long way beyond what is possible with current Bluetooth-based systems. The phone holds the data and is doing most of the hard work, but there should be no need to actually interact with the phone directly. Rather, everything can be controlled from the head unit's touch screen and associated controls.
The intention is that MirrorLink head units will work with any phone that supports the standard.

The mobile router module will ensure efficient and reliable transmission of Instant Mobility application data from the handheld device (check-in, check-out, geo-location, etc.) and/or the vehicle (sensing output) to the Instant Mobility infrastructure. Considering ITS and IETF standardization activities, the overall in-vehicle system may host several communication equipment having interfaces towards the infrastructure: Dedicated Short-Range Communications (DSRC), Wi-Fi, WiMax, LTE, 3G, IEEE 802.11p, Bluetooth on the OBU and LTE, 3G, Wi-Fi, Bluetooth on the handheld device. However, data transmission failures could occur if one relies exclusively on the 3G interface of the handheld device (signal drop in tunnels, reduced cellular bandwidth, etc.). The mobile router would support ITS functionalities to be compliant with future ITS infrastructures.

Intelligent Transport Systems (ITS) are systems to support transportation of goods and humans with information and communication technologies in order to efficiently and safely use the transport infrastructure and transport means (cars, trains, planes, ships).

Elements of ITS are standardized in various standardization organizations, both on an international level at e.g. ISO TC204, and on regional levels, e.g. in Europe at ETSI TC ITS and at CEN TC278.

Intelligent Transport Systems (ITS) include telematics and all types of communications in vehicles, between vehicles (e.g. car-to-car), and between vehicles and fixed locations (e.g. car-to-infrastructure). However, ITS are not restricted to Road Transport - they also include the use of information and communication technologies (ICT) for rail, water and air transport, including navigation systems.

Co-operative ITS systems include vehicle-to-vehicle, vehicle-to-infrastructure and infrastructure-to-infrastructure communications for the exchange of information. Figure 1 shows the participants in the ITS communication architecture and a selection of ITS applications.

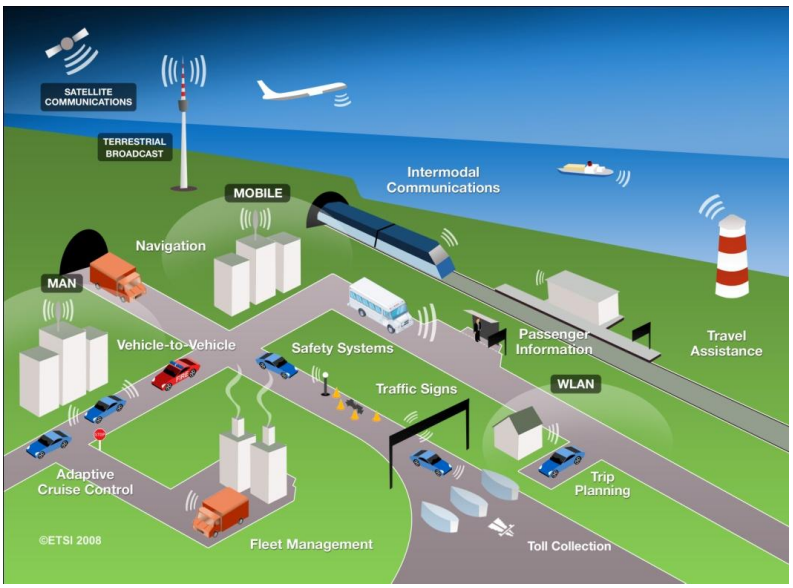

Figure 1: ITS Application field

European Commission has requested CEN, CENELEC and ETSI through Mandate M/453 on co-operative System standardization (October, 6th 2009) to:

- Carry out an analysis of the required European standardization activity based on the existing roadmaps of the standardization process for Co-operative ITS services within the European Standardization organizations. The analysis should:
  - Include a detailed work programme covering the necessary standardization work in support of Co-operative ITS services. This standardization work covers exclusively road-bound traffic. All other ground level traffic, such as water navigation and rail traffic, are not covered. The European Standardization Organisations should identify the potentialities for information interchange between transport modes not included in this mandate and those included. However it is not excluded that the outcome of research and standardization activities would lead to extension of the standardization work to other transport modalities in the future.
  - Identify which are the potential functionalities that the new systems can supply to drivers, infrastructure providers, emergency services, public administrations and any other identifiable stakeholders. The European Standardization Organizations should identify the risks for the privacy of the users of these functionalities and the measures to be taken to eliminate these risks.
  - Identify the minimum set of European standards required in the field of Cooperative systems to ensure interoperability for vehicle to vehicle communications, for vehicle to infrastructure communications and for communications between infrastructure operators. This set of standards should be divided into communication, information and security standards and should take into account existing work, such as DATEX (CEN TC 278 WG8).
- Develop test methods for assessing the conformity of the identified minimum set of standards.
- Develop the rest of the identified standards and technical specifications for Cooperative ITS.

All these topics are quite relevant for Instant Mobility services especially regarding the expected always-on connectivity for real-time services and to include vehicles as sensors in the whole transport infrastructure.

2.4 Goods transport operators' enabler set

EPCglobal is a set of RFID standards and services to increase visibility and efficiency throughout the supply chain and provide a higher quality information flow between companies and their key trading partners. EPC was created for businesses to manage products through the supply chain.
Several major retailers and product manufacturers are using EPC technology as a way to improve supply chain management. Similar to the VIN on a car, an EPC is a way to uniquely identify a pallet, parcel or individual product. It is the next generation of the bar code, but unlike the barcode, which needs "line of sight" to be read, EPC tags use radio waves to read product information faster and more efficiently.
EPCGlobal is the most common standard in Europe to communicate with goods and develop new ICT services for supply-chain and logistics value chain.

One of the main issue regarding dynamic time/place drop point service is the need to share calendar and to synchronize activities related to different companies constraints. To identify some solution, Instant Mobility project will follow the work done in the following standards.
For calendar data, CalConnect, the Calendaring and Scheduling Consortium, is focused on the interoperable exchange of calendaring and scheduling information between dissimilar programs, platforms, and technologies. It does not design standards by itself, but identify and state needs and requirements, so that right standards are developed, if required.
The CalConnect web site[5] provides a list of calendaring and scheduling standards. The following listed standards describe data models and protocols that can be used to exchange related data: iCalendar data model (RFC 5545[6]), CalDAV protocol (RFC 4791[7]), SyncML technology[8] (targeting mobile devices – handled by Open Mobile Alliance).
The iTIP specification (RFC5546[9]) describes how iCalendar objects are exchanged, in order to schedule events or tasks. It does not specify any transport protocol. iSchedule[10] is such a protocol, which can be used across different internet domains.

2.5 Traffic management enabler set

Geolocate data on reference cartography is one of the main issues to provide accurate information on urban areas traffic. The cartography could be based on the OpenStreetMap platform.
OpenStreetMap (OSM) is a collaborative project to create a free editable map of the world. Two major driving forces behind the establishment and growth of OSM have been restrictions on use or availability of map information across much of the world and the advent of inexpensive portable GPS devices.
The maps are created using data from portable GPS devices, aerial photography, other free sources or simply from local knowledge. Both rendered images and the vector dataset are available for download under a Creative Commons Attribution-ShareAlike 2.0 licence.

[5] http://www.calconnect.org/CD1104_Calendaring_Standards.shtml
[6] https://datatracker.ietf.org/doc/rfc5545/
[7] https://datatracker.ietf.org/doc/rfc4791/
[8] http://www.openmobilealliance.org/tech/affiliates/syncml/syncmlindex.html
[9] https://datatracker.ietf.org/doc/rfc5546/
[10] http://tools.ietf.org/id/draft-desruisseaux-ischedule-01.txt

3. Standard Organizations

3.1 3GPP

http://www.3gpp.org
3GPP prepares, approves and maintains the necessary set of Technical Specifications and Technical Reports for an evolved 3rd Generation and beyond Mobile System. 3GPP focus on the access network and core network layers of a telecommunication system. 3GPP is constantly looking at service to network interfaces, as well as modern network features including security, network features, and application level signalling. After TS22.868, 3GPP is now discussing special considerations facilitate M2M traffic from a business and connectivity perspective.

- 3rd Generation Partnership Project (3GPP): http://www.3gpp.org/
- 3GPP TS22868 (http://www.3gpp.org/ftp/Specs/2007-03/Rel-8/22_series/22868-800.zip)

In Telco-originated identity management solutions, the central notions are: identifiers and authentication. For instance, IMS distinguishes between the private IMPI (IP Multimedia Private Identity) that is typically only known by the user's home operator and the public IMPU (IP Multimedia Public Identity) that is given to services (i.e. Application Servers), potentially different IMPUs to different services. Authentication is typically performed by means of a tamper-resistant smartcard and the SIM application running on it (Subscriber Identification Module; SIM, USIM, ISIM). Convergence of Telco-originated solutions to Internet-originated solutions started with the introduction of the GAA (Generic Authentication Architecture) by 3GPP, of which the core element is GBA (Generic Bootstrapping Architecture). GBA is used for establishing a shared secret (based upon the long-term master secret in the xSIM card) between the UE (User Equipment) and any service provider (called the NAF i.e. Network Application Function). This shared secret is then used for different purposes such as end user authentication (HTTP Digest, PSK-TLS) or provisioning PKI certificates (SSC i.e. Support for Subscriber Certificates).

Instant Mobility relevance: As Instant Mobility is focusing on mobile devices and especially Smartphone, the relevance of 3GPP is limited to interfaces and how they would support real-time data collection.

3.2 CEN

http://www.cen.eu/
The **European Committee for Standardization** (CEN) is a business facilitator in Europe, removing trade barriers for European industry and consumers. Its mission is to foster the European economy in global trading, the welfare of European citizens and the environment.
CEN is a major provider of European Standards and technical specifications. It is the only recognized European organization according to Directive 98/34/EC for the planning, drafting and adoption of European Standards in all areas of economic activity with the exception of electro-technology (CENELEC) and telecommunication (ETSI).

Instant Mobility relevance: As Instant Mobility is focusing on Transport and Mobility for multimodal services, and CEN is one of the SDO involves in ITS standardization (Intelligent Transport System), we have to follow achievement and future roadmap related to these activities.

3.3 EPC Global

http://www.gs1.org/epcglobal
EPCglobal is a joint venture between GS1 (formerly known as EAN International) and GS1 US (formerly the Uniform Code Council, Inc.). It is an organization set up to achieve worldwide adoption and standardization of Electronic Product Code (EPC) technology.

The EPC is a unique number that is used to identify a specific item in the supply chain. The EPC is stored on a RFID tag, which combines a silicon chip and an antenna. Once the EPC is retrieved from the tag, it can be associated with the data held in a secured database, such as where an item originated or the date of its production. Much like a global trade item number (GTIN) on the barcode or vehicle identification number (VIN), the EPC is the key that contains the information used within the EPCglobal Network. An EPC tag does not carry personally identifiable information.

EPCIS (EPC Information Services) is a standard designed to enable EPC-related data sharing within and across enterprises. This data sharing is aimed at enabling participants in the EPCglobal Network to obtain a common view of the disposition of EPC-bearing objects within a business context. This standard is largely adopted by logistics and supply-chain actors to assume traceability of goods using RFID tags.

The EPCglobal Architecture defines and includes a list of EPC-related roles and standards.

- *EPCIS Capturing Application*: Supervises the operation of the lower-level architectural elements and provides business context by coordinating with other sources of information involved in executing a particular business process step.
- *EPCIS Accessing Application*: Responsible for carrying out overall enterprise business processes aided by EPC-related data.
- *EPCIS-enabled Repository*: Records EPCIS-level events and makes them available for query by EPCIS Accessing Applications.

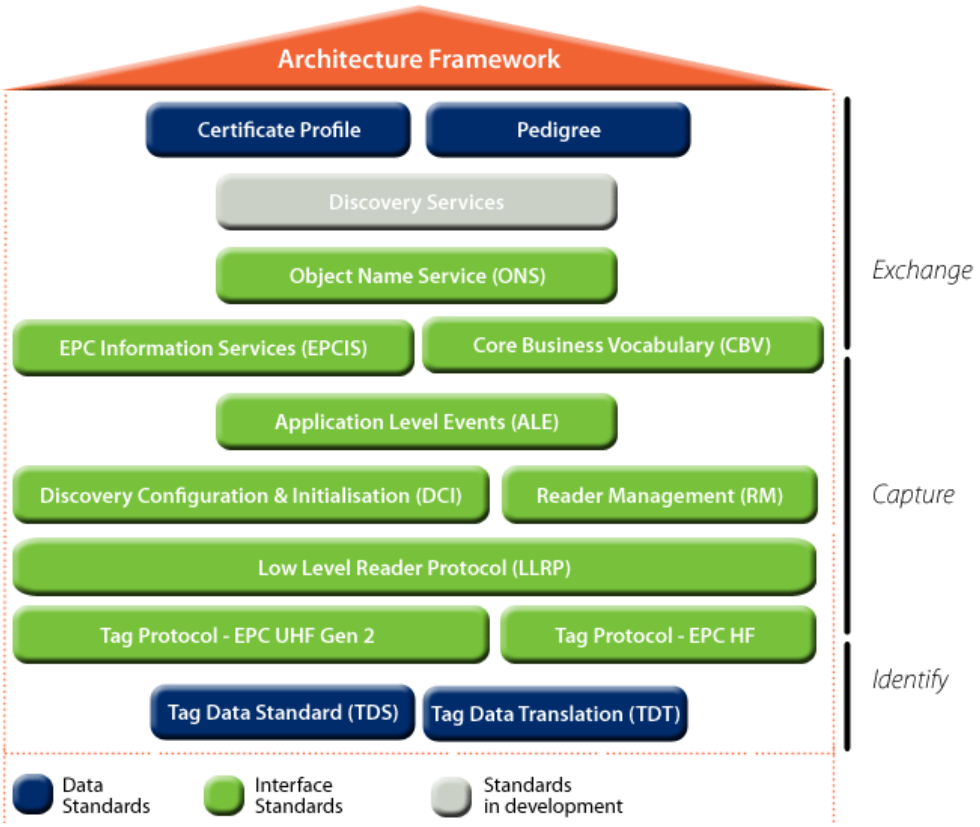

Figure 2: EPC Global standards overview

Instant Mobility relevance: As Instant Mobility is focusing on multimodal services for goods, EPCGlobal is the first ICT standard for goods traceability but it should be associated with other standards especially for geographical and real-time location.

3.4 ETSI

http://www.etsi.org/

ETSI is a key body for both architecture and protocols in telecommunications and will be a reference. As the only European Standards Organisation which covers Future Internet topics, the ETSI structure allows an "early adoption" mechanism, through the creation of an Industry Standardization Group, and it is intended to explore this possibility.

Two main working groups are very relevant for Instant Mobility:

- ETSI Technical Committee (TC) M2M is devoted to machine-to-machine infrastructure architecture and protocols. Release 1 was completed at the end of 2011 but it was not comprehensive enough to allow deployments. Release 2 will contain necessary details and will likely be completed in late 2012 or mid-2013 within a new and larger organisation for M2M which includes many other global SDOs.
- ETSI TC ITS is a Technical Committee which has been defining a Basic Set of Application (BSA), which can be deployed within a three year time frame after its standardization completion. This BSA regroups applications and use cases that can be provided to several customers' profiles in different transportation contexts. These customers' profiles are but not limited to:
    - the vehicle owner;
    - the vehicle driver;
    - the vehicle passengers;
    - road traffic managers.

  Moreover, vehicles are moving in different environments and traffic contexts under various speeds and driving conditions. Taking into account the customers' profiles, the environmental and contextual situations, the BSA comprises:
    - active road safety applications targeted to improve vehicle' occupants safety;
    - traffic efficiency applications targeted to improve the road traffic management;
    - a collection of other applications enabling a cost-effective deployment.

ETSI TR 102 638 V.1.1.1 describes BSA to be specified by Intelligent Transport Systems (ITS) in Release 1 of the ETSI ITS standards set.

ETSI EN 302 665 specifies the reference architecture of communications in ITS supporting a variety of existing and new access technologies and ITS applications.

This standard defines ITS station types (or sub-systems):

- **Central ITS station**: Central ITS-S provides centralized ITS applications. A central ITS station may play the role of traffic operator, road operator, services provider or content provider. Furthermore, central ITS station may require further connection with backend systems via e.g. Internet.
- **Roadside ITS station:** Roadside ITS station provides ITS applications from roadside. A roadside station may provide ITS applications independently or co-operatively with central ITS station or other roadside ITS stations.
- **Vehicle ITS station:** Vehicle ITS station provides ITS applications to drivers and/or passengers. It may require an interface to access in vehicle data from the in vehicle network or in vehicle system e.g. CAN.
- **Personal ITS station:** ITS personal station provides ITS application to personal and nomadic devices.

Each of these ITS sub-systems contains an ITS station, i.e. the functionality described by the ITS station reference architecture.

ITS applications are distributed among multiple ITS stations in order to share information using V2X wireless communications. ETSI developed and defined Cooperative Awareness Message and Decentralized Environmental Message to support V2I and I2V communication (V2X messages).
These two messages can be received by ITS stations and then contribute to Instant Mobility ecosystem.

Cooperative Awareness Message (CAM)

ETSI TS 102 637-2 V1.2.1	Specification of communication protocols, message format, semantics and syntax as well as key interfaces for the co-operative awareness basic service supporting the defined basic set of applications.	Publication (2011-03-24)

The Cooperative Awareness Messages (CAMs) are distributed within the ITS-G5 or another relevant network and provide information of presence, positions as well as basic status of communicating ITS stations to neighbourhood ITS stations that are located within a single hop distance.
All ITS stations shall be able to generate, send and receive CAMs, as long as they participate in V2X networks.
By receiving CAMs, the ITS station is aware of other stations in its neighbourhood area as well as their positions, movement, basic attributes and basic sensor information.

NB: A new revision of TS 102 637-2 is in progress at ETSI which includes:

- First discussion was mainly about vehicle identification. It was decided to refer to ISO 24534-3 (Electronic Registration Identification) and to have CAM elements to be put in concordance with SAE standards.
- Public Transport information is integrated in CAM payload. It will be specified in another document in the future.

Decentralized Environmental Message (DENM)

ETSI TS 102 637-3 V1.1.1	Specification of Communication protocols, Message format, semantics and syntax as well as key interfaces for the Decentralized Environmental Notification basic service supporting the selected Basic Set of Applications.	Publication (2010-09-08)

ITS station will be able to broadcasts useful information that is related to traffic conditions.
Consequently, roadside ITS stations may collect the broadcasted information from vehicle ITS stations, process the information and forward the information to a central ITS station in order to improve the traffic efficiency and traffic management. In this case, the application execution can be achieved through V2V/I2V and/or other communications.
In addition, the ITS station that receives the DENM is able to provide appropriate HMI information to the end user, who makes use of these information or takes actions in its driving and travelling.
The general processing procedure of a use case is as follows:

- Upon detection of an event that corresponds to a RHW use case, the ITS station immediately broadcasts a DENM to other ITS stations located inside a geographical area and which are concerned by the event.
- The transmission of a DENM is repeated with a certain frequency.
- This DENM broadcasting persists as long as the event is present.

NB: A new revision of TS 102 637-3 is in progress at ETSI.

Instant Mobility relevance: ITS standard is one of the most relevant European standards to deal with transport and mobility message-oriented services. It will support Instant Mobility approach to use vehicles

as sensors, as well as collected data from road infrastructure. As another Technical Committee is working on Machine to Machine standard, Instant Mobility partners have to understand how both standards could be complementary.

3.5 GENIVI Alliance

http://www.genivi.org/
GENIVI® is a non-profit industry alliance committed to driving the broad adoption of an In-Vehicle Infotainment (IVI) open-source development platform.
In August 2011, the GENIVI's Compliance Program was announced which defines a required set of features and components that comprise the GENIVI platform. With this program, auto manufacturers and their suppliers now have a clear definition of what GENIVI considers essential to delivering a compliance IVI software platform.
The vehicle and some of its infotainment use cases do not fit comfortably into any of the traditional consumer or IT categories. As a mobile device itself, it must function as a master for communication with portable consumer devices and as a client for connection to the cloud. It must avoid driver distraction through its ease of use; it must have the speed and reliability of an embedded device, but the rich user functionality and ecosystem support of a PC. At the heart of the answer is the middleware. The middleware provides the hardware and software abstraction for the applications whilst providing the services upon which the applications depend.

Instant Mobility relevance: As GENIVI Alliance provides an Open Platform to develop communication set on board, it is one of the promising way to improve connectivity into next vehicle generation.

3.6 IETF

http://www.ietf.org
The mission of the IETF is make the Internet work better by producing high quality, relevant technical documents that influence the way people design, use, and manage the Internet. Many working groups in IETF are of relevance to the Instant Mobility project. IETF is discussing context services, mainly in the SIMPLE and GEOPRIV working groups. The IETF 6lowpan and CoRE working group focuses on including sensor nodes on transport and service level which could be particularly relevant for Instant Mobility scenarios.

Instant Mobility relevance: The main interest here is to cross IETF M2M standards with the European standards.

3.7 ISO

The Working Group 7 (WG7) is working on sensor networks.
This WG is developing standardization in the area of generic solutions for sensor networks and application-oriented sensor networks including standardization of terminology. This terminology includes the development of a taxonomy and standardization of reference architectures. The WG7 proposes also some guidelines for interoperability.

Instant Mobility relevance: The main interest here is to cross ISO M2M standards with the European standards.

3.8 OMA

http://www.openmobilealliance.org
"The mission of the Open Mobile Alliance is to facilitate global user adoption of mobile data services by specifying market driven mobile service enablers that ensure service interoperability across devices, geographies, service providers, operators, and networks while allowing businesses to compete through innovation and differentiation." Generally the OMA specifies application interfaces on the server-side and on the user device end, while re-using as much as possible existing protocols for the communication, which should work over all mobile networks or even be network agnostic.

Instant Mobility relevance: The main interest here is to use OMA standards to implement easily multimodal services into mobile devices and to be able to transform some of them as sensor.

3.9 W3C

http://www.w3.org
W3C defines the standard for an open and interoperable Web. As Instant Mobility scenarios are built on top of Web technologies, W3C activities are of high relevance. It seems that two working groups are relevant for Instant Mobility.

- W3C HTML 5 is to bring the web into maturity as a full-fledged application platform with standard video, sound, images, and animations. The whole specification is still being worked on. Based on the current draft, existing browser (Firefox 3.5, Internet Explorer 8, Safari 4, Chrome 2 and Opera 10) have already implemented parts of the specification and demonstrated many advanced features that in the past used to be provided by external browser extensions
- W3C Geolocation WG is created in response to requests from the community for W3C to develop a standardized, secure and privacy-sensitive interface so that Web applications may gain access to location information. The objective of this Geolocation WG charter is to enable Web access to the user's location information via a standardized interface or interfaces.

Instant Mobility relevance: The main interest here is to potentially use W3C standards to implement new HMI to provide user-friendly interfaces for multimodal services and to follow W3C work regarding geolocation using Internet capabilities.

4. Regulation recommendations

Regulation recommendations will be described in the second version of this document based on acceptability surveys analysis, data business cases and how cities involved as partners of Instant Mobility expect to deploy some services for their citizen and results of Security and Privacy analysis.

4.1 Acceptability surveys results

To be developed in the second version.

4.2 Data business cases results

To be developed in the second version.

4.3 Security and Privacy results

To be developed in the second version.

5. Conclusion

In conclusion of this first version, Instant Mobility is following some standards to use some subset functionalities with some major issues:

- Improvement of geographical location services
- Implementation of message-oriented multimodal services (ITS)
- Deployment of devices-as-sensors and vehicles-as-sensors services
- Deployment of secured and certified services.