Study on the
Implementation of a European Network of Certification Centres (ENCC) for the purpose of the Single European Service of Electronic Fee Collection

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Disclaimer

The following report represents the opinion of the study team, expressed under a contract provided by the European Commission. However, in no way can the European Commission be formally committed by its conclusions or its statements.

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1 Executive Summary

Subject of the study was the *Implementation of a European Network of Certification Centres* (ENCC) for the purpose of the Single European Service of Electronic Fee Collection (EETS). According to the requested workflow the study is structured along the work packages, *WP1, WP3, WP4 and WP2*.

In ***WP1*** the *Technical Feasibility of an ENCC* as outlined in the Report of Expert Group 4 (EG4) was analysed. First findings of this analysis and the special situation of the EFC domain in Europe determined the material to be analysed and the selection of stakeholders to be consulted by means of a survey and by interviews. The results were compiled in a SWOT table which sorts basically the identified *Strengths, Weaknesses, Opportunities* and *Threats*. As quintessence it can be stated, that the EG4 principle approach of distinguishing technical and operational CERTIFICATION is suitable and reasonable. It provided the basis of the further development of this study. The following subjects have been regarded being worthwhile for further considerations:

- Adaptation of the EG4 approach to common (European) CERTIFICATION practices;
- Handling of the immature standardisation of the European EFC domain;
- INSPECTION of service components relevant for interoperability;
- Inclusion of *Key Performance Parameters* monitoring in the CERTIFICATION scope;
- Possible interests conflicts due to tests of competitive OBEs in TOLL CHARGERS' premises;
- Liability issues in the certification context.

The outcome of the feasibility analysis provided the input for ***WP3***, *Organisation of ENCC and Network Procedures*. One of the first steps within that work package was the selection of established and proven certification schemes with possible elements applicable for the ENCC. The selection process led to a number of requirements of which at least one had to be fulfilled by a certification scheme to be further considered. It turned out that one major challenge or difference compared to traditional certification schemes is the target group. It is the small group of *EFC Equipment Manufacturers*, EETS PROVIDERS and TOLL CHARGERS requesting a small number of quite complex certifications. Common CERTIFICATIONS aim at consumer protection with nar-

row scopes of conformity and well defined functionality, safety, security, or quality requirements and test procedures. EETS CERTIFICATION in contrast comprises CONFORMITY and INTEROPERABILITY ASSESSMENTS as well as *Service INSPECTIONS*.

At the end a selection of eight certification schemes has been analysed more thoroughly to identify possibly applicable elements for ENCC. The outcomes of that analysis, combined with the recommendations derived from the WP1 results led to the proposal for the ENCC structure on hand. Some special characteristics of that structure are the following:

- *General Distinction between Test and Certification:* This complies with common certification practices, enables national notification of bodies, improves equal treatment, provides flexibility, supports competition, facilitates mutual recognition of test results, and reduces the potential of discrimination.
- *Distinction between CONFORMITY and INTEROPERABILITY ASSESSMENT:* This enables differentiation of standardised and non-standardised European EFC domain and a stepwise evolution of the EETS Certification scheme, as well as it facilitates differentiation of liability.
- *Deployment of Independent Reviewer and/or Test Witnessing:* This enables to restrict INTEROPERABILITY ASSESSMENT to *Test Witnessing* by an *Independent Reviewer* which takes care for sound and fair ASSESSMENTS especially at TOLL CHARGERS premises (the target system INTEROPERABILITY is strived for).
- *Central Management Structure:* This enables a non-profit organisation supported by its stakeholders, demand-oriented installation of authorised groups and committees in its board, benefit from the single responsibility for maintaining and continuously adapting an EETS CERTIFICATION REFERENCE FRAMEWORK, and last but not least it enables a one-label policy, e.g. EETS certified plus additional Code for EFC systems, like *EETS CERTIFIED FOR A, CH, D, F*.
- *Service Inspections:* These enable INTEROPERABILITY ATTESTATION of service elements which are crucial for PROCEDURAL INTEROPERABILITY and thus covering an essential part of the non-standardised European EFC domain.
- *Provisional Certification:* This gives more confidence in the EETS CERTIFICATE since CERTIFICATION becomes definitive only if the *Object under Certification* (OUC) has successfully undergone a proven-in-operation period (of e.g. of 4 month) in a real operational environment.

- *Follow up of In-Service Monitoring of Key Performance Parameters:* The follow-up INSPECTIONS of the TOLL CHARGER'S *Key Performance* figures allow a differentiated insight in the quality of the various (EETS) OBE registered in the system and in the process chain. This in turn enables effective quality control and may help to solve conflicts in case of insufficient performance of particular OBE types.

WP4 investigated the technical procedures for the Testing of EFC equipment. Crucial outcomes of that work packages are these:

- Technical procedures and related facilities are entirely different for the standardised European EFC domain and the non-standardised European EFC domain. Technical procedures for the first domain can be developed on the basis of experiences from, and the adaptation of established CONFORMITY ASSESSMENT procedures. They take place basically in a laboratory environment. The second domain is associated with INTEROPERABILITY ASSESSMENT. The related procedures are very different from those deployed for CONFORMITY ASSESSMENT since it takes place in an operationally oriented environment.
- The proposed structure of the identified technical procedures is based on the CEN ISO/TS 14907-1. This standard specifies the test procedures for EFC RSE and OBE. Since it is limited to automated (electronic) payment using a standardised DSRC it was extended, especially by procedures for the non-standardised European EFC domain.
- Procedures for the standardised domain are assigned to the groups *Pre-Tests, Functionality Tests,* and *Quality Tests*. Characteristic of the *Pre-Test* is that the APPLICANT carries out the necessary tests for CONFORMITY DECLARATION or takes care for *Third Party ATTESTATION* according to the requirements of the underlying directive.

  Apart from CONFORMANCE ASSESSMENT referring to EN 12253, EN12795, EN12 834 and UNI 10607, parts 1, 2, 3, the procedures for *Quality Tests / Inspections* cover among others *Availability*, *Absence of Retroactive Effects*, *Factory Inspection* or INSPECTION of *Key Performance Parameters* and others.

  Procedures for and *Functionality Tests* cover e.g. *Communication, EFC-Application, Security, Vehicle characteristics,* or *Security*.

- In terms of TECHNICAL INTEROPERABILITY ASSESSMENT valuable findings and inputs are expected from the RCI project which is currently preparing *Field Trials* for the developed EETS OBE Prototype. The *Factory Acceptance Tests*, (FATs), *Site Acceptance Tests* (SATs) and *Operational Tests* (OTs) to be executed coincide exactly to the ENCC approach.
- A number of issues have been identified which have to become part of the Conformity and INTEROPERABILITY ASSESSMENT. Among these:
  - Precondition for INTEROPERABILITY Tests in the Target EFC system is an EETS conformant RSE;
  - Proven absence of retroactive effects of multiple services OBU;
  - Accuracy of recognising geo-objects must be tested (to be defined);
  - Verification of the applicability of the OBE on specific stretches of tolled network (to be defined) must be included too.
  - Service components relevant for Interoperability such as *Contract Issuing* or *Service Payment* have to be inspected;
- Since INTEROPERABILITY ASSESSMENT by its nature cannot be executed against technical specifications/standards but in an operational environment, *Independent Reviewer* or inspectors should witness and review related tests.
- It should be also mentioned that liability issues coming up in cases of malfunctioning of certified EFC EQUIPMENT has to be taken into account since it has a crucial impact on INTEROPERABILITY ASSESSMENT by a *Third Party*.

With the knowledge gained in the work packages *WP1, -3*, and *-4*, an ENCC business case could be developed as requested in the scope of ***WP2***. For this business case a number of general assumptions had to be met. The major ones are:

- "*Greenfield Approach*", meaning the setting-up of completely new companies;
- *Steady State*, all entities are regarded as *Third Party* entities, no supplier TEST LABORATORIES are regarded as cost-saving alternative only;
- The costs of CERTIFICATION CENTRES and TEST LABORATORIES are covered by service fees;
- Due to the different cost structure for TESTING, the TEST LABORATORIES had to be split up into TEST LABORATORIES for DSRC systems and for autonomous systems.
- The regarded period starts at the year 2009 and ends at 2014.

The calculations show that the ENCC can be realistically realized by the proposed organisational model, based on the following variable assumptions made: The basic assumption starts from the demand for ca. 200 initial certifications till 2014, incl. OBE, RSE, and services; ten of them for autonomous EFC systems. The service fees for EFC equipment for example were calculated in total with 100.000€ for a DSRC system and with 1.2Mio€ for an autonomous EFC system. A further assumption is the increasing number of TEST LABORATORIES and certification centres within the regarded period 2009 to 2014.

The business case shows for all entities (TEST LABORATORIES, CERTIFICATION CENTRES, *EETS CERTIFICATION Authority*) more or less positive results.

Considerable potential for cost-saving and thus fee reduction was identified in the reduction of the number of test labs and CERTIFICATION CENTRES as well as in the designation of manufacturer TEST LABORATORIES.

Due to the amount of material to be considered and the complexity of the domain not all aspects could be considered in an adequate level of detail. Those objects deserving further attention and the perspectives are outlined in paragraph *Conclusions and Perspective*.

2 Introduction

TÜV Rheinland InterTraffic GmbH was selected by DG TREN to carry out a *Study on the Implementation of a European Network of Certification Centres* (ENCC) for the purpose of the Single European Service of Electronic Fee Collection (EETS).

2.1 Background

At the time this study was conducted the CERTIFICATION requirements associated with the directive 2004/52/EC were being under consideration. These requirements have been compiled since they give a picture of the objectives and **expectations** associated with CERTIFICATION in the EETS context, but do not necessarily reflect the opinion of the study team:

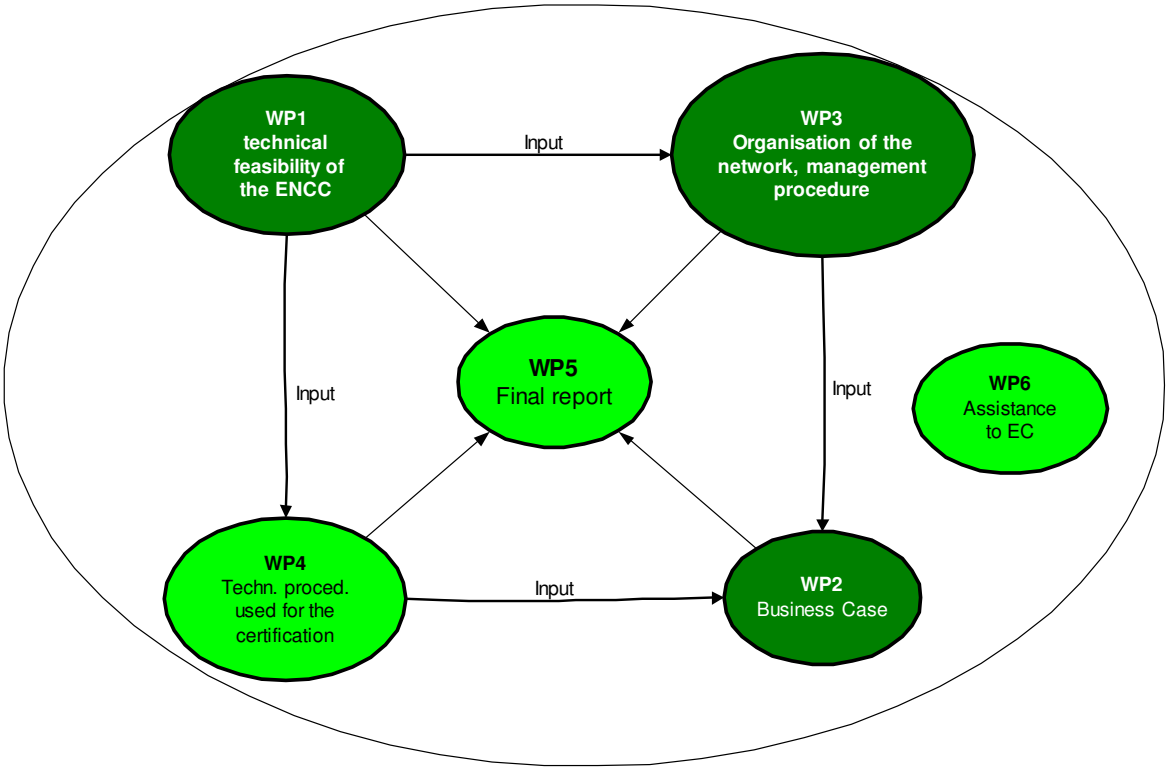
- In order to implement the EETS, it is required that all equipments related to this service are certified by independent bodies. This certification process will aim at giving the insurance to toll operators and contract issuers that the out board EETS equipment or units onboard vehicles circulating on the EETS toll domain meet the EETS requirements and ensure a seamless and complete levy of the due toll.
- In order to certify the equipment related to the EETS, an ENCC and related certification procedures have to be established.
- The *Certification Centres* will have to test/certify prototypes, series of industrial products and manufacturing facilities according to the specifications established and publicly available under the scope of the EETS. Toll operators and *Certification Centres* will establish jointly the list of such specifications.
- Certifications operations will be split into the following categories:
    - provision of a technical certification label, Europe-wide valid, with the performance of the appropriate tests in laboratory environment and in operational environment,
    - regular monitoring and assessment of the production chains of the manufacturers and of their sub-contractors,
    - verification of the applicability of the equipment on specific stretches of tolled network and its integration in the local systems.
- These different operations may be performed by different categories of *Certification Centres* (CC). These centres build collectively the ENCC. All CC invol-

ved by the EETS have to be located in the countries in the European Union.

- The ENCC comprises a management structure whose tasks are the following:
  - establish, update and maintain the list of standards, specifications and procedures, and the content of the procedures,
  - liaise with contract issuers and EFC operators, especially in cases of conflicts around the reliability of a certification procedure,
  - disseminate best practice and recommendations for use among all bodies in the network,
  - in general, manage and / or perform any task allowing to ensure the reliability of the certification label towards their users.
- The ENCC have to deal with all EQUIPMENT related to the EETS including those related to the detection of violations, and the identification of offenders.
- The ENCC shall have the responsibility to clarify and precise the test specifications and procedures required for all its activity, in agreement with the TOLL OPERATORS and EETS PROVIDERS.

2.2 Structure of the study

According to the requested structure, the study had to be divided into six work packages (WP). The correlation is illustrated in the figure below.

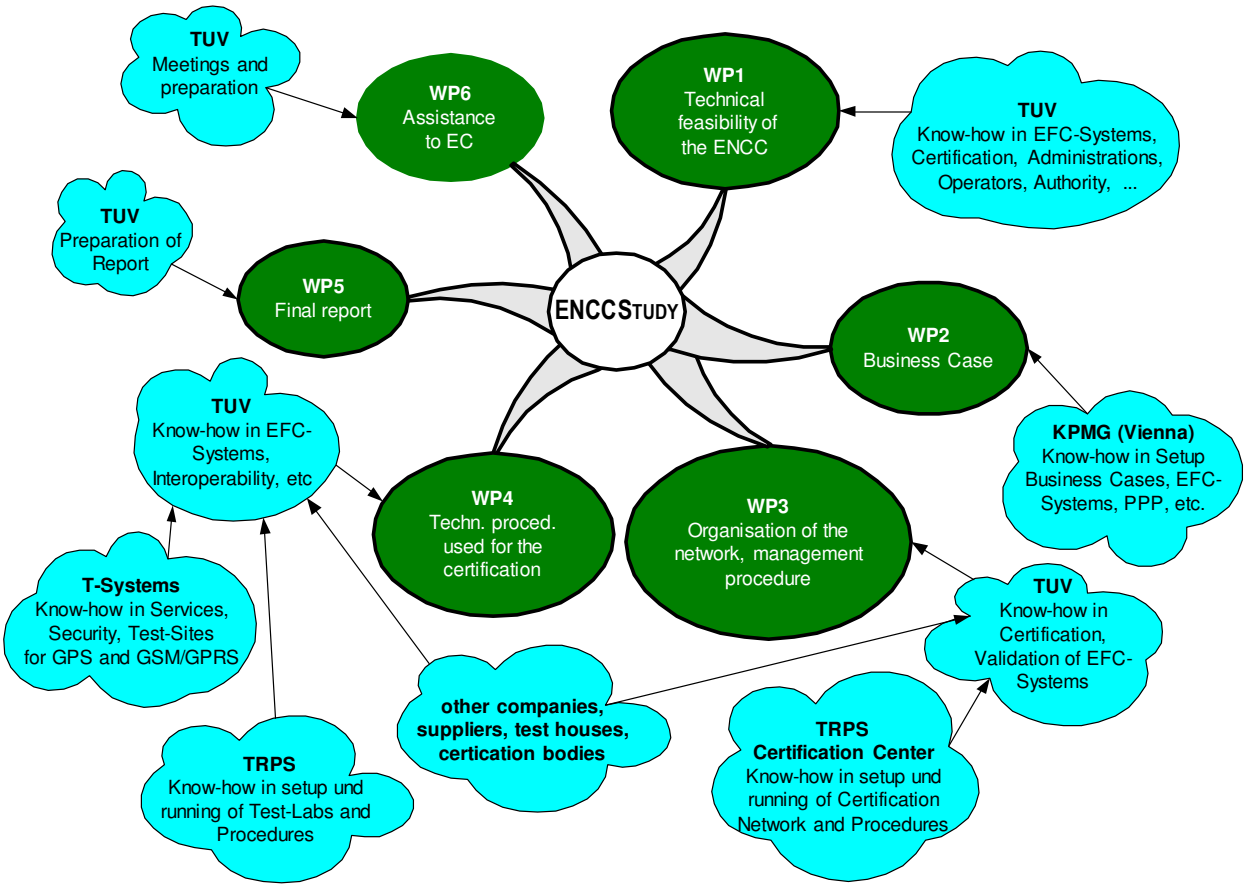


Work packages of this study

2.3 Project Organisation

The document on hand represents the work results of the Work Packages WP1 to WP4. To cover all aspects of the study different stakeholder are involved with their particular experience and knowledge in EFC EQUIPMENT and systems, in development, TESTING and CERTIFICATION procedures and in the market.

The following figure gives an impression of how the subcontractors are involved in terms of know how and work packages responsibilities.



Overview Project Organisation

2.4 Document Structure and typographic conventions

The study report on hand is organised along the structure of the work packages as illustrated above. The detailed structure can be taken from the *Table of Content*.

Emphasis was put on the readability of the study report in spite of the amount of material to be considered and the complexity of the matter. Therefore, most of the material has been taken out from the main text body into the appendices. For example, *Annex 9, Frequently Asked Questions* covers some explanation of basic facts and rules on CERTIFICATION and does not blur the actual issue.

The setting up of a separate list of *Terms and Definitions* (see section 9.10) right from the beginning of the study was regarded as a good investment for all work packages. It has proven to improve the readability and common understanding of the matter among the working groups involved in the study.

The application of these *Terms and Definitions* is supported by the following **typographic conventions** used in this document:

A word with CAPITAL LETTERS	… indicates a specific term defined or described in *Annex 10, Terms and Definitions*
Terms	Words that have a specific meaning or quotations are printed in *Italic*
[…]	Numbers and characters between square brackets indicate references to publications mentioned in *Annex 1, References.*

3 Technical Feasibility of ENCC

The technical feasibility of ENCC as outlined in the EG4 Report was analysed in the scope of Work Package 1. First findings of this analysis determined the material to be analysed and the selection of stakeholders to be consulted in a survey and/or by interviews. The quintessence of that analysis was compiled in the SWOT table below, which basically sorts findings in *Strengths, Weaknesses, Opportunities* and *Threats*. Information on the SWOT method applied can be found in section 9.9.1.

	Strengths	Weaknesses
Internal	**S01:** Differentiation of two types of *Certification Centres,* the ETCC for technical CONFORMITY ASSESSMENT and the OCC for INTEROPERABILITY ASSESSMENT. **S02:** Identification of the fact that operational/interoperability tests must be executed in a real system environment on site at the EFC system/ toll context. **S03:** Suggestion to follow an incremental approach, starting with basic, more stable activities and when necessary to extend with other activities like e. g. enforcement. **S04:** The number of OCCs will be geared towards the number of toll motorway authorities, TOLL CHARGERS or groups of them. **S05:** Flexible approach, considering the relevant EFC technologies. **S06:** The consideration of the manufacturing process after TYPE APPROVAL is in line with European *Global Approach*.	**W01:** The EC's *Global Approach* and common CERTIFICATION practices imply different responsibilities for CERTIFICATION and TESTING. This differentiation was not considered in the report. Both types of *Certification Centres*, the ETCC and the OCC take also the responsibility for TESTING. **W02:** The objects under certification (OUC) cover OBU and RSE certification only. CERTIFICATION of processes that are relevant for INTEROPERABILITY (e. g. personalisation and installation in the vehicle or Service Payment) are not considered. **W03:** The CONFORMITY ASSESSMENT requires mature (*Harmonised) Standards* which are not available yet for covering all EFC technologies. **W04:** The post certification phase (surveillance, follow up) does not consider *In Service Monitoring* (*Key Performance Parameters* etc.). **W05:** The following questions are left open in the report: • Who is liable for what in the certification context, e. g. in case of malfunction of EFC EQUIPMENT, or if billing does not work properly, or toll is not correctly levied? • How to deal with new TOLL CHARGERS which do not accept certified equipment, e.g. because they are not satisfied with certain quality characteristics of certified equipment? • How to recognize test results of existing (proprietary/manufacturer's) EFC systems proven in operation?
	Opportunities	**Threats**
External	**O01:** Due to the novelty of the technology and services behind, no certification infrastructure (independent, accredited bodies, mature standards, know how, etc.) exists. This bears the opportunity to start from scratch, justifying an incremental approach. For example involvement of the *EFC Equipment Manufacturer* and the TOLL CHARGER in the INTEROPERABILITY ASSESSMENT (executing tests etc.) in a first step. **O02:** Due to the integration of products, services, proprietary EFC implementations no single certification and/or test house will be able to cover the full range of testing and certification services in the ETC domain. This necessitates a co-operative approach of competent TEST LABORATORIES and CERTIFICATION BODIES supported by an information system that enables networking.	**T01:** Setting up of a certification scheme, based on traditional third party testing and certification (like e. g. those derived from the *New Approach* and *Global Approach*) might slow down EETS certification progress. **T02:** A conflict of interests caused by the necessity of testing INTEROPERABILITY on site at the TOLL CHARGERS premises. It cannot be excluded that new EFC equipment under test competes with the EFC PROVIDER'S own equipment which questions its neutrality of test execution. **T03**: The expectation an ETCC needs to have the capability to cope with any EFC technology is demanding towards the proprietary technologies and immature standardisation. The expectations of finding competent TEST LABORATORIES covering all technologies might become a disappointing activity. **T04:** New EETS OBEs introduced in an existing EFC system may influence *Key Performance Indicators* figures (e. g. recognition rate) which in turn will affect liability. **T05:** The publication of proprietary (interface) specifications by national EFC operators bears the risk of affecting contractual rights of partners in operating tolling systems and/or of violating Intellectual Property Rights.

Further details on the underlying survey being conducted can be found in *Annex 3, Results of the ENCC Survey.*

From results of the feasibility analysis the following **recommendations** have been derived which should be considered for the development of the ENCC organisational structure as well as the management (WP3) and technical (WP4) procedures:

1. In a first step the *EFC Equipment Manufacturer* and the EFC OPERATOR/TOLL CHARGER could act as TEST LABORATORY. Both having comprehensive technical knowledge and experience in testing their technology. The role of the CERTIFICATION BODY in that first step could be to witness the tests. This approach would enable a quick and cost-effective start.
2. As long as no TEST LABORATORY and CERTIFICATION BODY is accredited and or notified for the required EFC scope, competent TEST LABORATORIES and CERTIFICATION BODY should be designated by a supervising management board.
3. The organisational structure of the ENCC should split the "*Certification Centres*" into two levels, namely that of TEST LABORATORIES and that of CERTIFICATION BODIES. Eventually both should be subject of notification by national authorities to allow that requirements can be legally enforced.
4. The organisational structure and procedures of the ENCC should be prepared by suitable means to cope with potential conflicts of interests if e. g. the EFC equipment under test at the EFC PROVIDER'S premises competes with its own established equipment.
5. The liability questions "Who is liable for what?" in case of malfunction or performance loss (e. g. of EFC equipment, or if billing does not work properly, or toll is not correctly levied) should be analysed with regard to the following aspects: The scope of CERTIFICATION and the extent to which liability can be covered by it.
6. It has proven worthwhile to start with clarifying the certification statements to be signed on the certificates right in the beginning. This supports to focus on the crucial things and helps to discover gaps in the certification scope in an early stage.
7. Legal measures (e.g. ESSENTIAL REQUIREMENTS set down in the EC decision) should avoid discrimination of *EFC Equipment Manufacturers* and/or EETS PROVIDERS resulting from conflicts of interests of the TOLL CHARGERS which impede INTEROPERABILITY tests of EFC Equipment tested at their premises.

8. Apart from OBE Conformity and technical INTEROPERABILITY ASSESSMENT the following interfaces should be considered as object of inspection. Data interfaces between
    - TOLL CHARGERS and EETS PROVIDER,
    - EETS PROVIDER and SERVICE USER, and
    - TOLL CHARGERS and SERVICE USER.

   Additionally service components relevant for interoperability should be included in the scope of certification.
9. For the certification process two main paths of certification should be considered. The first one is the certification of a new EFC system and the second one is the refit, update, or migration of an existing EFC system.
10. The various specialised TEST LABORATORIES and CERTIFICATION BODIES to be involved should be linked to each other in order to enable cooperation, monitoring of operation of the ENCC the CERTIFICATION procedure.
11. An *EETS Certification Reference Framework* (EETS-CRF) should be established that will be used as a reference for all the actors involved in the EETS certification program. It should include:
    - The detailed description of the ENCC organizational structure and the operational procedure to guide its actors;
    - A list of all relevant standards, specification requirements and reference implementations agreed with *EFC EQUIPMENT Manufacturers*, TOLL CHARGERS, EETS-Providers etc. forming the basis for EETS CONFORMITY and INTEROPERABILITY ASSESSMENT;
    - A description of the standards and specifications against which an OUC shall be tested for conformance;
    - The formal description of the elements which have to be tested or inspected and the description of test programmes, test cases, test suites.

4 Basic considerations for EFC Certifications

This chapter outlines the basic European structures and regulations which must be taken into account when designing an ENCC. The first subsection *introduces* regulatory aspects of European certification schemes and outlines the two basic Certification Domains to be distinguished in the EC. The following subsections introduces those certification schemes promising applicable elements for the ENCC and those EC Directives and standards pertaining to EFC certification.

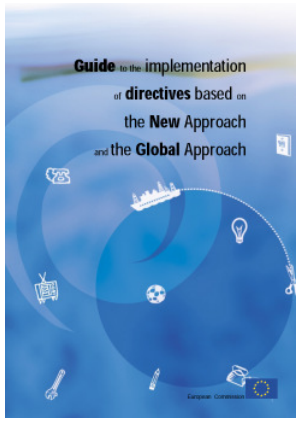
4.1 CERTIFICATION terminology

In the CERTIFICATION context often different terms are used for the same thing. For example, *Certification Centre, Certification Body, Test Laboratory* and *Notified Body;* or *Conformity Assessment, Type Approval, Type Examination,* and *Certification*, etc. In order to avoid misunderstandings and to enable common understanding, a list of related terms has been compiled and explained in *Annex 10, Terms and Definitions*. The terms and definitions therein are taken from related Standards as far as possible. They can be recognised by their CAPITAL LETTERS. To give an impression and for better understanding a look at the following terms is recommended:

- ASSESSMENT,
- CERTIFICATION,
- CERTIFICATION BODY,
- CONFORMITY ASSESSMENT,
- INSPECTION,
- NOTIFIED BODY
- TESTING,
- TEST LABORATORY,
- TYPE APPROVAL.

In addition to this a set of *Frequent Asked Questions* was compiled in *Annex 9, Frequently Asked Questions* clarifying e. g. “Why distinguish between CERTIFICATION and TESTING?” or “Why CONFORMITY TESTING and INTEROPERABILITY TESTING?”.

4.2 Voluntary and Mandatory CERTIFICATIONS



The European Union has developed instruments to remove the barriers to free circulation of goods. Among these are the *New Approach* to product regulation and the Global Approach to CONFORMITY ASSESSMENT [BLUE GUIDE].

The ***New Approach*** was laid down to technical harmonisation and standardisation, which establishes the limitation of legislative harmonisation to ESSENTIAL REQUIREMENTS that products must meet, if they are to benefit from the free movement within the Community. The ESSENTIAL REQUIREMENTS are harmonised and made mandatory by EC directives to be transposed into national legislation. The technical specification of products meeting these ESSENTIAL REQUIREMENTS are set out in *Harmonised Standards*. The application of the *harmonised* or other standards remains voluntary, and the manufacturer may always apply other technical specification to meet the requirements.

In comparison with the previous directives, which have very detailed requirements for specific products, the *New Approach* offers a number of advantages:

- It deals with large categories of products (e.g. machinery, high speed rail systems, toys, etc.)
- It can cover “horizontal risks”, such as Electromagnetic Compatibility (EMC), which affect one aspect of numerous kinds of products, without the need to address the specific product in detail.
- It builds closer co-operation between public authorities and market operators.
- It is based on total harmonisation (replacing diverging national legislation) rather than optional harmonisation (which creates a series of dual regimes).

It is important to note that previous and non-*New-Approach* Directives regarding products remain fully in effect. Thus, any product that they cover must meet all of the requirements that they set forth.

In addition to the principles of the *New Approach*, conditions for reliable CONFORMITY ASSESSMENT are necessary. This was covered by the ***Global Approach*** to certification and testing which states the following guiding principles for Community policy on CONFORMITY ASSESSMENT:

- Devising modules for the various phases of CONFORMITY ASSESSMENT procedures and by laying down criteria for the designation of bodies operating these procedures to ensure the necessary flexibility over the entire manufacturing process.
- Setting up ACCREDITATION systems for the recognition of competence of TEST LABORATORIES, INSPECTION BODIES and CERTIFICATION BODIES.
- The use of European standards relating to quality management (ISO 9001).
- Mutual recognition agreement concerning TESTING and CERTIFICATION.

The *New Approach* and the *Global Approach* are widely established in the CE-marking symbolising the conformity to all relevant EC directives. But not all products are subject to *New Approach* directives and need to be tested and certified to allow their free circulation within the community. In principle, two domains turned out to be distinguished: The *Mandatory Domain* (also called *Regulatory Domain*) and the *Voluntary Domain*:

The ***Mandatory Domain*** is characterized by the following:

- CONFORMITY ASSESSMENT and CERTIFICATION are regulated by EC directives ensuring that only products fulfilling human health, environmental and consumer protection requirements may circulate within the EU;
- Cover wide fields of product or risk in one piece of legislation;
- Impose generic ESSENTIAL REQUIREMENTS which do not get out of date;
- ESSENTIAL REQUIREMENTS are made mandatory by EC directives to be transposed into national legislation, thus product requirements and conformity assessment procedures are legally required by a national authority;
- **Notification** of TEST LABORATORIES, CERTIFICATION BODIES, and Inspection BODIES by a national authority or public ACCREDITATION BODY based on EN ISO/IEC 17000 /EN 45000 series. These NOTIFIED BODIES needs to be involved to ensure that requirements are legally required;

The ***Voluntary Domain*** is characterized by:

- No legal requirements;
- Product requirements and CONFORMITY ASSESSMENT procedures are specified by the customer on a contractual basis;
- EC supports;
- Harmonisation of technical standards;

- standardization of Certification procedures;
- Mutual recognition agreements;
- ACCREDITATION of TEST LABORATORIES and CERTIFICATION BODIES by a private or public ACCREDITATION BODY based on the EN ISO/IEC 17000/EN 45000 series.

What does that mean for the ENCC? Certification as required by Directive 2004/52/EC does apply neither to the *Voluntary Domain* nor to the characteristics of the *New Approach*. Unlike *New Approach* directives the Directive 2004/52/EC does not include ESSENTIAL REQUIREMENTS and requirements in terms of how manufacturers and providers shall demonstrate INTEROPERABILITY and CONFORMITY of their equipment or service. This might be made up in the course of the corresponding *Commission Decision* currently in preparation. In addition, a proper adoption of a *New Approach* strategy should be based on *Harmonised Standards* (see *Annex 9, Frequently Asked Questions*) which are not sufficiently available yet for the current EFC technologies. If the directive is nevertheless implemented by *New Approach* mechanisms, a Member State operating an EFC system will have to notify bodies responsible for approving EFC equipment for use in the enforcement of European Union legislation.

But since Directive 2004/52/EC does not have the characteristics of a *New Approach Directive* and CONFORMITY ASSESSMENT procedures have not (yet) been defined, there is not really an obligation for notifying bodies. To the opinion of the ENCC study team it can be rather considered as an option to facilitate imposition of fair execution of INTEROPERABILITY tests on EFC OPERATOR if conflicts of interests arise.

It is among others for these reasons that this study was prepared. In order to show a possible way for the actors (esp. the *EFC EQUIPMENT Manufacturers*, the EETS PROVIDERS, and the TOLL CHARGERS) who have to have CONFORMITY and INTEROPERABILITY of their equipment or services certified. The proposed structure is based on established practices and is oriented towards the best of both, the *Regulatory Domain* and the *Voluntary Domain* with the objective to find the best possible convergence between them.

4.3 Learning form other Certification schemes

In the course of the feasibility study (WP1) and the search for a suitable structure of the ENCC existing CERTIFICATION schemes have been evaluated. The following guidelines have been followed when selecting CERTIFICATION schemes providing applicable elements for the ENCC:

- The CERTIFICATION practice is proven worthwhile in operation;
- The scheme fits in the European CERTIFICATION context with respect to common CERTIFICATION practices and European CERTIFICATION and ACCREDITATION regulations;
- The scheme is applicable for a low number of product types produced for a specific market with few business partners rather than for the consumer market;
- The scheme is applicable for complex functionality CONFORMITY ASSESSMENT procedures, comparable with those known from telecommunication products;
- The scheme is applicable for service or process CONFORMITY ASSESSMENT;
- The scheme is applicable for INTEROPERABILITY ASSESSMENT;
- The scheme is suitable for an incremental or a stepwise development;
- The scheme is viably for the bodies involved;
- The scheme promotes equal treatment (achieving certification shall not be easier in one European body than in another);
- The scheme enables transparency, possibility of monitoring of operation or test/certification progress by operators or administrators involved;
- The scheme contains an acceptance procedure (designation, accreditation);
- The scheme has relations to the EFC domain.

Finally eight operating CERTIFICATION schemes have been selected as having potentially valuable elements for the ENCC. These are in alphabetic order:

1. *Bluetooth;*
2. Digital Tachograph;
3. IECEE CB Scheme;
4. ITSO, Interoperability Certification of Smartcard Ticketing (UK);
5. German Telecommunication Act (TKG);
6. GSM / *Global Certification Forum;*
7. Test Specification for Interoperable EFC-DSRC Systems in Sweden;

8. R&TTE;
9. WiFi.

Annex 4, Applicable Certification Schemes of this report contains a brief description of each scheme, extracting *Advantages*, *Disadvantages* and *Applicable Elements* of them. The tables below summarise these extracts.

Scheme: *Bluetooth* Qualification

Advantages:
• The centralised structure enables complete control by the *Bluetooth SIG*. This includes:
  • development of the standards,
  • ACCREDITATION of TEST LABORATORIES,
  • CERTIFICATION of the products;
• The scheme is funded by member fees;
• One label ("*Bluetooth*") with additional information on Bluetooth homepage.

Disadvantages: • Monopolistic structure; • The scheme is funded by member fees; • The scheme will work only, if the Bluetooth SIG has one goal, to place this one standard to the market. And it will not work, if there are incompatible standards or if they are not interested to support a special standard or system.
Applicable elements for ENCC: • Stepwise Approach for qualifying Test Laboratories (BQBs) in the early years of the scheme. • Centralised structure enabling complete control by the Management of the scheme.

Scheme: *German Telecommunication Act (TKG)*
Advantages: • Due to their multiple instances/ representations the clients were not depending on one TEST LABORATORY/NOTIFIED BODY. They could select the TEST LABORATORY for analogue network, ISDN independently. • Due to the nature of NOTIFIED BODIES, the client does not have to rely on a particular NOTIFIED BODY. It has the freedom to choose any, even that of an other Member states; • The product was affixed with the CE Mark including the number of the NOTIFIED BODY.
Disadvantages: • The quality of test and certification service (competence, impartiality) of the NOTIFIED BODIES may vary form country to country.
Applicable elements for ENCC: • Recognition of test results and issuing of EC certificate by NOTIFIED BODIES of other Member States. • The APPLICANT has the choice of the Test Laboratory.

Scheme: *Digital Tachograph Equipment Type Approval*

Advantages:

European Scheme based on a directive making extensive use of NOTIFIED BODIES for use in the enforcement of European Union legislation.

- Interoperability tests are carried out by a single laboratory under the authority and responsibility of the European Commission.
- Distinction of specialised TEST LABORATORIES for functionality, security, and INTEROPERABILITY.
- Within the first four months any *Interoperability Certificate* issued is considered provisional. If no interoperability faults are found during this period, certificates will become definitive then.
- Transparency of the process in terms of publishing of certification requests and approval certificates issued.

Disadvantages:

- Distinction between TEST and CERTIFICATION is not obvious.
- The level of transparency achieved by the requirement to publishing all certification requests might not be in the interest of all APPLICANTS.

Applicable elements for ENCC:

- Within the first four months any *Interoperability Certificate* issued is considered provisional. If no interoperability faults are found during this period, CERTIFICATES will become definitive then
- Distinction of specialised TEST LABORATORIES for functionality, security, and INTEROPERABILITY.

Scheme: *GSM (Global System for Mobile Communications / Global Certification Forum)*

Advantages:

- Internationally accepted, voluntary scheme. From the regulatory point of view there are no requirements for CONFORMITY or INTEROPERABILITY. Telecommunication providers test samples of selected products in their own or subcontracted TEST LABORATORIES. The TESTS are executed according to *Global Certification Forum* (GCF) specification (protocol conformance TESTS, functionality tests, INTEROPERABILITY TESTS, acoustical TESTS, …) and according to internal specifications of the provider. If there are no functional problems, the provider decides to sell the product.
- TEST cases are continuously updated so certified terminals are always tested to standards that reflect the latest phase of market and technology evolution.
- New technologies are incorporated into the GCF *CERTIFICATION Criteria* as appropriate

Disadvantages:

- Not obvious

Applicable elements for ENCC:

- Continuous update of TEST cases.

Scheme: *IECEE CB Certification Procedure*

Advantages:

- The "*One Stop Testing*" enables national approval by simply recognising the test results of the peer TEST LABORATORY.
- Peer assessment of Test Laboratories supports quality of service, mutual confidence and rec-

ognition of test results.

- By participating in working groups each *National Certification Body* (NCB) has a vote in the Certification Management Committee which rules the certification procedures.
- The scheme provides five confidence levels for Test Laboratories. The range is from progressing from full control of testing by an accredited Test Laboratory (CBTL) to full confidence in the capabilities of the manufacturer's laboratory (RMT). Among these the *Test Witnessing*, also called *Supervised Manufacturer's Testing* (SMT).

Disadvantages:

- Due to the absence of governmental control the scheme is characterized by being market driven.
- Peer Assessment for creating confidence for enabling mutual recognition.
- Active involvement is necessary, otherwise NBC and CBTL risk to be cheated.

Applicable elements for ENCC:
The distinction of confidence levels for TEST LABORATORIES seems to be applicable for the ENCC. TEST witnessing or Supervised Manufacturer's Testing (SMT) in the CB Scheme could be an alternative to testing at a TEST LABORATORY, at least in the starting phase.

Scheme: *ITSO, Interoperability Certification of Smartcard Ticketing (UK)*

Advantages

- Commonalities with EETS, both follow an INTEROPERABILITY centred CERTIFICATION approach of existing "IT system".
- The way ITSO is managed and organised, the organisation was built as a non-profit organisation with a close relation to an accredited Test House and service provider.
- The most significant technical committee is responsible for the development and maintenance of the ITSO specification.
- ITSO's accredited service provider and TEST LABORATORY.

Disadvantages

- National approach

Applicable elements for ENCC:

- Non-profit organisational structure.
- Maintenance and continuously adaptation of the ITSO Specification.
- The way the management board is organised and it establishes and authorize groups and committees in its board.

Scheme: *Test Specification for Interoperable EFC-DSRC Systems in Sweden*

Advantages:

- Instead of a traditional third party testing, an *Independent Reviewer* provides a competent and independent review of the tests performed by the EFC supplier. It issues a *Conformity Appraisal Statement* upon review of the EFC supplier's test report.
- The responsibility of the *EFC EQUIPMENT Manufacturer* to provide the necessary proof, in the form of testing, test analysis, test reports and statements of conformity enables a cost-effective and flexible conformity evaluation where the technical parts can be handled by organisations

that have comprehensive technical knowledge and experience in DSRC, EFC, and testing
Disadvantages: • The level of independence of those, carrying out CONFORMITY ASSESSMENT is low and requires some confidence. • Inspection of manufacturing and Follow up measures are not considered. • Purely national scheme, it does not (yet) consider regulations for mutual recognition of test results in the European context.
Applicable elements for ENCC: Due to the relative early status of interoperable EFC and the rare-existence of accredited TEST LABORATORIES and CERTIFICATION BODIES in the EFC domain the deployment of *Independent Reviewers* is a conceivable alternative to traditional third party certification schemes. At least in a first step.

Scheme: *Wi-Fi*

Advantages:
• The centralised structure enables complete control by the *Wi-Fi Alliance*. This includes:
  • creation of the standards,
  • ACCREDITATION of TEST LABORATORIES,
  • CERTIFICATION of the products;
• The scheme is funded by member fees;
• One label ("*Wi-Fi certified*") with additional indication of the supported versions of the standard.

Disadvantages: • Monopolistic structure; • The scheme is funded by member fees • The scheme will work only, if the *Wi-Fi Alliance* has one goal, to place this one standard to the market, the scheme will not work, if there are incompatible standards.
Applicable elements for ENCC: • Stepwise approach in the early years of the scheme; first designate Test Laboratories, then accreditation followed. • The label policy can be transferred to EETS labelling. One label, e.g. "EETS certified" plus additional Interoperability codes for the EFC system. For example: EETS certified for A, CH, D, F.

4.4 Elements Applicable to ENCC

The harmonisation of the applicable elements of the analysed CERTIFICATION schemes with the recommendations derived from the WP1 results led to the following guidelines that have been applied for the development of the ENCC organisational and procedural structure:

- **General Distinction between Test and Certification:**

  This complies with common certification practices, allows national notification of bodies, improves equal treatment, provides flexibility, supports competition,

facilitates mutual recognition of test results, and reduces the potential of discrimination.

- **Distinction between CONFORMITY and INTEROPERABILITY ASSESSMENT:**
  This enables differentiation of standardised and non-standardised European EFC domain, an incremental evolution of the EETS CERTIFICATION scheme, and facilitates differentiation of liability.
- **Deployment of *Independent Reviewer* and/or Test Witnessing:**
  This enables to restrict INTEROPERABILITY ATTESTATION to *Test Witnessing* by an *Independent Reviewer* which takes care for sound and fair ASSESSMENTS especially at TOLL CHARGERS premises (the target system INTEROPERABILITY is strived for).
- **Central Management Structure:**
  This enables a non-profit organisation funded by its stakeholders, demand-oriented installation of authorised groups and committees in its board, benefit from the single responsibility for maintaining and continuously adaptation of an EETS CERTIFICATION REFERENCE FRAMEWORK, and last but not least it enables a one-label policy, e.g. EETS certified plus additional Code for EFC system, like *EETS CERTIFIED FOR A, CH, D, F*.
- **Service Inspections:**
  These enable INTEROPERABILITY ATTESTATION of service elements which are crucial for OPERATIONAL INTEROPERABILITY and thus covering an essential part of the non-standardised European EFC domain.
- **Provisional Certification:**
  This gives more confidence in the EETS CERTIFICATE since it becomes definitive only if the OUC has successfully undergone a proven-in-operation period (e.g. of 4 month) in a real operational environment.
- **Follow up of In-Service Monitoring of *Key Performance Parameters*:**
  The follow-up INSPECTIONS of the Toll Charger's key performance figures allows a differentiated insight in the quality of the various (EETS) OBE registered in the system. This in turn enables quality control and may help to solve conflicts in case of insufficient performance of particular OBE types.

5 Proposal of an ENCC Structure

5.1 Approach

The principle approach outlined by *Expert Group 4* distinguishing "*Technical Certification"* (by the ETCC) and *"Operational Certification"* (by the OCC) was regarded as reasonable and builds the basis for the further development of the ENCC certification structure proposed in this study. This development attempts in the main to combine the characteristics of the European *New Approach* and *Global Approach* with the advantages of schemes proven in the *Voluntary Domain*. In other words, it takes the best of both, the *Regulatory Domain* and the *Voluntary Domain* with the optimal possible convergence between them.

The proposal of the study team aims furthermore at an incremental approach instead of pursuing the "green field" approach that would require a long lasting setting up of specialised TEST LABORATORIES, the necessary technical resources, and the know how in advance. The implementation phase could be handled more flexible. In this phase it could be the *EFC EQUIPMENT Manufacturer*, designated by the *EETS Certification Authority* (EETS-CA) which could act as *Technical TEST LABORATORY* (TTL) and provides as such the necessary proof in the form of testing, test analysis, test reports and ATTESTATION. And it is the TOLL CHARGER, also designated by the *EETS Certification Authority* (EETS-CA) who acts in the beginning of ENCC as *Operational TEST LABORATORY* (OTL) conducting INTEROPERABILITY ASSESSMENT. The latter makes sure, that new EETS EQUIPMENT interoperates with its TOLL CHARGER'S toll system in terms of correctness, accuracy, reliability, and other characteristics.

The role of the CERTIFICATION BODIES (TCCs, OCCs, and EETS-CA) will be the same as in common certifications. In addition to their original role of CERTIFYING CONFORMITY (and INTEROPERABILITY) on the basis of TEST and INSPECTION reports they will witness and review the tests performed by the *EFC EQUIPMENT Manufacturer* and the TOLL CHARGER. The final EETS CERTIFICATE will then be issued by the EETS-CA, which also grants the affixing of an *EETS Compliance Mark*. Due to the complexity and novelty of the matter it is recommended to consider the first four months of EETS Certification as provisional. If no interoperability faults are found during this period, certificates would become definitive.

This approach enables a quick start, since the technical parts can be handled by organisations that have comprehensive technical knowledge and experience in both, the standardised *EFC* domain*, DSRC, UNI* as well as the not-yet-standardised domain of *GNSS/GSM* and enforcement.

The transparency of the certification procedure will be achieved by inserting and keeping up to date all key information in the CERTIFICATION INFORMATION SYSTEM (CIS). All involved parties, APPLICANT*s*, TEST LABORATORIES, CERTIFICATION BODIES will have access to this information. The CIS will be hosted and administered by the EETS-CA.

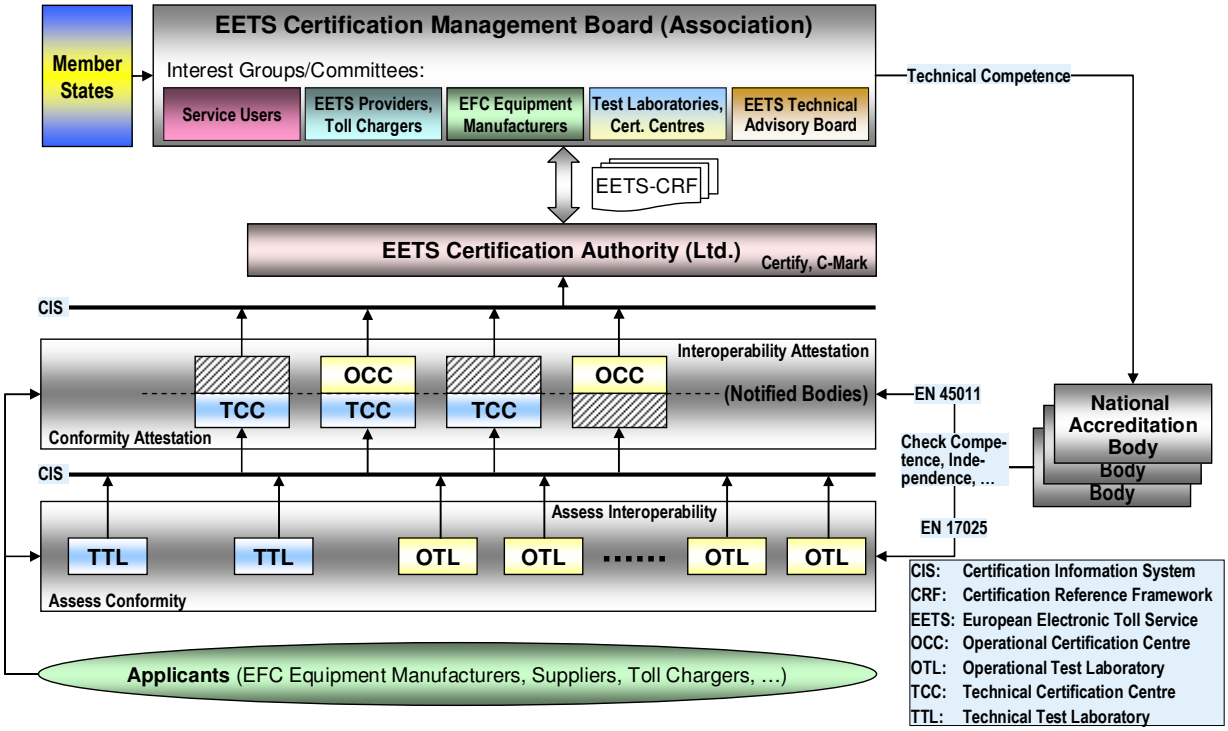
Once interoperable EFC is more mature and is in operation across Europe the CONFORMITY AND INTEROPERABILITY ASSESSMENT processes may also be formalised and become more third party oriented on TEST LABORATORY level.

If the *Electronic Toll Directive* 2004/52/EC or the related *EC Decision* requires the notification of bodies in charge of certifying conformity with ESSENTIAL REQUIREMENTS (typically for the *New Approach* directives) it will be the CERTIFICATION BODIES (OCC and TCC) that are the candidates for being designated as NOTIFIED BODY by the responsible authorities of the participating Member States.

The ENCC structure as proposed in the following sections is divided into *Organisational Structure* and *Certification Procedure;* both representing the steady state scenario. That is to say TECHNICAL TEST LABORATORIES (TTLs) and OPERATIONAL TEST LABORATORIES (OTLs) are illustrated as third parties. For the ENCC implementation phase they can be easily replaced by *EFC EQUIPMENT Manufacturer*s and TOLL CHARGERS as mentioned above.

5.2 ENCC Organizational Structure

For the ENCC organizational structure the following entities and interrelations are proposed:



Organizational Structure proposed for ENCC

A detailed description of the responsibilities is subject of the subsequent paragraphs.

5.2.1 EETS CERTIFICATION Management Board (EETS-CMB)

The EETS-CMB will be a non-profit organisation within the EETS INTEROPERABILITY MANAGEMENT, composed of members representing the various interests of the European EFC stakeholders. Its aim is to manage the operational EFC certification in Europe, - one reason why it should be part of the EETS INTEROPERABILITY MANAGEMENT. Some of its key responsibilities will be:

- To manage and supervise the whole EETS certification program;
- To set up and maintain the EETS CERTIFICATION REFERENCE FRAMEWORK (EETS-CRF) which will reflect the permanent, convergent evolution of the European EFC domain, being used as a reference for all the actors involved in the EETS certification program;
- To support the *CERTIFICATION Centres* (OCCs, TCCs) to solve conflicts arising from different interpretations of conformity and interoperability requirements.

5.2.2 EETS CERTIFICATION Authority (EETS-CA)

The EETS-CA will be a limited company belonging to the EETS-CMB (or alternatively an independent non-profit organisation under the authority and responsibility of the European Commission). It will be the authority within the ENCC, which establishes and operates the policies and practices of the EETS certification scheme. It will take care for equal treatment of APPLICANTS and OUCs within the ENCC. The members will be designated by the EETS-CMB. The key responsibilities will be:

- To evaluate conformity and INTEROPERABILITY ATTESTATIONS and related documentation;
- To designate TEST LABORATORIES and CERTIFICATION BODIES (TCCs, OCCs);
- To administer content and process management in the CIS;
- To issue the EETS Certificate(s);
- To grant the affixing of the *EETS Compliance Mark* with additional marks of supported EFC system for the certified OUC;
- To give rise to *Follow up* INSPECTIONS (*Factory INSPECTIONS*, *In-service Monitoring*);
- To take care for equal treatment of APPLICANTS and OUCs within the ENCC. This may include the solving of disputes arising from conflicting interests of the parties involved, e.g. caused by the necessity of testing an EETS-OBE at the TOLL CHARGERS premises that competes with the TOLL CHARGERS own OBE, - another reason for incorporating the EETS CERTIFICATION in the EETS INTEROPERABILITY MANAGEMENT.
- To host and to administer IT of the *Certification Information System* (CIS);
- To manage content and EETS-CRF in the CIS.

5.2.3 TECHNICAL CERTIFICATION CENTRES (TCCs)

TCC will be independent bodies that are accredited for compliance with EN 45011 by an ACCREDITATION BODY for ATTESTING conformity of EFC equipment. They issue EFC CONFORMITY ATTESTATIONS based on the test results submitted by a Test Laboratory for CONFORMITY Testing.

If the *Electronic Toll Directive* 2004/52/EC or the related *EC Decision* requires the notification of bodies in charge of certifying conformity with ESSENTIAL REQUIREMENTS, the TCC can also represent a NOTIFIED BODY, designated by a national authority and/or by authorities of further *Member States* for the use in the enforcement of the European legislation.

The key responsibilities will be:

- To define/approve test procedures for CONFORMITY of standards and specifications and the technical INTEROPERABILITY between *EFC EQUIPMENT Manufacturers* derived from the EETS-CRF;
- To request and evaluate supplier's DECLARATIONS, CONFORMANCE ATTESTATIONS, CERTIFICATES from the APPLICANT required by relevant EC directives;
- To check and approve the TEST LABORATORY'S conformity test plan derived from the procedures and the EETS-CRF;
- To evaluate TEST results provided by the TEST LABORATORY;
- To issue EETS CONFORMITY ATTESTATIONS;
- To inspect EFC equipment production (*Factory INSPECTION*).

If accreditation is not available by the time of service request, the designation by the EETS CMB will be sufficient in a first instance.

5.2.4 Operational CERTIFICATION CENTRES (OCCs)

OCC will be independent bodies that are accredited for compliance with EN 45011 by an ACCREDITATION BODY for attesting INTEROPERABILITY of EFC equipment and/or services. The INTEROPERABILITY ATTESTATION issued is based on the test results of the TEST LABORATORY for INTEROPERABILITY ASSESSMENT.

If the *Electronic Toll Directive* or the related *EC Decision* requires the notification of bodies in charge of certifying conformity with ESSENTIAL REQUIREMENTS, the OCC can also represent a NOTIFIED BODY, designated by a national authority and/or by authorities of further *Member States* for the use in the enforcement of the European legislation.

The key responsibilities will be:

- To define/approve test procedures for operational INTEROPERABILITY between EFC Operators derived from the EETS-CRF;
- To check and approve the TEST LABORATORY'S INTEROPERABILITY test plan derived from the TEST procedures and the EETS-CRF;
- To evaluate TEST results provided by the TEST LABORATORY;
- To inspect service components needed for INTEROPERABILITY (e.g. *Contract Issuing, Service Payment*, …);
- To issue EETS INTEROPERABILITY ATTESTATION.

If accreditation is not available by the time of service request, the designation by the EETS CMB will be sufficient in a first instance.

5.2.5 Technical TEST LABORATORIES for Conformity TESTING (TTLs)

TTLs will be independent bodies that are accredited for compliance with EN/ISO 17025 by an ACCREDITATION BODY for testing conformity to standards and specifications of EFC equipment. They carry out the CONFORMITY ASSESSMENT of EFC EQUIPMENT according to a specified test plan which has to be agreed with the TCC and the Toll Charger in case of RSE. The test results are submitted to the TCC for achieving CONFORMITY ATTESTATION. Some of their key responsibilities will be:

- To generate and keep up to date a detailed conformity test plan derived from the EETS-CRF to be approved by the TCC;
- To execute tests in accordance with approved test plan;
- To compile test results for the APPLICANT and the TCC.

If accreditation is not available by the time of service request, the designation by the *EETS Certification Management Board* will be sufficient in a first instance.

Due to the fact that EFC CONFORMITY ASSESSMENT require special know how, test equipment, and a specialized EFC technical environment for test execution – comparable e. g. with Factory Acceptance Tests – it is possible that the APPLICANT (*EFC Equipment Manufacture*r) itself becomes an accredited/designated TEST LABORATORY for CONFORMITY TESTING.

5.2.6 Operational TEST LABORATORIES for INTEROPERABILITY TESTING (OTLs)

OTLs will be independent bodies that are accredited for compliance with EN/ISO 17025 by an ACCREDITATION BODY for testing INTEROPERABILITY of EFC EQUIPMENT. They carry out the INTEROPERABILITY ASSESSMENT of EFC EQUIPMENT according to a specified test plan which has to be agreed by the OCC and by the TOLL CHARGER which is responsible for the operation of the EFC system.

For this purpose they need both, the knowledge of the EFC System to which INTEROPERABILITY shall be achieved and an agreement with the TOLL CHARGER enabling the execution of INTEROPERABILITY tests on the target EFC system on site. Some of their key responsibilities will be:

- Verifying the ability of EFC EQUIPMENT, in case of an OBE personalised by the EETS PROVIDER/CONTRACT ISSUER and integrated in a vehicle to be used in a the target EFC system;
- To agree a detailed INTEROPERABILITY test plan / INSPECTION plan derived from the EETS-CRF with the OTL;
- To conclude and to maintain agreement(s) with TOLL CHARGERS for executing tests in the real or productive-like target EFC environment.
- To compile test results for the APPLICANT and the OCC.

If accreditation is not available by the time of service request, the designation by the EETS CMB will be sufficient in a first instance.

Due to the fact that INTEROPERABILITY tests must be executed in a real (or productive-like) EFC System environment – comparable e. g. with *Site Acceptance Tests* – it is possible that a TOLL CHARGER itself becomes an accredited/designated TEST LABORATORY for interoperability testing. This helps to counteract the conflict of interests a TOLL CHARGER might have when it is also the APPLICANT or when testing a “foreign” OBE competing with the own OBE.

5.2.7 APPLICANT

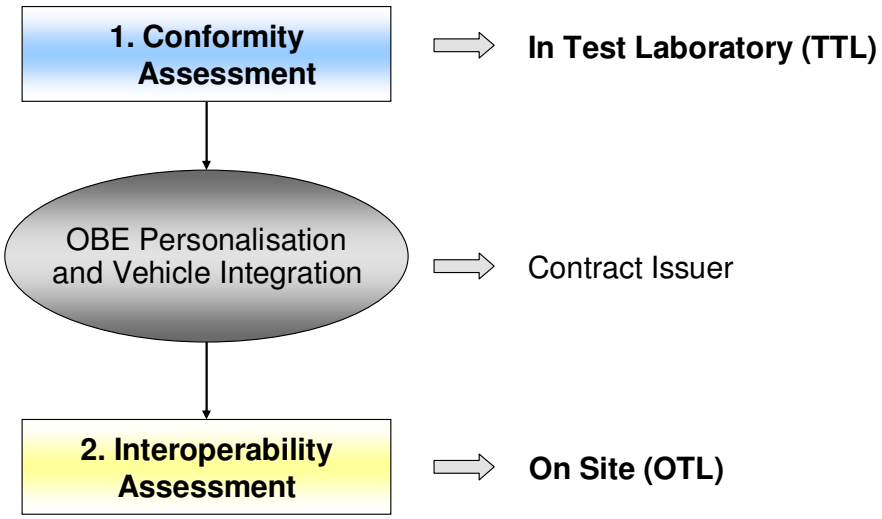
The APPLICANT will be the organisation, designing and producing or operating EFC EQUIPMENT. EFC EQUIPMENT and operational processes have to be in compliance with standards and specifications. It lodges the request for a CERTIFICATION to be issued for a particular EFC equipment. Derived from the nature of this role it may be an

EFC EQUIPMENT Manufacturer, an *EFC EQUIPMENT Supplier*, an EETS PROVIDER or a TOLL CHARGER. The APPLICANT initiates the CERTIFICATION procedure, pays the selected TEST LABORATORY and CERTIFICATION BODY for their service. Some of the key responsibilities will be:

- To define INTEROPERABILITY objectives by specifying to which EFC system(s) the EQUIPMENT/processes shall be interoperable;
- To contract the CERTIFICATION BODIES (TCCs, OCCs) and, if necessary, the Test LaboRATORY (TTLS, OTLS);
- To provide and keep up to date all technical documentation as well as conformity DECLARATIONS and ATTESTATIONS to be submitted;
- To mark (*EETS-Compliance Mark* with additional marks of supported EFC system) the EFC equipment after successful CERTIFICATION;
- To notify any change, non-CONFORMITY or non-INTEROPERABILITY to the TCC and/or OCC.

5.3 EETS CERTIFICATION Procedure

This section describes the procedure that an APPLICANT shall execute for achieving EETS CERTIFICATION. Due to the different natures of tests to be executed, the procedure is sub-divided into two major phases as shown below.

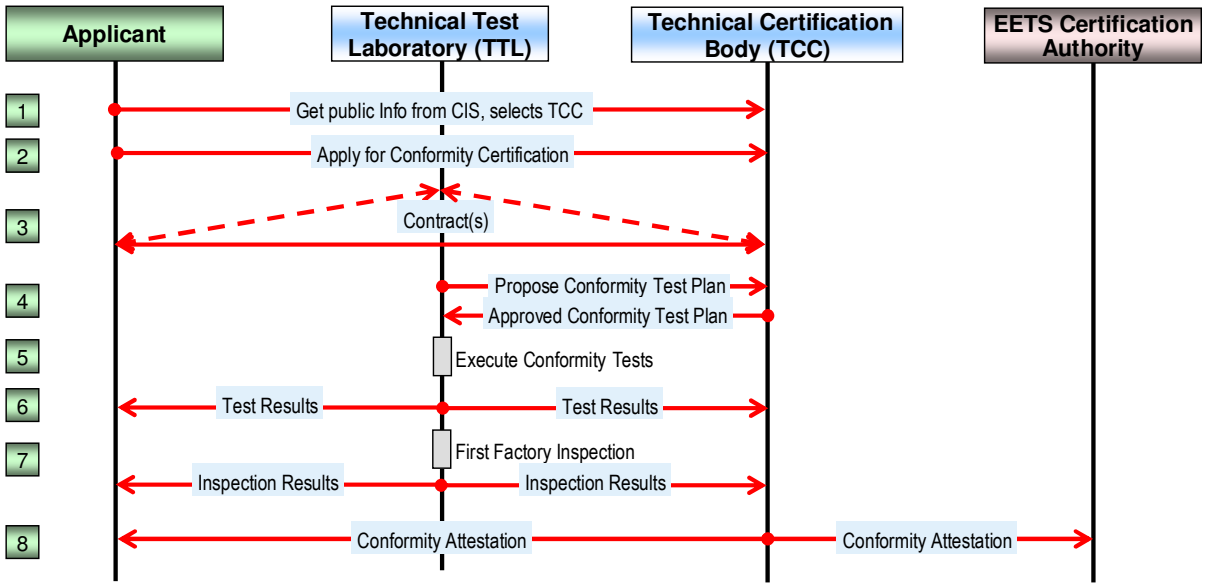


The first phase covers the CONFORMITY TESTS against standards and specifications, being performed in the TEST LABORATORY environment (comparable e .g. with *Factory Acceptance Test*). The second phase covers the INTEROPERABILITY TESTS, basically

conducted in a real (or productive-like) EFC System and in the TOLL CHARGERS premises (comparable e. g. with *Site Acceptance TESTS* and *Operational TESTS*).

5.3.1 Conformity CERTIFICATION Procedure

This sub section outlines the first phase of the EETS CERTIFICATION procedure. It describes the CONFORMITY ASSESSMENT process that will be executed from the APPLICANT'S view point. It assumes the steady state. That is to say the sequence diagram illustrates the *Technical TEST LABORATORY* (TTL) as a *Third Party*. However for the ENCC implementation phase it can be anticipated that the *EFC EQUIPMENT Manufacturer* itself executes CONFORMITY TESTING in its own TEST LABORATORY. Thus the TTL must be regarded as the EFC supplier's (designated) TEST LABORATORY. Once conformant EFC is more mature and is in operation across Europe, the CONFORMITY CERTIFICATION processes may converge in formal CERTIFICATION procedures as outlined in this section. By this time the *Third Party* TTLs probably will have adequately upgraded their test equipment encourage by a worthwhile business case.



Conformity Certification Procedure proposed for ENCC

The sequences above show the basic steps of the CONFORMITY ATTESTATION procedure. The activities are born out of the respective responsibilities of the APPLICANT, the TTL, the TCC and the EETS-CA as outlined in the previous section. The steps represent a simplified scenario because they only involve one CERTIFICATION BODY, and one TEST LABORATORY, but it is sufficient for showing the principle. In practice the procedure is passed several times with different TTLs and TCCs, depending on the

number of Conformity tests necessary. The presented interactions of the diagram have the following meanings from the APPLICANT'S viewpoint:

Step	Description
1	For Applying for CERTIFICATION the APPLICANT shall make sure that it is in the possession of the latest version of the EETS CERTIFICATION REFERENCE FRAMEWORK (EETS-CRF) which is available in the CERTIFICATION INFORMATION SYSTEM (CIS), published and maintained by the EETS-CMB. This framework contains apart from the CERTIFICATION regulations and EFC standards and specifications a list of accredited/designated/notified TEST LABORATORIES, INSPECTION and CERTIFICATION BODIES. With this information the APPLICANT is able to select a suitable TCC. This applies also for the TTL having the required competence/accreditation for the CONFORMITY ASSESSMENT.
2	After having selected a TCC the APPLICANT applies for CONFORMITY ASSESSMENT by completing a *Certification Application Form* downloaded from the CIS, the application shall include: • Identification of the APPLICANT; • Identification of the *Object under Test* (OUT); • CONFORMITY DECLARATIONS/ ATTESTATIONS, giving evidence that the relevant EC directives have been obeyed (e. g. EMC, R-TTE, HMI, …); • Abstract of *Technical Documentation.* Having considered the application the requested TCC shall provide a response to the APPLICANT giving its opinion on whether the application is complete, correct, and conclusive.
3	The information exchange with the TCC allows the *APPLICANT* to estimate efforts, costs and duration and to conclude eventually a contract with it. A similar information exchange of step 2 takes place between the APPLICANT and the TTL that finally results in a contract. It must be noted, that there will be one contract between the CERTIFICATION BODY and the *APPLICANT* if there is an existing (sub)contract between TTL and TCC. After contract(s) conclusion(s) the application will be made available for the EETS-CA by means of the CIS for registration and publication.
4	The TTL shall plan the CONFORMITY TEST e.g. with respect to ISO 14907-1, RTTT–EFC – *Test procedures for user and fixed equipment, Description of test procedures* and ISO 14907-2, RTTT–EFC – *Test procedures for user and fixed equipment, Conformance test for the onboard unit application interface.* This shall include: • Identification and description of the OUT; • Identification of European EFC systems the OUT shall interoperable with; • Identification of standards to be adhered (EN 12253, EN 12795, EN15509, …); • Identification of other specifications to be adhered; • Intention to use relevant existing test results for similar or the same OUT with reasoning; • Outstanding CONFORMITY ATTESTATIONS, DECLARATIONS to be provided by the APPLICANT, giving evidence that the relevant EC Directives are obeyed. • Premises at which CONFORMITY test will be executed. • Intended test facilities, tools and test scripts; • Organisations which are intended to subcontract for supporting the testing / evaluation and analysis, if any;

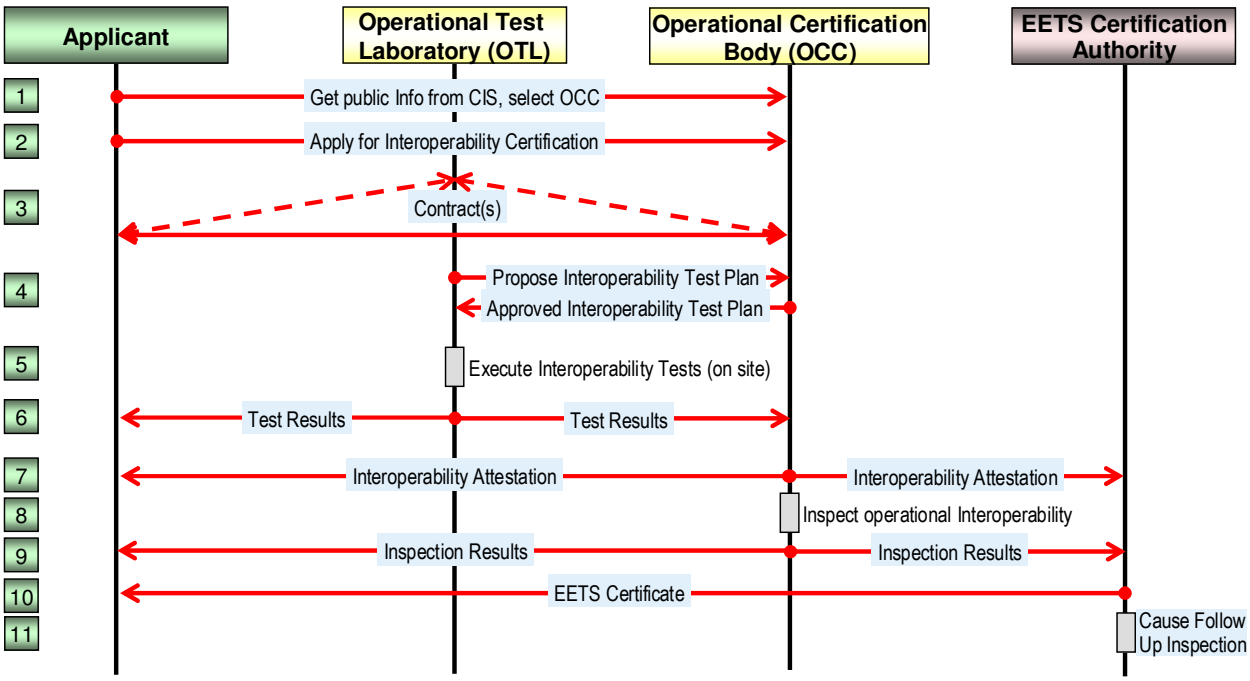
Step	Description
	• Schedule for testing, analysis and identification of tests. The final version of the conformity test plan shall be submitted to the TCC. The TCC shall evaluate the proposed test plan for testing the OUT and approve it – after possible clarifications – for execution. **Note:** The TTL should consult the TCC in the preparation of these outputs in order to ensure that the opinion of the TCC (on whether the test plan will allow adequate CERTIFICATION OF CONFORMITY of the OUT) is considered in the test plan.
5	The TTL shall cause the conformity TESTS to be executed, the analysis to be undertaken and the results to be reported. **Note:** For reasons of the rare comprehensive technical knowledge and experience in EFC and testing DSRC or GNSS/CN technology at the TTLs it must be assumed that the CONFORMITY TESTING is conducted by *the EFC EQUIPMENT Manufacturer's* TEST LABORATORY. The role of the TCC is then to witness tests and to conduct a competent impartial review of the tests performed by the EFC manufacturer.
6	The test results to be submitted to the TCC by the TTL shall include: • Identification and description of the OUT; • The approved final version of the test plan; • Premises at which conformity tests were executed; • Test facilities and tools used; • Identification of specifications which fulfilment have not been furnished prove; • Test layout / configuration (including hardware and software versions); • Test results; • Overall test verdict / recommendation for attesting conformity. The test results delivered **to the APPLICANT** may include in addition: • Test log records; • Details on stuff involved; • Test facilities, test tools and test scripts used.
7	An Inspector of the TCC conducts a *First Factory Inspection* to ensure that all series of EQUIPMENT ordered from the *EFC EQUIPMENT Manufacturer* will perform accordingly to the equipment tested by the TTL. These INSPECTIONS will especially verify the application of the relevant quality procedures defined for the particular production.
8	When all tests of the test plan are passed and when all the data and documents collected during the CERTIFICATION procedure are completed, the TCC shall evaluate the test results and issues – after possible clarifications – a CONFORMITY ATTESTATION to the APPLICANT. This ATTESTATION shall include: • CERTIFICATION BODY issuing the Certificate, • APPLICANT, • OUT, • Scope of CONFORMITY, • Date of issue, • Period of validity, • Reference to test results The TCC shall register and publish the CONFORMITY ATTESTATION in the CIS.

5.3.2 INTEROPERABILITY CERTIFICATION Procedure

This sub section describes the second phase of the EETS certification procedure that must be executed by an APPLICANT striving for INTEROPERABILITY ATTESTATION. Pre-condition for entering the INTEROPERABILITY ASSESSMENT phase is the EETS CONFORMITY ATTESTATION and a personalized OBE, installed in a (test) vehicle.

The procedure described starts from a steady state scenario. That is to say the *Operational TEST LABORATORY* (OTL) are illustrates as a *Third Party*. For the ENCC implementation phase it can be anticipated that the TOLL CHARGER of the target EFC system executes INTEROPERABILITY TESTING in its own - real or simulated - EFC system. In this case the OTL must be assumed as the TOLL CHARGER's (designated) TEST LABORATORY. Once interoperable EFC is more mature and is in operation across Europe the INTEROPERABILITY CERTIFICATION processes may approach the formal CERTIFICATION procedures as outlined in this section. By this time the (third party) OTLs probably will have adequately upgraded their test simulation environment encouraged by a worthwhile business case.

The sequence diagram below illustrates the scenario of the steps to be conducted to achieve INTEROPERABILITY CERTIFICATION and the right to affixing the *EETS Compliance Mark*.



Interoperability Certification Procedure

The sequences above illustrate the basic steps of INTEROPERABILITY ATTESTATION procedure. The activities are born out of the respective responsibilities of the APPLICANT, the OTL the OCC and the EETS-CA (s. previous section). The steps represent a simplified scenario because they only involve one CERTIFICATION BODY, one TEST LABORATORY and one *Target EFC System*, but it is sufficient for showing the principle. In practice the procedure is passed several times with different OTLs and OCCs (and EFC Operators), depending on the number of EFC systems interoperability is strived for.

The presented steps of interaction have the following meanings from the APPLICANT'S viewpoint:

Step	Description
1	Precondition for entering the INTEROPERABILITY ATTESTATION AND CERTIFICATION procedure is the issued EETS CONFORMITY ATTESTATION and an OBE personalised and installed in a (test) vehicle. For Applying for CERTIFICATION the APPLICANT shall make sure that it is in the possession of the latest version of the EETS-CRF which will be available in the CIS, published and maintained by the *EETS Certification Management Board*. This framework contains apart from the CERTIFICATION regulations and EFC specifications a list of accredited/designated/notified TEST LABORATORIES and CERTIFICATION BODIES. With this information the APPLICANT is able to select a suitable OCC. This applies also for the OTL having the required competence/designation/accreditation/notification for the offered service.
2	After having selected an OCC the APPLICANT applies for INTEROPERABILITY ASSESSMENT by completing a *Certification Application Form* downloaded from the CIS, the application shall include: • Identification of the APPLICANT; • Identification of the OUT; • Identification of the interoperability objectives (*Target EFC System*); • the CONFORMITY ATTESTATION; • Abstract of *Technical Documentation.* Having considered the application the OCC shall provide a response to the APPLICANT giving its opinion on whether the application is complete, correct, and conclusive.
3	The APPLICANT selects one of those TEST LABORATORIES that is accredited by a ACCREDITATION BODY and/or designated by the EETS-CA to test EFC products or systems. Once selected it concludes a contract for INTEROPERABILITY ASSESSMENT with the OTL and the OCC. There could be also one contract between the OCC and the APPLICANT if there is an existing (sub)contract between OTL and OCC. **Note:** Due to the fact that INTEROPERABILITY TESTS must be executed in a real (or at least productive-like) EFC System environment – comparable e. g. with *Site Acceptance Tests* – it is possible that a TOLL CHARGER itself becomes an accredited/designated TEST LABORATORY for INTEROPERABILITY TESTING. This helps to counteract the conflict of interests a TOLL CHARGER

Step	Description
	might have when TESTING a "foreign" OBE competing with the own OBE.
4	The OTL shall plan INTEROPERABILITY TESTS. The output of this planning shall include: • Identification and description of the OUT; • Identification of the *Target EFC System* the OUT shall be interoperable with; • Identification of standards to be adhered; • Identification of other requirements specifications to be adhered; • Intention to use relevant existing test results for similar or the same OUT with reasoning. This may include the *Operational Proof Test* executed by the TOLL CHARGER over a period of several months by a certain number of representative users; • EFC System/Premises in/at which interoperability test will be executed; **Note:** Due to the lack of operational EFC simulation environments it must be anticipated that the TESTING is conducted at the *Target EFC System* of the TOLL CHARGER; • Intended test facilities, tools and test scripts; • Organisations which are intended to subcontract for supporting the testing / evaluation and analysis, if any; • Schedule for testing and analysis; The final version of the INTEROPERABILITY test plan shall be submitted to the OCC for approval. **Note:** The OTL shall consult the OCC in the preparation of these outputs in order to ensure that the opinion of the OCC (on whether the test plan will allow adequate ATTESTATION of INTEROPERABILITY respectively of the object under test) is reflected in the test plan. The OCC shall evaluate the submitted test plan and approve it – after possible clarifications – for execution.
5	The OTL shall according to the approved test plan cause the INTEROPERABILITY tests to be executed, the analysis to be undertaken and the results to be reported. **Note:** For reasons of the rare comprehensive technical knowledge and experience in EFC and testing DSRC or GNSS/CN technology at third party TEST LABORATORIES it must be assumed that the INTEROPERABILITY TESTING is conducted in close co-operation with or by the TOLL CHARGER. The role of the OTL is then to witness tests and to conduct a competent impartial review of the tests performed by the TOLL CHARGER.
6	The test results to be **submitted to the OCC** shall include: • Identification and description of the OUT; • The approved final version of the INTEROPERABILITY test plan; • *Target EFC-System* and premises at which INTEROPERABILITY tests were executed; • Test facilities/simulation environment and tools used; • Identification of those requirements which fulfilment have not been proved, with reasoning; • Test layout / configuration (including hardware and software versions); • Test results in terms of adherence of standards and other specifications; • Overall test verdict/recommendation for ATTESTING INTEROPERABILITY; • Test facilities, test tools and test scripts used. The test report **provided to the APPLICANT** may include in addition: • Test log records; • Details on stuff involved;

Step	Description
7	When all tests of the test plan are passed and when all the data and documents collected during the INTEROPERABILITY ATTESTATION procedure are completed, the OCC evaluates the test results and issues – after possible clarifications – an INTEROPERABILITY ATTESTATION to the APPLICANT and to the EETS-CA.
8	• OPERATIONAL INTEROPERABILITY is inspected by a designated Inspector of the OCC. The INSPECTION relates to service components relevant for INTEROPERABILITY such as *Contract Issuing, Service Payment,* or *Customer Service Support.*
9	The INSPECTION results to be submitted to the OCC shall include among others: • The target system(s) the OUT has proven INTEROPERABILITY with; • Identification of the EETS PROVIDER and the TOLL CHARGER that have been inspected; • The service components inspected.
10	The EETS-CA issues an *EETS CERTIFICATE* to the APPLICANT. The CERTIFICATE shall include: • THE TCC issued the CONFORMITY ATTESTATION; • THE OCC issued the INTEROPERABILITY ATTESTATION; • The APPLICANT; • The target system the OUT has proven INTEROPERABILITY with; • Date of issue; • Period of validity; • Reference to detailed TEST result. The EETS-CA shall register and publish the INTEROPERABILITY CERTIFICATE by the CIS. Within the first four months any *EETS CERTIFICATE* issued is considered provisional. If no CONFORMITY or INTEROPERABILITY faults are found during this period, the ATTESTATION will become definitive. If during this period, faults are found, the TEST LABORATORY in charge of related tests shall identify the causes of the problems with the help of those concerned (*EFC EQUIPMENT Manufacturer*, THE TOLL CHARGER, or the EETS PROVIDER) in order to conduct the necessary modifications. The APPLICANT shall be granted the right to affixing the *EETS Compliance Mark* for INTEROPERABILITY of the OUT by the NOTIFIED BODY.
11	The EETS-CA causes FOLLOW UP INSPECTIONS which include *Factory Inspections* of Production, OPERATIONAL INTEROPERABILITY INSPECTIONS and *In Service Monitoring.* The APPLICANT shall notify any systematic failure or non-INTEROPERABILITY to the OCC. The APPLICANT shall keep records allowing the evaluation of the KEY PERFORMANCE INDICTORS.

6 Technical Procedures to be considered

Within the scope of Work Package 4 the technical procedures and facilities had to be listed for the TESTS of the EFC EQUIPMENT with regard to the technology and operation. Paragraph 5.3, *EETS Certification Procedure* introduced such procedures on an abstract level by outlining the technical and operational ASSESSMENT process for CERTIFICATION. The next level of (more) detail requires the consideration of standards/specifications to be applied.

From the CERTIFICATION point of view presently two general domains of technical specifications have to be recognised as being relevant:

1. The standardised European EFC domain, which is characterised by existing material such as European directives, CEN and ISO documents; and
2. the non-standardised European EFC domain, which is specified by
   - requirements from the national road charging applications in Europe,
   - results of previous European road charging projects, and
   - relevant findings of the Commission's Expert Groups and results from previous European road charging projects.

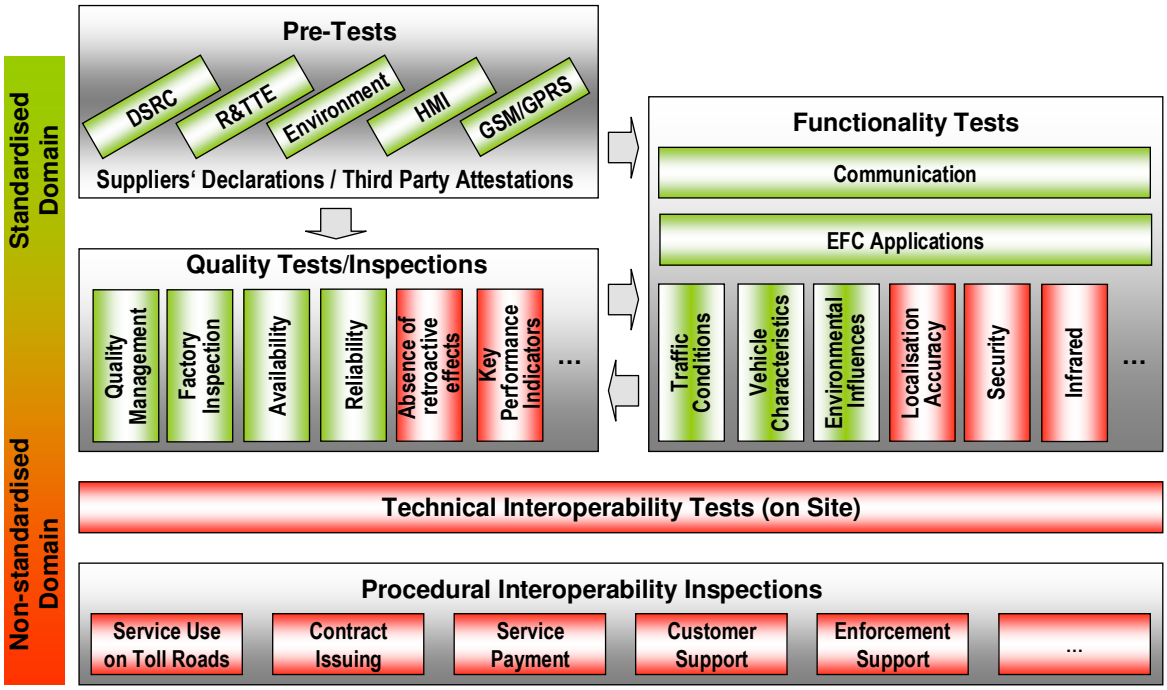
Technical procedures for the first domain can be developed on the basis of experiences from, and the adaptation of established CONFORMITY ASSESSMENT procedures. They take place basically in a laboratory environment. The second domain is, besides autonomous EFC systems, associated with the INTEROPERABILITY ASSESSMENT. The related procedures are very different from those deployed for CONFORMITY ASSESSMENT since it takes place in an operational environment (s. *Annex 9, Frequently Asked Questions* "*Why CONFORMITY TESTING and INTEROPERABILITY TESTING?"*). The non-awareness of this difference is a reason for a widely spread expectation which should be put into perspective in this context:

> CERTIFICATION does not mean "*Bring a box to a test lab and waiting whether tests have passed or not*". Complex specifications like those handled in the EETS context bear the difficulty in defining the *CERTIFICATION Scope*. It is finally the CERTIFICATE which must clearly and precisely state to which standard, specification the OUC (OBE, RSE, or (part of) service) is conformant with. And it is the same CERTIFICATE which must clearly state to which particular national road charging application(s) and/or reference the OUC is interoperable with.
>
> CONFORMITY EVALUATION takes place sensibly after standards have been

agreed or on the basis of proven specifications or at least of "*Golden References*". With regard to the early status of the standardised European EFC domain it cannot however be expected that CONFORMITY and/or INTEROPERABILITY ASSESSMENT can be performed in the usual manner. For that TEST LABORATORIES need first of all a common basis of standards that enable to equally (in the sense of all labs do it in the same way) and consistently test and prove CONFORMITY to meet the declared or required performance.

A lot of energy has been put in the analysis of the available specifications from the CERTIFICATION point of view, but this effort did not lead to a satisfying result with regard to the expectations outlined above and in the *Introduction* of this report (see par. 2) as well. *Annex 7, Interrelations of relevant specifications for EFC* and the related statements give an idea of the attempt to proceduralise the relevant specifications identified so far.

Nevertheless the results achieved so far are illustrated in the figure below. It is based on the CEN ISO/TS 14907-1*, RTTT-EFC Test Procedures for users and fixed equipment*. This standard specifies the test procedures for EFC RSE and OBE with regard to the conformance to standards and requirements for TYPE APPROVAL and acceptance TESTING which is within the realm of EFC application. Since it is limited to automated (electronic) payment using a standardised DSRC it was extended, especially by procedures for the non-standardised European EFC domain.



Technical Procedures in the EETS Certification Process

The figure shows the general structure of test and INSPECTION procedures or groups of them deemed as relevant for EFC EQUIPMENT systems. The ENCC approach starts from the assumption that *Pre-Tests* are in the responsibility of the APPLICANT (*EFC EQUIPMENT Manufacturer*, components provider, supplier) since these are tests or ATTESTATIONS more or less covered by the application of EC directives or other established TYPE APPROVAL procedures. It is the APPLICANT that carries out the necessary tests for CONFORMITY DECLARATION or takes care for *Third Party ATTESTATIONS* according to the requirements of the directive. The *Pre-Tests* should be conducted prior *Quality Tests/Inspections* and *Functionality Tests*. The *Quality Tests/Inspections* and *Functionality Tests* can be executed concurrently but prior the *Technical INTEROPERABILITY TESTING* and the *Operational INTEROPERABILITY INSPECTIONS*.

The following sub sections list the objects to be covered by each test/INSPECTION procedure. *CEN ISO/TS 14907-1* provides further details on the groups *Quality Tests/Inspections* and *Functionality Tests* by assigning the test types *Laboratory, Inspection, Simulation, Field Test* and thus the necessary facilities.

The specific test procedures which are required for a specific EFC system shall be identified and listed in the test plan as mentioned in section 5.3 *EETS Certification Procedure*.

6.1 Technical Procedures for the Standardised European EFC Domain

The following structure is derived from *CEN ISO/TS 14907-1*. The identified procedures are assigned to the groups:

- Pre-Tests,
- Functionality Tests, and
- Quality Tests / Inspections.

This structure was preserved, only a few procedures were added which are briefly described in the following subsections.

6.1.1 Pre-Tests

The EFC roadside and on-board equipment shall comply with the EC directives e.g. for R&TTE, GSM, or *Environment* and the regulations and standards applicable in the countries and regions in which it will be operated. The relevant parameters have to be considered during overall test planning. Results of already carried out tests and

approvals have to be taken into account and have to be compared with the requirements of the specific EFC application.

6.1.1.1 DSRC

The procedures for the DSRC tests cover the following areas:

- Layer 1,
- Layer 2, and
- Layer 7, if not covered by Functionality Tests (s. below).

6.1.1.2 Environment

The procedures for the environment tests cover the areas:

- Basic parameter;
- Mechanical;
- Electrical;
- Chemical/Biological;
- Safety.

6.1.1.3 R&TTE

Test procedures for the R&TTE are related to OBE and RSE within the scope of the R&TTE directive (s. *Annex 5, Relevant European Directives*). It covers basically the areas:

- Radio Interference (EMC) and
- Effective use of radio frequency.

6.1.1.4 HMI

The procedures for tests of the *Human Machine Interface* cover areas like

- Presentation of information and
- safe system interaction with driver.

6.1.2 Quality Tests/Inspections

6.1.2.1 Quality Management

The QM system of an organisation is determined by the objectives of the organisation, by its products and by the practices specific to the organisation.
EN ISO 9001 specifies the requirements for a quality management system, including the design, development, production, installation, and maintenance. The compliance

to this standard constitutes a minimum requirement for all organizations claiming compliance to EFC equipment standards or operating an EFC system.
The *EFC EQUIPMENT Manufacturer*/EETS PROVIDER/TOLL CHARGER is required to provide evidence to the TECHNICAL CERTIFICATION BODY (TCC) that such current EN ISO 9001 compliance CERTIFICATION is held by the manufacturer.

6.1.2.2 Factory INSPECTION

These INSPECTIONS shall ensure that all series of equipment ordered from the *EFC EQUIPMENT manufacturer* will perform accordingly to the CERTIFIED EQUIPMENT. They will especially verify the application of the relevant quality procedures defined for the particular production.

6.1.2.3 Reliability, Availability TESTING

Procedures for reliability and availability TESTING may refer to standard methodologies, e. g. using an analytical reliability model, a simulation model, or test on samples of equipment.
For the RSE, a reliability model includes factors as:

- number of communication components (i.e. beacons or antennas) involved for a given toll plaza configuration (especially significant in multilane situations);
- possibility of component or subsystem redundancy to avoid failure;
- ability to store transactions in stand alone mode in case of failure of the link between RSE and central system this is not strictly speaking a DSRC functionality, but shall be performed at the RSE level, and is a key point for most tolling systems.

For the OBE, physical tests will be performed on sample equipment. There are some issues that are specific to the DSRC environment and which need specific test prescription as:

- RSE-OBE transaction reliability;
- physical life duration of an OBE given the conditions in a vehicle;
- battery duration of an OBE under operating conditions;
- life duration of smart card (e.g. contacts, memory read/write cycle).

6.1.2.4 Absence of Retroactive Effects

For OBEs enabling the operation of multiple services as e.g. for *Value Added Services* a test procedure must be in place which proves the absence of retroactive ef-

fect pertaining the pure EFC service. This is due to the fact that any attached component or service bears risks concerning security (manipulation, integrity), availability, and data protection (use/exploitation of personal data, stored and operated in the OBU. These tests have some relation to security also.

6.1.2.5 Inspecting Key Performance Indicators

New EETS OBEs introduced in an existing EFC system may influence key performance indicators. The TOLL CHARGER generates and keeps available records of the *In Service Monitoring* allowing the EVALUATION of these indicators by third party.

6.1.3 Funtionality TESTING

Procedures for *Functionality Tests* are related to components or to a complete EFC system consisting of an OBE, RSE or both and RSE/OBE in combination. The objective of the tests is to validate that the equipment to be tested fulfils the functional and technical requirements of the specification. The proof consists of INSPECTIONS, simulations and tests which shall ensure that the system specifications and the equipment of EFC are in conformance with the EFC requirements based on standards and regulations, national requirements or other, non-standardised requirements.
In the following a set of tests are described which need to be covered by procedures. Which tests are relevant and sufficient to prove the performance of an EFC system or components of it has to be defined by a specific test plan.

6.1.3.1 Communication TESTING

The test procedures and specifications with regard to communication are defined in CEN ISO/TS 14907-2. This standard specifies the tests that verify OBU conformance of implemented communication (transaction) protocols to the details specified in EN ISO 14906 to be used for EFC applications (This standard can also be used as a source of inspiration for RSE testing against EN ISO 14906).
The document describes general requirements for conformance testing and specific test procedures for:

- Basic DSRC Layer 7 functionality;
- EFC application functions;
- EFC attributes(e.g. EFC application information);
- addressing procedures of EFC attributes and (hardware) components (e.g. In Circuit Cards and HMI);

- EFC transaction model;
- behaviour of the interface.

6.1.3.2 EFC Application TESTING

The test procedures of *EFC Application Test* cover the following areas:

- Validation of the specification;
- Implementation tests;
- Functionality tests.

6.1.3.3 Infrared

The infrared interface enable transaction between OBEs and support beacons as well as transactions between OBEs and enforcement beacon in the German toll system. Corresponding test procedures for interface tests need to be established.

6.1.3.4 Traffic Conditions

The test procedures of *Traffic Conditions* cover the following areas:

- Longitudinal distance between vehicles;
- Lateral distance between vehicles;
- Lateral distance between OBE's;
- Speed of vehicles;
- Driving angle;
- Lane changing;
- Shadowing;
- Traffic scenarios - free flow;
- Traffic scenarios – restricted;
- Traffic volume.

6.1.3.5 Vehicle Characteristics

The test procedures of *Vehicle Characteristics Tests* cover the following areas:

- Length, height, and width of vehicle;
- Length of bonnet;
- Other vehicle features including weight, number of axles, volume, shape paintwork, colour, air conditioner, mobile communication equipment;

- Constructive elements like superstructures in the windscreen area lorries with external sun visors car transporter with projecting loading surface, sun roof (open/closed)/roof mountings;
- Attenuation of windscreen, caused by e.g. metallised, coated, heated, dirty windscreen;
- Angle of windscreens horizontal plane cars, small trucks and vans trucks, bus & touring cars;
- Angle of windscreens vertical plane location in the outer curve area;
- Mounting height of OBE antenna;
- Lateral mounting of OBE antenna from middle of windscreen;
- OBE behaviour in terms of variation of supply voltage, operational state of OBE, fixing of OBE, Integrated Circuit Card behaviour.

6.1.3.6 Environmental Influences

The test procedures of *Environmental Influences Tests* cover the following areas:

- Width of pavement;
- Number of lanes;
- Other topographical influences;
- Water and dust;
- Temperature, humidity and day light;
- Other weather conditions.

6.1.3.7 Accuracy TESTING

A test procedure for these kinds of tests relates to the measuring of the accuracy of recognising geo-objects (to be defined) of autonomous OBEs. This includes verification of the applicability of the equipment of specific stretches of tolled network and its integration in the local systems and the resolution of the most critical roads (to be defined).

6.1.3.8 SECURITY

This relates to procedures for TESTING SECURITY mechanism to be used by the EETS PROVIDER in verifying the claim. This may include key management, digital signature etc. The compliance to ISO/IEC FDIS 27001, *Information Technology – Security Techniques – Information Security Management Systems – Requirements* and ISO/IEC 17799, *Information Technology – Security Techniques – Code of Practice*

for Information Security Management constitutes a minimum requirement for the EETS PROVIDER and the TOLL CHARGER.

6.2 Technical Procedures for the non-standardised European EFC Domain

In the context of this study the non-standardised European EFC domain is associated with TECHNICAL and OPERATIONAL INTEROPERABILITY ASSESSMENT. The underlying CERTIFICATION procedures are roughly described in section *5.3.2 Interoperability Certification Procedure.*

The investigations on how to cope with the non-standardised European EFC domain in terms of CERTIFICATION led to the question "*What needs reasonably being certified?*" For answering this question it is necessary to go a way back in the background of CERTIFICATION.

The common reason for CERTIFICATION is to give consumers or purchasers some confidence that claimed characteristics (e.g. conformity functionality, or compatibility) or presumed characteristics (e.g. safety, security, or quality) of a product apply. This is justified and established for most cases like for consumer products or for safety related products and will apply also for CONFORMITY ASSESSMENT in EFC (standardised domain). But from the viewpoint of the ENCC-Study team it cannot be transferred to INTEROPERABILITY ASSESSMENT without restrictions for the following reasons:

- CERTIFICATION needs standards or clearly specified requirements. This does not unrestricted apply for the EFC domain on hand. The minimum set of functionality, interface specifications, service levels are not sufficiently standardised or published (yet) to build a solid basis for INTEROPERABILITY ASSESSMENT.
- CERTIFICATION is "made for conformity" because it states at the end that a product conforms to specified requirements. It generally does not state that an object under certification interoperates with other conformant, or even certified, products.
- Certification should not be overstressed. It does not guarantee compliance to specified standards or the absence of design faults or the exclusion of product failure. It states that a product conforms to specified requirements or at least that no deviations have been identified and gives thus some confidence that the specifications to be fulfilled are fulfilled.
- CERTIFICATION will save money and time if it can be combined with outsourcing of TESTING or Inspection services. This often applies for consumer products

with fast innovation cycles like mobile phones or for safety checks of mass products requiring special test equipment and expertise. But CERTIFICATION can also cause considerable costs in terms of time and money if it requires demanding test environment and know how. For example the simulation of an EFC environment of an autonomous system consumes millions of Euros that a TEST LABORATORY would have to invest. It will be difficult to justify the investment in and the maintenance of such resources for TESTING CONFORMITY and INTEROPERABILITY required for CERTIFICATION purposes only.

- CERTIFICATION does not replace contractual agreements or take away liability from contractual partners. It should be clear, the degree of which values at stake increase, contractual covering and liability gain in importance. As known from of the automotive industry, vehicle recalls sometimes cause serious economical damage. The risk of this kind of damage is usually not covered by means of CERTIFICATION, at least not primarily. So in the EFC domain. But apart from the substantial economical harm that can be caused by the recall of e. g. malfunctioning OBUs the loss of toll fees can be even worse. The EETS PROVIDER will be requested by the TOLL CHARGER to balance the loss in case of occurrence.

Taking these considerations into account, EETS PROVIDER, *EFC EQUIPMENT Manufacturer* and TOLL CHARGER will have a very own interest to provide conformant and interoperable EFC EQUIPMENT and processes. They will not rely only on CERTIFICATES. They will really make sure on their own that new EETS EQUIPMENT fits in their systems in terms of conformity, correctness, accuracy, reliability, and others. This applies especially for the INTEROPERABILITY ASSESSMENT. For liability reasons the TOLL CHARGER will not accept any EETS OBU that has not undergone its own tests. Trustworthy INTEROPERABILITY testing require real operational EFC environment. This can be provided only by the TOLL CHARGER itself.

6.2.1 Technical INTEROPERABILITY TESTING

The search of an adequate basis for conducting the CONFORMITY and INTEROPERABILITY ASSESSMENT led finally to the finding, to restrict in the present phase of the ENCC lifecycle to the available standards. And instead of investigating any further in the question "*How to cope with technical procedures in the non-standardised domain?*" it

was found more appropriate to observe the progress of the RCI project which was faced with the same problem.

Indeed, valuable work on that has already been done in the scope of the RCI project which has analysed the specifications of the above mentioned EFC domains to finally arrive at a consolidated set of requirements ([RCI DEL 1.3] and [RCI DEL 7.1]) covering all specification items relevant for CONFORMITY and INTEROPERABILITY. Each requirement was allocated to the test categories *Factory Acceptance Tests* (FAT), *Site Acceptance Tests* (SAT), or *Operational Tests* (OT). These categories coincide exactly to the ENCC approach. The FAT represent the CONFORMANCE TESTS (standardised European EFC domain), SAT and OT fits the INTEROPERABILITY TESTS (non-standardised European EFC domain) in the ENCC.

At the time this report was drafted RCI was preparing the *Field Trials* being based on the test plans defined for each test category (RCI Del. 5.x). Especially the SAT executed in the six national road charging systems involved (AUTOPASS, ASFINAG, LSVA, TIS, TELEPASS, TOLL COLLECT, VIA-T, VIA VERDE) will be of interest for the technical procedures and the facilities necessary in this non-standardised European EFC domain.

6.2.2 PROCEDURAL INTEROPERABILITY INSPECTIONS

In addition to the Technical INTEROPERABILITY TESTING (SAT and OT) the study team has deemed necessary to carry out PROCEDURAL INTEROPERABILITY ASSESSMENT. PROCEDURAL INTEROPERABILITY is the use of a common format of presentation, the same working procedures and data delivery, and common data elements definitions for the information to be exchanged. It requires a common interpretation of the data objects as well as common rules for their handling.

This category of INTEROPERABILITY comprises services or service components, that are crucial for INTEROPERABILITY. Service components of that kind have been elaborated in [CESARE III, D5.1], *List of relevant procedures for Interoperability.* These are:

- *Governance and Certification;*
- *Service use on toll roads;*
- *Contract Issuing;*
- *Service Payment;*
- *Customer Service Support;*

- *Enforcement Support, and*
- *Promotion.*

Taking for example the service component *Service Payment*. For invoicing the EETS Provider the following functions, each developed by procedures, need to interoperate between the different TOLL CONTEXTS (combinations):

- *Collect stored tolling transactions per issuer;*
- *Claim payment from EETS provider;*
- *Check claim; and*
- *Pay Toll Charger / Inform Toll Charger about payment.*

The INTEROPERABILITY of these functions must be verified by means of service INSPECTIONS. The extent to which these INSPECTIONS can take place is object of further discussion.

7 ENCC Business Case

With the knowledge gained in the work packages 1, 3, and 4, the ENCC business case could be developed as requested in the scope of ***WP2***. The business case was developed by means of Excel tables. For clarity reasons these tables cannot be inserted here. However the tables with the essential information has been prepared for this document and annexed in *Annex 8, Calculation Tables of ENCC Business Case* for further substantiation of the results outlined in this paragraph.

7.1 General Assumptions

The ENCC business case starts from a number of assumptions which had to be met to create a basis for calculations. The major ones are listed hereafter.

- The business case for ENCC starts from the following entities defined in the section ENCC Organizational Structure:
    1. *EETS Certification Management Board* (EETS-CMB),
    2. *EETS Certification Authority* (EETS-CA),
    3. *Technical Certification Centres* (TCCs),
    4. *Operational Certification Centres* (OCCs),
    5. *Technical TEST LABORATORIES* (TTLs) for DSRC systems, and
    6. *Operational TEST LABORATORIES* (OTLs) for DSRC systems
    7. *Technical TEST LABORATORIES* (TTLs) for autonomous systems, and
    8. *Operational TEST LABORATORIES* (OTLs) for autonomous systems.

  The differentiation of entity No. 5 and No. 7 as well as No. 6 and No. 8 turned out to be necessary due to the very different cost structure associated with Testing of these different technologies.
- The so called "*Greenfield Approach*" was chosen as basis, meaning the setting-up of completely new companies.
- The business case assumes a *Steady State*, that is to say all entities are regarded as *Third Party* entities, no supplier TEST LABORATORIES.
- The costs of CERTIFICATION CENTRES and TEST LABORATORIES are covered by service fees.
- The basic assumption start from the demand for ca. 200 initial certifications till 2014, incl. OBE; RSE, and services; ten of them for autonomous EFC systems. The service fees for EFC equipment for example were calculated with

100T€ for a DSRC system and with 1.2Mio € for an autonomous EFC system. Further details can be found in *Annex 8, Calculation Tables of ENCC Business Case.*

- The business case is calculates for a time period of six years, 2009 to 2014.
- An increasing number of test labs and certification centres is assumed in the regarded time period.

7.2 Methodology

The approach used for the estimation of the costs for setting-up and running the eight entities and the calculation of the business case is based on two general data inputs.

- The **fixed costs** consist of administration costs for each operational entities (for setting up the offices, standards and services), office equipment and complex test equipment. This data was estimated by the study team by means of ECXEL sheets.
- The **variable costs** were calculated, based on the estimated demand of services per entity and the fees that can be realistically **charged per service**. The calculations were repeatedly discussed within the study team in order to find a realistic balance with regard to the demand for initial certifications, follow-up certifications and the corresponding costs for work, set-up costs and test materials.

During the calculations the necessary work-loads for each certification was discussed what finally lead to a slight adaptation of services fees.

In order to **calculate the necessary working time and working costs** per operational unit, the service fees were split-up in fees for work (EUR 1.143.- per technician working day) and fees for set-up costs and materials per each service.

Services fees charged by EETS-CA, TCCs, and OCCs lead to 100% working time and working costs in the business case.

Service fees charged by TTLs and OTLs lead to 90% (working time and) working costs and 10% set-up and material costs in the business case.

Assuming a realistic number of 211 effective working days for each technician/expert per year, the total number of working days needed to perform the estimated services for each year was calculated for each of the 8 different units.

The working costs for technicians/experts were then split into three categories: senior technicians, technicians and junior technicians with 3 different cost levels. The further

calculations are based on 25% time and costs for senior technicians, 35% for technicians and 40% for junior technicians.

Finally all **variable costs per unit** - that depend on the number of employees (administrators; technicians/experts) – were estimated, using conservative rates for office space and rent, office expenses, consumables, communication costs, etc.

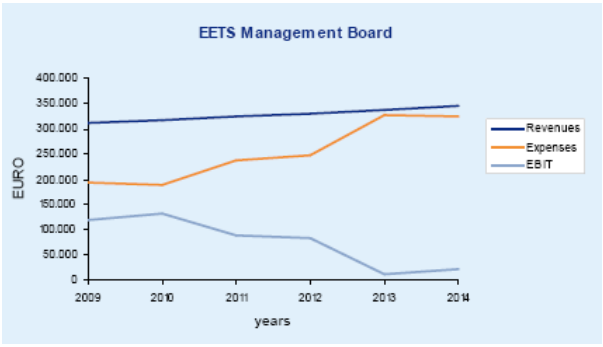
In the first approach, the business case was calculated for the one unit per entity. These results were repeatedly discussed within the study team what iteratively lead to the estimated increase of units per entities for the years 2009 until 2014.

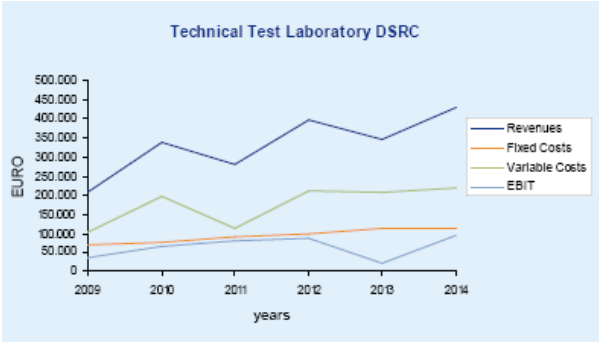
Secondly, we split-up the revenues on the increased number of units per entity, calculating the fixed costs and variable costs per unit, based on the methodology mentioned above.

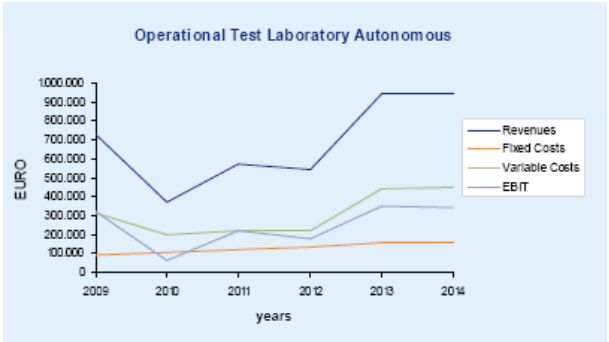
7.3 Conclusions from the business case (realistic case)

The results from the business case show, that the ENCC can be realistically realized, based on the data and assumptions of the study team and their results from work packages 1, 3, and 4.

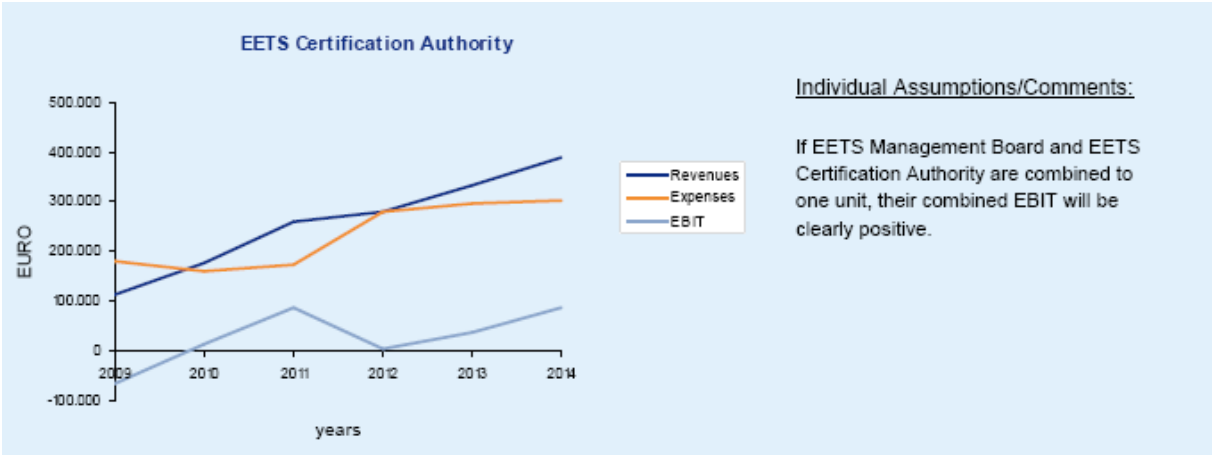
The business case for the 5 entities EETS-MCB, OCCs, TTLs (both, for DSRC and autonomous systems) and OTLs (for autonomous systems) show clearly positive results. All operational entities providing services for autonomous systems show very positive results.

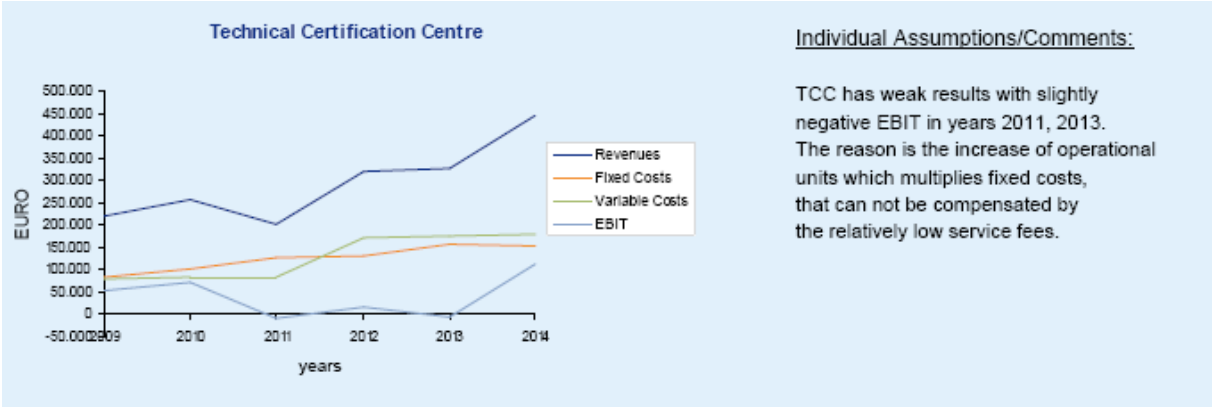


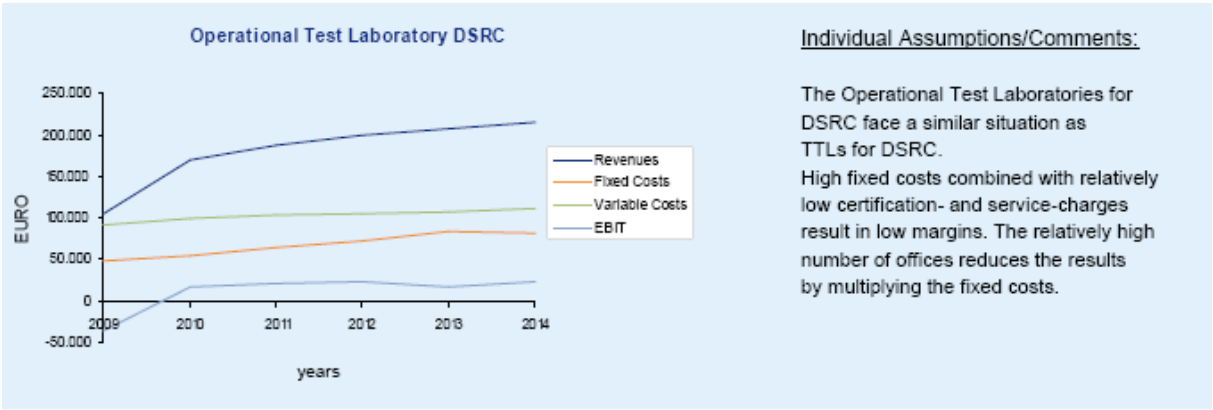




The business cases for the 3 entities EETS-CA, TCCs and OTLs for DSRC systems show slightly negative results in the first year, respectively in the years when new units are opened. Since the business case is based on the *Greenfield Approach*, it can be realistically assumed, that for TCCs and OTLs (for autonomous) coming from existing service providers, even the financial results for the first year of new units will be positive.







7.3.1 Possible solutions to further improve the financial results

7.3.1.1 EETS Certification Authority

The first year is slightly negative. In the second and fourth year the results are only slightly positive. It would therefore make sense to combine the EETS-CMB (e. g. non-profit organization) with the EETS-CA (e. g. 100% service company, belonging to the EETS-CMB). The combination would allow the authority to transfer their financial surplus to the service company, if necessary. The combination would also generate cost reductions through a joint office and reduced administration costs.

7.3.1.2 Technical Certification Centers (TCCs)

For the years 2008 until 2014, the number of TCCs would increase from 1 to 3 units, causing them to be slightly negative in the third and fifths year.

Technical Certification Center (TCC)

YEARS	2009		2010		2011		2012		2013		2014	
TCC												
number of units	1		1		2		2		3		3	
per TCC unit:												
number of technical workers	*1*		*1*		*1*		*2*		*2*		*2*	
Revenues	218.484		254.690		200.250		320.183		326.587		444.158	
variable costs and % of total costs	*-80.234*	*49%*	*-81.838*	*45%*	*-63.475*	*40%*	*-170.289*	*56%*	*-173.605*	*53%*	*-177.160*	*54%*
fixed costs and % of total costs	*-84.730*	*51%*	*-101.529*	*55%*	*-125.385*	*60%*	*-131.652*	*44%*	*-156.800*	*47%*	*-153.576*	*46%*
Total costs	-164.963		-183.367		-208.860		-301.941		-330.494		-330.744	
EBIT (and EBIT-Margin)	53.521	24%	71.322	28%	-8.610	/	18.242	6%	-3.907	/	113.414	26%
EBITDA (and EBITDA-Margin)	61.521	28%	81.322	32%	3.390	2%	34.242	11%	14.093	4%	125.414	28%

EBIT-Margin = EBIT / Revenue
EBITDA-Margin = EBITDA / Revenue

To improve their financial situation, only two TCCs could be opened instead of three. This would cause less fixed and less variable costs per unit, and better utilization of technical staff. The other possibility to improve the financial results would be to significantly increase the service fees, if this is acceptable for the envisaged customers.

7.3.1.3 TTLs and OTLs for DSRC

Both types of DSRC Test Laboratories have relatively high equipment costs upfront, but may only charge much lower service fees, compared to TEST LABORATORIES for autonomous systems.

Technical Test Laboratory DSRC (TTL_{DSRC})

YEARS	2009		2010		2011		2012		2013		2014	
TTL DSRC												
number of units	1		1		2		2		3		3	
per TTL DSRC unit:												
number of technical workers	*1*		*2*		*1*		*2*		*2*		*2*	
Revenues	208.080		339.587		281.432		397.469		345.356		428.843	
variable costs and % of total costs	*-101.042*	*60%*	*-197.635*	*72%*	*-111.618*	*55%*	*-210.036*	*68%*	*-208.230*	*65%*	*-220.053*	*66%*
fixed costs and % of total costs	*-68.760*	*40%*	*-76.280*	*28%*	*-90.305*	*45%*	*-99.977*	*32%*	*-114.418*	*35%*	*-113.251*	*34%*
Total costs	-169.802		-273.915		-201.924		-310.012		-322.648		-333.304	
EBIT (and EBIT-Margin)	38.278	18%	65.671	19%	79.509	28%	87.457	22%	22.708	7%	95.538	22%
EBITDA (and EBITDA-Margin)	81.028	39%	115.421	34%	136.259	48%	153.207	39%	95.458	28%	166.288	39%

Operational Test Laboratory DSRC (OTL_{DSRC})

YEARS	2009		2010		2011		2012		2013		2014	
OTL DSRC												
number of units	2		2		3		4		5		6	
per OTL DSRC unit:												
number of technical workers	*1*		*1*		*1*		*1*		*1*		*1*	
Revenues	104.040		169.793		187.622		198.735		207.214		214.421	
variable costs and % of total costs	*-90.638*	*65%*	*-98.818*	*65%*	*-102.237*	*61%*	*-105.018*	*60%*	*-107.569*	*57%*	*-110.026*	*57%*
fixed costs and % of total costs	*-48.885*	*35%*	*-53.405*	*35%*	*-64.430*	*39%*	*-71.102*	*40%*	*-82.543*	*43%*	*-81.376*	*43%*
Total costs	-139.523		-152.223		-166.668		-176.119		-190.112		-191.403	
EBIT (and EBIT-Margin)	-35.483	/	17.571	10%	20.954	11%	22.615	11%	17.102	8%	23.018	11%
EBITDA (and EBITDA-Margin)	-12.608	/	44.446	26%	51.829	28%	59.490	30%	57.977	28%	61.893	29%

Since it might not be possible (for political reasons) to further reduce the number of TTLs for whole Europe, the solution can only be to significantly increase the service fees for DSRC systems, at least for the first years of ENCC.

7.4 Conclusions from the business case (optimistic case)

The optimistic case for the business case is based on a reasonably increased number for initial certifications and accordingly increased number for follow-up certifications.

As a consequence, the financial results for all 7 entities (EETS CMB not counted) are significantly improved, since the changes do not affect the EETS-CMB.

In the optimistic case, the financial results for the EETS-CA, the TCCs, the TTLs and OTLs for DSRC are positive, even without increasing the service fees for TESTING of DSRC systems.

8 Conclusions and Perspective

Based on the results and findings compiled in the course of the study the following are the key **conclusions** of the study team:

- Certification is not “Bring a box to a test lab and waiting whether tests have passed or not”. Diverse specifications like those to be handled in the EETS context bear the difficulty in defining the certification scope. It is finally the certificate which must clearly state to which standard, specification and/or reference the OUC (OBE, RSE, or (part of) service) is conformant with. And it is the same certificate which must clearly state to which particular national road charging application(s) the OUC is interoperable with.
- Certification should not be overstressed. It can not guarantee CONFORMITY or INTEROPERABILITY from the legal point of view and thus does not replace regulations and responsibilities for liability in case of malfunction.
- Reduction of consequences of interests conflicts caused by tests of competitive OBEs in TOLL CHARGERS premises by legally requiring that such tests have to be supported.
- Central management structure for controlling the certification scheme;
- General distinction between TESTING and CERTIFICATION;
- Distinction between CONFORMITY ASSESSMENT for the standardised European EFC domain and INTEROPERABILITY ASSESSMENT associated with the non-standardised EFC domain;
- Deployment of *Independent Reviewer* and/or *Test Witnessing*;
- Service Inspections for PROCEDURAL INTEROPERABILITY;
- Definitive Certification only after a passed proven-in-operation period;
- Follow up of *In-Service Monitoring* of *Key Performance Parameters*.

Not all aspects could be considered adequately in this study due to the amount of material and the complexity of the matter. The study team recommends therefore as a **perspective** that the outcome of the study on hand should lead to the development of an initial version of an EETS CERTIFICATION REFERENCE FRAMEWORK (EETS-CRF). Such a framework would be used as a reference for all the actors involved in the ENCC. It should include: material

- A list of all relevant standards, specification requirements and reference implementations agreed with EETS stakeholders forming the basis for EETS CONFORMITY and INTEROPERABILITY ASSESSMENT;
- The detailed description of the ENCC organizational structure and the operational procedure to guide its actors;
- The formal description of the elements which have to be tested or inspected and the description of technical procedures, test cases, test suites etc;
- The owner of the EETS-CRF would be the EETS-CMB at the end.

The study report on hand could represent a starting point of such a framework.

In addition the following recommendations are given for the incremental evolution of the EETS Certification scheme:

- Technical procedures should be further developed by assigning standards/specifications parameters, facilities and other crucial characteristics;
- INSPECTION procedures and criteria for service inspection should be developed in detail;
- Criteria to be applied for conducting *In-service Monitoring* should be defined;
- The roles of actors involved in the EETS CERTIFICATION scheme should be further expanded;
- Further effort should be invested in order to extract elaborate and define all service interfaces with possible quality issues and derive the necessary monitoring, inspecting and ATTESTATION tasks;
- The service components relevant for INTEROPERABILITY should be elaborated;
- The question how to solve interests conflicts caused by tests of competitive OBEs in TOLL CHARGERS' premises by legal measures should be further discussed.
- The question of how to deal with new TOLL CHARGERS which do not accept certified equipment, e.g. because they are not satisfied with certain quality characteristics of certified equipment, should be considered also.
- Last but not least further effort should be put in the detailing of a *Certification Information and Project Management System* (CIS) that supports and allows

monitoring of the whole certification process; linking together all parties involved in the CERTIFICATION process (APPLICANT, TTLs, OTLs, CCs, EETS-CS), and provide means for information management (EETS-CRF, specifications, test plans, etc), and process control.

9 Annex

9.1 Annex 1, References

Apart from the Standards and directives referred to in *Annex 5, Relevant European Directives* and *Annex 6, Relevant Specifications for EETS CONFORMITY ASSESSMENT* the following documents have been considered.

Reference	Title, Author, Date
BLUE GUIDE	Guide to the implementation of directives based on the New Approach and the Global Approach European Communities, 2000
CESARE III	D2.1 - Detailed service definition Version 5.1, 2006-07-19 D5.1 - List of relevant procedures for interoperability Version 5, 2006-07-21
CERTECS ATCRF	*Certification for Telematics Components & Services* (GST Sub Project) Deliverable 7.4, Automobile Telematics Certification Reference Framework (ATCRF), V1.0, 2007-01-31
EG2	EFC Expert Group 2, …Definition of parameters to be stored in on-board equipment designed for use with the European Electronic Toll Service, Version 3, April 2005
EG3	EFC Expert Group 3, …Recommendations on enforcement (including cross-border enforcement) for the European Electronic Toll Service
EG4	EFC Expert Group 4*, Certification of the Equipment related to the directive 2004/52/CE*, October 2005.
EG6	EFC Expert Group 6, …INTEGRATION OF ON-BOARD UNITS INTO VEHICLES, Version 1, 2005-07-01
EG9	EFC Expert Group 9, …Specification of the EFC application based on satellite Technologies, Version 3.2, 2006-02-20
EG11	EFC Expert Group 11, Definition of the EFC Application for the EETS based Microwave Technologies, Issue 1, 2006-02-06
EG12	EFC Expert Group 12, Security aspects of the EETS, Final Report Version 1.0, 2007-04-05
ENCC CALL FOR TENDER	Invitation to Tender No. TREN/B5/2-2006; Brussels, EC Directorate-General Energy and Transport, 2006-03-06
ENCC WP1 REPORT	Study on the Implementation of a European Network of Certification Centres (ENCC) for the purpose of the Single European Service of Electronic Fee Collection Progress Report on Work Package 1, Technical Feasibility of the ENCC, Version 0.8, 2007-04-28

Reference	Title, Author, Date
WILES	In Pursuit of Interoperability Anthony Wiles, ETSI PTCC, France Scott Moseley, Farbum Scotus, USA Steve Randall, PQM Consultants, UK IDEA Group Publishing International Journal of IT Standards and Standardization Research, Vol. 2, No.2., 2004
ITIL	ISO/IEC 20000-1:2005 Information technology - Service management - Part 1: Specification ISO/IEC 20000-2: 2005 Information technology - Service management - Part 2: Code of practice
MEDIA	Management of Electronic Fee Collection by DSRC Interoperability, Annex F, OBE Certification Procedures …
MISTER, EXPERT GROUP 9	Minimum Roads European Specification Tolling on Interoperability, Version 2.8, 2006-03-04
RCI DEL 1.3	Road Charging Interoperability Use Case and System Requirements Final report Work Package 1, Deliverable D1.3, V1.0 October 2006
RCI DEL 3.X	Road Charging Interoperability WP3, System Architecture and Interface Specification, Del. 3.2, Operational Procedure Architecture, Version 1.01, Del. 3.3, Minimum architecture for interoperability, V 1.01, Deliverable 3.4, Security Architecture for Interoperability, Version 1.0, April 2007
RCI DEL 4.X	Road Charging Interoperability WP4, Implementation, Implementation of RCI Prototypes, Implementation plan of FELA, ELEM, Q-Free Consortium Version 0.9, September 2007 FAT execution plan of FELA, ELEM, Q-Free Consortium Version 0.4, September 2007 Detailed Implementation Plan of T^2ASK, Version 0.9, September 2007 FAT execution plan of T^2ASK Version 0.9, September 2007
RCI DEL 5.X	WP5, Field Trials Deliverable 5.1, Field Trials Test plan Version 0.9, September 2007
RCI DEL 7.1	Road Charging Interoperability, WP7, *Validation* Deliverable 7.1, Validation Plan, Version 1.0, August 2007

9.2 Annex 2, *ENCC Questionnaire*

Questionnaire European Network of Certification Centres

ENCC Questionnaire

Thank you very much for your interest and, in advance, for your participation in this survey. After a short introduction you will find the questions, which will take about 10 minutes to answer.

Please return the completed questionnaire – preferably by e-mail - to:

TÜV Rheinland InterTraffic GmbH or
Attn. Mr. Dr. Ralf Röhrig
Am Grauen Stein
D-51105 Cologne
Phone: +49 22 18 06 1812
Fax: +49 22 18 06 17 36
eMail: ralf.roehrig@de.tuv.com

TÜV Rheinland InterTraffic GmbH
Attn. Mr. Dietmar Schmitz
Am Grauen Stein
D-51105 Cologne
Phone: +49 22 18 06 1815
Fax: +49 22 18 06 17 36
eMail: dietmar.schmitz1@de.tuv.com

0 Introduction

TÜV Rheinland InterTraffic GmbH was assigned by the European Commission / DG TREN to conduct a study on the implementation of a ***European Network of Certification Centres (ENCC)*** for the purpose of the Single European Service of Electronic Fee Collection. One of the tasks within the study is to gather the opinions of stakeholders in the area of electronic toll collection.

We invite you as one of the stakeholders to participate with your point of view in this survey.

ENCC stands for European Network of Certification Centres. It is related to the EC Directive on the interoperability of electronic road toll systems in the Community (2004/52/EC). This directive is working towards this goal by ruling the technologies and services that shall be used in future electronic road charging systems. These should use one or more of the following technologies:

- Satellite positioning,
- Mobile communications using the GSM-GPRS standard,
- 5,8 GHz microwave technology.

By 2007, the ***European Electronic Tolling Service (EETS)*** will be defined on the basis of one or more of these technologies. This new road charging service will be interoperable throughout Europe. The Directive on the electronic tolling interoperability states that:

- Operators and Member States are obliged to accept interoperable On Board Equipment that is compliant with the EETS.
- Operators are obliged to provide EETS and interoperable On Board Equipment to end users.
- The end user can make use of this service and On Board Equipment on a voluntary basis.

An Expert Group which has analysed the implications of the directive has concluded that there is a need for certification. It recommends to define and to implement a ***European Network of Certification Centres (ENCC),*** able to evaluate and certify the fulfilment of the EETS requirements in accordance with the European Directive.

The current status of the concept proposes a ***European certification label***. This label shall ensure that any compliant EFC (Electronic Fee Collection) equipment and EFC services can be used on any stretch of road participating in the EETS, not depending on

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the country of the supplier of the onboard unit, the country where the contract with the client is signed, nor the country where the travel is paid. Certification organisations being part of the ENCC will give the approval for affixing such a label.

A challenge to be accepted is the heterogeneous nature of the European EFC systems. Dependencies like

- distributed entities (certification bodies, test laboratories, manufacturers, EFC Operators, service providers ...),
- different technologies,
- regulatory requirements and relevant quality labels (e. g. EMC, GSM, WiFi, Blueooth, ...),

will overstrain traditional certification procedures. Automation and process management approaches need to be deployed for implementing an ENCC Scheme. This will connect the various test entities to be involved in order to enable cooperation, work sharing, and monitoring of different segments but with a common target for a "one-stop-shopping" approach when certifying onboard units, road side equipment, central systems and services.

About the survey:

The purpose of the survey is to analyse the views of the different stakeholders involved or interested in a potential ***European Network of Certification Centres (ENCC).***

You will find 5 pages divided into three sections with questions:

1. *About your organisation*,
2. *Questions* about general certification issues
3. *Specific questions* about study related issues

In chapter 4, a Glossary for explanation of special terms was added.

Our internal pre-test showed that it takes approximately 10 minutes to answer all questions. The answers may help us to assess the feasibility of the current ENCC concept and to identify possible improvements.

Your participation is completely voluntary and we assure you full anonymity and the application of international, ethical standards.

The results of this survey or rights thereon will be owned solely by the European Community, which may use, publish, assign or transfer them as it sees fit, without geographical or other limitation.

We would like to thank you very much for placing your time at the completion of this survey's disposal!

Questionnaire European Network of Certification Centres

1 About Your organisation

1.1 How would you categorise your organisation ?

- ☐ Car Manufacturer
- ☐ Certification Body
- ☐ EFC Operator
- ☐ Government
- ☐ OBU manufacturer
- ☐ Logistic Provider
- ☐ Payment Means Issuer
- ☐ Service User
- ☐ Test Laboratory
- ☐ Telecommunication Operator
- ☐ Toll Charger
- ☐ Toll Service Provider
- ☐ Road Operator
- ☐ Other, namely _____

1.2 How would you classify your position at your organisation? (Please mark only one)

- ☐ General Management
- ☐ Marketing & Sales
- ☐ Technical Management
- ☐ Technical/Development
- ☐ Other, namely _____

1.3 Are you familiar with certification? (Please mark only one)

- ☐ Fully (100%)
- ☐ Largely (75%)
- ☐ Moderately (50%)
- ☐ Hardly (25%)
- ☐ Not at all (0%)

1.4 Are you familiar with Electronic Fee Collection (EFC)? (Please mark only one)

- ☐ Fully (100%)
- ☐ Largely (75%)
- ☐ Moderately (50%)
- ☐ Hardly (25%)
- ☐ Not at all (0%)

1.5 Are you familiar with interoperability issues and the planned EETS? (Please mark only one)

- ☐ Fully (100%)
- ☐ Largely (75%)
- ☐ Moderately (50%)
- ☐ Hardly (25%)
- ☐ Not at all (0%)

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Questionnaire European Network of Certification Centres

2 Certification issues

The following questions address specified EETS certification issues. Please rate the following statements by marking the appropriate number or your preference as requested.

2.1 What do you expect from certification regarding EETS?

The Scale of Score: 1- Strongly Disagree, 2- Disagree, 3- Neutral, 4- Agree, 5- Strongly Agree, X- Don't know

2.1.1 Quality of the product/service improves in terms of	1	2	3	4	5	X
Liability	☐	☐	☐	☐	☐	☐
Security/Privacy	☐	☐	☐	☐	☐	☐
Conformity to standards	☐	☐	☐	☐	☐	☐
Interoperability	☐	☐	☐	☐	☐	☐
Reliability	☐	☐	☐	☐	☐	☐
User Acceptance	☐	☐	☐	☐	☐	☐

2.1.2 Cost reduction in terms of	1	2	3	4	5	X
"Outsourcing" of conformity and interoperability testing	☐	☐	☐	☐	☐	☐
Using standards instead of developing proprietary solutions	☐	☐	☐	☐	☐	☐
More vendors/suppliers available	☐	☐	☐	☐	☐	☐
More standardised components available	☐	☐	☐	☐	☐	☐
Others: _____	☐	☐	☐	☐	☐	☐

2.1.3 Increased costs because of	1	2	3	4	5	X
Additional formalism/documentation in the context of certification	☐	☐	☐	☐	☐	☐
Surveillance activities to maintain certificate validity	☐	☐	☐	☐	☐	☐
External service for testing and certification	☐	☐	☐	☐	☐	☐
Others: _____	☐	☐	☐	☐	☐	☐

2.1.4 Time to market for new product will become	1	2	3	4	5	X
shorter	☐	☐	☐	☐	☐	☐
longer	☐	☐	☐	☐	☐	☐

2.1.5 Other effects/benefits because of	1	2	3	4	5	X
Confidence of customers in the product/service increase	☐	☐	☐	☐	☐	☐
Market increases	☐	☐	☐	☐	☐	☐
Competition increases due to common standards	☐	☐	☐	☐	☐	☐
Others: _____	☐	☐	☐	☐	☐	☐

2.1.6 Others expectations: _____

2.2 What percentage of the development costs do you regard as acceptable for certification services (product certification, service inspection or in-service monitoring)?

Percentage: 0%

2.3 What additional time do you regard as acceptable for product/service certification?

☐ 1 month
☐ 2 months
☐ 3 months
☐ others: _____ months

2.4 What kind of certification service is desirable?

☐ Certification after finalising product/service development
☐ Certification as development accompanying product/service process (easier to correct/change/ improve the product/service)?

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Questionnaire European Network of Certification Centres

2.5 What kind of development process do you prefer for EFC components/services?	**1**	**2**	**3**	**4**	**5**	**X**
Assembling of certified components/services (of-the-shelf product)	☐	☐	☐	☐	☐	☐
Self development and certification of all components/services	☐	☐	☐	☐	☐	☐
Assembling of un-certified components and certification of integrated product	☐	☐	☐	☐	☐	☐
Others: _____	☐	☐	☐	☐	☐	☐

2.6 What certification category would you prefer?

☐ Self Declaration
☐ Independent Test Body
☐ Test Witnessing
☐ Others, namely: _____

2.7 In which role do you see your organisation/company within the scope of the future of EETS (see Glossary)**?**

☐ Contract Issuer
☐ EFC Operator
☐ EETS Provider
☐ Interoperability Contract Agent
☐ Payment Means Issuer
☐ Service User
☐ Toll Charger
☐ Transport Service Provider
☐ Other _____

2.7 If an EETS certification working group is started in the scope of a forum, are you prepared to contribute to it?

☐ no
☐ Yes (if yes, please provide us your contact coordinates by separate email/letter or fax)

2.8 If a pilot project in the scope of a R&D framework program is planned, are you interested to participate in it?

☐ no
☐ yes (if yes, please provide us your contact coordinates by separate email/letter or fax)

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3 Study specific questions

What do you expect from technical future regarding EETS scope?

3.1 For which of the following DRSC OBU types should a certification label be available?	**yes**	**no**	**n/a**
DSRC UNI only	☐	☐	☐
DSRC CEN only	☐	☐	☐
Dual Mode (UNI and CEN)	☐	☐	☐
Others: _____	☐	☐	☐

	yes	**no**	**n/a**
3.2 Do you agree that all relevant information (interface specifications, operational specification...) of national, proprietary EFC systems need to be published? (If possible name required info you regard critical) _____ _____	☐	☐	☐

3.3 How could already existing non EFC specific satellite positioning equipment and cellular communication (e.g. Navigation, Fleet Management) be used for future EFC equipment?	**yes**	**no**	**n/a**
Standardise/certify in-car interface for common GNSS/GSM equipment	☐	☐	☐
Install per vehicle dedicated multiple GNSS/GSM equipment	☐	☐	☐
Others: _____	☐	☐	☐

The Scale of Score: 1- Strongly Disagree, 2- Disagree, 3- Neutral, 4- Agree, 5- Strongly Agree, X- Don't know

3.4 Would you agree with the following? The certification should cover …	**1**	**2**	**3**	**4**	**5**	**X**
… different sub systems or modules	☐	☐	☐	☐	☐	☐
… the integration of all relevant sub-systems and modules and their corresponding systems in the vehicle.	☐	☐	☐	☐	☐	☐
… the correct operation in functional interaction context.	☐	☐	☐	☐	☐	☐
… correct implementation of interfaces to the Road Side Equipment (RSE) and/or the central system.	☐	☐	☐	☐	☐	☐
Others: _____	☐	☐	☐	☐	☐	☐

	yes	**no**	**n/a**
3.5 Would you agree to split the certification task betweenEuropean Technical Certification Centres (ETCC) (would be in charge of the technical certification and mainly related to equipment manufacturers) **and Operational Certification Centres (OCC)** (would be in charge of the operational certification and mainly related to Contract Issuers and EFC operators)**?**	☐	☐	☐

3.6.1 How many ETCCs do you regard as adequate for a free and competitive market?	Expected Number	_____
3.6.2 How many OCCs do you regard as adequate for a free and competitive market?	Expected Number	_____

3.7 What do you think are the most important requirements on ETCCs and OCCs?	_____

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	yes	no	n/a
3.8 Which additional technologies and systems apart from the EETS conformant technical equipment and services should be covered by the certification network?			
DRSC interoperability only	☐	☐	☐
Enforcement technologies (e.g. Video, classification systems)	☐	☐	☐
Digital tachograph	☐	☐	☐
Value Added Services or other Telematic Systems (e.g. eCall, Tracking and Tracing)	☐	☐	☐
Others: _____	☐	☐	☐

	yes	no	n/a
3.9 Do you think that a network of certification centres would be a way to assure some level of quality and homogeneity in the certification process?	☐	☐	☐

3.10.1 Would you agree that the role of the Certification Network should cover the following tasks:	yes	no	n/a
Establish, update and maintain the list of standards, specifications and procedures, and the content of the procedures.	☐	☐	☐
Manage relations with contract issuers and EFC operators, especially in cases of conflicts around the reliability of a certification procedure.	☐	☐	☐
Monitor the operations performed by all centres in the network.	☐	☐	☐
Deliver and eventually cancel authorizations to centres to be part of the network and perform the certification procedures.	☐	☐	☐
In general, manage and / or perform any task allowing to ensure the reliability of the certification label towards their users.	☐	☐	☐
Others: _____	☐	☐	☐

3.10.2 Who should be part of the certification network monitoring board?

☐ Contract Issuers	☐ Payment Means Issuers
☐ EFC Operators	☐ Service Users
☐ EETS Providers	☐ Toll Chargers
☐ Interoperability Contract Agents	☐ Transport Service Providers
	☐ Other _____

3.11 Would you agree with the following?	yes	no	n/a
Certification costs should be shared between the ETCCs and OCCs.	☐	☐	☐
The costs of the ETCCs should be covered by the equipment manufacturer, including also the factory tests.	☐	☐	☐
The costs of the OCCs should be shared between EFC operators and contract issuers.	☐	☐	☐
The costs should be assigned according to the costs-by-cause principle	☐	☐	☐
The costs should be shared based on a regulated market (e.g. membership fees)	☐	☐	☐

3.12 Would you agree with the following?	yes	no	n/a
There is a need for interconnecting the involved entities via a certification information system and a process management system to enable/assure quality, homogeneity, and monitoring of the certification process.	☐	☐	☐

If you have any further suggestion regarding the ENCC context, you are kindly invited to send us your comments in addition to your answers.

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4 Glossary

Term	Description
CONTRACT ISSUER	Interoperability sub-actor who issues the service rights to the customer, administers customer and vehicle data.
EFC OPERATOR	Interoperability sub-actor who has the right to collect the toll and is operating the EFC infrastructure on behalf of a Transport Service Provider or Road Authority
EETS	European Electronic Tolling Service; a service enabling users having only one contract and one set of OBE to use a vehicle in all toll domains under the operation of Directive 2004/52
EETS PROVIDER	Main interoperability actor who is offering EETS by issuing OBE, contracts and payment means to the Service Users. They guarantee the payment of the services consumed by their customers the proved by genuine claims from the Toll Chargers. They will claim payment from the Service Users. Sub-actors within the EETS Provision Role are Contract Issuer, Payment Service Provider, Interoperability Contract Agent etc.
INTEROPERABILITY MANAGER	Main interoperability actor who sets the rules for the interoperability and is therefore the regulatory body of the interoperability scheme. It will be responsible for supporting the solving of disputes.
INTEROPERABILITY CONTRACT AGENT	Interoperability sub-actor who negotiates contracts with Toll Chargers and organises payment to them as well negotiates contracts with other entities within the EETS Provider (especially Contract Issuer).
PAYMENT MEANS ISSUER	Interoperability sub-actor who collects the money from the customer and handles the payment of services (e.g. credit or petrol card companies, banks)
SERVICE USER	Main interoperability actor who is taking advantage of the EETS. They will make a contract with one of the EETS Providers and agree to pay for driving in the Toll Charger's toll domain. They can use the interoperability EFC service in the domains of all Toll Chargers. Sub-actors within the Service Usage Role are Customer, Driver, etc.
TOLL CHARGER	Main interoperability actor who is selling the road usage and is receiving tolls from road users. He is responsible for levying toll in a toll domain. He claims payment from the EETS Providers for the road usage of its clients which is guaranteed by a payment guarantee for genuine claims.
TRANSPORT SERVICE PROVIDER	Interoperability sub-actor who provides a transport service to the user (i.e. the road operator, road authority, the "owner" of the road infrastructure)

9.3 Annex 3, Results of the ENCC Survey

9.3.1 Developing the *ENCC Questionnaire*

One reason for developing the ENCC Questionnaire was to enquire general expectations on certification and opinions about the conclusions made by the authors of the EG4 Report. Questions on the responder's organisation category and on its background were raised to recognise (anonymously) possible trends or relations.

The *ENCC Questionnaire* was divided in three-parts:

1. The first one deals with general issues like category of organisation and familiarity with certification and EFC.
2. The second part enquires information about expectations on certification.
3. The third one asks for opinions about the particular conclusions of the EG4 report.

The questions are generally of multiple choice character. However most questions keep open a "backdoor" for open answers via the "*Other__"* option.

The complete questionnaire can be found in Appendix 2 of this report.

9.3.2 Distribution of the *ENCC Questionnaire*

In order to address (and inform) a wide range of interested parties a list of potential stakeholders was set up. This list comprises about **100 addressees** of one or more of the following categories:

- Car Manufacturer
- EG4 members
- **Certification Bodies**
- EFC Operator
- Government
- OBU manufacturer
- Logistic Provider
- Payment Means Issuer
- Service User
- **Test Laboratory**
- Telecommunication Operator
- Toll Charger
- Toll Service Provider.

The questionnaire was distributed by eMail to its addressees by 21st of February 2007.

9.3.3 Analysing and assessing the feedback on the *ENCC Questionnaire*

This paragraph analyses the feedback on the *ENCC Questionnaire*. As analysing tool MS EXCEL has been used. Due to its large size the complete table will be delivered as a file only.

The percentages presented in the subsequent paragraphs are rounded figures. This is because some answers bear some fuzziness in content and/or context. Moreover, not all responders are familiar with certification or EFC and left out answers.

9.3.3.1 Analysing feedback from ENCC Questionnaire, part 1: *About Your organisation*

About 25% of the addressees responded to the enquiry and sent back their completed ENCC Questionnaires. The spreading of responders is shown in the figure below.

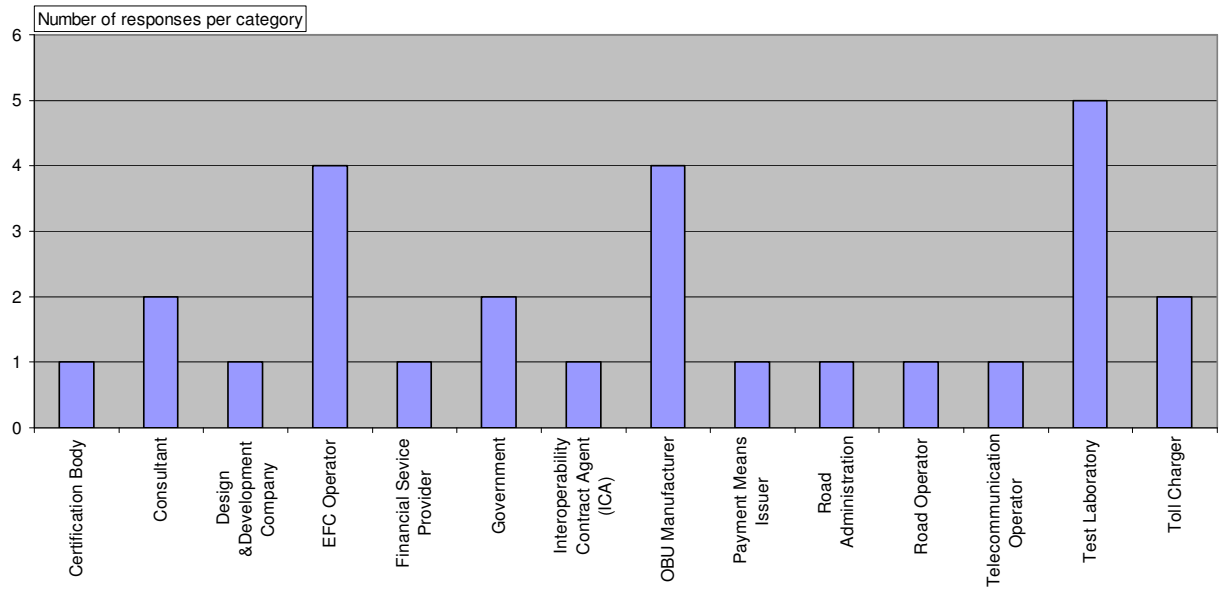


Diagram 1 Feedback on the ENCC Questionnaire, sorted in organisation categories

The diagram illustrates the distribution of the feedback received so far by 2007-04-19 among the relevant categories. The main feedback returned from TEST LABORATORIES + CERTIFICATION BODIES (6). OBU Manufacturers (4), EFC OPERATORS (3) and TOLL CHARGERS (2) did show increased interest too. No response was registered from Car Manufacturers so far.

About 40% of responders are in the position of *Technical Development*, 30% ticked *General Management* as their position in the organisation.
The most responders state to be familiar with the three issues *Certification, EFC* and *EETS*. Around 80% claim to be 75% or 100% familiar with these issues. Most are 100% familiar with EFC.

9.3.3.2 Analysing Feedback from ENCC Questionnaire, part 2, *Certification Issues*

Question 2.1.1: *What do you expect from certification regarding EETS?*

- More than 60% believe (agree or strongly agree) certification improves liability.
- The same goes for reliability.
- Almost 70% think certification improves security.
- More than 90% are convinced certification improves conformity to standards.
- Almost 100% agree or strongly agree with “certification improves interoperability”.
- There is no clear opinion about improvement of user acceptability. 40% think YES, 25% think NO. 35% are neutral in that point.

Question 2.1.2: *What do You expect from certification? Cost reduction because …*

- About 40% think certification reduces costs due to outsourcing of conformity and interoperability testing. The rest are neutral, don’t know, or disagree.
- About 60% believe in cost reduction because of the increased competition of vendors/manufacturers. 20% disagree with that.
- 60% agree with cost reduction caused by more standardised components available.
- More than 90% are convinced that the use of standards instead of proprietary solutions reduces costs.

Question 2.1.3: *What do you expect from certification?Costs increase because …*

- 50% to 60% believe that additional formalism/documentation in the context of certification increases costs. 10% disagree.
- More than 60% think that surveillance activities to maintain certificate validity cause an increase of costs. 10% do not agree.
- 70% are of the opinion that cost increases are caused by external services for testing and certification. About 20 % do not agree with that.

Question 2.1.4: *What do you expect from certification? Time to market ...*

- One half (strongly) disagrees with a shorter time to market because of certification. A quarter (25%) agrees on that. The rest are neutral or do not know.
- 50% to 60% (strongly) agree with a longer time to market because of certification. About 20% disagree. Around 30% are neutral or do not know.

Question 2.2: *Acceptable percentage of development costs for certification service ..*

- A majority of about 50% deems 5% to 10% of development costs as acceptable for certification service.

Question 2.3: ***Acceptable additional time for certification service …***

- A majority of about 50% deems 2 to 3 month as acceptable additional time for certification service.

Question 2.4: *What kind of certification service is desirable?*

- There is no clear opinion among the responders about this item. The one half supports certification of the final product the other half the development accompanying certification procedure.

Question 2.6: *What certification category would you prefer?*

- More than 70% prefer *Independent Test Body* or both, *Independent Test Body* and *Test Witnessing*.

Question 2.7: *In which role do you see your organisation within the scope of the future of EETS?*

- The answers of this multiple choice question depend on the present ROLE of the responders. On the one hand there are the *Test Service Providers*/CERTIFICATION BODIES, *OBU Manufacturers*, *Government/Road Operator*, *Consultants.* They intent to maintain their ROLE in future. On the other hand there are the EFC OPERATORS, PAYMENT MEANS ISSUER and a *Telecommunication Provider.* They tend to enlarge their future ROLE according to the definitions given in the ENCC Questionnaire's Glossary. In particular:
  - ETC Operators see their future ROLE in a combination of CONTRACT ISSUER, EFC OPERATOR, EETS PROVIDER, and TOLL CHARGER.
  - The *Telecommunication Provider* sees its Role in CONTRACT ISSUER, EETS PROVIDER, INTEROPERABILITY CONTRACT AGENT, PAYMENT MEANS ISSUER.

This differentiation confirms the support of process interfaces in certification as already commented in par. 2.1.4.

Question 2.7': *Contribution in an EETS Certification Working Group …*

- There is a strong interest in the contribution in an EETS working group. About 75% would be interested in contributing to the further development.

This issue will be taken up in the context of Work Package 5.

Question 2.8: *Interest in the participation in a pilot project within the scope of a R&D framework program …*

- A similar picture appears for the contribution in the scope of the R&D framework program, 80% would be interested in participating in such a pilot project.

This issue will be taken up in the context of Work Package 5.

9.3.3.3 Analysing Feedback from ENCC Questionnaire, part 3, *Study specific Questions*

The following questions have a direct relation to the conclusions of Expert Group 4, derived in its report [EG4 Report]. The underlying conclusion can be taken from par. 2.1.

Question 3.1 (EG 4 Conclusions # 1): *What would you expect from the technical future regarding EETS scope*?

- There is a clear opinion among the survey participants:
  1. *DSRC UNI only* is supported by 10%,
  2. 70 % say YES for *DSRC CEN only*, and
  3. More than 80% support the *Dual Mode, UNI & DSRC*. Some mention explicitly the full set in this context, which means incl. GNSS and GSM.

Question 3.2 (EG 4 Conclusions # 2): *Do you agree that all relevant information (interface specification, operational specifications …) of national, proprietary EFC systems need to be published?*

- The most participants share this conclusion. About 80% of the survey participants agree with publishing of relevant information. Some participants of the survey emphasise the restriction to service relevant information such as SLA, interface data, or TOLL CONTEXT DATA.

Question 3.3 (EG 4 Conclusions # 3): *How could already existing, non EFC specific satellite positioning equipment and cellular communication (e.g. Navigation, Fleet Management) be used for future EFC equipment?*

- 60% think multiple installations should be avoided by certifying a GNSS/GSM standard interface.
- 25% consider installing multiple GNSS/GSM equipment as the better solution. This minority suggest the following:
  - Install one GNSS/GSM based EFC equipment and making available other services.
  - EETS Provider will need to select a small range of devices it operates. In later stages it should include modules that contain all EETS relevant components in a secure environment, but can be integrated into other solutions, e.g. providing localisation data, HMI interface, and access to communications and local data interfaces (e.g. CAN Bus).
  - Making use of an API as defined in the GST project.

Question 3.4 (EG 4 Conclusions # 4): *Would you agree with the following (…)?*

- The survey participants responded as follows:
  1. 40% find certification should cover different sub systems. 30% do not agree with that. The remaining 30% of the participants is “neutral” or does not know.
  2. A majority of 75% does (strongly) agree that certification should cover the integration of sub systems. 15% disagree on that.
  3. The same consent goes for “Certification should cover functional interaction”.
     5% are against that.
  4. A majority of 95% thinks certification should cover the implementation of RSE.

Question 3.5 (EG 4 Conclusions # 5): *Would you agree to split the certification task between ETCC (…) and OCC (…)?*

- About 75% of the survey participants say YES to splitting the certification task between ETCC and OCC.
- 20% do not agree, saying NO.

Question 3.6 (EG 4 Conclusions # 6): *How many ETCCs / OCCs do you regard as adequate for a free and competitive market?*

- The majority selected 2 to 10 ETCCs
- Most participants deem a number between 1 and 6 as sufficient for OCCs.

This result is deemed as being doubtful since the ENCC Questionnaire did not properly introduce the difference between ETCC and OCC. It seems the survey participants are not quite aware that the number of OCCs is related to the number of EFC operators or countries.

Question 3.7 (EG 4 Conclusions # 7): *What do you think are the most important requirements on ETCCs and OCCs?*

- A variety of answers has been given on this question. The major commonality in this variety is *Independence*. About 50 % find *Independence* is most important. *Competency* and *Confidentiality* was mentioned also quite often as important characteristics. Other opinions – partly expressed in full – are very special and have not been registered statistically.

Question 3.8 (EG 4 Conclusions # 8): *Which additional technologies and systems apart from the EETS conformant technical equipment and services should be covered by the certification network?*

- Apart from the EETS conformant technical equipment and services the following percentages has been regarded as to be covered by the certification network:
  - 65% YES to “DSRC interoperability only”, 25% NO
  - 40 % YES to “Enforcement technology …” 40% NO
  - 40% YES to “Digital Tachograph”, 60% NO
  - 35% YES to value added or other Telematics services (e.g. eCall or Tracking and Tracing), 50% NO, partly justified by data protection risks in the context of value added services.

Question 3.9 (EG 4 Conclusions # 9), *Do you think the network of certification centres would be a way to assure some level of quality and homogeneity in the certification process?*

- All (!) survey participants have agreed with this conclusion.

Question 3.10 (EG 4 Conclusions # 10): *Would you agree that the role of the Certification Network should cover the following tasks (…)*

- The following tasks has been regarded as to be covered by the certification network:
  1. 75% picked “Maintaining the list of standards, specifications and procedures etc”.
  2. 60% picked “Managing relations with contract issuers and EFC operators …”. 40% disagree with that.
  3. 70% picked “Monitoring the operations performed by all centres in the network”. 30% disagree with that.
  4. 70% picked “Delivery/Cancel authorizations to centres to be part of the network ... 30% disagree with that.
  5. 80% picked “Managing and /or Performing any task allowing to ensure the reliability of the certification label towards their users”. 20% disagree with this task.

In this context it has been investigated, who should be member of a *Certification Network Management Board*. From the answers the following membership profile has been derived:

- 90% chose EETS PROVIDER
- 90% chose EFC OPERATORS
- 90% chose TOLL CHARGERS
- 65% chose CONTRACT ISSUERS in the Board
- 60% chose Interoperability CONTRACT AGENTS
- 50% chose PAYMENT MEANS ISSUER
- 50% chose Transport Service Providers
- 40% chose Service Users.

Question 3.11 (EG 4 Conclusions # 11): *Would you agree with the following? (…)*

- The following percentages turned out in terms of this question/conclusion:
  - 50% support cost sharing between ETCC and OCC, 15% are against this cost sharing and 25% find this is not applicable.
  - 70% picked “ETCC costs should be covered by the (certification) applicant”, whereas 25% are against that option.

- The situation is about fifty/fifty in terms of “costs of OCC shared between EFC OPERATOR and CONTRACT ISSUER”
- 85% tend to cost assignment according to the cost-by-cause principle. 10% are against that principle.
- 60% do not agree that costs are regulated by the market. 20% agree with it. Other 20% do not know.

Question 3.12: *Would you agree with the following? There is a need for interconnecting the involved entities via a certification information system and a process management system to enable / assure quality, homogeneity, and monitoring the certification process.*

- 95% of the survey participants have agreed with this statement. In some cases it is pointed out that such an information and process management system bears security risks in terms of discovering of competitor know how.

9.4 Annex 4, Applicable Certification Schemes

9.4.1 *Bluetooth* Qualification

Characteristics:

Bluetooth is a wireless short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. It operates in the unlicensed industrial, scientific and medical (ISM) band at 2.4 to 2.485 GHz, using a spread spectrum, frequency hopping. The key features of Bluetooth technology are robustness, low power, and low cost. The Bluetooth specification defines a uniform structure for a wide range of devices to connect and communicate with each other.

Bluetooth is managed by the *Bluetooth Special Interest Group* (*Bluetooth* SIG). The *Bluetooth SIG* has established the standard, and it has established the qualification system.

Manufacturers which want to have their equipment certified need to be a member of the *Bluetooth SIG*. The annual member fee depends on the member status, a free account is possible. With the membership the client signs the contract that he will do a certification for his products with a listing on the public home page https://programs.bluetooth.org/tpg/listings.cfm. By the certification there is a listing fee, from 5.000 US$ up to 25.000 US$, depending on the member status and the used version of the standard. With the listing fee the existing patents of the Bluetooth Standard are allowed to be used for the product.

The Bluetooth SIG gave the opportunity that everyone is allowed to establish a *Bluetooth* TEST LABORATORY, the *Bluetooth Qualification Test Facilities* (BQTF) and that everybody could be a Certification Body, the

Bluetooth Qualification Body (BQB).

In the beginning the ACCREDITATION of the TEST LABORATORY was conducted by the Bluetooth *Qualification Review Board* (BQRB), later the service was taken over by an ACCREDITATION authority.

For Bluetooth qualification the *Qualification Review Board* has notified the *Bluetooth Qualification Body.* After evaluation of its independence and competence and the knowledge.

Today the manufacturer is allowed to do the qualification by itself, but it can also contract *Bluetooth Qualification Expert* (BQE).

Bluetooth Qualification is the process by which the Member demonstrates compliance to the Bluetooth System Specifications, as required by the Bluetooth Agreement. The Bluetooth Qualification program is the framework that establishes the qualification rules and procedures.

Bluetooth Qualification activities are organized into four functional areas:

1. Policymaking is the purview of the *Bluetooth Qualification Review Board* (BQRB), consisting of delegates from each Bluetooth Promoter.
2. Interfacing with members on behalf of the *Qualification Program* as well as execution of the program policies is handled by a single *Bluetooth Qualification Administrator* (BQA), responsible to the BQRB.
3. Performing and reporting testing according to the current requirements which may be done by Members and/or *Bluetooth Qualification Test Facilities* (BQTF).
4. A *Bluetooth Qualification Body* (BQB) lists products on the Bluetooth Qualified Products list, after the Member has demonstrated to the BQB that the product meets the requirements for qualification.

All policies and practices of the *Bluetooth Qualification* program are established and maintained by the BQRB. The BQRB is chartered by *Bluetooth Special Interest Group* (SIG).

Through this PRD, the BQRB establishes the following entities:

- Bluetooth BQA --- responsible for administering the *Bluetooth Qualification Program* on behalf of the BQRB
- BQTF -- a test facility that is recognized by the BQRB to test *Bluetooth* wireless products
- BQB -- a person authorized by the BQRB to provide services to a member seeking *Bluetooth* product qualification. It is responsible for checking declarations and documents against requirements, reviewing product test reports, and listing products on the official database of Bluetooth qualified products.
- *Bluetooth Technical Advisory Board* (BTAB) – a forum consisting of all BQBs and BQTFs, responsible for advising the BQRB on technical matters relating to test requirements, test cases, test specifications and test equipment

Bluetooth also relates to the regulatory Domain covered by the R&TTE directive. It only requires Declaration by the manufacturer.

Advantages:

- The centralised structure enables complete control by the *Bluetooth SIG*. This includes:
  - development of the standards,
  - ACCREDITATION of TEST LABORATORIES,
  - CERTIFICATION of the products;
- The scheme is funded by member fees;
- One label ("*Bluetooth*") with additional information on *Bluetooth* homepage.

Disadvantages:

- Monopolistic structure;
- The scheme is funded by member fees;
- The scheme will work only, if the Bluetooth SIG has one goal, to place this one standard to the market, the scheme will not work, if there are incompatible standards or if they are not interested to support a special standard or system.

Applicable elements for ENCC:

- Stepwise Approach for qualifying TEST LABORATORIES (BQBs) in the early years of the scheme.
- Centralised structure enabling complete control by the Management of the scheme.

Further Information:

www.bluetooth.com, https://programs.bluetooth.org/tpg/listings.cfm

9.4.2 Wi-Fi

Characteristics:

Wi-Fi is an industry standard for wireless LAN products, issued by the *Wi-Fi Alliance*.

From the certification point of view WiFi is the same as WLAN but, the *Wi-Fi Alliance* has established tests sequences for:

- Interoperability,
- Security,
- Minimum performance requirements, and
- Quality of Service.

The *Wi-Fi Alliance* is organised as an non-profit authority. In the beginning it offered TEST LABORATORIES to become a *Wi-Fi TEST LABORATORY*. The *Wi-Fi Alliance* designated those TEST LABORATORIES which met their requirements and are located in the European county to be covered. After a certain time period these TEST LABORATORIES had to undergo an accreditation procedure conducted by representatives of the *Wi-Fi Alliance*. The Laboratories had to furnish prove their competence and the provision of adequate test equipment.

Today Wi-Fi CONFORMITY TESTS are conducted by eleven independent *TEST LABORATORIES* in seven countries. A public list of the *Authorized* Certification TEST LABORATORIES is available on the internet.

Manufacturers which want to have their equipment certified need to be a member of the *Wi-Fi Alliance*. The membership gives the *Wi-Fi Alliance* the right to list the member's/company's name and its Wi-Fi® product's name(s) in a listing of *Wi-Fi CERTIFIED*™ products on all promotional materials.

The annual member fee depends on the member status. Provided that the membership type allows the *Wi-Fi Alliance* to test, active, paid-in-full membership is required for authorization of Wi-Fi Certification. Applicants may use the *Wi-Fi CERTIFIED* logo pursuant to the terms of the Certification Mark License Agreement.

If a client/*Applicant* wants to show that its product fulfils the Wi-Fi requirements, it has to ask the *Wi-Fi Alliance* for a test ID number. With this number it can select and contract an accredited TEST LABORATORY out of the public list. The TEST LABORATORY reports to the *Wi-Fi Alliance* when it was selected.

The Wi-Fi Product can be tested according to different standards. There are mandatory and optional tests programs available, e. g. 802.11a, 802.11b, 802.11g, WMM, WMM power safe, or 802.11n draft.

After the test the TEST LABORATORY sends the test results directly to the *Wi-Fi Alliance* and to the client. When all tests have passed, the client can get a certificate for the tested product by the *Wi-Fi Alliance*. The certification fee is 300,00 US$ per certificate, a certificate for 802.11abg is three times the certification fee. Certified products are marked with the label(s).

The list of the certified products is public.

Advantages:

- The centralised structure enables complete control by the *Wi-Fi Alliance*. This includes:
  - creation of the standards,
  - ACCREDITATION of TEST LABORATORIES,
  - CERTIFICATION of the products;
- The scheme is funded by member fees;
- One label ("*Wi-Fi certified*") with additional indication of the supported versions of the standard.

Disadvantages:

- Monopolistic structure;
- The scheme is funded by member fees
- The scheme will work only, if the *Wi-Fi Alliance* has one goal, to place this one standard to the market, the scheme will not work, if there are incompatible standards.

Applicable elements for ENCC:

- Stepwise approach in the early years of the scheme; first designate TEST LABORATORIES, then

accreditation followed.

- The label policy can be transferred to EETS labelling. One label, e.g. "EETS certified" plus additional Interoperability codes for the EFC system. For example: EETS certified for A, CH, D, F.

Further Information:

www.wi-fi.com

9.4.3 German Telecommunication Act (TKG)

Characteristics:

The TKG is no more valid due to the deregulation by the R&TTE directive from April 2001 onwards, which has reduced the regulatory requirements to just a few tests. However the scheme provides some suggestions for ENCC.

According to the TKG wired telecommunication products had to be tested in an accredited TEST LABORATORY according to European harmonized standards. A test in one accredited TEST LABORATORY of a Member State was sufficient, no re-test for Member States was necessary.

The client submitted the test report of the accredited TEST LABORATORY to a *Notified Body for Telecommunication*. There the tests report was formally reviewed. If all required tests were declared as passed and there were no remaining inconsistencies, the client got an EC Certificate plus the Id-number of the NOTIFIED BODY. It was entitled to affixing the CE mark including the number of the NOTIFIED BODY on the product, such as e.g. **CE 0197 X**. The CERTIFICATE allowed the supplier to place the product into the whole European market.

The ACCREDITATION of the TEST LABORATORY was conducted by a national ACCREDITATION Body according to EN 45001, today replaced by EN ISO/IEC 17025.

The NOTIFIED BODIES for telecommunication were notified by the *Authority for Telecommunication* based on EN 45011.

By the new *R&TTE Directive* there are no requirements that a wired telecommunication product has to work (Regulation by the market). The manufacturer has to declare the intended use of the product in a manner that a consumer gets the information on which telecommunication provider it should work.

Advantages:

- Due to their multiple instances/ representations the clients were not depending on one TEST LABORATORY/NOTIFIED BODY. They could select the TEST LABORATORY for analogue network, ISDN PRI, … independently.
- Due to the nature of NOTIFIED BODIES, the client does not have to rely on a particular NOTIFIED BODY. It has the freedom to choose any, even that of an other Member states;
- The product was affixed with the CE Mark including the number of the NOTIFIED BODY.

Disadvantages:

- The quality of test and certification service (competence, impartiality) of the NOTIFIED BODIES may vary form country to country.

Applicable elements for ENCC:

- Recognition of test results and issuing of EC certificate by NOTIFIED BODIES of other Member States.

- The APPLICANT has the choice of the Test Laboratory.

Further Information:

www.bundesnetzagentur.de

9.4.4 GSM

Characteristics:

GEM CERTIFICATION is associated with the *Global Certification Forum* (GCF). This is an independent organisation with a wide-ranging membership of operators, equipment manufacturers and other interested parties.

Full membership of the GCF is open to mobile terminal manufacturers and network operators. Other interested parties including TEST LABORATORIES and TEST equipment manufacturers may participate as observers. Membership of the GCF is subject to an annual fee. However, all operators who are members of the *GSM Association* may join the GCF free of charge.

GCF CERTIFICATION sets out a series of clear steps for terminal manufacturers to follow, resulting in a visible and transparent trail to incorporate in the CERTIFICATION process.

By following the GCF TEST cases, manufacturers can perform tests that provide evidence of interoperability based upon criteria developed by the global standards-making community and validated through the GCF.

TEST cases will perform on a range of commercially available test equipment. This provides compatibility between test facilities - whether in-house or via a third party.

The TEST cases are continuously updated so GCF certified terminals would always have been tested to standards that reflect the latest phase of market and technology evolution. New technologies are incorporated into the GCF *CERTIFICATION Criteria* as appropriate.

Through the Forum, operators and terminal manufacturers have created a win-win situation. This new and comprehensive testing program provides greater assurance of terminal device functionality interoperability.

Terminal manufacturers who certify their terminals to GCF rules and procedures can be assured that:

- their products will benefit from a higher degree of interoperability;
- time-to-market for new products is reduced using this "one-stop" verification process;
- expensive and time-consuming duplication of effort can be avoided.

GCF certified terminals assure operators that:

- terminals will perform correctly on networks;
- customers will receive a seamless roaming service.

GCF certified terminal assures user that:

- it has been designed, manufactured and tested to agreed standards;
- it will interoperate correctly when used on a variety of digital mobile networks.

Advantages:

- Internationally accepted, voluntary scheme. From the regulatory point of view there are no requirements for CONFORMITY or INTEROPERABILITY. Telecommunication providers test samples of

selected products in their own or subcontracted TEST LABORATORIES. The TESTS are executed according to *Global Certification Forum* (GCF) specification (protocol conformance TESTS, functionality tests, INTEROPERABILITY TESTS, acoustical TESTS, …) and according to internal specifications of the provider. If there are no functional problems, the provider decides to sell the product.

- Test cases are continuously updated so certified terminals are always tested to standards that reflect the latest phase of market and technology evolution.
- New technologies are incorporated into the GCF *CERTIFICATION Criteria* as appropriate

Disadvantages:

- Not obvious

Applicable elements for ENCC:

- Continuous update of TEST cases.

Further Information:

www.globalcertificationforum.org

9.4.5 IECEE CB Certification Procedure

Characteristics:

The IECEE is a multilateral certification system based on standards prepared by the International Electrotechnical Commission (IEC). The acronym stands for *IEC System for Conformity Testing and Certification of Electrotechnical Equipment and Components*. *CB* is the abbreviation of CERTIFICATION BODY. The members of that system apply the principle of mutual recognition of test results to obtain certification or approval on national level internationally.

The IECEE's multilateral CONFORMITY ASSESSMENT schemes, based on the IEC International Standards, are truly global in concept and in practice. They reduce trade barriers caused by different certification criteria in different countries and helping industry to open up new markets.

The IECEE **governing structure** rests with the ***Certification Management Committee*** supported by the ***Committee of Testing Laboratories*** (CTL) for technical issues, by the ***Assessment Advisory Group*** (AAG) for the Peer Assessment Programme and by the ***Factory Inspection Committee*** (FIC) for the Factory Audit/Inspection. The ***Board of Appeals*** has the responsibility to arbitrate disputes and formal complaints filed by members and stakeholders. The ***Policy & Strategy Forum*** is an appointed group of Senior Industry and Certification experts that ensures the IECEE is always up-to-date with the current and future market trends.

CERTIFICATION operation can be outlined best by taking the example of a personal computer (PC) manufactured in Japan. The manufacturer applies to a Japanese IECEE CERTIFICATION BODY for a so called *CB Test Certificate* and its associated test report. The NOTIFIED BODY'S (NCB's) associated laboratory carries out the relevant tests based on the relevant IEC standards and submits a test report. This is reviewed and validated by the CERTIFICATION BODY which issues subsequently a *CB Test Certificate*. Wishing to sell the PC in the USA, Brazil, and Germany for example, the manufacturer sends the *CB Test Certificate* and associated Test Report to the *IECEE Certification Bodies* located in these countries. After an administrative review of the *CB Test Certificate* and the test report the relevant CERTIFICATION BODIES issue their certification mark without re-testing the PC because they recognize the Japanese NCB as one of their peers in the IECEE and have full confidence in the conformity assessment that has already been done. The Japanese manufacturer may now affix the national mark of conformity of the American, Brazilian and German bodies to the PC and is free to export it to these coun-

tries.

Many manufacturers using the IECEE CB Scheme operate their own capable TEST LABORATORIES in terms of personnel, facilities, and equipment for testing their own products. That means they test their products for which they have responsibility for design, development, and production. In recognition of the market needs to utilise these facilities, procedures have been established for obtaining *CB Test Certificates* under controlled conditions. These procedures are an alternative to testing at a CB TEST LABORATORY.

The following procedures have been developed under the *IECEE CB Scheme* for using a manufacturer's test facility:

- ***CB Testing Laboratory*** (CBTL): A laboratory successfully assessed within CB Scheme performs all necessary tests with own equipment in own facilities.
- ***Testing at Manufacturer's Premises*** (TMP): A representative of an accepted CBTL, on the request of an NCB, performs the full test in a manufacturer's laboratory with its own or the manufacturer's equipment.
- ***Witnessed Manufacturer's Testing*** (WMT): A representative of an accepted CBTL, on the request of an NCB, witnesses all tests done by a manufacturer's laboratory which uses its own equipment.
- ***Supervised Manufacturer's Testing*** (SMT): A representative of an accepted NCB or an accepted CBTL, on request of an NCB, supervises the quality management system and the laboratory testing processes and witnesses some part of each agreed testing program at a manufacturer's laboratory, which uses its own equipment.
- ***Recognised Manufacturer's Testing*** (RMT): A representative of an accepted NCB or an accepted CBTL, on request of an NCB, assesses initially and on an on-going basis the capability and expertise of the manufacturer's laboratory according to EN ISO/IEC 17025 and any other relevant IECEE Operational Documents, including the laboratory's quality management system and the laboratory's testing processes.

These procedures are considered as a whole to be a progression from full control of testing by a CBTL to full confidence in the capability of the manufacturer's laboratory (RMT).

Advantages:

- The "*One Stop Testing*" enables national approval by simply recognising the test results of the peer TEST LABORATORY.
- Peer assessment of Test Laboratories supports quality of service, mutual confidence and recognition of test results.
- By participating in working groups each *National Certification Body* (NCB) has a vote in the Certification Management Committee which rules the certification procedures.
- The scheme provides five confidence levels for Test Laboratories. The range is from progressing from full control of testing by an accredited Test Laboratory (CBTL) to full confidence in the capabilities of the manufacturer's laboratory (RMT). Among these the *Test Witnessing*, also called *Supervised Manufacturer's Testing* (SMT).

Disadvantages:

- Due to the absence of governmental control the scheme is characterized by being market driven.
- Peer Assessment for creating confidence for enabling mutual recognition.
- Active involvement is necessary, otherwise NBC and CBTL risk to be cheated.

Applicable elements for ENCC:

The distinction of confidence levels for TEST LABORATORIES seems to be applicable for the ENCC. TEST witnessing or Supervised Manufacturer's Testing (SMT) in the CB Scheme could be an alternative to testing at a Test Laboratory, at least in the starting phase.

Further Information:

www.iecee.org

9.4.6 Test Specification for Interoperable EFC-DSRC Systems in Sweden

Characteristics:

The Swedish Road Administration (SRA) has issued this test specification in August 2004. It specifies the Evaluation of Conformity of OBU and RSE to the Transaction Requirements using 5.8 GHz DSRC.

In this certification scheme it is the responsibility of the EFC supplier to provide the necessary proof, in the form of testing, test analysis, test reports and statements of conformity to the *Basic Requirements Specifications for Interoperable EFC DSRC Systems in Sweden.*

Conformity relies on an *Affirmation* from the EFC supplier of conformity with an additional appraisal by an *Independent Reviewer*. The role of the *Independent Reviewer* is to conduct a competent impartial review of the tests performed by the EFC supplier.

The **Roles** in particular:

- The APPLICANT (*EFC Equipment Supplier*) runs the evaluation process, performs the tests, and writes the test report. It also pays the *Independent Reviewer* for its work in the conformity evaluation process.
- The ***Independent Reviewer*** (IR) fulfils a quality assurance role, providing a competent and independent review of the tests performed by the EFC supplier. It issues a *Conformity Appraisal Statement* upon review of the EFC supplier's test report.
- An **Operator** takes part in tests or supports the *EFC Equipment Supplier* with test facilities.
- The **Swedish Road Administration** (SRA) owns and makes available the test specifications plus explanations and clarifications in case of any ambiguity in the specifications. It expresses its opinion whether it deems the *IR* proposed by the Applicant fits to its role in terms of independence, competence, etc. The SRA expresses also its opinion regarding the interpretation of the specifications should a need arise.

The Conformity Evaluation **Process** follows a rather practical workflow for CONFORMITY *ASSESSMENT including the steps Notification of Conformity Evaluation,* acceptance of IR, *Conformity Evaluation Planning, Test Execution, Test Reporting, Issuing Conformity Report (*containing *Conformity Statement* by the *EFC Equipment Supplier, Conformity Appraisal Statement* issued by the IR*, Test Plan, Test Report, ,ICS, IXIT)*, and registration by SRA.

Advantages:

- Instead of a traditional third party testing, an ***Independent Reviewer*** provides a competent and independent review of the tests performed by the EFC supplier. The EFC supplier issues a *Conformity Appraisal Statement* upon review of the *EFC EQUIPMENT Manufacturer*'s test report.
- The responsibility of the *EFC Equipment Supplier* to provide the necessary proof, in the form of testing, test analysis, test reports and statements of conformity enables a cost-effective and flexible conformity evaluation where the technical parts can be handled by organisations that have comprehensive technical knowledge and experience in DSRC, EFC, and testing

Disadvantages:

- The level of independence of those, carrying out CONFORMITY ASSESSMENT is low and implies

some confidence.

- Inspection of manufacturing and Follow up measures are not considered.
- Purely national scheme, it does not (yet) consider regulations for mutual recognition of test results in the European context.

Applicable elements for ENCC:

Due to the relative early status of interoperable EFC and the rare-existence of accredited TEST LABORATORIES and CERTIFICATION BODIES in the EFC domain the deployment of *Independent Reviewers* is a conceivable alternative to traditional third party certification schemes. At least in a first step.

Further Information:

Test Specification for Interoperable EFC-DSRC Systems in Sweden; Evaluation of Conformity of the Basic Requirements

Document version 1.03, 17 August 2004

Swedish Road Administration

9.4.7 Digital Tachograph Equipment Type Approval

Characteristics:

Interoperability tests are carried out by a single laboratory under the authority and responsibility of the European Commission. This is the TEMPEST Laboratory in Ispra, Italy. The INTEROPERABILITY test procedure is maintained by, implemented at, and available from this Laboratory.

Each Member State designates an authority responsible for approving digital tachograph system components (i.e vehicle units, motion sensors, and tachograph cards) for use in the enforcement of European Union legislation.

The INTEROPERABILITY certification is the last and concluding certification step of a series of three certifications required for TYPE APPROVAL of digital tachograph equipment. The other two certifications concern *Functional Testing* and *Security Evaluation*.

The *Laboratory for Interoperability Tests* runs a public web site on which a list of recording equipment or tachograph cards models is kept up to date. Each entry includes:

- for which a request for INTEROPERABILITY TESTS have been registered,
- recipients of a *Type Approval Certificate* for functionality and security,
- recipients of an INTEROPERABILITY CERTIFICATE (even provisional).

Requests will be officially registered only when the laboratory is in possession of:

- the entire set of material and documents necessary for INTEROPERABILITY TESTS,
- the corresponding *Security Certificate*, and
- the corresponding *Functionality Certificate*.

The manufacturer presents the interoperability certificate to the *Type Approval Authority* in a Member State.

There is no manufacturing inspection of approved types. Instead access must be granted to the reference set of tachograph equipment maintained at the *Interoperability Laboratory* to *Member State Type Approval Authorities* should needs arise.

Any changes to the specification of an item of tachograph equipment may require re-certification, i.e. complete or partial repetition of the *Type Approval Tests*. The needs for re-certification are established on a case-by-case basis in co-operation with the *Functional Testing Laboratory* and the *Security Certi-*

fication Authority.

Until four months after a first couple of recording equipment and tachograph cards (driver, workshop, control and company cards) are certified to be interoperable, any *Interoperability Certificate* delivered (including this very first one), regarding requests registered during this period, **is considered provisional**.

If at the end of this period, all products concerned are mutually interoperable, all corresponding *Interoperability Certificates* shall become definitive.

If during this period, interoperability faults are found, the laboratory in charge of interoperability tests shall identify the causes of the problems with the help of all manufacturers involved and shall invite them to realise the necessary modifications.

Advantages:

European Scheme based on a directive making extensive use on NOTIFIED BODIES for use in the enforcement of European Union legislation.

- Interoperability tests are carried out by a single laboratory under the authority and responsibility of the European Commission.
- Distinction of specialised TEST LABORATORIES for functionality, security, and INTEROPERABILITY.
- Within the first four months any *Interoperability Certificate* issued is considered provisional. If no interoperability faults are found during this period, certificates will become definitive then.
- Transparency of the process in terms of publishing of certification requests and approval certificates issued.

Disadvantages:

- Distinction between TEST and CERTIFICATION is not obvious.
- The level of transparency achieved by the requirement to publishing all certification requests might not be in the interest of all APPLICANTS.

Applicable elements for ENCC:

- Within the first four months any *Interoperability Certificate* issued is considered provisional. If no interoperability faults are found during this period, CERTIFICATES will become definitive then
- Distinction of specialised TEST LABORATORIES for functionality, security, and INTEROPERABILITY.

Further Information:

Commission Regulation (EC) No 1360/2002 of June 2002 adapting for the seventh time to technical progress Council Regulation (EEC) No 3821/85 on Recording Equipment in Road Transport (Digital Tachograph).

Digital Tachograph Equipment Type Approval Interoperability Test Specification Version 1.0, European Commission Joint Research Centre (Special Publication I.03.116)

9.4.8 ITSO, Interoperability Certification of Smartcard Ticketing (UK)

Characteristics:

ITSO has evolved from an initiative in 1998 as a result of discussions between various UK Passenger Transport Authorities concerning the lack of suitable standards for interoperable smartcard ticketing by the major players in the transport industry. The primary focus was the creation of a **specification for interoperable smartcards for transport applications**.

ITSO is a **non-profit organisation.** Its board consists of a number of committees with distinct tasks. They will not continue indefinitely but be reviewed as each task is completed. Where possible, ITSO

includes Member representation on these committees by asking them to provide expert resource in discussion and review.

The most significant committee currently in operation is the ***Technical Committee***. It is responsible for ensuring the next version of the ITSO Specification complies with any agreed changes and is updated in a fashion commensurate with the practical implementation of ITSO environment. In addition, the *Technical Committee* maintains close relationships with standards bodies so as to convergence with relevant emerging standards.

The **ITSO Specification** sets out the technical means by which interoperability of contactless smart-card systems can be facilitated. In addition to the specification, each Member agrees to abide by a set of Regulations. The Regulations ensure that all parties behave consistently and fairly, both in interactions with each other and with users of ITSO smartcards.

Through ITSO's accredited service provider and TEST LABORATORY, *Integri*, any media, point of service or back office must be certified for compliance with the ITSO specification before it can be called *ITSO Compliant*. However, unique to ITSO is that the same piece of equipment or software is **also assessed for INTEROPERABILITY** in the *ITSO Warehouse* of certified equipment, also run by *Integri*, before it can gain a full **compliance certificate**. *Integri* makes available its test tools and ITSO provides the scripts to manufacturers for pre-certification testing in their own premises. ITSO also provides and in some cases with some pre-conditions, an audited self certification methodology.

When a media, equipment or system has been approved or CERTIFIED by ITSO, a dated approval or certificate is issued to the supplier or member with fixed validity. A copy of all valid approvals and certificates, and details of the media, equipment or systems to which they relate (including version numbers etc) is available on the ITSO web site. It is an ITSO *Member's Operating License* requirement to validate that any media, equipment or software used is ITSO compliant and, by reference to their CERTIFICATES and Schedules, provides the specific functionality required by the ITSO License.

Advantages

- Commonalities with EETS, both follow an INTEROPERABILITY centred CERTIFICATION Approach of existing "IT system".
- The way ITSO is managed and organised, the organisation was built as a non-profit organisation with a close relation to an accredited Test House and service provider.
- The most significant technical committee is responsible for the development and maintenance of the ITSO specification.
- ITSO's accredited service provider and TEST LABORATORY.

Disadvantages

- National approach

Applicable elements for ENCC:

- Non-profit organisational structure.
- Maintenance and continuously adaptation of the ITSO Specification.
- The way the management board is organised and it establishes and authorize groups and committees in its board.

Further Information:

www.itso.org.uk

9.5 Annex 5, Relevant European Directives

In the course of the study a set of EC directives was analysed in terms of their relevance to CONFORMITY ASSESSMENT of EFC Equipment. As a result the following Directives have to be recognized as being potentially relevant for EFC CONFORMITY ASSESSMENT of EFC Equipment (OBE and RSE).

Relevant EC Directives	
93/465/EEC	**Directive on Modules for conformity assessment and rules for CE marking** Defines modules for the various phases of the conformity assessment procedure in technical harmonisation directives. The essential objective of a conformity assessment procedure is to enable the public authorities to ensure that products placed on the market conform to the requirements as expressed in the provisions of directives. **Relevance to EFC**: Applicable on harmonised or *New Approach* Directives such as 1999/5/EC or 2006/104/EC (s. below).
95/46/EC	**Directive on Protection of individuals with regard to the processing of personal data and on the free movement of such data** To be applied to the processing of personal data wholly or partly by automatic means, and to the processing otherwise than by automatic means of personal data which form part of a filing system or are intended to form part of a filing system. Privacy related to the telecommunication domain is complemented in the directive 2002/58/EC. **Relevance to EFC**: Yes, s. 2002/58/EC below
1999/5/EC (R&TTE)	**Directive on Radio equipment and telecommunications terminal equipment (R&TTE) and the mutual recognition of their conformity** It specifies ESSENTIAL REQUIREMENTS for the protection of health and safety of user and any other person, for the effective use of the radio frequency and for immunity and emission of electromagnetic waves. Valid for all products with a **wireless** transmitter or receiver (excluding receiver for audio and video broadcast) and for (wired) products which are connected to a public phone line. This Directive includes the requirements for Safety and EMC. Where apparatus constitutes a component or a separate technical **unit of a vehicle** within the meaning of Council Directive 72/245/EEC (OJ L 225, 10.8.1992, p. 72. Directive as amended by the 1994 Act of Accession.3) relating to the radio interference (electromagnetic compatibility) of vehicles or a component or a separate technical unit of a vehicle within the meaning of Article 1 of Council Directive 92/61/EEC of 30 June 1992 relating to the type-approval of two or three-wheel motor vehicles, the apparatus shall be governed by this Directive without prejudice to the application of Directive 72/245/EEC or of Directive 92/61/EEC respectively. **Wired telecommunication products (9 kHz – 3000 GHz)**: The ESSENTIAL REQUIREMENTS of Safety, and EMC have to be tested and declared according to the R&TTE Directive that they are fulfilled. The test can be done by an accredited test lab, by a non accredited test lab or even by the manufacturer. For wired telecommunication products there are no harmonized telecommunication

Relevant EC Directives	
	standards any more. Each telecommunication provider has to publish its own interface specification. Manufacturers design their products that fit to these interfaces. The manufacturer has to declare the intended use on the sales package and the user manual, on which interface the product can be used. Whether or not this product is in conformance with an interface specification relies on the manufacturer/supplier. Degree of conformity and quality is regulated by the market. **Wired telecommunication products:** The ESSENTIAL REQUIREMENTS on safety, EMC, effective use of the frequency and health have to be tested and declared according to the *R&TTE Directive* that they are fulfilled. The test can be executed by an accredited TEST LABORATORY, by a non accredited TEST LABORATORY or even by the manufacturer. **Procedure to place a product on the market:** The procedure to place a product on the market depends on whether or not the standards are harmonized under the R&TTE directive and on whether there are restrictions in terms of frequency range, output power, duct cycle, etc. **Two classes** are distinguished: ***Class 1*****,** Radio equipment putting into service without restrictions: Radio equipment is placed on the market by using the procedure identified in Annex III of the Directive (internal production control plus specific apparatus tests), where 1. radio test suites are defined in the harmonized standards. In this case, it has to be marked simply with *CE-mark (*s. *Annex 9, Frequently Asked Questions, What means the CE Mark?)* CE 2. radio test suites are not defined in the harmonized standards or by using the procedures identified in Annex IV or Annex V. In these cases it has to be marked with the CE mark plus number of notified body: e.g. CE 0197 ***Class 2*****,** Radio equipment putting into service with restrictions: Radio equipment is placed on the market by using the procedure identified in Annex III of the Directive (internal production control plus specific apparatus tests), where 1. radio test suites are defined in the harmonized standards. In this case it has to be marked with the *CE* mark plus the exclamation mark in a circle CE ⓘ 2. radio test suites are not defined in the harmonized standards, or by using the procedure identified in Annex IV or Annex V. In these cases it has to be marked with the CE mark plus the number of the notified body plus exclamation mark in a circle CE 0197 ⓘ **Relevance to EFC**: This directive is of major relevance for EFC CONFORMITY AS-

Relevant EC Directives	
	SESSMENT since EFC Equipment is based on GSM/GPRS standard and 5,8 GHz microwave technology. It relates to the above mentioned equipment Class 2 and the associated Harmonised Standards EN 300 674-1, EN 300 674-2-1, and EN 300 674-2-2 (*Annex 6, Relevant Specifications for EETS CONFORMITY ASSESSMENT*).
2000/53	**Directive on safe and efficient in-vehicle information and communication systems: A European statement of principles on human machine interface** The directive gives **recommendations** assigned to safe and efficient in-vehicle information and communication systems which covers principles on HMI. Design and installation issues are of main concern. These principles are valid: • whether the system is directly related to the driving task or not • for both portable and permanently installed systems such as telephones • for both original equipment manufacturers and after sales system providers including importers for all road vehicle types provided on the Community market This statement of principles will be of particular use to manufacturers when they have to consider the safety implications of HMI design. Design and installation issues are the main concern of this statement of principles and they therefore relate to the following critical issues: • how to design and locate information and communication systems in such a way that their use is compatible with the driving task • how to present information so as not to impair the drivers' visual allocation to the road scene • how to design such system interaction that the driver maintains under all circumstances safe control of the vehicle, feels comfortable and confident with the system and is ready to respond safely to unexpected occurrences. In order not to create unnecessary obstacles or constraints to the innovative development of products, the statement of principle is expressed mainly in terms of the goals to be reached by the HMI. **Relevance to EFC**: Yes, to be further considered esp. in terms of OBE, its installation and optical and acoustical signalling.
1360/2002	**Directive on Recording Equipment in Road Transport** (*Digital Tachograph*) Commission Regulation (EC) No 1360/2002 of 13 June 2002 adapting for the seventh time to technical progress Council Regulation (EEC) No 3821/85 on recording equipment in road transport (OJ L 207 05.08.2002 p.1). **Relevance to EFC:** Yes, if the on board unit need to be linked to the tachograph, the CONTRACT ISSUER in charge of integration of OBE in trucks have to ensure that the tachograph conforms with this directive.
2002/58/EC	**Directive on processing of personal data and the protection of privacy in the electronic communications sector** To be applied to the processing of personal data wholly or partly by automatic means, and to the processing otherwise than by automatic means of personal data which form part of a filing system or are intended to form part of a filing system. S.

Relevant EC Directives	
	also 95/46/EC. **Relevance to EFC**: Yes, EETS Provider, Toll Charger and other entities processing personal date have to implement security measures to protect personal data to prevent its use outside the EFC scope. The measures might become object of INSPECTION by national privacy authorities.
2002/95/EC (RoHS)	**Directive on the Restriction of the Use of Certain Hazardous Substances** The purpose of this Directive is the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment. Electrical and electronic equipment' or 'EEE' means equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields falling under the categories set out in Annex IA to Directive 2002/96/EC (WEEE) and designed for use with a voltage rating not exceeding 1 000 volts for alternating current and 1 500 volts for direct current; 1. Member States shall ensure that, from 1 July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE). **Relevance to EFC**: Yes*, Supplier's Declaration*
2002/96/EC (WEEE)	**Directive on Waste Electrical Electronic Equipment Directive WEEE** The purpose of this Directive is, as a first priority, the prevention of *Waste Electrical and Electronic Equipment* (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. 1. Member States shall ensure that users of electrical and electronic equipment in private households are given the necessary information about: o the requirement not to dispose of WEEE as unsorted municipal waste and to collect such WEEE separately; o the return and collection systems available to them; o their role in contributing to reuse, recycling and other forms of recovery of WEEE; o the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment; o the meaning of the symbol shown in Annex IV. 2. Member States shall adopt appropriate measures so that consumers participate in the collection of WEEE and to encourage them to facilitate the process of reuse, treatment and recovery. 3. With a view to minimising the disposal of WEEE as unsorted municipal waste and to facilitating its separate collection, Member States shall ensure that producers appropriately mark electrical and electronic equipment put on the market after 13 August 2005 with the symbol shown in Annex IV. 4. Member States may require that some or all of the information referred to in paragraphs 1 to 3 shall be provided by producers and/or distributors, e.g. in the instructions for use or at the point of sale.

Relevant EC Directives	
	Relevance to EFC: Yes, Supplier's DECLARATION
2004/52/EC	**Directive on Interoperability of Electronic Road Toll systems in the Community** Lays down the conditions necessary to ensure the interoperability of electronic road toll systems in the Community. It applies to the electronic collection of all types of road fees, on the entire Community road network, urban and interurban, motorways, major and minor roads, and various structures such as tunnels, bridges and ferries. It requires that all new electronic toll systems brought into service after 1 January 2009 (??) shall use one or more of the following technologies: satellite positioning; mobile communications using the GSM/GPRS standard, 5,8 GHz microwave technology. The principles: • Subsidiarity principle: The definition of toll scheme and service is left at the local/national level. • Non-discrimination principle: EETS users and/or vehicles shall not be discriminated against by the toll system. • Every electronic toll system using an OBE has to accept OBE based on the EETS. • Users have to be offered the EETS. • EETS users have to be accepted in all electronic toll systems (that fall under the scope of the Directive). • Prescribing to use at least one of technologies for toll schemes • Break-up of existing monopolies for issuing contracts and OBE to users as well as for manufacturing equipment (onboard and roadside). Unlike *New Approach* directives the EC 2004/52 does not contain requirements or references in terms of how manufacturers and providers shall demonstrate INTEROPERABILITY or CONFORMITY of their equipment or service. **Relevance to EFC**: Yes.
2004/104/EC	**Directive on EMC in automotive** Describes protection requirements along general lines to guarantee the free movement of all electrical and electronic appliances together with equipment installations containing electrical and/or electronic components. **Relevance to EFC**: Yes, test in an accredited Test Laboratory is necessary (EMC emission). The TEST LABORATORY approves that the product is not a security critical product and issues an ATTESTATION. With this ATTESTATION no EMC immunity is necessary, no TYPE APPROVAL is necessary, no *e1 certification mark* is necessary. The manufacturer can declare that its product fulfils this Directive (*Supplier's Declaration*). Specific standards for EFC are issued by EN 300 674:2004 series
2004/108/EC (EMC)	**Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC** This Directive regulates the electromagnetic compatibility (EMC) of active components or equipment. It aims to ensure the functioning of the internal market by requiring equipment to comply with an adequate level of electromagnetic compatibility

Relevant EC Directives	
	1. For the purposes of this directive, the following definitions shall apply: (a) 'equipment' means any apparatus or fixed installation; (b) 'apparatus' means any finished appliance or combination thereof made commercially available as a single functional unit, intended for the end user and liable to generate electromagnetic disturbance, or the performance of which is liable to be affected by such disturbance; … Radio equipment and telecommunications terminal equipment should not be covered by this Directive since they are already regulated by Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity. The electromagnetic compatibility requirements in both Directives achieve the same level of protection. Member States shall take all appropriate measures to ensure that equipment is placed on the market and/or put into service only if it complies with the requirements of this Directive when properly installed, maintained and used for its intended purpose. **Relevance to EFC**: Yes, covered by R&TTE directive 1999/5/EC
2006/38/EC	Amendment on Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures. **Relevance to EFC**: Yes, but has rather economical impact.
2006/95/EC (LVD)	**Directive on electrical equipment designed for use within certain voltage limits** (*Low Voltage Directive*) Replacement of 73/23/EWG: For the purposes of this Directive, 'electrical equipment' means any equipment designed for use with a voltage rating of between 50 and 1 000 V for alternating current and between 75 and 1 500 V for direct current, other than the equipment and phenomena listed in Annex II. Article 2 1. The Member States shall take all appropriate measures to ensure that electrical equipment may be placed on the market only if, having been constructed in accordance with good engineering practice in safety matters in force in the Community, it does not endanger the safety of persons, domestic animals or property when properly installed and maintained and used in applications for which it was made. **Relevance to EFC**: Covered by 1999/5/EC (R&TTE directive)

9.6 Annex 6, Relevant Specifications for EETS CONFORMITY ASSESSMENT

9.6.1 EFC Standards

The standards against which EETS compliant EFC equipment, components or services are assessed depend on the system technology and the application(s) the system is supposed to be able to perform. The list below compiles the standards presently available for the European EFC domain.

EETS-OBE have to comprise an interface(s) which conforms with at least one of the following technologies:

- Microwave at 5.8 GHz according to CEN DSRC standards layers 1, 2 and 7: EN12253 – EN12795 – EN12834;
- Microwave at 5.8 GHZ according to Italian national standards UNI 10607 - 2 parts 1, 2 and 3;
- Satellite location technology according to prENV ISO17575 and mobile communication technologies according to standard GSM TS 03.60/23.060 (under discussion).

The EETS microwave technology is based on the following standards and specifications:

Standard	
EN 300674-1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 1: General characteristics and test methods for Road Side Units (RSU) and On-Board Units (OBU)
EN 300674-2-1:2004	Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive; Sub-part 1: Requirements for the Road Side Units (RSU)
EN 300674-2-2:2004	Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500

Standard	
	kbit/s / 250 kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive; Sub-part 2: Requirements for the On-Board Units (OBU)
EN 15509:2006	Road Transport and Traffic Telematics - Electronic Fee Collection - Interoperability Application Profile for DSRC
EN ISO 14906:2004	Road Transport and Traffic Telematics (RTTT) Electronic Fee Collection (EFC) - Application Interfaces Definition for Dedicated Short-Range Communication (DSRC)
EN 13372:2004	Road Transport and Traffic Telematics (RTTT) - Dedicated Short-Range Communication (DSRC) - DSRC profiles for RTTT applications
EN 12834:2002	Road Transport and Traffic Telematics (RTTT) - Dedicated Short-Range Communication (DSRC) - Application Layer
EN 12795:2002	Road Transport and Traffic Telematics (RTTT) - Dedicated Short Range Communication (DSRC) - Medium access and logical link control
EN 12253:2004	Road Transport and Traffic Telematics (RTTT) - Dedicated Short Range Communication (DSRC) - Physical layer using microwave at 5.8 GHz
UNI 10607-1:2006	Road Traffic and Transport Telematics - Automatic Dynamic Debiting Systems and Automatic Access Control Systems Using Dedicated Short-range Communication at 5.8 GHz Part 1: Physical Layer
UNI 10607-2:2006	Road Traffic and Transport Telematics - Automatic Dynamic Debiting Systems and Automatic Access Control Systems Using Dedicated Short-range Communication at 5.8 GHz Part 2: Data Link Layer
UNI 10607-3:2006	Road Traffic and Transport Telematics - Automatic Dynamic Debiting Systems and Automatic Access Control Systems Using Dedicated Short-range Communication at 5.8 GHz Part 3: Application Layer
UNI 10607-4:2006	Road Traffic and Transport Telematics - Automatic Dynamic Debiting Systems and Automatic Access Control Systems Using Dedicated Short-range Communication at 5.8 GHz Part 4: The Electronic Fee Collection Service Object
UN-ECE	Inland Transport Committee - Working Party on the Construction of Vehicles TRANS/WP.29/78/Rev.1/Amend.2 – Consolidated resolution on the construction of vehicles (R.E.3)

For CONFORMITY ASSESSMENT the following standards are available for the EETS microwave technology systems:

Standard	
CEN ISO/TS14907-1:2005	Road Transport and Traffic Telematics (RTTT) Electronic Fee Collection (EFC) Test Procedures for user and fixed equipment; Part 1: Description of test procedures
CEN ISO/TS14907-2:2003	Road Transport and Traffic Telematics (RTTT) Electronic Fee Collection (EFC) OBU conformance test procedure

For the satellite location technology according to prENV ISO17575 no further standard is currently available.

Standard	
ISO TS 17575: 2004 (no ISO yet, distributed for review only)	Road transport and traffic telematics - Electronic fee collection - Application interface definition for electronic fee collection (EFC) based on Global Navigation Satellite Systems and Cellular Network (GNSS/CN)

9.6.2 Conformity Assessment Standards

Apart from those EFC standards identified above for the European EFC Domain the following standards have been considered as being relevant for EFC CONFORMITY ASSESSMENT from the CERTIFICATION point of view.

Standard		Remark
EN ISO/IEC 17000:2004	Conformity Assessment Vocabulary and general principles	
EN/ISO/IEC 17020:1998	General criteria for the operation of various types of bodies performing inspections	
EN/ISO/IEC 17025:2005	General requirements for the competence of testing and calibration laboratories	
ISO/IEC 17011:2004	Conformity assessment — General requirements for accreditation bodies accrediting conformity assessment bodies	Relevant for EETS-CA, designating TEST LABORATORIES
ISO/IEC 17024:2003	Conformity assessment — General requirements for bodies operating certification of persons	Not (yet) relevant for EETS
ISO/IEC 17030:2003	Conformity assessment — General requirements for third party marks of conformity	Relevant for APPLICANTS
EN 17050-1:2004	Conformity assessment — Supplier's declaration of conformity — Part 1: General requirements	Relevant for APPLICANTS
EN 45011:1998	General Requirements for bodies operating product certification systems	Relevant for CERTIFICATION BODIES (TCCs and OCCs)
EN 45020: 2006	Standardization and related Activities – General Vocabulary (ISO/IEC Guide 2:2004)	

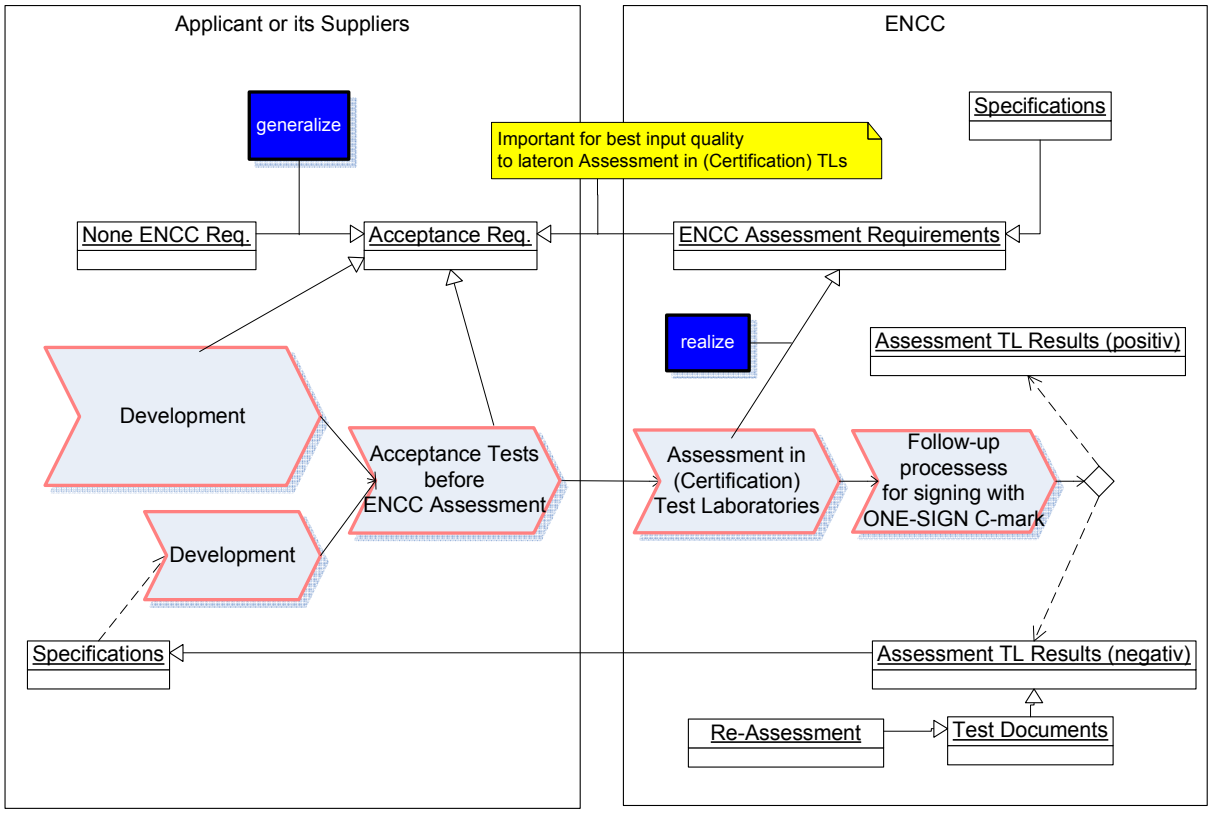
Conformity to these standards on the part of the NOTIFIED BODIES constitutes an element of presumption of conformity to the requirements of the directive. This applies also for the *Voluntary Domain*, where these standards are extensively used for the ACCREDITATION of bodies. It is irrelevant whether the body calls itself a *TEST LABORATORY*, a *CERTIFICATION BODY* or an *INSPECTION BODY* as long as it carries out the tasks in the CONFORMITY ASSESSMENT procedure and has technical ability to do so in an in-

dependent and impartial way. Further details see *Annex 9, Frequently Asked Questions, Why distinguish between CERTIFICATION and TESTING?*

9.7 Annex 7, Interrelations of relevant specifications for EFC

9.7.1 Proposal for High Level Processes

The strongly sequential high level processes are defined as follows:



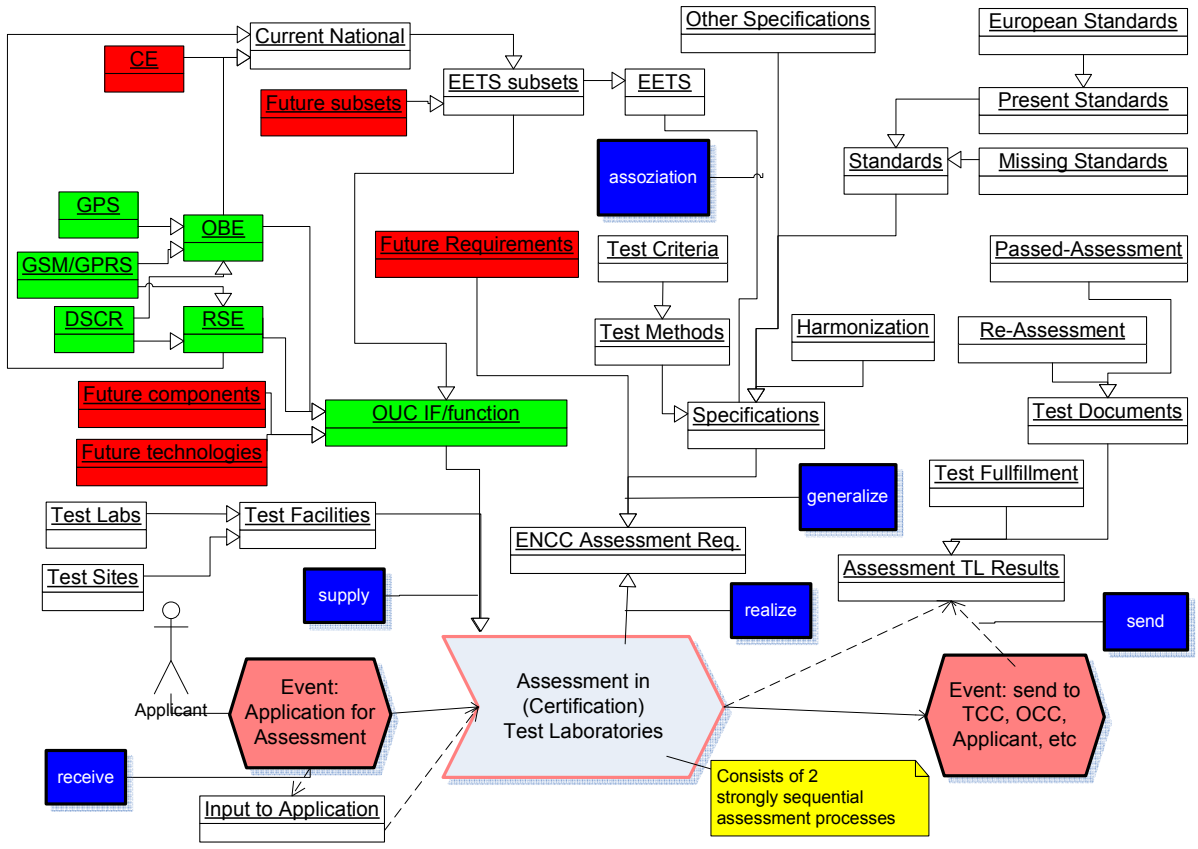
High Level Processes at Applicant and ENCC

The main statements are:

- There is a strictly sequential follow up of on one hand side the development of EETS equipment and its internal acceptance testing of the development process and on the other hand side the assessment of EETS equipment at ENCC Test Laboratories.
- In order to meet the ENCC assessment requirements these have to be considered during development represented through the internal acceptance requirements within and at the end of EETS equipment development.
- The development acceptance tests are initiated or conducted either by the applicants for ENCC certification themselves, the EETS equipment developers/manufacturers or authorised third parties.

- The result of the development acceptance tests must be mandatory input for the application for certification as well as for the assessment for certification in a TL. Ideally the result maps 100% to what is needed for assessment.
- Development stands for the wide range of totally new development up to a partly refit of a system component.
- In order to save cost and time in the process sequence not only the input to assessment has to be of agreed high quality but the same must also hold true for the standardised feedback of assessment to development improvement.
- Not only negative assessment results but also positive ones have to be reported by a qualified reporting in order to support the future development.
- Assessment stands for full assessment up to re-assessment of a component.

The main dependencies for ENCC High Level Test Laboratory process are as follows:

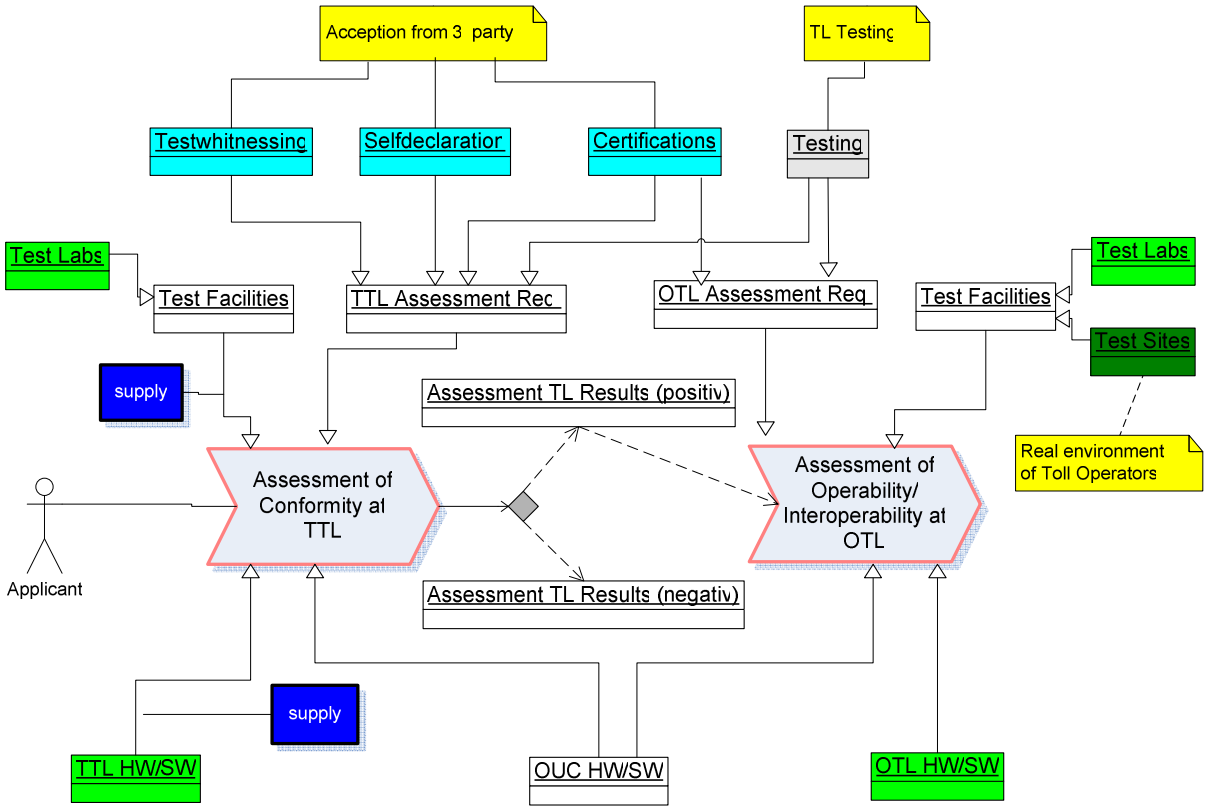


ENCC HL Test Laboratory (TL) Process and Dependencies

The main statements are:

- The assessment process of OUCs in Test Laboratories realises the ENCC assessment requirements which are defined by specifications for various fields.
- The assessment should be done standardised to the maximum possible extent in order to meet the goals for assessment quality, identical and comparable assessments at different Test Laboratories, saving of assessment and development costs and time, non-ambiguous evaluation of results and easy use of a CIS.
- Green-coloured items are currently under special focus whereas red-coloured items are of future interest.
- Process-related and *Quality of Service* related assessment aspects of testing of OUC are not under focus.
- For standardisation it is of major concern that the specifications have to be complete and of needed quality. Therefore a survey of present specifications has to be done rigorously, gaps concerning content and quality criteria have to be filled and finally entire specifications have to be agreed on by all ENCC countries.
- Currently incomplete EETS definition and in future even short-term change in EETS definition are to be solved. This can only be solved by well structured specifications and when possible by harmonisation of national policies and new technologies. There should be rules agreed on when and to what extent an EETS definition can be changed.
- For testing in real environment the Toll Operators play an important role as they have to open their system for site tests and they have to monitor and guarantee a certain *Quality of Service* level during the site tests which must be comparable to later on productive operation.

The split of ENCC High Level Test Laboratory process into two strongly sequential processes one at TTL and the other at OTL and differing aspects are given as follows:



Split of ENCC High Level Test Laboratory Processes to TTL and OTL

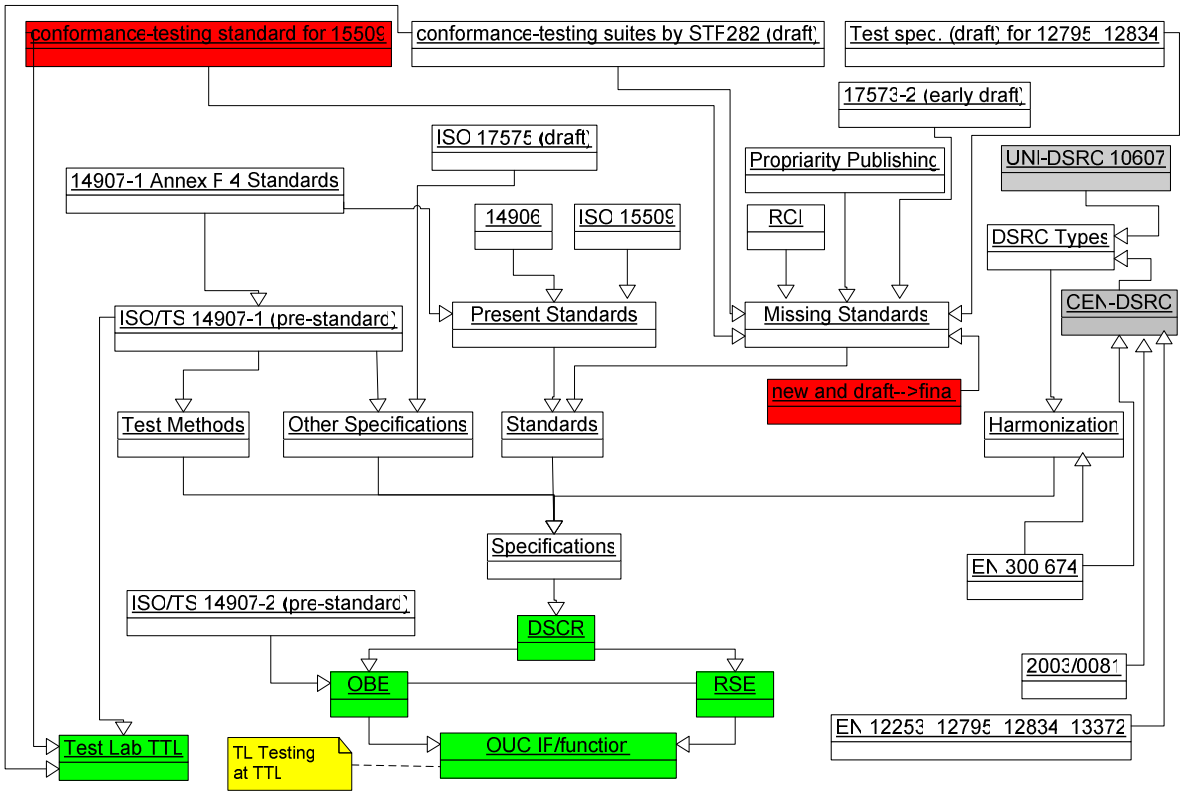
The main statements are:

- The two Test Laboratory processes are strongly sequential. It is mandatory that all results of TTL have to be present and positive in order to start with assessment at OTL.
- Any intermediate negative “priority-1” results in TTL or OTL shall put the correspondent Test Laboratory process to hold status and will lead to a feedback to the applicant. If necessary the stopped process has to be restarted from the very beginning.
- The light blue-coloured items represent the possible input to Test Laboratory processes that states already present “testing” and avoids another sound testing at Test Laboratories, but assessment of these statements still have to be conducted at Test Laboratories.
- The grey-coloured item “Testing” is the contrary to the light blue-coloured items. Here a full testing is mandatory.
- TTL and OTL both might need test facilities in Test Laboratories for factory acceptance tests but only OTL needs also testing at test sites in real environ-

ment of Toll Operators at a guaranteed *Quality of Service* by the Toll Operators during site tests.

9.7.2 DSRC TESTING procedure at Technical TEST LABORATORY

The following figure represents the attempt to illustrate the interrelations of the specifications for DSRC assessment procedure from the viewpoint of a *Technical TEST LABORATORY* (TTL).



DSRC TESTING procedure *at Technical TEST LABORATORY*

The main statements are:

- As conclusion of EG4 Report there are 3 types of DSRC OBUs (UNI, DSRC CEN, Dual) for which the certification network will be in charge of delivering a European Label. UNI only will not be EETS capable. Thus a DSRC UNI OBU as such is not expected to be OUC.
- The two DSRC types, CEN and UNI, are both operating but at very different level of specification. The Italian UNI-DSRC standard UNI 10607 is still needed to be updated and accepted as CEN norm and ETSI test norm. Since 2006 the European DSRC standard CEN-DSRC is an accepted CEN standard (EN 12253, EN 12795, EN 12834, EN 13372) and ETSI ERM STF 238 final-

ised the harmonised norm EN 300 674 for conformity assessment of physical layer. For CEN-DSRC a study by ETSI ERM TG37 STF 282 was started to develop a test specification for conformity assessment of upper protocol layers related to EN 12795 and EN 12834.

- ETSI provided a standard for conformance testing of CEN-DSRC for OBE and RSE - the standard EN 300 674 Part 1 and Part 2. These standards are registered in the official list of *Harmonised Standards* of the European Commission. Therefore the manufacturers of CEN-DSRC equipments can affix the CE mark when compliance with these standards was proven (s. *Annex 5, Relevant European Directives*).
- Concerning **missing standards** it can be stated that UNI and CEN should come to the same level of specifications and agreements upon them. All draft and pre-standard specifications should be finalised and agreed on by all Member States. Especially 17573-2 is an early draft and needed for the scope of describing the relationship between different EFC standards.
- For completion of missing standards all important projects, e.g. RCI, that build interoperable OBE and have practical implementation experience should be consulted for valuable input to updates of standards.
- The completion of missing test specifications must also be supported by finalisation of ISO 14907-1, ISO 14907-2 (*Test procedures for user and fixed equipment*) and prENV ISO17575.
- Sufficient proprietary publishing is mandatory for RSE or Central Equipment interfaces. Incorrect proprietary publishing that lead to wrong standards or wrong developed equipment should lead to certain consequences.
- As the test results in different TEST LABORATORIES should be equivalent a currently missing “conformance-testing standard for 15509” is needed as well. The scope of this missing standard is the support of conformity evaluation of OBE and RSE to (pr)EN 15509 “IAP for DSRC” standard. A conformance-testing standard will provide comparability of results from tests performed at different places and times and facilitate communications between parties. The standard should contain a *Test Suite Structure* and a *Test Purposes* to test DSRC at OBE and RSE and should define "Human-readable" test case specification. An *Abstract Test Suite* should also be part of the standard. New pro-

jects of this scope are currently applied for at CEN. Concerning the aspect of Test Suites CEN TC 278 has requested that ETSI, as a matter of priority, provide conformance testing suites as essential preparatory work to support interoperability of the CEN-DSRC. The duty of *Specialist Task Force 282* is CEN-DSRC Conformance Testing in support of Interoperability. The STF has produced INTEROPERABILITY test suites and related documentation to achieve

- Protocol testing for CEN DSRC MAC and LLC layers (EN 12795), and
- Protocol testing for CEN DSRC application layer (EN 12834) and using selected elements from EN 14906.

The deliverable comprises six Technical Specifications, covering:

These test specifications are currently being validated by ETSI members: they are developing test tools, implementing the test specifications on these tools, using them to test their products, and providing feedback on the test specifications.

Concerning ETSI time table and status of project the final reports should be already available but was not.

9.7.3 GNSS and NAVSTAR GPS

The main aspects for GNSS assessment at TTL or OTL are as follows:

- Concerning potential usage of GNSS currently usable for Europe is only the American NAVSTAR GPS system and therefore the basis for current assessment investigations. Other global positioning technologies like planned GALILEO will have their own specifications and quality and integrity statements which have to be assessed similar to current GPS.
- GPS is currently only used in OBE. Additional future usage in RSE or Central Equipment is not under concern of WP4.
- The outcome of GPS is either positioning information and/or distance travelled and/or time stamps at predefined frequency and quality. The needed output will be defined differently by each Toll Operators contractual stated needs for quality. Inside an OBE the GPS receiver component output may further be improved by e. g. digital tachograph or plausibility checks. So GPS output can be assessed either at interface of the GPS receiver or at interface of the OBE to Central Equipment of Toll Operators. For standardisation aspects the assessment of the GPS receiver interface and functions shall be related to current

state of the art GPS receivers and is therefore independent to different Toll Charger needs and is to be assessed at TTL. The GPS related OBE to Central Equipment interface and its function depends on Toll Chargers needs and has to be assessed at OTL for operability/interoperability at predefined quality of Toll Charger. Whether this predefined quality is met by OBE interface can be assessed only at standardised test sites in real environment with different GPS environment conditions and if needed in some cases in conjunction with Central Equipment systems close to real Central Equipment environment of Toll Operators, e.g. if toll recognition would be done based on map matching located at Central Equipment.

- To be assessed are therefore a GPS antenna in conjunction with a GPS receiver, the further processing on OBE and if needed the resulting quality at Toll Operators.
- OTL assessment must be done at test sites under predefined test conditions especially for representative environmental conditions influencing GPS output. Additional to a pure operational test within one Toll Operator Area a cross-area or cross-country test is mandatory for adjacent neighbourhood area of another Toll Operator for rigorous interoperability testing.
- Currently there are no GPS antenna or receiver certifications existing. Consequently the same holds true for GPS related OBE interface. A certification based on the quality assurance of GPS is also in future not possible as long as US DoD does not guarantee its quality. This disadvantage of the military driven system can be overcome in future by presence of civil driven systems like GALILEO.
- Existing and needed standards are as follows:
    - At antenna and receiver manufacturers side the usage of the definition of GPS signals and the compliance to quality and probability definition of positioning is state of the art and should be assessed by a present ICS according to 14907-2, 15509 and 17575-4 and additional minimal tests at test labs and test sites. The same holds true for the receiver interface compliance to NMEA 0183 format. Different receiver provide additionally non standardised different binary output formats which if used instead of NMEA format have to be documented by the manufac-

turer and the parameter compliance to parameter of NMEA can be assessed by a present ICS and minimal tests as well. Embedded receivers must have an available and documented interface for test output.

- Concerning GPS related OBE interface no standards exists for the quality of GPS related information as Toll Operators have their own quality requirements. These quality requirements and their conformance test conditions have to be published by the Toll Operators. Standards for GPS related OBE API parameters are given in 17575 (draft) and 17573-2 (early draft); both need to be finalised and should differ between GPS related data being mandatory for all EETS and optional for a single EETS.
- For testing at TTL and OTL there is a lack of a conformance-testing standards which has to provide comparability of results from tests performed at different places and times and facilitate communications between parties. The additional aspects mentioned for needed DSRC conformance-testing standard hold true as well.
- For conformance-testing especially at TTL and more benefit from test suites IXIT should be mandatory and standardised as well.

- In order to reduce costs the GPS receivers and antennas they should preferably consist of common mass market components or being a mass market product itself before applied to ENCC assessment. To force this and to use the advantage of an already widespread used and tested product by customers it could be mandatory to accept it only for ENCC assessment if this component is already a certain time in market and/or used by a certain number of customers.
- Open: Consequence of using different while cheaper antennas or only partly changed receiver firmware in OBE than during assessment?

9.7.4 GSM/GPRS

The main aspects for GSM/GPRS assessment at TTL or OTL are as follows:

- Concerning CN only GSM/GPRS will be evaluated.
- Within WP4 the GSM/GPRS will be discussed only for use in OBE.
- Special for GSM/GPRS is being a service used by EETS. Therefore only the Quality of Service of a GSM/GPRS component of an OBE (within a good

working CN) must be assessed by ENCC Test Laboratories. If the GSM/GPRS component for itself should be assessed then additionally its API has to be assessed.

- GSM/GPRS is a well specified standard und well tested over years together with many mobile terminals. GPRS is standardised as part of GSM Phase 2+.(G2.5), see EN 301 344 and TS 101 344. GSM of G2.5 and G3 is standardised as well.
- Mandatory for assessment is additionally a ROAMING test including explicit test of all currently available CNs in the EU countries under concern.
- The GSM/GPRS component assessment result is valid only together with the antennas of the tests and for OTL also the mounting in a vehicle.
- The GSM/GPRS assessment must be done for all potential usage conditions like maximum speed of vehicle or weak signal area.
- When OBE manufacturers could be forced to use standard GSM HW/FW/SW which is already used in mobile phones then ENCC assessment could make use of already present test results at CN operators or mobile manufacturers.
- For conformance-testing there are standards needed but yet not known/present. IXIT for testing in test suites are recommended.

9.8 Annex 8, Calculation Tables of ENCC Business Case

Input for Business Case (1) – 8 operational units, services and fees for equipment certification

Investments & Operational Costs	Year	EETS Management Board		EETS Certification Authority		TCC		OCC		TTL_{DSRC} [1,2,4]	OTL_{DSRC} [1,5]	$TTL_{autonomous}$ [1,4,5]	$OTL_{autonomous}$ [1,5]
		initial	operational [1,2,4]	initial	operational [1]	initial	operational [1]	initial	operational [1]				
Development of a certification organisational structure	1	30.000 €	30.000 €	30.000 €	30.000 €	30.000 €	30.000 €	20.000 €	30.000 €				
	2	10.000 €	20.000 €	10.000 €	10.000 €	10.000 €	40.000 €	0 €	10.000 €				
	3	20.000 €	50.000 €	10.000 €	10.000 €	10.000 €	50.000 €	0 €	10.000 €				
	4	10.000 €	50.000 €	20.000 €	20.000 €	10.000 €	50.000 €	10.000 €	10.000 €				
	5	10.000 €	50.000 €	10.000 €	10.000 €	10.000 €	60.000 €	0 €	10.000 €				
	6	5.000 €	50.000 €	10.000 €	20.000 €	10.000 €	60.000 €	0 €	10.000 €				
Provisioning of a Certification Information and Process Management System (CIS) [3]	1			50.000 €	10.000 €	10.000 €	4.000 €	5.000 €	2.000 €	15.000 €	15.000 €	15.000 €	15.000 €
	2			5.000 €	10.000 €	0 €	4.000 €	0 €	2.000 €	5.000 €	5.000 €	5.000 €	5.000 €
	3			5.000 €	10.000 €	0 €	4.000 €	0 €	2.000 €	5.000 €	5.000 €	5.000 €	5.000 €
	4			5.000 €	10.000 €	10.000 €	4.000 €	5.000 €	2.000 €	15.000 €	15.000 €	15.000 €	15.000 €
	5			10.000 €	20.000 €	0 €	4.000 €	0 €	2.000 €	5.000 €	5.000 €	5.000 €	5.000 €
	6			5.000 €	20.000 €	0 €	4.000 €	0 €	2.000 €	5.000 €	5.000 €	5.000 €	5.000 €
Development of test methods and test suites	1	10.000 €	50.000 €	0 €	5.000 €	0 €	5.000 €	0 €	5.000 €	300.000 €	150.000 €	900.000 €	500.000 €
	2	1.000 €	50.000 €	0 €	5.000 €	0 €	5.000 €	0 €	5.000 €	30.000 €	15.000 €	90.000 €	50.000 €
	3	1.000 €	50.000 €	0 €	5.000 €	0 €	5.000 €	0 €	5.000 €	30.000 €	15.000 €	90.000 €	50.000 €
	4	10.000 €	50.000 €	0 €	5.000 €	0 €	5.000 €	0 €	5.000 €	30.000 €	15.000 €	90.000 €	50.000 €
	5	1.000 €	50.000 €	0 €	5.000 €	0 €	5.000 €	0 €	5.000 €	30.000 €	15.000 €	90.000 €	50.000 €
	6	1.000 €	50.000 €	0 €	5.000 €	0 €	5.000 €	0 €	5.000 €	30.000 €	15.000 €	90.000 €	50.000 €
Operational costs for human resources, test and support infrastructure	1	10.000 €	50.000 €										
	2	2.000 €	50.000 €										
	3	2.000 €	50.000 €										
	4	10.000 €	50.000 €										
	5	2.000 €	100.000 €										
	6	2.000 €	100.000 €										
service costs	1												
	2			5.000 € per conformity & interoperability certification of DSRC equipment 10.000 € per conformity & interoperability certification of autonomous equipment		10.000 € per conformity statement of a DSRC equipment 80.000 € per interoperability statement of an autonomous equipment		10.000 € per interoperability statement of a DSRC equipment 40.000 € per interopera- bility statement of an autonomous equipment		40.000 € per Conformity Assessment	40.000 € per EFC System Interoperability Assessment	750.000 € per Conformity Assessment	350.000 € per EFC System Interoperability Assessment
	3												
	4												
	5												
	6												

Abbreviations:

CIS: Certification Information System
EETS: European Eletctronic Toll Service
EFC-CRF: EFC-Certification Refertence Framework
OCC: Operational Certification Centre
OTL: Operational Test Laboraratory
TCC: Technical Certification Centre
TTL: Technical Test Laboratory

Remarks:

[1] includes human resources
[2] Developing/maintain EFC-CRF
[3] Assumption: Licence fee for one single client system = 2500 € / year
[4] incl. Marketing Costs
[5] There will be a few TTLs but many OTLs for DSRC technology
[6] Exclucing Conformity Test required by relevant EC-Directives

Input for Business Case (2) – operational units, services and fees for process certification

Investments & Operational Costs	Year	EETS Management Board		EETS Certification Authority		OCC_{DSRC} [1]	$OCC_{autonomous}$ [1]
		initial	operational	initial	operational [1]		
Development of a certification organisational structure	1	covered in table Investment&Costs		covered in table Investment&Costs		covered in table Investment&Costs	
	2						
	3						
	4						
	5						
	6						
Provisioning of a Certification Information and Process Management System (CIS) [3]	1						
	2						
	3						
	4						
	5						
	6						
Development of inspection methods and tools	1			covered in table Investment&Costs		35.000 €	35.000 €
	2					20.000 €	20.000 €
	3					20.000 €	20.000 €
	4					20.000 €	20.000 €
	5					20.000 €	20.000 €
	6					20.000 €	20.000 €
Operational costs for human resources, test and support infrastructure	1						
	2						
	3						
	4						
	5						
	6						
service costs	1						
	2			5.000 € per certification of interoperability related DSRC processes 10.000 € per certification of interoperability related autonomous processes		75.000 € per interoperability specific process inspection plus yearly 7.500 € for follow up	150.000 € per interoperability specific process inspection plus yearly 15.000 € for follow up
	3						
	4						
	5						
	6						

Abbreviations:

CIS: Certification Information System
EETS: European Eletctronic Toll Service
OCC: Operational Certification Centre

Remarks:

[1] includes human resources

Input for Business Case (3) – number of services to perform for certifications

Certification Demand – standard case

Applicant	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				TOTAL
	Number of Certification				Number of Certification				Number of Certification				Number of Certification				Number of Certification				Number of Certification				
	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	
EFC Equipment Manufacturer	1	3	3	-	1	4	4	-	2	6	8	-	3	8	10	-	5	9	10		7	9	12		101
EETS Provider DSRC				4				8				8				12				8				7	45
EETS Provider autonomous				1				2				2				2				2				2	11
Toll Charger DSRC				5				9				14				9				4				3	45
Toll Charger autonomous				1				0				1				1				2				2	7
TOTAL	1	3	3	11	1	4	4	19	2	6	8	26	3	8	10	20	5	9	10	16	7	9	12	14	203
Following up Certification																									

Applicant	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				TOTAL
	Number of Certification				Number of Certification				Number of Certification				Number of Certification				Number of Certification				Number of Certification				
	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	
EFC Equipment Manufacturer				0				1				2				4				7				11	25
TOTAL	0	0	0	0	0	0	1	0	0	0	2	0	0	0	4	0	0	0	7	0	0	0	11	0	25

Certification Demand – optimistic case

Applicant	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				TOTAL
	Number of Certifications				Number of Certifications				Number of Certifications				Number of Certifications				Number of Certifications				Number of Certifications				
	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	
EFC Equipment Manufacturer	2	5	5	-	2	6	6	-	3	9	8	-	4	7	12	-	1	11	15		9	11	8		131
EETS Provider DSRC				6				10				12				10				8				3	45
EETS Provider autonomous				2				3				3				3				4				4	15
Toll Charger DSRC				7				11				16				8				8				5	55
Toll Charger autonomous				1				1				1				2				2				3	10
TOTAL	2	5	5	16	2	6	6	25	3	9	8	32	4	7	12	23	1	11	15	18	9	11	8	15	261
Following up Certifications																									

Applicant	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				TOTAL
	Number of Certification				Number of Certification				Number of Certification				Number of Certification				Number of Certification				Number of Certification				
	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	OBE 1	OBE 2	RSE	Process	
EFC Equipment Manufacturer				0				1				2				4				7				11	25
TOTAL	0	0	0	0	0	0	1	0	0	0	2	0	0	0	4	0	0	0	7	0	0	0	11	0	25

General Assumptions for the Business Case (1)

- Inflation: 2% per year

Variable Costs

Personnel Costs

- Technical employees:
  - 25% Senior Technicians € 80.000.-/year
  - 35% Technicians € 60.000.-/year
  - 40% Junior Technicians € 40.000.-/year
- Social charges: 25%
- Productive days per employee: 211/year

Costs which depend on number of employees

- Office rent: € 168.- per m^2/year; Office operating expenses: € 84.- per m^2/year (needed m^2 = number of employees * 10 + 40%)
- Communication costs per employee: € 840.-/year
- Consumables -> administration costs per employee: € 1.500.-/year

Charged price per expert's working day: € 1.143.-

General Assumptions for the Business Case (2)

Fixed Costs

- Administration costs (depend on individual entity, for details see TÜV-input)
- Insurance costs per unit (years 2009-2014):
  € 20.000, 20.000, 25.000, 25.000, 30.000, 30.000
- Tax consultant/lawyer costs per unit (years 2009-2014):
  € 5.000, 5.000, 6.000, 6.000,7.000, 7.000, 7.000
- Depreciation (depends on necessary equipment)

Depreciation Scheme

for office equipment: 5 years

for test laboratory equipment: 8 years

Financing Parameters

Interest rate for interests received: 1,5%

Interest rate for short term debt (after taxes): 5%

Maximum use of losses carried forward: 100%

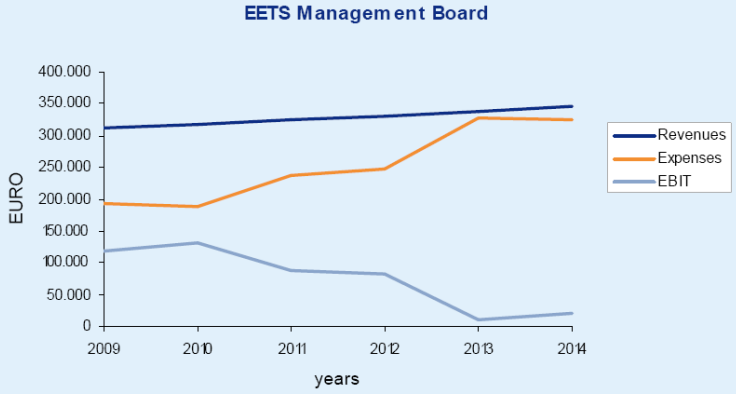
Tax rate: 25%

Original Capital: € 35.000.- per operational unit, in the first year

EETS Management Board (EETS MB)

YEARS	2009		2010		2011		2012		2013		2014	
EETS MB												
number of units	1		1		1		1		1		1	
per EETS MB unit:												
Revenues	312.120		318.362		324.730		331.224		337.849		344.606	
Total costs	-194.671		-187.699		-237.475		-247.880		-326.485		-324.099	
EBIT (and EBIT-Margin)	117.449	38%	130.663	41%	87.255	27%	83.344	25%	11.363	3%	20.507	6%
EBITDA (and EBITDA-Margin)	127.449	41%	143.263	45%	104.455	32%	106.544	32%	37.163	11%	37.907	11%

EBIT-Margin = EBIT / Revenue
EBITDA-Margin = EBITDA / Revenue



Individual Assumptions/Comments:

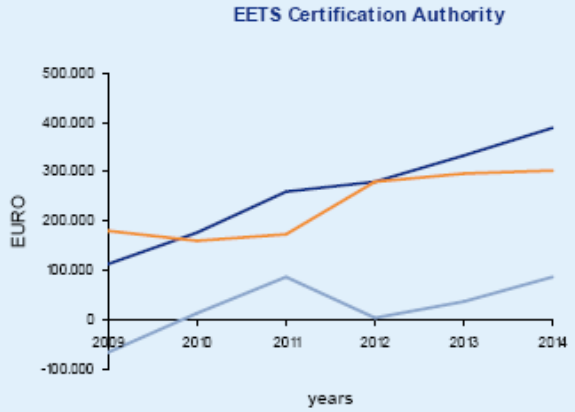
Creation of revenues through yearly member fees; 30 members

10 Small members:
à € 5.000
10 Medium members:
à € 10.000
10 Big members:
à € 15.000

EETS Certification Authority (EETS CA)

YEARS	2009		2010		2011		2012		2013		2014	
EETS CA												
number of units	1		1		1		1		1		1	
per EETS CA unit:												
number of employees	*1*		*1*		*1*		*2*		*2*		*2*	
Revenues	114.444		175.099		259.784		281.541		332.218		390.553	
Total costs	-180.766		-160.531		-172.856		-279.819		-295.632		-302.284	
EBIT (and EBIT-Margin)	-66.322	/	14.568	8%	86.927	33%	1.722	1%	36.586	11%	88.270	23%
EBITDA (and EBITDA-Margin)	-50.322	/	33.568	19%	108.927	42%	28.722	10%	67.586	20%	106.270	27%

EBIT-Margin = EBIT / Revenue
EBITDA-Margin = EBITDA / Revenue



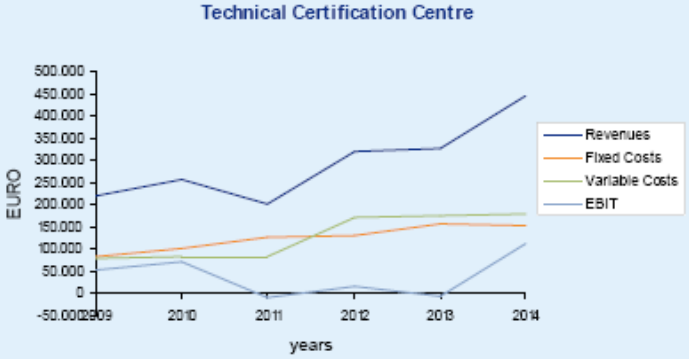
Individual Assumptions/Comments:

If EETS Management Board and EETS Certification Authority are combined to one unit, their combined EBIT will be clearly positive.

Technical Certification Center (TCC)

YEARS	2009		2010		2011		2012		2013		2014	
TCC												
number of units	1		1		2		2		3		3	
per TCC unit:												
number of technical workers	*1*		*1*		*1*		*2*		*2*		*2*	
Revenues	218.484		254.690		200.250		320.183		326.587		444.158	
variable costs and % of total costs	*-80.234*	*49%*	*-81.838*	*45%*	*-83.475*	*40%*	*-170.280*	*55%*	*-173.695*	*53%*	*-177.160*	*54%*
fixed costs and % of total costs	*-84.730*	*51%*	*-101.529*	*55%*	*-125.385*	*60%*	*-131.652*	*44%*	*-156.800*	*47%*	*-153.576*	*46%*
Total costs	-164.963		-183.367		-208.860		-301.941		-330.494		-330.744	
EBIT (and EBIT-Margin)	53.521	24%	71.322	28%	-8.610	/	18.242	6%	-3.907	/	113.414	26%
EBITDA (and EBITDA-Margin)	61.521	28%	81.322	32%	3.390	2%	34.242	11%	14.093	4%	125.414	28%

EBIT-Margin = EBIT / Revenue
EBITDA-Margin = EBITDA / Revenue



Individual Assumptions/Comments:

TCC has weak results with slightly negative EBIT in years 2011, 2013. The reason is the increase of operational units which multiplies fixed costs, that can not be compensated by the relatively low service fees.

Operational Certification Center (OCC)

YEARS	2009		2010		2011		2012		2013		2014	
OCC												
number of units	2		2		3		3		4		5	
per OCC unit:												
number of technical workers	*3*		*5*		*5*		*5*		*4*		*3*	
Revenues	625.541		1.055.902		1.045.449		1.012.074		800.983		689.211	
variable costs and % of total costs	*-240.701*	*75%*	*-409.191*	*88%*	*-417.375*	*87%*	*-425.723*	*87%*	*-347.390*	*83%*	*-265.753*	*79%*
fixed costs and % of total costs	*-79.129*	*25%*	*-54.081*	*12%*	*-61.557*	*13%*	*-65.688*	*13%*	*-73.599*	*17%*	*-69.911*	*21%*
Total costs	-319.829		-463.272		-478.932		-491.411		-420.989		-335.664	
EBIT (and EBIT-Margin)	305.711	49%	592.630	56%	566.517	54%	520.663	51%	379.994	47%	353.547	51%
EBITDA (and EBITDA-Margin)	310.711	50%	597.630	57%	571.517	55%	528.663	52%	387.994	48%	356.547	52%

EBIT-Margin = EBIT / Revenue
EBITDA-Margin = EBITDA / Revenue

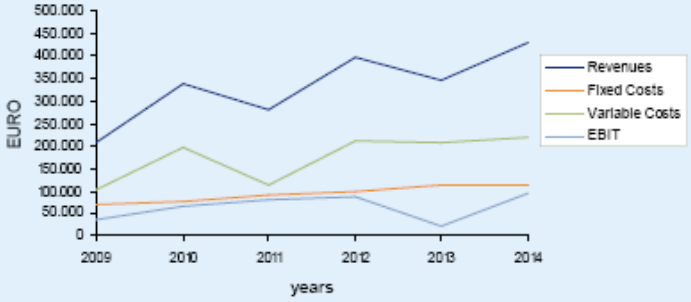
Individual Assumptions/Comments:

The results are very positive, since OCC provides both, equipment- and process- certifications and the corresponding follow-up services. Furthermore, the fixed costs for OCC are relatively low, as they need less equipment than in the far more engineering-intense Laboratories (TTLs, OTLs).

Technical Test Laboratory DSRC (TTL_{DSRC})

YEARS	2009		2010		2011		2012		2013		2014	
TTL DSRC												
number of units	1		1		2		2		3		3	
per TTL DSRC unit:												
number of technical workers	*1*		*2*		*1*		*2*		*2*		*2*	
Revenues	208.080		339.587		281.432		397.469		345.356		428.843	
variable costs and % of total costs	*-101.042*	*60%*	*-197.635*	*72%*	*-111.618*	*55%*	*-210.036*	*68%*	*-208.230*	*65%*	*-220.053*	*66%*
fixed costs and % of total costs	*-68.760*	*40%*	*-76.280*	*28%*	*-90.305*	*45%*	*-99.977*	*32%*	*-114.418*	*35%*	*-113.251*	*34%*
Total costs	-169.802		-273.915		-201.924		-310.012		-322.648		-333.304	
EBIT (and EBIT-Margin)	38.278	18%	65.671	19%	79.509	28%	87.457	22%	22.708	7%	95.538	22%
EBITDA (and EBITDA-Margin)	81.028	39%	115.421	34%	136.259	48%	153.207	39%	95.458	28%	166.288	39%

EBIT-Margin = EBIT / Revenue
EBITDA-Margin = EBITDA / Revenue



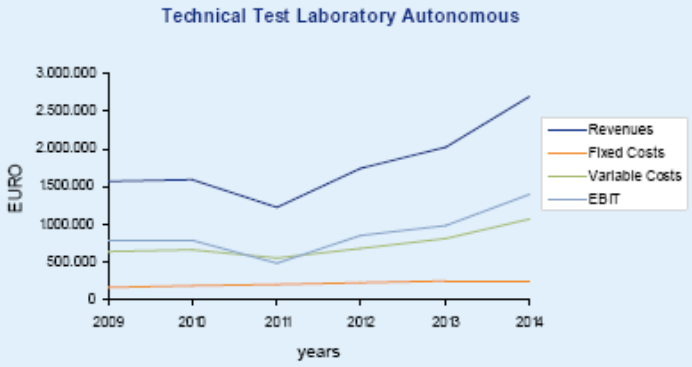
Individual Assumptions/Comments:

The Technical Test Laboratories face high fixed costs, as they need expensive equipment. At the same time they can not ask too high certification- and service fees, Since they are certifying standardized equipment (only DSRC) and are consequently facing more competition.

Technical Test Laboratory Autonomous ($TTL_{Autonomous}$)

YEARS	2009		2010		2011		2012		2013		2014	
TTL AUTONOMOUS												
number of units	1		1		2		2		3		3	
per TTL AUTONOMOUS unit:												
number of technical workers	*6*		*6*		*5*		*6*		*7*		*9*	
Revenues	1.560.600		1.591.812		1.217.736		1.738.927		2.027.092		2.699.411	
variable costs and % of total costs	*-637.451*	*81%*	*-650.211*	*79%*	*-539.149*	*74%*	*-684.760*	*76%*	*-810.641*	*77%*	*-1.057.200*	*82%*
fixed costs and % of total costs	*-148.260*	*19%*	*-167.780*	*21%*	*-193.805*	*26%*	*-215.477*	*24%*	*-241.918*	*23%*	*-240.751*	*18%*
Total costs	-785.721		-817.991		-732.954		-900.236		-1.052.559		-1.307.952	
EBIT (and EBIT-Margin)	774.879	50%	773.821	49%	484.782	40%	838.691	48%	974.533	48%	1.391.460	52%
EBITDA (and EBITDA-Margin)	897.129	57%	915.071	57%	645.032	53%	1.019.941	59%	1.174.783	58%	1.589.710	59%

EBIT-Margin = EBIT / Revenue
EBITDA-Margin = EBITDA / Revenue



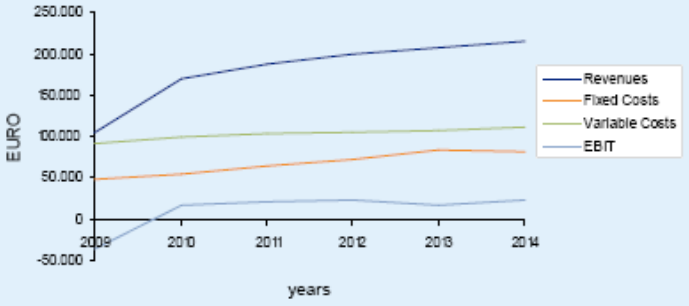
Individual Assumptions/Comments:

The Technical Test Laboratories for autonomous systems are very profitable, although they have high fixed costs for the necessary expensive equipment.
TTLs can ask for relatively high service fees, because the equipment and the certification work are very complex.

Operational Test Laboratory DSRC (OTL_{DSRC})

YEARS	2009		2010		2011		2012		2013		2014	
OTL DSRC												
number of units	2		2		3		4		5		6	
per OTL DSRC unit:												
number of technical workers	*1*		*1*		*1*		*1*		*1*		*1*	
Revenues	104.040		169.793		187.622		198.735		207.214		214.421	
variable costs and % of total costs	*-90.638*	*65%*	*-98.818*	*65%*	*-102.237*	*61%*	*-105.018*	*60%*	*-107.559*	*57%*	*-110.026*	*57%*
fixed costs and % of total costs	*-48.885*	*35%*	*-53.405*	*35%*	*-64.430*	*39%*	*-71.102*	*40%*	*-82.543*	*43%*	*-81.376*	*43%*
Total costs	-139.523		-152.223		-166.668		-176.119		-190.112		-191.403	
EBIT (and EBIT-Margin)	-35.483	/	17.571	10%	20.954	11%	22.615	11%	17.102	8%	23.018	11%
EBITDA (and EBITDA-Margin)	-12.608	/	44.446	26%	51.829	28%	59.490	30%	57.977	28%	61.893	29%

EBIT-Margin = EBIT / Revenue
EBITDA-Margin = EBITDA / Revenue



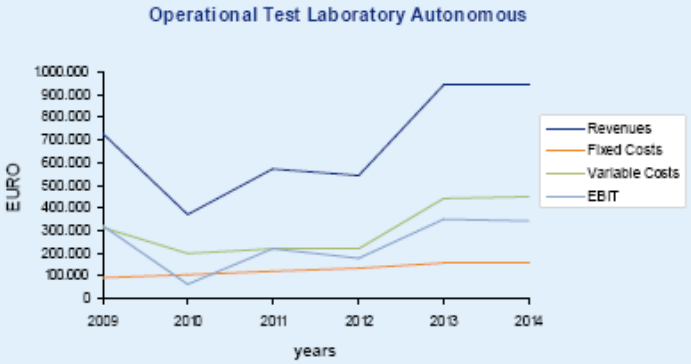
Individual Assumptions/Comments:

The Operational Test Laboratories for DSRC face a similar situation as TTLs for DSRC.
High fixed costs combined with relatively low certification- and service-charges result in low margins. The relatively high number of offices reduces the results by multiplying the fixed costs.

Operational Test Laboratory Autonomous ($OTL_{Autonomous}$)

YEARS	2009		2010		2011		2012		2013		2014	
OTL AUTONOMOUS												
number of units	1		2		2		3		3		4	
per OTL AUTONOMOUS unit:												
number of technical workers	*3*		*2*		*2*		*2*		*4*		*4*	
Revenues	728.280		371.423		568.277		541.000		945.976		944.794	
variable costs and % of total costs	*-313.529*	*77%*	*-200.619*	*65%*	*-223.778*	*64%*	*-224.389*	*62%*	*-441.087*	*74%*	*-448.817*	*74%*
fixed costs and % of total costs	*-95.260*	*23%*	*-106.780*	*35%*	*-124.805*	*36%*	*-138.477*	*38%*	*-156.018*	*26%*	*-155.751*	*26%*
Total costs	-408.789		-307.599		-348.583		-362.865		-598.905		-604.568	
EBIT (and EBIT-Margin)	319.491	44%	63.824	17%	219.694	39%	178.134	33%	347.071	37%	340.226	36%
EBITDA (and EBITDA-Margin)	386.741	53%	144.074	39%	310.944	55%	282.384	52%	462.321	49%	453.476	48%

EBIT-Margin = EBIT / Revenue
EBITDA-Margin = EBITDA / Revenue



Individual Assumptions/Comments:

The Operational Test Laboratories for autonomous systems are very profitable, for the same reasons as the Technical Test Laboratories for autonomous equipment. Relatively high certification- and service-fees and a low number of units (which avoids multiplication of fixed costs) are the main reasons for the high profitability.

9.9 Annex 9, Frequently Asked Questions

9.9.1 What means SWOT Analysis?

SWOT stands for *Strengths, Weaknesses, Opportunities* and *Threats*. It is an analysis technique that has been applied because of its simple and effective methodology to understand strengths and weaknesses, and to discover new opportunities and threats. Strengths and weaknesses are **internal** to EETS, opportunities and threats relate to **external** impacts.

The following guideline has been considered by applying the SWOT technique:

Strengths:

- What are the advantages of the EG4-Approach?
- What does its results better than existing certification schemes and practices?
- What do potential users and stakeholders of ENCC see as a strength?

Weaknesses:

- What could be improved?
- What has not been considered?
- What should be avoided?
- What are users and stakeholders likely to see as weaknesses?

Opportunities:

- What is successfully being done somewhere else in Certification?
- What are the interesting trends to be aware of?
- Useful opportunities can come from such things as:
    - changes in EFC technology and markets, or
    - changes in government policies related to EFC.
- Look at the strengths and ask whether these open up any opportunities.
- Look at weaknesses and ask whether they could open up opportunities by eliminating them.

Threats:

- What are the obstacles?
- What would happen if certification won't take place?
- What do other countries do?
- Are the required specifications for certifications are changing?

9.9.2 What does that mean, *New Approach* and *Global Approach*?

The European Union has developed instruments to remove the barriers to free circulation of goods. Among these, the *New Approach* to product regulation and the *Global Approach* to conformity assessment [BLUE BOOK].

The ***New Approach*** was laid down to technical harmonisation and standardisation, which establish the limitation of legislative harmonisation to ESSENTIAL REQUIREMENTS that products must meet, if they are to benefit from the free movement within the Community. The ESSENTIAL REQUIREMENTS are harmonised and made mandatory by EC directives to be transposed into national legislation. The technical specification of products meeting these ESSENTIAL REQUIREMENTS are set out in *Harmonised Standards*. The application of the harmonised or other standards remains voluntary, and the manufacturer may always apply other technical specification to meet the requirements.

In comparison with the previous directives, which had very detailed requirements for specific products, the New Approach offers a number of advantages:

- It deals with large categories of products (e.g. machinery, toys, or high speed rail systems, etc.)
- It can cover “horizontal risks”, such as Electromagnetic Compatibility, which affect one aspect of numerous kinds of products, without the need to address the specific product in detail.
- It builds closer co-operation between public authorities and market operators.
- It is based on total harmonisation (replacing diverging national legislation) rather than optional harmonisation (which creates a series of dual regimes).

In addition to the principles of the *New Approach*, conditions for reliable conformity assessment are necessary. This was covered by the ***Global Approach*** to certification and testing which states the following guiding principles for Community policy on conformity assessment:

- Devising modules for the various phases of conformity assessment procedures and by laying down criteria for the designation of bodies operating these procedures to ensure the necessary flexibility over the entire manufacturing process.

- Setting up accreditation systems for the recognition of competence of test, inspection and certification bodies.
- The use of European standards relating to quality management (ISO 9000 series).
- Mutual recognition agreement concerning testing and certification.

9.9.3 What are *New Approach* Directives?

The free movement of goods lies at the heart of achieving an open market for business in Europe. In May 1985, European Community Ministers agreed on a "*New Approach to Technical Harmonisation and Standards*" to fulfil this objective.
New Approach Directives (that is Community Law) set out the **ESSENTIAL REQUIREMENTS** (on safety, on human health, on consumer protection, and on environmental protection), written in general terms which must be met before products may be sold in the European Community. European harmonised standards provide the detailed technical information enabling manufacturers to meet the ESSENTIAL REQUIREMENTS. The directives also **explain how manufacturers are able to demonstrate conformity** with the ESSENTIAL REQUIREMENTS. Products which meet the ESSENTIAL REQUIREMENTS are to display the CE marking, as described in the particular directive, which means that the products can be sold anywhere in the Community.
Main Features of the legislation:

- Legislation is limited to goal-setting ESSENTIAL REQUIREMENTS on safety, human health, consumer protection, and environmental protection;
- Standards bodies draw up the technical specifications - European Standards - needed to ensure conformity with these requirements;
- The application of these standards is voluntary;
- Products made to European Standards enjoy a presumption of conformity with the ESSENTIAL REQUIREMENTS of the directives.

Directive 2004/52/EC does not (yet) have the characteristics of this kind of directive. There are around 25 *New Approach Directives* covering large categories of products. Relevant for EFC equipment are the following:

- Council Directive 2004/108/EC: *Electromagnetic Compatibility*;

- Council Directive 95/46/EC: *Protection of individuals with regard to the processing of personal data and on the free movement of such data*;
- Council Directive 1999/5/EC: *Radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity*;
- Council Directive 2000/53/EC: *Principles on human machine interface, HMI*;
- Council Directive 93/465/EEC: *Modules for conformity assessment and rules for CE marking*.

9.9.4 What are ESSENTIAL REQUIREMENTS?

ESSENTIAL REQUIREMENTS are set out in the annexes of *New Approach Directives* for certain product categories to ensure that products may be placed on the EC market and put into service only if the ESSENTIAL REQUIREMENTS are fulfilled. EC *New Approach Directives* are generally designed to cover all threats related to the public interest that they intends to protect.

For example in the case of the EMC-directive this is done by stating that all equipment should be able to perform satisfactorily in their EM-environment. This means that requirements must be met for both emission and susceptibility as equipment creates EM interference, and must reside in EM interference (or wanted field) from other equipment.

The details of limits and test methods are left over to the market, by means of *Harmonised Standards* to be applied.

9.9.5 What are *Harmonised Standards*?

Standards are voluntary agreements, in a detailed written format, that establish important technical criteria for products, services, and processes. Standards help to make sure that products and services are fit for their intended purpose(s), comparable, and compatible.

Harmonised Standards are European standards, adopted by standards bodies such as CEN, CENELEC, or ETSI, pursuant to a mandate from the European Commission, following consultation with the Member States. They are developed through an open and transparent process, based on consensus between all interested parties.

Harmonised Standards are published in the Official Journal of the European Union, and then **transposed into national standards**. Compliance with *Harmonised Stan-*

dards creates a presumption of conformity to the corresponding ESSENTIAL REQUIREMENTS of the Directives. This provides valuable protections for manufacturers, and also expands the possibilities for CONFORMITY ASSESSMENT procedures. However, compliance with *Harmonised Standards* is voluntary, and manufacturers are free to choose other technical solutions that comply with the ESSENTIAL REQUIREMENTS (but then the NOTIFIED BODY has to check if all TESTS are covered by the used standards). This allows for innovation. But, in such cases, the burden is upon the manufacturer to demonstrate compliance.
A list of references to harmonised standards in the context of the *New Approach* Directives can be found on the European Commission website.

9.9.6 When and how are *Harmonised Standards* developed?

European Standards are developed when there is a significant industry, market, or public need. For example, industry might need a standard to ensure the interoperability of a product or service. A Standard might be necessary to ensure that competition is fair. The public may require the benefits of a Standard that improves the quality and safety of a product or service. European Standards are also utilised to promote compliance with European legislation. In fact, most standards are developed for a combination of reasons, and provide a variety of benefits to diverse stakeholders.
Requests for new Standards can come from a number of different sources, public or private. Once the need is recognised and a request is made, the next step is referral of the issue to the appropriate *Committee* or *Working Group*. European Standards are normally developed in one of the three European standardisation bodies:

- The European Committee for Standardisation (CEN) deals with all sectors except electro-technology and telecommunication.
- The European Committee for Electrotechnical Standardisation (CENELEC) deals with the electro-technical sector.
- The European Telecommunications Standards Institute (ETSI) deals with the telecommunications and broadcasting sectors.

Many European standards are based on publications from the IEC (International Electronic Committee), adapted and/or modified by the CENELEC, and translated by the member states to be used in the respective countries. Standardization bodies in the Member States take care of their translation and distribution.

Committees in the member states contribute and finally vote for (or against) the resulting standards.
Generally speaking, any party that has an interest in or will be affected by a standard can contribute to its development. Participation can take place at the national level, by influencing the input from specific Member States, or it can take place at the European level.
Technical expertise is crucial for developing standards. The experts involved have a wide range of backgrounds, coming from industry, government, academic circles, trade and industry groups, non-governmental organisations, and special interest groups. One of the key operational principles of the European Standards bodies is that experts involved in preparing standards represent a variety of interests. This ensures balance and representation. In addition, it helps ensure that the standards are accepted and used once they are finished and published.

9.9.7 What means the CE Mark?

The ce-mark is the official marking required by the European Community for all Electric- and Electronic equipment that will be sold, or put into service for the first time, anywhere in the European community. It proves to the consumer or purchaser that this product fulfils all ESSENTIAL REQUIREMENTS (on safety, human health, consumer protection, and environmental protection) as they are defined in the European Directives. The ce-marking directive (93/68/EEC) was adopted on 1993. The ce marking directive gives a detailed description of the initials CE and any other marks specific to a particular directive and the ways conformity may be acquired.
In return for fulfilling the ce-marking requirements, the manufacturer or its agent gets the opportunity to cover the entire European market using only one CONFORMITY ASSESSMENT procedure for the topics covered in the miscellaneous directives.

9.9.8 What is a NOTIFIED BODY?

Each Member States has an obligation to transpose each CONFORMITY ASSESSMENT procedures established in a European *New Approach Directives* into their national legislation. The so called NOTIFIED BODIES carry out the tasks pertaining to the CONFORMITY ASSESSMENT procedure **when a third party is required** within in the scope of the directive. A NOTIFIED BODY must be a legal entity established on the territory of a Member State and thus under its jurisdiction. **Notification** is a **political act**

whereby a Member State informs the Commission and the other Member States that a body, which fulfils the relevant requirements, has been designated to carry out CONFORMITY ASSESSMENT according to a directive. **ACCREDITATION** in comparison is a **technical act** which is in most cases not mandatory but gives presumption for compliance.

NOTIFIED BODIES are free to offer their CONFORMITY ASSESSMENT services, within their scope of accreditation or notification respectively, to any economic operator established either inside or outside the Community. They may carry out these activities also on the territory of other Member States or of third countries.

Manufacturers or service providers are free to choose any NOTIFIED BODY that has been designated to carry out the CONFORMITY ASSESSMENT Procedure in question according to the applicable directive.

General responsibilities of NOTIFIED BODIES are:

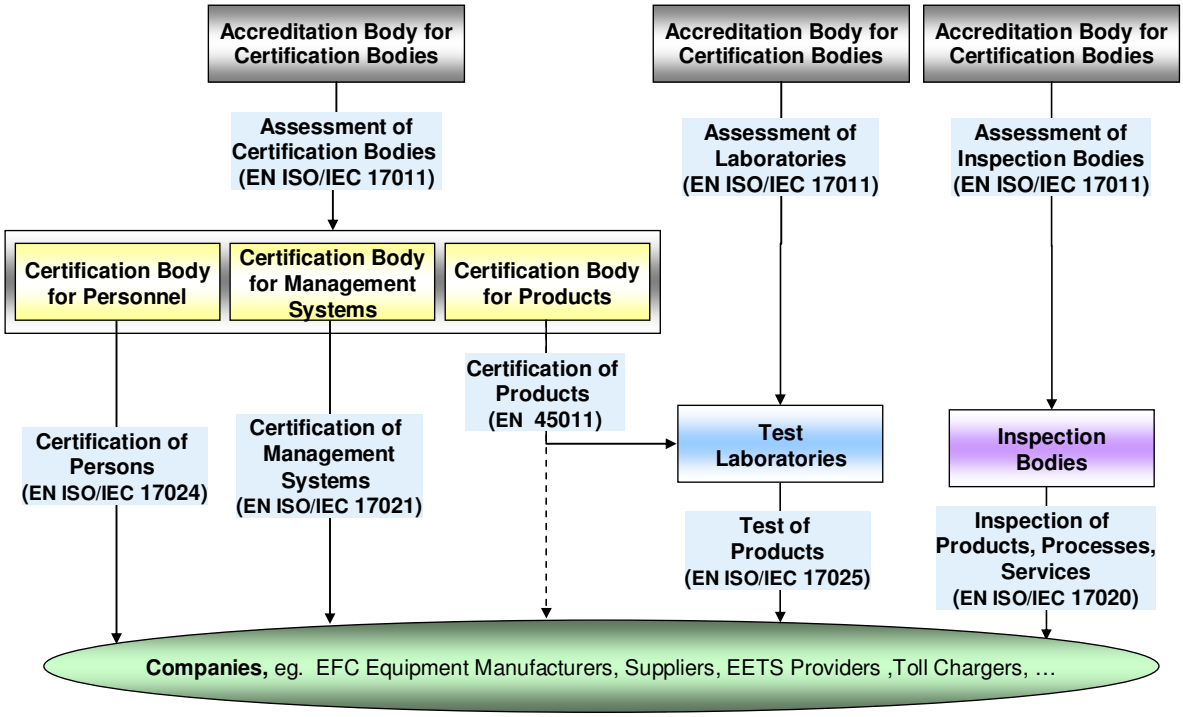
- To operate in a competent, non-discriminatory, transparent, neutral, independent and impartial manner.
- To employ the necessary personnel, that has sufficient and relevant knowledge and experience to carry out CONFORMITY ASSESSMENT in accordance with the directive in question.
- To make adequate arrangements to ensure confidentiality of the information obtained in the course of CONFORMITY ASSESSMENT.

Applied on the directive 2004/52/EC each Member State operating an EFC system has to notify bodies responsible for approving interoperable EFC equipment etc. for use in the enforcement of European Union legislation. But since directive 2004/52/EC has not the characteristics of a *New Approach Directive* and CONFORMITY ASSESSMENT procedures have not defined (yet), there is no real obligation (yet) to notify bodies for the 2004/52/EC (both can be subject of the related *EC Decision*, which was by the time this document was prepared under consideration). It can be rather considered as an option to facilitate imposition of fair execution of CONFORMITY AND INTEROPERABILITY ASSESSMENT on TOLL CHARGERS if conflicts of interests arise.

9.9.9 Why distinguish between CERTIFICATION and TESTING?

The *Global Approach* intents NOTIFIED BODIES for carrying out the tasks pertaining to the CONFORMITY ASSESSMENT procedures referred to in the applicable *New Approach*

Directives when a third party is required. This is supported by the EN 45000 series which becomes replaced by the EN ISO/IEC 17000 series, which cover the following types of NOTIFIED BODIES: TEST LABORATORIES, CERTIFICATION BODIES, INSPECTION BODIES, and ACCREDITATION BODIES. The interrelation of these bodies and the related standards are illustrated below.



Interrelation of Conformity Assessment Bodies and related Standards

The referred standards consist, in general terms, of a part dealing with the organisation and management of the body, and a part dealing with the technical requirements relating to the operation of the body. The standards must be seen as an integral whole, since both parts are needed to ensure the reliability and capability of the operations of the NOTIFIED BODIES.

	CERTIFICATION BODIES	TEST LABORATORIES	INSPECTION Bodies
Criteria for ACCREDITATION BODIES	EN ISO/IEC 17011	EN ISO/IEC 17011	EN ISO/IEC 17011
ACCREDITATION and ASSESSMENT Criteria			
Operational Criteria	EN 45011, EN ISO/IEC 17024	EN ISO/IEC 17025	EN ISO/IEC 17020

Conformity to the relevant standard of the EN 45000/EN ISO/IEC 17000 series on the part of the NOTIFIED BODIES constitutes an element of presumption of conformity to the requirements of the directive. This applies also for the *Voluntary Domain*,

where these standards are extensively used for the accreditation of bodies. It is irrelevant whether the body calls itself a *Test Laboratory*, a *Certification Body* or an *Inspection Body* as long as it carries out the tasks in the CONFORMITY ASSESSMENT procedure and has technical ability to do so in an independent and impartial way.

Another important reason for the different types of NOTIFIED BODIES is the support of equal treatment and impartiality. This results from the separation of those taking pass/fail decisions of test results (CERTIFICATION BODY) from those performing the tests (TEST LABORATORIES). CERTIFICATION BODIES control thus the CONFORMITY ASSESSMENT process. They ensure to some extend that tests are conducted in the same conformant way by all Test Laboratories submitting their test results for CERTIFICATION. Generally several TEST LABORATORIES are related to one CERTIFICATION BODY.

9.9.10 Why CONFORMITY TESTING and INTEROPERABILITY TESTING?

Compliance to standards will not be sufficient to ensure interoperability in the field. Actual interoperability testing is therefore required.

CERTIFICATION is by definition the procedure by which a third party gives written assurance that a product conforms to specified requirements. The term INTEROPERABILITY does not appear in this definition as conformance testing has been traditionally the domain of the CERTIFICATION domain.

INTEROPERABILITY TESTING has been coming up with the internet world and is increasingly being adopted by other industries, such as the telecommunications industry. Many still see these as either/or solutions, ignoring the fact that recent experience shows that both approaches have their strengths when used wisely.

CONFORMANCE TESTING does indeed have many advantages; if comprehensively specified, it determines whether the behaviour of an implementation conforms to the requirements laid out in its specification, including the full range of error and exception conditions that can only be induced or replicated by dedicated test equipment.

However, conformance testing does not prove end-to-end interoperability of functions between the two communicating systems, and it does not prove the operation of proprietary features, functions, interfaces, and systems that are not in the standardized domain. This is the strengths of INTEROPERABILITY TESTING which is an excellent technique for showing that different products really do work together. It exercises the complete product and covers aspects too complex (expensive) to fully test through conformance.

On the other hand, showing INTEROPERABILITY between two or more systems does not guarantee interoperability with other, non-tested implementations. Neither does it guarantee conformance. Two non-conforming implementations may still interoperate, but they will probably fail to interoperate with a correct (i.e. conforming product).
Finally, and this is possibly the key point, interoperability testing usually covers only the normal sequences of product behaviour. Unlike conformance testing, interoperability testing cannot force testing of error behaviour and other unusual scenarios.
What does that mean for EETS Certification procedure? Regarding the tremendous costs and the loss of image incurred if things getting wrong due to e. g. faulty OBE and/or loss of toll fees do justify the deployment of both techniques.
Experience in the telecommunications industry show, that combined application of both techniques gives a greatly increased confidence in the tested product and its chances of interoperating with other similar products. Many organisations and fora supporting specific technologies recommend that certification should involve both forms of testing [WILES].

9.10 Annex 10, Terms and Definitions

This report uses defined terms, which are indicated by CAPITAL LETTERS. The definition can be found in the table below. The source of each definition is referenced in the right column whenever applicable.

Term	Description	Source
APPLICANT	An organisation, which lodges the request for a CERTIFICATION to be issued for a particular EFC equipment or service. This is usually an *EFC EQUIPMENT Manufacturer* or EFC Operator.	-
ACCREDITATION	Third Party ATTESTATION related to TEST LABORATORIES and CERTIFICATION BODIES conveying formal demonstration of its competency to carry out specific CONFORMITY ASSESSMENT tasks. Note1: Requirements on TEST LABORATORIES and CERTIFICATION BODIES as well as INSPECTION BODIES and ACCREDITATION BODIES are defined by the EN 45000 / EN ISO/IEC 17000 series. Note2: This term is used in the context of accrediting of TEST LABORATORIES (TTLs, OTLs) or CERTIFICATION BODIES (TCCs, OCCs).	ISO/IEC 17000:2004
ACCREDITATION BODY	Authoritative body that performs ACCREDITATION. Note: *Accreditation Bodies* carry out ACCREDITATION in conformance with EN ISO/IEC 17011 (s. *Annex 6, Relevant Specifications for EETS Conformity Assessment*).	ISO/IEC 17000:2004
APPROVAL	Permission for a product, process or service to be marketed or used for a stated purpose or under stated conditions.	ISO/IEC 17000:2004
ATTESTATION	Issue of a statement, based on a decision, that fulfilment of specified requirements has been demonstrated. Note: The resulting statement, referred to in this document as a *Conformity Attestation* or *Interoperability Attestation*, conveys the assurance that the specified requirements have been fulfilled. Such an assurance does not, of itself, afford contractual or other legal guarantees.	ISO/IEC 17000: 2004
AUDIT	Systematic, independent, documented process for obtaining records, statements of fact or other relevant information and assessing them objectively to determine the extent to which specified requirements are fulfilled. Note: Whilst audit applies to management systems, assessment applies to TEST LABORATORIES or INSPECTION Bodies as well as more generally.	ISO/IEC 17000: 2004
CERTIFICATE	*Third Party* ATTESTATION related to products, processes, services, systems or persons. Note: A *Certificate* in the context with this document is providing confidence that a duly identified EFC Equipment or service is in Conformance with a specific standard or specification.	ISO/IEC 17000: 2004
CERTIFICATION	Procedure by which a *Third Party* gives written assurance that a product, process or service conforms to specified requirements.	ISO/TS 14907-1: 2005
CERTIFICATION BODY	Body that performs CERTIFICATIONS.	-
CERTIFICATION CENTRE	s. CERTIFICATION BODY	-
CERTIFICATION	IT System that supports the certification process. It consists	-

Term	Description	Source
INFORMATION SYSTEM (CIS)	essentially of an information system and a process management tool.	
CONFORMITY ASSESSMENT	is defined as demonstration that specified requirements relating to a product, process, system, person, or body are fulfilled. Note: The subject field of *Conformity Assessment* includes activities such as TESTING, INSPECTION and CERTIFICATION.	ISO/IEC 17000: 2004
CONTRACT ISSUER	INTEROPERABILITY sub-actor that issues the service rights to the customer, administers customer and vehicle data. Note: The Contract Issuer is a sub-actor of EETS PROVIDER.	CESARE III
CUSTOMER	INTEROPERABILITY sub-actor that signed the contract with the EETS provider to use the EETS service	CESARE III
DECLARATION	First-party ATTESTATION.	ISO/IEC 17000: 2004
EUROPEAN ELECTRONIC TOLLING SERVICE (EETS)	Service enabling users having only one contract and one set of OBE to use a vehicle in all toll domains under the operation of Directive 2004/52.	CESARE III
EETS CERTIFICATION REFERENCE FRAMEWORK (EETS-CRF)	Framework that will be used as a reference for all the actors involved in the EETS certification program. It will include: • A list of all relevant standards, specification requirements and reference implementations agreed with EETS stakeholders forming the basis for EETS CONFORMITY and INTEROPERABILITY ASSESSMENT; • The detailed description of the ENCC organizational structure and the operational process (this document) to guide its actors • The formal description of the elements which have to be tested or inspected and the description of test programmes, test cases, test suites; Owner of the EETS-CRF will be the EETS-CMB.	[EG4-Report]
EETS INTEROPERABILITY CONSTITUENT	Any elementary component, group of components, subassembly or complete assembly of equipment incorporated or intended to be incorporated into EETS upon which the INTEROPERABILITY of the service depends directly or indirectly. The concept of a "constituent" covers both tangible objects and intangible objects such as software	
EETS INTEROPERABILITY MANAGER	Organisation that gathers the functionality that deals with overall management of interoperable EFC. This includes rules for INTEROPERABILITY, Id-schemes, CERTIFICATION, common specifications, etc. Therefore this role represents the regulatory role of the EETS INTEROPERABILITY scheme. All in all the Interoperability Manager is responsible for • setting and maintaining rules and regulations for EETS including minimum service levels; • defining the rules and process of certifying OBE and RSE; • setting of the security rules; • establishing the basic model contracts among the roles;	CESARE III

Term	Description	Source
	• performing ongoing audit review for governance; • providing central registration service qualifying the EP according to the entry criteria; • defining rules to settle disputes between actors; • establishing and maintaining criteria for acting as an EP.	
EETS PROVIDER	Main Interoperability actor who is offering EETS by issuing OBE, contracts and payment means to the Service Users. They guarantee the payment of the services consumed by their customers the proved by genuine claims from the TOLL CHARGERS. They will claim payment from the Service Users. Sub-actors within the EETS Provision Role are CONTRACT ISSUER, Payment Service Provider, INTEROPERABILITY CONTRACT AGENT	CESARE III
EFC	Electronic Fee Collection; the collection of toll by electronic means via a wireless interface.	CESARE III
EFC EQUIPMENT	EFC Equipment consists of Roadside Equipment (RSE) and On-Board Equipment (OBE).	CEN ISO/TS 14907-1:2005
EFC OPERATOR	INTEROPERABILITY subactor that has the right to collect the toll and is operating the EFC infrastructure on behalf of a Transport Service Provider or Road Authority	CESARE III
EFC-SYSTEM	System that enables electronic debiting, i.e. paying for a transport service, without any action from the user at the moment of the use of the service.	CEN ISO/TS 14907-1:2005
ESSENTIAL REQUIREMENTS	are set out in the annexes of EC directives for certain product categories to ensure that products may be placed on the EC market and put into service only if the ESSENTIAL REQUIREMENTS are fulfilled. EC directives are generally designed to cover all threats related to the public interest that they intends to protect. Note1: There are no approved ESSENTIAL REQUIREMENTS (yet) in the 2004/52/EC. Note2: See *9.9.4 WHAT ARE ESSENTIAL REQUIREMENTS?*	
EUROPEAN TECHNICAL CERTIFICATION CENTRE (ETCC)	Represents a major part in the certification approach drafted by EG4. The ETCC will be in charge of the technical TEST/CERTIFICATION mainly related to equipment manufacturers (OBE and RSE). Its main task will be the verification of conformity to standards and specifications, and the technical interoperability between suppliers. It will be in charge to define the test procedures and the results expected when applying them. Note 1: Compare also OPERATIONAL CERTIFICATION CENTRE (OCC). Note 2: For questions of non-monopolistic situations, there would be a need for at least 2 if not 3 ETCCs in the Community. Note 3: Regarding the definition of TEST and of CERTIFICATION the ETCC would fit more the characteristics of a TEST LABORATORY.	[EG4 Report]
DRIVER	Interoperability sub-actor that is driving the vehicle in the Toll Charger domain	CESARE III
ENTITY	An organization that covers one or more Roles.	
EVALUATION	Systematic examination of the extent to which an entity e. g.	CEN ISO/TS

Term	Description	Source
	system, process, product, or a unit is capable of fulfilling specified requirements.	14907-1:2005
IMPLEMENTATION CONFORMANCE STATEMENT (ICT)	A statement made by the supplier that claims conformance to a certain specification. It states which capabilities have been implemented in the specifications. The ICS also states possible limitations in the implementation of the specification.	ISO/TS 14907-2: 2005
INSPECTION	Conformity evaluation by observation and judgement accompanied as appropriate by measurement, testing or gauging. Note 1: Inspection may concentrate on individual products or services, unlike CERTIFICATION, which concentrates on series of products. Note 2: Inspection does not need a separation of those taking *Inspection* decisions from those performing inspection. CERTIFICATION decisions taken by a different person(s) from those carried out CONFORMANCE ASSESSMENT. Note 3: In the scope of this document the word *Inspection* is used in the context of process inspection, Factory Inspection, in-service monitoring. Note 4: *In-service Inspection* is always an *Inspection*, not a CERTIFICATION.	EN 45020:1998 ISO/IEC 17020
INTEROPERABILITY	Interoperability is generally defined as "the ability of systems to provide services to and accept services from other systems and to use the services so exchanged to enable them to operate effectively together" The following three dimensions of interoperability are distinguished:	CARDME
INTEROPERABILITY (CONTRACTUAL)	Is expressed through contracts, in objectives and needs related to the provision of that seamless journey. These objectives and needs cover the exchange of information as well as a coherent policy on the use of this information and the making of connections (not relevant for this document).	CARDME
INTEROPERABILITY (PROCEDURAL)	Is the use of a common format of presentation, the same working procedures and data delivery, and common data elements definitions for the information to be exchanged. A common interpretation of the data objects as well as common rules for their manipulation and use are required.	CARDME
INTEROPERABILITY (TECHNICAL)	Includes physical INTEROPERABILITY and syntactical INTEROPERABILITY.	CARDME
INTEROPERABILITY MANAGER	Main interoperability actor which sets the rules for the interoperability and is therefore the regulatory body of the interoperability scheme. It will be responsible for supporting the solving of disputes.	CESARE III
IMPLEMENTATION EXTRA INFORMATION FOR TESTING (IXIT)	A statement made by the supplier or an implementor of an *Implementation Under Test* (IUT) which contains or references all of the information, in addition to that given in the ICT. It enables the TEST LABORATORY to run an appropriate test suite against the Device Under Test which contains the IUT.	ISO/TS 14907-2: 2005
NOTIFIED BODY	Bodies for carrying out the tasks pertaining to the CONFORMITY ASSESSMENT procedures referred to in the applicable *New Approach Directives* when a *Third Party* is required. In the context of this document the term *Notified Body* is used synonymously for CERTIFICATION BODIES, which are responsible	

Term	Description	Source
	for assessing the conformity or suitability for use of EETS Interoperability Constituents; Note1: A *Notified Body* must be a legal entity established on the territory of a Member State and thus under its jurisdiction. Note2: see also Annex *Frequently asked Questions*, "What is a Notified Body?"	
ON-BOARD EQUIPMENT	Equipment located within the vehicle and supporting the information exchange across the interfaces of its sub-units. It is composed of the On-Board Unit (OBU) and other sub-units whose presence has to be considered optional for the execution of the DSRC interface.	CEN ISO/TS 14907-1:2005
OBJECT UNDER CERTIFICATION (OUC)	Everything that can be certified is considered as an object. It is not limited to a (Software) product. Also an interface or a management system can be a OUC	
OPERATIONAL CERTIFICATION CENTRE (OCC)	Represents a major part in the certification approach drafted by EG4. The OCC will be in charge of verifying the ability of a certified OBE (by the ETCC), personalised and integrated in a vehicle (by a CONTRACT ISSUER) to be used in the network of a local EFC OPERATOR. It will be also in charge to define the test procedures to be applied on site and to verify that RSE are working in accordance with the specification. Note 1: Compare also EUROPEAN TECHNICAL CERTIFICATION CENTRE (ETCC). Note 2: The number of OCCs in the ENCC will be depending on the number of EFC Operators in the Community. Note 3: Regarding the definition of CERTIFICATION, of INSPECTION and of TEST the OCC would fit more the characteristics of an INSPECTION BODY.	[EG4 Report]
PAYMENT MEANS ISSUER	Interoperability sub-actor that collects the money from the customer and handles the payment of services (e.g. credit or petrol card companies, banks)	CESARE III
PRINCIPAL	Interoperability sub-actor; the organisation or legal entity which is giving or defining the right of collecting toll	CESARE III
PRIVACY	Certainty that personal information will be held in trust and used only in ways that have been authorized by the information's owner. Note 1: The person must confirm that its personal information will not be transferred or sold to any third party without his consent. Note 2: In comparison to Security: Privacy protects the person, Security protects the information.	
SAFETY	Freedom from unacceptable risks.	
(INFORMATION) SECURITY	Preservation of confidentiality, integrity and availability of data Note: *Availability*: Ensuring that authorized users have access to information and associated assets when required. *Confidentiality*: Ensuring that information is accessible only to those authorized to have access. *Integrity*: Safeguarding the accuracy and completeness of information and processing methods.	
SERVICE USER	Main interoperability actor who is taking advantage of the EETS. They will make a contract with one of the EETS Provid-	CESARE III

Term	Description	Source
	ers and agree to pay for driving in the Toll Charger's toll domain. They can use the interoperability EFC service in the domains of all Toll Chargers. Sub-actors within the Service Usage Role are Customer, Driver, etc.	
TECHNICAL DOCUMENTATION	The Technical Documentation is intended to provide information on primarily the design, the manufacture and operation of a product. The details depend on the nature of the product and on what is considered as necessary, from the technical point of view and for demonstrating of conformity of the product to the ESSENTIAL REQUIREMENTS.	
TESTING	Determination of one or more characteristics of an object of CONFORMITY ASSESSMENT, according to a procedure.	ISO/IEC 17000: 2004
TEST LABORATORY	Laboratory that performs tests (see TESTING)	EN 45020:1998
TOLL	A charge, a tax, or a duty in connection with using a vehicle within a toll domain	CESARE III
TOLLING APPLICATION	An application functionally defined by the autonomous Toll Chargers to get the needed data from the EETS Provider in order to claim the toll due.	CESARE III
TOLL CHARGER	Main interoperability actor who is selling the road usage and is receiving tolls from road users. He is responsible for levying toll in a toll domain. He claims payment from the EETS PROVIDERS for the road usage of its clients which is guaranteed by a payment guarantee for genuine claims. Sub-actors within the Toll Charging ROLE are EFC Operator, Toll Service Provider, Principal and others.	CESARE III
TOLL CONTEXT DATA	Data defining the set of rules, including enforcement rules, governing the generation and communication of charging data in a GNSS-based tolled Infrastructure. As such, this data describes the required behaviour of an EETS Front-End while the corresponding vehicle is in the domain of a specific context (roads subject to toll, tariffs, time dependencies etc).	RCI Del 1.3
TOLL DOMAIN	An area or part of the European road network where a TOLL REGIME is applied.	CESARE III
TOLL REGIME	The set of rules, including enforcement rules, governing the collection of toll in a TOLL DOMAIN.	CESARE III
TOLL SYSTEM	The off board equipment and possible other provisions used by a TOLL CHARGER for the collection of toll for vehicles.	CESARE III
TOLL SCHEME	Generic term used for TOLL REGIME and/or TOLL DOMAIN and/or TOLL SYSTEM.	CESARE III
TRANSPORT SERVICE PROVIDER	Interoperability sub-actor who provides a transport service to the user (i.e. the road operator, road authority, the "owner" of the road infrastructure)	CESARE III
TYPE APPROVAL	Approval based on conformity testing on the basis of one or more specimens of a product representative of the production.	ISO/TS 14907-1: 2005

Term	Description	Source
	Note: For the purpose of this document *Type Approval* applies also to processes and services.	

9.11 Annex 11, Abbreviations

For the purpose of this report, the following abbreviations apply:

Abbreviation	Description
API	Application Program Interface
CEN	European Committee for Standardisation
CERTECS	Certification for Telematics Components & Services
CESARE	Common EFC System for an ASECAP Road Tolling European System
CI	Contract Issuer
CIS	CERTIFICATION INFORMATION SYSTEM
GSM	Global System for Mobile Communications
DG TREN	Direction Générale de Transport et Energy
DSRC	Dedicated Short Range Communications
EC	European Community
EFC	Electronic Fee Collection
EG	Expert Group
EETS	European Electronic Toll Service
EETS-CA	EETS Certification Authority
EETS-CMB	EETS Certification Management Board
EETS-CRF	EETS CERTIFICATION REFERENCE FRAMEWORK
EMC	Electro Magnetic Compatibility
ENCC	European Network of Certification Centres
EP	EETS PROVIDER
ETCC	EUROPEAN TECHNICAL CERTIFICATION CENTRE
FAQ	Frequently Asked Questions
FAT	Factory Acceptance Tests
GNSS/CN	Global Navigation Satellite Systems / Cellular Networks
GSM	Global System for Mobile communications formerly *Groupe Spéciale Mobile*
GSS	Global Specification for short-range communication
ICS	Implementation Conformance Statement.
IOPM	INTEROPERABILITY MANAGER
ITIL	Information Technology Infrastructure Library
IXIT	Implementation Extra Information for Testing.
OBE/OBU	On Board Equipment/Unit

OT	Operational Tests
HGV	Heavy Good Vehicle
OCC	OPERATIONAL CERTIFICATION CENTRE
OUC	Object under Certification
RCI	Road Charging Interoperability
R&TTE	Radio and Telecommunications Terminal Equipment Directive
RSE	Road Side Equipment
SAT	Site Acceptance Tests
SU	SERVICE USER
TC	TOLL CHARGER
TERN	Trans-European Road Network
UML	Unified Modelling Language