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and Water Management



RDW

Heavy Goods Vehicle Charge

Design

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Colophon

Ministry Administrative core and Division
Toll charging RDW

Program management Heavy Goods
Vehicle Charge and Temporary Tolling
Blankenburg and ViA15

The Hague/ Veendam

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Table of contents

1	Introduction.....	7
	Purpose of the document.....	7
	Structure of the document.....	7
	Document relationships.....	8
2	Policy Principles.....	9
	Policy objective.....	9
	The system in brief.....	9
	Geographical scope.....	9
	Person liable for payment and exemption	11
	Tariff determination and differentiation	11
	Conditions.....	12
	Weighing criteria.....	13
3	Architectural Framework & Principles	14
	NORA.....	14
	IWEA	14
	Security and management	15
4	Design Choices.....	16
	Introduction	16
	Design choices following the coalition agreement.....	16
	Design choices in the policy framework phase	16
	Design choices in the design phase	16
	Background design choices	17
	Mileage registration and payment	17
	Supervision and enforcement	18
	Organization of implementation	19
	Guidelines and standards.....	19
	Sourcing strategy.....	21
5	Market & Organisational Model	22
	Domains in the Heavy Goods Vehicle Charge system	22
	Division of roles within the Heavy Goods Vehicle Charge system.....	23
6	Business Architecture.....	28
	Scenario's.....	28
	Service provider-dominant scenario.....	28
	Supervision & Enforcement	29
	Business Functions Model Heavy Goods Vehicle Charge – Level 1	30
	Primary Functions	31
	Secondary Functions.....	31
	Business Functions Model Heavy Goods Vehicle Charge - Level 2	32
	Registration Position Movement	33
	Public Communication	35
	Observation	36
	Supervision & Control	37
	Enforcement.....	38

7	System- & Information Architecture	40
	Locations in the system landscape.....	41
	Information Delivery Services & Systems.....	42
	Information Processing Services.....	42
	Information Reception & Post-processing Systems	42
	System Landscape Heavy Goods Vehicle Charge	43
	Information Delivery	44
	Information Processing	46
	Information Provision and post-processing systems.....	49
8	Security & Privacy	50
	Security	50
	Privacy	51
9	Future-Proofing.....	52
	On-Board Equipment.....	52
	Smartphones	52
	Emergency Solution & Route Ticket	53
	Fleet management system	53
	On-board diagnosis "dongle".	53
	Connected Vehicles.....	54
	Enforcement without DSRC	54
	Smart Tachograph	55
	Suppliers of interoperability hubs	55
A	Appendix: Definitions and Abbreviations	56
	Definitions.....	56
	Abbreviations.....	62

1 Introduction

The Rutte III coalition agreement stipulates that, following the example of neighboring countries, a Heavy Goods Vehicle Charge will be introduced as soon as possible. In consultation with the sector, the revenue from the levy is channeled back to the transport sector by reducing the motor vehicle tax on lorries and applies to innovation and sustainability.

The process of introducing the Heavy Goods Vehicle Charge has three phases. In the first phase, goals and principles are laid down in the Heavy Goods Vehicle Charge policy framework, which are used in the drafting of the law. The starting points concern the scope of the charge, the tariff level and tariff differentiation, the enforcement, the organization of implementation and the spending directions for innovation and sustainability of the transport sector. The preparation of the implementation of the levy has been linked in parallel with the legislative process in the second phase.

In 2018, the first phase started with, among other things, a global design. This document is part of the second phase, the phase in which the realization of the levy is prepared. Based on validation and analysis, KASEA has developed the Preliminary Design 1.1 – iteration 2 – (CIO update) and the Preliminary Design 1.1 – iteration 3 (BIT review), into the Design 0.99 which has been transferred to the RDW and rounded to the 1.0 version that can be shared for further external review and dissemination.

Purpose of the document

A policy framework was drawn up in 2018, which forms the policy starting point for the legislation and for the implementation of the system.

This document provides the technical explanation of the policy framework and the baseline for the further development of the system. In this context, design must be understood in the broad sense of the word, it includes both the functionally technical and policy definition of the desired solution for the charging system.

The technical design of the redistribution of the revenues has not been taken into account in this Design.

Structure of the document

This document is structured as follows: Chapter 2 deals with the policy principles of the Heavy Goods Vehicle Charge system, as they are also included in the Heavy Goods Vehicle Charge Act. The architectural frameworks and principles used are described in Chapter 3. Chapter 4 describes the design choices.

Chapter 5 then describes the market and organisational model of the levy. Among other things, it highlights the roles and responsibilities of various public and private parties.

Chapter 6 describes the Business Architecture with the Business Functions Model and the main processes.

Chapter 7 shows the Information and System Architecture. The corresponding functional and technical requirements are not expressed in this document, but are separately included in Relatics as a management environment for customer and system requirements.

Chapter 8 describes the aspects related to Security and Privacy. This chapter is limited to the general description. The elaboration of the security is laid down in a separate document (SIA) in which an analysis of threats, the risks, the measures and the requirements are included. The privacy aspects are also described in a separate document (PIA).

Chapter 9 provides insight into the relevant future developments and the relationship with the Heavy Goods Vehicle Charge system.

Annex A contains an overview of definitions and abbreviations.

Document relationships

The figure below shows the relationships between documents that have formed the basis of the design or where there is a clear interaction with the design. The policy framework and the architectural blueprint were born from the coalition agreement and the experiences from abroad. These documents were first shared with the parliament.

Through various research and advisory reports, a good interpretation of the organization and the use of the market was made. At the same time as the Heavy Goods Vehicle Charge Act was developed, the EETS Implementation Act was created. This legislation made the policy choices that were previously made possible.

The design serves as a basis for further detailing in the field of information and process descriptions, project start architectures and technical solution architectures. The design is also input for project and realisation plans.

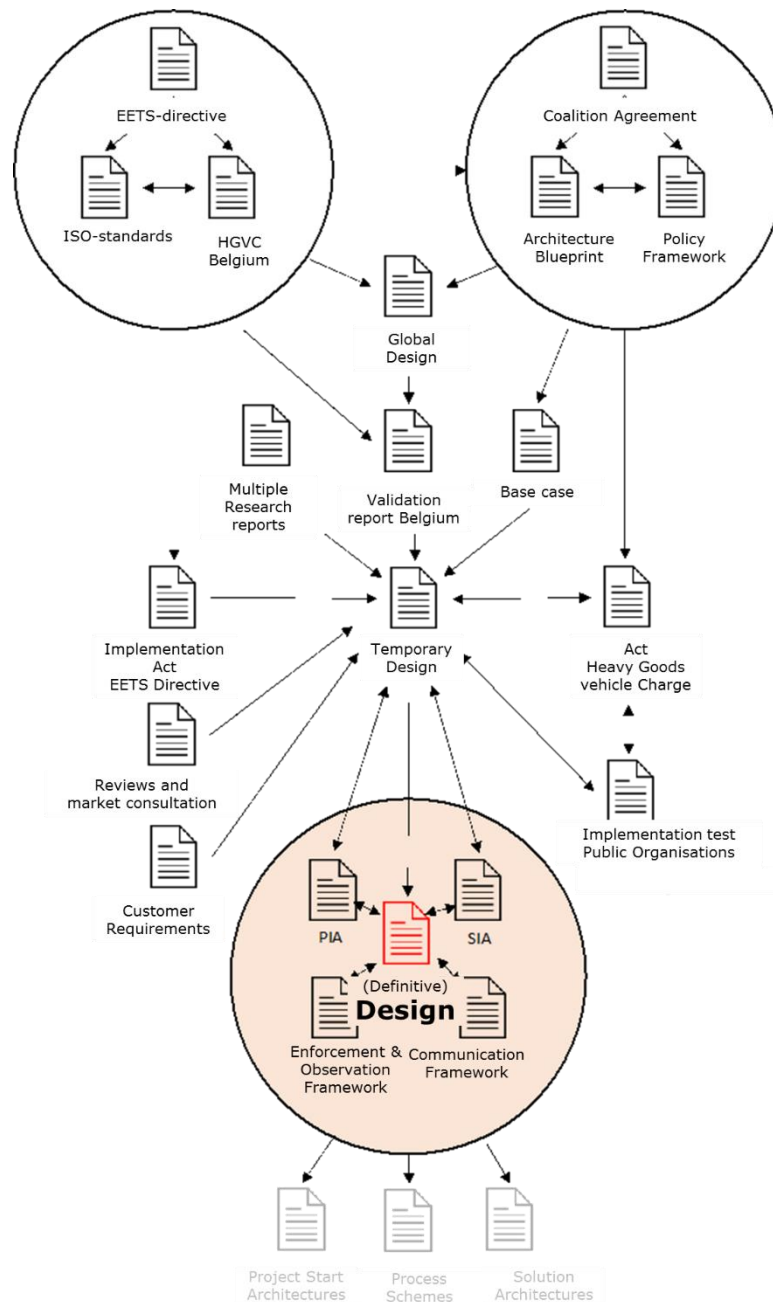


Figure 1: Relationships with other documents

2 Policy Principles

This chapter describes the policy principles for the Heavy Goods Vehicle Charges system.

Policy objective

With the Heavy Goods Vehicle Charge, the government aims to achieve the following objectives:

- To make domestic and foreign freight traffic pay for the use of the road, by converting a fixed tax (motor vehicle tax and Euro vignette) into a variable levy whereby payment is made per kilometre driven. For example, freight traffic will pay more for the use of the road than it does now.
- Innovating and making the Dutch transport sector more sustainable. In the coalition agreement (Rutte III) it has been agreed that revenues from the Heavy Goods Vehicle Charge will be channeled back to the transport sector in consultation with the sector by, in addition to reducing the motor vehicle tax on trucks, allocating funds for innovation and sustainability.

The introduction of a Heavy Goods Vehicle Charge and the investments in innovation and sustainability will contribute to the CO₂ reduction task for transport included in the coalition agreement (Rutte III) and the desire to achieve a smart and sustainable transport system.

The system in brief

The Heavy Goods Vehicle Charge Act means that the Minister of Infrastructure and Water Management is the Toll Charger of a Heavy Goods Vehicle Charge per kilometre driven, the height of which depends on the maximum mass and emission class of a Truck.

The levy applies to holders of domestic and foreign motor vehicles intended for the transport of goods (Trucks) with a maximum permissible mass of more than 3,500 kg. Semi-trailer tractors of which the towing Vehicle has a maximum permissible mass of less than 3,500 kg but with towed Vehicle if the assembly has a maximum permissible mass of more than 3,500 kg (BE tractors) are also covered by the Heavy Goods Vehicle Charge.

This is the same rule as in Belgium. The Heavy Goods Vehicle Charge is levied on road sections, i.e., specific roads or part thereof, as indicated in an annex to the Act.

Geographical scope

The starting point was that the Heavy Goods Vehicle Charge would be levied on all motorways and roads on which substantial diversion was expected to take place as a result of a charge on the motorways.

The road network to be priced has been chosen in such a way that roads on which freight traffic is expected to divert have been added to the road network as much as possible.

As in Belgium and Germany, it was also examined whether roads are suitable for accommodating extra freight traffic (capacity and road safety). If in practice it appears that there is some diversion to non-designated roads, measures will be taken.

For this purpose, freight traffic will be monitored after the introduction of the Heavy Goods Vehicle Charge. In urgent cases, a fallback route can be quickly included in the road network to be priced via the emergency regulation.

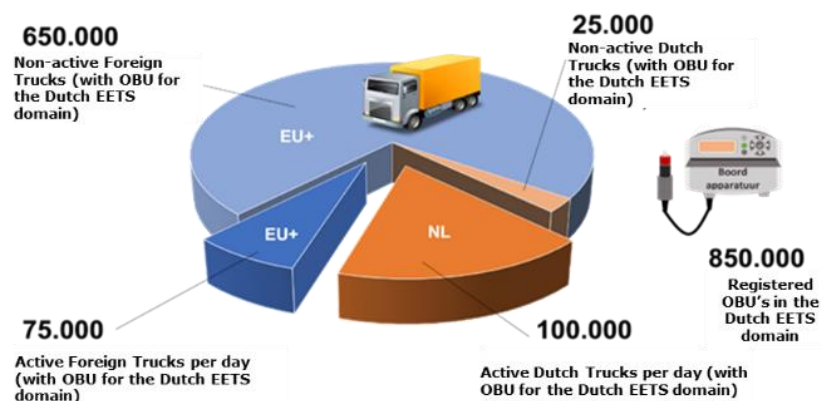


Figure 2: Number of active and inactive taxable trucks in the Netherlands on an average day (indicative)



Figure 3: Roads subject to the charge

The following road sections are included in the Heavy Goods Vehicle Charge Act:

- All motorways (A-roads), with two exceptions because these are 'separate' roads that do not connect to the rest of the motorway network. These are the A31 (approximately 18 km) in the province of Friesland and the A270 (approximately 3 km) in North Brabant.
- Roads on which divergent freight traffic of substantial size is expected to arise if only motorways are charged. This applies in particular to N-roads and some municipal main roads, especially in the middle and south of the Netherlands.

Person liable for payment and exemption

The Heavy Goods Vehicle Charge is levied from the Holder of a Truck. This concerns vehicles with a Dutch or foreign registration. In principle, the Holder is the person in whose name the Truck is registried in the vehicle registration.

The term Truck covers vehicles or combinations of vehicles intended or used for the carriage of goods by road, the maximum permissible mass of which exceeds 3,500 kilograms.

These are all lorries of categories N2 (with a maximum permissible mass exceeding 3,500 kg) and N3, referred to in Article 4(1)(b)(ii) and (iii), in conjunction with Annex I to Regulation (EU) 2018/858, but also the so-called BE tractor of category N1 of that Annex, of which the semi-trailer tractor has a maximum authorized mass not exceeding 3,500 kg. The BE tractor falls under the category of semi-trailer tractor referred to in Article 1.1 of the Vehicles Regulation. The BE tractor, like the other trailer tractors, has body code BC and is recognizable as such in the vehicle registration registry.

BE tractors – i.e. vehicles that can be driven with a BE driving license are vehicles consisting of two parts with a coupling device and together forming a unit, which together have a maximum permissible mass of more than 3,500 kg and which, by their nature, are intended for the transport of goods. See also the article-by-article explanation of Article 1 of the Act, which deals with the concept of Truck.

The law contains an exemption or a possibility to grant an exemption for certain trucks.

Holders of defense vehicles, of Trucks with dealer license plates, of lorries that are limited speed motor vehicles and of Trucks used as garbage trucks, street sweepers or sewer vacuum cleaners are exempted. Holders can get an exemption for Trucks:

- These are used by police, fire brigades.
- Which were first permitted at least forty years ago and insofar as they are not used commercially.

The exemptions and exemptions concern heavy goods vehicles that may be exempted based on the Euro vignette Directive and are in line with the exemptions provided for in the Motor Vehicle Tax Act 1994.

It replaces Directive 2004/52/EC of 29 April 2004 on the interoperability of electronic road toll systems in the Community and Commission Decision 2009-750/EC of 6 October 2009 defining the European electronic toll service and its technical components.

It should be noted that according to the proposed amendment to the Euro vignette Directive (which may be adopted in 2022), the mandatory differentiation based on Euro emission class will be replaced by a differentiation based on the CO₂ emission class.

Belgium has a differentiation based on euro emission class, weight and location (per region). See article 2.4.4.0.2 of the Flemish Tax Code.

Germany applies a weight-based differentiation in combination with the number of axles and euro emission class (Annex 1 to the "Gesetz über die Erhebung von streckenbezogenen Gebühren für die Benutzung von Bundesautobahnen und Bundesstraßen, Bundesfernstraßenmautgesetz – BFStrMG").

Tariff determination and differentiation

The Heavy Goods Vehicle Charge to be charged is determined on the basis of the number of Kilometres recorded on the Road sections designated by law.

The amount of the levy (rate) in the law is differentiated on the basis of weight class of (the combination of) the Truck (and the trailer) and the environmental characteristics (Euro emission class). The Euro vignette Directive requires differentiation on the basis of euro emission class, subject to certain derogations not applicable. The Netherlands is free to make a distribution by weight class. The classification for tariff differentiation is in line with the system of Belgium.

For the differentiation on Euro emission classes, the maximum permitted ratio between the tariff for EURO-0 and EURO-VI vehicles under the Euro vignette Directive has been chosen. The Law uses the maximum variation permitted by the current Euro vignette Directive and has chosen to have the rate for EURO-VI Vehicles and cleaner be half the rate for EURO-0. This contributes to the use of cleaner trucks.

See Article 5 of the Heavy Goods Vehicle Charge Act for the rate per kilometre driven. In order to prevent inflation from reducing the real size of the revenues from the Heavy Goods Vehicle Charge, the law provides for the tariffs to be indexed annually (as of 1 January).

Conditions

Interoperability of neighboring countries

The European Directive 2019/520 (of 19 March 2019 on the interoperability of electronic road toll systems and facilitating the cross-border exchange of information on non-payment of road fees in the Union (hereinafter also referred to as the EETS Directive) requires the Heavy Goods Vehicle Charge system to be designed to be as interoperable as possible with the systems in neighboring countries. This reduces the administrative burden on the sector and minimizes disruption to the free movement and transport of people and goods.

No extra equipment in trucks

The Rutte III coalition agreement states that no additional equipment should be required for trucks, so that the transport sector does not experience an unnecessary increase in burdens. This means that the On-Board Equipment that is already present in a Truck must also be able to be used in the Dutch system. This is only possible with On-Board Equipment from EETS providers.

Admission of multiple service providers

According to the EETS Directive, so-called EETS providers must be authorized in a non-discriminatory manner, without prejudice to the possibility of setting up a so-called Main Service Provider (MSP).

This creates a model in which multiple Service Providers can be active. These Service Providers make it possible to use multiple European toll roads with one On-Board Device. This means, for example, that the EETS providers operating in the Belgian and/or German system must also be authorized in the Netherlands, if they meet the conditions.

EETS providers must (in order to qualify as EETS providers) comply with the conditions set out in the EETS Directive (2019/5201 EU) and thus be registried and accredited by Toll Chargers as EETS providers in the Member State where they are established. The Directive requires EETS providers to conclude EETS agreements for all EETS domains in the territory of at least four Member States within a period of 36 calendar months of their registration, requiring them to conclude such agreements only for all EETS domains in a given Member State during the first 24 calendar months.

Detection of On-Board Equipment

Allowing On-Board Equipment means that this On-Board Equipment must be able to be detected and read for control and enforcement purposes. The system uses the European CEN standard 5.8 GHz DSRC (short-range communication) as a communication channel between On-Board Equipment and Roadside Equipment. From a technical perspective, this will enable the Dutch

Roadside Equipment to communicate with On-Board Equipment from Service Providers.

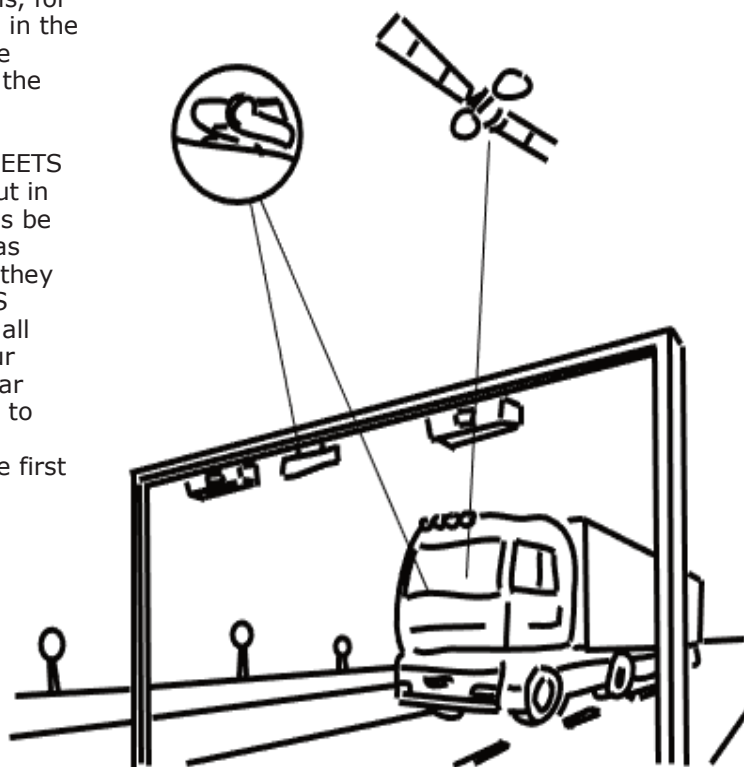
Use of satellite-based position technology (GNSS) and On-Board Equipment

The EETS Directive states that all new electronic toll systems requiring On-Board Equipment to be installed for use must be based on one or more of the following technologies:

- Satellite positioning (GNSS).
- Mobile communications.
- 5.8 GHz microwave technology (DSRC).

For the Heavy Goods Vehicle Charge, a GNSS based system is the most appropriate, due to the density of the entire Dutch road network, the required coverage of the toll network and the flexibility to add roads. This system is also in line with the coalition agreement (Rutte III) which states that the registration and payment system will be the same as that in neighboring countries.

Both the Belgian and German registration systems are based on the global navigation satellite system (GNSS) for determining location, time, direction of travel and movement.



Weighing criteria

For the introduction of the Heavy Goods Vehicle Charge, the focus is on the timely realization of a reliable charging system that is cost-efficient, manageable, flexible and user-friendly. Furthermore, the charging system will be developed in such a way that there will be as few undesirable effects as possible on, for example, road safety and the Dutch competitive position.

These criteria can work against each other in certain cases. If maximum flexibility is chosen, this can, for example, lead to higher implementation costs.

In any case, the following criteria will be used:

1. Timely: the aim is to implement the Heavy Goods Vehicle Charge system as soon as possible.
2. Reliable: The Heavy Goods Vehicle Charge system must provide sufficient assurance that every Kilometre driven is reliably collected.
3. Cost-efficient: the formulated objectives must be implemented as efficiently as possible at the lowest possible investments and operational costs over the lifetime of the system.
4. Manageable: the extent to which the road charging system can be controlled, managed, and adjusted so that the system continuously meets the requirements set for it.
5. Flexible: the system must be flexible enough so that parameters (such as tariff by location, direction of travel or vehicle characteristics) can also be adjusted after introduction.
6. User-friendly: it takes little effort for the user to meet the obligations of the Heavy Goods Vehicle Charge.

3 Architectural Framework & Principles

This chapter describes a number of architectural standards relevant to the Heavy Goods Vehicle Charge.

In order to be able to use proper guidance and quality control within the program, the proven architectural approach of the policy-responsible ministry was chosen, namely the I&W Enterprise Architecture.

The I&W Enterprise Architecture (IWEA) fills the gap between the (national) government-wide frameworks and the more concrete frameworks necessary for the realization of the various organisational units of the Ministry of Infrastructure and Water Management (I&W), including the Heavy Goods Vehicle Charge program, with a set of guiding principles – rules of the game – at the level of the Ministry of Infrastructure and Water Management (I&W). The architecture in IWEA uses a division into 'layers'. This classification is based on a combination of the formats used by NORA (Dutch Government Reference Architecture) and TOGAF (The Open Group Architecture Framework). This combination offers the possibility to incorporate the principles into a compact and clear whole.

NORA

The ten basic principles of NORA describe the main desired characteristics of public service from the perspective of the customer (the 'what'). The principles do not lay down anything about how these characteristics are to be achieved (the 'how').

The basic principles are mainly guiding and offer room for interpretation. In specialist NORA documents, these basic principles are translated into guidelines and best practice examples.

As indicated above, the principles are mainly focused on public service provision, and in the context of Heavy Goods Vehicle Charge they mainly give direction to the primary government tasks (Heavy Goods Vehicle Charge and enforcement):

- Proactive: Users get the service they need.
- Findable: Users can easily find the service.
- Accessible: Users can easily access the service.
- Standard: (Basic principle) Users experience uniformity in service through the use of standard solutions.
- Bundled: Users are offered related services bundled.
- Transparent: Users have access to information relevant to them.
- Necessary: Users are not confronted with unnecessary questions.

- Confidential: Users can rest assured that information will not be misused.
- Reliable: Users can be confident that the Service Provider adheres to agreements.
- Admissible: Users can provide input about the service.

IWEA

Not all architectural principles within IWEA are directly relevant to the design of the Heavy Goods Vehicle Charges system, but a number of principles certainly apply to the design of the solution. The relevant IWEA principles are listed below.

1. We coordinate with our stakeholders in the execution of our tasks.

Rational

The society expects in all its parts and all its involvement that a government organization such as the Ministry of Infrastructure and Water Management ensures that the work is carried out in mutual coordination with all stakeholders. In order to ensure the day-to-day functioning of the networks, projects and programs require close coordination with the environment. 'Environment' in this context means the totality of stakeholders, stakeholders and facilities.

Because there is more and more cooperation with external parties, such as fellow governments and market parties, mutual coordination is becoming increasingly important.

By means of stakeholder management, it is organized that all parties involved in change processes have been able to contribute on time.

Implications for the design of the Heavy Goods Vehicle Charges system

In the Netherlands, regular coordination with all parties involved in the chain is a prerequisite. This concerns, for example, market parties, road authorities and the transport sector.

2. Tasks, responsibilities and powers are clearly, unambiguously defined and known.

Rational

The Ministry of Infrastructure and Water Management has an organization in which policy, implementation and inspection are interconnected and supported by business operations, policy and governance support and an extensive knowledge infrastructure. It is important that everyone contributes to the result from their own role. Optimal collaboration, clear and short control lines, standardized work processes and bundled tasks help with this.

Responsibilities are invested as low as possible in the organization. Cooperation parties, clients, contractors, and other partners expect the Ministry of Infrastructure and Water Management to adopt a professional, expert approach to the execution of the tasks.

Implications for the design of the Heavy Goods Vehicle Charges system.

The design provides clear insight into the roles and responsibilities required for the design of the entire Heavy Goods Vehicle Charges chain. This is based on European standards and on the experiences from, among others, the Belgian Heavy Goods Vehicle Charges system. In Belgium there is an organization in which everyone contributes to the result from their own role.

3. Reuse comes before buying; buying goes for 'having it made'.

Rational

If it is necessary to purchase systems or have them built, existing solutions in the market are first looked at.

Implications for the design of the Heavy Goods Vehicle Charges system.

The starting point is delivery by market parties. In those areas where the specific characteristics such as the laws and regulations, data models and process agreements of the Dutch Heavy Goods Vehicle Charge system are applicable, adaptability to the Dutch situation and existing solutions within the implementing organizations is required. The futureproofing of the system must be guaranteed here. An over-reliance on a 'one size fits all' market solution and a 'vendor lock-in' must be avoided. Control over the data model, rules and process flow is a requirement for these components.

Security and management

IWEA has the following security and management principles:

- Security is based on risk assessment.
- Security is close to what is to be secured.
- Security is easily accessible.
- Management and security are integrally included in the design of the facilities.
- Changes to the provision of information take place in a release-based and structured manner.

The principles of security and management apply unabated to the design of the Heavy Goods Vehicle Charges system. In particular, the security of the communication between the On-Board Equipment and the various information systems requires the necessary attention. The use of digital, vehicle-related identity verification is an important aspect.

A separate document (the Security Impact Assessment, SIA) describes in detail the requirements for the Heavy Goods Vehicle Charge system as a whole and for the various organisational units and systems in particular.

The SIA is established based on the following methods and standards:

S.T.R.I.D.E.

- Standard for risk analysis.

NIST Cyber Security Framework

- Industry standard framework cybersecurity, a collection of many other industry standards.

ISA/IEC-62443 (ISA-99)

- Industry standard framework cybersecurity specific to non-standard IT components.

NEN-EN-ISO/IEC 27001:2017

- Industry standard framework of cybersecurity standards.

ISO/TS 19299:2015

- Cybersecurity framework for electronic toll collection
- Definition of a trust model.
- Basic principles for establishing a relationship of trust between stakeholders.
- Security requirements; Security measures - countermeasures.
- Security specifications for interface implementation.
- Addition to existing security requirements
- Key management; Describes the set-up of (security) key management and the exchange between stakeholders with different operational procedures such as key renewal, certificate revocation.

Baseline Information Security Government (BIO)

- Framework of standards for information security within the Dutch government.

4 Design Choices

Introduction

Relevant choices that have determined the contours of the system design and the corresponding division by roles, responsibilities, and tasks.

Design choices following the coalition agreement

- Maximum use of EETS Service providers
- Compliance with European directives and standards
- Connection to architectural standard Electronic Toll Collection - ISO 17573
- Use of satellite-based positioning (GNSS).

Design choices in the policy framework phase

- Optimal use of the market and Belgian example (Market unless and Belgium unless)
- Clear separation of responsibilities between the public Toll Charger and private service providers
- Division of tasks of Toll Charger tasks in the public domain
- Reuse goes before buying; buying goes before having it made
- The government is responsible for data protection and the knowledge of the data associated with the assigned tasks in the government domain.

Design choices in the design phase

- Use of a Main Service Provider
- Functional division into enforcement tasks (Observation, Supervision & Control, and the actual Enforcement)
- The execution of the Toll Charger tasks invests in one implementing organization
- Separation of policy and implementation; the role of the Ministry and the Implementing Organizations.

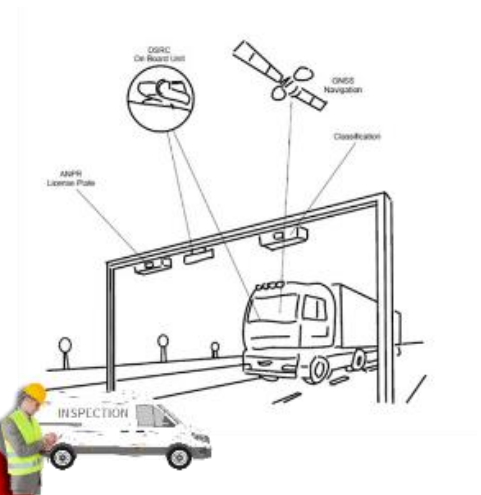
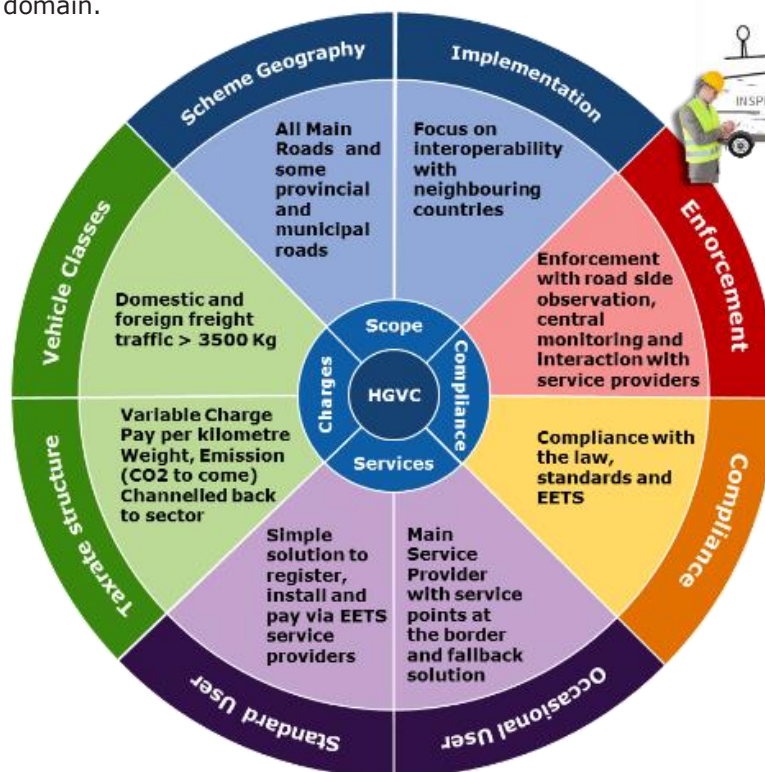


Figure 4: Design circle. Main features of the Heavy Goods Vehicle Charge System.

Background design choices

Coalition Agreement Rutte III

The Rutte III coalition agreement stipulates that the registration and payment system to be introduced for the Heavy Goods Vehicle Charge will be the same as in neighboring countries, so that no additional equipment is required for lorries.

EETS Directive Implementation Act

On 19 October 2021, the Implementation of the EETS Directive Act entered into force. Under this law, EETS providers (independent, private toll service providers operating in several European Member States) must be authorised for the registration and collection of the Heavy Goods Vehicle Charge.

Mileage registration and payment

The starting point of the EETS Directive is "one OnBoard Unit, one contract, one invoice" for toll areas in multiple countries.

The registration of the kilometres driven takes place with the help of On-Board Equipment, which is made available by service providers.

Service providers take care of the registration of the kilometres driven, the invoicing and the collection of the charge.

Because the invoicing and payment of the Heavy Goods Vehicle Charge takes place via the service providers, payment, and recovery by means of an order (administrative) would lead to undesirable complications for the execution and for the judicial process.

By driving a truck on a road on which the Heavy Goods Vehicle Charge applies, an administrative debt is created that is collected without a decision through private law collection and payment.

The holder concludes a service agreement with a Service Provider and the Minister concludes agreements with service providers.

Payment from a holder to a Service Provider is considered as payment of the payment obligation to the Minister.

Service providers have an independent obligation to pay to the Minister. In this way, service providers guarantee the payment of the registried kilometres of their customers.

In addition to EETS providers, a Main Service Provider is used. The Main Service Provider is obliged to accept everyone as a customer, for holders who, for various reasons, are unable or unwilling to conclude a service agreement with an EETS provider.

All vehicles subject to charges must have working On-Board Equipment when travelling on public roads, including on roads outside the charging network. This was chosen for ease of use, preventing diversion to the underlying road network and to make it technically possible to quickly add roads.

Holders receive the On-Board Equipment on loan from their Service Provider and pay a deposit to the service provider.

On-Board Equipment from EETS providers can also be used abroad, On-Board Equipment of the Main Service Provider only in the Netherlands.

In the event of notification of defective On-Board Equipment, the truck in question is excluded from any fines due to non-working On-Board Equipment for a period to be determined.

After the entry into force of the law, the EETS domain statement (a kind of general terms and conditions) for EETS providers will be published and the accreditation of EETS providers can be started.

In parallel, the Main Service Provider is tendered.

The number of EETS providers in Europe is growing steadily.

In Belgium and Germany, the market share of EETS providers is increasing at the expense of the market share of the Main Service Provider.

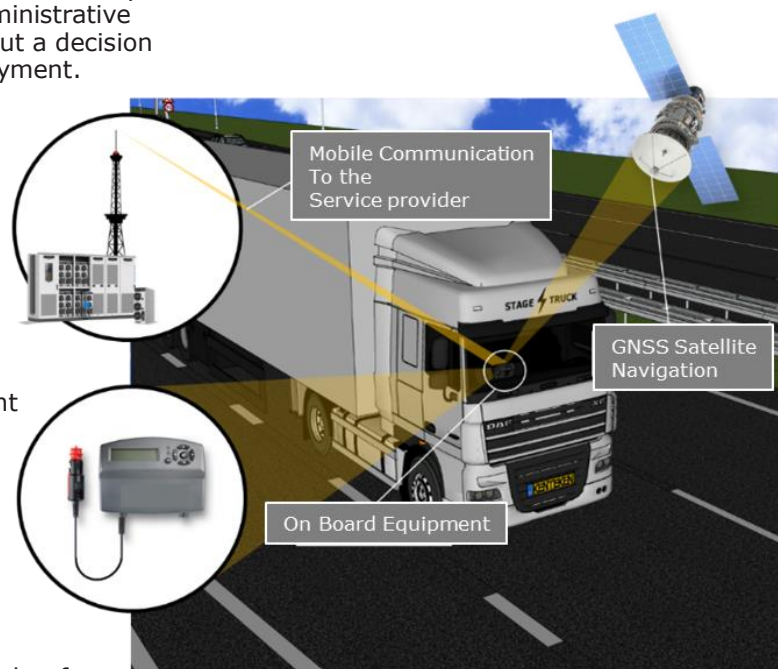


Figure 5: GNSS and On-Board Equipment

Supervision and enforcement

Enforcement is crucial to ensure sufficient certainty that is collected for every kilometre driven. Enforcement is therefore aimed at both promoting payment morale (preventive effect) and tackling offenders (corrective effect).

The government tries to promote payment morale with targeted communication so that truck owners are aware that they are liable to pay and is intended to prevent as few fines as possible from being imposed. For example, prior to the start of the levy, targeted national and international information for the transport sector will be set up.

The law is enforced with a combination of administrative and physical enforcement in the form of the goal of keeping the truck stationary. The measures will increase from light measures with (relatively) few consequences for the license plate holder – such as administrative fines – to more severe measures with more far-reaching consequences such as the detention of vehicles. These more severe measures will only be applied if the fine for stopping is not paid.

Germany and Belgium have a similar combination of administrative and physical enforcement by carrying out road checks.

The law stipulates that administrative fines can be imposed in the event of violations and that interim measures, such as the possibility of transferring the vehicle, can be used.

For the amount of the fines, we looked at the surrounding countries.

In the implementation, sufficient fixed and mobile roadside equipment, such as ANPR cameras and DSRC equipment, will be placed to ensure that there is a conclusive network of surveillance. This supervision is carried out by RDW.

In addition to administrative supervision, there is also physical supervision in the form of carrying out roadside checks.

For enforcement, this is also both administrative and physical.

The starting point for imposing fines is that fines are sent by the CJIB. For license plates issued in the Netherlands, you can look at the name and address details in the vehicle registration. For license plates from EU/EEA countries, the name and address details can be retrieved via the Eucaris software application based on the EETS implementation act. The collection of the fine can also be transferred to those countries. No fine can be sent for vehicles from other countries and enforcement takes place physically by keeping vehicles stationary.

For both physical supervision and physical enforcement, the Human Environment and Transport Inspectorate (ILT) is responsible for these tasks.

The law does not provide for separate criminal sanctions. The offences, such as computer breach (hacking of On-Board Equipment), are already covered by the Criminal Code. The Public Prosecution Service therefore has sufficient basis to be able to act against manipulation of On-Board Equipment.

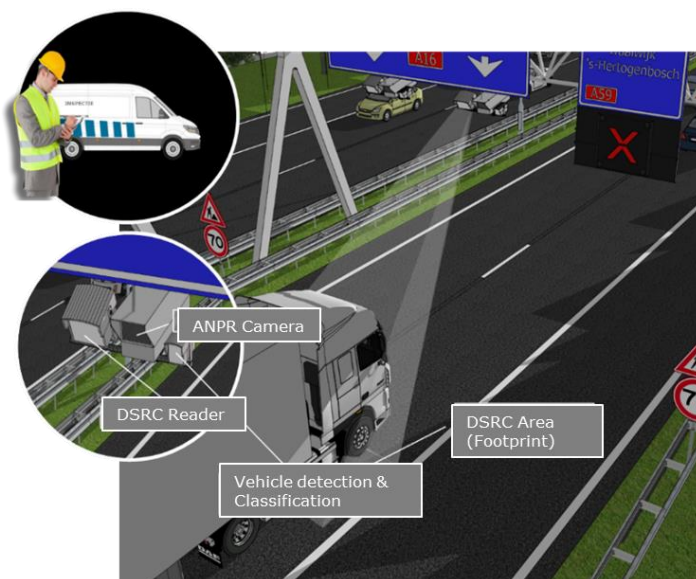
The amount of the fines is related to the type of violation:

1. Driving with On-Board Equipment that does not work properly
2. Driving with On-Board Equipment that is not turned on
3. Driving without a valid service agreement.
4. Driving without On-Board Equipment belonging to the Truck for which a valid service agreement has been concluded.

The compliance rate in neighboring countries, as in other European countries, is around 99%. We use this as a standard for the elaboration of compliance and enforcement supervision. We achieve this by means of fixed and mobile observation equipment.

The aim of the observation is to observe 95% of transit traffic and to achieve a control intensity of once every 100 kilometres. This aims for a control probability of 84%. These percentages are based on the experience of Belgium.

In addition, there is movable observation equipment that is complementary to the fixed observation equipment and is aimed at increasing the perceived chance of being caught.



Organization of implementation

Existing public parties, together with the Ministry of Infrastructure and Water Management, will take on the implementation tasks of the Heavy Goods Vehicle Charge: RDW, ILT, CJIB and RWS.

The bill that preceded the Heavy Goods Vehicle Charge Act has been tested by the intended contractors RDW, CJIB, ILT and RWS. Partly based on the insights that have emerged from this, the division of tasks has been further designed.

In the context of quality assurance, DGMO commissioned reviews in 2020 on both the Position Paper for the approach to the realization phase and the Governance and cooperation model for the exploitation phase of the planned system. This has led to two opinions:

1. Assign the final responsibility for implementation to one implementing organization (review Governance and cooperation model).
2. Invest the Toll Charger function and the necessary ICT systems entirely with RDW (review Position Paper).

RDW

Most of the tasks will be carried out by the RDW. The RDW will also be responsible for the coordination and functional management of the implementation. The idea is that the RDW realizes a limited part of the ICT facilities itself; Most of it is put out to tender. The RDW builds the part of the system that is mainly required for data processing, data flows and data storage in-house. In this way, the required data and intellectual property rights remain in public hands and the continuity of the system is prevented from being dependent on one market party. In other countries, we have seen that dependence on one market party can lead to higher costs in the longer term.

Environment and Transport Inspectorate (ILT)

The Human Environment and Transport Inspectorate will provide physical supervision along the road. To this end, the ILT is setting up a new department within the existing organization. The inspectors are specifically trained and deployed for this physical observation task. The costs of carrying out the supervision shall be paid from the levy. This means that this does not affect the regular funding of ILT.

Central Judicial Debt Collection Agency (CJIB)

The Central Judicial Debt Collection Agency will send the fine orders and collect fines.

Rijkswaterstaat (RWS)

Rijkswaterstaat performs several supporting tasks from its role as road manager, including providing the infrastructural facilities on the roadside such as portals, network and power supplies. As part of Rijkswaterstaat, the NDW is also a customer of data that arise within the Heavy Goods Vehicle Charge system and are used in an anonymized form for traffic management.

In consultation with the intended implementers, the details of the charging system will be further elaborated.

The interaction with market parties in 2020 and 2021 shows that the elaborated system fits well with their working method and standing practice in (Western) Europe.

Guidelines and standards

EETS Directive

The EETS Directive (2019/520/EC) and its regulations, which have been implemented in the Dutch EETS Implementation Act, include:

1. Definitions for actors, etc.
2. Technological solutions for the electronic road toll systems requiring on-board equipment to be installed or used.
3. Provisions on the registration of EETS providers.
4. Rights and obligations for the EETS provider; and
5. Rights and obligations for the Toll Charger.

The intended interoperability must (partly) be achieved by using clear, standardized interfaces and associated definitions, which are described in ISO standards.

ISO 17573 architecture standard for toll collection systems

The ISO 17573 architecture standard describes the architecture for toll collection systems where a user can use multiple toll areas (with different Toll Chargers for each toll area) with a single contract.

In this ISO standard, the different roles and the associated tasks and responsibilities, and the most important interfaces between the actors are further elaborated. This architectural standard is also the basis for all other standards relating to toll collection systems.

This standard identifies four stakeholders: the Interoperability Manager, the Toll Charger, the Toll Service Providers, and the User ("User").

In this draft, the following chapters explain how the Dutch situation uses these standards and how the division of roles as described in the Heavy Goods Vehicle Charge Act has been made.

Other relevant ISO standards

The figure below shows the scope of the relevant information exchange and interfaces with the corresponding ISO standards. Interface definitions for the Dutch Heavy Goods Vehicle Charge system are drawn up based on the ISO standards and must comply with them.

The ISO 17575:2016 standard defines the information exchange between the front-end and the backend of the Service Provider. This standard is not mandatory but is listed here for information.

The ISO 12855 standard defines the exchange of information between the Service Provider and the Toll Charger. Complying with this standard is important to achieve interoperability with neighboring countries and to make the best use of the current range of EETS service providers.

The CEN/TS 16986:2016 standard defines a coherent set of transactions, triggers, conditions, data elements, transfer mechanisms and support functions for interoperable data exchange between Toll Charger and service provider's central systems, based on ISO 12855.

The introduction of Directive 2019/520/EC requires the standardized interfaces between the central systems of Toll Chargers and service providers to comply with CEN/TS 16986, no later than 5 years after the entry into force of the Directive.

The ISO 12813:2019 standard relates to the (DSRC) communication between On-Board Equipment and roadside system in the context of supervision of so-called autonomous Heavy Goods Vehicle Charge systems.

The ISO 14906:2018 standard covers the definition of the application interface for targeted short-range communication.

The relevant standards are the following:

1. ISO 12855:2016 - Electronic toll collection - Information exchange between service providers and Toll Chargers
2. CEN/TS 16986:2016 - Electronic Fee Collection - Interoperable application profiles for information exchange between Service Provision and Toll Charging
3. ISO 12813:2019 - Electronic Fee Collection - Compliance check communication for autonomous systems
4. ISO 17573:2010 - Electronic Toll Collection - System Architecture for Vehicle Transport Services
5. ISO 14001:2013 - Environmental management system
6. ISO 14906:2018 - Electronic toll collection - Definition of the application interface for targeted short-range communication

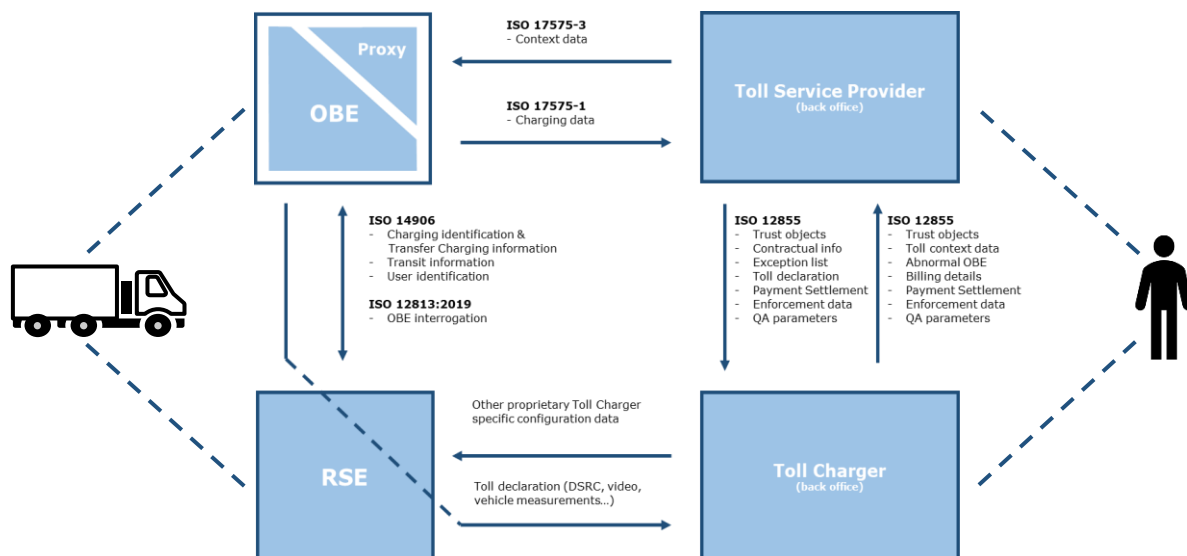


Figure 6: NEN-EN-ISO-17573-1 and other standards for Electronic Toll Collection

Sourcing strategy

The strategy regarding the outsourcing of activities and facilities is based on the basic principle Reuse goes before buying; Buying goes for 'having it made' (see also chapter 3).

If it is necessary to purchase systems or have them built, existing solutions in the market are first looked at.

The starting point is therefore delivery by market parties.

In those areas where the specific characteristics such as the laws and regulations, data models and process agreements of the Dutch Heavy Goods Vehicle Charge system are housed, adaptability to the Dutch situation and existing solutions within the implementing organizations is required.

For the main components of the system, this means the following:

1. On-Board Equipment

The basis of EETS for the user is the use of one on-board device, with one contract and one service provider. In line with the coalition agreement where no additional On-Board Equipment in trucks is desired, this means that the strategy is to be able to reuse On-Board Equipment that is in circulation in Europe in the Dutch system. In practice, EETS providers must demonstrate through an accreditation process that their equipment is indeed suitable for use in the Dutch toll domain.

Different rules apply to the Main Service Provider, here equipment used by the HDA and tendered by the Dutch government may not be used outside the Netherlands. This rule also applies the other way around for equipment from the Belgian and German Main Service Provider. Optimal use of the EETS market remains the strategy.

2. Service provider

The Service Provider's systems for communication with On-Board Equipment, GIS systems for mapping and calculation of coordinates, financial systems and customer contact systems are an integral part of the service provided by the service providers and will not be built or purchased separately by the government.

3. Roadside equipment for observation

The roadside equipment is part of a tender for the provision of services by the supplier of these systems. The service is based on the provision of information from an operational back office of the supplier that includes the required data from vehicle observations and On-Board Equipment on the roadside.

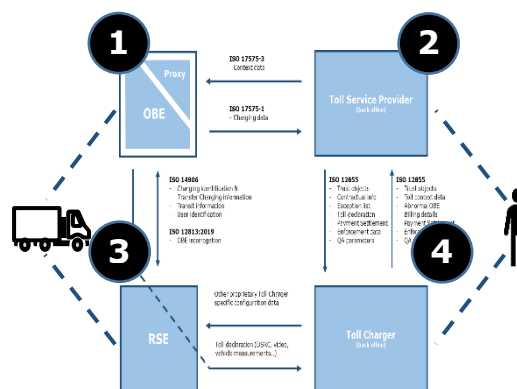


Figure 7: Sourcing plots

4. Levy, supervision, and enforcement systems

For the systems of the Toll Charger, Supervisors and Enforcer, the first thing that is foreseen is that a large part of the reuse of existing solutions by the various implementing organizations is foreseen. This includes the financial system for handling the tax amounts received from the service providers, case and file systems at the executors, customer contact and information systems, collection, and collection systems.

Furthermore, the connection of the government systems to the information provision by the service providers and the supplier of roadside information requires the implementation of interfaces within the government domain. These interfaces are based on standards and previous implementations in Belgium and Germany. There is no 'Commercial Off the Shelf' box or system that can be purchased for this purpose and works within the system landscape of the government. However, optimal use will be made of the experts from the market who have supported the construction of similar interfaces in other countries.

The rules to be applied when determining violations must be based on Dutch law.

Furthermore, interfaces will have to be realized to be able to use the received and processed information in the underlying existing systems.

The futureproofing of the system must be guaranteed here. An over-reliance on a 'one size fits all' market solution and a 'vendor lock-in' must be avoided. Control over the data model, rules and process flow is a requirement for these components.

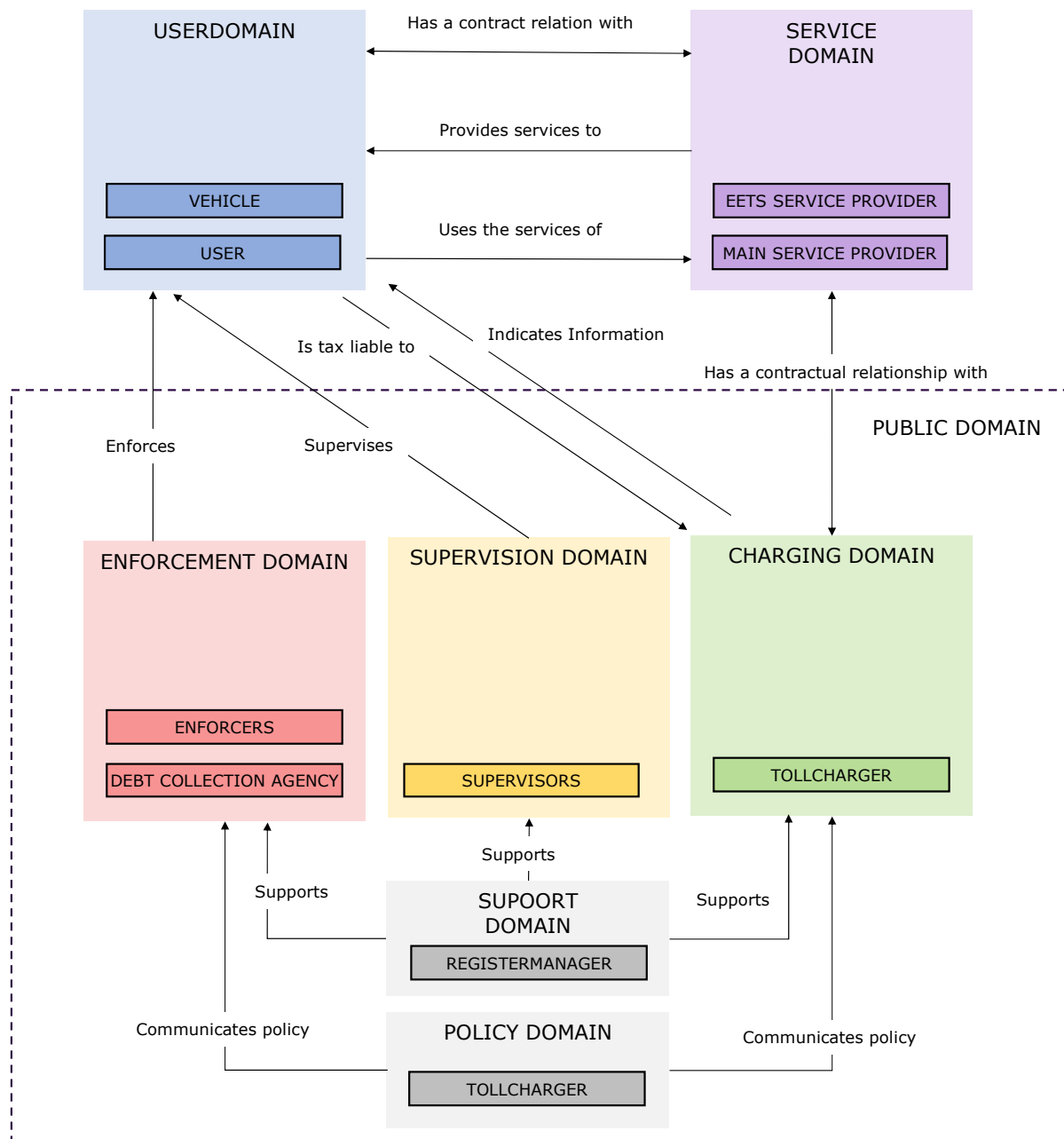
5 Market & Organisational Model

This chapter explains the market and organisational model for the Heavy Goods Vehicle Charge system.

Domains in the Heavy Goods Vehicle Charge system

The execution of Heavy Goods Vehicle Charge has several primary roles and responsibilities. These different roles are located within five primary domains: the user domain, the service domain, the supervision domain, the enforcement domain, and the charging domain. Shown in the Figure below.

In short, private providers of toll services take care of the registration of the kilometres driven in the toll domain and the collection of the Heavy Goods Vehicle Charge. The providers of toll services conclude a contract with the Toll Charger within the public charging domain. In addition, there are tasks within the public oversight and enforcement domain that monitor compliance by users in the user domain. The policy domain is responsible for drafting and maintaining the policy and legal framework and communicates this to the various other roles.



22 | Figure 8: Market & Organisational model

Division of roles within the Heavy Goods Vehicle Charge system

Several roles have been identified in the Heavy Goods Vehicle Charge Act and in this draft. These roles are a special feature of the roles in the ISO Standard that describes the operation of a toll system.

The Toll Charger task as described in the ISO 17573-1 standard and in the EETS Implementation Act, has been specialized in the Dutch Heavy Goods Vehicle Charge Act to several different roles to be able to carry out the various processing responsibilities in the Dutch system and the levy and the imposition of the fine on behalf of the Minister of Infrastructure and Water Management.

The Toll Charger

Article 2(3): Our Minister is Toll Charger as referred to in the Implementation of the EETS Directive Act.

The Toll Charger determines the toll regime, operates the toll system, and can provide transport services. It provides the artefacts, mechanisms, organisational structures, and tools for information transfer necessary to manage the charging system. The responsibilities of this role relate to the functional operation of the system. This role is fulfilled through direct interaction with the service providers.

(From: ISO 17573-1 description responsibilities Toll Charger)

The standard responsibilities of a Toll Charger include:

Basic charging, including:

1. The provision, where applicable, of the transport service, e.g., access to a road network, a car park, or a ferry connection,
2. Definition of the charging principles for the service offered, e.g., the tariff principles for a toll road or zone.

Calculating the toll (directly or through contractual relationship with the toll service provider), including:

1. Where appropriate, communicating to the user the result of the tolling process,
2. Communicating securely with actors (service providers) who play a role in issuing the contract, means of payment and On-Board Equipment.

Generating Toll Context Data, including:

1. Informing the driver of the vehicle about the availability of the toll system and toll collection principles, e.g., by means of signs and messages.
2. Providing geographical data of the charging objects to autonomous systems in the toll area, as well as providing positioning information.

Implementation and compliance with the security and privacy policy for the toll domain.

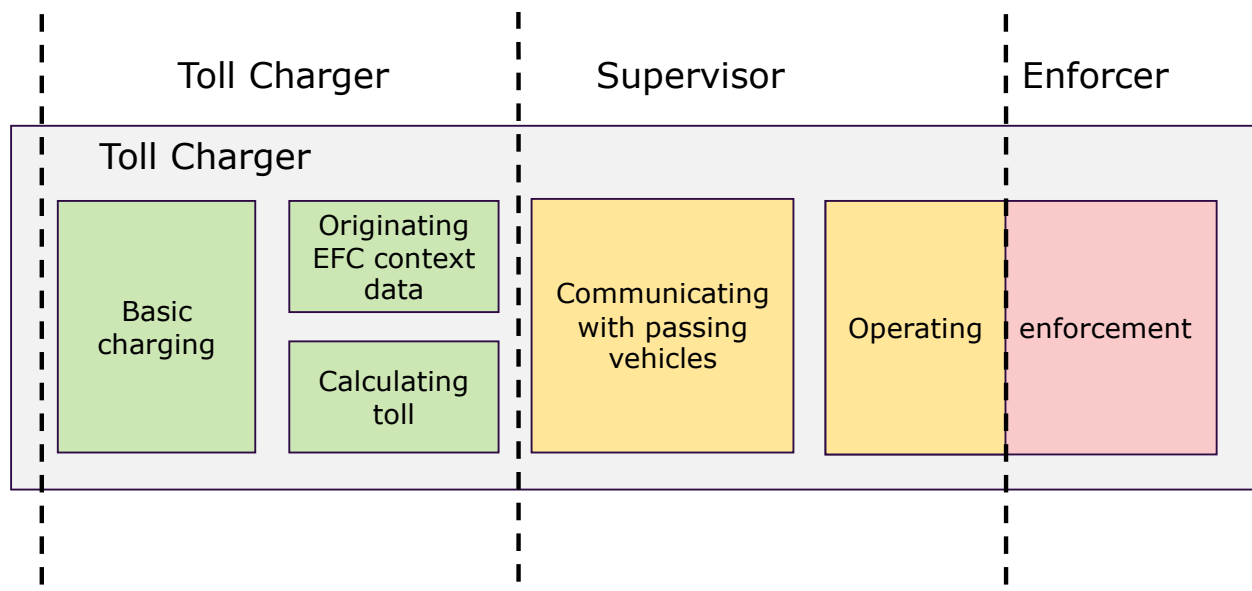


Figure 9: Translation of the Dutch definitions on the NEN-EN-ISO 17573-1 Toll Chargers task

The Supervisor(s)

Article 14(1): The officials designated for this purpose by order of our Minister shall be responsible for supervising compliance with the provisions of or pursuant to this Act.

The Supervisor has the following responsibilities (aligns with ISO 17573-1 description responsibilities Toll Charger):

1. Detecting a vehicle subject to tolls
2. Communication with passing vehicles, including, where applicable and depending on the technology chosen in the given toll area:
3. The collection of the characteristics of a vehicle (to ensure a correct classification of the vehicle) that are used for the calculation of the toll (the check for the correct toll context data). The information collected can either be read from the On-Board Equipment, measured (both used for the calculation of the toll or for the verification of the data read from the On-Board Equipment), or collected from a central database or vehicle registry (offline toll calculation)
4. Secure communication with the On-Board Equipment, if present on board, by exchanging information necessary for the supervisory task.

Enforcer

Article 15(1): Our Minister may impose an administrative fine on the holder for an offence as referred to in Article 13

Enforcement, including (aligns with ISO 17573-1 description of Toll Charger responsibilities):

1. Check, record, and handle exceptions every time a vehicle passes through a toll area. Compliance monitoring of autonomous systems falls under this responsibility
2. Handling enforcement cases with due regard for privacy.
3. Collection and collection of the fine imposed

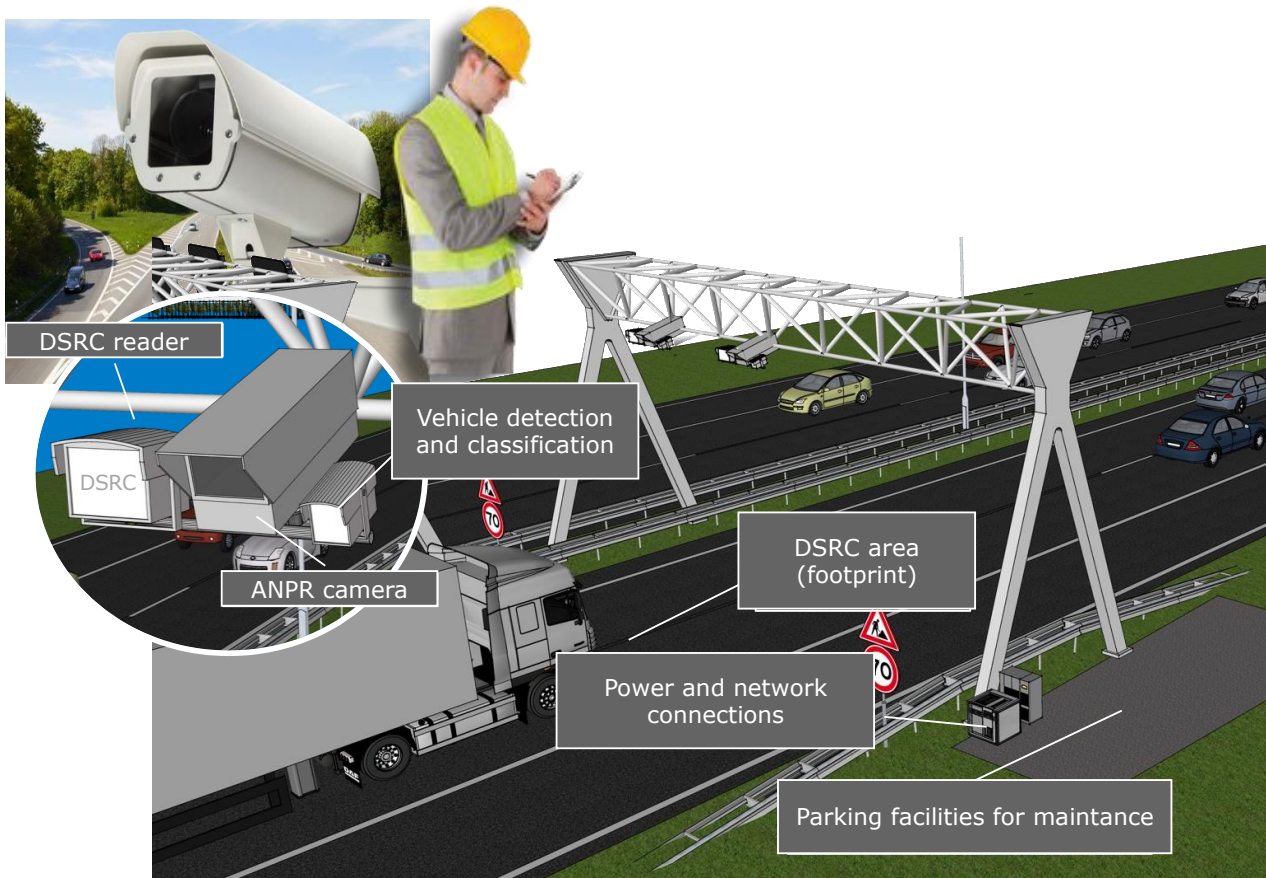


Figure 10; Situation sketch roadside

Registry Manager

To support the cooperation and the different processing responsibilities between the different roles, a Registry Manager has been designated in the Heavy Goods Vehicle Charge Act.

Article 24 of the Heavy Goods Vehicle Charge Act states that there is a registry for the Heavy Goods Vehicle Charge (hereinafter: the registry) in which the data necessary for the proper execution of the Heavy Goods Vehicle Charge are processed. The manager is appointed by the minister and the intention is to assign this task to RDW.

This summary describes the positioning of the registry in the Heavy Goods Vehicle Charge system intended by RDW in relation to the various actors and the operation of the registry.

The administrator of the registry is the controller of the registry and observes the applicable retention periods. Specifically for personal data in the registry, it is stipulated that these are used by the administrator exclusively for the proper implementation of the Heavy Goods Vehicle Charge Act and the provision of data from the registry to the Minister and Supervisor for the performance of their duties under the Heavy Goods Vehicle Charge Act.

The registry is also mentioned in the following articles in the Heavy Goods Vehicle Charge Act:

1. Art. 21(4) – The personal data processed by the Minister for levy, recovery and enforcement are made available for inclusion in the registry.
2. Art. 22(3) – the personal data processed by the Supervisor for the purposes of monitoring compliance and issuing the administrative fine shall be made available for inclusion in the registry.

Method of completion (management of the) registry:

The various actors collect data for the implementation of Heavy Goods Vehicle Charge. The relevant data shall be made available to the registry manager for inclusion in the registry by means to be determined by the registry manager

When data needs to be accessed, this takes place via relevant key values (e.g., registration number, and/or file number) that are included in a central index whose source data is in the registry. In this way, the information can be made accessible to the right actors.

In any case, a file and personal key is included in the index.

This makes it possible to retrieve the necessary data from the various technical platforms at case level and at person level. A pull system is provided when the data is requested. The index is part of the registry, and the registry manager is therefore the administrator of the index.

The registry and thus the data from the actors can consist of different data sets. For example, the registry operator does not itself receive information directly from the service providers, that is the responsibility of the Toll Charger. After the information has been received and checked by the Toll Charger, it is offered for storage in the registry via the publication mechanism made available by the registry manager. The information therefore falls under the regime of the registry manager and is therefore responsible for, among other things, monitoring and complying with the statutory retention periods. This means, for example, administrative user data (for supervision and enforcement purposes) of service providers, which is obtained by the Toll Charger, part of the Heavy Goods Vehicle Charge registry.

Furthermore, there is no direct exchange of data between the various actors, queries take place on data sets that are part of the registry. As an actor, the Registry Manager can therefore fulfil its legal tasks and responsibilities by properly completing the supporting management process.

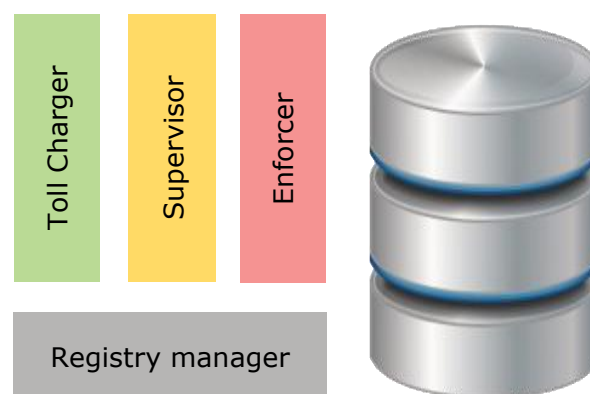


Figure 11: Registry manager as supporting role

Service Provider

The Service Provider is responsible for the contracts with the user role, and provides artefacts, mechanisms, organisational structures and tools for information transfer necessary to manage an Electronic Toll Collection System.

The responsibilities of this role relate to the functional operation of the system. This role shall be fulfilled in direct interaction with the interoperability manager in the relevant Member State, the Toll Charger, and the user.

The Service Provider's responsibilities include:

Providing basic amenities, including:

1. Providing On-Board Equipment, when toll collection is carried out by means of electronic equipment on board the vehicle,
2. Guaranteeing the payment of the toll to the entity that has the role of Toll Charger fulfills
3. Organizing the payment modalities for the user
4. Collecting the money from the signer of the contract
5. Managing customer relationships related to the use of the toll service regarding information, claims, questions and answers, handling of errors and any contractual or financial matters
6. Implementing and complying with the security and privacy policy for the toll collection systems
7. Monitoring the actual operational quality in relation to the agreed SLAs.

Act as a contract provider to the user, including:

1. Offering contracts according to established conditions to interested users and concluding contractual agreements,
2. Providing and managing the contract including the service rights for the user of the toll service.

Taking care of the toll notification, including:

1. Ensure that the On-Board Equipment securely reports information required for toll collection
2. Editing context data from elsewhere (from the Toll Chargers role) in such a way that it can be installed in the On-Board Equipment.
3. Adaptation of the On-Board Equipment, in a safe way.
4. The maintenance of the On-Board Equipment, including securing the functionality



Figure 12: EETS-providers per country



Figure 13: Example of On-Board Equipment

Interoperability manager

A specific role has been established and prescribed in the EETS Directive for the management of toll domains in a country, i.e., the establishment and enforcement of a set of rules that together determine the policy of a particular scheme or of the entire national domain.

These responsibilities relate to the operation of the system, and, unlike other roles, the role of interoperability manager can hardly be fulfilled by a single actor. On the contrary, its responsibilities are often assumed in real toll systems by different actors and regulations.

The responsibilities of the interoperability manager include:

Establishing rules, including:

1. Defining the supported security and privacy policy for the toll system, acting as the safety authority that determines the policy on safety interaction between the different security domains.
2. Defining and maintaining ID schemes and, if necessary, supporting the issuance of IDs that provide unique registration codes for organizations and components and unique identifiers or rules for generating unique identifiers for the toll applications and messages.

Certification of Toll Components, including:

1. Laying down the certification requirements for actors involved in the toll system and equipment used,
2. Granting or revoking operating licences to relevant actors
3. Monitoring of operation through periodic reports.
4. Handling of disputes, including:
5. Establishment of operational procedures between actors,
6. Management of disputes between actors

In the Netherlands, the executive tasks related to the registration of EETS service providers are vested in the RDW. NIWO has been appointed as an intermediary body. The policy tasks, including the maintenance of the EETS laws and regulations, are assigned to the Ministry of Infrastructure and Water Management. The maintenance of the ID schemes (part of the security tasks in the toll domains) is part of the implementation responsibility within the individual toll domains.

Given the general and generic nature of this role (is also relevant for e.g., the Temporary Toll Pathways in the Netherlands), it will not be further elaborated in this document.

6 Business Architecture

This chapter describes the business architecture. First, the scenario that forms the basis for the design, processes, roles, and tasks that make up the system is discussed.

Scenario's

The CEN/TS 16986 talks about two different scenarios that may underlie toll collection systems: the Service Provider-dominant scenario and the Toll Charger-dominant scenario. In the Service Provider-dominant scenario, the Service Provider takes care of the calculation and collection of the charge.

In the Toll Charger-dominant scenario is the responsibility for calculating the levy invested in the Toll Charger. The Dutch system of Heavy Goods Vehicle Charge is based on the Service Provider-dominant scenario.

Service provider-dominant scenario

For the Heavy Goods Vehicle Charge, it was initially decided to request only the Toll Notification (ISO 12855: "TollDeclaration") in aggregate form from the Service Providers. This only contains the amount due per period per Truck, and no travel dates. No Recovery (ISO 12855: "BillingDetails") is exchanged between Toll Charger and Service Provider. The Payment Announcement (ISO 12855: "PaymentAnnouncement") is used to announce the payment of the levy to the Toll Charger from the Service Provider.

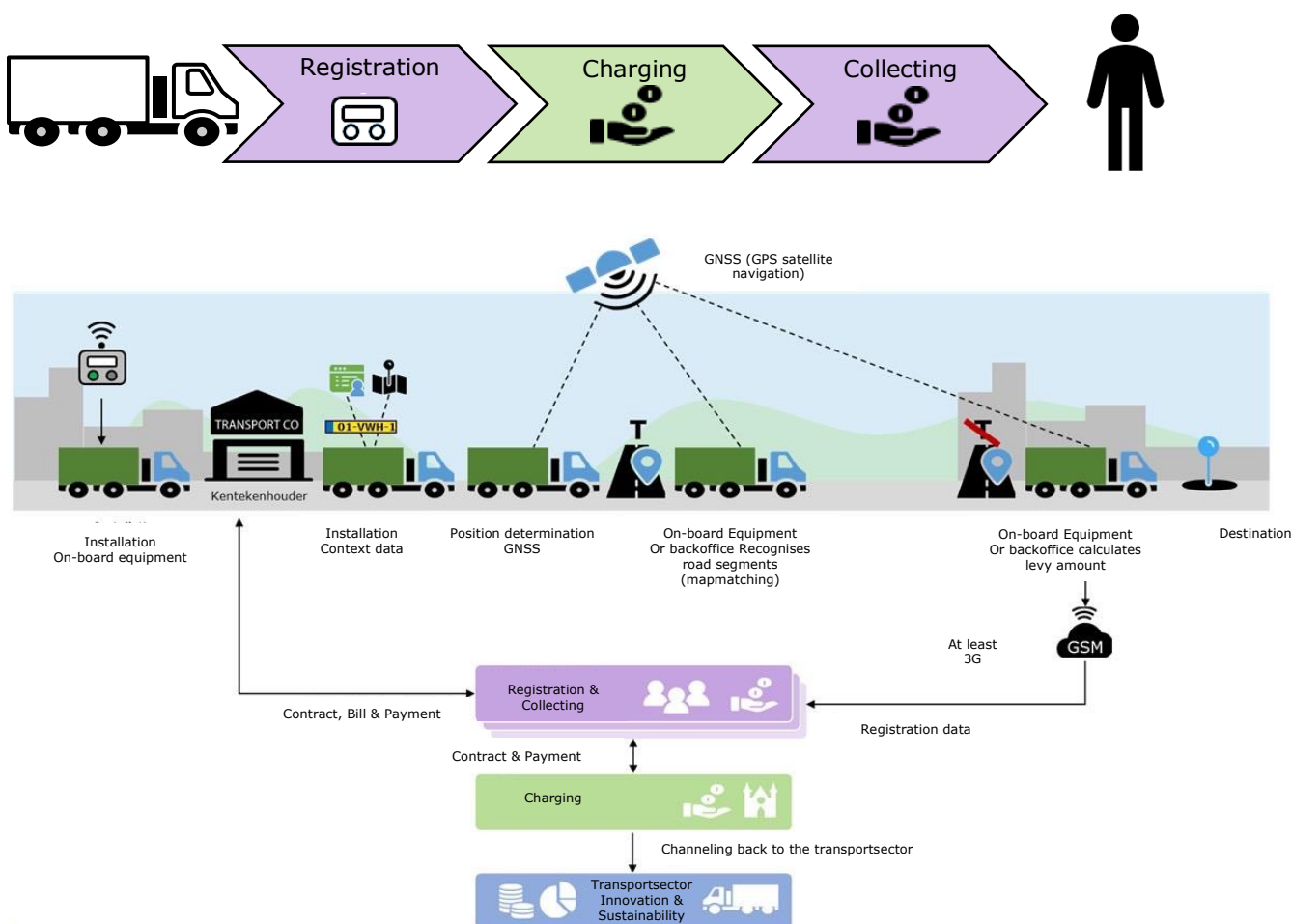


Figure 14: The 'Happy Flow' Registration of kilometres, Collection and Remittance of the amount of the levy

Supervision & Enforcement

The supervision and enforcement process consists primarily of:

Electronic and physical observation on the roadside with central administrative supervision by the Supervisor.

The imposition of the fine by the Enforcer, the sending of the order and the collection and collection of the fine by the Central Judicial Debt Collection Bureau.

Handling objections and appeals.

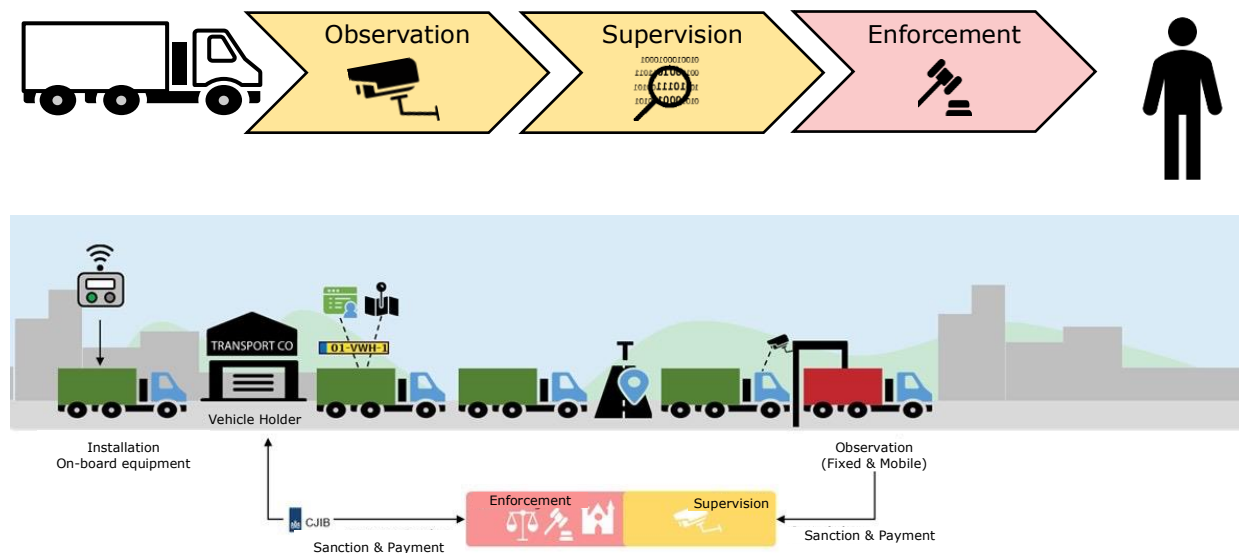


Figure 15: Supervision & Enforcement of the road user

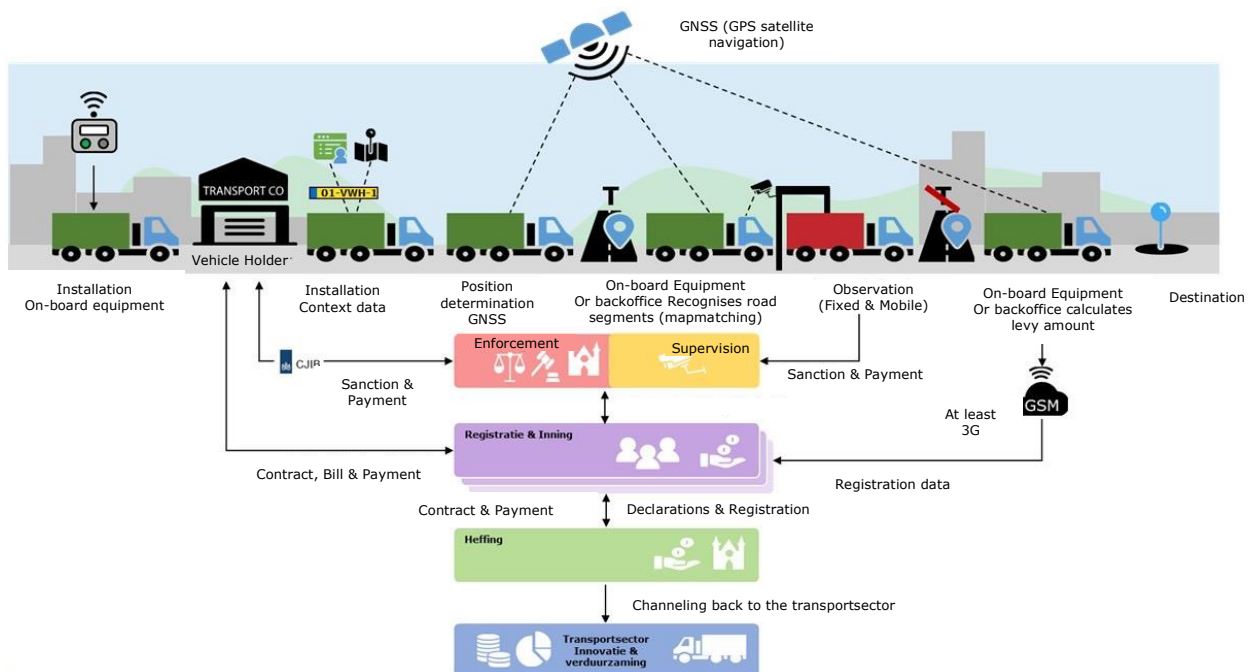


Figure 16: Summary of the primary process of the Dutch Heavy Goods Vehicle Charge System

Business Functions Model Heavy Goods Vehicle Charge – Level 1

The Business Functions Model represents the main tasks of the Heavy Goods Vehicle Charge system as business functions modeled in assigned domains with a defined responsibility. The model is recorded in an architecture repository (ARIS) and is described according to the Archimate 3.1 method that is considered standard within the Dutch government.

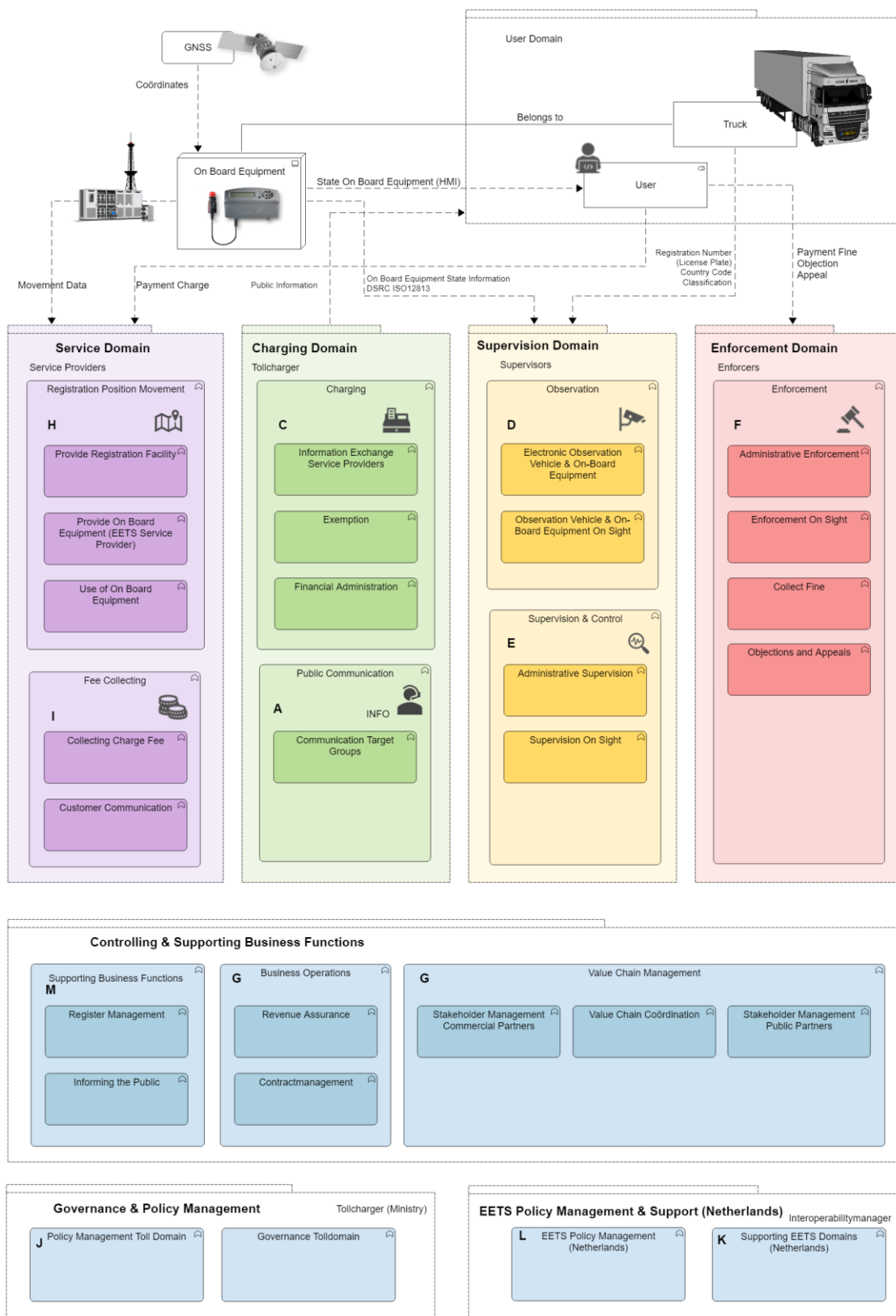


Figure 18: Business function model Heavy Goods Vehicle Charge - Level 1

Primary Functions

Registration Position Movement

Registering the position and ensuring registration of the movement by providing On-Board Equipment, managing and maintaining it and installing the current Toll Context Data.

Fee Collecting

The calculation, collection and payment of the amounts by the Service Provider on the basis of the registration of movements.

Charging

Receiving the charging amounts from the Service Providers and the associated financial administration. In addition, the Toll Charger manages the exemptions and collects the necessary data from Service Providers.

Public Communication

Providing general information and public contacts prior to and during the exploitation phase. This primary task involves the interactive part of general information.

Observation

Detecting, classifying, and identifying Vehicles and On-Board Equipment at observation sites with both Fixed and Movable roadside equipment. The physical observations by the Inspector and the preparation of an observation report are also covered.

Supervision & Control

The control of users and the establishment of punishable facts based on data. In this process, the observation data of Observation (D) and administrative user data (including exception lists) from the Service Providers are used.

From these checks, information can also arise indirectly and be recorded in the registry, which can then be used by the Toll Charger to clarify the performance of Service Providers and to correctly handle any problems within the Contract Management process.

Enforcement

The administrative enforcement process with the imposition, collection and collection of fines (including through physical enforcement) and the various processes for handling objections and appeals against the fines imposed.

Secondary Functions

Supporting Business Functions

Registry Management

Includes managing the Heavy Goods Vehicle Charge registry.

Informing the Public

Concerns informing target groups through various media before, during and after the introduction of the Heavy Goods Vehicle Charge.

Business Operations

Revenue Assurance - concerns the process of revenue Assurance and governance of the Toll Chargers organization.

Contract management

Includes accrediting and testing the Service Providers and managing the contracts with Service Providers. Contract management also takes care of the periodic checks resulting from the accreditation process. The management of the contract with the supplier of the roadside systems is also part of this task.

Value chain management

Chain-wide activities such as managing and monitoring information, privacy and security policy is part of this task. The relationship with market organizations and chain partners is also managed here.

Policy Management Toll Domain

Drafting and maintaining the EETS domain statement, formulating the policy for the Heavy Goods Vehicle Charge toll domain (setting road network and tariffs) and supporting laws and regulations on the EETS domain.

Governance Toll domain

The management from the governance role within the Ministry of Infrastructure and Water Management.

EETS Policy management (Netherlands)

Supporting EETS laws and regulations in the Member State.

Supporting EETS-domains

One task of the Interoperability Manager is to ensure that the registration of EETS providers and the settlement of disputes between EETS domains is invested and settled.

The order of the assigned letters corresponds to previous reviews and rating reports and has therefore been added.

Business Functions Model Heavy Goods Vehicle Charge - Level 2

Level 2 shows the business functions with a deepening at the level of the processes. The responsible role is assigned to the company function. The business functions and associated processes are briefly described in this chapter. In the ARIS architecture repository, the processes have been further modelled using 'Business Process Modelling Notation' (BPMN) schemas.

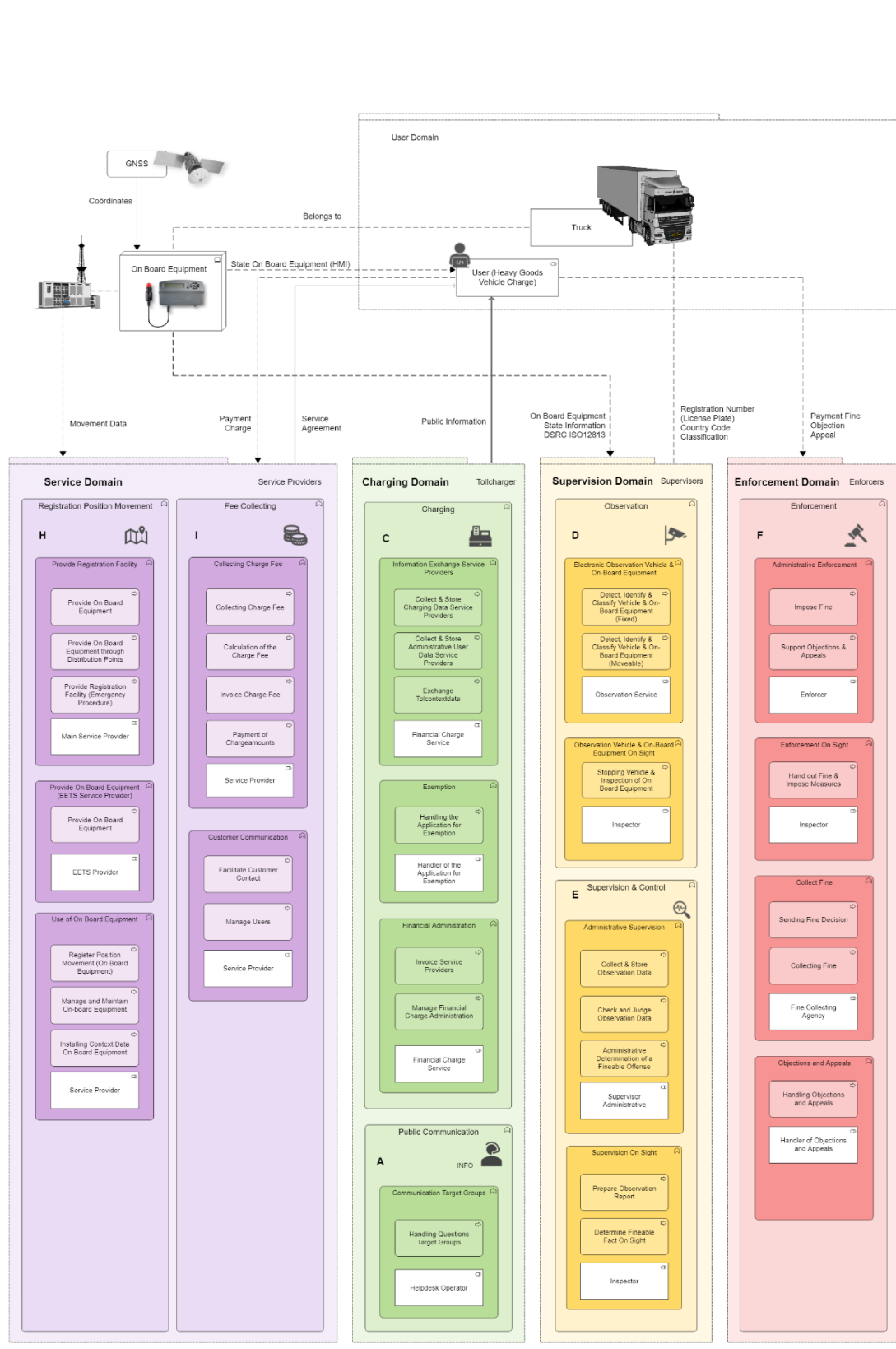
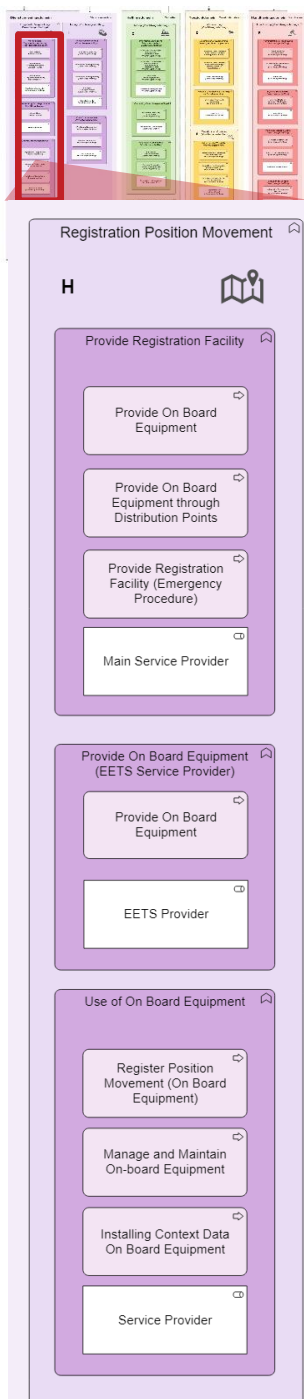


Figure 17; Business Functions Model Heavy Goods Vehicle Charge - Level 2



Registration Position Movement

The movement and calculation of the kilometres travelled is determined using On-Board Equipment.

Provide Registration Equipment (Main Service Provider)

Provide On-Board Equipment

This includes the provision of On-Board Equipment in a regular manner for the Service Provider (post, etc.)

Provide On-Board Equipment through Distribution Points

The Main Service Provider is obliged to be able to provide the On-Board Equipment in addition to the regular manner in a manner that has been agreed with the client (Toll Charger). In addition, the On-Board Devices must be able to be dispensed via designated distribution points, among other things.

Provide Registration Facility (Emergency Procedure)

The provision of a Registration Facility in the context of an emergency procedure (loss, theft, defect) must also be arranged by the Main Service Provider. The Registration Facility is described as a facility that can be either a replacement on-board device or an agreed temporary emergency solution in the form of e.g. a ticket or mobile application.

Provide On-Board equipment (EETS-Service provider)

Provide On-Board Equipment

This includes the provision of On-Board Equipment in a regular manner for the Service Provider (post, etc.).

Use of On-Board Equipment

Registry Position Movement (On-Board Equipment)

The On-Board Equipment (OBU or OBE) on board the Vehicle determines the positions of the Vehicle and transmits them to the service provider via mobile communication. The design is based on so-called 'thin' on-Board Equipment as most EETS providers use this variant. In the 'thin' On-Board Equipment, most calculations take place in the back office of the service provider, for the 'thick' On-Board Equipment in the On-Board Equipment itself.

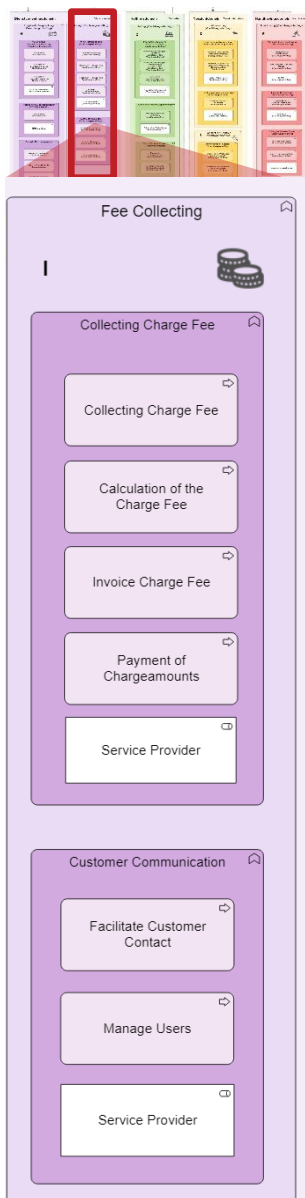
In the Heavy Goods Vehicle Charge Act, the decision has been taken not to prescribe the choice of the variant of the On-Board Equipment. The design offers space for the application of both 'thick' and 'thin' On-board equipment.

Manage and maintain On-Board Equipment

The Service Provider is responsible for maintaining the On-Board Equipment through timely updates and replacement when necessary. This concerns both functional and technical updates. The Service Provider must also communicate the status of the changes to the user.

Installing Context Data On-Board Equipment

The relevant data (road sections, tariffs) of the Dutch Heavy Goods Vehicle Charge domain must be installed in the On-Board Equipment and the back office.



Fee Collecting

Collecting Charge Fee

Collecting Charge Fee

Organizing the payment modalities for the user

Collecting the money from the signer of the contract (Holder). The invoiced charge amount is paid by the user and received by the service provider.

Calculation of the Charge Fee

The Service Provider calculates the toll amounts due over the distance driven based on the toll area rules (the Toll Context Data). This is done by translating the coordinates into the use of the Road section segments of the taxable road network.

The amounts are calculated based on the length of the Road section segments as supplied in the Toll context data.

Invoice Charge Fee

The Service Provider periodically sends an invoice to the Holder. The Account Holder pays this invoice to the Service Provider.

Payment of Charge amounts

Guaranteeing the payment of the toll to the entity fulfilling the role of Toll Charger.

The Service Provider sends the aggregated Toll Declaration with aggregated kilometres and amounts per license plate to the Toll Charger daily, which contains the total amount of charge to be paid for the period (Article 9, second paragraph). Prior to the actual payment, the Service Provider sends a Payment Announcement, which contains a reference to the Toll Notification.

Customer Communication

Facilitate Customer Contact

Facilitating customer contact through various channels, regarding information, claims, questions and answers, handling errors and all contractual or financial matters

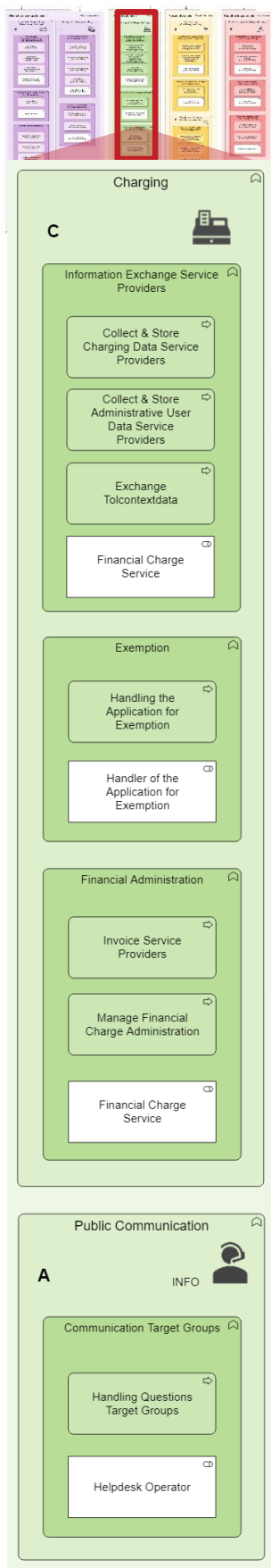
Manage Users

Managing customer relationships related to the use of the toll collection service. The Holders register their Vehicles with the Service Providers, each of which maintains a 'Customer List' (with Holders).

In addition, they receive reports from Customers with defective On-Board Equipment, which they maintain on a 'List of defectively reported On-Board Equipment' and there may be defaulters or customers attempting to defraud who are registered on a 'List of Invalidated On-Board Equipment'. The collective name for these lists is the Service Provider Exception List.

The so-called Exception List of CEN/TS 16986 provides space for the exchange of these lists.

Reports of defective On-Board Equipment can be displayed as status on the Customer list. It is important that the Toll Charger and the Supervisor are aware of these Exception Lists in the context of enforcement.



Charging

Information Exchange Service Providers

Collect & Store Charging Data Service Providers

Receiving, checking, and recording the daily aggregated Toll Declaration with aggregated kilometres and amounts per registration number showing the total amount of charge payable for the period (Article 9, second paragraph). The exchange of this information takes place via a prescribed standardized interface (ISO 12855). Prior to the actual payment, the Service Provider sends a Payment Announcement, which contains a reference to the Toll Declarations.

Collect & Store Administrative User Data Service Providers

This concerns the process of receiving and recording Administrative User Data sent by the Service Providers. The exchange of this information also takes place via the prescribed standardised interface (ISO 12855). See also the explanation under Managing Users at the service provider.

Exchange Tollcontextdata

The Toll Charger sends the necessary data necessary to ensure the proper functioning of the On-Board Equipment and back office by the Service Provider. It contains road sections and tariff information.

Exemption

Handling the Application for Exemption

This concerns the process of handling applications for an exemption via a supported (web) channel. The Toll Charger reviews the application and decides. This decision is recorded in the registry and is used by the Supervisor and enforcer.

Financial Administration

Invoice Service Providers

After the payment announcement has been made by the service provider, the Toll Charger creates an invoice for the Service Provider to keep the financial administration consistent.

Manage Financial Charge Administration

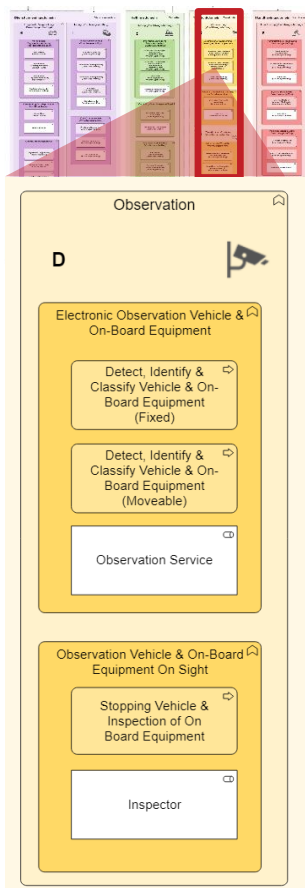
Maintaining the financial records in which the service providers are recorded as separate debtors.

Public Communication

Communication Target Groups

Handling Questions Target Groups

Facilitating contact with target groups through various channels, regarding information, questions, and answers about the Heavy Goods Vehicle Charge in general. Users who are already customers of a Service Provider are facilitated by the relevant Service Provider.



Observation

Electronic Observation Vehicle & On-Board Equipment

Detect, Identify & Classify Vehicle & On-Board Equipment (Fixed)

This task involves the collection of the observation data on the roadside by Fixed roadside equipment. The Observation Service provides the observation data to the Supervisor.

The Holder's On-Board Equipment is read at observation sites with Roadside Equipment using DSRC (Dynamic Short-Range Communication) technology. The vehicle class is also determined using a classification system. It should be noted that the classification system verifies the plausibility of the class specified by the user and is not itself able to determine the exact weight and environmental class. In addition, the license plate is recognized, and images are made with an ANPR camera and an overview camera.

The results of the license plate recognition, the DSRC data and the visual material are combined into a Vehicle Passage Notification. These reports are automatically evaluated and assessed for reliability, and if necessary, manually corrected and then sent to the Regulator's interface (in the case of data from a vehicle ostensibly subject to the charging obligation). The photos will then be deleted.

Detect, Identify & Classify Vehicle & On-Board Equipment (Moveable)

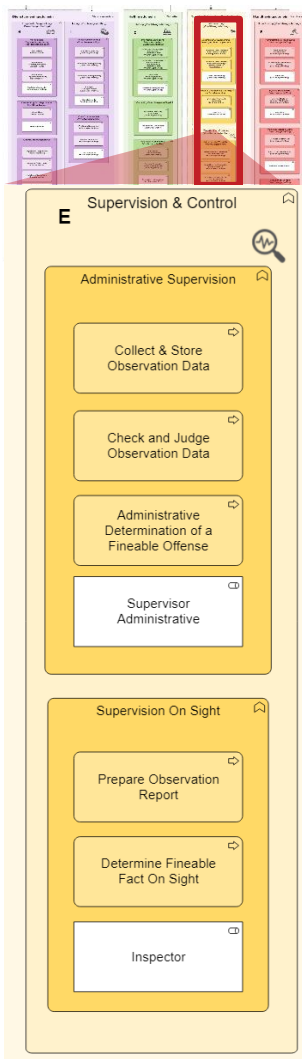
This task involves collecting the observation data on the roadside by Movable roadside equipment. The relocation of the equipment also falls under this task and is laid down in the agreement with the Supervisor. The further handling is the same as the description for the fixed equipment.

Observation Vehicle & On-Board Equipment on Sight

Stopping Vehicle & Inspection of On-Board Equipment

In addition to the observations via fixed and movable roadside equipment, physical observations can be made by the Inspectorate during road checks and standstills.

In the back office of the Roadside Equipment, a perceived license plate is compared with the Signaling List. In the event of a match, a signaling notification can be sent via an interface to the Inspector Heavy Goods Vehicle Charge for stoppage.



Supervision & Control

Administrative Supervision

Collect & Store Observation Data

The main process starts with the collection and technical checking of the roadside notifications.

Check and judge Observation Data

The processes within Supervision and Control are focused on the obligations that the user must comply with. The Supervisor checks and assesses the reports received for irregularities and compares them with the administrative user data placed in the registry by the Toll Charger and the list of exemptions.

The report is analyzed based on the received status information from the On-Board Equipment and the user data (defect reports, etc.) and it is checked based on established rules whether there is a Fineable Fact. If an on-board device functions correctly when passing, it can still be determined based on the status information whether the on-board device has not been switched off while driving. The leniency time after reporting a defect can also be investigated.

Administrative Determination of a Fineable Offence

If there is reason to do so, the Supervisor will determine a Fineable Event and it will be prepared in the registry for the Enforcer. The Enforcer decides whether a fine is imposed.

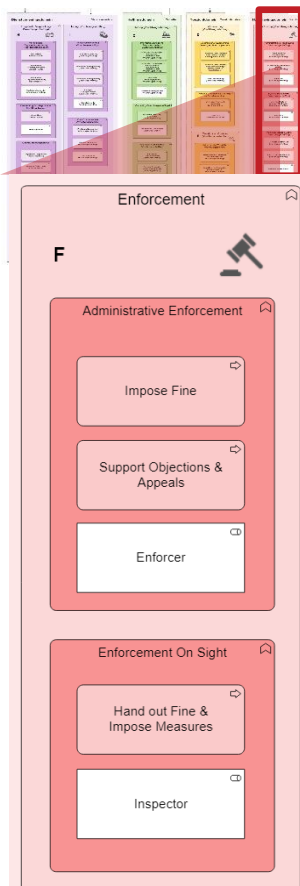
Supervision On Sight

Prepare Observation Report

In cases where irregularities have been detected by the Inspector during the observation, an observation report shall be drawn up and forwarded to the Supervisor.

Determine Fineable Fact On Sight

This process follows a standstill and inspection, where it is immediately clear that there is a Fineable Event without an observation report being possible or necessary to be drawn up for central treatment by the administrative Supervisor. After this, the Inspector can start the enforcement process himself. See enforcement for this.



Enforcement

Concerns the administrative and physical part of enforcement including the imposition and transfer of fines, including collection and collection of fines. This also includes the various processes for handling objections and appeals. In addition, there is the physical enforcement process, which is completed by keeping Vehicles still based on the Signaling List and inspecting Vehicles and On-Board Equipment during roadside checks by the Inspector.

Administrative Enforcement

Impose Fine

If audit data shows that a user has committed violations, this is detected by the Supervisor and prepared in the registry for the Enforcer, who acts if necessary. This action will consist of the imposition of a fine.

In exceptional cases, the Enforcer can use the Toll Charger and the Heavy Goods Vehicle Charge registry, movement data of the relevant Obtain vehicles from the Service Provider in the form of a Toll Declaration with travel data, the Extended Toll Declaration, and place them next to the notification. With this check, the Enforcer can, for example, confirm or reject suspicions that the Driver has switched off the On-Board Equipment.

Support Objections & Appeals

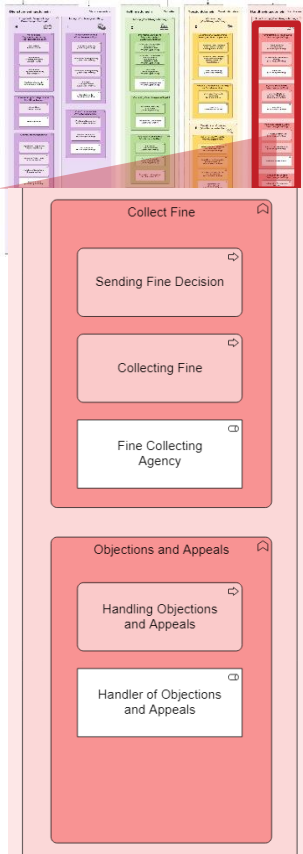
When the user submits an objection, the imposer of the fine will have to be able to provide support to the Objection and Appeal handler.

Enforcement On Sight

Hand out Fine & Impose Measures

If administrative fine collection is not possible, physical enforcement can be decided by keeping a Vehicle still by placing the registration number on the Signaling List. In such a situation, if there is a hit along the roadside, the Inspectorate will be able to stop the Vehicle and collect the bad fine.

In the case of a regular inspection, the Inspector can also decide to impose a fine immediately when it is immediately clear that there is a violation and the fine cannot be handled administratively due to the lack of an exchange treaty regarding the holder data.



Collect Fine

Sending Fine Decision

After the fine has been imposed by the Enforcer, the information is made available to the Collection Agency that sends the order.

Collecting Fine

After this, the generic collection process is started for handling the payment and any reminders or additional (bailiff) measures.

Objections and Appeals

Handling Objections and Appeals

The Holder can lodge an objection against a fine decision with the Enforcer and then possibly appeal to the court and appeal to the Council of State. The court notifies the Enforcer of the filing of the appeal and sends the relevant case information. Both the Holder and the Enforcer will be informed of the court ruling. When the appeal is rejected and the time limit for appeal has expired, the fine automatically becomes irrevocable. During the treatment, there is an intervention message to the Collection and Collection process.

Note: A Holder may also dispute an invoice with the Service Provider. The Service Provider must have set up a process for handling this.

7 System- & Information Architecture

The Heavy Goods Vehicle Charge system is based on the ISO 17573-1 scheme, which describes the interoperability between the different components of the system.

The information exchange between the back office of the Service Provider and the Toll Charger and the On-Board Equipment and the roadside systems of the Supervisor is central to this.

The basis is formed by the On-Board Equipment that takes care of the registration of the kilometers driven and also provides the necessary status information to the roadside systems.

From these information flows, the Levy, Supervision and Enforcement processes are activated.

To facilitate cooperation between the Toll Charger, Supervisors and Enforcers, the Heavy Goods Vehicle Charge Registry has been added.

In the figure below, the Dutch responsibilities are shown in the ISO 17573-1 diagram.

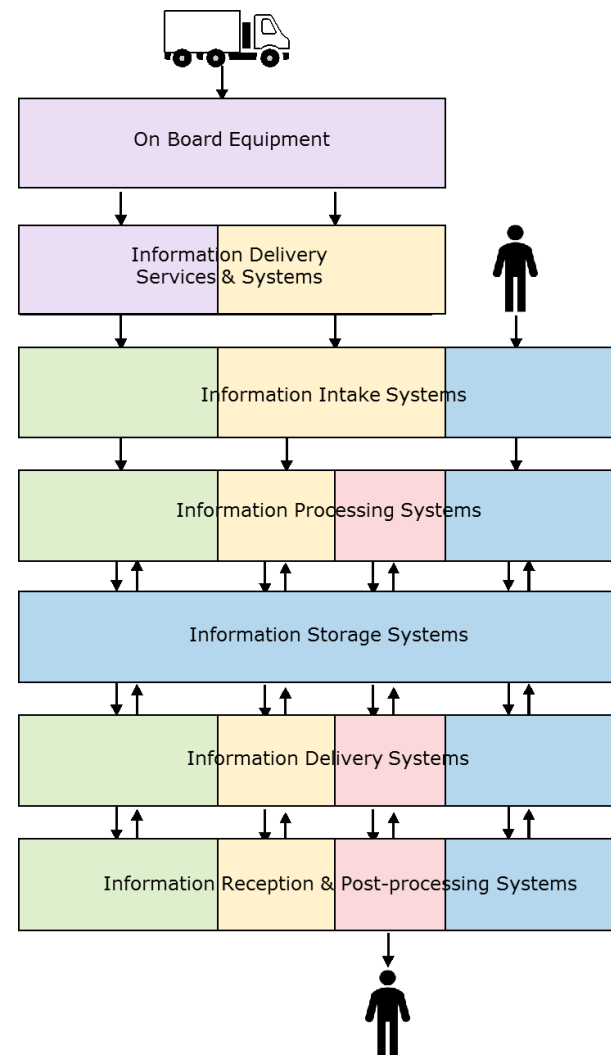


Figure 18: Classification of systems

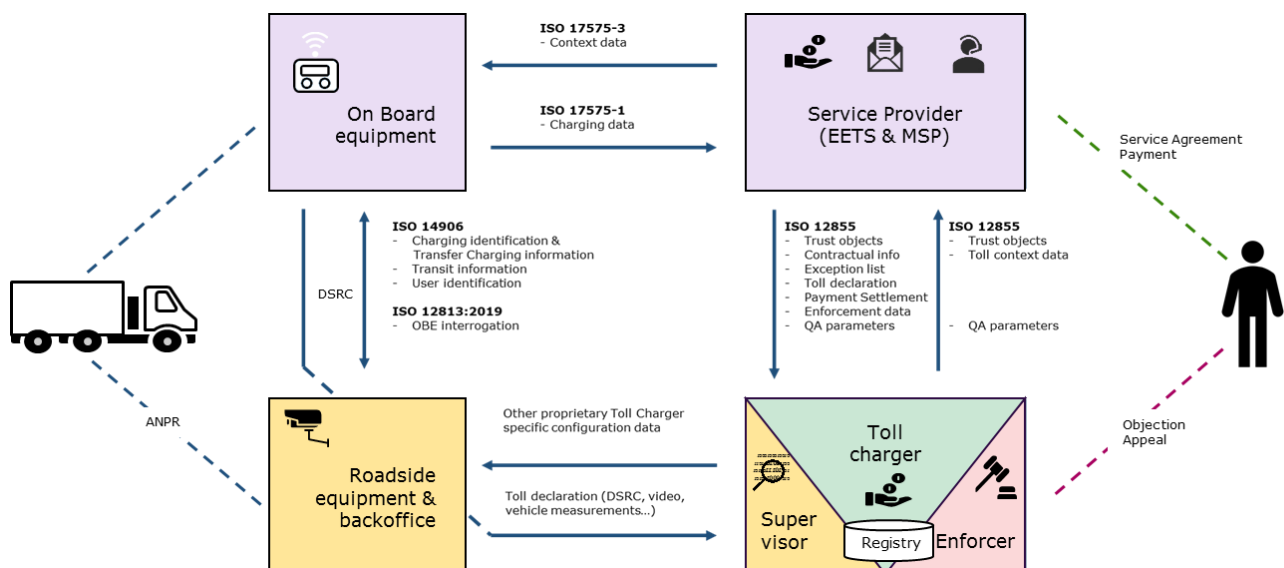


Figure 19: Dutch responsibilities mapped on the ISO 17573-1 scheme.

Locations in the system landscape

The figure below shows the locations that form the basis for the Heavy Goods Vehicle Charge systems. Many systems of both the market parties and the government are based on cloud solutions. The latest Cloud policy of the Dutch government was tested against this classification. No obstructive aspects did arise.

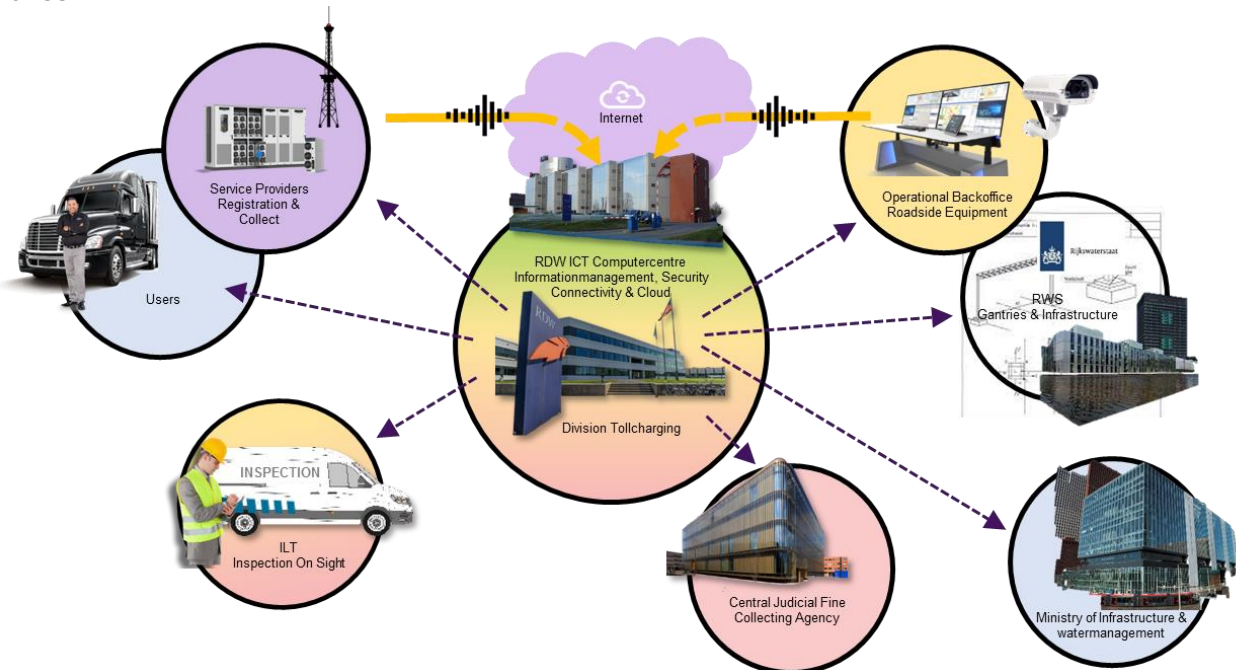


Figure 21: Outline of organisations & locations that play a role in the system landscape

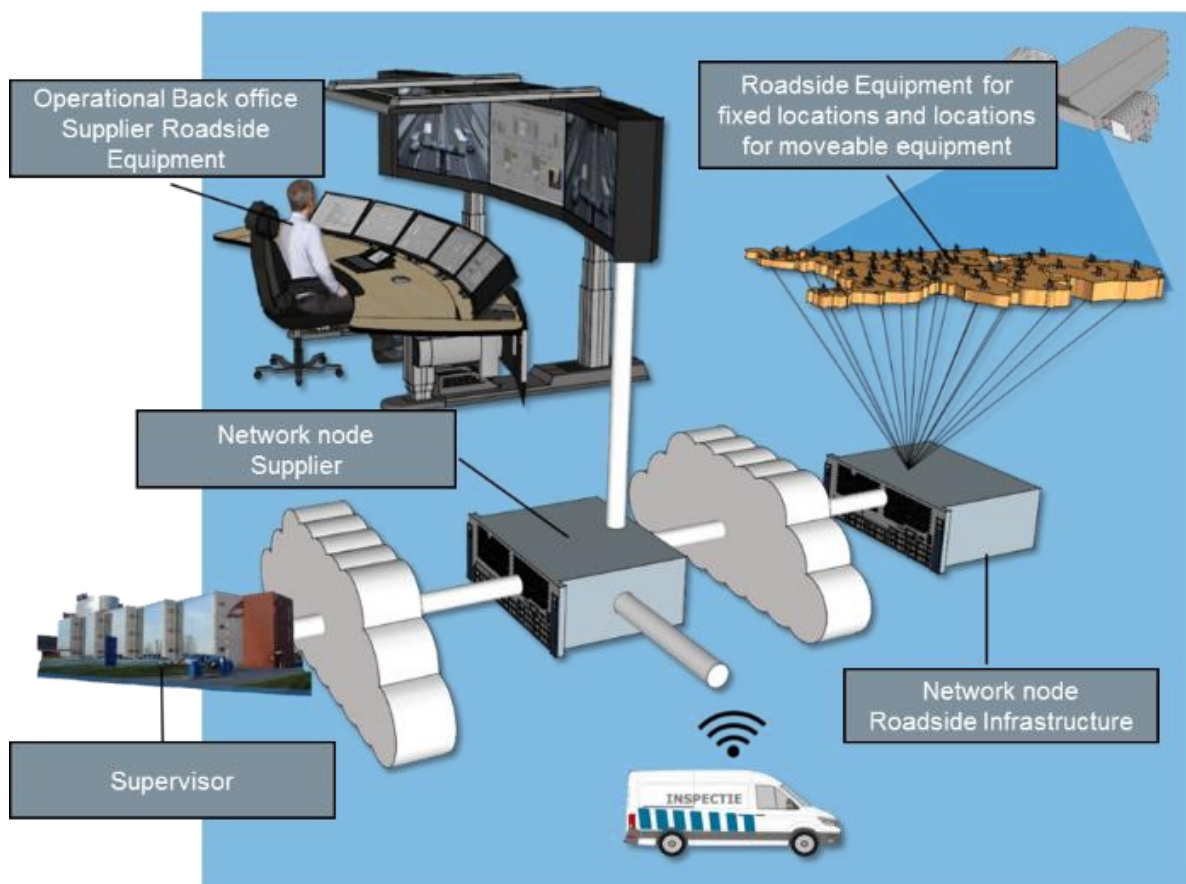


Figure 20: Sketch of the operational roadside equipment backoffice and interfaces

Information Delivery Services & Systems

The Information Delivery Services & Systems consist of the services and systems of the Service Provider and the supplier of the roadside systems.

These services and systems are the most important basis for the proper functioning of the Heavy Goods Vehicle Charge system. This collects the basic information for the levy and enforcement.

The services and systems are tendered in the market and have proven themselves to a large extent in other toll domains in Europe.

Information Processing Services

The information from Service Providers and Roadside Systems are the input for the information processing systems of the Toll Charger, Supervisors and Enforcers in the public domain.

These systems are based on proven concepts and building blocks (system components and platform). In addition, it is necessary to build or configure a number of specific components in order to be able to realize the required interfaces in the system.

In order to support the basis of the EETS concept and not to distort the level playing field in the Service Provider market, it is important that the interface of the Toll Charger is independent and not part of the service provided by the Main Service Provider.

The connection between the back office of the supplier of the roadside systems and the Supervisor will also have to be realized in order to be able to receive and process the information.

Subsequently, there is internal business logic and data exchange that enable a fair supervision and enforcement regime based on Dutch law. The revenue recognition is also partly based on the information from the Heavy Goods Vehicle Charge Registry and the business logic.

Finally, the processed information will have to be used in the existing financial system, the case system for objection and appeal and can be passed on to the Judicial Collection and Collection Agency. This information transfer is based as much as possible on the reuse of existing applications.

Information will also have to be made available to the supplier of the roadside systems in the form of signaling lists. The roadside inspector will also need to be able to request information.

This means that the Information Processing Systems are characterized by a combination of reuse, purchase and construction of certain parts.

It is important to recognise that these facilities cannot be taken off the market as a whole (Commercial Off The Shelf). When the market indicates that it can play a role here with existing solutions, it always concerns components such as a financial system, case system, roadside systems and back office and specific systems that form the basis for mainly the support of service provider tasks. All these components are reused or tendered.

Reference is also often made to the provision of 'Tolling As A Service' systems that can provide support as a whole. These are also solutions that are either used in a Toll Charger dominant scenario (such as point charges at tunnels or bridges) or as here the service provider supports activities in a service provider dominant scenario. Proven solutions are used in the Heavy Goods Vehicle Charge system wherever possible.

Information Reception & Post-processing Systems

These systems often support the end of a main process and take care of the handling of the financial administration, fines, objections, appeals and customer questions.

The systems mainly consist of existing solutions that are used within the implementing organizations in multiple standard scenarios. The basic registrations that are consulted within the government for vehicle and personal information are also described here.

The following sections further explain the components of the system landscape.

System Landscape Heavy Goods Vehicle Charge

The systems of the Heavy Goods Vehicle Charge system are shown below. The system landscapes of the service providers and supplier of the roadside systems are not further elaborated here. The requirements for these services and systems are maintained in the Requirements Management System Relatics and the Architecture Repository ARIS and are included in, among other things, annexes to the tender documentation.

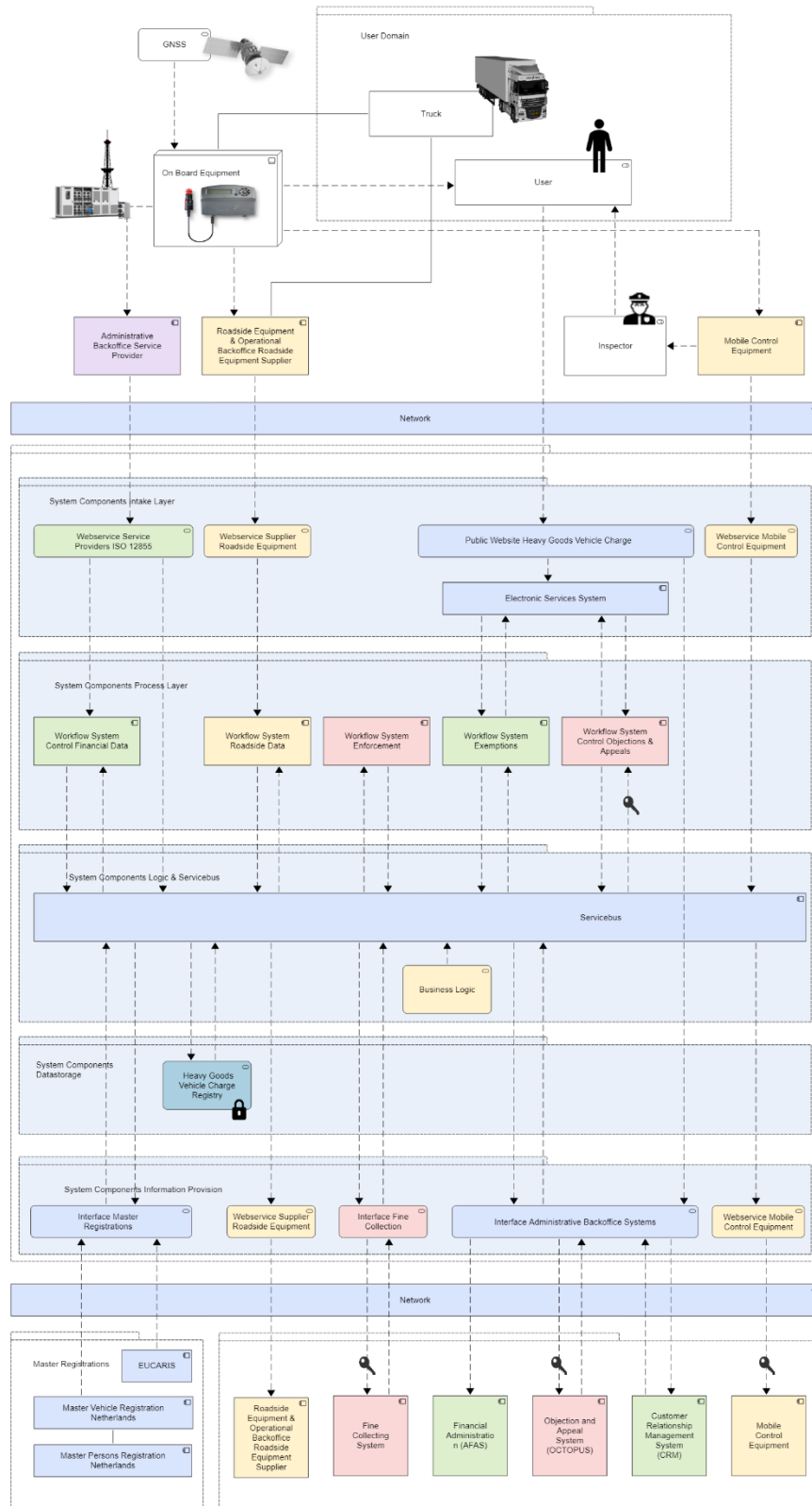
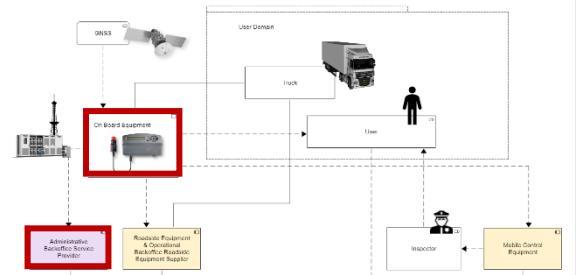


Figure 22: System Landscape Heavy Goods Vehicle Charge

Information Delivery

Systems of the Service Provider

The Service Provider's systems consist of a large number of facilities that make it possible to maintain communication with the On-Board Equipment, process GIS data, manage users and conduct financial administration. For the Heavy Goods Vehicle Charge system, these systems are not further developed, given that they are part of the functionally requested service. However, the interfaces with the Toll Charger and roadside systems of the Supervisor will be specified and tested (accreditation process)



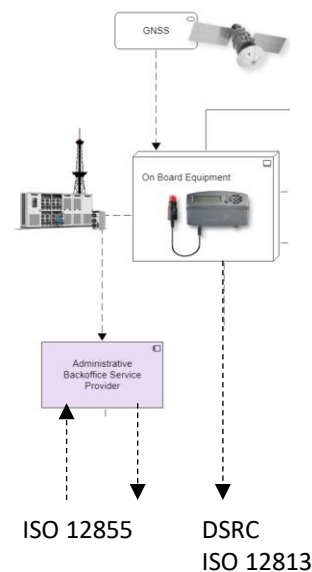
Input Back office service provider

The most important input for the systems of the Service Providers is the data that comes from the On-Board Equipment and the user.

The Service Provider also receives from the Toll Charger the relevant context data (road sections, tariffs) for the toll domain.

Main input:

- Service agreements
- Payments
- Travel data
- Toll context data
- User questions

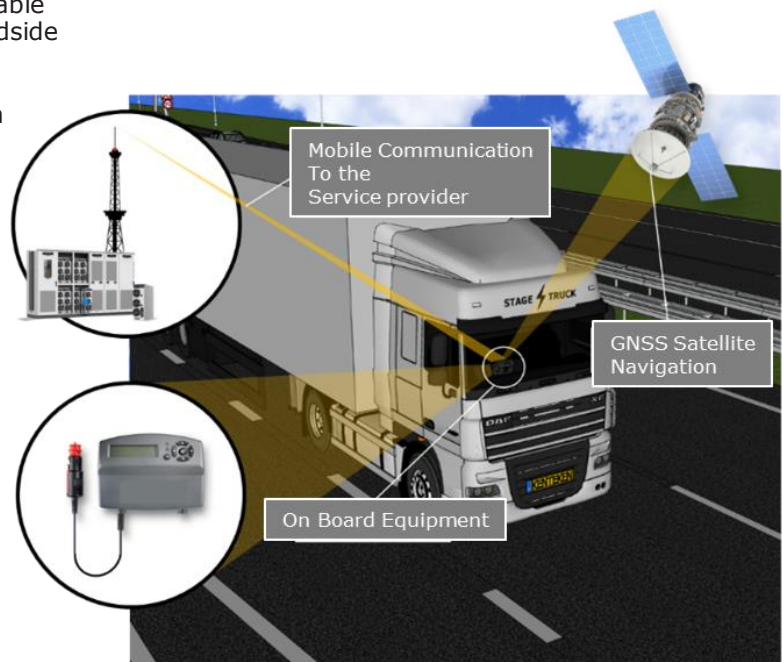


Output Back office service provider

The service provider shall ensure that the results of the journey with the kilometres travelled result in daily aggregated toll declarations and corresponding payment announcements (ISO 12855). The On-Board Equipment must be able to provide the status information to the roadside systems of the Supervisor (ISO 12813). In addition, the Service Provider must provide the relevant administrative user information to the Toll Charger (ISO 12855).

Main output:

- Toll Declarations
- Billing Details
- Payment Announcements
- Administrative Userdata (lists)
- Service Agreements
- Payments



Systems for Electronic Observation

The electronic observation systems consist of fixed and movable roadside equipment with ANPR and DSRC and are connected to an operational back office.

Operational Back office supplier:

- Roadside equipment operation, quality control photos and ANPR data and movement of movable enforcement equipment
- Sending observation data
- Enforcement data retrieval service for physical enforcement.

Input

- Vehicle Identification, Classification and On-Board Equipment Status Information
- Signaling lists
- Subscription to the signaling list.

Output

- Vehicle Passage Notifications
- Hit on the signaling list

Gantries (RWS and sub-contractors)

- Portals for fastening equipment
- Power supply and backup
- Network provision (fiber optic)
- Network service for routing and transport roadside data

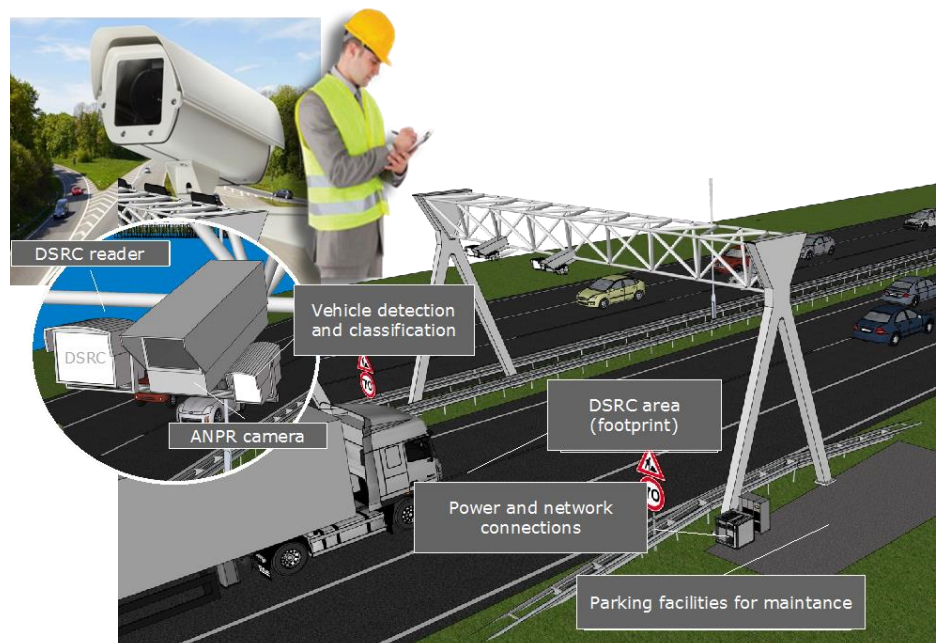
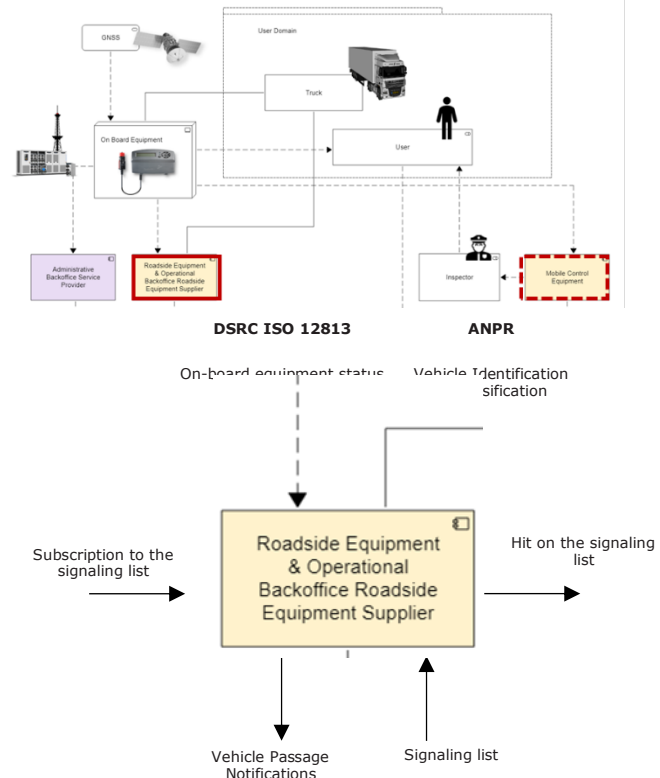
Mobile Control Equipment (option)

Input

- On-Board Equipment status information

Output

- Observation Report



Information Processing

System components Intake layer

For communication with the service providers, a standard ISO 12855 interface (web service) must be realized by the Toll Charger. This allows the service providers to exchange the required information in a trusted way.

For the exchange of information with the supplier of the roadside systems, a (web) service is realized for receiving the vehicle passage notifications.

Customer questions and information provision are done in a familiar way through the regular channels. For the public website, its own Heavy Goods Vehicle Charge will be realized at the latest, within the platform of the standard websites of the RDW. The support (process logic and controls) of the various services is also done in a generic way via the existing Electronic Services concept and system.

Finally, an interface is required for the receipt of the observation reports generated by the roadside inspectors.

Webservice Service providers

Input

- (Extended) Toll Declarations
- Billing Details
- Payment announcements
- Administrative user data
- Toll context data (via Registry publish service)

Output

- (Extended) Toll Declarations
- Payment announcements
- Administrative user data
- Toll context data

Webservice supplier roadside equipment

Input

- Vehicle Passage Notifications

Output

- Vehicle Passage Notifications

User

Input

- Questions
- Application for exemption
- Objection

Output

- Questions
- Application for exemption
- Objection
- General Information
- Decision Exemption
- Status Objection

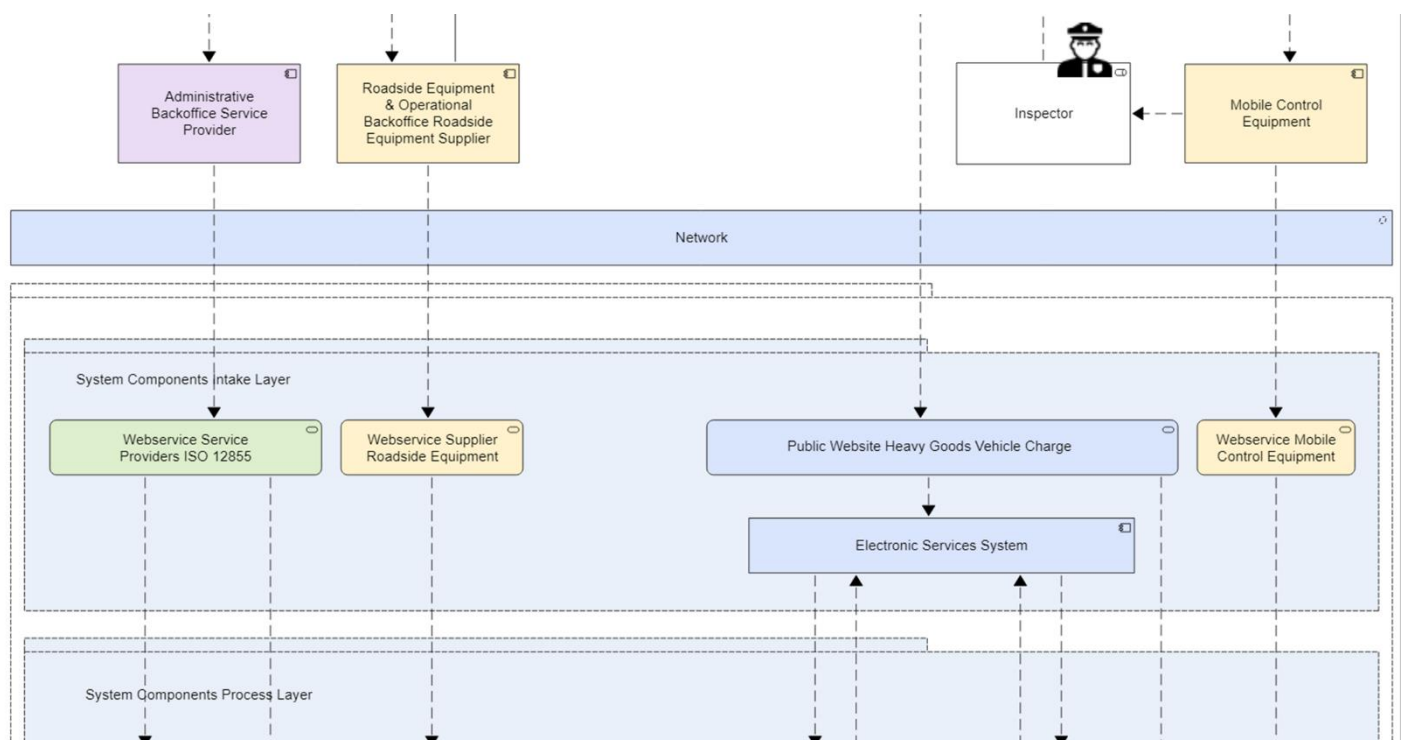
Web service Mobile Control Equipment

Input

- Observation Report

Output

- Observation Report



Systems Components Process Layer

For the treatment of the information received from service providers, roadside systems, inspection and customers, the RDW concept of the work order systems is followed. In this way, the assessment can take place on the basis of the desired business logic and the necessary additional information can be obtained from the Heavy Goods Vehicle Charge registry.

The results of the assessments are placed in the registry, after which the verified information and assessments are made available to the underlying business systems (financial, fine collection, objection and appeal, etc.).

Workflow system control financial data

Input

- (Extended) Toll declarations
- Billing Details
- Payment Announcements

Output

- Payment Announcements

Workflow system roadside data

Input

- Vehicle Passage Notifications
- Business logic Heavy Goods Vehicle Charge
- Administrative user information
- Vehicle information

Output

- Vehicle Passage Notifications
- Finable Offences

Workflow system enforcement

Input

- Finable Offences
- Extended toll declarations
- Vehicle Owner information

Output

- Fine

Workflow system Exemptions

Input

- Application for exemption

Output

- Decision exemption

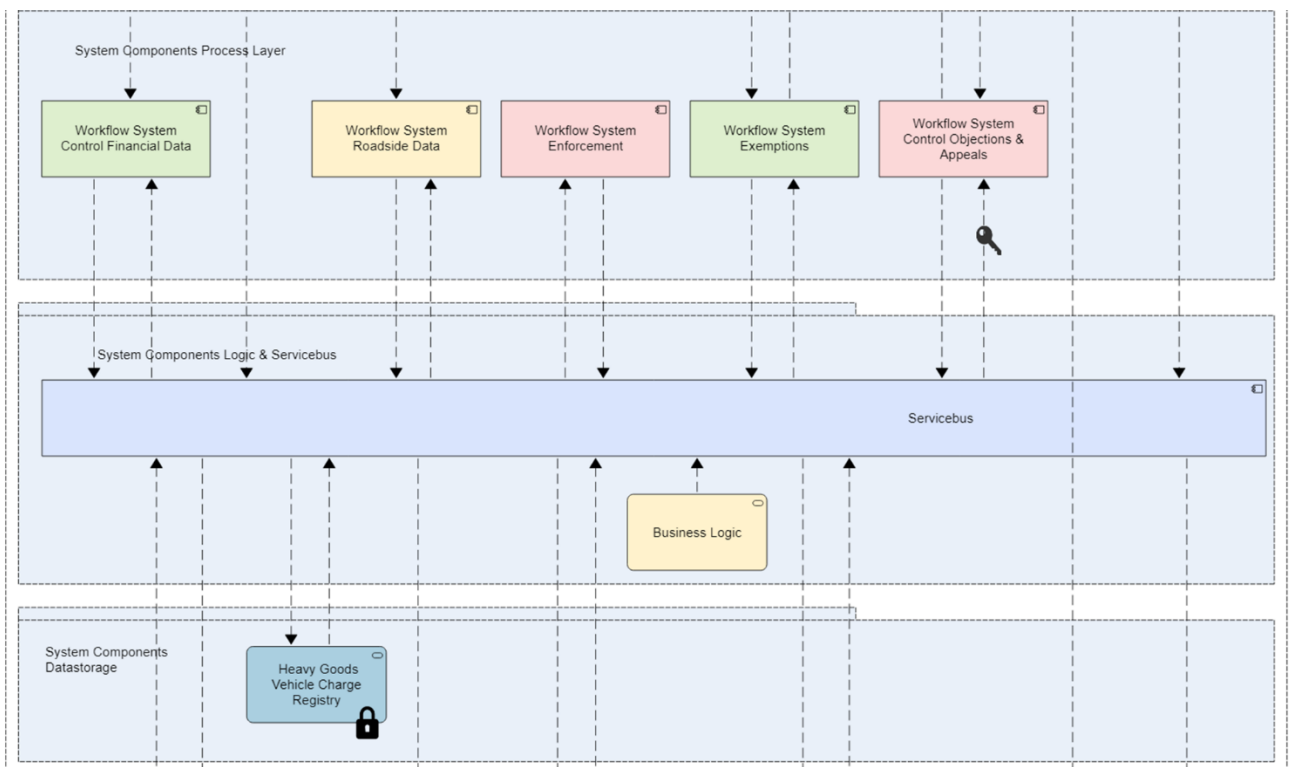
Workflow system control objections & appeals

Input

- Objection/appeal
- Fine
- Finable offences

Output

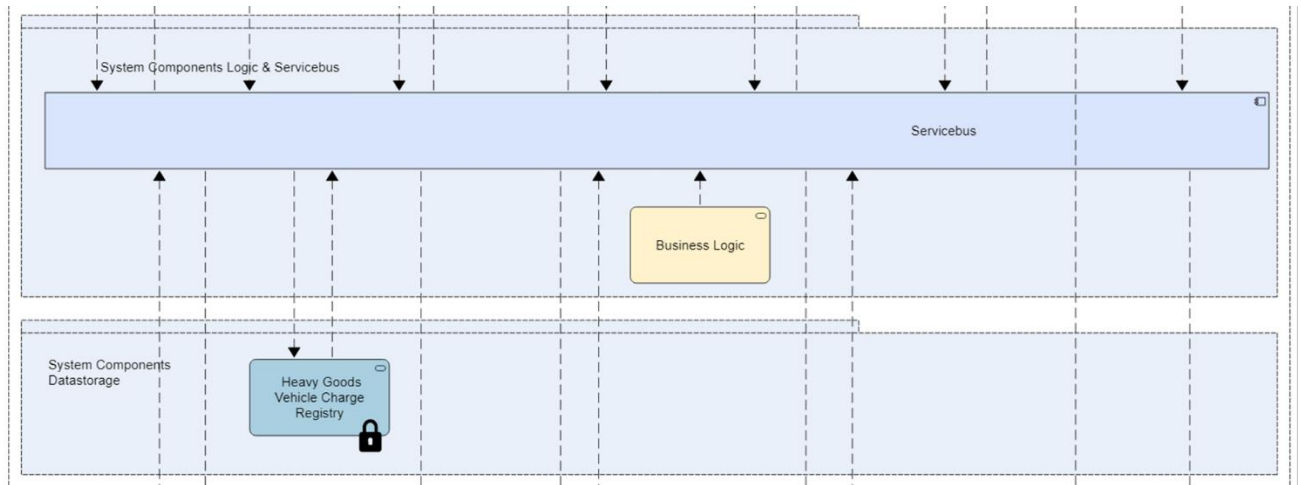
- Status objection/appeal
- Decision objection/appeal



Registry and Servicebus

The Heavy Goods Vehicle Charge Registry is the central place where information is stored and accessed. This is done via a service bus on which various publication ('publish') and subscription ('subscribe') services have been realized. This mechanism allows information to be shared between the different system components and maintains the processing responsibility of the various roles.

When information is placed in the registry by the administrator, this information is subject to the processing regime and responsibility of the Registry administrator. This ensures compliance with, among other things, statutory retention periods. The services on the service bus for accessing the registry are also the responsibility of the Registry Manager.



Information Provision and post-processing systems

The Information Access layer describes the new and existing interfaces and services to unlock the underlying information systems. The information systems are:

Master Registrations

Input

- Date/Time
- License Plate Number
- BSN (Citizen Identification)

Output

- Vehicle Information
- Identification Vehicle Holder
- Address information Vehicle Holder

Financial Administration system (AFAS)

Input

- Payment Announcements

Objection and Appeal system (Octopus)

Input

- Objection
- Fine file number
- Fine file

Output

- Status objection/appeal

Customer Contact system (CRM)

Input

- Question

Output

- Treatment question status

Mobile Control Equipment

Input

- Fine file number
- Fine file

Output

- Observation report

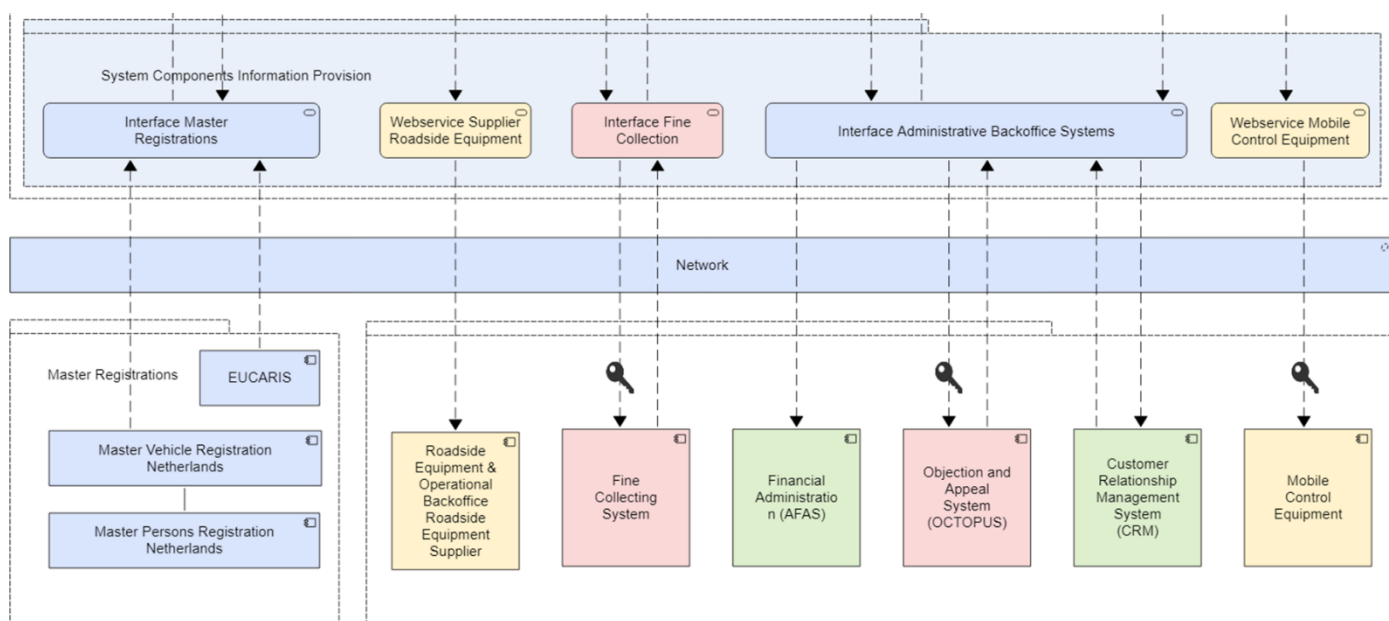
Fine Collection System

Input

- Fine file number
- Fine file
- Fact code

Output

- Fine file number
- Fine file
- Fact code
- Fine status



8 Security & Privacy

Security

Security Impact Assessment

The Ministry of Infrastructure and Water Management recognizes the importance of privacy and cyber security of the system for the Heavy Goods Vehicle Charge. Therefore, the Ministry has asked KASEA to carry out an analysis of the risks at this stage of the design of the system. The results are recorded in a separate document, the Security Impact Assessment (SIA). This SIA describes the threats, the measures and the requirements arising from the measures. Given the large size and sensitivity of this information, a separate document has been drawn up for this purpose.

The analysis was carried out on the risks resulting from the implementation of a toll system in accordance with the applicable standards and the Dutch situation in particular. In addition, various workshops were carried out with parties involved to gain insight into the design. These workshops were used as a basis for this research. The activities carried out included documentation study, workshops and risk analyses.

Key findings and recommendations

Given the large amount of personal data and the, in some cases, sensitive nature of the information, it is important that information security is set up at a high level. This concerns the complete spectrum from securing servers and (Wireless) connections to the physical security of Roadside devices, but also the governance and setting up of management procedures. To ensure a high level of security, extensive analyses have been carried out on various security aspects.

A total of 48 analyses were carried out, resulting from 6 'STRIDE' analyses on the relevant data flows between actors in the chain as included in the design. The risks have been translated into measures to be taken. The measures then result in requirements that are imposed on the various work packages and the market and implementing organisations.

Some of the requirements relate to all work packages, these requirements are derived from NIST CSF or ISO 27001 standards. This includes governance, risk assessment, risk management, identity and access management, awareness and training, technology, data security, management processes, detection and monitoring, response and recovery processes. The continuous improvement process on these elements is also an essential part of this. For the sake of readability and to avoid too many duplicate entries, the security requirements have been included in the SIA.



Privacy

Privacy Impact Assessment

When carrying out the Heavy Goods Vehicle Charge, personal data will be processed, both by government agencies and by private parties that have a role in the provision of data in the chain. The Heavy Goods Vehicle Charge must comply with the legal requirements set by the General Data Protection Regulation (GDPR) and the GDPR Implementation Act. In connection with this, Data Protection Impact Assessments (in practice better known as Privacy Impact Assessments (PIA)) are carried out periodically. By carrying out a PIA, the protection of personal data in a structured way becomes part of the balancing of interests and decision-making of intended policies, regulations and (ICT) projects within the chain of organizations involved. This increases the quality of decision-making. A PIA can be executed and updated several times and at different times. The PIA for phase 1 (the policy phase) and phase 2 (the internet consultation).

Personal data is understood to mean: all information about an identified or identifiable natural person. Information about deceased persons, legal entities, animals, property and objects are in principle not personal data.

In determining whether a person is identifiable, account should be taken of all means that can reasonably be expected to be used to identify the person. Metadata – information about information – is also personal data if the identity of the data subject can be traced from it. Examples of metadata are: which browser or phone someone is using.

Location information and geographical information also qualify as personal data if the information can be traced back to a person. Think of the linking of data from the Personal Records and Vehicles Database and the monitoring of the locations of Vehicles.

A license plate number applies to organisations/persons who can make the link between license plate number and the person in whose name the Vehicle in question is drawn up, as personal data.

Special personal data

Below is an exhaustive list of categories of special personal data:

- Racial or ethnic origin;
- Political views;
- Religious or philosophical beliefs;
- Trade union membership;
- Genetic data;
- Biometric data for the purpose of uniquely identifying a person;
- Health data;

Legal identification numbers.

Numbers identifying a person prescribed by law may only be processed for purposes determined by law. Think of: a Citizen Service Number (BSN). Governments may use the BSN. Private parties must also have a legal basis for this.

Criminal personal data

These are both convictions and suspicions of criminal offences. Examples of this are: official report, sepot decision, criminal record, account interrogation and application for an addition in a criminal case.

Ordinary personal data

Ordinary personal data does not mean that there is no high privacy risk. Certain personal data may be sensitive due to the context in which they are used and therefore pose a high privacy risk. This could include:

- Information on the financial or economic situation of the person;
- Information about violations of legal regulations, administrative and/or disciplinary measures or sanctions;
- Data that can be misused for (identity) fraud;
- Communication and location data.

Privacy Impact Assessment

The PIA Heavy Goods Vehicle Charge describes in detail the data processing and the associated privacy aspects.



9 Future-Proofing

Toll technology is evolving rapidly and it is therefore important to describe the possible future innovations and how they may affect the system as described in this draft.

On-Board Equipment

One component where innovations are expected is in the On-Board Equipment, which is used to detect and record the location of a Vehicle and sends this information back to the Service Provider. In the Belgian and German systems, among others, this is done using a special On-Board Unit (OBU) that is charged via the Vehicle, and combines the following functions:

- GNSS location tracking
- Mobile communication
- DSRC capacity

All this is supplied in one device, the OBU, which must be approved by the Toll Charger during accreditation for use in the toll domain.

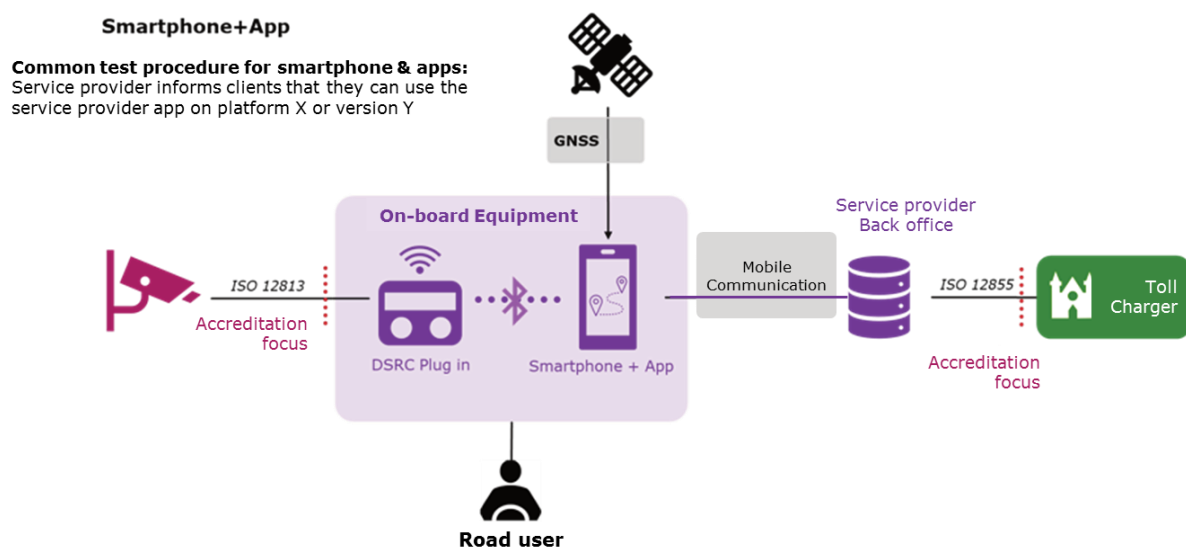
However, the requirements set out in the Implementation of the EETS Directive Act and in this draft do not prescribe that all these functions must be provided by one device. This makes it possible for Service Providers to use different devices to deliver the total functionality. The total functionality can be accredited and tested in the same way as an OBU in which all functionalities are combined.

Several countries, including the Netherlands, are exploring the possibility of extending remote-based toll collection to all Vehicles, including passenger cars. This development stimulates research and development of various technologies and the main possibilities considered for the future are explained below.

Smartphones

Most smartphones have a GNSS/GPS and mobile communication capability, and as such are an obvious option to take over at least two of the three functions of an OBU, as included in this design. This option has the advantage that most users already own a smartphone. However, when this is not the case, a new smartphone is generally more expensive for the user than an OBU.

It is possible that a Service Provider develops an app or has it developed by a third party and offers it to its customers. This app can be a 'thick client' where the rate is calculated in the smartphone itself, or a 'thin client' where the position data is sent back to the Service Provider who then calculates the charge.



The use of smartphones as OBU for toll collection has a number of potential problems:

1. Users can forget their smartphone;
2. The battery of the smartphone may be empty;
3. The smartphone may fall, be damaged or lost, stolen or overheated;
4. Users may forget to start/stop the app, or not place the phone in the correct position for proper location tracking;
5. There are differences in the hardware, in the operating systems, and in the versions of the mobile operating systems (this may also have implications for the accreditation process);
6. A smartphone may be more susceptible to fraud and interference than an OBU;
7. The use of the (private) smartphone may not be accepted by all users. It also potentially poses systematic privacy and security risks;
8. Smartphones do not have built-in capability for DSRC.

Points 1 to 4 are mainly operational problems and require careful consideration of how to deal with different scenarios.

Regarding point 5, there are several developments going on in the market that are closely monitored and that can affect the accreditation process of a smartphone + application + DSRC combination. For example, it is being investigated whether the accreditation process can be simplified by testing different operating systems and applications, instead of each type of model. However, there are still many uncertainties, including the location accuracy of different types of smartphones, and how this affects the registration of the location of the vehicle.

For point 6, the solution should meet the requirements of the SIA. An assessment of the possible additional risks may be required.

At point 8, it is good to mention that there is already a manufacturer that has developed a separate DSRC unit that can connect to a smartphone via Bluetooth. The cost of such a unit is not known, and it will require a separate charger.

In summary, the requirements do not exclude a smartphone application, provided that the above problems are solved.

In addition, smartphones could also play a role in providing a temporary solution in the event of a faulty or stolen OBU. A market consultation carried out in 2020 shows that for most EETS providers, the replacement of an OBU (in other words, the delivery of replacement OBUs to the

customer) is possible within 2 - 3 days, but in some cases takes 1 - 2 weeks, usually at the customer's headquarters.

Emergency Solution & Route Ticket

An interim, optional solution to this situation is that the HDA offers the driver an emergency solution by making available a (web-based) app with which the toll due can be calculated in an alternative way for a short period of time, until they receive the replacement OBU from their regular Service Provider.

In the short term, it will have to be investigated whether the earlier mentioned app can be implemented as an emergency solution (both in the form of an app with 'live registration' and in the form of a route ticket) for stolen or defective OBUs, taking into account the current scope and the current legislative proposal (or only limited adjustments to it), and without disrupting the planning of the tenders.

Fleet management system

Many fleet managers equip their Vehicles with tracking systems so that they can better control and manage their fleet. Such systems are usually equipped with GNSS/GPS and mobile communication and transmit the position data to the management system provider, which provides the fleet manager with a portal for the management of his fleet. This position data can be used for toll collection, as happens in Hungary and Bulgaria. These schemes do not provide for DSRC.

Different hardware and software are used by the different suppliers of this equipment. The Hungarian and Bulgarian systems have opted for an approach whereby each type must be accredited.

Besides the lack of DSRC, there is nothing in the requirements that makes such an approach impossible.

On-board diagnosis "dongle".

On-Board Diagnostics (OBD) is designed to give service technicians and mechanics access to the vehicle management system and to the interface for detecting any problems, and for performing software updates. This specialized port was soon made available for general use by third-party manufacturers, using a plug-in "dongle" or connector, where a user could purchase the device, plug it into the OBD port in their Vehicle and access the vehicle data. The devices are charged via the port itself and do not require any additional cables or power supplies.

Some vendors have developed devices that are charged by the OBD port and have a capability for GNSS/GPS and mobile communication. This device can be considered as a special OBU, but powered by the OBD port and without DSRC capability. Since there is no DSRC capacity, such units are cheaper than an OBU with DSRC.

Although all modern cars have an OBD port, it is not known to what extent truck fleets are equipped with such a port, nor to what extent a unit connected to it is able to pick up GNSS signals for accurate positioning.

A "dongle" would require individual accreditation per model and the effects of different positions in the Vehicle would have to be investigated.

In addition to the lack of DSRC, there is nothing in the requirements that excludes this type of solution.

Connected Vehicles

Newly produced vehicles on the European market are increasingly equipped with 'connected car' technology. It is expected that the share of Vehicles with this technology on the market will increase, as since 2018 it has been mandatory for new Vehicles to include GPS and communication modules in the so-called eCall system.

Some car manufacturers, such as BMW, Audi and Land Rover, send data, including position data, back to the manufacturer. Such data can be used for toll collection and have the advantage that the data does not depend on a driver's device or on switching on. Such built-in devices do not have DSRC capability.

It is not known to what extent Trucks are equipped with such facilities, nor what the manufacturers' plans are for their future introduction. Such provisions would clearly require some sort of individual accreditation and the involvement of the manufacturer as a potential Service Provider.

Beyond the lack of DSRC, there is nothing in the requirements that would preclude such an approach.

Enforcement without DSRC

Most of the above alternatives to On-Board Equipment do not have DSRC. In GNSS toll collection, DSRC is used for the control and enforcement of the charge, and provides the Roadside Equipment with important additional information, not only about the Vehicle, but also about the On-Board Equipment, including information about GPS locking, power on/off, etc. Without this DSRC facility, the Roadside Equipment has no information about which Vehicles have On-Board Equipment, and if so, whether it is operational. In this case, the only data available to the Toll Charger is that of the ANPR system and the classification equipment.

In order to determine whether a system without DSRC is possible in the future, more research is needed into the information that can be provided via ISO 12855. This concerns the following information that is needed to answer three important questions:

1. Data relating to identification. This data helps to answer the question whether the passing Vehicle is equipped with an authentic and activated OBE belonging to this Vehicle and assigned to an accredited service provider and active in this toll domain
2. Status information. This data is necessary to answer the question whether the OBE transmits the correct (GO) operational status to the user and whether it functions properly in terms of core technical functionality.
3. Data relating to the Vehicle. This data helps to answer the question of what are the rate-determining vehicle parameters currently specified by the user.

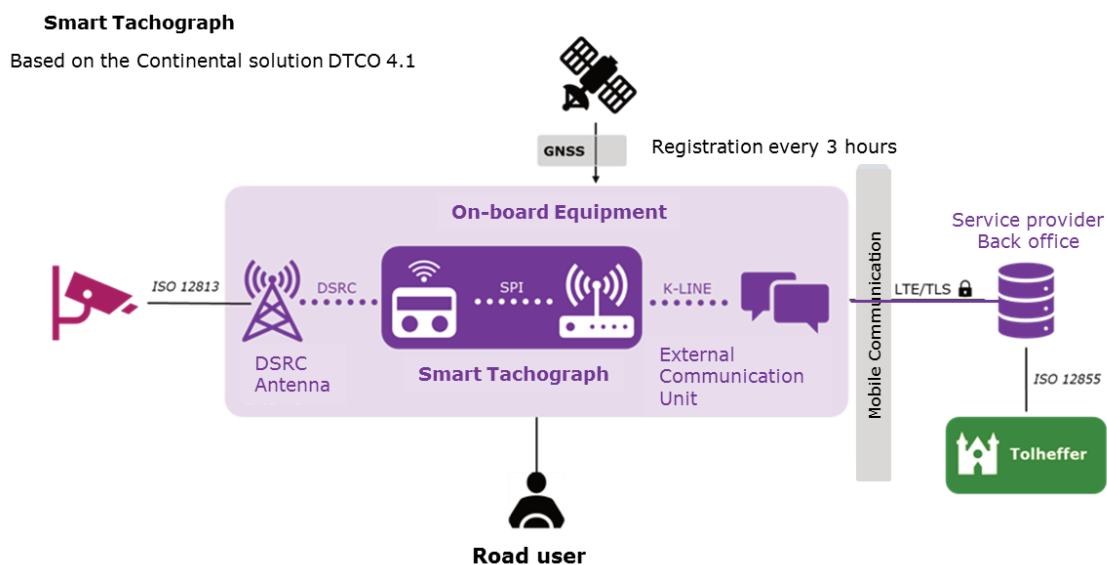
A system without DSRC is therefore only possible from an enforcement point of view if the above information that the Toll Charger needs can also be obtained in another way, through the Service Providers.

This innovation will not be further explored at the current stage of the program. After the system is live, it can be seen whether this innovation will still be investigated.

Smart Tachograph

Developments in the smart tachograph market will be monitored, but do not seem to be sufficient at the moment to be used for GNSS toll collection. For example, based on the current European regulations (Regulation (EU) No 165/2014 of the European Parliament and of the Council), the smart tachograph does not (yet) appear to be usable for toll collection. In addition, there are concerns about possible interference between the smart tachograph and the registration equipment. Developments in the smart tachograph market will be monitored, but do not seem to be sufficient at the moment to be used for GNSS toll collection. For example, based on the current European regulations (Regulation (EU) No 165/2014 of the European Parliament and of the Council), the smart tachograph does not (yet) appear to be usable for toll collection. In addition, there are concerns about possible interference between the smart tachograph and the registration equipment.

Based on the Ptolemus report "Compatibility studies between smart tachograph, weight & dimension applications and systems operating in the 5795-5815 MHz band and the adjacent bands"



Suppliers of interoperability hubs

Another development concerns that of the interoperability hub. In a number of Scandinavian countries, Austria, parts of North America and Ireland, it has been established that interoperability can be simpler, more efficient and more cost-effective by providing a centralised platform or hub where different files, such as exception lists, transaction files and context data can be consolidated and exchanged.

It also means that a single interface must be set up by the Service Providers and the Toll Charger(s), leading to lower installation and maintenance costs and higher reliability. With the arrival of a single interface, the testing and accreditation process also becomes easier. In addition to these benefits, the simplified access offers the opportunity to create more competition in the market, leading to further efficiencies.

From the role of Toll Charger in the Netherlands, this development is followed with interest, but given the expected lead time and the many legal hurdles that have to be taken, the current Heavy Goods Vehicle Charge solution will probably not benefit directly from this in the coming years. The research into and consultation on the use of a joint interoperability hub is continuing together with Belgium, Germany and Denmark, among others.

A Appendix: Definitions and Abbreviations

Definitions

The list is generic for Heavy Goods Vehicle Charge and describes concepts that go beyond just this Design Document.

Definition	Meaning (& Source)
Accreditation	Allowing Service Providers to provide services in a specific toll domain. The purpose of the accreditation process is to ensure that the equipment, software and processes of the EETS providers work correctly and are in compliance with the Implementation EETS Directive Act, the requirements laid down in the EETS domain statement and the specific systems and interfaces used. Successful accreditation enables EETS providers to charge their customers for the Heavy Goods Vehicle Charge through their account.
Administrative user data	Collective name for the information offered by the service providers to the Toll Charger regarding users, contracts and status information of the On-Board Equipment (ISO 12855 exception list and others). Not the financial information (toll declarations, payment announcements).
Aspect	Specific feature of the Heavy Goods Vehicle Charge system to be developed.
Candidate Service Provider	A Service Provider wishing to provide toll services to Holders in the Heavy Goods Vehicle Charge EETS area but has not yet been issued a certificate of accreditation or proof of successful completion of the tests.
Certificate of suitability for use	The certificate referred to in Article 41.2 of the EETS domain statement.
Chasing trajectory	The road section between the staging location and the enforcement location in which the Inspector Heavy Goods Vehicle Charge recognizes the signaled Truck and instructs it to follow to the enforcement location for the purpose of stopping.
Controller	A natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data; where the purposes and means of such processing are laid down in Union or Member State law, they may define the controller or the criteria for its designation.
Customer	The person with a Service Agreement that has access to the electronic toll service, for example the freight transport company.

Definition	Meaning (& Source)
Customer list	ISO 12855: "White List" An overview from each Service Provider, containing all its Service Agreements with Holders.
Declaration of suitability for use	The declaration referred to in [Article 41.1] of the EETS domain statement.
Driver	The person who uses the road network with a Vehicle.
Duplicate code	The indication of how many replacement number plates have been issued for the relevant Vehicle.
EETS-Directive Implementation Act	Rules for the implementation of Directive (EU) 2019/520 of the European Parliament and of the Council of 19 March 2019 on the interoperability of electronic road toll systems and facilitating the cross-border exchange of information on failure to pay road fees in the Union
EETS-directive	Directive 2019/520 of the European Parliament and of the Council of 19 March 2019 on the interoperability of electronic road toll systems and facilitating the cross-border exchange of information on failure to pay road fees in the Union.
EETS-domain	EETS-domain as referred to in Article 1 of the EETS Directive Implementation Act.
EETS-domain statement	EETS-domain statement as determined by the Toll Charger
EETS-provider	EETS provider as referred to in Article 1 of the EETS Directive Implementation Act.
EETS-registry	Registry as referred to in Article 6 of the Implementation of the EETS Directive Act managed by the Member State, with data on the relevant EETS domains.
Enforcement location	The roadside location where enforcement is taking place.
Enforcer	The organisation charged with imposing fines on behalf of the Minister.
Euro emission class	The emission class EURO 0, EURO I, EURO II, EURO III, EURO IV or EURO V referred to in Annex 0 to Directive 1999/62/EC of the European Parliament and of the Council of 17 June 1999 on the charging of heavy goods vehicles for the use of certain infrastructures (OJ 1999 L 187), or emission class EURO VI referred to in Annex I to Regulation (EC) No 595/2009 of the European Parliament and of the Council of 18 June 2009 on type-approval of motor vehicles and engines with respect to emissions from heavy-duty vehicles (Euro VI) and on access to vehicle repair and maintenance information, amending Regulation (EC) No 715/2007 and Directive 2007/46/EC and repealing Directives 80/1269/EEC, 2005/55/EC and 2005/78/EC (EU 2009, L 188).
Exception List	ISO 12855 and ISO 17573: "Exception List". Information exchanged between the Service

Definition	Meaning (& Source)
	Providers and the Toll Charger on the use of specific On-Board Equipment in an EETS domain.
Extended Toll Declaration	A communication from a Service Provider to the Toll Charger, drawn up in accordance with CEN/TS 16986, which, in contrast to the regular Toll Declaration, also includes the travel dates.
Fixed observation location	Roadside location where Fixed roadside equipment can be placed to observe.
Fixed roadside equipment	Fixed equipment installed for roadside observation.
Function	Intended operation of a system.
Heavy Goods Vehicle Charge	Levy referred to in Article 2, first paragraph, Heavy Goods Vehicle Charge Act.
Heavy Goods Vehicle Charge Act	Law of 22 August 2022, laying down rules for charging a truck levy for driving a truck on designated road sections.
Heavy Goods Vehicle Charge registry	Registry as referred to in Article 24 of the Heavy Goods Vehicle Charge Act that is managed by the Registry Manager and in which the data necessary for the proper execution of the Heavy Goods Vehicle Charge are processed.
Holder (Vehicle Owner)	Holder as referred to in Article 1 of the EETS Directive Implementation Act: • In whose name a Truck is listed in the Vehicle Registration; • Who actually has a Truck for which no License Plate has been specified; • In whose name a Truck is drawn up in a foreign register concerning motor vehicles registered there, the registration concerning motor vehicles used for the benefit of the armed forces, kept by our Minister of Defence, as well as any other registration concerning motor vehicles, which he is entitled to carry in the Netherlands.
Inspection	Organisation who is allowed to stop vehicles under Article 17 of the Heavy Goods Vehicle Charge Bill.
Inspector Heavy Goods Vehicle Charge	The person designated under section 14(1) of the Heavy Goods Vehicle Charge Act and charged with supervising compliance with the supervision provided for by or pursuant to the Heavy Goods Vehicle Charge Act. This specifically concerns the Inspector in charge of physical supervision
Interface	Interconnection (association, carrier, channel) between two systems/system parts, through which a (sometimes dynamic) interaction or interaction between those systems/system parts can take place.
Interim measure	An interim measure as referred to in Article 17, third paragraph, Heavy Goods Vehicle Charge Act.

Definition	Meaning (& Source)
Interoperability constituent	A basic component, group of components, part of an assembly or complete assembly of equipment which are part of or intended to be part of the EETS and on which the interoperability of that service depends directly or indirectly, including both tangible and intangible items such as software.
Interoperability Manager	The organisation responsible for legislation and regulations in one or more EETS areas, including enforcement rules and rules regulating the collection of the charge in an EETS domain.
Kilometre/Kilometer	The distance, expressed in units of 1000 meters, rounded to the higher or lower hundredth; at the higher hundredth if the thousandth of a kilometer is more than or equal to 5 and rounded at the lower hundredth if the thousandth of a kilometer is less than 5.
List of Defect Reported On-Board Equipment	ISO 12855: relevant reason code 3 from the Exception List. An overview from each Service Provider, containing all On-Board Equipment reported as defective by the Holder or Service Provider.
List of Invalidated On-Board Equipment	ISO 12855: "Black List" A list maintained by Service Providers of Vehicles for which the Service Provider concerned no longer accepts responsibility for the payment of the Heavy Goods Vehicle Charge, for example for non-payment or fraud.
Main Service Provider	Service provider referred to in Article 11 of the Heavy Goods Vehicle Charge Act.
Map-matching	A process of assigning measured geographic locations to locations on a digital map to determine which routes vehicles have driven.
Maximum Permissible Mass (MPM, Dutch: MTM)	the weight of a Truck plus the maximum weight of cargo permitted for the Truck.
Movable roadside equipment	Movable equipment installed for roadside observation.
MSP-Agreement	Agreement concluded between the Toll Charger and the Main Service Provider.
National contact point	The competent authority designated in the Netherlands for the cross-border exchange of vehicle registration data.
OBE footprint test	A test in which the communication between the OBE and the DSRC beacon is tested in different positions using a test set-up consisting of a test gantry with mounted roadside equipment.
Observation Service /Observation Supplier	A party contracted by [the State / the RDW] that provides the systems and provides services for obtaining and sending the observation data along the roadside.
On-Board Equipment	On-Board Equipment in a Truck Used for Electronic Toll Collection.

Definition	Meaning (& Source)
On-Board Equipment	All hardware and software components installed or carried on board a Truck that are used as part of the toll service, in order to collect, store, process and receive or transmit data remotely, as a separate device or integrated into the Truck.
Our Minister	Minister of Infrastructure and Water Management.
Payment Announcement	The statement provided by the Service Providers to the Toll Charger, announcing the payments they will make, in accordance with Payment Announcement CEN/TS16986.
Penalty Charge Notice	Order imposing an administrative fine as referred to in Article 15 of the bill.
Phase of use	The period in which the system to be implemented is in use from and including the date on which the Heavy Goods Vehicle Charge is actually due.
Physical living environment	Physical living environment as referred to in article 1.2, second paragraph, of the Environmental Act.
Physical Observation/ Observation On Sight	Making observations by human action, with or without the help of technical aids, to monitor compliance with the Heavy Goods Vehicle Charge Act.
Processor	A natural or legal person, public authority, agency or other body that processes personal data on behalf of the controller.
Public Judicial Debt Collection Agency	The body responsible for collecting and paying fines on behalf of the Minister of Infrastructure and Water Management, also known as the fine collection agency or CJIB.
Registry Manager	The role responsible for managing the Heavy Goods Vehicle Charge registry. This role is also Controller for the registry.
Requirement	Description of the requested characteristic of the product or service to be supplied.
Road	The road referred to in section 1(1)(b) of the Road Traffic Act 1994.
Road authority	• Our Minister for roads managed by the State; • Provincial councilors for roads managed by a province; • The general administration for roads under the management of the water board or, by decision of the general board, the day-to-day management; • The mayor and aldermen or, by their decision, a board committee set up by them for other roads.
Road section	Specifically designated road or part of that road, as referred to in article 2, first paragraph, Heavy Goods Vehicle Charge Act.
Road section segment	A part of a Road section with a unique "chargeObjectId".

Definition	Meaning (& Source)
Roadside equipment	Fixed and movable equipment installed next to a road for observation purposes.
Service agreement	Agreement referred to in Article 8, first paragraph, Heavy Goods Vehicle Charge Act.
Service Provider	Main Service Provider or EETS Provider
Signaling trajectory	The road stretch between the Observation Site and the Staging Location in which it is determined that the Truck in question must be stopped in respect of a non-collectible fine in connection with the charge.
Signaling list	List of Vehicles to be stopped.
Staging location	The location where the Inspector Heavy Goods Vehicle Charge (incl. official car) can set up for stopping Vehicles after a hit with the Signaling List.
Storage location	The location where a Truck (towing vehicle) for max. 12 weeks can be stored.
Supervisor	The person designated pursuant to Article 14, first paragraph. The organisation responsible for (administrative) supervision.
System Heavy Goods Vehicle Charge	All components that allow the levying of load based on distance driven from Trucks.
Taxable road network	Road network subject to the Heavy Goods Vehicle Charge; Road sections referred to in the Annex to the [Heavy Goods Vehicle Charge Bill].
Test harness	A test environment consisting of software and test data that is set up to be able to test systems or parts thereof automatically under different conditions and to check the behavior and output.
Test cases (Use cases)	A specific case consisting of a sequence of events that an actor may encounter and which is used to test the functionality of a system and its processes.
Toll Charger	Toll Charger as referred to in Article 1 of the Implementation of the EETS Directive Act.
Toll Context data	The information established by the responsible Toll Charger that is necessary to determine the toll to be paid for a particular Vehicle in a specific toll area and to complete the toll transaction, as referred to in paragraph 15, Article 2 of the EETS Directive Implementation Act.
Toll Declaration	A communication from a Service Provider to the Toll Charger, drawn up in accordance with CEN/TS 16986:2016, indicating, among other things, the On-Board Equipment ID, the number of kilometres driven on roads subject to charges and tariff class and confirming the presence of a Vehicle in an EETS domain.
Toll status	Information about a License Plate Number from the Heavy Goods Vehicle Charge registry.

Definition	Meaning (& Source)
Truck	Motor vehicle referred to in article 1, first paragraph, point (c) of the Road Traffic Act 1994 or a combination of vehicles intended or used for the carriage of goods by road, the maximum permissible mass of which is more than 3,500 kilograms.
Variable observation location	Roadside location where Movable Roadside Equipment can be placed to observe.
Vehicle	A Vehicle as defined in the Heavy Goods Vehicle Charge Act.
Vehicle registration	The registry referred to in Article 42 of the Road Traffic Act 1994.
Workday	Every day, except Saturday, Sunday or a public holiday as referred to in the General Time Limits Act.

Abbreviations

Abbreviation	Meaning
ANPR	Automatic Number Plate Recognition Technology to automatically recognize license plates from digital images.
DSRC	Dedicated Short Range Communications Technology for wireless communication over short distances (up to a few tens of meters), especially for 'automotive' applications. The technology is widely used for electronic Heavy Goods Vehicle Charge, both for identification/registration (not in this scenario) and for enforcement (this scenario). Communication takes place between On-Board Equipment in a (moving) vehicle and the Roadside Equipment (RSE). DSRC has two variants: microwave and infrared.
EETS	European Electronic Tolling Service Service to improve interoperability between electronic toll systems in the European Union, ultimately creating a single uniform method for electronic Heavy Goods Vehicle Charge (EFC). The service is defined in Directive 2019/520 (see also Commission Decision 2009/750/EC of 6 October 2009).
GNSS	Global Navigation Satellite System Satellite positioning technology. Most well-known operational system is the American GPS (Global Positioning System). There is also a European system under development called Galileo and a Russian system called GLONASS.
GPRS	General Packet Radio Service GPRS is a technique that extends the existing GSM network. With this technology, a more

Abbreviation	Meaning
	efficient, faster and cheaper way for sending and receiving mobile data is achieved.
GSM	Global System for Mobile Communications Standard for digital mobile telephony. GSM is considered the second generation of mobile telephony (2G).
KASEA	KPMG, Stibbe, Eubelius and ARUP. Consortium that supports the Ministry with substantive advice and realization of underlying documentation for Heavy Goods Vehicle Charge. Among other things, knowledge input from the Belgian toll domain.
KPI	Key Performance Indicator
OBE	On Board Equipment On-Board Equipment in a Truck Used for Electronic Heavy Goods Vehicle Charge.
PIA	Privacy Impact Assessment Analysis of system-wide privacy risks and measures.
PICS	Protocol Implementation Conformance Statement The declaration of conformity of the protocol implementation.
RPO	Recovery Point Objective Recovery point objective is the aim to comply with the agreed maximum permissible amount of data loss after failure of a system.
RTO	Recovery Time Objective Recovery time objective is the aim to meet the agreed recovery time after failure of a system.
SIA	Security Impact Analysis Analysis of system-wide security risks and measures.
MPM (Dutch:TMM)	Maximum Permissible Mass The mass of the truck or combination of vehicles plus the maximum mass of load permitted for the truck or combination of vehicles.
TTH	Temporary Toll Blankenburg & ViA15.
VPM (Dutch)	Vehicle Passage Notification.
HGVC (Dutch: VWH)	Heavy Goods Vehicle Charge.

