DIRECTIVE 2004/52/CE on the Interoperability of Electronic Fee Collection Systems in Europe

CERTIFICATION OF THE EQUIPMENT RELATED TO THE DIRECTIVE

Version 1

PREPARED BY THE EXPERT GROUP 4

Table of Content

1.- Scope of work

The European Directive 2004/52/EC provides a framework for the interoperability of EFC systems in Europe in the coming years. The EETS (European Electronic Toll Service) needs to be defined by July 2006 and initially to be offered for heavy goods vehicles and long distances coaches by middle 2009.

Technical issues required for the definition and deployment of the EETS include the **certification procedures** to be observed as stated in the annex of the directive.

In this way this report provides recommendations to be followed in order to define, and implement a **European Network of Certification Centres** able to evaluate and certify the fulfilment of the EETS in relation with the European Directive.

Recommendations have tried to include different topics related to:

- objectives of the certifications centres
- what should be certified
- certification procedures including manufacturing
- organisation, management and structure of the network of certification centres

In order to provide these recommendations it has been considered all the existing EFC systems in Europe, in spite of the different level of deployment. Nevertheless the current different degrees of maturity, of road network coverage, of technology deployment (see annexes), and of availability of public technical specification and/or standards need to be taken into consideration.

2.- Needs for certification

2.1.- European EFC panorama in next years

The current situation allows thinking in a near future with EFC systems based in the following 2 possibilities:

- DSRC 5.8 GHz
- Multi-technology systems

where systems which could use different technology subsystems have been called multi-technology systems : GNSS for vehicle positioning, CN for communications and / or DSRC. This is not a complete set of technologies which could also use subsystems like inertial systems or digital maps, but it contains the technologies included in the European Directive for EFC interoperability.

2.1.1- EFC systems based on DSRC

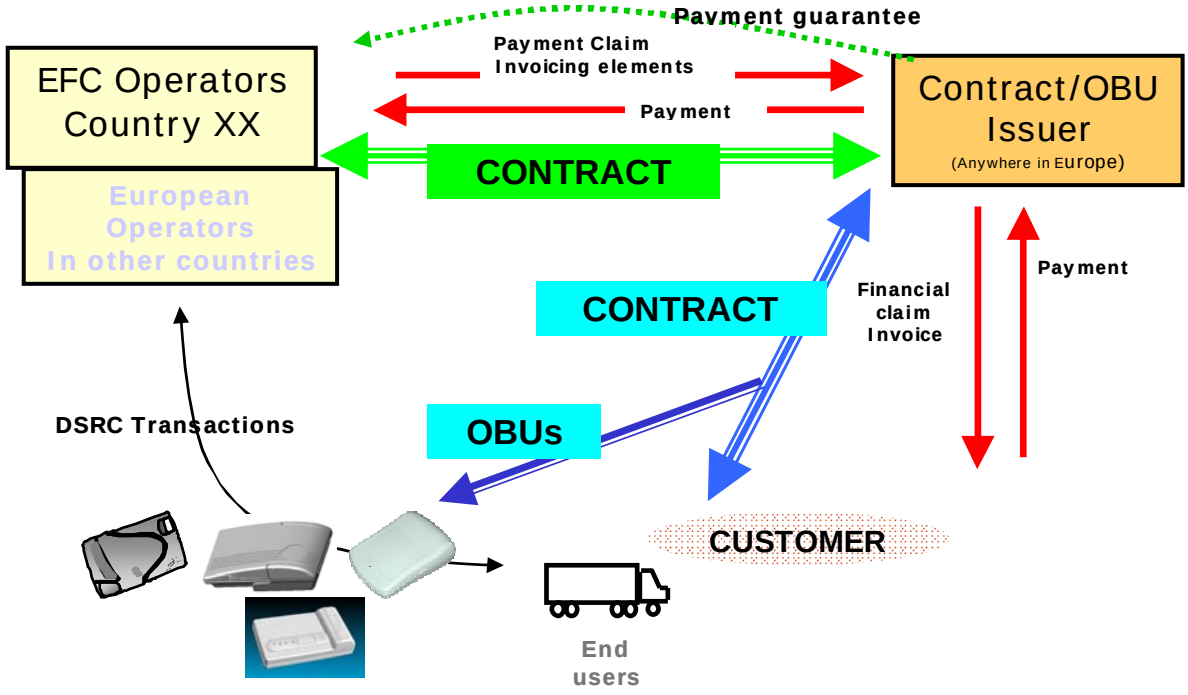
They are characterised by localisation of the vehicle when it passed over a beacon's communication area (in lanes and under gantries or road side supports). The transactions are built in the toll lane computers and in central system of the EFC Operators.

They include 2 possibilities where the first one is more extended across Europe (see table in annex).

- DSRC CEN 5.8 GHz based systems (European Norm of TC 278)
- DSRC 5.8 GHz Italian based systems (UNI norm specific for Italy)

In order to define the actors using this approach in the CARDME environment[1], the basic functional schema could be found in following picture:

[1] In Italy, there is a unique Contract Issuer (Autostrade) in relation with all Italian EFC Operators.



2.1.1.1.- EFC systems based on DSRC CEN

Apart Italy, all existing DSRC System are based on (or it is planned to migrate on) DSRC CEN 5.8 GHz OBU and RSE. Thus the Contract Issuers will be able to deliver interoperable OBU's to be accepted by a lot of EFC Operators acting throughout Europe, if according to the proposal of EG1, a single European EFC application is implemented.

In "non DSRC countries" (currently Germany and Switzerland), Contract Issuers are able to deliver OBUs with a CEN standard DSRC interface. For instance, the Swiss Custom Authority (Contract Issuer in Switzerland) is delivering OBU for Swiss Vehicles, accepted in Austria. Moreover, German OBUs delivered by Toll Collect includes a CEN DSRC subpart that could be activated in the future.

Thus, concerning the request of both EFC Operators and Contract Issuers, to obtain a certification regarding the interoperability of all OBUs (or CEN part of multi technologies OBUs) there is a need to build a certification process according to a standardised procedure mutually accepted by all actors (Manufacturers, Contract Issuers, EFC Operators and Users).

2.1.1.2.- EFC systems based on UNI standards

These systems are installed in Italy only and there are 2 possible situations for them in the coming years:

- Italy decides to keep the UNI specifications only. However, the principles of fair competition in the Single Market requires that UNI specifications can be tested in every Member State of the EU for the purpose of the European EFC Service, and that certification according to them can be granted in every Member State.

Also, Autostrade has designed a "dual" OBU (including a UNI sub part and a CEN part to be used outside Italy) and, in case such OBUs were to be offered in the frame of the European EFC Service, the certification process should be similar to those in the previous item.

- Italy decides to install CEN beacons in all toll plazas and them all type of OBUs are accepted. This is however most unlikely.

Conclusion 1 : there are of 3 types of DSRC OBU's (UNI, DSRC CEN, Dual) for which, the certification network will be in charge of delivering a European label.

2.1.2.- EFC systems based on multi-technologies

There are presently in Europe, two road pricing systems based on multi technologies OBU's:

A - Germany (Toll Collect) operating a system using OBU's running with the following technologies/functionalities:

- Location of the vehicle module using:
    - GNSS technology (GPS and Galileo in the future)
    - Communication with infrared beacons (re-localisation of a vehicle in an area with decreased satellite performance)
    - Map of the tolled network
    - Vehicle sensors: odometer and compass
    - Corresponding software
    - Communication interface via GSM technology for updating the map, the position of the infrared beacons and the software.
- Elaboration of a transaction on board using:
    - Table of tariffs to be applied, updated periodically via the GSM communication
    - Location of the vehicle
    - Transactions are transferred to the central system via the GSM

As in the DSRC systems, the transactions are handled by a central system and the corresponding invoices are sent to the customers for payment.

The enforcement system, for the vehicles equipped with an OBU's, is using the infrared communication link for controlling the OBU. This enforcement system is similar in mind to the one installed in Austria in a CEN DSRC environment.

In Germany, beside the automatic system, there is a manual system not to be addressed in the frame of this Expert Group.

B – Switzerland (Swiss Custom Authority) operating a system using OBU's running with the following technologies/functionalities:

- Location of the vehicle module using:
    - GNSS technology (GPS)
    - Communication CEN DSRC at the Swiss border
    - Corresponding software

  The location function is used only for detecting the presence of the vehicle inside or outside of Switzerland.

- Counting of the distance done inside Switzerland.
    - The distance is measured thanks to the tachometer
    - The registered distance is periodically transferred to the Swiss Custom Authority by the means of a smart card.

As in the DSRC systems, the transactions are handled by a central system and the corresponding invoices (based on the kilometre) are sent to the customers for payment.

The enforcement system, for the vehicles equipped with an OBU's, is using the DSRC communication link for controlling the OBU. This enforcement system is similar in mind to the one installed in Austria in a CEN DSRC environment.

In Switzerland, as in Germany, beside the automatic system, there is a manual system not to be addressed in the frame of this Expert Group.

Regarding the future of the multi technologies OBU's, some other projects may appear in Europe, but no definite solution has yet been defined, Moreover, there is no public detailed specification describing the Swiss and the German systems.

Conclusion 2 : In order to carry out the certification tasks there is a need to have public technical information on the EFC systems to be certified: standards, technical specifications, operational specifications,…Especially, certification according to the requirements of any national EFC system need to render these documents public.

Conclusion 3 : Multi-technologies EFC systems are using technologies already installed in some vehicles (mainly trucks) for freight and fleet management. Clients would not understand the need to install in the same vehicle the same equipment twice for different applications. In this way there is a need to answer how the EFC application could use the satellite positioning equipment and cellular communication already installed in a vehicle for other purposes.

Conclusion 4 : Summarising, Certification Centres needs to work not only for the most extended DSRC CEN deployed EFC systems but for all existing European EFC systems taken into account in the European Directive for EFC interoperability.

Moreover in all cases it will is necessary to consider :

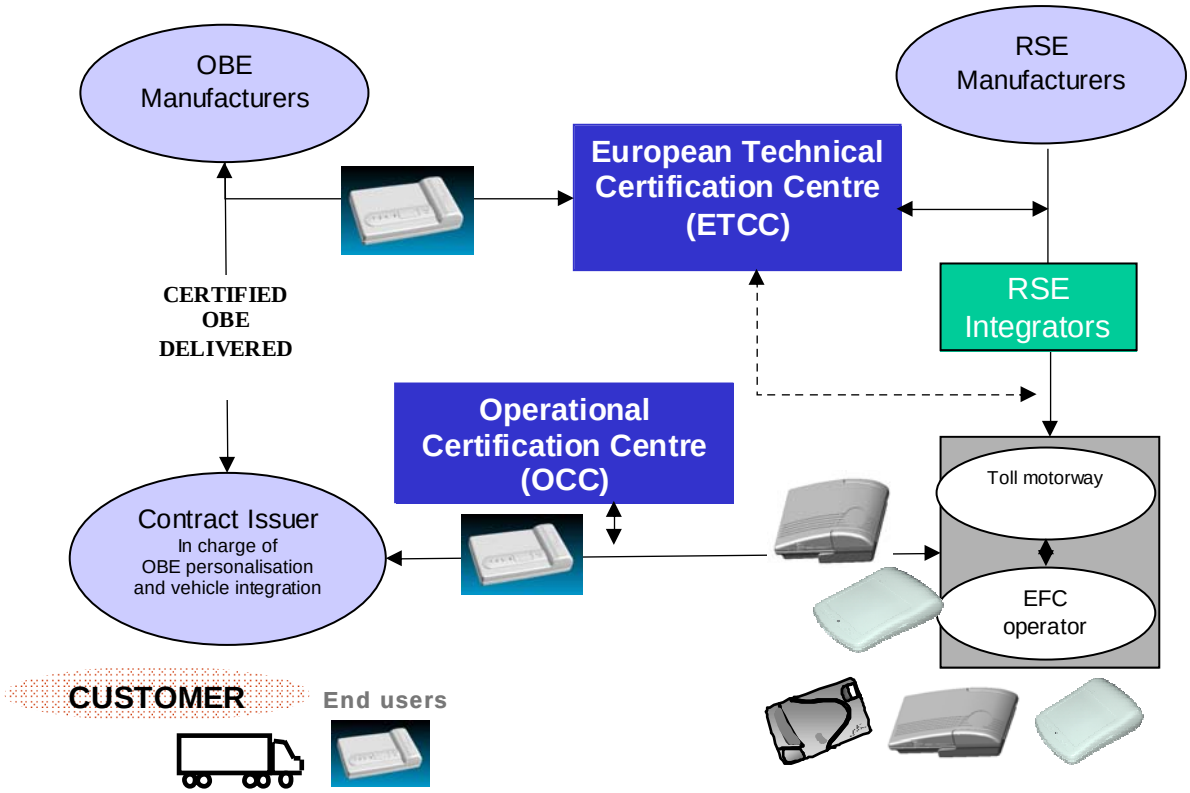
- ***not only the certification or the different sub-systems or modules presented above,***
- ***but also the certification of the integration in the vehicle of these components and function,***
- ***how they work together,***
- ***and how they are interfaced with the central system and the RSE***.

2.2.- Certification of current and future EFC systems

Taking into account the panorama of the European EFC systems, as described previously, it is clear that it is only possible presently to work on the systems already in operation, whatever their technology: CEN DSRC, UNI DSRC, and satellite based systems. These systems are the ones operated by ASECAP members, the Swiss Custom Authority, and the Company Toll Collect in Germany.

The figure hereafter represents the proposal for a Certification Network with tasks split between 2 types of centres. It is valid for any type of EFC system, but it is foreseen to be used initially with the more mature EFC systems and where the availability of public technical specifications or standards allows the certification.

- European Technical Certification Centres (ETCC)
- Operational Certification Centres (OCC)



2.2.1.- European Technical Certification Centres (ETCC)

Contract issuers and EFC equipment manufacturers (both RSE and OBE manufacturers) will be the entities who will mainly require the foundation of some ETCCs working at technical level across Europe. They will obtain profit from the existence of certified RSE and OBEs.

On this matter, it is wise to recall that the rules of the Single Market and of the World Trade Organization require that any call for tender under the European EFC Service be open to any supplier of any country in the world, which may lead European EFC operators and contract issuers to have the opportunity to order their equipment in countries outside of Europe, if the requirements are fulfilled.

EFCC's main task will be related to verify the conformity to the specifications, standards and the technical interoperability between suppliers. For this task they will **use existing public technical documentation** or information:

- the specifications (both technical and functional) provided by the manufacturer
- available standards and public specifications
- specifications of all equipment used by EFC systems

The ETCC will be in charge to define the test procedures to be applied by the manufacturers (in laboratory or on test sites) and to verify that the manufacturers are performing the tests correctly, according the test procedures and that the results are compliant with the values expected in the test procedure..

The ETCC will also be in charge of the Factory Test which will provide the insurance that all series of equipment ordered from a specified supplier will perform accordingly to the equipment tested in the laboratory tests mentioned here above. Especially, these factory tests will comprise (but not be limited to) the verification of the application of the whole quality procedures defined for this company according to set of standards ISO 9000.

2.2.2.- Operational Certification Centres (OCC)

There could be as many OCCs as countries or toll motorways associations, EFC operators or any group of them who want to coordinate their efforts together in order to test on site the correct working of different EFC equipment. The OCCs will be in charge to verify the ability of certified OBE (by the ETCC), personalised and integrated in a vehicle (by a Contract Issuer), to be used in the network of local EFC operators.

They will use existing technical documentation based on:

- the technical and functional specifications provided by the manufacturers and the ETCC
- the specifications of all equipment used in the network of EFC operators
- the functional specifications delivered by the Contract Issuers

The OCC will be in charge to define the test procedures to be applied mainly on test sites and to verify that RSE are working correctly according the test procedures on one hand and that the results are in conformity on the other hand.

Conclusion 5 : It is recommended to split the certification task between entities

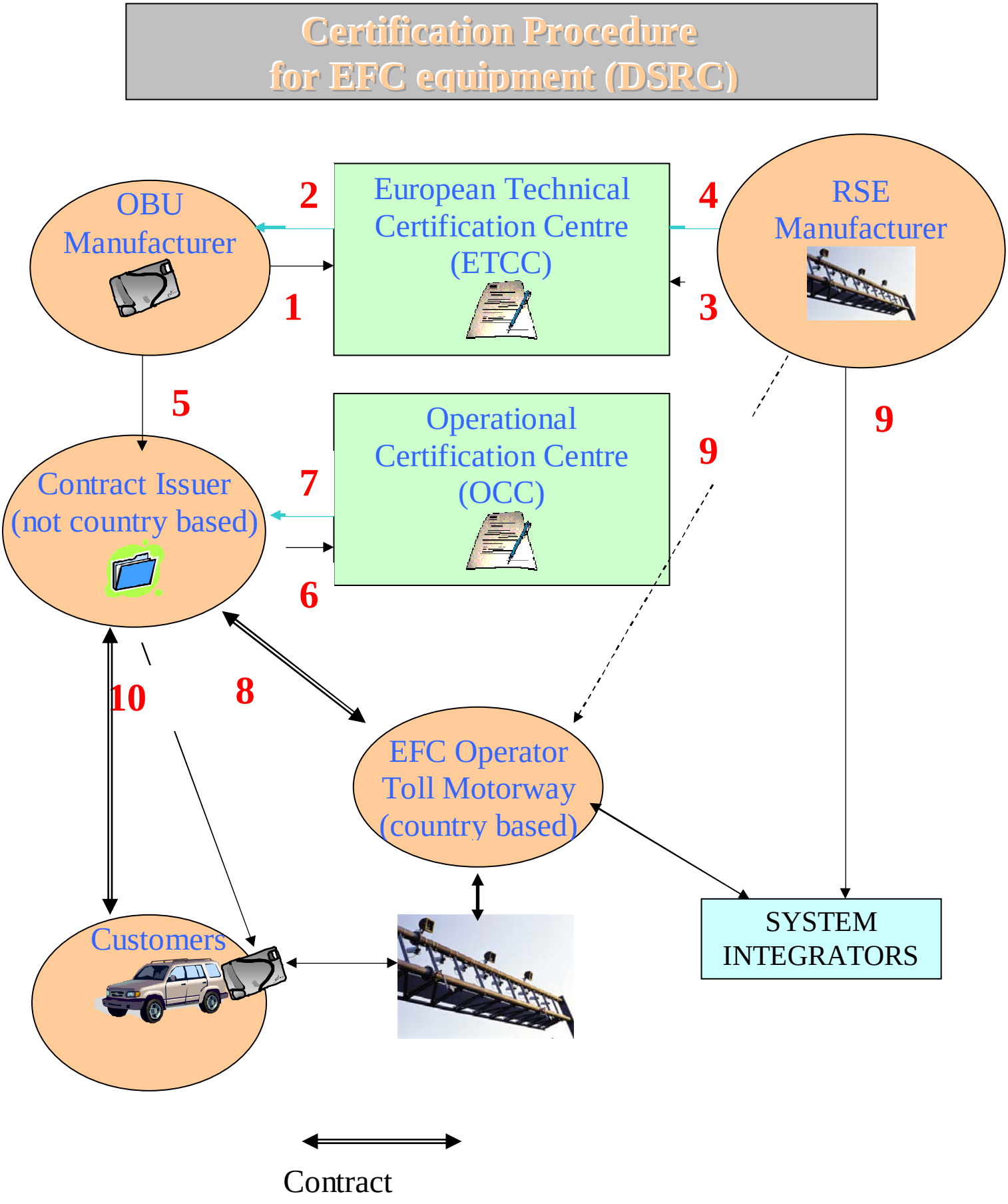
- ***ETCC which would be in charge of the technical European Certification and mainly related to equipment manufacturers***
- ***OCC which would be in charge of the operational certification and mainly related to Contract Issuers and EFC operators. They are also dealing with most of the issues on system integration.***

Conclusion 2 : In order to carry out the certification tasks there is a need to have public technical information on the EFC systems to be certified: standards, technical specifications, operational specifications,…Especially, certification according to the requirements of any national EFC system need to render these documents public.

2.3.- Certification task

2.3.1.- Stages to obtain a complete certification

In the following picture is presented the procedures which will allow obtaining a certification for a specific case of EFC systems based on DSRC.


Certification Procedure
for EFC equipment (DSRC)
OBU
Manufacturer
European Technical
Certification Centre
(ETCC)
RSE
Manufacturer
Contract Issuer
(not country based)
Operational
Certification Centre
(OCC)
EFC Operator
Toll Motorway
(country based)
Customers
SYSTEM
INTEGRATORS
1
2
3
4
5
6
7
8
9
9
10
Contract

The different steps (in red color) are explained here:

1.- OBE manufacturers provides equipment to be certified to an ETCC

2.- ETCC provides stamps with first certification (certified with stamp label 1)

3.- RSE manufacturers provides equipment to be certified to the ETCC

4.- ETCC provides stamps with first certification (certified with stamp label 1)

5.- Equipments certified with stamps label 1 could be acquired by a Contract Issuer who can be either a national or an international entity

6.- Contract Issuer provides equipment certified with stamp label 1 to the OCC

7.- OCC provides stamps with second certification (certified with stamp label 2) which allow the use of the OBE in a specific transport network. Therefore, it appears that the step 7 will have to be performed with as many OCCs as required to cover the whole European road network complying with the tested technology.
Let's explain this statement. Contract issuers may elect to propose to their clients a range of onboard units according to the kind of trip they have : CEN DSRC only, CEN + UNI DSRC, Full range OBE (CEN DSRC, UNI DSRC, Satellite). In such case, the first element of the range will need to be certified only in those countries using CEN microwave technologies, and for instance not in Germany. The last one however, will need to be certified all over Europe. A manufacturer will need to get the stamp label 2 from different OCCs, and each of these stamps will be limited in geographic extension.

8.- Agreement between Contract Issuer and EFC operator allows the use of the OBE in a specific transport network

9.- EFC operator could install RSE certified with stamp label 1 directly or via a system integrator in a specific transport network

10.- Contract Issuer provides its clients with a completely certified OBE allowing the use of a specific transport network according to the technologies introduced in the OBE.

Conclusion 6 : For questions of non-monopolistic situations, it is clear that there is a need for at least 2 if not 3 ETCCs. The number of OCCs in the certification network will be dimensioned by the need to cover the whole tolled network in the Community, plus those operators of the non EU-Member States who would like to join the European EFC Service.

With the proposed structure, there is clear need to have international Contract Issuers which would be in charge to provide cross-border services.

There is a need to develop the relationship between EFC operators (and road operators) and Contract Issuers.

2.3.2.- Initial issues related to the creation of a Network of Certification Centres

There is necessary to study carefully the feasibility of a network of European Certification Centres (Technical and Operational). The creation itself could be something not complicated and not really expensive; the main problem is related to the later maintenance of this new structure. It will imply to carefully define the rules for its management.

Moreover, the future business in this area is not so clear. So a feasibility study is requested for this network of certification centres and it should contain very clear arguments from the economical point of view.

This feasibility study would be the first part of the work of the entities interested to be part of this network of centres. In this way the second part of this feasibility study, in case of positive results should be the design phase of the Certification Network which could provide a detailed specification of what should be implemented afterwards.

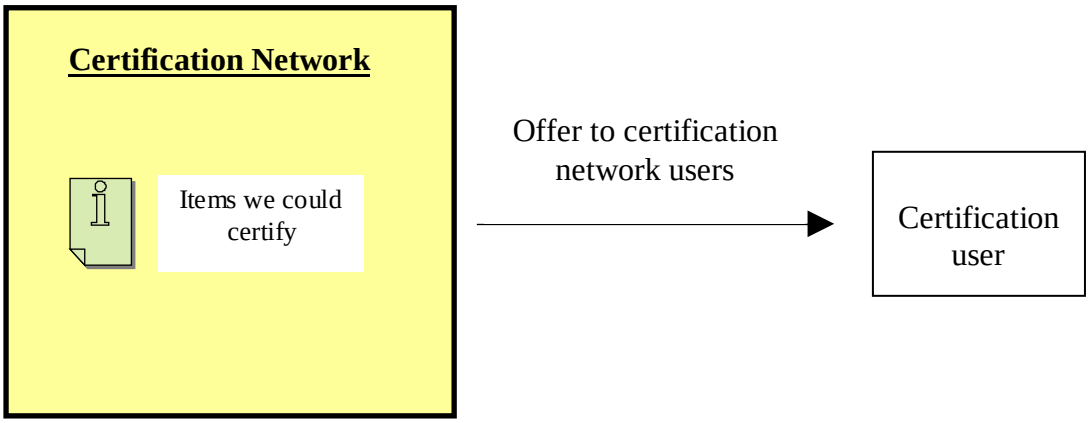
The definition of the certification network must take into account both

- the functional specifications related to the activities to be done
- the technical procedures to be adopted by the certification network
- the management structure and rules for the network
- the business case and financing of the network. The basic idea for this financing is presented in paragraph 3.5 here below.

Conclusion 7 : It is recommended to launch a call for expression of interest of entities which want to be part of a network for certification centres. The initial part of the work to be done by the interested entities will be a feasibility study, including the design of network and a business plan.

2.3.3.- What is to be certified by the Certification Network

The tasks to be done by the certification network don't need necessarily to be fixed and irremovable. That means that initially, when created, the certification network on EFC could be in charge of some tasks which later could be extended. It is suggested to follow an incremental approach starting with basic or more stable activities and when necessary to extend to other activities like certification of video-enforcement systems.



Here user means any user of the Certification Network and not the user of the EFC system.

Only what is in accordance to the EETS specifications could be initially part of the EFC certification network. This means a need to include on the definition of the EETS all the technologies related or current European EFC systems and also to make available and public all necessary technical specifications.

Conclusion 8 : Certification Network needs to deal with all the current European EFC systems, but initially it could start with the more mature technologies and systems (like DSRC CEN systems or the German satellite system) and later continue the process with the certification of new systems (like the video-enforcement certification).

2.3.3.1 CEN DSRC technology

Current standardisation work in the CEN DSRC context is covering:

- the different communications layers and electromagnetic compliance systems (CEN DSRC 5.8 GHz TC 278 Standard corpus) and some specifications for interoperability (like GSS).
- the data handled in the OBU, in the roadside Equipment and in central systems, according to the application to be defined by the EG 11 (EFC application for the European EFC service, based on microwave technologies).

Additionally, several initiatives have offered possibilities for converging toward interoperable systems both per country (France, Austria, Spain, UK …) and then between countries (CESARE, CARDME, MEDIA).

Related the European EFC transaction current European actions are in the way to search a unique or minimum common interoperable European transaction. EG 11 will provide proposals on this issue.

Summarising, the Certification Network will have at his disposal a lot of information, specification and standards, authorising to work on:

- The technical environment

- The operational context including security mechanisms
- The personalization of the OBU's
- The exchange of data between OBU and RSE.

Following the standards availability it has been already created two European (and ISO) standards on test procedures[2] for mobile and fixed equipment which are related to the EFC systems based on CEN DSRC but nothing at this level has been done for applications based on GNSS/CN.

Finally it is necessary to leave out of this certification network (at least initially) all the local approaches than doesn't have interoperability as a requirement. This will include:

- Back office, which includes all the data processing which is not a matter of interoperability except the items related to the use of security or cryptography when requested.

- Classification systems, which depend on local decisions. Agreement in the classes to be used or the parameter used to determine the classes could be a matter of interoperability but all the required approach has been already reported via the corresponding Expert Group 2.

Finally enforcement systems should also be initially kept out of the certification network. They need a legal and administrative framework before to be extended and used at European wide level. Technically the problem seems to be solved or near a solution but the situation seems more complex at legal and administrative level when dealing with the cross-border enforcement. Enforcement certifications would comprise the three following issues:

- Technical part
- Administrative agreements
- Legal basis

The two last of them are out of the certification scope, **and are based on national requirements, legislation and procedures**. The technical part will need both specific development and standardisation for this matter. Enforcement at technical level has not any relationship with communication systems. In the case it is decided later on, to include this EFC sub-system in the certification network, it would require specific entities for the certification of this matter. In fact the problem seems wider than EFC because the same equipment would be used for other traffic monitoring tasks like the speed enforcement and currently all Member States have developed procedures to certify the equipments used for traffic violator prosecution, like radars and cameras.

Nevertheless the certification process for enforcement procedures and what is more important, the network for exchange and prosecution of violators need to be created in parallel.

2.3.2.1. UNI DSRC (Telepass)

[2] CEN ISO TS 14907-1 and CEN ISO TS 14907-2

The situation concerning the Italian specification is not very different from the situation of the CEN DSRC, and the conclusions of the paragraph here above apply to this second technology. However, it is recalled that every ETCC in the system needs to have the capability to perform its task for the UNI standards as well as for the CEN standards. Concerning the European EFC application, it would be the same for the UNI interface than for the CEN interface.

For issues under the responsibility of the OCC however, it is most likely that these issues will be dealt with only by an OCC in close relations with the Italian EFC operator "Autostrade per l'Italia", master in the design and use of the UNI specifications. The philosophy of the concept ETCC-OCC does not allow another OCC to deal with this issue.

2.3.2.2 Satellite based tolling

As said previously in this document, due to the present situation of satellite tolling, it is difficult to envision more in terms of certification than the compliance with the German EFC system presently under operations with Toll Collect. No standard really exists and is applied in any other Member State.

In order to test the compliance with the German system in any ETCC, it is required, as for the UNI specifications, all documents according to the German system are made available for the ETCC. Furthermore, as for the Italian system, the OCC part of the certification process will most probably have to be handled for that system by the OCC in close relations with Toll Collect and / or the German Administration.

For these technologies, the statements related to enforcement apply here as well. Enforcement is presently based on the national requirements in Germany (legal and technical). Enforcement in Germany is handled by infrared technologies which are out of the scope of the Directive 2004/52/CE. Therefore, the question of enforcement for satellite tolling in the European EFC Service will be dealt with by the Expert Group 10, and the question of certification related to this, is left to this expert group.

3.- Recommended action plan

Some recommendations have been already provided in previous part of this document. This chapter includes the rest of the recommended actions.

3.1.- Creation of a Certification Network

Standard EN 45020 defines the terms "certification" and "certification body" as follows:

> Certification is *a procedure by which a third party gives written assurance that a product, process, or service conforms to specified requirements.*
>
> Certification body is *the body carrying out the certification*.
>
> In this way "third party" is *the person or body that is recognized as being independent of the parties involved, as concerns the issue in question.*

A certification network has the objective to certify something in a coordinated way. Related to the EFC directive, the certification network to be created could be able to assess any EFC system, service or equipment and give a possible stamp on conformance with the European EFC directive and the single EFC service promised by this directive. This stamp should be Europe wide, which means that it should allow the stamped product to be proposed by its supplier to any call for tender launch throughout Europe for the purpose of the European EFC System.

The first arising question is coming from the concept of network. What is the need of a network?, or why different agreed and independent certification centres could not carry out this task?.

A similar service is offered by the certification centres in charge of the GSM communication network. Once the standard is agreed and established, both the mobile phone manufacturers and the service operators know what to do and how to implement mobile phones, antennas, and services (roaming included) but what is clear is that certification is only done for mobile phones and mainly related to the EMC.

The normal procedure for a certification centre, interested to certify something, is to request the corresponding authorisation. National Accreditation Body is the organisation which accredits bodies (laboratories, certification centres, verifiers, …) that engage in conformity assessment, whatever the industry in which they operate, their size, public or private ownership or membership of associations, companies, universities or research organisations. This doesn't include the participation in a network but independent bodies.

A network is useful when some type of procedure or action is shared among the members of the network or when there is some type of agreement between the members of the network. And this is really important for the future EETS. For instance the following topics related cooperation among centres should be had into account:

- **A certification provided by any centre of network should have the same value. This implies those procedures tests are to be the same in every centre.**
- **It should be not easier to obtain a certification in a centre than in other.**

- **Splitting of different measures or conformance tests of the different communication layers could be done in different centres. In this way some centres could be in charge of some activities or measures.**

- **Sharing of equipment, technology and procedures for the assessment.**

- **Possible agreements in distribution of the market for certification when overload of work or any other type of problem.**

- **Avoiding of monopolistic situation having at least 2 ETCCs and several OCCs**

Conclusion 9 : A network of certification centres is a way to assure some level of quality and homogeneity in the certification process.

In any case the certification centres should assure a correct working of the devices and systems to be assessed in relation with the single European EFC service which is to be offered. This evaluation and certification should produce benefits to the different users of the certification centres:

- EFC equipment manufacturers. They will be the organisms obtaining the main benefits. Once their equipment has been evaluated they could sell their systems with some type of stamp which could be a way to open some markets

- EFC contract issuers. They would know what OBEs they could provide to their clients (end users). It could allow to search and find better offers in the market and the corresponding price reduction.

- EFC operators. They would benefit from the guarantee on both OBEs and RSEs. They would know which are the RSE they could implement in their motorways and the OBEs working with their RSEs. This will avoid some of the necessary test up to know and would allow concentrate more in the specific on site applications.

3.2.- Use of standards (CEN DSRC case study)

Requirements for the supply of electronic toll equipment

The basic investor's requirement is that the purchased system will work well, or that the purchased components work well together with the already installed or distributed components. Basic requirement for the supply of the electronic components is the compatibility.

The benefit of a certification network is that an investor can trust in the good functionality of system or components labelled as certified.

Several kinds of standards and technical descriptions (together: *specifications*) need to be considered for the certification:

- Specifications related to safety, ease of use etc.
- Specifications related to functionality and probably specifications related to performance

Specifications related to safety etc.

Microwave equipment/system need to comply with IEEE standards for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz (IEEE c95.1-1991).

Components need to fulfil the requirements of the EU directives (CE Approval):

- 1999/5/EC, R&TTE
- 89/336/EEC, Electromagnetic Compatibility
- 73/23/EC, Low Voltage

Specifications related to functionality

The specifications against which a component / system is certified depends on the system technology and the application(s) the system is supposed to be able to perform. The list of specifications will probably also change over time with new technologies emerging or old ones becoming obsolete.

As an example, a CEN DSRC system is considered.

Table No.1

Reference indication	**Document No.**	**Date**	**Name**
CEN/TC278 [DSRC-L1]	EN 12253	2004	Road Transport and Traffic Telematics (RTTT) – Dedicated Short-Range Communication (DSRC) – Physical layer using microwave at 5.8 GHz
CEN/TC278 [DSRC-L2]	EN 12795	2002	Road Transport and Traffic Telematics (RTTT) – Dedicated Short-Range Communication (DSRC) – Medium access and logical link control
CEN/TC278 [DSRC-L7]	EN 12834	2002	Road Transport and Traffic Telematics (RTTT) – Dedicated Short-Range Communication (DSRC) – Application Layer
CEN/TC278 [DSRC-P]	EN 13372	2004	Road Transport and Traffic Telematics (RTTT) – Dedicated Short-Range Communication (DSRC) – DSRC Profiles for RTTT Applications
CEN/TC278 [EFC AID]	EN ISO 14906 EFC	2004	Road transport and traffic telematics – Electronic Fee Collection – Application interface definition for dedicated short-range communication
GSS [3]	GSS Version 3.2	2003	Global Specification for Short range

[3] *Not part of the CEN DSRC standard, but required by many operators*

			communication

Technical interoperability and in consequence basic functionality requires that all pieces of equipment conform to the documents listed in table 1 (see footnote 1).

For a transaction to run, also procedures, application data, security keys etc. need to be compatible. The operator may consider if he wants equipment where he can upload these data himself or where also the functionality of one or more transaction models have been certified. In the first case, the specification provided for data upload also needs to be used for the certification. In the latter case, the certification needs to extend to one or more of the existing EFC application.

The certification of a CEN DSRC system should be done according to EN14907-1 "EFC test procedures for user and fixed equipment, part 1: Description of test procedures", and EN14907-2 "EFC test procedures for user and fixed equipment, part 2: Conformance test for the onboard unit application interface" and at least cover the tests mentioned in these documents.

Some performance evaluation could be included in the certification to ensure that the OBU localisation is not compromised by different OBUs.

3.3.- Manufacturing processes to be certified

To ensure compliance to the standards and technical specifications in the certification work some factory tests need to be done. This chapter includes what could be done.

Configuration Control

The manufacturer shall demonstrate a system for configuration control which secures the sustainability for the certification effort. Additionally shall rules be developed which defines for which events a re-certification is required. In principle shall new revisions of equipment be certified which contains hardware/software which affects the applicable interfaces.
ISO 9000 or similar Quality certification should be used to set the standard for these processes.

Traceability

The nature of usage of EFC equipment over several operators requires traceability system for the equipment in manufacturing. All significant modules in the equipment shall be traceable on batch level (including manufacturer) to enable audits and follow up of systematic erroneous behaviour. The supporting system for this process should be presented upon initial certification for approval. An existing industrial praxis should be used to define the criteria for acceptable level of detail and control.
This implies that manufacturing serial numbers will increase in importance compared to today's system where the operator's serial number often is the only used number and not easily linked to manufacturing traceability.

Applicable Units.

Fully serialised units shall be certified. Prototypes and pre-production does not demonstrate proper degree of confidence due to reasons origin both from the equipment and in the production lines.

Manufacturers should however be able to consult or make preliminary certification activities to minimise risks in the development process and to get preliminary feedback from the Certification Network.

Also the Certification Network should be offered access to preliminary test results in the manufacturer's premises to prepare the Certifier before the Certification and to make the actual certification activities as smooth as possible and remove potential problems before starting the certification activities which use more resources.

Manufacturing Lines

The Factory process shall also be covered in the certification, including subcontractors activities. A checklist which includes a mini-re-certification of the produced equipment shall be established and applied for each new factory line.

Spot-checking

To ensure fulfilment of the certification results by the manufacturer and the certified equipment, a spot-checking scheme should be part of the business model (eg subscription) for the certification network. It is probably necessary to re-visit the certification by letting the Certifier pick random equipment from the manufacturing line and to make a re-certification. This procedure should cover less parameter but not a fixed reduction but more a random.

3.4.- Certification Network structure

Conclusion 10 : the certification network structure should be able to deal with the control and management of the network. Its functions are described below

Some type of structure to assure a correct working of the certification network is necessary. This structure will depend on the objectives for which it is created. The more important objective for this certification network should be the control and monitoring of the certification network and the "certification" of the different members of the certification network. Moreover it also should be in charge of the strategic issues like any change in the certification network objectives. Tasks to be performed by the network management structure include the following items :

- 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.

In order to achieve this goal it should be proposed the ad hoc structure, which should be in charge of:

- Allow the participation of a new certification body in the network and provision of the corresponding accreditation. The proposed structure should have an organism in charge of reviewing the proposal for new members of the certification network and provide the mechanism to audit or assess not only the technical capabilities of the candidate member but also the opportunity, advantages or strategic circumstances.

- Withdraw of a member of the certification network due to any reason based in technical problems produced by bad certifications or measures. In order to carry out this procedure should be established the mechanism to be used to start an investigation. Moreover in order to have as much as possible fair systems, clear procedures related to the circumstances in which an investigation could be initiated or who could request the start of the investigation procedure.

- Withdraw of a member due to own request due to lose of market or re-appointment of business. The certification network structure needs to assure the maintenance or reallocation of possible clients by the rest of the certification network members. Any type of compromise from all the members needs to be assumed or at least to identify the minimum time for permanence in the network.

- Closure or pass to "stand by" of the certification network, when there is not business opportunity or most of the equipment and services has been already certified. It also will be necessary to fix and agree the procedure for "wake up" the network when necessary.

In order to carry out these tasks it would be necessary to identify who should be part of the network structure monitoring and in which of the tasks should participate. In this way

- relationship between ETCCs and OCCs members need to be agreed
- degree of participation in this management structure of rest of EFC actors: Equipment manufacturers, Contract Issuers, EFC operators, Systems Integrators, etc

3.5.- Business plan

It will allow appreciating the level of confidence in the certification network itself or whether it will be necessary to provide extra support in the future.

Bidders need to present in the feasibility study a business plan which will be evaluated as the tool which allows knowledge on the economical feasibility of the network. This business model also must include information on the optimal size of the certification network.

Some type of compromise or acceptance of the entities which will economically support the certification will be welcome. If it is not possible at this stage to provide this compromise, bidder must do a survey on the entities which are ready to economically maintain the certification network and how much they could compromise.

A certification network with a not clear business model must be rejected immediately because it will be clear information about the non feasible sustainable network.

Proposed members of the certification network should present what is the economical support they need to have in order to maintain the network and which entities should support this network and also the share of costs among these entities.

Due to market constraints, ideally they are proposed only 3 or 4 ETCCs for the whole Europe. Really only 2 could be enough for the tasks to be done but having several of them gives some warrantee on competence, maintenance, technical discussion, and so on. Other members could be engaged when adding new features to the ETCC (like systems based on multi-technology or video-enforcement). These new members will be involved with the specific new applications, services or equipment to be tested.

For OCCs as it is to be maintained at regional level it will depend on associations or agreements between EFC operators and/or toll motorways and/or countries. So the number of hem needed is not so limited. Moreover they don't need to be stable and permanent but re-initiated when rally needed.

Conclusion 11 : A feasible sustainable business plan for maintenance of the certification network structure must be done.
It is recommended to split the certification costs between the ETCC & OCCs. The costs of the ETCCs should be assumed by equipment manufacturers, including also the factory tests and the funding of the OCCs are to be split between EFC operators and Contract Issuers.

3.6.- Time table for establishing the certification network

Timetable is a key factor related to the establishment of the certification network. The steps presented in this chapter are based on the time constraints coming from the Directive 2004/52/EC on EFC interoperability.

EFC directive fixes the following time constrains related to the offering of a single European EFC service:

- Definition of the service 1st July 2006
- Use of the service by HGV and long distance coaches: middle 2009
- Use of the service by all vehicles: middle 2011

With this time schedule in mind the following steps are suggested:

- First proposal on items to be taken into account and initial ideas for the certification network. Work done by EG4 on Certification (this document and possible updates or reviews). This task should be finished by end 2005.

- Launching on call for expression of interest for creation of a Network of Certification Centres limited to CEN DSRC. Beginning of 2006. This call for tender should include the main items from this document, and also the still open questions.

- Feasibility study on certification network, organizational aspects, functional design, technical design and business model. This activity could last for 1 year, so to be finished by beginning 2007. At this time the single EFC service will be already defined and the work of most of the expert groups will be finished. So this task could incorporate most of these inputs. Nevertheless a lot of open technical questions related to real implementation of the single EFC service will be not still solved as some of the projects working in this matter like RCI will not finished up to the end of year 2007 (at least).

- Implementation of first certification centre: from 2007- 2009. It should be working before the date for the implementations of the service for HGV and long distance coaches y middle 2009 (as stated in the directive). Nevertheless if the certification network could start before this date it could be useful for the more mature systems like DSRC CEN or for a marketing approach in other countries around the World.

Conclusion 12 : Recommended timetable:

- ***Agreement in initial recommendation (this document): end 2005***
- ***Launching call for expression of interest for creation of the certification network: beginning 2006***
- ***Feasibility study on certification network, organizational aspects, functional design, technical design and business model: beginning 2007***
- ***Implementation of first certification centre: from 2007- 2009***

SUMMARY OF CONCLUSIONS

Conclusion 1 : there are of 3 types of DSRC OBU's (UNI, DSRC CEN, Dual) for which, the certification network will be in charge of delivering a European label.

Conclusion 2 : In order to carry out the certification tasks there is a need to have public technical information on the EFC systems to be certified: standards, technical specifications, operational specifications,…Especially, certification according to the requirements of any national EFC system need to render these documents public.

Conclusion 3 : Multi-technologies EFC systems are using technologies already installed in some vehicles (mainly trucks) for freight and fleet management. Clients would not understand the need to install in the same vehicle the same equipment twice for different applications. In this way there is a need to answer how the EFC application could use the satellite positioning equipment and cellular communication already installed in a vehicle for other purposes.

Conclusion 4 : Certification Centres needs to work not only for the most extended DSRC CEN deployed EFC systems but for all existing European EFC systems taken into account in the European Directive for EFC interoperability. Moreover in all cases it will is necessary to consider :

- ***not only the certification or the different sub-systems or modules presented above,***
- ***but also the certification of the integration in the vehicle of these components and function,***
- ***how they work together,***

and how they are interfaced with the central system and the RSE.

Conclusion 5 : It is recommended to split the certification task between entities

- ***ETCC which would be in charge of the technical European Certification and mainly related to equipment manufacturers***
- ***OCC which would be in charge of the operational certification and mainly related to Contract Issuers and EFC operators. They are also dealing with most of the issues on system integration.***

Conclusion 6 : For questions of non-monopolistic situations, it is clear that there is a need for at least 2 if not 3 ETCCs. The number of OCCs in the certification network will be dimensioned by the need to cover the whole tolled network in the Community, plus those operators of the non EU-Member States who would like to join the European EFC Service.

Conclusion 7 : It is recommended to launch a call for expression of interest of entities which want to be part of a network for certification centres. The initial part of the work to be done by the interested entities will be a feasibility study, including the design of network and a business plan.

Conclusion 8 : Certification Network needs to deal with all the current European EFC systems, but initially it could start with the more mature technologies and systems (like DSRC CEN systems or the German satellite system) and later continue the process with the certification of new systems (like the video-enforcement certification).

Conclusion 9 : A network of certification centres is a way to assure some level of quality and homogeneity in the certification process.

Conclusion 10 : the certification network structure should be able to deal with the control and management of the network. Tasks to be performed by the network management structure include the following items :

- ***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.***

Conclusion 11 : A feasible sustainable business plan for maintenance of the certification network structure must be done.
It is recommended to split the certification costs between the ETCC & OCCs. The costs of the ETCCs should be assumed by equipment manufacturers, including also the factory tests and the funding of the OCCs are to be split between EFC operators and Contract Issuers.

Conclusion 12 : Recommended timetable:

- ***Agreement in initial recommendation (this document): end 2005***
- ***Launching call for expression of interest for creation of the certification network: beginning 2006***
- ***Feasibility study on certification network, organizational aspects, functional design, technical design and business model: beginning 2007***

Implementation of first certification centre: from 2007- 2009

Annexes

Table on European use of EFC

European Countries	ETC	Number of tags PL + VL		Number of ETC Lanes (or equivalent)	Techno DSRC	Conformity with CEN Norm	Comments	Potential ability to accept CARDME OBUs	Potential ability to deliver CARDME OBUs	Number of Toll Transaction per Month (Entry/Exit)	Main Manufacturers
		ene-04	mid 2005	2007/2008						January 2004	
Austria	**PL / Cial (> 3,5 Tonnes)**	200.000	600.000	2.500	**YES**	**YES**	EUROPPASS	**YES**	**YES**	In operation since January 1st, 2004	Kapsch
Greece	**All Classes**	35.000	200.000	50	**YES**	**YES**	Attikiodos, TEO, Rion Antirion	**YES**	**YES**		Kapsch, TG, Q-FREE
France	**Classes: LV, LCV, 2 wheels (Trucks in 2005)**	950.000	2.000.000	3.200	**YES**	**YES**	All classes from 2004/2005	**YES**	**YES**	30.000.000	CS, Thales GEA, Q-FREE, Kapsch
Italy	**All Classes**	3.800.000	4.500.000	2.500	**YES**	**"A" deviation**	Dual OBU are planed (By Autostrade)	**NO**	**YES**	80.000.000	Autostrade
Portugal	**All Classes**	1.450.000	1.600.000	500	**YES**	**Cf. comment**	Not compatible presently. Migration is planed End 2005	**YES**	**YES**	15.000.000	Q-FREE
Switzerland	**PL > 3.5 T**	60.000	65.000	100	**YES**	**YES**	Uniquely for data transfer on borders and enforcement	**Specific system**	**YES**	No ETC transactions	Fela
Norway	**All Classes**	1.050.000	1.250.000	250	**YES**	**YES**	Autopass	**YES**	**YES**	10.000.000	Q-FREE
Spain	**All Classes (not everywhere)**	210.000	800.000	800	**YES**	**YES**	All classes from 2004 (Planned)	**YES**	**YES**	5.000.000	Kapsch, Thales
Denmark	**All Classes**	150.000	200.000	8	**YES**	**YES**	Storebelt (Pista impemented)	**YES**	**YES**	800.000	Kapsch
Sweden	**All Classes**	100.000	150.000	6	**YES**	**YES**	Oresund	**YES**	**YES**	500.000	Kapsch
UK											
Dartford	**All Classes**	127.000	200.000	40	**YES**	**YES**	Interoperability is planed in short term	**YES**	**YES**	1.000.000	Kapsch, CS
Birmingham		10.000	50.000	53	**YES**	**YES**				Started end 2003	Kapsch, CS
Ireland	**All Classes**	100.000	150.000	25	**YES**	**YES**		**YES**	**YES**		Kapsch, CS
Turkey		320.000	400.000	150	**YES**	**YES**		**YES**	**YES**		Kapsch
Slovenia	**LV**	100.000	210.000	100	**YES**	**YES in 2005**	Scheduled evolution of ETC system (all classes scheduled for 2006)	**YES**	**YES**	1.500.000	Kapsch
TOTAL		**8.662.000**	**12.375.000**	**10.282**						**143.800.000**	
Germany	**PL (> 12 Tonnes)**	-	500.000	-	**GNSS GSM InfraRouge DSRC**	**YES with CEN DSRC module**	In parallel with a manual system (Ticket to be buyed in toll stations outside motorways)	**NO**	**YES**	Not yet in operation (Planed for 2005/2006)	-

List of Acronyms

CEN	European Committee for Standardisation
DSRC	Dedicated Short Range Communications
EFC	Electronic Fee Collection
EMC	Electromagnetic Compatibility
EETS	European Electronic Toll Service
ETCC	European Technical Certification Centre
GNSS/CN	Global Navigation Satellite Systems / Cellular Networks
GSM	Global System for Mobile communications
GSS	Global Specification for Short range communication
OBE	On Board Equipment
OCC	Operational Certification Centre
RSE	Road Side Equipment
TERN	Trans-European Road Network