

DIN EN ISO 17573-1



ICS 03.220.20; 35.240.60

Einsprüche bis 2018-10-17

Entwurf**Elektronische Gebührenerhebung –
Systemarchitektur für fahrzeugrelevante Maut –
Teil 1: Referenzmodell (ISO/DIS 17573-1:2018);
Englische Fassung prEN ISO 17573-1:2018**

Electronic fee collection –
System architecture for vehicle related tolling –
Part 1: Reference model (ISO/DIS 17573-1:2018);
English version prEN ISO 17573-1:2018

Perception du télépéage –
Architecture de systèmes pour le péage lié aux véhicules (ISO/DIS 17573-1:2018);
Version anglaise prEN ISO 17573-1:2018

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2018-08-17 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses Entwurfs besonders zu vereinbaren.

Stellungnahmen werden erbeten

- vorzugsweise online im Norm-Entwurfs-Portal von DIN unter www.din.de/go/entwuerfe bzw. für Norm-Entwürfe der DKE auch im Norm-Entwurfs-Portal der DKE unter www.entwuerfe.normenbibliothek.de, sofern dort wiedergegeben;
- oder als Datei per E-Mail an naautomobil@din.de möglichst in Form einer Tabelle. Die Vorlage dieser Tabelle kann im Internet unter www.din.de/go/stellungnahmen-norm-entwuerfe oder für Stellungnahmen zu Norm-Entwürfen der DKE unter www.dke.de/stellungnahme abgerufen werden;
- oder in Papierform an den DIN-Normenausschuss Automobiltechnik (NAAutomobil), 10004 Berlin, Postfach 8 04 62, Behrenstr. 35, 10117 Berlin.

Die Empfänger dieses Norm-Entwurfs werden gebeten, mit ihren Kommentaren jegliche relevanten Patentrechte, die sie kennen, mitzuteilen und unterstützende Dokumentationen zur Verfügung zu stellen.

Gesamtumfang 60 Seiten

DIN-Normenausschuss Automobiltechnik (NAAutomobil)

Nationales Vorwort

Dieses Dokument (prEN ISO 17573-1:2018) wurde vom technischen Komitee CEN/TC278 „Intelligente Transportsysteme“ ausgearbeitet, dessen Sekretariat von NEN (Niederlande) gehalten wird.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-02-71 GA „Gemeinschaftsarbeitsausschuss NAAutomobil/DKE: Intelligente Verkehrssysteme“ des DIN-Normenausschusses Automobiltechnik (NAAutomobil).

Der Entwurf ist derzeit zur parallelen Umfrage vorgelegt.

Der Normentwurf liefert eine Beschreibung der Architektur zur elektronischen Gebührenerhebung aus Unternehmenssicht. Zusätzlich legt dieser Normentwurf Informationsinteraktionen sowie generelle Informationsobjekte fest und bildet damit die Basis aus numerischer Sicht durch Identifikation numerischer Objekte und deren Schnittstellen.

Nationaler Anhang NA (informativ)

Begriffe

3 Begriffe

Für die Anwendung dieses Dokuments gelten die Begriffe in ISO/IEC 7498-1:1994, ISO/IEC 10746-2, ISO/IEC 10746-3, ISO/IEC 15414 und die folgenden Begriffe.

ISO und IEC stellen terminologische Datenbanken für die Verwendung in der Normung unter den folgenden Adressen bereit:

— IEC Electropedia: unter <http://www.electropedia.org/>

— ISO Online Browsing Platform: unter <http://www.iso.org/obp>

3.1

Kontextdaten

(en: context data)

Information welche vom verantwortlichen Mauterheber festgelegt wurde um eine Mautgebühr für ein Fahrzeug in einem bestimmten Mautgebiet einzurichten und um die Mautübertragung abzuschließen

3.2

elektronische Gebührenerhebung

EFC

(en: electronic fee collection)

Gebührenerhebung mit elektronischen Mitteln

Anmerkung 1 zum Begriff: Die eigentliche Bezahlung (Gebührenerhebung) kann außerhalb eines Mautsystems stattfinden.

3.3

Vollstreckung

(en: enforcement)

Maßnahmen oder Aktionen die durchgeführt werden, um die Befolgung von Gesetzen, Bestimmungen oder Regeln sicherzustellen

Anmerkung zum Begriff: In diesem Zusammenhang: Der Prozess zur zwingenden Einhaltung eines Mautregimes.

3.4

Interoperabilität

(en: interoperability)

Fähigkeit eines Systems, Informationen auszutauschen und die Informationen, die ausgetauscht wurden, vielfältig zu nutzen

BEISPIEL Maut-Interoperabilität bezweckt, dass damit Fahrzeuge durch verschiedene Mautgebiete fahren können und dabei nur eine fahrzeuginterne Einrichtung (OBE) mit nur einem Vertrag eines Maut-Dienstanbieters haben.

3.5

Lokalisierungsverbreitung

(en: localization augmentation)

Information die von der Straßenrand- zur fahrzeuginternen Einrichtung gesendet wird, um die Position für autonome Systeme zur verbreiten

3.6

fahrzeuginterne Einrichtung

OBE

(en: on-board equipment)

Alle notwendigen Einrichtungen im Fahrzeug, um geforderte Funktionen und Kommunikationsdienste für die elektronische Gebührenerhebung (EFC) ausführen zu können

3.7

Straßenrand-Einrichtung

(en: roadside equipment)

entweder stationäre oder mobile Einrichtung entlang einer Straße

3.8

Rolle

(en: role)

Menge von Verantwortlichkeiten

3.9

Nahbereichskommunikation

(en: short range communication)

Mauttechnik, basierend auf Informationsübertragung mittels Funkverbindung zwischen einer Straßenrand-Einrichtung und einer fahrzeuginternen Einrichtung

Anmerkung 1 zum Begriff: Dieses beinhaltet 5.8 GHz DSRC sowie ITS-G5 und RFID.

3.10

Tarifübersicht

(en: tariff scheme)

Menge von Regeln zur Gebührenfestsetzung für ein Fahrzeug in einem Mautgebiet

3.11

Maut

(en: toll)

Gebühr, Steuer oder Verpflichtung, erhoben in Verbindung einer Fahrzeugbenutzung innerhalb eines Mautgebiets

3.12

Mauterheber

(en: toll charger)

legale Instanz die Maut erhebt, um ein Fahrzeug in einem Mautgebiet zu nutzen

3.13

Mauterklärung

(en: toll declaration)

Aussage um die Nutzung eines gegebenen Mautdienstes an einen Mauterheber anzumelden

3.14

Mautgebiet

(en: toll domain)

Bereich oder Teil eines Straßennetzwerks in der ein bestimmtes Mautregime angewendet wird

3.15

Mautregime

(en: toll regime)

Menge von Regeln, einschließlich Vollstreckungsregeln, welche die Erhebung von Maut in einem Mautgebiet regeln

3.16

Mautschema

(en: toll schema)

organsatorischer Blick auf ein Mautregime, inklusiver der Akteure und deren Beziehungen

3.17

Mautdienst

(en: toll service)

Dienst, welcher Nutzern ermöglicht Maut zu bezahlen

3.18

Maut Dienstanbieter

(en: toll service provider)

Instanz, welche Mautdienste in einem oder mehreren Mautgebiet(en) anbietet

3.19

Transportdienst

(en: transport service)

Dienst bezogen auf die Transportinfrastruktur, welcher Nutzer angeboten wird

3.20

vertrauenswürdiges Objekt

(en: trust object)

Informationsobjekt, welches zwischen zwei Einheiten ausgetauscht wird, um gegenseitiges Vertrauen sicherzustellen

BEISPIEL Ein vertrauenswürdiges Objekt kann z. B. eine elektronische Signatur oder elektronisches Zertifikat sein.

— Leerseite —

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Abbreviations and symbols	3
4.1 Abbreviations	3
4.2 Symbols	4
5 The EFC community: roles and objectives	5
5.1 Introduction	5
5.2 Other ITS systems and services	6
5.3 Sensors and actuators, vehicle system and common equipment	6
5.4 Infrastructure sensors and actuators/Infrastructure sourced data	6
5.5 Financial/Commercial systems	6
5.6 Telecommunication systems	6
5.7 Jurisdiction/Authorities	6
5.8 Standardisation and certification bodies	7
5.9 Common Service rights provider	7
6 Roles internal to the toll charging environment	7
6.1 Introduction	7
6.2 EFC domain roles	7
6.3 Interoperability Manager	8
6.3.1 Short description	8
6.3.2 Responsibilities	8
6.4 Toll service provider	9
6.4.1 Short description	9
6.4.2 Responsibilities	9
6.5 User of the service	10
6.5.1 Short description	10
6.5.2 Responsibilities	10
6.6 Toll Charger role	11
6.6.1 Short description	11
6.6.2 Responsibilities	11
6.7 EFC functional roles and responsibilities	12
7 Services	12
7.1 Overview	12
7.2 Services involving toll charger, toll service provider and Interoperability Manager	13
7.2.1 Adding or deleting a new toll charger	14
7.2.2 Adding or deleting a new toll service provider	15
7.2.3 Adding or modifying a toll regime	17
7.2.4 Defining rules	18
7.2.5 Monitoring operations	19
7.2.6 Handling disputes	20
7.3 Services involving the toll service provider and user	20
7.3.1 Providing EFC contract	21
7.3.2 Providing customer care	22
7.3.3 User billing	23
7.4 Services involving the toll charger and toll service provider	24
7.4.1 Collecting transit information (Short Range Communication systems)	24
7.4.2 Collecting charging information (autonomous systems)	25
7.4.3 Payment settlement	26
7.4.4 Exception detection	26

7.4.5	Trust objects exchange	28
7.4.6	Exceptions handling.....	29
7.4.7	Providing local information.....	30
8	The EFC physical architecture.....	31
8.1	EFC architecture in relation to ISO 17427-1	31
8.2	EFC architecture in relation to ISO 21217	32
Annex A (informative) Mapping EFC architecture into the C-ITS architecture		34
Annex B (informative) Information schemata and basic information types.....		37
Annex C (informative) Enterprise objects within roles		43
Bibliography		48

Foreword

This document (prEN ISO/DIS 17573-1:2018) has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematics”, the secretariat of which is held by NEN, in collaboration with Technical Committee ISO/TC 204 “Intelligent transport systems”.

This document is currently submitted for DIS Ballot

This document will supersede ISO 17573:2010.

Introduction

The widespread use of tolling also requires provisions for users of vehicles that are roaming through many different toll domains. Users should be offered a single contract for driving a vehicle through various toll domains and those vehicles require onboard equipment (OBE) that is interoperable with the toll system in the various toll domains. In Europe, for example, this need has been officially recognised and legislation on interoperability already has been adopted (Directive 2004/52).

In addition to specialised standards there is also a further need for a system architecture that:

- provides an architectural “umbrella” for other EFC standards in terms of a common definition of terms and concepts, basic system functionalities, and structure
- provides a common terminology which enables its users
- to improve the quality of specifications to be used in an international market,
- to reduce the risk for conflicting interpretations of specifications (purchaser) and descriptions (supplier),
- to simplify the communication between experts from different continents, and
- to enhance the potential use of other EFC standards;
- defines a common framework, that enables both:
 - identification of potential activities subject to standardization, and
 - maintaining a common and consistent view of the whole area;
- defines the boundaries between the EFC and external domains;
- identifies all architectural objects that lay inside the EFC boundaries;
- provides a basic understanding of EFC, EFC interoperability, and the EFC services being offered.

Toll systems covered by the present document may be used for various purposes including measured distance toll, road segment toll, closed network toll, cordon toll, area toll, time-based toll and collecting fees for the use of bridges, tunnels, ferries, or for parking.

The first edition of the present document was based on a conceptual model defined in ENV ISO 14904. Since then ideas on conceptual models have evolved in several regional projects and implementations, e.g. in Japan and Europe. Those new models have been detailed to a further extent compared to ISO 17573 and are more close to real life implementations. The second edition of the present document is based on these new conceptual models and uses the associated terms and definitions.

Although there are many differences, collecting toll for vehicles can be to some extent compared with collecting fare for public transport. Architectural harmonisation of the collection of fee and fare may be desirable from a policy and from a user point of view. In the past EN ISO 24014-1 *Interoperable Fare Management system - Part 1: Architecture (IFMSA)* prepared by CEN TC 278 WG 3 Public Transport used ISO 17573:2010 as a starting point for their work. This present document has benefited from that and has also taken ISO/FDIS 24014-1 into account.

In this present document the Open Distributed Processing (ODP) standard is used for the description of the architecture.

The ODP standard gives a vocabulary and modelling tools to see the architecture of a system from different perspectives (the viewpoints), in order to cover, e.g., hardware components as well as network protocols or interfaces or roles and general policies of the system itself. This is accomplished using different sets of concepts and terminologies, each one of those expressed as a viewpoint language. A complete description of a real system can only be achieved when all viewpoint models are designed.

This allows for a clear separation of concerns and an easier way to define a system. A brief description of the ODP concepts can be found in Annex A.

In more recent years, the development of concepts and standards in the field of Cooperative ITS (C-ITS, ISO TC204/WG18 and CEN TC278/WG16) led to the definition of a general Enterprise viewpoint architecture for C-ITS (ISO 17427-1) that, by following the same approach of using the ODP architecture to model a complex system, extended the concepts and terms defined by the second edition of the present document to the more general realm of Cooperative ITS.

This third edition of the present document gives a description of the architecture of the toll systems environment from the enterprise viewpoint, by refining and extending what had been already done in the second edition, and using terms and concepts developed in ISO 17427-1. In addition, the present document gives the foundations of the information viewpoint by defining information interactions and general information objects, and gives the basis for the computational view, by identifying needed computational objects and their interfaces. With respect to the second edition, this third edition removes all security requirements on interfaces, which are better and more generally dealt with in EN ISO/TS 19299.

The present document is Part 1 of a multipart standard that is made of the following parts:

- ISO IS 17573-1: Electronic fee collection — System architecture for vehicle related tolling — Part 1: Reference Model (this document)
- ISO/TR 17573-2: Electronic fee collection — System architecture for vehicle related tolling — Part 2: Terminology

- Entwurf -

Electronic fee collection — Systems architecture for vehicle-related tolling —

Part 1: Reference model

1 Scope

The present document defines the architecture of toll system environments in which a customer with one contract may use a vehicle in a variety of toll domains and with a different Toll charger for each domain.

Toll systems conforming to the present document may be used for various purposes including road (network) tolling, area tolling, collecting fees for the usage of bridges, tunnels, ferries, for access or for parking. From a technical point of view the considered toll systems use electronic equipment on board of a vehicle.

From a process point of view the architectural description focuses on toll determination, toll charging, and the associated enforcement measures. The actual collection of the toll, i.e. collecting payments, is outside of the scope of the present document.

The architecture in the present document is defined with no more details than those required for an overall overview, a common language, an identification of the need for and interactions among other standards, and the drafting of these standards.

The present document as a whole provides:

- The enterprise view on the architecture, which is concerned with the purpose, scope and policies governing the activities of the specified system within the organization of which it is a part.
- Terms and definitions for common use in a toll environment
- A decomposition of the toll systems environment into its main enterprise objects
- The roles and responsibilities of the main actors
- Identification of the provided services by means of action diagrams that underline the needed standardised exchanges
- Identification of the interoperability interfaces for EFC systems, to be specified in specialised standards.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 7498-1:1994, *Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model — Part 1*

ISO/IEC 10746-1, *Information technology — Open Distributed Processing — Reference model: Overview — Part 1*

ISO/IEC 10746-2, *Information technology — Open distributed processing — Reference model: Foundations — Part 2*

ISO/IEC 10746-3, *Information technology — Open distributed processing — Reference model: Architecture — Part 3*

ISO/IEC 10746-4, *Information technology — Open Distributed Processing — Reference Model: Architectural semantics — Part 4*

ISO/IEC 15414, *Information technology — Open distributed processing — Reference model — Enterprise language*

ISO 17427-1, *Intelligent transport systems — Cooperative ITS — Part 1: Roles and responsibilities in the context of co-operative ITS architecture(s)*

3 Terms and definitions

For the purpose of this document, terms and definitions given in ISO/IEC 7498-1:1994, ISO/IEC 10746-2, ISO/IEC 10746-3, ISO/IEC 15414 are used. The following terms are defined in the present document.

3.1 context data

information defined by the responsible toll charger necessary to establish the toll due for circulating a vehicle on a particular toll domain and to conclude the toll transaction.

3.2 electronic fee collection (EFC)

fee collection by electronic means.

Note 1 to entry: The actual payment (collection of the fee) may take place outside the toll system.

3.3 enforcement

measures or actions performed to achieve compliance with laws, regulations or rules.

Note 1 to entry: In this context: the process of compelling observance of a toll regime.

3.4 interoperability

ability of systems to exchange information and to make mutual use of the information that has been exchanged.

EXAMPLE Tolling interoperability aims at enabling a vehicle to drive through various toll domains while having only one OBE operating under one contract with a toll service provider.

3.5 localisation augmentation

information sent by the roadside equipment to the onboard equipment to augment the positioning for autonomous systems

3.6 onboard equipment (OBE)

all required equipment on-board a vehicle for performing required electronic fee collection (EFC) functions and communication services.

3.7 roadside equipment

equipment located along the road, either fixed or mobile.

3.8 role

set of responsibilities

3.9

short range communication

tolling technique based on transfer of information via a radio connection between a roadside equipment and an onboard equipment

Note 1 to entry: This includes 5.8 GHz DSRC as well as ITS-G5 and RFID.

3.10

tariff scheme

set of rules to determine the fee due for a vehicle within a toll domain.

3.11

toll

charge, tax or duty levied in connection to using a vehicle in a toll domain

3.12

toll charger

entity which levies toll for the use of vehicles in a toll domain

3.13

toll declaration

statement to declare the usage of a given toll service to a toll charger

3.14

toll domain

area or part of a road network where a certain toll regime is applied

3.15

toll regime

set of rules, including enforcement rules, governing the collection of toll in a toll domain.

3.16

toll scheme

organizational view of a toll regime, including the actors and their relationships.

3.17

toll service

service enabling users to pay toll.

3.18

toll service provider

entity providing toll services in one or more toll domains.

3.19

transport service

transport infrastructure related service which is offered to the user.

3.20

trust object

information object that is exchanged between entities to ensure mutual trust.

EXAMPLE A trust object may be e.g. an electronic signature or an electronic certificate.

4 Abbreviations and symbols

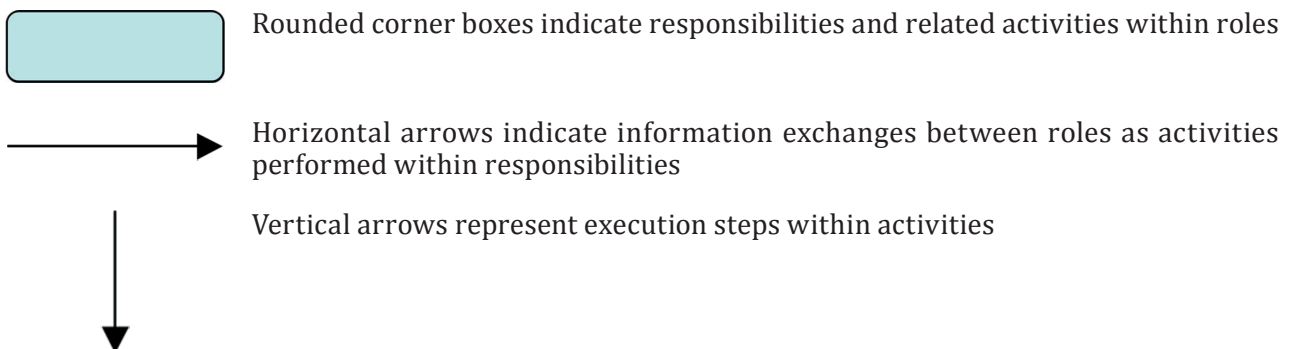
4.1 Abbreviations

For the purpose of this document, the following abbreviations apply throughout the document unless otherwise specified.

CE	Central Equipment
CRM	Customer Relationship Management
DSRC	Dedicated Short-Range Communication
EETS	European Electronic Toll Service
EFC	Electronic Fee Collection
GNSS	Global Navigation Satellite Systems
ID	Identity
IFMSA	Interoperable Fare Management system Architecture
OBUE	On-board Unit
ODP	Open Distributed Processing
RFID	Radio Frequency IDentification
RSE	Roadside Equipment
SLA	Service Level Agreements
SRC	Short Range Communication
TC	Toll Charger
TMS	Traffic Management system
TTP	Trusted Third Party
UML	Unified Modelling Language

4.2 Symbols

In action diagrams, the following graphical conventions apply:





Solid circles represent start of activities



Partially coloured circles represent end of activities



Solid horizontal bars represent decision gates

5 The EFC community: roles and objectives

5.1 Introduction

Electronic Fee Collection is an ITS service supported by Cooperative ITS (C-ITS) enabling the user of a vehicle-related transport service to pay for the transport service, e.g. the use of a tolled road, without manual intervention. The ITS application providing the ITS service will usually be implemented in C-ITS equipment installed in the vehicle, at the roadside and in central systems. In some scenarios, it also includes personal ITS equipment like smartphones. Hence, the EFC service could be described in the context as defined in ISO 17427-1 ITS – Cooperative ITS – Part 1: Roles and responsibilities in the context of Co-operative ITS architecture(s).

The C-ITS architecture can be described by a community of external and internal enterprise objects (ISO 17427-1). For EFC, the community has the objectives of providing an EFC service with its benefits regarding traffic safety, traffic efficiency, comfort and mobility to the EFC service user. External enterprise objects are involved in the provision of the EFC service but are not set up for the sole purpose of EFC. The present document only includes the definition of the internal enterprise objects but the external enterprise objects are shortly described in this clause to give the complete picture of the EFC community. Figure 1 shows the external objects in the EFC community.

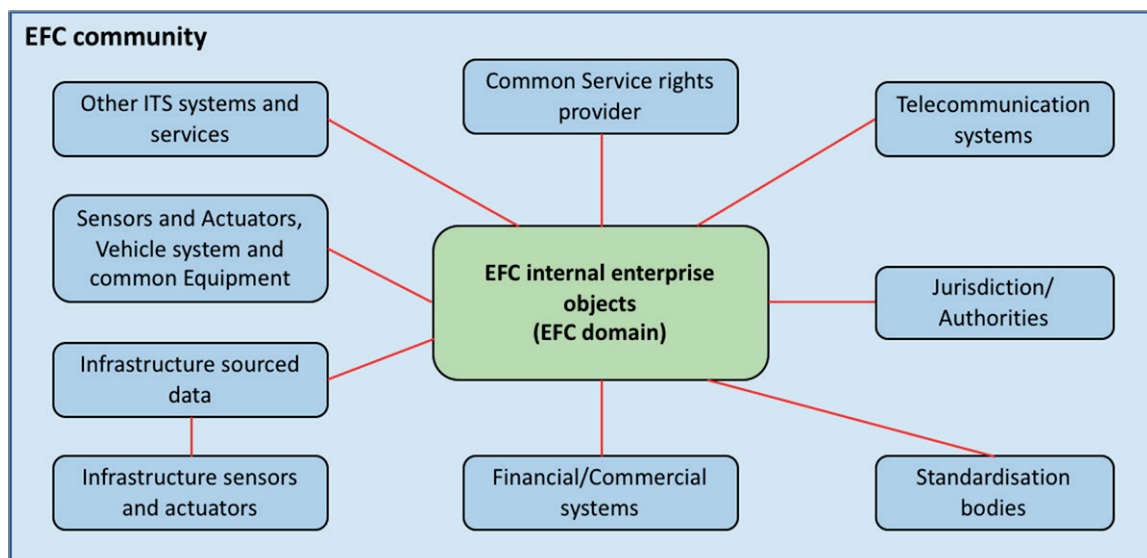


Figure 1 — Enterprise objects in the EFC community

The subclauses that follow give a concise description of each Enterprise object depicted in Figure 1. Detailed responsibilities for roles defined within the Toll Charging Environment are dealt with in Clause 6.

5.2 Other ITS systems and services

An ITS service may build on data provided by other ITS systems and/or ITS services. The EFC internal enterprise domain may for instance receive data from other traffic management and/or information systems as input to road pricing algorithms used in an EFC system.

5.3 Sensors and actuators, vehicle system and common equipment

An EFC domain may use information from vehicle sensors and data stores integrated in the vehicle where the main purposes of the sensor or data store are not related to EFC. The information is retrieved from the sensors and data stores and used for the toll or fee calculation. Examples of such sensors and data stores are GNSS sensors (e.g. in devices used for navigation, fleet management), tachograph, trailer sensor, suspension sensors, axle in use sensors and vehicle related information stored in a secure application module (SAM). The data stores could be either in the vehicle or elsewhere, e.g. a computer installed within the EFC domain.

5.4 Infrastructure sensors and actuators/Infrastructure sourced data

A toll charging environment may use data from environmental sensors, e.g. pollution measurements, for the toll or fee calculation. A dynamic road pricing scheme may for instance use both the pollution measurements from environmental sensors and the data on traffic flows and speeds from a Traffic Management Centre for the dynamic toll or fee calculation. Sensors that are solely installed for the purpose of EFC are defined to be part of the internal enterprise objects.

5.5 Financial/Commercial systems

The functionality requested from financial/commercial systems is to provide the financial services requested by the EFC internal enterprise objects. The services will mainly be transfer of money between entities in the EFC community. It is important to note that the EFC internal enterprise objects handle charging data while the financial/commercial systems handle payment information ('money').

The present document makes a strict distinction between the payment (financial) domain supporting the EFC domain and the charging domain within the EFC domain itself. Only the charging in the EFC domain is covered by the present document.

5.6 Telecommunication systems

The functionality requested from the telecommunication systems is to provide telecom services requested by the EFC domain. Examples of such services could be cable network for transfer of data between the operators of the EFC internal enterprise objects and air-interface network for transfer of data between the EFC charging equipment and the On-Board Equipment.

5.7 Jurisdiction/Authorities

The responsibilities of the external enterprise object called Jurisdiction/Authorities is to define the framework in which a EFC domain shall operate. The framework is defined by policies constituting of laws and regulations, mandates, constraints and requirements. Different authorities define different policies:

- Road and Transport Authorities, e.g. a Department of Transport, may define policies related to the type of and availability, reliability and quality of the transport service subject to a toll or fee. The authorities may also, in co-operation with the financial authorities, define policies for tariffing principles to be used in an EFC domain. The authorities may also, in co-operation with the financial authorities, define the policies that govern the configuration of the EFC enterprise objects and assignment of roles to enterprise objects as well as the environment contracts that govern the system. An example here would be that the authorities define the policy which is basis for the contract between an operator taking the role of issuing EFC contracts and the operators taking the toll charging roles.