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report

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Interoperability Management Implementation Plan

Table of contents

1.	INTRODUCTION	4
1.1.	Background	4
1.2.	Purpose of document	5
2.	STAKEHOLDERS AND THEIR ROLES	6
2.1.	Identifying the stakeholders	6
2.2.	Existing stakeholders	7
2.2.1.	The European Commission	7
2.2.2.	National Governments of Member States	7
2.2.3.	Toll Chargers	8
2.2.4.	EETS providers	8
2.2.5.	Equipment manufacturers	8
2.2.6.	Standardisation bodies	8
2.3.	Stakeholders that will need to be created	9
2.3.1.	EETS Notified bodies	9
2.3.2.	National conciliation bodies	9
2.3.3.	Pan-European bodies	9
3.	KEY ISSUES FOR INTEROPERABILITY MANAGEMENT	10
3.1.	Introduction	10
3.2.	EETS technical specifications	10
3.3.	EETS domain statements and service level agreements	13
3.4.	Registration and certification of EETS Providers	15
3.5.	Commercial processes	18

4.	APPROACHES TO A BUSINESS MODEL FOR INTEROPERABILITY MANAGEMENT	19
4.1.	Overall principles	19
4.2.	Possibility of cluster approach to developing EETS	21
5.	DOCUMENTS REQUIRED	23
6.	ANNEX 1: GLOSSARY AND ABBREVIATIONS	24
	Glossary	24
	Abbreviations	25
7.	ANNEX 2: OUTLINE EETS DOMAIN STATEMENT	26
	Toll Charger rules	26
	Services required from EETS providers	28

1. Introduction

1.1. Background

CESARE is a suite of projects promoted by ASECAP, the ASECAP associated organizations and the road administrations of several European countries known as “the Stockholm Group” (SG). CESARE is supported by the European Commission, with the objective of specifying, designing, developing, promoting and implementing a common Interoperable European Electronic Toll Collection System (EETS) on the European road network. CESARE has been divided into several phases, whereby the previous phase called CESARE III has been completed in October 2006. The results of CESARE III showed that there was a need for further actions in a next project phase (CESARE IV) in order to realize the interoperability objectives. The main goal of CESARE IV is to define a framework for establishing an interoperable European Electronic Tolling Service (from now on, EETS), functioning in a coordinated way at the European level, while allowing the Member States to fasten the pace of their national implementation plans for EETS. In this way CESARE IV will contribute to the implementation of the Directive 2004/52/EC.

It is important to note that the CESARE IV project has proceeded in parallel with the drafting of EETS Decision, which was finalised and received a positive opinion of the Toll Committee the 27 March 2009. Work on this report has throughout been able to reflect that draft in full, while earlier parts of the project were not able to work against a stable document. It is important to note that the draft EETS Decision changed substantially in the final weeks before agreement was reached on the final version. It is therefore inevitable that there are some inconsistencies in terminology and in substance between this report and those produced earlier in the process.

This has led to the following significant changes in the CESARE IV working assumptions from 2007 which will have an impact on the work done by WP 03:

- The IM was supposed to be one entity on an international level. This assumption is no longer valid and the original IM role and responsibilities defined in CESARE III are distributed on several actors both on international and national levels.
- The original project definition was based on the understanding that there would be a much greater degree of conformity in the implementation of EETS in member states with a much greater degree of centralisation of interoperability management. The framework eventually agreed in the Decision envisages a greater degree of freedom for Member States in implementing EETS and managing interoperability. Thus the original intention that CESARE IV should describe detailed processes has been modified and instead WP03 seeks to focus on more general and high-level principles of interoperability management.

1.2. Purpose of document

The overall purpose of WP3 is to develop proposals for Interoperability Management. It may be summarized as a description of a possible way forward for the implementation of EETS IM including but not limited to:

- stakeholders that should be established and possible alternatives in those cases where one or more stakeholder is not established
- the critical path for the EETS IM implementation including sequences, potential bindings/relationships and pre-requisites/conditions
- a process model for the IM responsibilities
- the common basis for the contractual relationships that have to be established

The purpose of this document is to provide an outline description of the processes and structures that are needed to make European interoperability work. It lists the stakeholders and their interests in the process, and seeks to set out the basis on which Report D 3.2 can develop a workplan and timeline for implementation of interoperability management.

The document aims to:

- Describe the principal stakeholders within EETS and their roles, based on the reports of CESARE IV WP2 in particular, but reflecting the EETS Decision as agreed by the Commission and the Comité Télépéage on 27 March 2009
- Describe the interfaces – technical, functional, legal and contractual - between those stakeholders developing the propositions set out in the WP2 documents
- Outline the basis for potential business models which could allow interoperability to be developed
- Make recommendations about the processes and documents needed for interoperability management
- Outline issues relating to the contractual relationships that have to be established
- Identify issues where further work is needed in order to put EETS – and in particular EETS interoperability management – in place

The conclusions of this document are expected to feed into Report D 3.2, which will develop a road map for interoperability. As it will be necessary for the WP 3.1 deliverable to consider questions of the dependencies inherent in interoperability and the sequence in which parts of the structure of interoperability are enacted, there will inevitably be a close synergy between Reports D 3.1 and D 3.2.

2. Stakeholders and their roles

2.1. Identifying the stakeholders

CESARE IV deliverable 2.1 established the following three categories of stakeholders:

Stakeholders already defined in the Decision that will be regularly involved in the delivery of the Service:

- Toll Chargers (TC)
- EETS Providers (EP)
- Equipment manufacturers
- Service Users

Stakeholders already existing that occasionally intervene in the different processes:

- European Commission
- National Governments of Member States
- European and national courts of justice
- Standardization bodies

Stakeholders that do not exist yet and need to be created for IM:

- Comité Télépéage (permanent version of the existing one)
- National Regulatory Authorities
- Conciliation Bodies (where separate from National Regulatory Authorities)
- Coordination Group of EETS National Regulatory Authorities/Conciliation Bodies
- TC advisory forum
- EP advisory forum
- Notified Bodies (NB) for EETS
- Coordination group of Notified Bodies

Since D2.1 was agreed, the draft Commission Decision on EETS has been finalised and agreed. The principal difference between this and the draft that formed the basis for D2.1 is the removal from the Decision of any reference to national regulatory authorities. Instead, the Decision requires the creation of Conciliation Bodies which will have a role in resolving commercial and contractual disputes between Toll Chargers and EETS providers.

This does not mean that there will not be a need for Member States to establish regulatory processes. In order to fulfil their obligations under the Directive and the Decision, it will be necessary for Member States to be able to compel Toll Chargers to enter into agreements with duly registered EETS providers and monitor the overall compliance with EETS regulations. Moreover, there is likely to be a strong case for co-operation between Toll Chargers within – and conceivably beyond – individual Member States.

In addition to these bodies, there is a question of whether there is a need for overarching Europe-wide institutions. The Commission has made it clear that the creation of Europe-wide bodies must be voluntary– it has no powers to create and delegate responsibility to other bodies and the line of legal authority for EETS implementation rest with the Governments of Member States. But equally there is a very strong case in operational terms for having associations of toll chargers and EETS providers to support the management of the contractual and operational interfaces between parties.

This report considers the role of each of the key stakeholders in Interoperability Management (IM) in turn below.

2.2. Existing stakeholders

2.2.1. The European Commission

The Commission's principal role is to ensure that the Directive is implemented by Member States and to undertake a number of functions that are allocated to it by the Decision, with the support of the Comité Télépéage. It is responsible for managing any changes to the overall legal framework for interoperability, including initiating any changes to the Commission Decisions governing the EETS service. However the responsibility to implement the service relies on Member States and the Commission can not itself devolve its powers to other organisations (the Meroni principle¹). Thus the direct role of the Commission in implementing interoperability will be limited, although it will continue to set the framework against which EETS operates.

2.2.2. National Governments of Member States

Like any other EU Directive, Directive 2004/52 and Commission Decisions made under that Directive are instruments addressed to member states, rather than to private entities, to undertake actions, This means that Member States have the legal responsibility to put in place the conditions to enable EETS to operate, and ensure that the legislative framework in their jurisdiction is such as to bring about the conditions in which EETS can be delivered. Any statutory powers required to allow EETS to operate will derive from the jurisdiction of the Member States.

Member States are given the following specific responsibilities under the Commission Decision:

- Maintain a register of EETS toll chargers on their territory and EETS Providers with whom they have contractual relationships
- Maintain a register of EETS providers registered in the Member State and manage the registration process
- Establish conciliation bodies to deal with disputes between EETS providers and the toll chargers whose domains are located on their territory
- Formalise the designation of Notified Bodies (although there is no requirement to designate Notified Bodies in any one member state)

¹ Judgment of the Court of 13 June 1958. - Meroni & Co., Industrie Metallurgiche, SpA v High Authority of the European Coal and Steel Community. - Case 9-56: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:61956J0009:EN:HTML>

At a more general level, Member States are required to ensure that the Service can be delivered. Although the Decision is silent on this issue, the clear implication of the Decision is that Member States will need to have the means to compel EETS providers and toll chargers to enter into agreements – without this power it will not be possible for states to fulfil their obligations under the Directive.

2.2.3. Toll Chargers

The essence of EETS is that toll chargers will be required to open their domains to vehicles equipped with EETS equipment, and obtain the revenue relating to use of their infrastructure by those vehicles through EETS providers. Among the tasks of the Toll Chargers is also the cooperation in enforcement and monitoring issues. They will be registered by Member States and required to produce EETS Domain Statements. They will need to be represented in the interoperability management process and will have a key role in the usage acceptance testing of EETS providers' equipment. Member States' regulatory processes will impact directly on toll chargers and will need to scrutinize their EETS domain statements. It is possible that they will have a direct role in approving EETS providers' equipment and processes where they choose not to seek certification through Notified Bodies; again, that function will need to be regulated. They will have recourse to national conciliation bodies in case of disputes.

2.2.4. EETS providers

EETS providers will be required to obtain a registration in one Member State. This includes, among others, the conformance to specifications of their interoperability constituents. This conformance can be checked by notified bodies or will be a self-declaration of the EETS Provider. For the suitability of use in specific toll domains, the approval by a Toll Charger or a notified body is required. EETS Providers will enter into regulated and contractual agreements with Toll Chargers and will have recourse to national conciliation bodies.

2.2.5. Equipment manufacturers

Manufacturers will principally be driven by the needs of their customers – EETS providers, Toll Chargers in the case of roadside equipment and possibly in the longer term vehicle manufacturers for line-fitting – to be able to purchase EETS compliant equipment. The EETS decision envisages a process of self-certification so there will be no more than limited interaction with notified bodies as part of the process of ensuring that their equipment is compliant. However, in order to do this it is essential that they know the certification criteria early in the process; they are critically dependent on the availability of future Commission Decisions that will set out both the EETS technical specification and the certification process that will assure that specification.

2.2.6. Standardisation bodies

The European standardization bodies are currently working to develop standards for the interfaces specified in Annex II of the Commission Decision. It is important to stress that these standards will form the basis for further Commission decisions on an EETS specification, rather than providing the specification itself.

2.3. Stakeholders that will need to be designated or created

2.3.1. EETS Notified bodies

These are required by the EETS decision and must be designated by the Member States where they are registered. They could be entrusted for assessing applications by organisations who wish to become EETS providers, prior to registration by a Member State. They therefore discharge one of the central functions of Interoperability Management

Notified bodies will have a direct relationship with the European Commission, through the Coordination Group of Notified Bodies created by Decision 2009/750/EC (EETS Decision) as a sub-committee of the Comité Télépéage, to advise on technical issues.

2.3.2. National conciliation bodies

The creation of National Conciliation Bodies is required by the EETS decision. Articles 10 and 11 of the Commission Decision require that these can play a role in solving disputes within Member States and must collaborate with their counterparts in the other Member States.

2.3.3. Pan-European bodies

Currently the European Commission and the Toll Committee are the only cross-Europe institutions involved in implementing EETS. As described above, formal responsibility for creating the national conditions for the service lies with National Governments. But this does not preclude the creation of informal, non-mandatory pan-European bodies which can play a role in setting up and running the service, particularly at an operational level.

There are basically two types of role that a pan-European body could play:

- It could act as a trusted third party, involved in for example the issue of security keys or in transfer of certain types of data (including for example statistical data)
- It could act as a forum for the exchange and dissemination of views and best practice, in a similar way to the Co-ordination Group of EETS legal authorities proposed in D2.1

These roles are not mutually exclusive, although the former is probably of greater operational importance than the latter. In neither case would the pan-European body have any executive powers; these would need to remain vested in national Governments in Member States. However, an informal body could play an important role in interoperability management as a forum for the development of policy and common operational systems and procedures.

It is likely that groups of stakeholders will develop their own pan-European forums. Toll Chargers, with their practical experience of running tolling systems, are already represented through ASECAP, and EETS Providers may wish to develop their own international associations. However, it is important to note that the contractual relations will be between individual parties and governed by the applicable national law, rather than being based on agreements between Europe-wide bodies.

3. Key issues for interoperability management

3.1. Introduction

EETS is a market-based service whose implementation will be managed through a number of key relationships and processes. In addition to the operational interfaces these will include:

- The EETS technical specifications, which, to become mandatory, would need to be set out in further Commission Decisions
- The registration of Toll Chargers and EETS providers by public authorities
- EETS Domain Statements including service level agreements between EETS providers and toll chargers
- The certification of EETS providers' equipment and processes, either by notified bodies or by toll chargers, and of Toll Chargers' roadside equipment, For the EETS provider this process will involve demonstrating conformity to the EETS specifications and suitability for use testing
- A range of financial and commercial relationships, which will be needed to turn the aspirations for a market-based service into a reality

3.2. EETS technical specifications

The EETS technical specification will be a key document, which will:

- Determine the technical conditions that EETS providers and Toll Chargers must meet
- Determine the testing processes to be used by notified bodies and toll chargers
- Provide a basis for the drafting of EETS domain statements

The EETS decision agreed on 27 March 2009 contains a list of the key EETS interfaces. However, it does not include all the specifications for those interfaces. Common specifications are needed to ensure an efficient implementation of these interfaces between a large number of Toll Chargers and EETS Providers. In addition to that, the manufacturers of equipment supporting these interfaces need clear specifications to be able to apply for a certification.

By mandate 338 of the European Commission the standardisation bodies were entitled to develop a standardisation program to support the interoperability of EFC systems.

For DSRC systems, many of the key interfaces are already specified in standards, most notably EN 15509 which covers the air interface for DSRC charging transactions. Other necessary standards, for compliance check communication, localisation support and back office communication, are currently being developed by the European standardisation bodies. Other issues, like a general security architecture for EFC systems, have just been proposed as new work items and will therefore take more time for finalization.

The issue of reliance on standards raises important issues in relation to the timetable for achieving EETS. Implementation of EETS will require a second and possibly subsequent Commission Decisions which will set

out the technical specifications. The current approach in the Commission Decision is that the specifications for the interfaces should be based on the outcomes of work currently under way within the standardization bodies; however, such an approach would effectively mean that the deadlines in Directive 2004/52 for implementing EETS would be unachievable.

It is additionally essential to understand that the standardization process will not, of itself, deliver an EETS specification. Although all of the interfaces listed in Annex II of the Commission Decision are covered by standardization work, many of the standards currently under development are tool-box standards that provide a range of options. The development of an EETS specification would therefore require substantial and potentially controversial work to develop an agreed text that could command consensus across the 27 Member States. This is likely to be a lengthy and difficult task, likely to involve a significant input from the Co-ordination group of Notified Bodies.

The alternative to relying on the standardization process would be for the Commission to lead work on developing a set of interim performance standards and protocols for the interfaces in Annex II. These would however also require a further Commission Decision.

The development of the EETS specification should analyse the available and upcoming standards for their applicability in EETS. A strong liaison should be created with the standardisation bodies.

The back office interfaces need to be implemented independently from the technology of the tolling system (DSRC-based or GNSS) and are also independent of the implementation of the EETS Providers tolling technology (thin or thick client). The data that is to be transferred differs, but the interface needs to be provided in any case. In particular the EETS Decision lists the following backoffice interfaces:

- Exchange of toll declaration data between EETS Providers and Toll Chargers, specifically:
 - Submission and validation of claims for toll payment based on DSRC charging transactions
 - Submission and validation of GNSS toll declarations
- Invoicing / settlement
- Charge transactions
- Exchange of information to support exception handling:
 - in the DSRC charging process
 - in the GNSS charging process
- Exchange of EETS blacklists
- Exchange of trust objects
- Sending of Toll Context Data (which will form part of the EETS Domain statement) from Toll Chargers to EETS Providers

It is obvious that a standardisation of these interfaces is crucial for an efficient setup of relationships between Toll Chargers and EETS Providers. The correct implementation of these interfaces is also subject of the conformity to specifications and suitability for use procedures according to Annex IV of the EETS Decision.

In the current discussion of the back office interfaces, the ISO 17575 with its four parts is often mentioned as the basis for the implementation. This is formally not correct, because this standard only describes the interface between a front-end system (OBE and an optional central proxy system) and a backend system. However, the interface definitions with the messages and attributes of this standard are a fundamental basis for the further work and will be incorporated into the ISO 12855, which is the standard for back office communication between Toll Chargers and EETS Providers. In particular, the ISO 12855 describes the following interfaces:

- Exchange of Trust Objects (security keys, digital certificates, certificate revocation lists, ...)
- Originate and distribute EFC context data

- Manage Exception lists (black lists)
- Report Billing details (Charge Reports between Toll Charger and EETS Provider)
- Claim payment for service usage (Invoicing)
- Exchange Enforcement data (Enforcement support, Providing additional details for enforcement by the EETS Provider to the Toll Charger)
- Exchange Quality assurance parameters (Service Levels)

For payment and settlement, the interface should be standardized to the level of detail found in ISO8583 regulating exchange of bank card transactions, so as to ease the process of admitting new partners. The data available at the EP back office must be sufficient to invoice the customer according to relevant legislation in order to reimburse VAT or other taxes incurred anywhere.

Summary and recommendations:

- Standards shall be used as much as possible to enable the interfaces which are mentioned in Annex II of the EETS decision
- Standards need to be profiled before incorporating them in an EETS specification
- ISO 12855 will be the standard which describes the back office interfaces between EETS Providers and Toll Chargers. This standard is not only valid for EETS, but also for other interoperability schemes. In the EETS definition process a standard for the back office interfaces needs to be specified. This should be ISO 12855.
- ISO 12855 needs to be adapted or profiled for usage in the EETS scheme. In particular, it has to be defined, which messages, parameters and attributes are mandatory, which are optional and which must not be used in EETS.
- A security concept for EETS is needed to create trust between stakeholders and to provide elementary security services to the interfaces. This is not provided by ISO 12855, which only describes the general exchange of security or trust objects, but not how to use them. A new work item on a general EFC security architecture has recently been proposed in CEN.
- Toll Context Data for the description of a toll system and the Charge Reporting Rules with the requirements of the Toll Charger towards the EETS Provider on the extent of reported data need to be restricted for usage in EETS to limit the number of options for tolling systems. A framework of possible options needs to be specified to give assurance to the EETS Providers, that changed or new toll systems can be covered by their implementation without substantial changes.
- The format in which a Toll Charger is required to provide geographical information of its toll road network in case of GNSS based systems must be agreed. An EETS Provider needs a precise description of the toll objects, whether they are areas or segments of roads. Two major options are possible:
 - The Toll Charger provides a complete map in a standard format like GDF and marks the relevant toll objects, e.g. segments of a motorway. This option requires more effort on the Toll Chargers side, but reduces complexity on the EETS Providers side and reduces potential conflicts in case of incorrect tolling, because the geographic data can be assumed to be correct, even in the case where it does not match the reality. This option is preferable;
 - The Toll Charger provides a textual or any other simple form of description of the geographic data of the toll objects. In case of segment-based tolling this could be the name of a motorway and the name of entry and exit to the specific segment. In this case, the EETS Provider has to use his own map or (more likely) one of an official map provider. This reduces the effort on the Toll Chargers side, but can be source of various conflict points where the actual situation on the road does not comply with the representation on the map.

3.3. EETS domain statements and service level agreements

The EETS Domain Statement is described in Annex I of the EETS Decision and will be the overall description of all organisational, contractual, legal and technical requirements when an EETS Provider wants to offer its services in a toll domain of a Toll Charger. However, the current description of the EETS Domain Statement is very general and needs to be described in much greater detail. Only the following requirements are stated in the EETS Decision:

"... procedures and Service Level Agreement (... , accepted percentage of missed / erroneous tolls, accuracy of toll declaration data, operational availability performance...)"

Moreover, the status of the EETS Domain Statement must remain provisional at this stage in the process. Member States are required to register Toll Chargers within nine months of the Decision but some of the issues that will determine the structure and content of those Statements will not be available by that time. It will only be possible to produce definitive EETS Domain Statements once there is an agreed EETS technical specification.

EETS domain statements will be subject to regulation, as they will provide information on the basis on which parties will enter into contractual agreements. The regulatory arrangements in Member States will need to contain processes that will ensure that the statements do not restrict competition or promote unjustifiably high barriers to market entry. Service levels will be at the heart of this process, and it is therefore important that there is consistency across the EETS service. The fact that these Statements will be regulated increases the importance of developing common templates for EETS domain statements. This task needs to be led by the Commission.

A possible model for an EETS Toll Domain Statement is set out at Annex 2, for illustrative purposes. This is based on DSRC protocols and the final Statements will need to reflect the range of EETS technologies and the EETS technical specification.

The service level agreements for EETS form a crucial part of the requirements for EETS Providers. These are needed to:

- internally monitor the performance of the EETS providers systems
- assure the required service level of the EETS provider in order to ensure the income of the Toll Charger as a basis for the remuneration of the EETS Providers

A clear differentiation has to be made between the enforcement of user compliance and the checking of service levels between Toll Charger and EETS Provider. If the user fulfilled his obligations of monitoring the status of the OBE and correct declaration of variable parameters, any toll non-declaration needs to be resolved between the Toll Charger and the EETS Provider. Based on current experience in existing tolled undertakings, failure to read DSRC transponders will be a particularly important issue.

Service level agreements (SLA) are contractual agreements on definition, monitoring and evaluation of key performance indicators (KPI). These will form part of the EETS Domain Statement, for which two general categories of SLAs can be defined:

- Service levels on availability of systems or interfaces
- Service levels which measure the accuracy and correctness of toll declarations

The first group of service levels covers availability of interfaces and their supporting systems, if necessary for the correct functioning of the interoperability scheme, e.g. availability of localisation augmentation beacons, operated by the Toll Charger or systems for accepting black lists from the EETS Provider.

The second group of service levels is defined depending on the concrete toll domain. Based on the current standardisation activities, the following different toll schemes can be subdivided as follows:

- Segment tolling (entire or parts of a specific segment of a road)
- Area tolling accuracy to time stayed
- Area tolling acc. to distance travelled
- Cordon tolling (tolling depending on entry and exit into an area)

These toll schemes can overlap within the same toll domain. As an example, in the Netherlands it is planned to have a basic fee for the distance travelled in the area which covers the whole country, and in addition to that a toll on specific parts of the motorway network based on segment tolling. Or, for example, a city congestion scheme in which a local authority is a toll charger may levy a charge on the same roads for which a distance charge is payable under a national road pricing scheme.

The definition of service level parameters is a very important but also a very difficult task. At a general level, SLAs must:

- Be objective, measurable and certifiable, the results of the monitoring should be reproducible under the same conditions
- Be representative and provide statistical significance of the samples for monitoring compared to the total number of vehicles, considering the total number of vehicles of an EETS Provider travelling on the toll road network
- Cover the whole toll network and the different vehicle classes which are defined in the toll context data and it must be representative in respect to the specific influence parameters like geographical situations or time variations in traffic.

For all kind of toll schemes, service levels could be defined that use the amount of toll loss in a certain period of time and a single or a sample of vehicles; along with processes for monitoring the extent to which those standards are being achieved.

Segment tolling	Quota of detected segments / total segments
Area tolling (time)	Deviation of measured time and actual time of a vehicle in an area
Area tolling (distance)	Deviation of the measured distance and actual distance of a vehicle in an area Accepted deviation of measured distance from actual distance (e.g. 2%)
Cordon tolling	Quota of detected toll points / total toll points passed Number of detected cordon crossings / total cordon crossings

Summary and recommendations:

- The structure of an EETS domain statement needs to be elaborated further and should be provided as a blueprint for Toll Chargers and the Member States.
- Examples of EETS domain statements should be provided for the existing electronic toll systems, reflecting the different technologies
- Protocols shall be elaborated for further parts of the EETS domain statement where no common understanding is available yet. This includes in particular
 - Commercial conditions including remuneration
 - Payment and invoicing policies
 - Provide recommendations for possible technical service levels

3.4. Registration and certification of EETS Providers

Article 3 of the EETS Decision describes the requirements that must be met by an EETS Provider who wants to become registered in a Member State. Article 3b sets out that in order to demonstrate their technical compliance EETS providers must meet the conformity to specifications procedure as described in Annex IV.1 of the decision. The registration procedure is done independently from a specific Toll Charger domain that means that this conformance procedure can only provide tests in a test environment against certain test equipment.

Annex IV.1 of the [draft] Commission Decision describes in very general terms the certification procedure:

"For assessing interoperability constituents conformity (including road side equipment and interfaces) with the requirements set out in this decision and all relevant technical specifications, the manufacturer of the interoperability constituents to be used in EETS provision or his authorised representative shall choose the procedures from among the modules listed in Decision 768/2008/EC. As a result, it shall draw up the interoperability constituents "EC" declaration of conformity to specifications, where applicable subject to obtaining an examination certificate from a notified body.

Depending on the chosen conformity assessment modules of Decision 768/2008/EC, the "EC" declaration of conformity to specifications covers the manufacturer's self-assessment or the assessment by a notified body or bodies of the intrinsic conformity of interoperability constituents, considered in isolation, to the specifications to be met."

No further explanations are given on the specific interoperability constituents which are subject to this procedure. Moreover, no requirements are given on the selection of the appropriate procedures of the Decision 768/2008² (decision on a common framework for the marketing of products). In particular, the Decision is largely silent on how the payment services and other commercial aspects of EETS will be developed, even though this is a crucial element of the delivery of the service.

As a starting point, the following systems of an EETS Provider could be subject to a conformity to specifications procedure:

- OBE with respect the interfaces for short-range communication, safety and electromagnetic compatibility, mounting requirements, data security requirements on the storage and processing of sensitive data, HMI
- Interface for toll context data from a toll charger (full and differential, DSRC and GNSS based systems, different toll schemes, acceptance of charge reporting rules)
- Interface for issuing blacklists to the Toll Chargers
- Interface for security objects like certificates, masterkeys for DSRC communication etc
- Interface for charge reports coming from or going to the Toll Charger depending on the toll scheme. This includes checking the compliance with the Toll Charging Reports
- Interface for reporting service levels
- Interface for giving enforcement support to Toll Chargers
- Compliance with privacy and data retention regulations

The evaluation of the interoperability interfaces shall be based on appropriate test standards. These test standards are almost ready for the DSRC interfaces and in development or planned for the backoffice communication interfaces and the interfaces between front-end systems (OBE and optional proxy system) and backoffice systems for GNSS based systems. Where no test standards are available, e.g. for privacy or data retention regulations, proper certification documents need to be produced to have a common and accepted way to achieve and provide certification. This could be the responsibility of the Coordination group of Notified Bodies.

To support the efficiency of any following suitability for use procedure, where an EETS Provider is subject to evaluation of its systems and processes in a real toll domain, the conformity procedure could already check compliance with the common toll schemes of DSRC and GNSS toll domains.

In terms of process, registration is crucially dependent on the development of an EETS technical specification and the test specification that follows from that. It is difficult to see any process for doing so that would not involve the Commission, supported by the Comité Télépéage, in developing a further Decision, which would in turn need to reflect the emerging standards. It is important to understand that those standards of themselves will not provide the basis on which to base an EETS specification.

It will also be important that to ensure that there is a continuing process for updating this specification, especially as technology and processes develop. It is particularly important to ensure that any technical specification does not inhibit innovation and that the Commission – through the Comité Télépéage and the Coordination Group of Notified Bodies – responds to technical change.

It is also necessary to ensure that the certification process is sufficiently grounded to prevent inconsistencies, especially between the standards applied by notified bodies. Within the certification process there is a potential conflict between the decentralization of approvals inherent in a CE-marking approach to the certification of equipment and the central approval of the processes and suitability of an EETS provider. For example the

² Decision No 768/2008/EC of the European Parliament and the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC - Official Journal reference L218/82, Volume 51., 13 August 2008

decentralized system for Type Approval of Motor Vehicles, relies on a very detailed set of statutory requirements, to ensure consistency. The scope for homologation bodies to exercise any judgement is reduced to a minimum. Nevertheless, differences in interpretation of the rules still occur. Both Toll Chargers and EETS providers have a powerful interest in ensuring consistency, since in both cases the failure to achieve such consistency will result in a loss of revenue.

It is particularly important to ensure that Member States ensure consistent standards between national approvals of notified bodies – there should be no perception that any Member State's approved notified bodies offer an easier route to approval for either EETS providers or toll chargers. Firm governance is a pre-requisite of a workable certification process.

It is also important to recognize that the balance of process between Notified Bodies and Toll Chargers is likely to change over time. As the EETS decision describes the EETS certification process includes two elements:

- The conformity of technical systems and service processes to specifications which will be checked by a Notified Body or by self-assessment. This is a prerequisite for registration as an EETS Provider and gains him the right to enter into contractual agreements with Toll Chargers.
- The suitability for use testing of EETS Providers by Toll Chargers or Notified Bodies to ensure that the approved systems can deliver the requirements of the EETS domain statement for each Toll Charger in the real world

In the early stages of EETS it would be reasonable to expect that the suitability for use element is likely to assume a much greater role than in a mature EETS, as the collective experience of developing EETS develops. It will be important to ensure that Interoperability Management procedures are sufficiently flexible to accommodate a developing EETS market and do not inhibit technical or contractual innovation.

Notwithstanding the fact that there are unlikely to be a significant number of Notified Bodies in the immediate future, the Coordination Group of Notified Bodies should be implemented as soon as possible – if necessary with the participation of representatives of Member States until Notified Bodies are formally set up and approved for EETS - to start the definition of the appropriate framework. This Group shall provide answers to the questions mentioned below.

Summary and recommendations:

- Which are the interoperability constituents which are subject to this procedure?
- Which are appropriate procedures from the 768/2008 Directive for EETS? The procedures differ significantly in their scope of the evaluation, e.g. self-assessment or assessment by a notified body
- Who defines the detailed requirements and relevant technical specifications which have to be used in the certification procedure, since they are not described in the current EETS decision? The Coordination Group of Notified Bodies should be in charge of that, with a strong input from Toll Chargers.
- It is still undecided in which way the Toll Chargers have to prove, that their systems comply with the EETS requirements and toll chargers' systems. Concrete recommendations to the member states should be given on this issue
- Recommendations should be given to the member states, how a common application of conformity checking procedures by all notified bodies can be organised

3.5. Commercial processes

Although considerable effort has been dedicated to developing technical elements of EETS, there remain huge uncertainties over the way in which the commercial aspects will be managed, and it is vitally important that the Commission leads urgent and rigorous work to develop these. Many of the key issues were set out in the report of Expert Group 7 to the Commission, which made a number of recommendations for further work on key issues. These inter alia include recommendations that:

- There must be a viable business model, in which the party receiving a service is willing to pay a price for it
- There should be a common contractual framework governing the interface between the Toll Charger and EETS provider, irrespective of the countries of operation, with local legislative input being kept to the unavoidable minimum
- There should be a minimum set of terms and conditions throughout Europe. These could in time develop into a standard set of contracts, which could make the process of negotiation and agreement very much simpler
- Consideration should be given to the extent to which EETS services are caught by European legislation on financial services
- There are related questions about the extent to which EETS transactions are caught by the Payment Services Directive
- A number of detailed conditions should be in place to facilitate the production and use of blacklists

These are substantial questions that go to the heart of the delivery of the EETS services. While it is not within the competence of the CESARE program to investigate these issues further, it is clear that the Commission has an important role in leading further work on these issues, and that the outcome of that work will have important consequences for the structure of EETS interoperability management and the delivery of the service as a whole.

Furthermore, it is recommended that the extent to which these commercial questions have been resolved should form a key criterion for the Commission's judgement in its eighteen-month review of whether EETS is deliverable within the Directive's timescales.

4. Approaches to a business model for interoperability management

4.1. Overall principles

The purpose of this chapter is to set out systematically some of the general principles underlying the EETS commercial model, which need to be reflected in interoperability management – in particular as it relates to disputes resolution. A business model for interoperability management will need to reflect the interfaces, issues and constraints described above. It will also crucially need to reflect the overall business model for the service – it cannot be imposed in a free-standing way. It must in particular reflect an understanding of which parties are receiving and paying other parties for a particular service. It must also be sufficiently flexible to reflect changes in the way the EETS business is conducted.

It must in particular:

- be flexible – reflecting the fact that the development of EETS as a market is an uncertain and unpredictable process
- be scalable – reflecting the fact that the service is likely at the outset to have a relatively small user base, but that this is likely to increase over time, in particular if unit costs per transaction fall;
- be open to change – it must not constrain innovation, and must allow changes in business practices, and must not enshrine particular ways of innovation
- be impartial – reflecting fairly the interests of all participants in the market.
- be properly funded in a way that reflects the structure of the overall market.

A key question which will impact on business models overall is that of who is the customer in the EETS environment, and on whose behalf the service is being delivered. This can be understood in one of two ways:

- as a service provided to the EETS user, who is essentially paying a transaction or a subscription charge to an EETS provider to manage his toll payments and for the benefits of being able to settle a single bill
- or, as a service provided to the Toll Charger, undertaking on his behalf tasks such as issuing on-board equipment and billing which would in other circumstances fall on the Toll Charger himself.

These two approaches are by no means mutually exclusive, and both need to be understood in approaching the business case for IM.

A key issue will be the resourcing of interoperability management. This report does not make recommendations as the institutions of interoperability management will vary between Member States and will inevitably change as the market develops.

The following tables give examples of possible basic additional obligations and risks for each party:

Role	Obligations and risks	Benefits
Toll Charger	<ul style="list-style-type: none"> • Infrastructure and system, including upgrades • Certification/testing of roadside equipment • Establishment of bilateral agreements with all certified EPs • Potential exposure to greater revenue risk from EETS transactions compared to local solutions • Potential loss of interest on pre-pay deposits held • Potential collection fee paid to EP 	<ul style="list-style-type: none"> • Revenue collected without needing to manage user account • Revenue collected without needing to issue/maintain OBE • Greater proportion of equipped vehicles reduces overall cost of collection • Greater proportion of equipped vehicles reduces compliance issues • Easier to pursue EP for unpaid toll based on payment guarantee than pursue user (especially cross-border) • Reduced infrastructure and system costs due to market efficiencies • Potential access fee paid by EP • Enforcement support from EETS providers
EETS Provider	<ul style="list-style-type: none"> • Establishment and operation of EETS service • Procurement of certified OBEs • Certification/testing of the service (including with TCs?) • Establishment of bilateral agreements with all TCs • Payment guarantee entails credit risk transferred from TC • Potential access fee paid to TC 	<ul style="list-style-type: none"> • Ability to offer comprehensive service with single OBE • Right to contract with all TCs on equitable terms • Fees from users for EETS • Fees from users for other services offered alongside EETS • Potential collection fee paid by TC
EETS User	<ul style="list-style-type: none"> • Service fees • Time costs of registering for the service and becoming equipped (for fixed OBE) • Opportunity cost of depositing funds in a pre-pay account 	<ul style="list-style-type: none"> • Convenience of single account, invoice and OBE for all tolls • Reduced risk of penalties • Potential platform for other location-based services • Ability to receive comprehensive service from the EP (one contact)
Interoperability Manager	<ul style="list-style-type: none"> • Production and maintenance of specifications • Establishment and operation of certification regime • Oversight and dispute resolution services • Management of shared data 	<ul style="list-style-type: none"> • Economic benefits of interoperable tolling

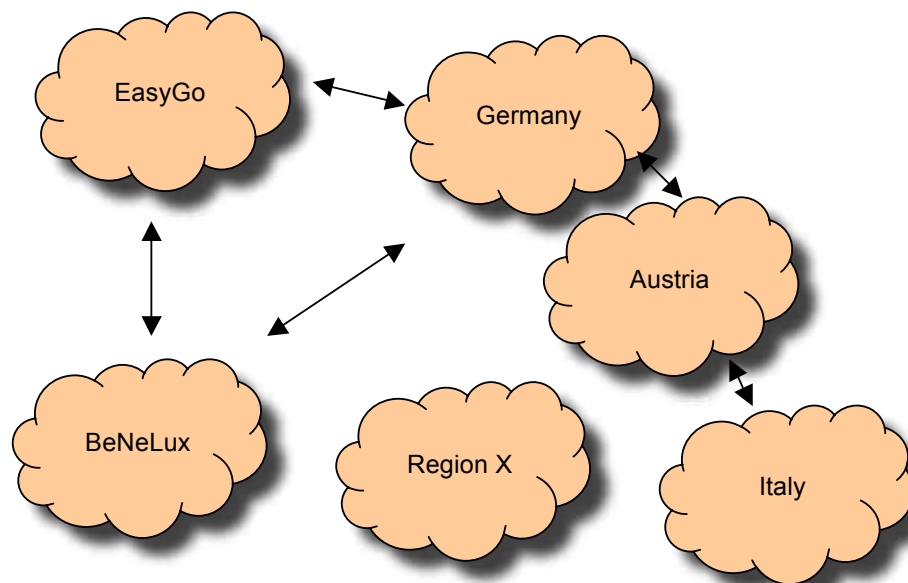
This table demonstrates that both toll chargers and EETS providers will experience potential costs and benefits as a result of EETS, which will need to be reflected in the structure of interoperability management. The business case for EETS will be determined by the balance of the costs and benefits in those tables. However, interoperability management will need to be sufficiently flexible to deal with a wide range of business and functional models, while acting in a way that does not impose unnecessary costs the participants in the service.

4.2. Possibility of cluster approach to developing EETS

The fundamental vision of the EETS is to provide a service that covers all toll and charge schemes subject to Directive 2004/52. In order to achieve this goal EETS Providers shall conclude contracts covering all EETS domains within 24 months following their registration by a Member State.

The EETS Decision foresees bilateral contracts between EETS providers and Toll Chargers, a system which would be cumbersome and cause considerable practical difficulties for interoperability management.

An alternative approach might be regional. Based on models currently used in Easy-Go, the implementation of EETS through a regional approach could look like this:



Example (purely illustrative) of regional implementation of interoperability

Europe consists of several regions. Traffic volumes between these regions differ very much. As an example in the illustration above, EasyGo see high traffic volumes from Germany, Austria and the Be-Ne-Lux while much less from Italy. On the other hand Italy has significant traffic exchange with Austria and Germany. A gradual implementation of interoperability could reflect this.

The regional approach has the following advantages:

- The cooperation between toll chargers within a region would give:
 - An obligation from all issuers signing a contract with the region, to cover all toll chargers independent of size or geographical location.
 - The region would be attractive to issuers due to the number of toll chargers and total turnover of the region.
 - The toll chargers of a region will have a strong basis for negotiating deals with issuers.
 - The possibility to cooperate on specifications, procedures, common regional services etc, common representation etc.
- The great majority of transactions can be handled within each region, not influencing the capacity of any. European network.
- The business model based on the regional model is clearly defined both for toll chargers and issuers. Issuers are providing a service to the toll chargers and to the users. Issuers should be allowed to employ the OBE for additional services like ferries, parking etc thereby achieving a more attractive product where parts of the cost is covered by other transport service providers.
 - If, as in the example above, an agreement exists between EasyGo and Austria and Germany and between Austria and Germany and Italy it would make it easier to make a similar agreement between EasyGo and Italy even if the traffic basis is less.
 - The interoperability management within each region could be sufficient also to handle the interoperability management necessary between regions.
 - The communication infrastructure within the regions would suffice also to handle the external transactions etc. There would be no need for an additional EETS infrastructure.
 - The basis of the regional model is already proven through commercial operation.

In summary, there is a hierarchy of interoperability management, with toll chargers and EETS providers operating through regional institutions where they exist to deliver a Europe-wide service. Although there are no powers to mandate such an approach, and although there are potential risks around scalability in particular, its active development could lead to substantial benefits in terms of delivering a cost-effective and workable system of interoperability management.

5. Documents required

The required documentation for EETS would include a range of contractual, technical and process-related documents. The example of Easy-Go suggests that these would include:

- Documents relating to administration and management
- Technical specifications
- Joint-venture agreements
- Implementation documents
- Detailed arrangements for settlement, invoicing, VAT etc
- Procedures relating to issues like customer relations, IT procedures, change procedures etc
- Detailed descriptions of toll domains

In practice, much of this information will be contained in the EETS Toll Domain Statement required by the Commission Decision.

6. ANNEX 1: Glossary and abbreviations

Glossary

The following Terms are used in the document:

Term	Definition
Certification	In the directive and the draft decision this word refers to all compliance checks with EETS rules, for all stakeholders and equipments. Regarding the vocabulary, the present report is more specific: <ul style="list-style-type: none"> - Equipments (OBE, RSE and back office systems) are “Certified” - EETS Providers are “Approved” - Toll Chargers are “Qualified” - Notified Bodies are “Appointed”
EETS Provider (EP)	A legal entity (or group of legal entities) providing the European Electronic Toll Services (EETS) on one or more toll domains to Service Users, for one or more categories of vehicles
Enforcement	The process of compelling observance of a law, regulation, etc. (EN ISO 17573)
EETS toll transaction	The data describing the charged road use concluded by the Toll Charger according to national and local law taking into account the toll declarations
Interoperability	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 (EN ISO 17573)
Interoperability Manager (IM)	In the EETS context, the Interoperability Manager (IM) is an entity or an organisation (i.e. a set of entities), which plays the role of managing the interoperability of the European Electronic Tolling Service, including in their functions the governance and other main components of the Service
Notified Body	Body in charge of certain parts of the equipments and stakeholders certification/qualification/approval
On-Board Equipment (OBE)	Equipment fitted within or on the outside of a vehicle and used for toll purposes
Role	Identifier for a behaviour, which may appear as a parameter in a template for a composite object, and which is associated with one of the component objects of the composite object Roles defined in the European Electronic Service: Interoperability Manager (IM), Toll Charger (TC), EETS Provider (EP) and Service User (SU)
Service User (SU)	A generic term used for the customer of an EETS Provider, one liable for toll, the owner of the vehicle, a fleet operator, a driver etc. depending on the context (EN ISO 17573)
Toll	A charge, a tax, a fee, or a duty in connection with using a vehicle within a toll domain (EN ISO 17573)

Term	Definition
Toll Charger (TC)	A legal entity (or group of legal entities) in charge of the Toll Charging role, including amongst others, the operation of toll domains, collection of tolls and enforcement tasks
Toll Context Data	A set of EETS relevant data related to a certain Toll domain. This information is expected to be loaded in the OBE in tolling systems based on GSM/GPS technology
Toll Domain	An area or part of a road network where a toll regime is applied (EN ISO 17573)

Abbreviations

The following abbreviations can be used in this document:

CEN	Comité Européen de Normalisation
CESARE	Common Electronic Fee Collection System for a Road Tolling European Service
CtTp	Comité Télépéage
DSRC	Dedicated Short Range Communications
EETS	European Electronic Tolling Service
EFC	Electronic Fee Collection
EP	EETS Provider
ETC	Electronic Toll Collection
ETSI	European Telecommunication Standardization Institute
GDF	Geographic Data File
GNSS	Global Navigation Satellite Systems
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HGV	Heavy Goods Vehicle
IM	Interoperability Manager (EETS Interoperability Manager)
ISO	International Organization for Standards
KPI	Key Performance Indicators
NB	Notified Body
OBE	On-Board Equipment
RSE	Road Side Equipment
SG	Stockholm Group
SLA	Service Level Agreement
SU	Service User (EETS Service User)
TC	Toll Charger (EETS Toll Charger)
UMTS	Universal Mobile Telecommunications System

7. Annex 2: Outline EETS Domain Statement

Toll Charger rules

Topic	Section	Notes
Where the charge applies	<i>The overall area to which the scheme applies</i>	Identifies the jurisdictions concerned.
	<i>The overall area to which the scheme applies</i>	Identifies the jurisdictions concerned.
When the charge applies	<i>Charging days</i>	Defines the days of the year on which charges will be applicable.
	<i>Charging hours</i>	Defines the hours during which charges will be applicable.
	<i>Duration of charging scheme</i>	Defines the intended duration for which the scheme will run. Most schemes will be indefinite, although it is feasible that schemes could be put forward for a fixed duration.
Who needs to pay?	<i>Relevant vehicles to which the charge applies</i>	Defines the vehicles to which the charge applies, including reference to vehicle categories to which different charges apply.
	<i>Exempt vehicles</i>	Defines any vehicles exempt from charging. A number of vehicle types may be exempted from charges by national rules. Further local exemptions may be defined by Toll Chargers. This should also identify the mechanism by which exempt vehicles will be detected and/or registered with the Toll Charger.
How the User can pay the charge?	<i>Solutions administered by the Toll Charger</i>	Lists the solutions (ways for a User to interact with a Toll Charger) administered by the Toll Charger itself. Variants within a solution may be identified: for example, terms offered to business users may differ from those offered to personal users within a particular solution.
	<i>Solutions accepted from third party Account Issuers (including EETS Providers)</i>	Lists those solutions that allow users to pay the charge via a third party Account Issuer. Toll Chargers may accept tags issued by certain Account Issuers or declarations of charges from providers of autonomous in-vehicle equipment, for example. From an EETS perspective, Toll Chargers within scope of the Directive will also need to accept either the EN15509 tag or GNSS-based declarations from EETS Providers.

Topic	Section	Notes
What happens if the User does not pay?	<i>Time limit for compliance</i>	The time limit beyond which a User is considered non-compliant if they have not paid the correct charge using any solution administered or accepted by the Toll Charger.
	<i>Penalty charges</i>	Defines the standard level of penalty charge for non-compliance with the Scheme Rules, together with any discount for early payment or increase for late payment.
	<i>Penalty charge process</i>	Describes the time limits for paying penalty charges as well as details of the representation and appeal processes.
	<i>Channels and payment means for penalty charges</i>	Defines the channels and the corresponding payment means available to Users to pay penalty charges.
Signs and signals	<i>Signs and signals used by TC to inform user</i>	Signs leading to EETS lanes. Signals used to show valid payment or non-valid payment.
Information	<i>Where to get additional information</i>	States the www of the TC where up to date prices and discounts as well as campaigns etc are listed.
Degraded mode	<i>Rules for degraded mode</i>	States how the EETS user will pay the TC in the event that the EETS OBE is not operating.

Services required from EETS providers

Topic	Section	Subsection	Notes
Details of AI solution 1 (repeated for each solution administered by a 3rd party AI)	Description of solution		Brief description of how the User pays the charge via a third party Account Issuer, including EETS Providers. Beyond the rules and conditions set out for EETS, EETS Providers can base their commercial offering to Users on channels and payment means of their choosing.
	Standard road user charges payable	<i>Vehicle category 1</i>	Defines the standard charges (before any discounts) to be paid by vehicles in category 1 under the first solution. The level of charge applicable is for the Toll Charger to determine, but it must not discriminate unfairly against Users who choose a third party Account Issuer. For EETS Providers, this fairness will be checked by the national conciliation body of the country in which the Toll Charger is based, against rules agreed at the European level.
		<i>Repeat the above for each vehicle category included in the scheme</i>	
	Discounted charges (if any)	<i>Discount (a) description of eligibility</i>	Describes the User or vehicle characteristics that define eligibility for this discount.
		<i>Charges payable under discount (a)</i>	A discount could result in no charge, a fixed charge for all vehicle categories, or a percentage reduction from the standard charge for each vehicle category
		<i>Registration requirements for discount (a)</i>	Defines the evidence that must be provided to allow the User to claim this discount. This evidence may be collected by the Account Issuer.
		<i>Repeat the above for each discount type included in the scheme</i>	
	Account Issuer obligations		Brief description of the Account Issuer's obligations and liabilities to the Toll Charger in this solution, and details of any charge exception process that may be invoked by the Toll Charger. For EETS Providers this needs to include user acceptance testing
	Charge collection fee offered		Defines any payment offered by the Toll Charger to the Account Issuer for the service of collecting the charge. This could be e.g. fixed per month or per transaction depending on the commercial arrangements.
	Access fee levied		Defines any payment requested by the Toll Charger from the Account Issuer for the costs of the Toll Charger allowing that solution. This could be e.g. fixed per User per month or per transaction or per Account Issuer depending on the commercial arrangements.
	Charge settlement terms		Describes the arrangements for Account Issuers to make periodic payments to the Toll Charger in respect of charges incurred by their Users (less any collection fee)



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