ANNEX 4: TESTING PROCESS FOR CANDIDATE SERVICE PROVIDERS

1. Introduction

After the *letter of intent* has been signed and the technical and commercial concept has been presented, Viapass, and potentially its experts, shall conduct the testing process.

The figure shows the order and mutual dependence of all the tests which must be performed within the context of certifying a (candidate) service provider.

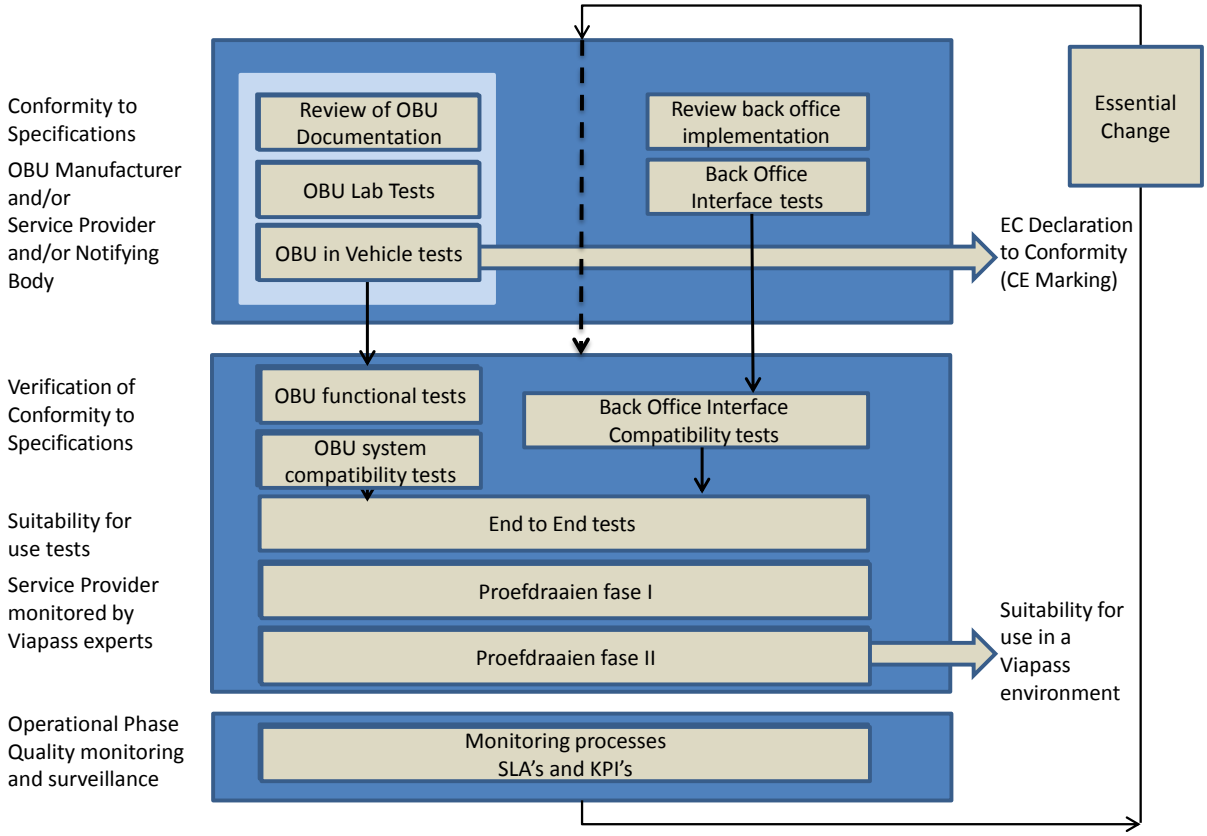

Figure: Overview of all tests involved in certifying a (candidate) service provider.

(Candidate) service providers must already have passed the conformity tests before Viapass and its experts start their testing process. The conformity of the (candidate) service provider's interoperability constituents to the standards listed in *Annex 2* of the Toll Domain Statement was tested during the conformity tests. The conformity tests must have been performed in accordance to one of the procedures from among the modules listed in Decision 768/2008/EC. The conformity tests resulted in a declaration of conformity of the interoperability constituents.

The first part of the testing process by Viapass and its experts therefore consists of the *verification of the conformity tests*. This verification consists of (i) the inspection of the declaration

of conformity of the (candidate) service provider's OBU, (ii) the inspection of the declaration of conformity of the (candidate) service provider's back office, (iii) compatibility tests for the OBU and (iv) functionality tests for the OBU.
The verification of the conformity tests is outlined in greater detail in section 2 of this Annex.

The second part of the testing process consists of the *suitability tests*. The objective of these tests is to prove that the (candidate) service provider's kilometre charging system functions properly in coordination with the Belgian kilometre charging system in the toll chargers' toll domains. This is proven if the interoperability constituents indeed function correctly and in accordance with the specifications in a test environment and, subsequently, in the actual Belgian kilometre charging system. The suitability tests consist of: (i) the interface tests for the service provider's back office, (ii) the End-to-End tests, and (iii) the test run (in two stages). The suitability tests will be performed in accordance with Annex IV of European Commission Decision 2009/750/EC.
The suitability tests are outlined in greater detail in section 3 of this Annex.

The (candidate) service provider's performance is continuously measured during the operational stage by means of the Key Performance Indicators (KPIs) provided in Annex 7 of the toll domain statement. This is described in further detail in Annex 8 to the toll domain statement.

If one or more toll chargers decide to implement a bi-annual change to the road network that is subject to the charge or to the tariffs or tariff categories, the accuracy of the registration of kilometres travelled by the service provider's kilometre charging system must be re-tested, as outlined in section 4 of this Annex.

If the service provider's OBU and/or the back office undergo relevant changes, the service provider must apply to have its kilometre charging system recertified. Section 5 of this Annex outlines this recertification process.

If a (candidate) service provider uses multiple OBU models, e.g. because they are supplied by different manufacturers, such OBUs must undergo all of the processes outlined in this Annex.

2. Verification of the conformity tests

a. Verification of the declaration of conformity of the OBU

The (candidate) service provider presents the EC declaration of conformity of the interoperability constituents regarding its OBU (hereafter: EC declaration regarding the OBU).

The EC declaration regarding the OBU clearly states that the CE marking placed on the OBU pertains to conformity tests. The EC declaration regarding the OBU was drawn up in accordance with Annex III to Decision No 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC. The EC declaration regarding the OBU must contain all relevant information, including at least:

- the brand and model of the OBU in question,
- the European legislation based upon which the declaration was made,

- The manufacturer,
- The standards based upon which the tests were performed.

The conformity tests must prove the conformity of the OBU to the following standards:

- CEN/ISO TS 12813:2009 and the DSRC standards referred to therein

Viapass is entitled to examine the documents of the EC declaration regarding the OBU and to (have someone) perform specific tests where necessary.

b. Declaration of conformity of the back office interface

The (candidate) service provider presents the EC declaration of conformity of the interoperability constituents regarding its back office interface (hereafter: EC declaration regarding the back office interface).

The EC declaration regarding the back office interface was drawn up in accordance with Annex III to Decision 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC.

The conformity tests only pertain to the back office interface interacting with the Viapass back office (see Figure 1 in Annex 7 to the toll domain statement) and must prove the conformity of said interface to the following standards:

- CEN/ISO TS 12855:2012

Viapass is entitled to examine the documents of the EC declaration regarding the back office interface and to (have someone) perform specific tests where necessary. Viapass and its experts will pay attention primarily to the correct communicating, by the service provider, of black lists and white lists, address details of parties subject to the charge and vehicle details of vehicles subject to the charge.

c. Compatibility tests for the OBU

During the conformity test, the (candidate) service provider proved that the OBU complies with the ISO 12813:2009 standard. However, an additional specification, which Viapass will provide, applies to the enforcement equipment used by Viapass. During the compatibility tests for the OBU, the (candidate) service provider must prove, in cooperation with the Viapass experts, that the OBU also meets this specification.

d. Functionality tests for the OBU

The aim of the functionality tests for the OBU is to verify the performance of the (candidate) service provider's OBU under controlled circumstances. Such verification will focus on the functionality and reliability of the OBU.

At least the following elements will be tested in cooperation with the Viapass experts:

- The (candidate) service provider must prove in a laboratory environment that the OBU communicates correctly with the toll chargers' roadside equipment while using varying personalisation data.
- The (candidate) service provider must prove in a laboratory environment that communication with roadside equipment is reliable.
- The (candidate) service provider must prove in an acceptance environment, i.e. in an actual roadside environment, that the OBU communicates correctly with roadside equipment under realistic circumstances.

During the test, the (candidate) service provider must vary (i) personalisation data, (ii) OBU installation positions, (iii) vehicle model and (iv) driving speed.

3. Suitability tests

a. Introduction

The suitability tests shall be performed after the conformity tests have been completed successfully. The objective of these tests is to prove that the (candidate) service provider's kilometre charging system functions properly in coordination with the kilometre charging system in the toll chargers' toll domains. The suitability tests consist of: (i) the interface tests for the service provider's back office, (ii) the End-to-End tests, and (iii) the test run (in two stages).

Tests already performed during the conformity tests are only repeated if Viapass so requests.

b. Tasks and responsibilities

During the suitability tests, the (candidate) service provider's kilometre charging system is tested in a laboratory environment and in the existing kilometre charging system. Viapass, its experts and the (candidate) service provider cooperate to this end. The overall distribution of tasks and responsibilities is outlined in this section.

The (candidate) service provider must:

1. bear the responsibility of performing the suitability tests;
2. draw up a test plan for the suitability tests. This test plan includes: a schedule, the detailed test cases, the necessary test environments and test tooling and findings management. Viapass must approve this plan before the suitability tests may be started. Detailed requirements for the test plan will be communicated by Viapass beforehand.
3. perform the tests in accordance with the agreed test plan;
4. draw up a test report and make it available to Viapass. Detailed requirements for the test report will be communicated by Viapass beforehand.

Viapass will take the following actions, in consultation and cooperation with its experts:

1. assess the test plan and grant permission to start the suitability tests if the test plan is adequate;
2. supervise the execution of the suitability tests by the (candidate) service provider;
3. provide its cooperation in performing the suitability tests if this is required;

4. based on the test report of the (candidate) service provider's system, assess the performance of such system in the toll chargers' kilometre charging system. This specifically concerns the required registration accuracy and the proper functioning of this system on all of the toll chargers' roads;
5. certify the suitability for use if the (candidate) service provider's kilometre charging system functions properly and in accordance with the specifications.

The (candidate) service provider must cooperate with Viapass and its experts. The experts' task is to ensure good collaboration between the service provider and Viapass.

c. Interface tests of the (candidate) service provider's back office

During these interface tests, the flawless communication of the (candidate) service provider's back office with the toll charger's back offices and the Viapass back office through the interfaces is tested.

The interface tests must prove the conformity of the (candidate) service provider's back office to the following standards:

- CEN/ISO 12855:2012.
- The additional specifications which Viapass will make available.

At least the following elements shall be tested:

- sending toll context data from Viapass to the (candidate) service provider's back office;
- sending daily toll statements from the service provider's back office to the Viapass back office;
- communication regarding the management of the black list and the white list, including name, address and place of residence data;
- communication regarding the payment of toll to the toll chargers' back offices (with a copy to the Viapass back office).

d. End-to-end tests

The end-to-end tests shall verify that the (candidate) service provider's kilometre charging system functions properly as a whole. In addition to this, the compatibility of the (candidate) service provider's interoperability constituents with the toll chargers' existing kilometre charging systems shall be verified. Furthermore, all of the (candidate) service provider's operational processes shall be tested. The tests shall be performed in an acceptance environment that is technically identical to the toll chargers' kilometre charging system.

These tests are used to assess whether all systems function properly in conjunction. At this stage, all technical requirements in *Annex 7* which have not yet been verified in an earlier test stage shall be tested. It is customary that *use cases*, which have been drawn up from the perspective of the various end users, are used in this type of test.

e. Test run

The test run is the last stage of the suitability tests. The (candidate) service provider can only start the test run after Viapass has judged that all of the tests outlined above have been fully and correctly completed.

The test run consists of two sub-stages:

Sub-stage 1: At least six vehicles, equipped with a total of 30 OBUs, must complete four defined test routes. These test routes consist of at least:

- 300 km on a route consisting of motorways;
- 150 km of a route consisting of secondary roads;
- 75 km on a route consisting of roads in the urban centre of Brussels, including the tunnels located there; and
- 75 km on a route consisting of narrow roads in the urban centre of Brussels.

The registration accuracy of the system must meet the requirements set in KPIs and technical specifications 1.2.1 to 1.2.5, as described in *Annex 7* to the Toll Domain Statement. See *Annex 8* to the Toll Domain Statement for a description of the method to determine KPIs 1.2.1, 1.2.2 and 1.2.3.

Sub-stage 2: At least four vehicles, equipped with a total of at least 20 OBUs, must together travel along all roads having a tariff higher than EUR 0/km in the toll chargers' toll domains. The proper functioning of the (candidate) service provider's kilometre charging system, including the required accuracy on all roads driven on, must be verified during this process.

The (candidate) service provider is responsible for organising the test run, but must draw up a trial run plan in consultation with Viapass, since the test run shall take place in close cooperation with the latter.

f. Declaration and certificate of suitability for use

If the aforementioned tests have been completed successfully, the service provider or its authorised representative draws up a declaration of suitability for use so that Viapass (acting in the name and for the account of the toll charger) can issue a certificate of suitability for use. The declaration of suitability for use confirms the assessment of the (candidate) service provider with respect to the suitability for use of the interoperability constituents in the toll charger's toll domain.

Based on the declaration of suitability for use, Viapass (acting in the name and for the account of the toll charger) subsequently issues a certificate of suitability for use in the toll charger's toll domain if it is proved that the tested interoperability constituents function properly.

4. Bi-annual re-testing

Every toll charger reserves the right to change the road network subject to the charge and/or the tariffs and tariff categories every six months. If a change is planned, Viapass will communicate

the detailed changes to the service provider no later than three months before said changes are required to become operative. The service provider must then implement said changes in its (acceptance) system. The service provider must start repeating the test run, as outlined in section 3. e, no later than one month before the changes are required to become operative. These tests must focus on proving that all of the changes have been implemented correctly. The service provider may only start rolling out the changed software to all OBUs in production after Viapass has approved the changed system. Obviously, the service provider must plan re-testing in such a manner that there is enough time to complete said roll-out before the scheduled change date.

5. The recertification procedures

a. OBU recertification

Whenever any relevant change has been made to the OBU, the service provider must prove again that its OBU meets the applicable requirements.
Some of the most relevant cases which may give reason for recertification of an OBU are stated in the list below:

- Changes to the DSRC hardware and software stack
- Changes to other OBU hardware or software
- Changes to the OBU management system
- New OBU functionality.

The service provider must always report changes to the OBU to Viapass by means of a change report. Viapass decides on the basis of this report whether re-doing part of the conformity and suitability tests will suffice or whether all of the said tests must be re-done.

b. Recertification of the service provider’s back office

Changes to the service provider’s back office must always be made in consultation with Viapass and after a change report has been provided. On basis of the impact of the change, Viapass will decide which parts of the conformity and suitability tests must be re-done.

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