ANNEX 7: APPLICABLE TECHNOLOGY, TECHNICAL REQUIREMENTS AND KEY PERFORMANCE INDICATORS

1. The applicable technology

a. System overview

Figure 1 provides a schematic overview of the subsystems within the kilometre charging system, including the interfaces between these subsystems. The description in this paragraph is merely intended to clarify the tests required. The complete interface specifications will be provided by Viapass.

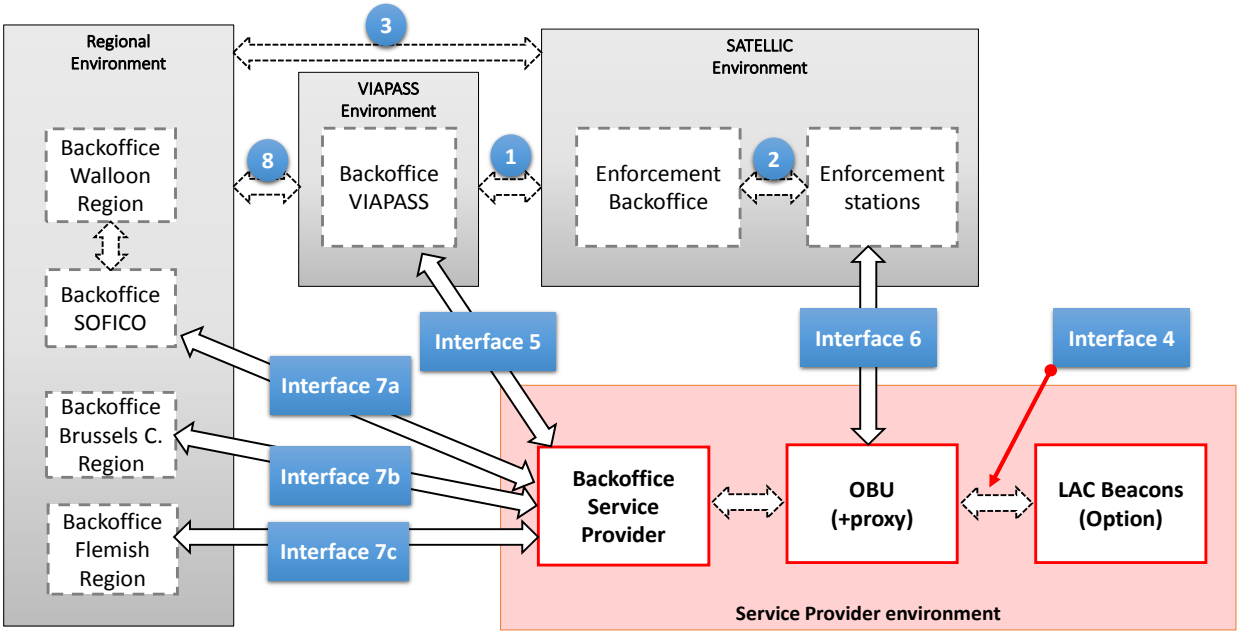

Figure 1 Schematic overview of subsystems and interfaces in the kilometre charging system with associated interface standards

The back office of the service provider, the OBU and the interfaces drawn in solid lines are explicitly subject to the certification tests. For the interfaces, this means that a service provider must demonstrate that these satisfy the set requirements.

The other systems and interfaces are outside the scope of the test processes described in *Annex 4*. A service provider does not therefore explicitly need to demonstrate that these interfaces satisfy a particular specification. Obviously, however, all interfaces must function correctly when performing the End-to-End tests and the Trial Run (see Annex 4).

Below is a brief functional description of the systems shown in Figure 1:

(i) The **On-board Unit and the proxy (OBU)**: this concerns equipment inside or outside a vehicle subject to the kilometer charge, which is primarily used to record the use of the road network subject to charge using GNSS technology and send data on this use to the back office of the service provider. The OBU also has a DSRC interface to the enforcement stations, which must satisfy ISO 12813 and the interface specifications provided by Viapass.

(ii) The **back office of the service provider**: this involves the central facilities of the service provider, in which the data recorded by the OBUs are aggregated, validated and/or enriched. Based on these data, for each vehicle subject to charge the service provider's back office regularly sends toll declarations to the Viapass back office (interface 5) and necessary information (for instance, daily toll statements, payment report, traffic data, …) to the back offices of the toll charger (interface 7). In general, the service provider's back office takes technically care of the obligations (legal, tax, financial, confidentiality, privacy, …) that stem from the activities of the service provider.

(iii) The **Viapass back office**: this involves the central facilities of Viapass, the interregional entity regarding toll charging. In the Viapass back office the parameters are defined, based on which the height of the amounts to be paid is determined. These parameters (such as the roads subject to charge and the amount of the kilometer charge per kilometre depending on the tariff zone/road section, maximum permitted total weight and Euro emission class of the vehicle, time and direction of travel) are forwarded to the back office of the service provider. The Viapass back office also checks the data (daily toll statements) supplied by the service provider and the toll amounts paid. The interface from the service provider back office to the Viapass back office must comply with ISO 12855 and with the interface specification that will be made available by Viapass. The communication relating to the management of the black lists and white lists of the service provider also goes via this interface.

The data included in the black lists and the white lists are depersonalized by Viapass. Viapass communicates the name, the address and/or domicile and/or registered office of the party subject to the charge to the enforcement authorities, at their request.

(iv) The **enforcement back office**: this is the back office of the service provider charged with the execution of enforcement and sanctioning ("enforcement provider").

(v) The **back offices of the toll charger:** these are back offices that are managed separately by each toll charger. The service provider sends the necessary information (for instance, daily toll statements, payment report, traffic data, …) to these back offices. In general, the toll charger's back office takes technically care of the obligations (legal, tax, financial, confidentiality, privacy, …) an the enforcement and reporting activities that stem from its activities.

(vi) The **enforcement stations**: Fixed, flexible and/or mobile stations next to or above the road, that are capable of detecting and classifying vehicle automatically, recognize the number plate, interrogate the OBU over a DSRC interface, compare obtained data with the white list and the black list, and, in case of a suspected violation, send data to the enforcement back office.

(vii) **LAC beacons** (if needed)**:** Location Augmentation Communication is a technology for improving the accuracy of the position determination of GNSS-based OBUs in places where

GNSS is not sufficiently accurate. This technology is standardized in the ISO 13141:2010 standard. If such beacons are required for the system of the service provider, it must install such beacons on its own expenses, while Viapass will assist with getting the necessary permits. The service provider shall also have to demonstrate that the OBU and the beacons function properly, so that the OBU-proxy combinations satisfy the set accuracy requirements.

b. Operational processes

Besides the functioning of the technical systems, all (business) processes must also be tested before a service provider can be admitted to the toll domain of the toll chargers. To that end the following important processes will, among others, be verified:

(i) The recording of the kilometres travelled by an OBU-proxy combination on the entire Belgian road network
(ii) The recording of events by an OBU,
(iii) The communication of data from service provider back office to Viapass back office (statement),
(iv) The calculation under all circumstances of the correct amount of the kilometer charge for each vehicle so that the correct amount is paid to the toll charger,
(v) The payment of amounts collected from the kilometre charge to the toll charger,
(vi) The correct drawing up of white lists and black lists, including name and address details,
(vii) The establishing of the Key Performance Indicators (KPIs) achieved by the service provider.
(viii) The communication with the enforcement equipment
(ix) The functional business processes, by means of *use cases*.

2. Technical requirements and Key Performance Indicators

The system of the service provider must comply with the following requirements and Key Performance Indicators (KPIs).

The requirements set out below are regarded as minimum requirements, for which, depending on the case, a malus or fixed penalty is applied, or possibly a compensation under common law.
In case the service provider does not comply with a KPI during a given quarterly period, a malus will be applied. Only the KPI mentioned in 1.2.1 may give rise to a bonus.

For some requirements a fixed penalty per case is applicable, which depends on the importance of the requirement, in accordance with the legend below. A case is considered to be a situation in which the service provider does not comply with the specified technical requirement once or more times. If a case is not remedied within the time period mentioned below, it will be considered as a new case until the requirement is fulfilled. Penalties will be accumulated.

Legenda

	Technical requirement for which, unless explicitly mentioned otherwise in that technical requirement, no fixed penalty has been set.
	KPI with bonus-malus formula specified in annex 8 (KPI).
	Very important requirement with severe penalty: 1% of the total quarterly toll revenues of the service provider per case for the application of penalties and penalty point reductions. Every case must be remedied within a time period of one week as from the first notification of the toll charger and/or Viapass of the violation of the requirement, unless stipulated otherwise below.
	Important requirement with intermediate penalty: 0.5% of the quarterly toll revenues of the service provider per case for the application of penalties and penalty point reductions. Every case must be remedied within a time period of two weeks as from the first notification of the toll charger and/or Viapass of the violation of the requirement, unless stipulated otherwise below.
	Regular requirement with regular penalty: 0.2% of the quarterly toll revenues of the service provider per case for the application of penalties and penalty point reductions. Every case must be remedied within a time period of four weeks as from the first notification of the toll charger and/or Viapass of the violation of the requirement, unless stipulated otherwise below.

a. Kilometre charging system

1.1.1	Standard	The system must comply with architecture standard ISO 17573: 2010.
1.1.2	Standard	The system must comply with standard ISO 14001:2004.

b. Recording

1.2.1	KPI: Recording accuracy	The total number of kilometres recorded on toll network routes to be defined later, made by vehicles with a working OBU shall not differ from the actual number of kilometres travelled by more than 4% in urban areas and more than 2% in non-urban areas, including major roads in urban areas,.
1.2.2	KPI: Recording accuracy	The number of vehicles with a working OBU for which the number of recorded kilometres on the toll network exceeds the actual number of kilometres travelled by more than 1.5% in urban areas and 1% in non-urban areas, including major roads in urban areas, must be less than 0.1%.

1.2.3	KPI: Recording accuracy	The number of vehicles with a working OBU for which the number of recorded kilometres on the toll network falls short of the actual number of kilometres travelled by more than 4% in urban areas and 2% in non-urban areas, including major roads in urban areas, must be less than 2%.
1.2.4	Tariff system	The tariff applied to the user for the kilometres recorded by the service provider must be correct taking into account the parameters of the applicable tariff formula for this vehicle, this tariff zone or road section.
1.2.5	Tariff system	For all recorded kilometres in a particular tariff zone or road section, all recorded kilometres travelled within more than 25 m from the outer boundaries of this zone must be assigned to that tariff zone or road section.
1.2.6	Tariff system	A tariff zone or road section is never shorter than 150 m and never narrower than 75 m. Several types of road with different tariffs may be defined within a zone. The tariff system must always detect the correct road section within the zone.
1.2.7	Tariff system	The tariff system must be able to handle at least 1000 tariff categories. This includes Euro emission classes, maximum permitted total weight classes, road categories, time categories and direction categories and zero tariffs
1.2.8	Tariff system	The tariff system must support the use of at least 100,000 different tariff zones or road sections.
1.2.9	Tariff system	The tariff system must offer the possibility of being adapted once every six months to new or modified tariff zones, road sections and tariff categories (preparation, development, testing, pre-loading, acceptance and activation). All new/modified elements in the tariff system must be active on the date of entry into force.
1.2.10	Recording	All incidents and error messages that take place in relation to kilometre recording must be logged and must be able to be consulted by means of a service point and enforcement point.
1.2.11	Dispatch	All movements recorded by the OBU, whether or not aggregated, must in fact be reported by the proxy to the back office. All activities that take place in relation to the sending of OBU usage data (incoming and outgoing) must be logged and be able to be consulted by the concerned toll charger and Viapass by means of interfaces with the service provider.

1.2.12	Aggregation	All incidents and error messages that take place in relation to aggregation must be logged in the OBU proxy combination and must be able to be consulted by the service provider and Viapass by means of an electronic interface.
1.2.13	Validation / enrichment	All activities that take place in relation to validation and enrichment must be logged and be able to be consulted by the service provider and Viapass by means of an electronic interface.
1.2.14	Fixed charge	The system must allow a fixed charge to be levied in certain zones if a vehicle has travelled at least X metres, but never less than technically possible, within this zone, with a maximum of Y fixed charges per vehicle per 24-hour period. The amount of the fixed charge and the values X and Y are determined, if necessary, by the toll charger.
1.2.15	EURO emission class and MPTW	The EURO emission class and maximum permitted total weight (MPTW) used by the service provider for the determination of the tariff for the charged kilometer charge, must not be different from the real EURO emission class and maximum permitted total weight (MPTW), as evident from the vehicle documentation presented to the toll charger, for more than 1% of the vehicles. If a deviation of more than 1% is detected, a fixed penalty of 2,000 EURO will be charged per vehicle above that limit of 1%, provided that during the quarterly period concerned at least 2,000 vehicles registered by the service provider were inspected.

c. OBU

1.3.1	Certification	The service provider is responsible for certification of the OBU and the kilometre charging system.
1.3.2	Directive	The OBU must comply with Directive 2004/108/EC on electromagnetic compatibility (EMC).
1.3.3	Directive	The OBU must comply with Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
1.3.4	Directive	The OBU must comply with Directive 2002/96/EC on waste electrical and electronic equipment (WEEE).
1.3.5	Directive	The OBU must comply with all standards required by EC- and Radio and Telecommunications Terminal Equipment (R&TTE) directives.
1.3.6	Directive	The OBU proxy combination must comply with ISO 17575.

1.3.7	Weather / traffic	The OBU proxy combination must function reliably and in accordance with the accuracy requirements in all weather and traffic conditions in Belgium.
1.3.8	Weather / traffic	The OBU must function correctly in collaboration with the enforcement equipment in all weather and traffic conditions in Belgium.
1.3.9	First fix	The OBU proxy combination must be able to determine its position reliably within not more than 60 seconds of the OBU having been switched off or shielded for a long period, and from that moment record the kilometres travelled accurately and reliably.
1.3.10	Reprogrammable	The functions of the OBU, such as the enforcement interface, the location augmentation interface and the recording functionalities, must be remotely reprogrammable.
1.3.11	Personalisation	The OBU proxy combination must be able to be personalised at the time of issuance with data from the vehicle, such as Euro emission class, MPTW and license plate.
1.3.12	Fraud	The OBU proxy combination must have functions that detect deliberate disruption of its correct operation and report this to the back office and the party subject to the charge / driver. This includes, for example, but is not limited to, spoofing, jamming, shielding, tampering and breaking in.
1.3.13	Fraud	The OBU proxy combination of a party subject to the charge who commits fraud or continues to illegally use the road must have the possibility of sending position information to the back office to identify the fraudulent party subject to the charge and stop the driver.
1.3.14	Replacement OBU	The service provider must provide possibilities by which a party subject to the charge whose OBU is no longer working properly can obtain a correctly functioning OBU within a limited time (maximum 30 minutes).
1.3.15	MMI	The man-machine interface must not jeopardise traffic safety.
1.3.16	MMI	The man-machine interface must indicate clearly and unambiguously to the driver whether the device is working correctly.
1.3.17	MMI	The man-machine interface must clearly and unambiguously indicate to the party subject to the charge / driver when the device is not working and the party subject to the charge / driver must report the OBU as faulty to the service provider.

1.3.18	Recording	The system for establishing the kilometre charge uses GNSS location determination as a way of determining location, time, direction of travel and movement
1.3.19	Communication	The OBU must be able to communicate wirelessly and without the intervention of the driver with the necessary functions of the service provider such as sending of kilometre declarations and tariff updates. This communication must be able to take place on a two-way basis (upload from the OBU and download to the OBU). It is up to the service provider to select a technology appropriate to the requirements. The technology used must make it possible to submit data at least every minute. This 1-minute requirement applies as long as there is mobile data network coverage. When there is no coverage, all recorded usage data must be able to be stored in the OBU.
1.3.20	Communication	As soon as the vehicle equipped with the OBU is situated at 00h00 within the Belgian borders or enters Belgium during the day, the OBU must, after passing the Belgian border and as soon as the GNSS system communicates that the OBU is situated at least 100 metres near the Belgian border, make a connection with the back office of the service provider, communicating that a toll domain of the Belgian kilometre charging system has been entered. The OBU has to make the same connection with the back office of the service provider when the concerned vehicle leaves Belgium, with the communication that the Belgian territory has been left.

d. Back office

1.4.1	Collection	All recorded kilometres for a particular day must be claimed by no later than the following day. If the amount of the recorded but not yet claimed kilometres reaches the usage guarantee of the party subject to the charge, the service provider must make an extra claim at that moment. Depending on the guaranteed payment method submitted, a claim concerns a collection from the credit card or fuel card company or a reduction of the balance (for advance payments).
1.4.2	Collection	All activities that take place in relation to collection must be logged and be able to be consulted.
1.4.3	Collection	The service provider must inform the driver, in a manner attributable to the party subject to the charge, by means of a message on the OBU that the party subject to the charge no longer has a valid agreement with the service provider or that the OBU is no longer working.

1.4.4	Declaration (DTS)	The service provider must have sent every day by 06h00 the file (Daily Toll Statement or DTS) that contains all kilometres recorded for the previous day, to the concerned toll charger in due form. The time period during which must be remedied is 24h as from the notification of the violation of the requirement by the service provider.
1.4.5	Declaration / notice	All activities that take place in relation to a declaration and billing (incoming and outgoing) must be logged and be able to be consulted by the concerned toll charger and Viapass by means of interfaces with the service provider.
1.4.6	Payments	The collected kilometre charge amounts are paid from the bank account operated by the service provider to the (individual) bank accounts of the toll charger.
1.4.7	Invoicing	At least once per month, the service provider must generate an electronic invoice and submit this to the party subject to the charge. The invoice lines must be grouped by day and by toll charger. The level of detail of the invoice must be able to be determined by the party subject to the charge. In the interim, by logging into the account of his/her personal web page, the party subject to the charge can be given the possibility to obtain an overview of the amounts charged up to that date and the associated recorded kilometres for each (type of) tariff zone/road section and tariff for each (type of) tariff zone/road section.
1.4.8	Invoicing	The invoice must at least show the full amount of the kilometre charge per toll charger, with a distinction being made between infrastructure costs and external costs, and clearly distinguish the costs of the services of the service provider and the toll amount owed. Any VAS are shown separately. Any VAT is shown separately. Besides the composition of the toll amount that is relevant to the party subject to the charge, the invoice shall also at least show the time and place of the toll, unless the party subject to the charge decides otherwise.
1.4.9	Invoicing	All activities that take place in relation to the generation and sending of the usage and payment overview must be logged and be able to be consulted.
1.4.10.	Dispatch DBR	The service provider must have sent every working day by 10h00 the overview of payments (Disbursement Report or DBR) to the concerned toll charger in due form.
1.4.11.	Dispatch DIL	For every toll charger subject to VAT, the service provider must have sent every working day by 9h00 the Daily Invoice List or DIL to the concerned toll charger as required.

1.4.12.	Dispatch DCNL	For every toll charger subject to VAT, the service provider must have sent every working day by 9h00 the Daily Credit not List or DCLN to the concerned toll charger as required.

e. Interfaces

1.5.1.	Interfaxe 4: OBU – LAC Beacon	The OBU must be able to support the localization augmentation beacon in accordance with the ISO/TS 13141:2010 standard. In practice this interface functions by means of the same physical interface as interface 6.
1.5.2	Interface 5 : toll charger - service provider	The exchange of data via interface 5 must use the EN-ISO 12855:2012 standard.
1.5.3	Interface 5: toll charger - service provider	The communication over interface 5 must take place on a reliable, confidential and irrefutable way by both parties.
1.5.4	Interface 6: OBU - enforcement	The enforcement interface must comply with standard CEN ISO/TS 12813:2009.
1.5.5	Interface 6: OBU - enforcement	The enforcement interface of the control stations is reprogrammable so that the OBU of the (EETS)service providers with possible deviant protocols can also be questioned by means of this interface.
1.5.6	Interface 6: OBU - enforcement	The enforcement equipment must be authenticated before the OBU sends data via the interface.

f. Key Performance Indicators

1.6.1	Reporting	Reporting on KPIs takes place to Viapass each month within 20 working days of the end of the month.
1.6.2	Reporting	If it is likely that the defined tolerance on a KPI will be exceeded, the service provider must report this within 24 hours. This is therefore earlier than the periodic reporting moment.

g. Monitoring Interfaces

1.7.1	Interface monitoring transactions	The service provider shall provide an interface through which it is possible for Viapass and the concerned toll charger to check all transactions performed by the service provider on behalf of Viapass, from OBU to invoicing and collection.
1.7.2	Interface traffic data	The service provider is able to provide an interface through which per-minute anonymised traffic data of movements of parties subject to the charge of the service provider in Belgium can be sent to Viapass and the toll charger every 5 minutes, whilst respecting the privacy legislation.

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