European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

TC 278 *Road Transport and Traffic Telematics* N1937

Title : Proposals from TC 278 in response to the EC ICT Action Programme 2007

Source : Secretariat

Date : 2007-06-06

Status : For information

Note : As agreed at our 38th plenary meeting the TC secretariat has compiled and forwarded to CEN/CMC proposals received in response to the ITS paragraph of the 2007 ICT Standardisation Work Programme of the European Commission (see document N1891).

The first proposal relates to standardisation of the ADAS interface specification to enable the integration of new safety attributes into digital maps.

The second proposal relates to further standardisation of EFC in relation to electronic tolling systems in the community ad to the European electronic toll service in accordance to Directive 2004/52/EC, as required by Mandate M/338.

A third proposal in the area of eCall is under preparation in CEN/TC 278/WG 15, which is explicitly referenced in the 2007 Standardisation Work Programme. However, some steps in agreeing the MSD will not be finalised until later in May 2007. Therefore now is too early for a well-contrived proposal to be submitted. WG 15 has confirmed that it will certainly submit its proposal on further standardisation of the eCall service in response to an anticipated second call under the 2007 Standardisation Work Programme.

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Guidelines for the Technical Proposal

2007 ICT Standardization Work Programme

Application Form

Title: Analysis of the Standardisation Requirements Resulting from Research Activities in the Field of ADAS Interface Specification
Organisation : CEN

Part I – Policy relevance and expected market impact

1. Objective

The development of Advanced Driver Assistance Systems (ADAS), and, more generally, in-vehicle ITS applications which support drivers of all types of vehicles in driving safely, comfortably and economically, are of major importance to the automotive industry and to society. ADAS products on the market today, such as Adaptive Cruise Control, perform their functions using information generated by optical sensors. Map-supported ADAS applications will use map data as a primary or supplemental sensor to provide enhanced support to the driver in situations where optical sensors are of limited use. Examples of such applications include predictable adjustable lighting, curve warning, dynamic pass prediction, fuel efficiency improvement or brake cooling for trucks, among others.

The objective of this Proposal is to address the standardised delivery of map data to various in-vehicle advanced driver assistance systems. The ADAS Interface Specification Forum, along with several EC-funded (NextMap; Maps&ADAS; FeedMAP) and EC member country-funded projects (SOLVI), have developed methods to provide for the standardised delivery of map data to ADAS applications. The method is described in the following diagram.

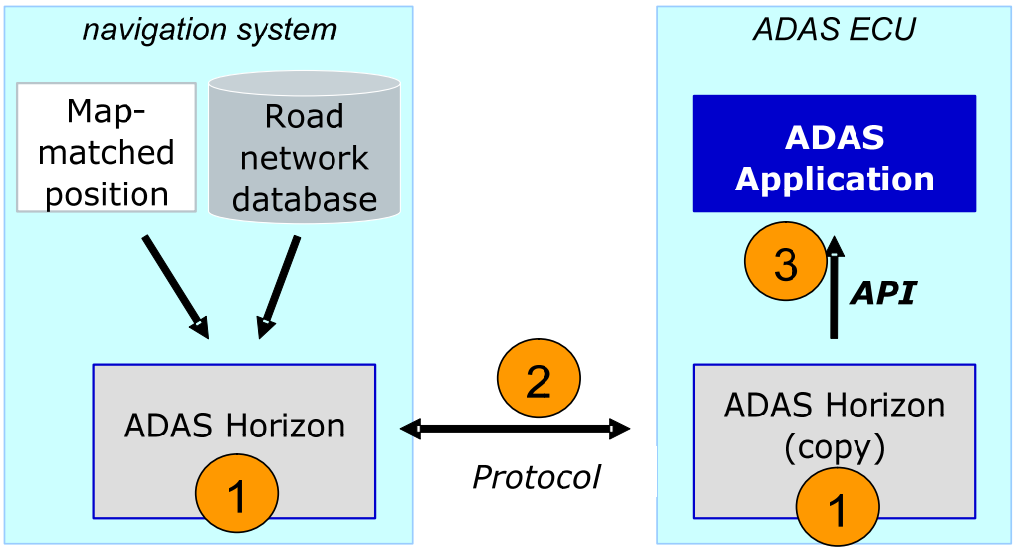

Figure 1: ADASIS Standards Components

The basic principle is to deliver road network data and associated attributes in the vicinity and along the path of a moving vehicle, along with a map-matched position, to a repository of data. This repository is referred to as the ADAS Horizon (1). From this repository, the data is moved to the ADAS applications in the most efficient manner for the application, either directly or over a vehicle bus (e.g. CAN or FlexRay) (2). On the application side, a copy of the ADAS Horizon is delivered to the ADAS Application via an application programming interface (API) (3).

The work performed under this proposal includes the following:

1. Analyze whether the data model and data dictionary for the ADAS Horizon is sufficient for standardisation or whether modifications are required and/or additional features or attributes must be added;

2. Determine which parts (if any) of the Protocol can be standardised and which parts must be left for adaptation on the individual vehicle platforms;

3. Determine which parts (if any) of the API can be standardised and which parts must be left for adaptation for the individual ADAS Applications.

4. Develop and adopt a CEN Technical Specification in CEN/TC 278 *Road Transport and Traffic Telematics*.

The following deliverables will be submitted:

- Interim Report on tasks 1, 2 and 3. This will be submitted six (6) months after start of work.

- Final Report on tasks 1, 2 and 3. This will be submitted twelve (12) months after start of work.

- CEN Technical Specification *Road transport and traffic telematics - ADAS interface specification for map data* (preliminary title). This will be submitted eighteen (18) months after start of work.

2. Rationale

The use of map data for in-vehicle applications is not new. Navigation systems have been installed in vehicles for more than fifteen years. One of the recognised difficulties with navigation systems is that map data compiled for one navigation system is not interoperable with any other navigation system from a different system manufacturer, or many times, across different system generations from the same manufacturer. An automotive industry initiative has been ongoing for the past ten years to attempt to eliminate this problem, but there is still no result from these efforts. Once a de facto method of working has been developed, as was the case with the navigation system business, it is extremely difficult to develop a standard.

For the execution of the standardisation work proposed in this document, CEN/TC 278 will work closely together with the ADASIS Forum. The ADASIS Forum was established in May 2001 by a group of automobile, in-vehicle system developer and map data companies with the primary goal of developing a standardised map data interface between stored map data and ADAS applications, and thereby avoiding the interoperability problem experienced with navigation systems. The idea promoted by the ADASIS Forum was that map data used for an on-board navigation system, or map data stored specifically for a collection of ADAS functions, could be extracted to an intermediate collection point, referred to as the Electronic Horizon Provider, and from this point the map data could be delivered to any set of ADAS applications. It was proposed that navigation system developers should deliver their data to the Electronic Horizon Provider, irrespective of how the data is selected, in a standard and open format that can be used by any ADAS applications. In this way, the selection of a navigation system supplier or map data provider would be separated from the selection of ADAS application providers.

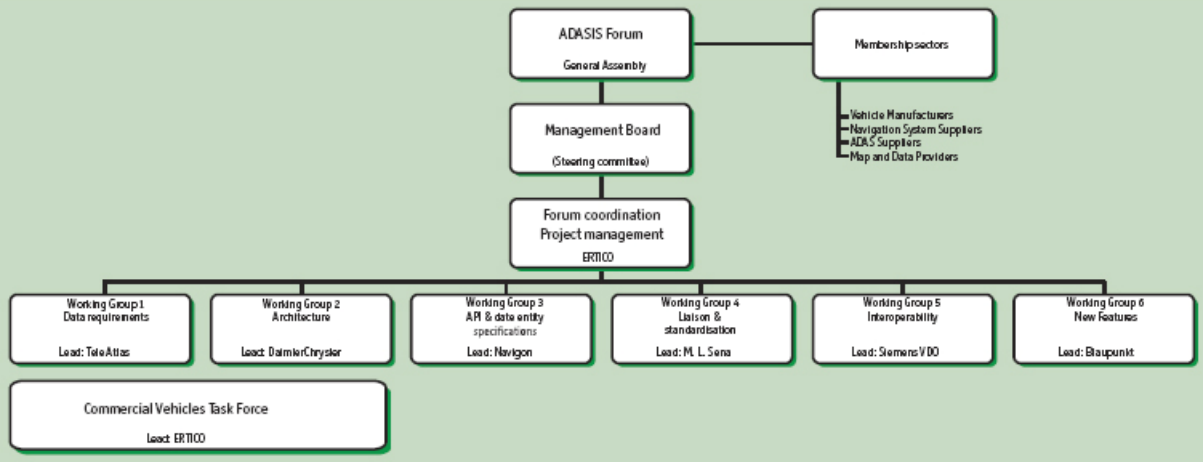

Figure 2: ADASIS Forum Organisation – December 2006

Following a period of one year, when preliminary requirements were established and a basic working approach agreed, the ADASIS Forum was brought to ERTICO in June 2002 for project management. Four Working Groups were established, each led by an industry expert. Working Groups 1, 2 and 3 prepared specifications and requirements. These were completed in late 2003 and turned over to the Maps&ADAS Project, which began work in February 2004. The objectives of Maps&ADAS were to develop, test and validate the following:

- An applicable standard for gathering, certifying, maintaining and providing safety content enhanced digital map databases to be used in ADAS and Navigation Applications

- An applicable standard for an interface between ADAS and the in-vehicle map data sources (not necessarily navigation systems) for accessing map data around the vehicle position

Maps&ADAS was completed in January 2007, with significant progress made on testing map-based ADAS applications. The final steps of validating the extent of standardisation required, and preparing the documents for standardisation, were not completed. It is these steps that this proposal addresses.

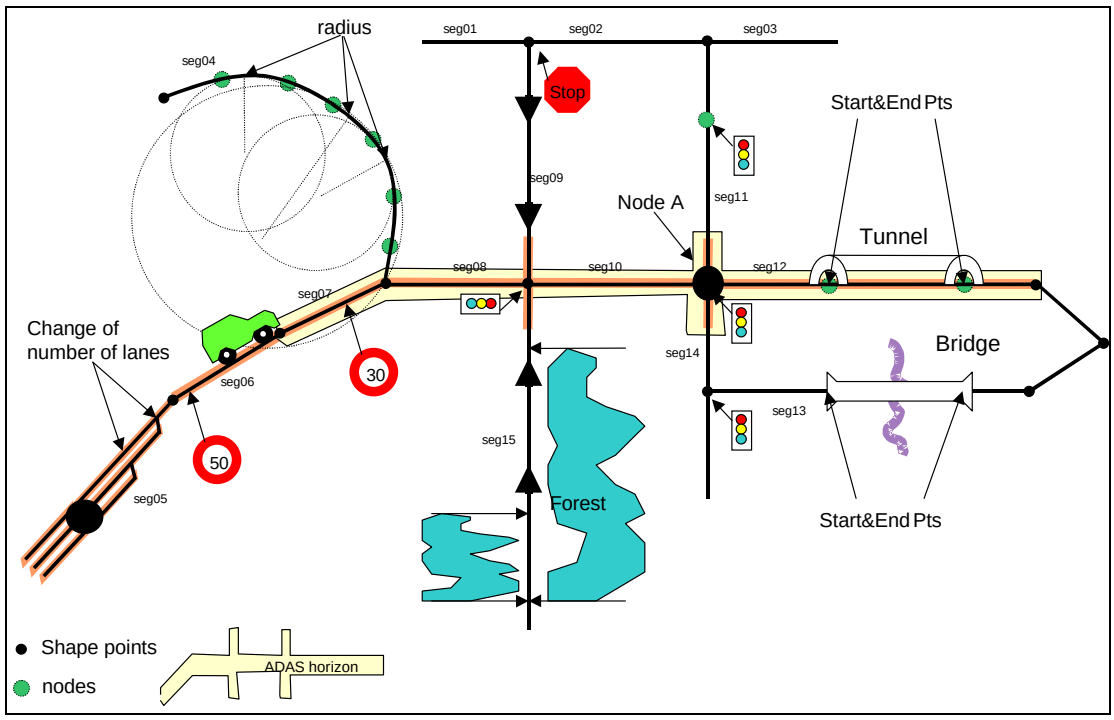

Figure 3: Sample of an ADAS Horizon

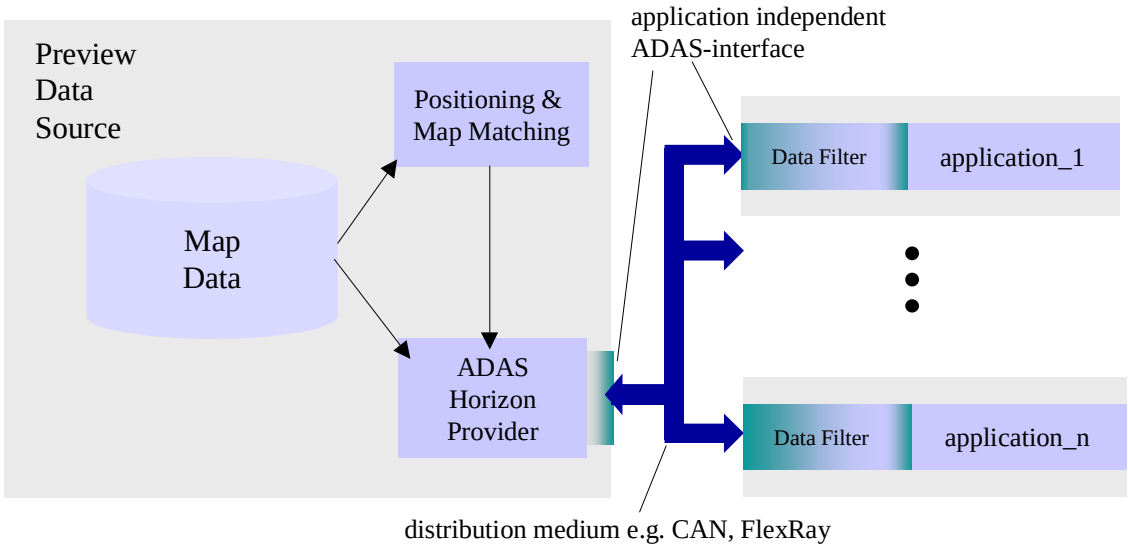

Figure 4: Data Flow from Map Data Source to ADAS Applications

3. Policy relevance and market impact

This work supports the 2007 ICT Standardisation Action Plan of the European Commission. On page 13 of the Plan, it states:

> *"The ESOs are invited to further continue the ongoing standardisation activities on eCall and to address future standardisation needs arisen from the i2010 Intelligent Car initiative, including the research in ICT for Mobility.*
>
> *This includes the following issues:*

…

- to analyse the standardisation needs resulting from research activities in the field of digital maps, taking into account activities of ISO TC 204 working groups, and in particular regarding:

- the extension of of the existing map data exchange standard GDF to integrate new safety attributes into digital maps

- standardisation of the ADAS interface specifications

This work will support the ongoing standardisation activities for Geographic Data Files (GDF) based on EN ISO 14825, a joint effort by CEN/TC 278 and ISO/TC 204. The work will provide input on requirements for additional features and attributes to be defined within the GDF data model.

4. Market impact

The ADASIS Forum had thirty members as of its last plenary meeting in December 2006. These members are committed to the successful realisation of a standard ADAS Interface Specification. They have devoted a significant amount of time and resources over the more than seven years since the Forum was founded to develop the specification and to test it in their own applications. Many of these companies have also contributed their work in-kind to participate in projects that have further developed and verified the specification.

There is not a single automotive company manufacturing cars in Europe today that is not either a member of the ADASIS Forum or is represented by its parent or an affiliated company. It is fully expected that the entire automotive industry will adopt and implement an ADAS Interface Specification standard when it is finalised. Some ADASIS Forum members have already begun to implement portions of the specification, and their experience is providing important feedback to further the overall standardisation initiative.

Given the efforts expended thus far by the automotive industry in the preparation of the ADAS Interface Specification, it is difficult to imagine that they would allow a situation to arise which permitted proprietary map data formats to be used in their ADAS applications. Nevertheless, unless there is a strong support from the standards community, it is possible that a de facto approach which is not standardised will evolve, and another opportunity to reduce costs and improve performance through standardisation will be lost.

Part II- Execution of the work

5. Working method/approach

This work will be carried out within the existing structures of CEN/TC 278 (WG 7 Geographic Data Files[1]) and the ADASIS Forum (Work Package 4, Industry Liaison and Standardisation) under the formal liaison between CEN and ERTICO. Members of the ADASIS Forum will participate in each of the identified tasks. For this project,

[1] Preliminary allocation. A special working group may be established.

the ADASIS Forum will be open to experts from CEN/TC 278 in accordance with the CEN rules.

The project will start with a kick-off meeting with all of the ADASIS Forum Working Group leaders and the ADASIS Forum Management Board. At this meeting, the project plan and deliverables will be agreed. Monthly project meetings will be conducted at ERTICO in Brussels or at one of the project team member's premises. Prior to submission of the Interim and Final reports, the draft documents will be circulated to all ADASIS Forum members and to the relevant working groups of CEN/TC 278 for review and comment. The actual CEN/TS will be developed and adopted in CEN/TC 278 in accordance with the CEN rules.

The work will be co-ordinated with that of ISO/TC 204 (WG 3 Geographic Data) under the established relationship between CEN/TC 278 and ISO/TC 204.

6. Performance indicators

The key performance indicator for this work is the timely finalisation and adoption of the CEN Technical Specification. Furthermore, the CEN system has inherent performance indicators such as, for example, the minimum number of members to support the work.

We will have two performance evaluation checks, performed with the standards body, one following the completion of the interim report, and one following the completion of the final report.

7. Work plan, milestones and deliverables

	Task	Start	Finish	Year	2007	2007	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2009	2009	2009	2009	2009
				Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Nov	Dec	Jan	Feb	Mar	Apr	May
				From start	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Establishment of Project Team	2007-11	2007-11																			
2	Kick off meeting	2007-12	2007-12	1																		
3	Preparation of interim report	2007-10	2008-04	6																		
4	Interim report	2008-04	2008-04																			
5	Preparation of final report	2008-04	2008-11																			
6	Final report	2008-11	2008-1																			
7	Preparation of CEN/TS	2008-11	2009-04																			
9	Adoption of CEN/TS	2009-05	2009-05																			

8. Financial details

	# of units	Unit rate in €	Total costs in €
Costs of staff/experts or equivalent			
- Administrative support (NEN)	30	457,00	14.250,00
- Project management (NEN)	30	663,00	19.890,00
- Experts (100% subvention)	300	650,00	195.000,00
Travel costs			
- Project manager	1	500,00	500,00
- Experts	30	500,00	15.000,00

2007 ICT Standardization Work Programme

Application Form

Title: Interoperable Electronic Fee Collection for Europe.
Organisation : CEN

Part I – Policy relevance and expected market impact

1. Objective

The following is a proposal comprising standardisation and research items in the field of Electronic Fee Collection (EFC). The objective is to establish a coherent set of standards that lays the foundation for interoperable EFC systems throughout Europe.

Situation

Road User Charging (RUC) systems using EFC are installed and in use all over Europe. RUC are used for financing investments, congestion pricing and for providing a fair pricing for the use of roads (i.e. internalising the externalising costs related to accidents, noise and pollutions etc). EFC is used at bridges, motorways, urban areas and ferries. EFC is also used in HGVs for levying taxes on the road network in some countries. EFC includes a wide range of different technologies, such as dedicated short range communication (DSRC), global navigation satellite systems (GNSS, such as Galileo), Cellular Network (CN e.g. GPRS and 3G), automatic video recognition, tachographs.

There are standards providing support for parts of these systems and interfaces. For instance the DSRC-suite, EN 14906 on "EFC-DSRC application interface" and EN 15509 on "interoperable application profile for DSRC" provide the basis for interoperability in DSRC-based EFC. However there are more standards needed to cover for all aspects of fully functioning interoperable EFC. This situation is addressed in this proposal.

The main objective is to foster interoperability between EFC-systems. The (European) EFC-suppliers will also benefit and have a much stronger position on the world market if supported by European standards for the implementation of EFC-services worldwide. Furthermore these standards address the needs being brought forward by the development by the European Electronic Toll Service (EETS), called for by the "European EFC interoperability Directive" (2004/52/EC).

Results

The results of this programme will contribute to:

- the development of the European Electronic Toll Service
- making it easier for operators for purchase and specify equipment; reduced cost, risks and time for implementation
- simplicity in terms of use of the services
- market situation for European EFC suppliers and service provider
- widespread introduction of RUC in Europe.

Deliverables

The following deliverables will be submitted to the full work programme:

Standards (EN or TS):

- Information flows between Operators of Electronic Fee Collection (EFC) Systems
- Interoperable Application Profile (IAP) supporting GNSS/CN OBE-localisation augmentation using DSRC
- Conformity evaluation of Interoperable Application Profile (IAP) supporting GNSS/CN OBE-localisation augmentation using DSRC
- Interoperable Monitoring Application Profile for Enforcement using DSRC at 5,8 GHz
- Conformity evaluation of Interoperable Monitoring Application Profile for Enforcement using DSRC at 5,8 GHz
- Conformance evaluation of OBE and CE for EFC based on GNSS/CN
- Interoperable Application Profile (IAP) for GNSS/CN based EFC systems

Technical Reports:

- Requirements for personalisation of first mount OBU
- Urban Road Using Charging requirements
- Requirements for a universal Pre-Payment System for EFC
- Value Added Services based on GNSS/CN compatible EFC OBE

2. Rationale

Interoperability between Electronic Fee Collection (EFC) systems in Europe is one of the most important objectives for standardisation work in the EFC domain. In addition, the need for an interoperable European road user charging service based on EFC standards is called for by the adopted Directive (2004/52/EC) on the interoperability of electronic road toll systems. A mandate, M/338, on how standardisation could support these efforts was initiated. The final report "M/338 Mandate on EFC – Final report of the CEN Editor" indeed highlights the importance of a set of standards in its final recommendations (section 14.11, S.2.1-2).

The lack of interoperability would lead to a situation where drivers travelling through different areas with road user charging would need to install several on-board equipments in their vehicles; impeding the free circulation of goods, services and people in Europe. Typically the on-board equipment and the off-board equipment are not supplied by the same manufacturer. Therefore the interface between these two types of equipment has to be agreed upon in an interface specification.

Other interfaces and areas where standards could support the interoperable EFC are highlighted in the m/338 report as well as in the EFC architecture work. This includes not only interfaces between equipment, but also; information flows between operators, conformance evaluation and test standards, personalisation of OBE, performance requirements and enforcement/monitoring support.

The responsibility for standardising the European EFC application has been assigned to CEN/TC 278 "Road transport and traffic telematics". Most standards in EFC are developed as joint work items together with ISO/TC 204, under CEN lead. In addition ETSI provides certain technical standards on testing that are vital for the EFC-area.

The work proposed here builds on the work from other European EFC projects, such as CESARE-3, CARDME, PISTA, m/338 and RCI.

CEN/TC278 (WG1) has already produced a series of EFC standards that forms the foundation for the work being proposed here. This includes:

- ENV ISO 14904 Interface specification for clearing between operators
- EN ISO 14906 EFC application interface definition for DSRC
- ENV ISO 14907-1 EFC Test procedures user and fixed equipment - Part 1: Description of test procedures
- CEN ISO/TS 14907-2 EFC Test Procedures user and fixed equipment - Part 2: Conformance test specification for onboard units
- EN 15509 Interoperable application Profile for DSRC
- CEN ISO/TS 17573 EFC System architecture for vehicle related transport services
- CEN ISO/TS 17574 EFC security services framework – guidelines for EFC security protection profiles

Ongoing work in WG1:

- prCEN ISO/TS 17575 Application Interface Definition for CN/GNSS based EFC
- Conformity evaluation of on-board and roadside equipment to EN 15509
    - Part 1: Test suite structure and test purposes
    - Part 2: Abstract test suite
- Revision of CEN ISO/TS 17573:2002 EFC System architecture for vehicle related transport services
- Information flows between Operators of EFC Systems (PNWI, EN)
- prCEN ISO/TS 25110 Interface definition for on-board account using ICC (joint CEN ISO WI under ISO lead)

Grant applications have been evaluated favourably by EC DG ENTER for the first two items in the list above, and the associated contracts are being prepared.

3. Policy relevance and market impact

The suite of standards in this programme directly addresses the requirements for the implementation of the interoperability Directive 2004/52/EC. It is therefore an essential part of the policy embodied in the Directive, namely that EFC should become interoperable throughout Europe, based on the development and implementation of the European Electronic Toll Service (EETS). See the ICT work programme 2007, section 8.1 (page 8).

Furthermore the ICT work programme 2007, Part II, section Intelligent Transport, explicitly mentions (page 14):

- "to execute further work in relation to electronic tolling systems in the Community and to the European electronic toll service in accordance to Directive 2004/52/EC, as required by Mandate M/338."

The target group for EFC standards are the organisation being involved in implementing EFC systems, namely; manufacturers, service operators, toll charges, authorities.

The beneficiaries of interoperable EFC are a wide group of actors including:

- Users/travellers – easier use of EFC, less expensive equipment
- Transport organisations –a more seamless Europe, less expensive equipment
- Service operators – new business opportunities
- Manufacturers – better market opportunities, stronger market position
- Toll charges and operators – easier procurement, lower costs
- Authorities – possibility to implement a wider range of RUC-measures.

4. Market impact

Industry has been directly involved in the development to date of WG1 standards and has participated in Expert Groups set up by the Commission to investigate aspects of moving towards EFC interoperability as envisaged in the Directive and the proposed EETS.

Once the EETS becomes available, it is expected that there will be a significant market for interoperable EFC systems and for on-board vehicle equipment capable of providing the EETS to users.

In addition, quite apart from the provision of interoperability for EFC users, the availability of standards EFC will enable the market to grow more quickly, and will remove one of the major technical obstacles to the widespread introduction of road

user charging systems. This might also considerably strengthen the position on European technology and standards worldwide.

The main European industrial companies involved in the development of EFC systems have participated in the work to date on the requirements for standardising EFC based on both DSRC and GNSS/CN. If an agreed standard can be reached within a reasonable timescale, not only will this provide the necessary technical environment for the implementation of the EETS, but it will also ease the path for national or regional authorities to introduce road user charging systems that are able to take advantage of the additional flexibility offered by using several technologies.

Part II- Execution of the work

5. Working method/approach

The objective of the work is to provide a coherent set of standards supporting the emergence of interoperable EFC in Europe. The work is built upon standards already published as well as the ongoing work.

Activities may differ between each work item being proposed. The work consists of the following activities:

- Research activities to explore certain areas if interest, resulting in a Technical Report or in Interim Report for each area.
- Studying the requirements in the EETS-work as well as the m/338 report
- Analysis of the possible adaptation of work being done in the Expert Groups for the EETS.
- Preparation of new work item proposals for CEN/TC 278 for items of interest.
- Search for the involvement of external stakeholder in the process (new actors). Seek guidance and acceptance for proposed concepts.
- Liaison with the EU-Commission and its bodies, working with the EETS, e.g. the Committee Télépéage and any related sub-committees
- Liaisons with other ongoing activities in the field.
- Liaisons with ETSI on the preparation of technical test standards relating to EFC.
- Preparation of draft standards.
- Handling of comments and preparation of final draft standards for voting in the CEN.
- Dissemination of results in the EFC sector.

The following work items (intended at standards) are proposed:

- Information flows between service providers and operators
- Revision and Update of EN ISO 14906 reflecting experience, accommodate the relatively recently adopted new vehicle Euro class definitions (i.e. Euro 4 and Euro 5) and more
- Interoperable profile (IAP) supporting OBU-localisation and augmentation using DSRC
- test standards for the localisation support transaction
- Interoperable profile for Monitoring of enforcement transactions using DSRC
- test standards for this monitoring transaction
- Profiles for GNSS/CN applications (based on prCEN ISO/TS 17575)
- Conformance testing of prCEN ISO/TS 17575 requirements

The following research related work is proposed (to be technical reports):

- Installation, personalisation and mounting of OBU
- Urban Road Using Charging requirements in view of an emerging new segment with specific requirements (see e.g. London, Stockholm and Milan)

- Pre-paid requirements
- EFC related value added services
- Performance and accuracy requirements
- Test suite for performance requirements.

All items of work listed above cannot be done at the same time and will be subject to prioritisation of the work. This has to be detailed at a later stage, together with the involved parties.

6. Performance indicators

The coordination and cooperation with major stakeholders in the implementation of the European interoperability directive is fundamental for a successful execution of this work. In particular, it will be essential to cooperate with the EC's Committee Télépéage, its various expert groups, the CESARE III/IV project and the RCI project.

Dissemination and consultation with the stakeholders:

- Presentation of the drafts at EC's EFC Committee Télépéage meetings. A liaison will be established with key stakeholders (including Member States, EC's EFC Expert Group, ASECAP, Stockholm Group and with EC's RCI project);
- Dissemination of advanced draft to stakeholders, via EC's EFC Expert Group, for information;
- Review and incorporation of the forthcoming final TC comments, i.e. the regular formal CEN and ISO dissemination and consultation procedure. This review process should provide a suitable performance indicator methodology.
- Liaison with ETSI on test standards and related matters.

Through the CEN rules, the members of CEN/TC 278 are committed to involve all stakeholders, including Member States, in the formal review and approval of the draft deliverables.

The resulting standards will eventually be disseminated through the CEN member bodies, through established channels.

7. Work plan, milestones and deliverables

Deliverables are:

<u>Standards (EN or TS):</u>

- Information flows between Operators of Electronic Fee Collection (EFC) Systems
- Interoperable Application Profile (IAP) supporting GNSS/CN OBE-localisation augmentation using DSRC
- Conformity evaluation of Interoperable Application Profile (IAP) supporting GNSS/CN OBE-localisation augmentation using DSRC

- Interoperable Monitoring Application Profile for Enforcement using DSRC at 5,8 GHz
- Conformity evaluation of Interoperable Monitoring Application Profile for Enforcement using DSRC at 5,8 GHz
- Conformance evaluation of OBE and CE for EFC based on GNSS/CN
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Technical Reports:

- Requirements for personalisation of first mount OBU
- Urban Road Using Charging requirements
- Requirements for a universal Pre-Payment System for EFC
- Value Added Services based on GNSS/CN compatible EFC OBE

Work plan tasks

The work plan for the EFC standards programme should include the following tasks:

- Agree on priority for activities in the programme
- Establish of project teams
- Start up of Research activities
- Analysis of needs, requirements input from other projects
- First draft of EN, TS or TR
- Interim reports to EC
- Review and incorporation of TC and other comments into documents
- Produce Final draft EN, TS or TR
- Submission of final reports to EC
- Dissemination of the outcome of Grants

Concrete milestones, work plan, time schedules, etc are do be added after priority has been agreed with involved stakeholders.

8. Detailed descriptions of items for work

8.1 Information flows between Operators of Electronic Fee Collection (EFC) Systems

Objective
The objective of this standard is to provide tools for back-office information exchange between EFC Operators (Issuers, Toll Operators, Service providers) in an interoperable environment.

Scope:

- EFC systems for vehicle related transport services, e.g. road user charging, parking and access control.
- Procedures for exchange of information between EFC systems. The data exchange between the User and the EFC system, i.e. the interface between the On-Board Unit (OBU) and Roadside Equipment (RSE) is outside the scope of the standard.
- Classes and types of messages.
- Data format and content, e.g. security lists, transaction lists, security key management, data clearing messages and exception handling data, e.g. digital pictures of possibly violating vehicles.
- Data transfer.

Relevance
The ongoing work on EETS makes this a highly relevant area for standardisation. The interface being covered is absolutely essential for practical implementation of interoperable cross border EFC.

Relations to other tasks
The task is highly related to the ongoing revision of the 17573 EFC Architecture standard. When relevant it builds on tools from standards such as EN 14906 and prCEN ISO/TS 17575.

The work builds on experiences from real implementations and projects such as; CESARE-3, MEDIA, Norits as well as national implementations.

Deliverable type
EN

8.2 Interoperable Application Profile (IAP) supporting GNSS/CN OBE-localisation augmentation using DSRC

Objectives
ISO prTS 17575 provides the basic technical specification for the air interface between a GNSS/CN-based OBE and a Central Entity (CE). The anticipated process inside the OBE is assumed to provide adequate information about the location of the

OBE in order to operate according to the EFC context specific rules provided in the data modules. However in certain scenarios the OBE may not be able to provide localisation information in the required accuracy or continuity using GNSS alone. This may happen if the standard GNSS accuracy is not sufficient or in urban canyons where some satellites may be shadowed.

The objective of this technical specification is to provide a solution for this problem defining an application interface using short range communication means between the OBE and a RSE. The used communication media should be the DSRC link being used for tolling in DSRC tolling systems according to EN15509, EN 14906 and the underlying DSRC-standards.

Scope

- Provisioning of location and heading information
- Security means to protect manipulating the OBE with fake RSE
- Provisioning of geo data which may be required at focal points.
- Provisioning of temporarily modified geo data for upcoming charge objects, which may temporarily overwrite the context data (e.g. road construction).
- Handover of the charge report balance.

The main focus of the work should be to define requirements and basic concepts to define solutions for the above mentioned applications. Special attention shall be taken allowing different applications of this communication channel enabling different focus in case different EFC domains require different features. However, interoperability among EFC domains applying different options should still be provided for.

The technical proposal does not take into account other technologies and non-technical elements for OBU localisation.

Relevance

The result occurring through the work on the technical proposal will implicit a clear situation for equipment suppliers, Service Providers and Toll Chargers and will contribute to the implementation of the EETS. The main relevance for standardising the DSRC localisation augmentation applications for GNSS/CN EFC systems is that this is mandatory to achieve interoperability.

Relations to other tasks

The main technical specification for GNSS/CN EFC contexts are the ISO TS 17575 applied in an organisational environment defined according to EN 17573. However to achieve interoperability in EFC domains where localisation augmentation beacons are used and OBE may roam from any other EFC domains it is of utmost importance to standardise this beacon transaction. The IAP being defined builds on EN15509, EN 14906 and the underlying DSRC-standards.

Deliverable type

There will be two deliverables:

- An IAP-standard for localisation (defining requirements): EN.
- A conformance evaluation standard accompanying the IAP: EN.

8.3 Interoperable Monitoring Application Profile for Enforcement using DSRC

Objective

The objective of this work item is to define the exchange of information over the DSRC link between an OBU and a RSE in an Enforcement station (fixed or mobile), in order to support the enforcement procedures in an interoperable GNSS based road charging environment such as the coming European EETS service according to the EU Directive 2004/52/EC. The Monitoring Application and transaction will e.g. allow drawing conclusions about a correct functioning of the OBE in the GNSS context, the correctness of the data declaration by the user, etc.

Scope

The work item will define requirements regarding the application data, the application services and the security functions that all may be used to build a monitoring DSRC transaction for enforcement. The requirements will be defined in the format of an Application Profile standard. The Standard will not provide a full solution for enforcement, and it will not define enforcement processes or other parts of the EFC-system.

The second part of the work item is to define a complete test suite according to the requirements in the proposed Interoperable Monitoring Application profile. The test suite will further be broken down into test cases, described in text and in an executable formal test script notation such as TTCN. Validation of the test suite is also included in the work.

Relevance

The enforcement process for Electronic fee collection systems is regarded as a local or national item, but nevertheless in an interoperable environment the OBU must offer a Monitoring Application, which serves as a common technical platform for enforcement, and supports the local enforcement procedures. This harmonisation will enable the possibility to build enforcement stations capable to read enforcement data from any OBU regardless which provider has issued the OBU. A prerequisite for this harmonisation is that the local enforcement requirements are harmonised so that a common minimum denominator can be defined.

Relations to other task

The basis for the monitoring application will be the DSRC communication stack as it is defined in DSRC standards such as EN 12253, EN 12795, EN 12834, EN 13372, and the CEN EFC-IAP standard EN 15509.

Application data and application services will be defined according to the definitions in the existing EFC application Interface standard for DSRC, EN ISO 14906, and the constraints defined in the upcoming application interface standard for GNSS based EFC, prCEN ISO/TS 17575. Whenever possible the same application data and functionality as defined in EN 15509 will be used.

Deliverable type
There will be two deliverables:

1. An Application Profile standard with the requirements divided into one section for the RSE and one section for the OBU. This standard will further contain a normative PICS (protocol implementation statement), to support the test standard, and possibly also informative transaction examples. Type: EN.
2. The deliverable will be a profile test standard divided in a first part that covers the Test Suite Structure and the Test Purposes and a second part is the Abstract Test Suite that defines the test cases in the formal test script notation. Type: EN.

8.4 Conformance evaluation of OBE and CE for EFC based on GNSS/CN

Objectives
A set of draft standards, CEN ISO/TS 17575-1 to 4, are being produced which will define the exchange of data between on-board equipment (OBE) and central equipment (CE) in order to support electronic fee collection based on GNSS/CN technologies. The objective of this work item is to define tests for conformity of OBE and CE to these standards.

Scope
The scope of the proposed test specifications corresponds to the scope of the 17575 specifications. The current draft of prCEN ISO/TS 17575 is being re-written as four separate but linked documents, according to the 'Roadmap' document (WG1 N911).
The four parts of the revised CEN ISO/TS 17575 are as follows:

- Part 1: Charging
- Part 2: On-line updating of toll data and software
- Part 3: Roaming
- Part 4: Communication: transactions and connections to lower layers

Tests will be defined to enable the evaluation of the conformity of both OBE and CE to the four separate parts of CEN ISO/TS 17575.
The tests will include requirements identified by Expert Group 9 which proposed three separate positional accuracy requirements to be input to the certification process for EETS OBE. The three requirements are the recognition of geo-objects, absolute positioning error based on a test set of road conditions, and distance measurement.

Relevance
Testing of equipment provides a necessary step toward real life implementation of standardised requirements. The final report on the M338 Mandate on EFC includes a specific recommendation (R.12) for the definition of a set of test procedures which will allow the certification of OBE suitable for the EETS. This proposal will provide such a definition.

Relations to other tasks
This task is closely related to the completion of the four parts of the 17575 standard as set out in the Roadmap document for CEN ISO/TS 17575. This work is the subject of a proposed new Project Team.

Deliverable type
The deliverable will be a TS.

8.5 Interoperable Application Profile (IAP) for GNSS/CN based EFC systems

Objective
The draft CEN ISO/TS 17575 is an enabling standard providing a large variety of optional implementations of GNSS/CN based EFC systems. It is anticipated that in a realistic application none of the systems will implement all optional features rather a subset of options optimising each single system to local requirements.
However if in larger EFC arrangements involving more than one EFC domain like EETS roaming among those domains shall be possible using a single OBE then it is required to limit options to a well defined set in order to keep the complexity of the OBE manageable. With that some of the options become mandatory and others are not allowed.
Typically this will be defined in profiles. Profiles are anticipating one or more generic sets of requirements and define how to use each of the optional features of the base standards. The number of different profiles shall be low enough to keep the overall complexity at a manageable level however each of the EFC domains shall find within the set of defined profiles at least one covering the own requirements. With that it becomes manageable to agree in large EFC systems on one or more of the defined profiles. Then each of the EFC domains must be compatible at least with one of these agreed system profiles while the OBE must be compatible to all existing domain profiles to maintain interoperability among those.
The objective of the proposed work item is to provide a set of GNSS/CN based EFC profiles covering at least the needs of the European Electronic Toll Service.

Scope
The profiles defining the use of optional elements of the CEN ISO/TS 17575 will cover the organisational role allocation defined in prEN ISO 17573 and other European projects like CESARE III.
A generic matrix of role allocations to abstract actors will be assumed and with that all communication interfaces between the OBE and different physical or organisational separated entities are identified. The set of profiles will provide these interface specification referencing base standards and/or optional elements of those.
The scope of the GNSS/CN profiles will cover the localisation augmentation beacons as well as the enforcement data exchange if appropriate enabling standards are defined in other working groups.

Relevance
The current discussion in Europe on how to implement an interoperable EFC system including all the different member states with all the different "flavours" why and how to use EFC for fee or tax collections as well as to use it for traffic management using

well optimised tariff constructions show that limits in the scope of EETS must be agreed on. Profiles in beacon based EFC systems like EN 15509 have demonstrated that this allows a clear overall definition of this technology. The same objective is relevant for profiles to clearly define how to use GNSS/CN based EFC standards when implementing EETS.

Relations to other tasks
The main standard relevant for the GNSS/CN profiles is the CEN ISO/TS 17575. However beside links within the base standards there will be some links to the architecture frame work defined in prEN ISO 17573 as well as to standards defining the short range communication stack used for location augmentation and enforcement.

Deliverable Type
Type: TS.

8.6 Personalisation of first mount OBU

Objectives
The objective of this task is to prepare a technical report for identifying the requirements linked to the personalisation of first mount OBU.

Scope
As the EETS will become a reality and taking into account the higher rate of penetration of telematics equipment inside the vehicles (see the success of PND (personal navigation device), it could be perceived that the elements of OBU could be directly integrated by the vehicle manufacturer as first mount part.
In this case, the EETS provider will be faced to the issue to define how to put in the OBU the data related to the contract between him and the user. This issue is pending for both type of OBU: DSRC and GNSS/CN.
The issues that should be addressed are:

- Access to the protected data inside the OBU e.g. ContractNumber
- Where are the EETS and contract data located? (inside the OBU or in a smart card).

Relevance
At the present time as the OBU are delivered by the EETS provider, this personalisation phase is part of the contract between the EETS provider and the OBU manufacturer and it isn't defined in any standard.
As the OBU will be part of the vehicle, this means that different contracts issued by different EETS provider should be implemented inside the OBU during the lifetime of the vehicle at each change of vehicle owner.

Relations to other tasks

- prCEN ISO/TS 17575 Application Interface Definition for CN/GNSS based EFC
- Revision of CEN ISO/TS 17573:2002 EFC System architecture for vehicle related transport services
- Information flows between Operators of EFC Systems (PNWI, EN)

- prCEN ISO/TS 25110 Interface definition for on-board account using ICC (joint CEN ISO WI under ISO lead)
- EN 15509 Interoperable Application Profile for DSRC

Deliverable type
Technical Report.

8.7 Urban Road Using Charging requirements

Objective
Urban charge systems are likely to become much more common across Europe as a means of seeking to restrain traffic demand. Hence, there is a need to ensure that equipment designs are developed the specifically take account of the urban context since equipment for motorways or plazas have not been designed to address this. The objective of this research area is to analyse the particular urban requirements for EFC standards.

Scope
This work item shall seek to analyse DSRC Urban Charge Point Requirements (possibly a standard) that will incorporate the key elements of the following:

- Build upon existing standards in this domain including IAP (EN 15509) etc
- Establish the core requirements and functionality than must be provided within DSRC equipment in these environments
- Ensure interoperability with systems in non-urban contexts (e.g. motorways, plaza systems, hand-held readers etc)
- Minimise and, if possible, have no impact upon OBU / OBE design
- Take account of the potential Aesthetic impact
- Handle chaotic traffic
- Accommodate the diversity of road users
- Recognise the potential need to address highly variable topology
- Meet a wide variety of installation challenges
- Minimise the impact of E-M interference
- Meet international requirements for Health and Safety
- Consider the wider Policy Context that City centres must address in addition to tackling congestion

The physical location and configuration of the installation represents a compromise between the needs of the DSRC transaction, of the local electromagnetic environment and of the existing built environment locally both above and below ground. The urban charging system, of which the DSRC element is a part, will be required to fit within a wider social and transport policy context

It is recognised that not all the elements above lend themselves to a standard, nor will Industry be interested in promoting all above topics. However, with an increasing number of urban congestion systems being considered, there is a need to create relevant standards from the above lists and hence make it easier for suppliers to offer equipment and possibly services against the requirements.

Relevance

Throughout Europe and beyond, the traditional approach to charging has been for tunnels, crossings and specific road links many of which have employed electronic approaches as part of the solution. With increasing car ownership and limited ability to enhance local road infrastructure many cities are experiencing levels of congestion that are unsustainable and cause significant impacts in terms of air pollution, and economic inefficiencies. As a result local authorities are looking into options for private vehicle demand restraint that including electronic tolling schemes.

However, standards currently in place are generally focused upon installation in toll lane plazas, or free flow applications for traffic flowing in a single direction (e.g. on Motorways). In contrast, urban traffic environments are much more constrained in terms of: the width of the carriageway; sources of electromagnetic interference; limited opportunities for equipment siting. In addition they are characterised by: unpredictable traffic behaviour (including unusual manoeuvres and parked vehicles (including the potential for OBU battery drain when parked under DSRC beacons)) and movements that are not related to chargeable vehicles (e.g. pedestrians).

Relations to other tasks

- Revision of CEN ISO/TS 17573:2002 EFC System architecture for vehicle related transport services
- Information flows between Operators of EFC Systems (PNWI, EN)
- prCEN ISO/TS 25110 Interface definition for on-board account using ICC (joint CEN ISO WI under ISO lead)
- EN 15509 Interoperable Application Profile for DSRC

Deliverable type

Technical Report.

8.8 Requirements for a universal Pre-Payment System for EFC

Objectives

The discussion on payment-mode within the environment of electronic fee collection at present is based on the existence of a post-payment contract between the Toll Service Provider (TSP) and the Service User (SU). Pre-conditions of such a contractual agreement are

- sufficient creditworthiness of the SU and
- the existence of a bank account with the SU.

Questions are arising in the context of the access to an EFC System for

- SUs not being able to meet one of the a.m. conditions
- occasional SUs (mainly from the private sector)
    - not willing to open a bank account
    - not able to open a bank account (by reasons what so ever)and therefore not allowed to participate.

To meet the requirements of this clientele, one or more suitable ways of pre-payments have to be established for EFC to grant interoperability:

- Stored value on electronic medium
- Stored value on central account

As far as private users are concerned legislation could ask for anonymous payment mode as nobody can be forced to open a bank account.

Scope

Before defining necessary standards in that field the requirements of a universal Pre Payment system able to communicate with the OBU have to be evaluated, especially with regard to a valuable payment solution for private cars.
Technical, procedural as well as juridical requirements have to be investigated. As far as the latter are concerned it has to be clarified whether electronic money is questioned according to Article 1 of Directive 2000/46/EC and whether the medium-issuing organisation has to act as financial institution if it is not.

Relevance

We estimate the relevance of that task as very high regarding the introduction of an interoperable electronic toll service for private cars according to Directive 2004/52/EC. Such introduction requires the existence of a pre-payment system to not exclude anybody from the service and to offer an anonymous payment mode.

Relations to other tasks

EN ISO 14906
prTS 25110

Deliverable type

As the task is defined as a research activity it will result in an Interim Technical Report.

8.9 Value Added Services based on GNSS/CN compatible EFC OBE

Objective

The European Directive 2004/52/EC on the interoperability of electronic road toll systems defines the general technologies, which shall be used in future systems of electronic toll services. It is anticipated that this application will be a mass application at least for trucks. With that the On Board Equipment (OBE) required to handle the service inside the vehicle will be operational in a large number of future vehicle, mainly trucks. If the GNSS and CN technologies are applied – which is recommended in the directive – then location sensors and long range communication means are available in these OBE.
Bearing that in mind the preamble of the directive (clause 8) expresses the expectation that this kind of OBE may push value added services based on these OBE technologies, and with that avoiding additional cost in the vehicles at least for basic services. And from the view of the European Commission this shall be clearly safety related service but also commercially attractive services like haulier management support.

The objective of this task is to investigate the possibilities, constraints and effects of using an EFC-OBE for value added services.

Scope

The planned task shall provide answers to the above-mentioned objective. Currently the border between services based on EFC OBE without any additional equipment and comfort service platforms is not clearly visible. With that the scope of this NWI shall investigate if the expectation mentioned in the directive is feasible and if yes, which of the anticipated services shall be enabled in EETS compatible OBE. The second question is how they can be implemented not jeopardising the security requirements of the Service provider responsible for the OBE and with that the charging process.

Relevance

The definition on how to include value added services into GNSS/CN based tolling OBE is vital from the beginning. Mainly due to security reasons OBE hardware and API must support this from the beginning. Having that in mind it is essential developing now a concept dealing with these kinds of services. This also may provide some help for the European Commission in finding the right level on which service shall be instructed to be part of the EETS service. Candidates for that might be the e-call and dangerous goods/life stock monitoring.

Relations to other tasks

Currently there are a lot of activities dealing with value added service for vehicles. There is also a brought definition of security related services based on the result of the e-safety activities of the EC. There are also standardisation activities defining the e-call which may be the first candidate to be realised on EFC OBE. All these activities shall be evaluated and synergies with the EETS compatible EFC OBE shall be taken into account to elaborate possibilities to implement first safety related services (later also others) on EFC OBE platform. This shall be compatible with the definitions of other working groups mainly in the definition of communication transactions to and from back offices.

Deliverable Type

The output of this task shall be a Technical Report. Depending on the result this may include an advice to set up a working group going deeper and to define a technical specification.

9. Expert resources and time schedule

The table below provides an estimate of the required paid experts to perform the work associated with the proposed standardisation programme for "Interoperable Electronic Fee Collection for Europe".

Work item	**No of experts**	**Total no of man days**	**Milestones and time schedule**
Information flows between Operators of Electronic Fee Collection (EFC) Systems (see 8.1)	3-4	120	• Adoption of NWI and work plan: 2 months • Interim report incl. draft standard for TC review: 6 months • Interim report incl. draft standard for CEN enquiry: 12 months • Final report incl. final draft standard for formal vote: 22 months • Deliverable type: EN
Interoperable Application Profile (IAP) supporting GNSS/CN OBE-localisation augmentation using DSRC (see 8.2)	3-5	120	• Adoption of NWIs and work plan: 2 months An IAP-standard for localisation (defining requirements): EN • Interim report incl. draft standard for TC review: 6 months • Interim report incl. draft standard for CEN enquiry: 12 months • Final report incl. final draft standard for formal vote: 22 months A conformance evaluation standard accompanying the IAP: EN • Interim report incl. draft standard for TC review: 10 months • Interim report incl. draft standard for CEN enquiry: 16 months • Final report incl. final draft standard for formal vote: 26 months
Interoperable Monitoring Application Profile for Enforcement using DSRC (see 8.3)	3-5	120	• Adoption of NWIs and work plan: 2 months An IAP-standard for monitoring (defining requirements): EN • Interim report incl. draft standard for TC review: 6 months • Interim report incl. draft standard for CEN enquiry: 12 months • Final report incl. final draft standard for formal vote: 22 months A conformance evaluation standard accompanying the IAP: EN • Interim report incl. draft standard for TC review: 10 months • Interim report incl. draft standard for CEN enquiry: 16 months • Final report incl. final draft standard for formal vote: 26 months
Conformance evaluation of OBE and CE for EFC based on GNSS/CN (see 8.4)	3-4	160	• Adoption of NWIs and work plan: 2 months Part 1: Test suite structure and test purposes: TS • Interim report incl. draft standard for TC review: 6 months • Final report incl. final draft standard for formal vote: 12 months Part 2: Abstract test suite, incl. extra information for testing: TS • Interim report incl. draft standard for TC review: 10 months • Final report incl. final draft standard for formal vote: 16 months
Interoperable Application Profile (IAP) for GNSS/CN based EFC systems (see 8.5)	3-4	100	• Adoption of NWIs and work plan: 2 months • Interim report incl. draft standard for TC review: 6 months • Interim report incl. draft standard for CEN enquiry: 12 months • Final report incl. final draft standard for formal vote: 22 months • Deliverable type: TS.
Personalisation of first mount OBU (see 8.6)	2-3	50	• Adoption of NWI and work plan: 2 months • Interim report for TC review: 6 months • Final report: 12 months • Technical Report.
Urban Road Using Charging requirements (see 8.7)	2-3	60	• Adoption of NWI and work plan: 2 months • Interim report for TC review: 6 months • Final report: 12 months • Technical Report.

Work item	No of experts	Total no of man days	Milestones and time schedule
Requirements for a universal Pre-Payment System for EFC (see 8.8)	2-3	60	• Adoption of NWI and work plan: 2 months • Interim report for TC review: 6 months • Final report: 12 months • Technical Report.
Value Added Services based on GNSS/CN compatible EFC OBE (see 8.9)	2-3	50	• Adoption of NWI and work plan: 2 months • Interim report for TC review: 6 months • Final report: 12 months • Technical Report.
Coordination and management of the "Interoperable EFC standardization programme"	1-2	42	Coordination and management of the programme and associated dissemination activities
Total number of expert man days		882	

10. Cost estimate

	# of units	Unit rate in €	Total costs in €
Costs of staff/experts or equivalent			
- Administrative support (NEN)	60	457,00	27.420,00
- Project management (NEN)	120	663,00	79.560,00
- Experts (100% subvention)	882	650,00	573.300,00
-			
Travel costs			
- Project manager	2	500,00	1.000,00
- Experts	60	500,00	30.000,00