EasyGo+ and EETS
Acceptance Procedures

Enclosure E to Document 202
“Roadside and on board equipment”

Document: 202-E
Version: 1.0
Date: 22 January 2018

Table of contents

DOCUMENT REVISION HISTORY 4
DEFINITIONS AND ABBREVIATIONS 5
REFERENCES 6
1 PURPOSE AND SCOPE 7
2 PROCESS OVERVIEW 7
2.1 CONFORMITY TO SPECIFICATION DECLARATION 8
2.2 SUITABILITY FOR USE TESTS 9
2.3 OPERATION PHASE - RECERTIFICATION PROCESS 9
3 CONFORMITY TO SPECIFICATION DECLARATION FOR OBE 10
3.1 GENERAL 10
3.2 OBE CONFORMITY DECLARATION CONSTITUENTS 10
3.2.1 CE marking and declaration 10
3.2.2 OBE manufacturer examination certificates and reports 11
3.2.3 Test reports 12
4 BACK OFFICE INTERFACE CONFORMITY DECLARATION 12
5 SUITABILITY FOR USE TESTS 13
5.1 GENERAL TEST REQUIREMENTS 13
5.2 FUNCTIONAL OBE TESTS 14
5.2.1 Objectives 14
5.2.2 Laboratory test cases 14
5.2.3 Test cases performed at the test site 26
5.3 OBE SYSTEM COMPATIBILITY TESTS 30
5.3.1 Objectives and overview 30
5.3.2 Test cases performed at the test site 30
5.3.3 On-road test cases 37
5.4 BACK OFFICE INTERFACE COMPATIBILITY TESTS 39
5.4.1 Objectives and overview 39
5.4.2 Tests 39
5.5 END TO END TESTS 46
5.5.1 Objectives and overview 46
5.5.2 Test cases 47
5.6 OBE PILOT OPERATION 120
5.6.1 Objectives and overview 120
5.6.2 Organization 120
5.6.3 Parameters and limitations 120
5.6.4 Result evaluation 120
5.6.5 End of Pilot Operation 120

6 RECERTIFICATION PROCESS 121
6.1 CHANGE REPORT 121
6.1.1 OBE 121
6.1.2 Back office interface 121
6.2 BASIC OBE TESTING 121
7 ANNEX A – OBE PERSONALIZATION DATA EXAMPLE 122
8 ANNEX B - REFERENCES 124
9 ANNEX C – OBE FUNCTIONAL AND SYSTEM COMPATIBILITY TEST CASE OVERVIEW FOR SPECIFIC SYSTEM ARCHITECTURES (INFORMATIVE) 127
10 ANNEX D – E2E TEST CASE OVERVIEW FOR SPECIFIC TOLL DOMAINS (INFORMATIVE) 130

Document revision history

Version	Date	Author	Main changes
1.0	02.05.2013		1st version approved by Steering Committee
1.1	04.07.2017	HHA	First draft
1.20	10.10.2017	HHA	Editorial changes; Annex D added
1.22	14.11.2017	AKA	E2E test cases for C2 and C7 transactions added
1.30	10.01.2018	HHA	Version for release
2.0	22.01.2018	ASK	Editorial revisions, change of document title.

Definitions and abbreviations

Abbreviation	Definition
CE	Conformity Declaration
CEN	European Committee for Standardization
DSRC	Dedicated Short Range Communication
DUT	Device under test
EETS	European Electronic Toll Service
EFC	Electronic Fee Collection
EGH	EasyGo Hub
EN	European standards
ETSI	European Telecommunications Standards Institute
HGV	Heavy Goods Vehicle
ISO	International Organization for Standardization
ISO/DIS	ISO Draft International Standard
MMI	Men Machine Interface
OBE	On-Board Equipment
PCTR	Proforma Conformance Test Report
PICS	Protocol Implementation Conformance Statement
PKE	Portable enforcement device (Portable Kontrolleinrichtung), used in combination with a MAS
REETS	Regional European Electronic Toll Service
RSE	Road Side Equipment
SU	Service User
TC	Toll Charger (Especially EasyGo toll charger within this document)
TSP	Toll Service Provider (Especially EETS- or EasyGo+ toll service provider within this document)

References

All references are listed in Annex B - References of this document. For dated references, subsequent amendments to or revisions of any of these publications apply only when incorporated in it by amendment or revision. For undated references, the latest edition of the referenced publication applies.

1 Purpose and scope

This document specifies the acceptance procedures for EETS- and EasyGo+ Providers, abbreviated as TSP within this document. In technical sense there is no difference in acceptance procedures for EasyGo+ or EETS providers. The acceptance procedures define the conformity declarations and test processes for

- On-Board Equipment (OBE) with DSRC transactions according to EN 15509 and
- The back-office interface from a TSP to an EasyGo toll charger (abbreviated as TC further in this document) via the EasyGo Hub.

The term TC represents all affected TC within EasyGo for the TSP's services (EasyGo+ or EETS (REETS).

The current document "EasyGo+ and EETS Acceptance Procedures" is the base for the final acceptance of a TSP. A successful passing of the acceptance procedures will result in the "Suitability for Use" certification of the tested OBE as well as of the TSP's back office interface to the EasyGo TC's back-office via the EasyGo HUB (EGH).

2 Process overview

The acceptance procedures define the assessment methodology for the "Suitability for Use" tests of an OBE in connection with the TSP's back office interface to the TC's back-office via the EGH). The successful approval is only valid for the tested OBE with the tested software version and the back-office interface version used at testing.

The acceptance procedures are divided in three main phases:

- the Conformity to Specification Declaration
- the Suitability for Use tests and
- the monitoring during the pilot operation phase

A recertification process of a TSP is started after a relevant software or hardware change.

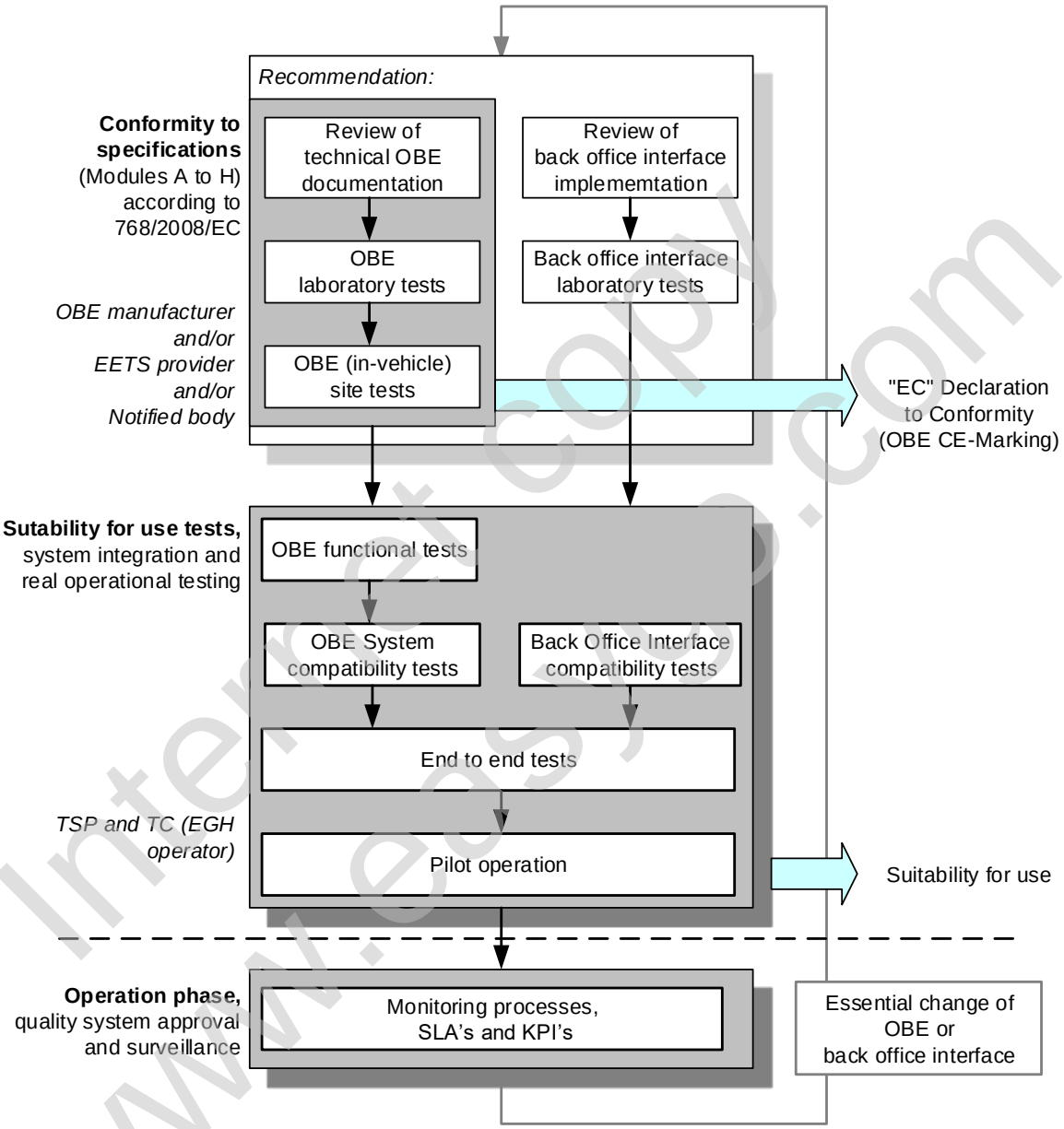


Figure 1: Acceptance procedures overview

2.1 Conformity to specification declaration

The conformity to specification declaration for an OBE contains the CE certification of the OBE to all relevant standards with the conformity statements, the certificate(s) including the evaluation report(s) and the detailed test reports. It also contains the conformity declaration to the relevant OBE Requirement Specification [EasyGo-202A]. The declaration shall be delivered by the OBE manufacturer or the TSP.

The *Figure 1: Acceptance procedures overview* contains inside the top box a recommendation for the test and verification process resulting in the "EC declaration to conformity".

In addition to the conformity declaration of the OBE also a conformity declaration of the TSP's back office interface according to the EasyGo specifications is required (See [EasyGo-201] and [EasyGo-203])

2.2 Suitability for Use tests

The Suitability for Use tests cover all aspects of the DSRC communication, back office data exchange, performance and service level agreement monitoring as well as security and privacy issues. The "Suitability for Use tests" phase is divided in the following sequence of four test steps:

1. Functional tests, e.g. transaction reliability tests, etc.
2. OBE system compatibility tests (Functional tests in laboratory, at a test site and for roadside equipment not available at the test site at production system components)
3. Back office interface tests in a test environment (Integration tests)
4. End to end tests with the OBE in the operational EFC environment to check all required business processes
5. Pilot operation phase with a limited number of OBE and a limited time frame

These test steps shall be performed in cooperation between TC, EGH operator and the TSP. However, the responsibility for the test phase remains with the TSP.

Please note:

This document contains all testcases necessary for acceptance in all EasyGo DSRC toll domains, regardless of multilane free flow or barrier based systems. If acceptance for only one toll domain is desired, it is up to the TC to select the suitable testcases only.

Furthermore, depending on physical size and/or power supply (battery or external power), alternative testcases will apply.

2.3 Operation phase - recertification process

During the system operation a planned change of the OBE hardware or software shall be reported to the TSP before introduced in the concerned toll context.

- "The OBE software or hardware change" report is the base for the decision concerning which phases and steps of the approval process shall be repeated for the recertification of the OBE. It is expected, that the manufacturer performs a set of basic DSRC tests after each OBE software change, also in case of only a small software change without the necessity of a recertification.
- A change of the back-office interface is only possible after agreement with the TSP. Such a change shall be handled by a process agreed between the TSP and TC based on the impact of the interface change. This process is outside the scope of the current document.

For details of the change and incident management see [EasyGo-403], if not other agreements with a TC apply.

3 Conformity to specification declaration for OBE

3.1 General

The "OBE declaration of conformity to specifications" is relative to the requirements of Directive 2004/52/EC, Decision 2009/750/EC and all relevant standards and technical specifications. Depending on the chosen module (from Decision 2008/768/EC (CE Conformity Marking)), the "EC" Declaration of Conformity to specifications, to be drawn up by the manufacturer, shall cover the manufacturer's self-assessment and/or shall be subject to obtaining an examination certificate from a Notified Body.

The conformity declaration shall in particular consider conformity of the OBE

- to the DSRC transaction according to EN 15509 and related DSRC standards; and
- to the requirements defined in EETS-OBE Requirements Specification [EasyGo-202-A] and the related documents.

Conformity to specifications shall be reassessed in case of a significant modification of the OBE or when the Notified Body's certificate is expired. The following (not exhaustive) list defines the most relevant modification cases of the OBE for the concerned toll context:

- Change of the DSRC hardware (e.g. change the DSRC tag manufacturer, use of a different tag from the same manufacturer, etc.)
- Modification of the DSRC software stack
- Modification of the OBE hardware or software architecture (e.g. change the main OBE processor, introduce a new task in the software, modification of the inter task communication, etc.)
- Modification of the OBE operating system
- Additional (new) OBE functionality
- Etc.

The final decision about a required reassessment of the OBE conformity declaration and hence also a new cycle of the approval process is up to the TSP, based on the detailed change description (see chapter 6 Recertification process). The decision will be taken in cooperation with the TSP and/or OBE manufacturer.

3.2 OBE Conformity declaration constituents

3.2.1 CE marking and declaration

The Manufacturer shall affix CE markings to the packaging where feasible. In compliance with Annex IV of Decision 2009/750/EC, a CE marking relative to EETS is accompanied by a Declaration, which will clearly specify that it concerns conformity to specifications. This "EC" Declaration should contain all relevant information to identify

- the OBE which is declared to be conform
- the European legislation according to which it is issued
- the manufacturer or its authorized representative
- the Notified Body if applicable
- reference to relevant standards

- other normative or required documents as appropriate

The EC declaration of conformity shall have the model structure set out in Annex III of Decision No 2008/768/EC.

3.2.2 OBE manufacturer examination certificates and reports

Depending on the chosen modules from 2008/768/EC, the following documents shall be provided by the TSP (or by the manufacturer):

Module A - Internal production control:

- None (manufacturer's technical documentation at the disposal of national authorities)

Module B – EC- Type examination:

- The TSP/ Manufacturer shall provide the EC-type examination certificate and the evaluation report containing the results of the systematic examination of the extent to which the OBE and/or the manufacturer fulfills the specific functional and quality system requirements.

Module C - Conformity to type based on internal production control

Module C1 - Conformity to type based on internal production control plus supervised product testing

Module C2 - Conformity to type based on internal production control plus supervised product checks at random intervals

Module C, C1 and C2 require EC-type examination certificate (module B)

Module D – Conformity to type based on quality assurance of the production process

Module D requires EC-type examination certificate (module B)

Module D1 – Quality assurance of the production process

Module E – Conformity to type based on product quality assurance:

- Visit and/or audit report of production quality system (e.g. ISO 9001 quality management certificate)

Module E requires EC-type examination certificate (module B)

Module E1 – Quality assurance of final product inspection and testing:

- Visit and/or audit report of production quality system (e.g. ISO 9001 quality management certificate).

Module F – Conformity to type based on product verification:

- Certificate of conformity (in respect with the examinations and tests).
- Module F requires EC-type examination certificate (module B).

Module F1 – Conformity based on product verification

- Certificate of conformity (in respect with the examinations and tests)

Module G – Conformity based on unit verification:

- Certificate of conformity (in respect with the examinations and tests)

Module H – Conformity based on full quality assurance:

- Quality system assessment report (for the design and production phase, including for example an ISO 9001 quality management certificate)

Module H1 – Conformity based on full quality assurance plus design examination:

- Certificate of conformity (in respect with the examinations and tests)
- EC design examination certificate.

3.2.3 Test reports

The manufacturer and/or the Notified Body shall provide detailed test reports from all performed DSRC relevant OBE tests. The following, not exhaustive list shows the expectation of the performed DSRC interoperability tests:

- OBE tests defined in EN 15876-1 [IAP TEST] for all layers
- a set of tests comparable to the tests defined in chapter 5.2 of the current document.

The OBE test results of EN 15876-1 shall be reported by the Proforma Conformance Test Report (PCTR) defined in Annex C of this test standard. The PCTR shall include conformance log and detailed test results whenever possible.

Test reports about additional tests shall contain a description of the test and the constituents.

4 Back office interface conformity declaration

The TSP shall deliver a conformity declaration for the back-office interface defined in [EasyGo-201] and [EasyGo-203]. The declaration shall contain a Protocol Implementation Conformance Statement (PICS) according to the requirements in [EasyGo-201] and [EasyGo-203].

5 Suitability for Use tests

5.1 General test requirements

The Suitability for Use test shall be performed by the TC in cooperation with the TSP. The TC is entitled to appoint and authorize a company / organization (e.g. the supplier of the RSE) to carry out some or all tests. The TSP may appoint and authorize a test institute or a Notified Body or suppliers to accompany the test. For OBU models which were already tested successfully with identical hard- / software version and a similar / identical configuration in the past e.g. for other TSP, it can be agreed to drop selected functional OBE tests according to chapter 5.2 and 5.3. The remaining tests to be carried out are on disposal of the TC.

Please note, that this document contains test cases for all system architectures in use by EasyGo TC (Multilane Free Flow and barrier based systems). Following tables give overview about minimum test case requirements to apply if acceptance is desired for e.g. only one specific toll domain:

- Annex C – OBE functional and system compatibility test case overview for specific system architectures (informative)
- Annex D – E2E test case overview for specific toll domains (informative)

It is up to the TC to define additional test cases, if necessary.

All test results shall be fully documented in a test report, containing identification of the tested OBE, test set-up, test equipment, test vectors and test results – ensuring traceability and allowing reproducibility.

Test Contracts:
For the functional OBE tests according to chapter 5.2 and 5.3 the used EFC Context Mark shall differ from the one used later on (E2E test in production environment, pilot and operational phase). For further information on the EasyGo test strategy, reference is made to [EasyGo-206].

Test report constituents:

The list below defines the information that shall be delivered as a report for each test case:

- test name
- test number
- run number and total number of test runs
- hardware version of tested OBE
- software version of tested OBE
- test location, versions and/or identification of used RSE test equipment
- description of test run (if appropriate including special observations)
- test result description (including test passed/not passed)
- test date and test duration (e.g. start and end time)
- name of the responsible tester
- reference to test log files or supplementary test documentation if available

5.2 Functional OBE tests

All tests shall be performed at least with an OBE contingent from pilot-run series, which are manufactured on mass production conditions. The sample size shall be sufficient to proof the corresponding requirement and acceptance criteria. At least ten samples of the OBE subject to testing shall be provided by the TSP for tests in test environment, each personalized as agreed between TSP and TC (For personalization data example see ch. 7). For tests in production environment add. 10 samples are required (personalization data to be agreed). If the TSP can assure change of personalization data remotely at short notice, a minimum number of five samples could be agreed.

Precondition for starting the functional OBE tests is the accepted conformity declaration for this OBE.

As test equipment the roadside equipment currently in use in the Austrian tolling system needs to be used if not defined and agreed differently.

5.2.1 Objectives

The main objectives of the functional OBE tests are:

- Verification of the OBE functionality in interaction with beacons under laboratory conditions (including the verification of the user MMI).
- Validation of the transaction reliability of the OBE.
- Guarantee the OBE functionality in interaction with the road side equipment in a sufficiently large communication zone.
- Verification of the MMI requirements for the OBE.
- Verification of the OBE interaction with the road side and enforcement equipment.
- Verification of the OBE functionality together with a reference OBE being at the same time in the RSE communication zone.

5.2.2 Laboratory test cases

All test cases in this chapter are performed under laboratory conditions.

Test name:	Basic transaction – stand-alone beacon	No.: 1.0.5
Purpose:	Verification of the OBE personalization and functionality in interaction with road side equipment	
Equipment:	Stand-alone beacons of all beacon types deployed in the system with the relevant application (EN15509) according to the test scope	
Description:	Several transactions shall be performed with OBEs with different personalization data (detailed test data specification see Annex A – OBE personalization data): • Vehicle category (e.g. 2, 3 or 4+ axles) and license plate numbers • European vehicle class (e.g. HGV up to and over 12t, large passenger vehicles) • Expiry date after current date	

To evaluate the test target, a second transaction is performed with each OBE to read-out the attribute ReceiptData1 written in the previous transaction.

Checking of the acoustic signal of the OBE; checking of the toll transaction record.

The test case steps are to be executed with samples of the OBE under test with all the different OBE personalization data configurations under test.

The test case is to be executed with all available beacon types and all relevant applications.

At least five executions of the test cases steps per available beacon type and relevant application are to be performed in scope of this test case.

Intention: Performing of valid transactions: Depending on the values presented by the OBE the tariff can be correctly calculated.

The received data is according to the defined personalization data of the OBE.

The value of Receiptdata1 written by the RSE is correctly stored and can be correctly read-out.

Check the MMI beep signalling for "transaction OK".

Test name:	Transaction – expiry date near	No.: 1.1.3

Purpose: Verification of the OBE functionality in interaction with road side equipment.

Equipment: Stand-alone beacons of all beacon types deployed in the system with the relevant application (EN15509) according to the test scope

Description: Tolling transaction of an OBE with an expiry date that is reached in less than two months: The data element PaymentMeans.ExpiryDate has a date value which will be reached in less than 62 days.

Checking of the acoustic signal of the OBE; checking of the toll transaction record.

The test case is to be executed with all available beacon types and all relevant applications.

At least five executions of the test cases steps per available beacon type and relevant application are to be performed in scope of this test case.

Intention: Signalling of near expiry date by the OBE (OBE expires within 62 days) with two beeps.

Correct OBE data presented by the OBE and collected in the toll transaction record.

Test name:	Transaction – contract expired	No.: 1.1.5
Purpose:	Verification of the OBE functionality in interaction with road side equipment.	
Equipment:	Stand-alone beacons of all beacon types deployed in the system with the relevant application (EN15509) according to the test scope	
Description:	Tolling transaction of an expired OBE: The data element PaymentMeans-ExpiryDate is older than the current date. Checking of the acoustic signal of the OBE; checking of the toll transaction record. The test case is to be executed with all available beacon types and all relevant applications. At least five executions of the test cases steps per available beacon type and relevant application are to be performed in scope of this test case.	
Intention:	Correct signalling of the expired contract by the OBE with four beeps. Correct OBE data presented by the OBE and collected in the toll transaction record.	

Test name:	Transaction – static conditions	No. : 1.2.1
Purpose:	Verification of the OBE functionality in interaction with road side equipment.	
Equipment:	Stand-alone beacons of all beacon types deployed in the system with the relevant application (EN15509) according to the test scope	
Description:	Put an OBE in communication area of an RSE with fixed BeaconID for more than 5 minutes. Remove the OBE from the communication area of the beacon with fixed BeaconID and keep it out of the communication area of the beacon for more than 5 minutes. Put the OBE back into the communication area of the beacon with fixed BeaconID (no BeaconID change is to be done before this). Checking of the acoustic signal of the OBE; checking of the toll transaction record. The test case is to be executed with all available beacon types and all relevant applications.	
Intention:	Correct behaviour of the OBE being in the communication zone of at least 5 minutes: Only one transaction is performed. Correct OBE data presented by the OBE and collected in the toll transaction record.	

Correct behaviour of the OBE after being removed from the communication zone for 5 minutes and placed back into the communication zone after that: One transaction is performed. Correct OBE data presented by the OBE and collected in the toll transaction record.

Test name:	Tariff correlation and MMI axles selection (in the lab)	No.: 1.2.5
Purpose:	Verification of the OBE functionality in interaction with the user and the road side equipment.	
Equipment:	Stand-alone beacons of all beacon types deployed in the system with the relevant application (EN15509) according to the test scope	
Description:	Transactions are performed by OBE with different tariff parameters: • Base vehicle category: 2, 3 or 4+ Axles • For base vehicle category 2 and 3 the transaction is performed before and after a change of the axle selection (to all possible categories 3 and 4+) via the MMI. • European vehicle class (e.g. HGV up to and over 12t, large passenger vehicles) Observation of the toll transaction records in the database. Check the OBE axle category or axles number MMI indication of the base category and/or after the setting by MMI. The test case is to be executed with all available beacon types and all relevant applications. At least five executions of the test cases steps per available beacon type and relevant application are to be performed in scope of this test case.	
Intention:	Performing of valid transactions with the correct tariff (depends on vehicle category and contract type). Every transaction is performed with the correct tariff according to the active tariff table: • By base category • After change of the axles by MMI Checking the indication of the current axles category and/or number.	

Test name:	System stability – broken transactions	No.: 1.2.6
Purpose:	Verification of the OBE functionality in interaction with road side equipment.	
Equipment:	Stand-alone beacons of all beacon types deployed in the system with the relevant application (EN15509) according to the test scope	

Description:	15 OBEs including at least 10 samples of the OBE under test are put into the communication zone at the same time, until all have signalled a completed transaction. All samples of the OBE under test are valid (not expired, not blacklisted, ...). Observation of the toll transaction records in the RSE Database. The test case is to be executed with all available beacon types and all relevant applications. At least five executions of the test cases steps per available beacon type and relevant application are to be performed in scope of this test case.
Intention:	For each OBE one valid transaction is present in the RSE Database: a total of 15 valid transactions with status “transaction completed” is present in the database

Test name:	Allocation of new DSRC master-keys	No.: 1.2.7
Purpose:	Verification of the OBE functionality in interaction with road side equipment.	
Equipment:	Stand-alone beacons of all beacon types deployed in the system with the relevant application (EN15509) according to the test scope	
Description:	Substitution of the DSRC access credentials master-keys on MAS-side for a wrong key: Keys are changed manually. No performing of valid transactions when RSE and OBE use different keys: Access denied by the OBE. The test case is to be executed with all available beacon types and all relevant applications. At least five executions of the test cases steps per available beacon type and relevant application are to be performed in scope of this test case.	
Intention:	No performing of valid transactions when RSE and OBE use different keys: Access denied by the OBE.	

Test name:	OBE blacklisted	No.: 1.2.8
Purpose:	Verification of the OBE functionality in interaction with road side equipment.	
Equipment:	Stand-alone beacons of all beacon types deployed in the system with the relevant application (EN15509) according to the test scope	
Description:	The OBE ID of the OBE is put on the Blacklist of the RSE; the OBE is brought into the communication area.	

	Checking of the acoustic signal of the OBE; checking of the toll transaction record. The test case is to be executed with all available beacon types and all relevant applications. At least five executions of the test cases steps per available beacon type and relevant application are to be performed in scope of this test case.
Intention:	The OBE signals a non-valid transaction with four beeps. Correct OBE data presented by the OBE and collected in the toll transaction record.

Test name:	OBE with blacklist bit	No.: 1.2.8A
Purpose:	Verification of the OBE functionality in interaction with road side equipment.	
Equipment:	Stand-alone beacons of all beacon types deployed in the system with the relevant application (EN15509) according to the test scope	
Description:	OBE with Bit 15 in EquipmentStatus set for blacklisting; the OBE is brought into the communication area. Checking of the acoustic signal of the OBE; checking of the toll transaction record. The test case is to be executed with all available beacon types and all relevant applications. At least five executions of the test cases steps per available beacon type and relevant application are to be performed in scope of this test case.	
Intention:	The OBE signals a non-valid transaction with four beeps. Correct OBE data presented by the OBE and collected in the toll transaction record.	

Test name:	Transaction - timing tests	No.: 1.3.1
Purpose:	Verification of the correct OBE timing according to EN12253 and EN12795 in interaction with the beacon.	
Equipment:	Lab equipment, test beacon.	
Description:	The parameters U1, U1a, U8, U8a, U13, U13a from EN 12253 and T3, T4a, T4b, T5, N3 from EN 12795 are determined by appropriate test setups. The random selection of the public uplink window is checked.	
Intention:	Checking the correct timing according to EN12253 and EN12795.	

Test name:	Transaction – software stability (Conveyor Belt Arrangement)	No.: 1.2.3

Purpose:	Verification of the stability of the OBE functionality in interaction with RSE by moving through the communication zone.
Equipment:	Conveyor belt arrangement equipped with Multi-lane beacon of each multi-lane beacon type deployed in the system with the relevant application (EN15509) according to the test scope in an anechoic chamber. The beacon is having its beacon ID changed automatically for each passage or a second beacon is used without interfering communication zone to simulate BeaconId change.
Description:	An OBE shall perform more than 10.000 transactions by moving through the communication zone. The OBE movement through the communication zone with a Conveyor belt arrangement is used based on following behaviour: • Dynamic RF path loss and phase changes normally arising during the passage of a tolling station are simulated by movement of the OBE under test on a conveyor belt. • For this test case, the communication zone shall exhibit strong fading effects. • By adjusting the simulated driving speed, the communication duration shall be set to a value in a range between 180 milliseconds and half a second (500 milliseconds) for each transaction. The test shall be performed separately with at least 3 samples of the OBE under test. The test case is to be executed with each multi-lane beacon type deployed in the system and all relevant applications
Intention:	Testing of stability of OBE software. Expected result: • Less than 0,05% missing or incorrect transactions for each OBE. • No multiple transactions performed within one passage. A correct transaction is defined as a transaction delivering enough data for correct tolling to the RSE data base.
Remark:	This test case is mutually exclusive with test case 1.2.3A, where a DSRC Channel Simulator is used instead of the conveyor belt arrangement. This test case version is used, where it's possible to rotate the OBE under test on the conveyor belt.

Test name:	Transaction – software stability (DSRC Channel Simulator)	No.: 1.2.3A

Purpose: Verification of the stability of the OBE functionality in interaction with RSE by moving through a simulated communication zone in an anechoic chamber.

Equipment: Dynamic DSRC Channel Simulator equipped with Multi-lane beacon of each multi-lane beacon type deployed in the system with the relevant application (EN15509) according to the test scope. The beacon is changing the beacon ID automatically for each simulated passage.

Description: An OBE shall perform more than 10.000 transactions by moving through the simulated communication zone.

The simulation of the OBE movement through the communication zone with a "DSRC Channel Simulator" is used based on following behaviour:

- Dynamic RF path loss and phase changes normally arising during the passage of a tolling station are simulated in an anechoic chamber using a DSRC Channel Simulator.
- For this test case, the simulated communication zone shall exhibit strong fading effects.
- By adjusting the simulated driving speed, the communication duration shall be set to a value in a range between 180 milliseconds and half a second (500 milliseconds) for each transaction.

The test shall be performed separately with at least 3 samples of the OBE under test.

The test case is to be executed with each multi-lane beacon type deployed in the system and all relevant applications.

Intention: Testing of stability of OBE software.

Expected result:

- Less than 0,05% missing or incorrect transactions for each OBE.
- No multiple transactions performed within one passage.

A correct transaction is defined as a transaction delivering enough data for correct tolling to the RSE data base.

Remark: This test case is mutually exclusive with test case 1.2.3, where a conveyor belt arrangement is used instead of the DSRC Channel Simulator. This test case version is only used, where it’s not possible to rotate the OBE under test on the conveyor belt (e.g. due to size/ weight or external power supply of the OBU).

Test name:	Transaction - behaviour at slow motion (Conveyor Belt Arrangement)	No.: 1.4.1

Purpose:	Verification of the OBE functionality in interaction with the beacon in case of slow entry into the communication zone.
Equipment:	Conveyor belt arrangement equipped with Multi-lane beacon of each multi-lane beacon type deployed in the system with the relevant application (EN15509) according to the test scope in an anechoic chamber. The beacon is having its beacon ID changed automatically for each passage or a second beacon is used without interfering communication zone to simulate BeaconId change.
Description:	OBE is entering and leaving the communication zone slowly (simulated speed equal or lower 6 km/h). a) First test run: 300 times; if all transactions OK: passed. b) If at first test run there are missing or incomplete transactions: new test run with 1000 cycles. If error rate < 0.3%: Test case is passed. In the simulated communication scenario, the OBE shall be located in the communication zone at least 6 seconds. The test case is to be executed with each multi-lane beacon types deployed in the system and all relevant applications The test shall be performed separately with at least 3 samples of the OBE under test.
Intention:	Testing of stability of OBE software at slow motion Expected result: • Transaction error rate shall be less than 0.3%.for each OBE. • No multiple transactions performed within one passage. A correct transaction is defined as a transaction delivering enough data for correct tolling to the RSE data base.
Remark:	This test case is mutually exclusive with test case 1.4.1A, where a DSRC Channel Simulator is used instead of the conveyor belt arrangement. This test case version is used, where it's possible to rotate the OBE under test on the conveyor belt.

Test name:	Transaction - behaviour at slow motion (DSRC Channel Simulator)	No.: 1.4.1A

Purpose:	Verification of the OBE functionality in interaction with the beacon in case of slow entry into the communication zone.

Equipment: Dynamic DSRC Channel Simulator equipped with Stand-alone beacons of all beacon types deployed in the system with the relevant application (EN15509) according to the test scope. The beacon is changing the beacon ID automatically for each simulated passage.

Description: OBE is entering and leaving the simulated communication zone slowly (simulated speed equal or lower 6 km/h).

The simulation of the OBE movement through the communication zone with a "DSRC Channel Simulator" is used based on following behaviour::

- Dynamic RF path loss and phase changes normally arising during the passage of a tolling station are simulated using a "DSRC Channel Simulator"
- For this test case, the maximum downlink impact power to the OBU shall be set to a level of 6 dB above the OBU's sensitivity.
- Test execution:
  a) First test run: 300 times; if all transactions OK: Test is passed.
  b) If at first test run there are missing or incomplete transactions: new test run with 1000 cycles.

If error rate < 0.3%: Test is passed.

In the simulated communication scenario, the OBE shall be located in the communication zone at least 6 seconds.

The test case is to be executed with each multi-lane beacon types deployed in the system and all relevant applications

The test shall be performed separately with at least 3 samples of the OBE under test.

Intention: Testing of stability of OBE software at slow motion

Expected result:

- Transaction error rate shall be less than 0.3%.for each OBE.
- No multiple transactions performed within one passage.

A correct transaction is defined as a transaction delivering enough data for correct tolling to the RSE data base

Remark: This test case is mutually exclusive with test case 1.4.1, where a conveyor belt arrangement is used instead of the DSRC Channel Simulator. This test case version is only used, where it's not possible to rotate the OBE under test on the conveyor belt (e.g. due to size/ weight or external power supply of the OBU).

Test name:	Transaction - behaviour with OBE under test and reference OBE (Conveyor Belt Arrangement)	No.: 1.4.2

Purpose:	Verification of the OBE functionality in interaction with the beacon in a configuration where multiple OBE moving through the communication zone.
Equipment:	Multi-lane beacon of each multi-lane beacon type deployed in the system with beacon controller and relevant application (EN15509) according to the test scope in an anechoic chamber. The beacon is having its beacon ID changed automatically for each passage or a second beacon is used without interfering communication zone to simulate BeaconId change.
Description:	Two samples of the OBE under test and one additional reference OBE are passing the communication zone consecutively (the contract of one sample of the OBE under test is blocked). The OBE movement through the communication zone with a Conveyor belt arrangement is used based on following behaviour: • The OBEs distance to each other is 3 cm. • The width of the communication zone is > 30 cm. • The belt speed is set to 10 cm/s. • In the simulated communication scenario, the possible transaction duration shall be configured to a time longer than three (3) but less than five (5) seconds. Test execution: c) First test run: 300 times; if all transactions OK: Test is passed. d) If at first test run there are missing or incomplete transactions: new test run with 1000 cycles. If error rate < 0.3%: Test is passed. The test case is to be executed with each multi-lane beacon type deployed in the system and all relevant applications
Intention:	Transaction error rate shall be less than 0.3%.
Remark:	This test case is only applied, where it's possible to rotate the OBE under test on the conveyor belt.

Test name:	OBE MMI – Selection of Number of Axles by User	No.: 14.0.1

Purpose:	Verification of the OBE functionality in interaction with the user.

Equipment:	Multi-lane beacon (RSE equivalent) deployed in the system with the relevant application (EN15509) according to the test scope. OBE operating manual provided by the TSP.
Description:	OBE personalized for a **truck** with 2 tractor axles and no trailer axles (Base category 2) OBE MMI shall indicate 2 axles, check of category read by RSE shall show 2 axles. Manual declaration of 1 trailer axle (done according to the operating manual) OBE MMI shall indicate 3 axles, check of category read by RSE shall show 3 axles. Manual declaration of 2 trailer axles (done according to the operating manual) OBE MMI shall indicate 4 axles, check of category read by by RSE shall show 4 axles. If possible by MMI, increase number of trailer axles further OBE MMI shall indicate more than 4 axles, check of category read by RSE shall show still 4 axles. Set again declaration of trailer axles to 1(done according to the operating manual) OBE MMI shall indicate 3 axles, check of category read by RSE shall show 3 axles. Set again declaration of trailer axles to 0 (done according to the operating manual) OBE MMI shall indicate 2 axles, check of category read by by RSE shall show 2 axles. Upon each change of the declared trailer axles the category shall be confirmed by performing a transaction on a toll station equipment and checking the toll record of the transaction. OBE personalized for a **bus** (European Vehicle Group 3) with 2 tractor axles and no trailer axles (Base category 2) Repeat the test steps above, depending on the rules of the specific toll domain, the manually declared trailer axles shall not be reflected accordingly in the transaction record of RSE.
Intention:	The OBE's MMI shall allow to declare trailer axles until the sum of (number of tractor axles (=base class) + number of declared trailer axles) =4 (or higher if possible according to the OBEs operating manual) is reached.

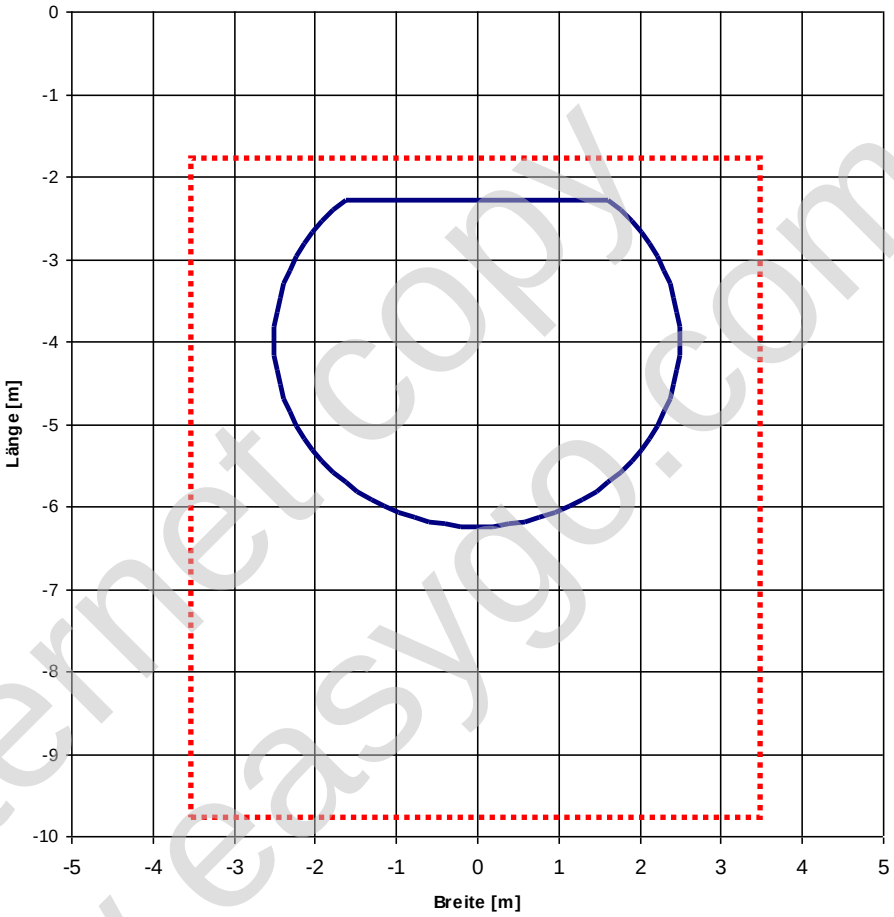
Remark: For busses, trailers are not taken into account during tariff calculation in the Austrian toll domain.

5.2.3 Test cases performed at the test site

The test site offers realistic testing conditions without traffic.

Test name:	Communication zone – Multilane Beacon, one beacon activated	No.: 3.0.1
Purpose:	Verification of the OBE functionality in interaction with road side equipment.	
Equipment:	Multi-lane beacon of each multi-lane beacon type deployed in the system with beacon controller with echo software. Determination of the communication zone with only one beacon activated.	
Description:	The antenna lobe of this beacon exhibits 30° vertically and 45° azimuthally opening. The main beam is tilted by 45° to the horizontal direction and points against the direction of the lane. The beacon is mounted at a height of 5.5m to 6.5m. The transmit power level is adjusted to 33 dBm EIRP as specified by EN 300674. The RX sensitivity is better than –104 dBm (-110 dBm typically). The communication zone is determined with the ECHO application. The following configuration shall be used: • Echo size: 124+4 Byte • Number of Echoes: 100 The OBE has to be properly mounted at a height of 2.2m behind laminated glass equivalent to the windscreen of a truck, which is orientated perpendicular to the street surface and perpendicular to the direction of the lane. The test case shall be executed with each multi-lane beacon type deployed in the system.	
Intention:	At the lateral position of the beacon the communication zone of the OBE under test shall have a minimum length of 4 m and a width of +/- 2.5 m as shown by the blue line in the figure. The red dotted line shows the maximum allowed size of the communication zone. The minimum communication zone is defined as the area where the OBE under test answers correctly more than 95% of all ECHO requests. Outside the maximum communication zone boundaries, no OBE communication is allowed. If the OBE is communicating outside the defined maximum communication zone, depending on the influence of this effect to the system performance, it	

can be agreed between the TC and the RSE-system supplier to accept this OBE for operating in the concerned toll systems, provided that the OBE is compliant to all relevant standards.



Test name:	Communication zone – Multilane configuration, all beacons activated	No.: 3.0.2

Purpose: Verification of the OBE functionality in interaction with road side equipment.

Equipment: At least 3 multi-lane beacons of each multi-lane beacon type deployed in the system with beacon controller with echo software.

Determination of the communication zone with at least three beacons mounted above 3 adjoining lanes activated.

Description: The antenna lobes of these beacons exhibit 30° vertically and 45° azimuthally opening. The main beams are tilted by 45° to the horizontal direction and point against the direction of the lane. The beacons are mounted at a height of 5.5m to 6.5m at a mutual distance of 2m to 3m perpendicular to the direction of the street. Each beacon uses a different RF

channel with a transmit power level of 33 dBm EIRP as specified by EN 300674. The RX sensitivity of each beacon is better than 104 dBm (-110 dBm typically).

The communication zone is determined with the ECHO application.

The following configuration has to be used:

- Echo size: 124+4 Byte
- Number of Echoes: 100

The OBE under test has to be properly mounted at a height of 2.2 m behind laminated glass equivalent to the wind screen of a truck which is orientated perpendicular to the street surface and perpendicular to the direction of the lane.

The test case shall be executed with each multi-lane beacon type deployed in the system.

Intention: For all tested lanes the communication zone of the OBE under test shall have a minimum length of 4 m.

The communication zone is defined as the area where the tested OBE answers correctly more than 95% of all ECHO requests.

Test name:	Communication zone – single lane beacon	No.: 3.1.1

Purpose: Verification of the OBE functionality in interaction with road side equipment.

Equipment: Single-lane beacon with narrow footprint suitable for use in toll booths of each single-lane beacon type deployed in the system with echo application.

Determination of the communication zone with one single-lane beacon activated.

Description: The antenna lobe of this beacon exhibits 15° vertically and 35° azimuthally opening. The main beam is tilted by 45° to the horizontal direction and points against the direction of the lane. The beacon is mounted at a height of 5.5m to 6.5m. The transmit power level is adjusted to 33 dBm EIRP as specified by EN 300674. The RX sensitivity is better than –104 dBm (-110 dBm typically).

The communication zone is determined with the ECHO application.

The following configuration has to be used:

- Echo size: 124+4 Byte
- Number of Echoes: 100

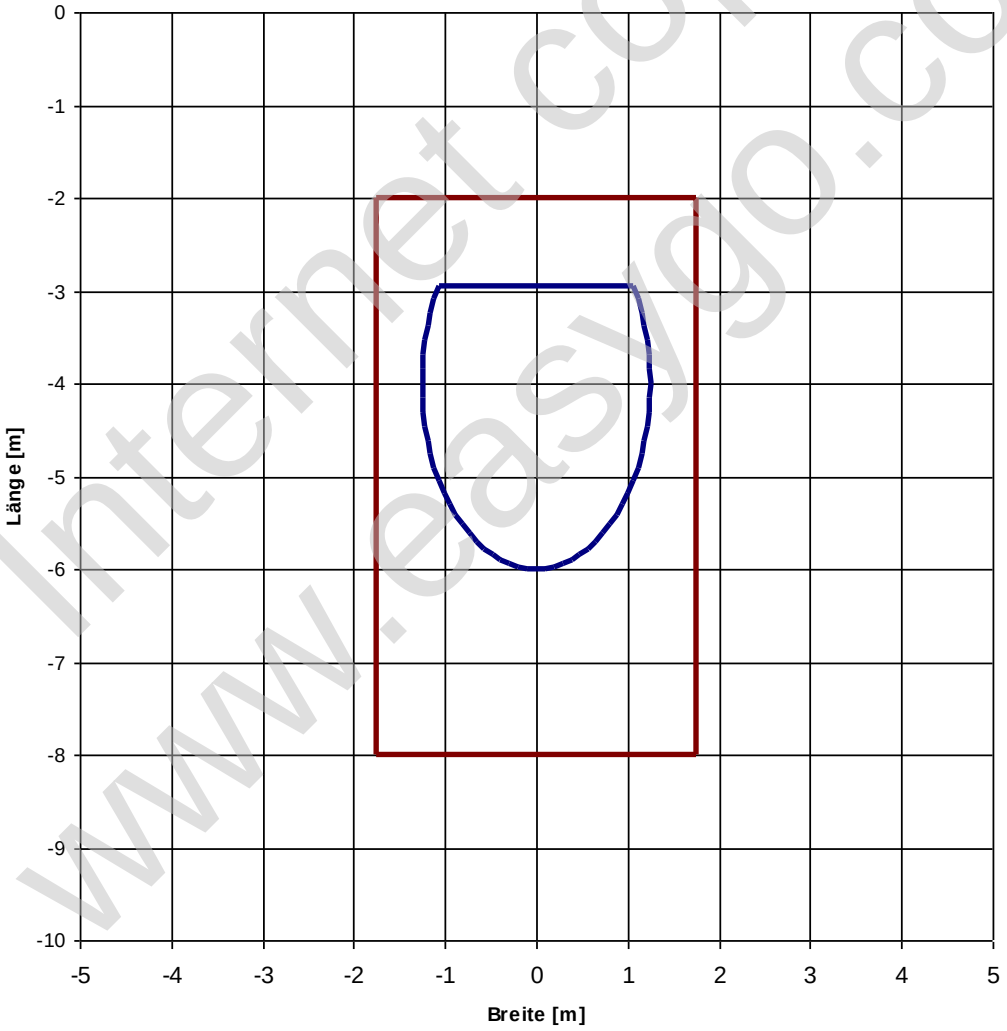
The OBE has to be properly mounted at a height of 2.2m behind laminated glass equivalent to the wind screen of a truck which is orientated

perpendicular to the street surface and perpendicular to the direction of the lane.

The test case is to be executed with each single-lane beacon type deployed in the system.

Intention: At the lateral position of the beacon the communication zone of the OBE under test shall have a minimum length of 3 m and a width of 1.25 m as shown by the blue (inner) line in the figure. The red (outer) rectangle shows the maximum allowed size of the communication zone.

The communication zone is defined as the area where the OBE under test answers correctly more than 95% of all ECHO requests.



5.3 OBE system compatibility tests

5.3.1 Objectives and overview

The main objective of the system compatibility test is to verify the functionality of the OBE in interaction with the road side and enforcement equipment, and to verify the correct processing within the tolling and enforcement system under operating conditions. After performing the transactions, the further processing of the transaction data in all the following systems will be checked.

The second objective is the verification of the OBE under test functionality together with a reference OBE being at the same time in the RSE communication zone.

The system compatibility test is divided into two phases. The first tests are performed at the test site. After passing these tests, additional tests on-road will check the system compatibility of the OBE under test under real operating conditions.

5.3.2 Test cases performed at the test site

The test site offers realistic testing conditions without traffic.

Test name:	OBE in dynamic conditions	No.: 2.0.1
Purpose:	Verification of the OBE functionality in interaction with road side equipment under dynamic conditions.	
Equipment:	Fixed roadside enforcement equipment (Enforcement station) and vehicle (truck).	
Description:	Samples of the OBE under test with valid contract (not expired, not blacklisted, etc.). Passages are performed with the OBE at 50 km/h and 80 km/h. Check of the toll transactions and enforcement data e.g. at the data base of RSE. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.	
Intention:	Correct matching of the toll transaction record with the enforcement data record: For the OBE one valid transaction is created and no enforcement data is created. (A check of the raw enforcement data shall confirm that the vehicle was effectively detected by enforcement equipment and that the Enforcement record was matched with the Toll Transaction record.)	

Test name:	EETS OBE and other OBU in the communication area	No.: 2.0.3
Purpose:	Verification of the OBE functionality in interaction with road side equipment under dynamic conditions in combination with a reference OBE in the same vehicle.	

Equipment:	Fixed roadside enforcement equipment (Enforcement station) and vehicle (truck).
Description:	A sample of the EETS OBE under test and a sample GO-Box in the same vehicle. Either the sample of the EETS OBE under test or the reference OBE are expired (PaymentMeans-ExpiryDate older than current date). The other one is valid (not expired, not blacklisted, account not low in case of a Pre-Pay-OBU …). Passage is performed with both the EETS OBE and the reference OBE mounted in the vehicle at 80 km/h. Check of the toll transaction and enforcement data. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.
Intention:	Both EETS OBE perform a transaction • Expired OBE: transaction is not valid • Valid OBE: transaction is valid No enforcement data is created.

Test name:	Multi EETS OBE in dynamic conditions	No.: 2.0.7
Purpose:	Verification of the OBE functionality in a multi OBE situation in interaction with road side equipment under dynamic conditions.	
Equipment:	Fixed roadside enforcement equipment (Enforcement station) and vehicle (truck).	
Description:	Passing the communication zone with three valid EETS OBE in one vehicle at the same time: passage with 3 EETS OBE mounted in the vehicle at 80km/h. Checking of the acoustic signal of the OBE; observation of the toll transaction database at the RSE. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.	
Intention:	Each OBE should perform one valid toll transaction: the OBE signals the transaction and a toll transaction record is created.	

Test name:	EETS OBE in dynamic conditions – Expiry date near	No.: 2.0.10
Purpose:	Verification of the OBE functionality in interaction with road side equipment under dynamic conditions.	
Equipment:	Fixed roadside enforcement equipment (Enforcement station) and vehicle (truck).	
Description:	Passing the communication zone with nearly expired OBE under test (PaymentMeans.ExpiryDate not expired, but expiring within 62 days) mounted in the vehicle. Passage is performed at 80 km/h. Checking of the acoustic signal of the OBE; observation of the toll transaction database at the RSE. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.	
Intention:	The OBE under test signals that the expiry date is near (2 beep). A valid toll transaction record is created. No Enforcement data is created.	

Test name:	EETS OBE in dynamic conditions – contract expired	No.: 2.0.12
Purpose:	Verification of the OBE functionality in interaction with road side equipment under dynamic conditions.	
Equipment:	Fixed roadside enforcement equipment (Enforcement station) and vehicle (truck).	
Description:	Passing the communication zone with expired OBE under test (PaymentMeans.ExpiryDate expired, i.e. older than current date) mounted in the vehicle. Passage is performed at 80 km/h. Checking of the acoustic signal of the OBE; observation of the toll transaction database and enforcement data at the RSE. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.	
Intention:	The OBE under test signals that the contract is expired (4 beep). A not valid toll transaction record is created in the database. Enforcement data with appropriate enforcement type is generated.	

Test name:	EETS OBE in dynamic conditions – OBE on blacklist	No.: 2.0.17
Purpose:	Verification of the OBE functionality in interaction with road side equipment under dynamic conditions.	
Equipment:	Fixed roadside enforcement equipment (Enforcement station) and vehicle (truck).	

Description:	Passing the communication zone with blacklisted OBE under test (the OBE-ID of the OBE under test is put to the Blacklist of the RSE) mounted in the vehicle. Passage is performed at 80 km/h. Checking of the acoustic signal of the OBE; observation of the toll transaction and enforcement data at the RSE. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.
Intention:	The OBE under test signals that it is blacklisted (4 beep). A not valid toll transaction record is created. Enforcement data with appropriate enforcement type is generated

Test name:	EETS OBE in dynamic conditions – Wrong category declared	No.: 2.1.2
Purpose:	Verification of the OBE functionality in interaction with road side equipment under dynamic conditions.	
Equipment:	Fixed roadside enforcement equipment (Enforcement station) and vehicle (truck).	
Description:	Passing the communication zone with valid OBE under test mounted in the vehicle at 80km/h. The value of the declared vehicle category (2, 3 or 4+ axles) or the number of axles of the trailer (1 or 2+ axles) in the OBE under test is lower than the category (number of axles) of the truck Checking of the acoustic signal of the OBE; observation of the toll transaction database and enforcement data at the RSE. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.	
Intention:	The OBE under test signals a correct transaction (1 beep). A valid toll transaction is created in the database. Generation of enforcement transaction data (OBU with wrong declaration of vehicle category) with appropriate enforcement type.	

Test name:	EETS OBE in dynamic conditions – Wrong license plate number	No.: 2.1.3
Purpose:	Verification of the OBE functionality in interaction with road side equipment under dynamic conditions.	

Equipment:	Fixed roadside enforcement equipment (Enforcement station) and vehicle (truck).
Description:	Passing the communication zone with valid OBE under test mounted in the vehicle at 80km/h. The OBU is personalized with a license plate number different in at least 2 characters from the trucks license plate. Checking of the acoustic signal of the OBE; observation of the toll transaction database and enforcement data at the RSE. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.
Intention:	The OBE under test signals a correct transaction (1 beep). A valid toll transaction is created in the database. Generation of enforcement transaction data (OBE with wrong LPN) with appropriate enforcement type.

Test name:	EETS OBE and Portable Enforcement Equipment – Wrong category declared	No.: 13.0.2

Purpose:	Verification of the OBE functionality in interaction with portable enforcement equipment.
Equipment:	Tolling station, upgraded with portable enforcement equipment, truck with trailer
Description:	Passage with the EETS OBE mounted in the vehicle at 80 km/h. The value of the declared vehicle category (2, 3 or 4+ axles) or the number of axles of the trailer (1 or 2+ axles) in the OBE is lower than the real axle category of truck + trailer. Checking of the acoustic signal of the OBE; checking of the toll transaction and enforcement data at the RSE. At least six passages are to be performed in scope of this test case.
Intention:	The OBE signals a correct transaction (1 beep). A valid toll transaction record is created in the database. Correct functionality of the toll station and portable enforcement equipment in interaction with the OBE. Generation of enforcement transaction data (OBU with wrong declaration of vehicle category) with appropriate enforcement type.

Test name:	EETS OBE and Portable Enforcement Equipment – OBE on blacklist	No.: 13.0.3

Purpose:	Verification of the OBE functionality in interaction with portable enforcement equipment.

Equipment:	Tolling station, upgraded with portable enforcement equipment, truck with trailer
Description:	Passing the communication zone with blacklisted OBE under test (the OBE-ID of the OBE under test is put to the Blacklist of the RSE) mounted in the vehicle. Passage is performed at 80 km/h. Checking of the acoustic signal of the OBE; observation of the toll transaction and enforcement data at the RSE. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.
Intention:	The OBE under test signals that it is blacklisted (4 beep). A not valid toll transaction record is created. Enforcement data with appropriate enforcement type is generated

Test name:	EETS OBE and Portable Enforcement Equipment – OBE with blacklist bit set	No.: 13.0.3 A

Purpose:	Verification of the OBE functionality in interaction with portable enforcement equipment.
Equipment:	Tolling station, upgraded with portable enforcement equipment , truck with trailer
Description:	Passing the communication zone with OBE under test (Bit 15 in EquipmentStatus is set for blacklisting purposes) mounted in the vehicle. Passage is performed at 80 km/h. Checking of the acoustic signal of the OBE; observation of the toll transaction data and enforcement data at the RSE. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.
Intention:	The OBE under test signals that it is blacklisted (4 beep). A not valid toll transaction record is created. Enforcement data with appropriate enforcement type is generated

Test name:	EETS OBE and Portable Enforcement Equipment – valid OBE	No.: 13.0.4

Purpose:	Verification of the OBE functionality in interaction with portable enforcement equipment.
Equipment:	Tolling station, upgraded with portable enforcement equipment, truck with trailer

Description:	Passing the communication zone with OBE under test (Valid contract, not expired, not blacklisted etc.) mounted in the vehicle. Passage is performed at 80 km/h. Checking of the acoustic signal of the OBE; observation of the toll transaction data and enforcement data at the RSE. At least six passages respectively executions of the test cases steps are to be performed in scope of this test case.
Intention:	The OBE under test signals a valid transaction (1 beep). Correct matching of the toll transaction with the enforcement data: For the OBE one valid transaction is created and no enforcement data is created. (The presence of the vehicle's enforcement data in the raw enforcement data confirms that the vehicle was effectively detected and that the Enforcement record was matched with the Toll Transaction record.)

Test name:	EETS OBE readout with mobile enforcement equipment	No.: 9.0.1
Purpose:	Verification of the OBE functionality in interaction with mobile enforcement equipment.	
Equipment:	Mobile enforcement equipment, truck	
Description:	Various EETS OBE with different OBE data (declared category, base axles class, license Plate Number, contract type) and different status: account low, contract expired, OBE on Blacklist, OBE on Incident List, etc. All EETS OBE should have performed tolling transactions before read-out with mobile enforcement equipment. Read-out of the EETS OBE in stock-still truck by a passing the mobile enforcement equipment with a speed of 20 km/h. Checking of the compatibility with mobile enforcement equipment: Simple read-out, displaying on mobile enforcement equipment GUI of OBE data (only the EETS data is available)	
Intention:	Correct readout and signalling of the OBE. Correct displaying of OBE data and status on mobile enforcement equipment.	

5.3.3 On-road test cases

The on-road tests are containing all system compatibility tests not executable at the test site.

Test name:	Tariff correlation and MMI axles selection (on the road)	No.: 1.2.5 A

Purpose:	Verification of the OBE functionality in interaction with the user and the road side equipment under dynamic conditions.
Equipment:	Heavy-goods vehicles, tolling stations, enforcement stations, toll booth equipment, tolling stations upgraded with portable tolling stations
Description:	Transactions are performed by OBE with different tariff parameters: • Base vehicle category: 2, 3 or 4+ Axles • For base vehicle category 2 and 3 the transaction is performed before and after a change of the axle selection (to all possible categories 3 and 4+) via the MMI. • European vehicle class (e.g. HGV up to and over 12t, large passenger vehicles) Observation of the toll transaction records in the database. Check the OBE axle category or axles number MMI indication of the base category and/or after the setting by MMI.
Intention:	Performing of valid transactions with the correct tariff (depends on vehicle category and contract type). Every transaction is performed with the correct tariff according to the active tariff table: • By base category • After change of the axles by MMI Checking the indication of the current axles category and/or number.

Test name:	EETS OBE on-road tolling	No.: 4.0.1

Purpose:	Verification of the functionality of OBE in interaction with the road side equipment under dynamic conditions.
Equipment:	Heavy-goods vehicles, tolling stations, enforcement stations, toll booth equipment, tolling stations upgraded with portable tolling stations
Description:	The test shall be performed with several (approximately 5) OBE with valid contracts at all station types on the road (live system). The Test covers multiple passages of: • tolling stations • enforcement stations • toll booth equipment

- tolling stations upgraded with portable tolling stations

Intention: Performing of valid transactions and no enforcement.

For each passage of any station type with each of the OBEs under test a valid toll transaction is performed and signalled by the OBE.

Test name:	EETS OBE on-road enforcement	No.: 5.0.1

Purpose: Verification of the OBE functionality in interaction with road side equipment under dynamic conditions.

Equipment: Heavy-goods vehicle, enforcement stations

Description: The test shall be performed with an OBE with incorrect (too low) number of axles (OBE valid, i.e. not expired, not blacklisted,...) at all enforcement station types on the road.

Intention: Performing of enforcement transactions and check of their correct further handling.

For each passage of an enforcement station with the OBE under test:

- The OBE signals a valid transaction (1 beep).
- A valid toll transaction record is created in the database.
- An enforcement transaction record with appropriate enforcement type is created in the database.

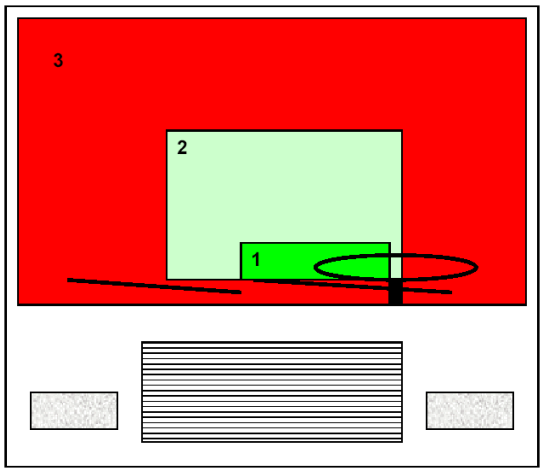
Test name:	EETS OBE cross reading in toll booth environment	No.: 12.1.1

Purpose: Verification of the OBE functionality in interaction with toll booth equipment.

Equipment: Toll booth equipment, truck

Description: Checking if the OBE communicates

- correctly with the beacon of the currently used lane
- not with beacons of other lanes



OBE is mounted behind windscreen on the outermost position (right- or left-hand side) of area 2.

Test mounting place of the OBE:

- area 1: optimal position
- area 2: suboptimal position
- area 3: wrong position

Intention: Correct transaction with the beacon of the currently used lane and correct signalling of the OBE. Correct displaying of OBE data on the tolling cash desk of the currently used lane.

5.4 Back office interface compatibility tests

5.4.1 Objectives and overview

The objective of the back-office interface compatibility tests is the approval of an error free data exchange between the two back office implementations.

The test shall be performed in a non-operational test environment but with the data connections lines later used for operation. In this test environment, no data exchange shall have any influence on the real operational system, neither on the TSP's nor on the TC system.

Precondition for starting the back-office interface compatibility tests is the accepted conformity declaration for this interface.

5.4.2 Tests

The test processing is described in [EasyGo-206] the detailed information of the test scope of the back-office interfaces is described in [EasyGo-201] and [EasyGo-203].

The relevant test stages as outlined in [EasyGo-206] with respect to the back-office interface compatibility tests are:

- Integration Test 1 (INT1)
- Integration Test 2 (INT2)

5.4.2.1 Test scopes of the relevant test stages

The columns «Interface» and «Step» in the following table reference to the corresponding information in [EasyGo-201] and [EasyGo-203].

Interface	Step	Description	INT1	INT2	E2E-TEST	E2E-PROD
ACT	1	Generate “local” output data				
ACT	2	Receive and validate input data				
ACT	3	Generate confirmation file	n.a.	n.a.	n.a.	n.a.
ACT	4	Download and validate confirmation file	n.a.	n.a.	n.a.	n.a.
ACT	5	Update tables				
ACT	6	Generate output file				
ACT	7	Download and validate own data in received file				
ACT	8	Download and validate received file				
ACT	9	Process received file				
ACT	10	Validate processes				
AIT	1	Generate “local” output data				
AIT	2	Receive and validate input data				
AIT	3	Generate confirmation data	n.a.	n.a.	n.a.	n.a.
AIT	4	Download and validate confirmation file	n.a.	n.a.	n.a.	n.a.
AIT	5	Update tables				
AIT	6	Generate output file				
AIT	7	Download and validate own data in received file				
AIT	8	Download and validate received file				
AIT	9	Process received file				
AIT	10	Validate processes				
TST	1	Generate “local” output data				
TST	2	Receive and validate input data				
TST	3	Generate confirmation data	n.a.	n.a.	n.a.	n.a.
TST	4	Download and validate confirmation file	n.a.	n.a.	n.a.	n.a.
TST	5	Update tables				
TST	6	Generate output file				

Interface	Step	Description	INT1	INT2	E2E-TEST	E2E-PROD
TST	7	Download and validate own data in received file				
TST	8	Download and validate received file				
TST	9	Process received file				
TST	10	Validate processes				
NAT	1	Generate “local” output data				
NAT	2	Receive and validate input data				
NAT	3	Generate confirmation file				
NAT	4	Download and validate confirmation file				
NAT	5	Update tables				
NAT	6	Generate output file				
NAT	7	Download and validate own data in received file	n.a.	n.a.	n.a.	n.a.
NAT	8	Download and validate received file				
NAT	9	Process received file				
NAT	10	Validate processes				
HGV	1	Generate “local” output data				
HGV	2	Receive and validate input data				
HGV	3	Generate confirmation file				
HGV	4	Download and validate confirmation file				
HGV	5	Update tables				
HGV	6	Generate output file				
HGV	7	Download and validate own data in received file	n.a.	n.a.	n.a.	n.a.
HGV	8	Download and validate received file				
HGV	9	Process received file				
HGV	10	Validate processes				
TIF	1	Generate output data				
TIF	2	Receive and validate input data				

Interface	Step	Description	INT1	INT2	E2E-TEST	E2E-PROD
TIF	3	Generate confirmation file	n.a.	n.a.	n.a.	n.a.
TIF	4	Download and validate confirmation file	n.a.	n.a.	n.a.	n.a.
TIF	5	Update tables				
TIF	6	Generate output file				
TIF	7	Download and validate own data in received file	n.a.	n.a.	n.a.	n.a.
TIF	8	Download and validate received file				
TIF	9	Process received file				
TIF	10	Validate processes	n.a.	n.a.	n.a.	n.a.
TIC	1	Generate output data				
TIC	2	Receive and validate input data				
TIC	3	Generate confirmation file	n.a.	n.a.	n.a.	n.a.
TIC	4	Download and validate confirmation file	n.a.	n.a.	n.a.	n.a.
TIC	5	Update tables				
TIC	6	Generate output file				
TIC	7	Download and validate own data in received file	n.a.	n.a.	n.a.	n.a.
TIC	8	Download and validate received file				
TIC	9	Process received file				
TIC	10	Validate processes				

5.4.2.2 Test-Scenarios regarding exchange of toll transaction data

The following Test-Scenarios regarding the exchange of toll transaction data (via TIF and TIC interfaces) files between TC and TSP are tested in scope of test stage INT2:

Full acceptance of debit TIF file holding passages with valid transactions
(TIF Sample #01 - C1 Full Acceptance):

- For 2 OBE test samples from the HGV list of the TSP at least 5 C1 records for each of the OBE test samples along with the respective E1 summary records are sent to the TSP within a debit TIF file.
  For 1 of the 2 OBE test samples a number of axles higher than the base category set in the HGV is used.
- The TSP responds to this TIF file with a TIC file with a full acceptance.

Full acceptance of credit TIF file
(TIF Sample #02 - R2 Full Acceptance):

- Precondition: TIF Sample #01 has been successfully executed.
- For that OBE of TIF Sample #01, for which the number of axles higher than the base category has been used during TIF Sample #01 execution, the debit records that have been accepted by the TSP in scope of TIF Sample #01 are credited and sent to the TSP as R2 records along with the respective T1 summary record within a credit TIF file.
- The TSP responds to this TIF file with a TIC file with a full acceptance.

Full acceptance of re-debit TIF file following a crediting
(TIF Sample #03 – C3 Full Acceptance following R2 Full Acceptance):

- Precondition: TIF Sample #02 has been successfully executed.
- For that OBE of TIF Sample #02, for which the transactions have been credited during TIF Sample #02 execution, the re-debiting is performed by sending C3 resent records with the number of axles and tariff according to the base category of the OBE in the TSP's HGV along with the respective E1 summary record within a debit TIF file.
- The TSP responds to this TIF file with a TIC file with a full acceptance.

Full acceptance of debit TIF file holding passages with reconstructed transactions
(TIF Sample #04 – C4 Full Acceptance):

- For 1 OBE test samples from the HGV list of the TSP at least 5 C1 records and in-between 2 C4 records (representing gaps of toll stations on which no transaction took place) along with the respective E1 summary record are sent to the TSP within a debit TIF file.
- The TSP responds to this TIF file with a TIC file with a full acceptance.
- On the next working day, a respective matching quality of service C8 records (non-clearable) to one of the clearable C4 records along with the respective quality of service E1 summary record are sent to the TSP within a debit TIF file. As those are non-clearable, they are sent with a zero-tariff amount.
- The TSP responds to this TIF file with a TIC file with a full acceptance.

Full acceptance of debit TIF file holding passages with incomplete transactions
(TIF Sample #05 – C6 Full Acceptance):

- For 1 OBE test samples from the HGV list of the TSP at least 5 C1 records and in-between 2 clearable C6 records (representing clearable incomplete transactions on toll stations) along with the respective E1 summary record are sent to the TSP within a debit TIF file.
- The TSP responds to this TIF file with a TIC file with a full acceptance.
- On the next working day, a respective matching quality of service C8 records (non-clearable) to one of the clearable C6 records along with the respective quality of service E1 summary record are sent to the TSP within a debit TIF file. As those are non-clearable, they are sent with a zero-tariff amount.

- The TSP responds to this TIF file with a TIC file with a full acceptance.

Full acceptance of debit TIF file holding passages with video-based transactions
(TIF Sample #06 – C8 Full Acceptance):

- For 1 OBE test samples from the HGV list of the TSP at least 5 C1 records and in-between 2 clearable C8 records (representing video-based transactions on enforcement stations) along with the respective E1 summary record are sent to the TSP within a debit TIF file.
- The TSP responds to this TIF file with a TIC file with a full acceptance.
- On the next working day, the respective matching quality of service C8 records (non-clearable) to the 2 clearable C8 records and 1 more quality of service C8 record (from a different station) along with the respective quality of service E1 summary record are sent to the TSP within a debit TIF file. As those are non-clearable, they are sent with a zero-tariff amount.
- The TSP responds to this TIF file with a TIC file with a full acceptance.

Partial rejection of debit TIF file holding passages with valid transactions
(TIF Sample #07 - C1 Partial Rejection):

- For 2 OBE test samples from the HGV list of the TSP at least 5 C1 records for each of the OBE test samples along with the respective E1 summary records are sent to the TSP within a debit TIF file.
  For 1 of the 2 OBE test samples the E1 summary record is manipulated to deviate from the sum of the C1 records tariff amounts to provoke a partial rejection.
- The TSP responds to this TIF file with a TIC file with a partial rejection, rejection the C1 records and the E1 summary record of the OBE with the manipulated E1 summary record.

Total rejection of debit TIF file holding passages with valid transactions
(TIF Sample #08 - C1 Total Rejection):

- For 2 OBE test samples from the HGV list of the TSP at least 5 C1 records for each of the OBE test samples along with the respective E1 summary records are sent to the TSP within a debit TIF file.
  The footer of the TIF file is manipulated to deviate from the sum of the E1 summary records tariff amounts to provoke a total rejection.
- The TSP responds to this TIF file with a TIC file with a total rejection.

Partial rejection of credit TIF file
(TIF Sample #09 – R2 Partial Rejection):

- Have TIF Sample #01 re-executed.
- For 1 OBE from the TIF Sample #01 re-execution perform a crediting similar to TIF Sample #2.
  The T1 summary record of the credit TIF file is manipulated to deviate from the sum of the R2 records tariff amounts to provoke a partial rejection.

- The TSP responds to this TIF file with a TIC file with a partial rejection, rejection the R2 records and the T1 summary record of the OBE with the manipulated E1 summary record.

Total rejection of credit TIF file
(TIF Sample #10 – R2 Total Rejection):

- Have TIF Sample #01 re-executed.
- For 1 OBE from the TIF Sample #01 re-execution perform a crediting similar to TIF Sample #2.
  The footer of the credit TIF file is manipulated to deviate from the sum of the T1 summary records tariff amounts to provoke a total rejection.
- The TSP responds to this TIF file with a TIC file with a total rejection.

Full acceptance of resent transactions in a TIF file without prior crediting
(TIF Sample #11 – C3 Full Acceptance without prior crediting):

- Precondition: TIF Sample #07 has been successfully executed.
- For that OBE of TIF Sample #07, for which the E1 summary record had been manipulated, C3 resent records (with the same axles a tariff like in the TIF Sample #07) along with the correct respective E1 summary record are sent within a debit TIF file.
- The TSP responds to this TIF file with a TIC file with a full acceptance.

Full acceptance of manually keyed-in billing details in a TIF file
(TIF Sample #12 – C2 Full Acceptance):

- For 2 OBE test samples from the HGV list of the TSP at least 1 C2 record for each of the OBE test samples along with the respective E1 summary records (if supported by the TC) are sent to the TSP within a debit TIF file.
  For 1 of the 2 OBE test samples a number of axles higher than the base category set in the HGV is used.
- The TSP responds to this TIF file with a TIC file with a full acceptance.

Full acceptance of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process in a TIF file
(TIF Sample #13 – C7 Full Acceptance):

- For 2 OBE test samples from the HGV list of the TSP at least 1 C7 record for each of the OBE test samples along with the respective E1 summary records (if supported by the TC) are sent to the TSP within a debit TIF file.
  For 1 of the 2 OBE test samples a number of axles higher than the base category set in the HGV is used.
- The TSP responds to this TIF file with a TIC file with a full acceptance.

5.4.2.3 Test-Scenarios regarding check of the TST update handling

The following Test-Scenarios regarding the check of the TST update handling at the TSP are tested in scope of test stage INT2:

Update of the TST having one toll station removed and a new one added
(TST Update Sample #01):

- Precondition: The original TST of the TC has been processed before in the TSP's back office system.
- Store the data of the actual TST of the TC to enable a seamless rollback later on.
- Remove 1 toll station from the TST.
- Add 1 toll station to the TST with an unused Station Code, Station Name Short and Station Name Long.
- Transmit the TST update to the TSP.
- The TSP processes the TST update in its back-office system.

Check TST update by exchanging a debit TIF file
(TST Update Sample #02):

- Precondition: TST Update Sample #01 has been executed successfully.
- Send a debit TIF file to the TSP with the following content:
    - For 1 OBE test sample from the HGV list of the TSP at least 5 C1 records, one of those representing a valid transaction at the toll station that has been added in TST Update Sample #01, along with the respective E1 summary record.
    - For 1 other OBE test sample from the HGV list of the TSP at least 5 C1 records, one of those representing a valid transaction at the toll station that has been removed in TST Update Sample #01, along with the respective E1 summary record.
- The TSP responds to this TIF file with a TIC file with a partial rejection, accepting the records of the OBE that did a transaction at the toll station that has been added in TST Update Sample #01 and rejecting the records of the OBE that did a transaction at the toll station that has been removed in TST Update Sample #01.

Rollback of prior update of the TST
(TST Update Sample #03):

- Precondition: TST Update Sample #01 and TST Update Sample #02 have been executed successfully.
- Rollback the TST content to the content stored in TST Update Sample #01.
- Transmit the rolled back TST as a new update to the TSP.
- The TSP processes the new TST update in its back-office system.

5.5 End to end tests

5.5.1 Objectives and overview

The end to end tests verify the full compatibility of the OBE and the TSPs back office interface within the whole tolling system and the coverage of all processes. After performing several test scenarios, the further processing of the transaction data in all the following systems will be checked.

Precondition for starting the end to end tests is successful functional OBE and back office interface compatibility tests.

A successful passing of the end to end tests is the precondition for the start of the pilot operation phase.

5.5.2 Test cases

The following E2E-Scenarios are performed in the testing environment during test stage E2E-TEST and in the operational EFC environment during test stage E2E-PROD. The following table gives an overview which of the E2E-Scenarios are tested in which of the test stages. Please note that for those E2E-Scenarios for which actual payment is involved, the payment relevant test cases are executed in E2E-PROD test stage only.

E2E-Scenario-ID	E2E-Scenario-Title	E2E-TEST	E2E-PROD	E2E-PROD for new OBE of existing TSP
Scenario-01	New EETS Contract with Service User	X	X	
Scenario-02	OBE enters the toll domain for the first time while being blacklisted	X	X	
Scenario-03	OBE performs transactions on the road - normal operation (incl. POS test)	X	X	
Scenario-04	OBE performs transactions on the road - blacklisted OBE	X	X	X
Scenario-05	OBE performs transactions on the road - OBE has blacklist bit set		X	X
Scenario-06	OBE performs transactions on the road - enforcement		X	
Scenario-07	OBE performs transactions on the road - reconstructed transactions	X	X	X
Scenario-08	OBE performs transactions on the road - incomplete transactions	X		
Scenario-09	OBE performs transactions on the road - crediting	X	X	
Scenario-10	OBE performs transactions on the road - Service / Warning beep		X	X
Scenario-11	OBE performs transactions on the road - central retroactive payment		X	

E2E-Scenario-ID	E2E-Scenario-Title	E2E-TEST	E2E-PROD	E2E-PROD for new OBE of existing TSP
Scenario-12	OBE performs transactions on the road – retroactive connection of transits to an OBE after customer complaint	X	X	
Scenario-13	Barrier based systems - manually taken transits based on Vehicle Declaration	X	X	

5.5.2.1 E2E-Scenario-01: New EETS Contract with Service User

Test name:	Open a new contract	No.: E2E-01.01
Purpose:	Verification the Service User contract formation process of the TSP and the subsequent exchange of the validation data.	
Actor:	Service User (SU), Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	A Service User (SU) contacts a Toll Service Provider (TSP) with a request to enter into a contract enabling the SU to drive with his vehicle in the toll domain of one or a number of specific Toll Chargers (TCs). The TSP collects the data needed from the SU for opening the requested contract. The TSP prepares the contract to be signed by the SU. The SU signs the contract. The TSP collects the data regarding the vehicle for which the contract with the SU is to be established from the SU. The TSP personalizes the OBE with the previously collected data regarding the vehicle for which the contract with the SU is to be established and contractual data. The TSP produces the Vehicle Declaration holding all the needed information for the toll domains for which the SU has signed a contract.	
Intention:	TSP agrees to establish a contract with the SU. The SU's data needed for opening the contract is collected. The contract is prepared and ready for signature by the SU. The contract established.	

The data of the vehicle of the SU is collected.

The OBE is personalized and ready for hand-over to the SU.

The Vehicle Declaration holding all the needed information for the toll domains for which the SU has signed a contract is prepared and ready for hand-over to the SU along with the OBE.

Test name:	Personal OBE handout - Distribute validation data - Update local HGV	No.: E2E-01.02a
Purpose:	Verification the Service User contract formation process of the TSP and the subsequent exchange of the validation data.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) performs an update of his local Heavy Goods Vehicle data (HGV, whitelist) entering the OBE data of the OBE personalized for the Service User (SU) in Test Case E2E-01.01. The TSP sends the updated local HGV to the EasyGo HUB for distribution to the Toll Chargers (TCs). The TSP checks the EasyGo HUBs response to the local HGV data (HGC) to see whether the update of the local HGV data is successfully processed by the EasyGo HUB.	
Intention:	The TSP's local HGV data is updated and ready for transmission to the EasyGo HUB. The TSP's update of the local HGV data is transmitted to the EasyGo HUB. The HGC sent by the EasyGo HUB confirms that the local HGV data is correctly processed without errors by the EasyGo HUB and will be distributed to the TCs with the next scheduled update.	

Test name:	Personal OBE handout - Distribute validation data - Process global HGV update	No.: E2E-01.03a
Purpose:	Verification the Service User contract formation process of the TSP and the subsequent exchange of the validation data.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	

Description:	The Toll Charger (TC) downloads the updated global HGV from the EasyGo HUB. The TC validates the updated global HGV after download. The TC processes the updated global HGV within his back-office system. Optional: The TC distributes the updated global HGV data to his road side equipment.
Intention:	The updated global HGV is available at the TC. The validation is successful. The updated global HGV data is successfully imported into the TC's back-office system. Optional: The updated global HGV data is distributed to the TC's road side equipment.

Test name:	Personal OBE handout - OBE and Vehicle Declaration handover	No.: E2E-01.04a
Purpose:	Verification the Service User contract formation process of the TSP and the subsequent exchange of the validation data.	
Actor:	Toll Service Provider (TSP), Service User (SU)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) personally (i.e. by means of a point-of-sale or the like) hands over the personalized OBE and the corresponding Vehicle Declaration (see Test Case E2E-01.01) to the Service User (SU).	
Intention:	The SU has received the personalized OBE and the corresponding Vehicle Declaration.	

Test name:	Postal OBE delivery - Distribute validation data - Update local NAT	No.: E2E-01.02b
Purpose:	Verification the Service User contract formation process of the TSP and the subsequent exchange of the validation data.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	

Description:	The Toll Service Provider (TSP) performs an update of his local Non-Accepted Table data (NAT, blacklist) entering the OBE data of the OBE personalized for the Service User (SU) in Test Case E2E-01.01. The TSP sends the updated local NAT to the EasyGo HUB for distribution to the Toll Chargers (TCs). The TSP checks the EasyGo HUBs response to the local NAT data (NAC) to see whether the update of the local NAT data is successfully processed by the EasyGo HUB.
Intention:	The TSP's local NAT data is updated and ready for transmission to the EasyGo HUB. The TSP's update of the local NAT data is transmitted to the EasyGo HUB. The NAC sent by the EasyGo HUB confirms that the local NAT data is correctly processed without errors by the EasyGo HUB and will be distributed to the TCs with the next scheduled update.

Test name:	Postal OBE delivery - Distribute validation data - Process global NAT update	No.: E2E-01.03b

Purpose:	Verification the Service User contract formation process of the TSP and the subsequent exchange of the validation data.
Actor:	Toll Charger (TC)
Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	The Toll Charger (TC) downloads the updated global NAT from the EasyGo HUB. The TC validates the updated global NAT after download. The TC processes the updated global NAT within his back-office system. Optional: The TC distributes the updated global NAT data to his road side equipment.
Intention:	The updated global NAT is available at the TC. The validation is successful. The updated global NAT data is successfully imported into the TC's back-office system. Optional: The updated global NAT data is distributed to the TC's road side equipment.

Test name:	Postal OBE delivery - Send OBE and Vehicle Declaration to SU	No.: E2E-01.04b
Purpose:	Verification the Service User contract formation process of the TSP and the subsequent exchange of the validation data.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) sends the personalized OBE and the corresponding Vehicle Declaration (see Test Case E2E-01.01) to the Service User (SU) by means of a postal or delivery service. The OBE needs to be shielded when sent to the SU by means of a postal or delivery service.	
Intention:	The SU has received the personalized OBE and the corresponding Vehicle Declaration.	

Test name:	Postal OBE delivery - SU activates the received OBE	No.: E2E-01.05b
Purpose:	Verification the Service User contract formation process of the TSP and the subsequent exchange of the validation data.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Service User (SU) contacts his Toll Service Provider (TSP) for activation of the personalized OBE received by means of a postal or delivery service.	
Intention:	The TSP activates the OBE in his system. The OBE is ready to be used on the road.	

Test name:	Postal OBE delivery - Distribute validation data - Update local NAT and HGV	No.: E2E-01.06b
Purpose:	Verification the Service User contract formation process of the TSP and the subsequent exchange of the validation data.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	

Description:	The Toll Service Provider (TSP) performs an update of his local Non-Accepted table data (NAT, blacklist) removing the OBE data of the OBE personalized for the Service User (SU) in Test Case E2E-01.01. The TSP sends the updated local NAT to the EasyGo HUB for distribution to the Toll Chargers (TCs). The TSP checks the EasyGo HUBs response to the local NAT data (NAC) to see whether the update of the local NAT data is successfully processed by the EasyGo HUB. The TSP performs an update of his local Heavy Goods Vehicle data (HGV, whitelist) entering the OBE data of the OBE personalized for the Service User (SU) in Test Case E2E-01.01. The TSP sends the updated local HGV to the EasyGo HUB for distribution to the Toll Chargers (TCs). The TSP checks the EasyGo HUBs response to the local HGV data (HGC) to see whether the update of the local HGV data is successfully processed by the EasyGo HUB.
Intention:	The TSP's local NAT data is updated and ready for transmission to the EasyGo HUB. The TSP's update of the local NAT data is transmitted to the EasyGo HUB. The NAC sent by the EasyGo HUB confirms that the local NAT data is correctly processed without errors by the EasyGo HUB and will be distributed to the TCs with the next scheduled update. The TSP's local HGV data is updated and ready for transmission to the EasyGo HUB. The TSP's update of the local HGV data is transmitted to the EasyGo HUB. The HGC sent by the EasyGo HUB confirms that the local HGV data is correctly processed without errors by the EasyGo HUB and will be distributed to the TCs with the next scheduled update.

Test name:	Postal OBE delivery - Distribute validation data - Process global NAT and HGV update	No.: E2E-01.07b
Purpose:	Verification the Service User contract formation process of the TSP and the subsequent exchange of the validation data.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	

Description:	The Toll Charger (TC) downloads the updated global NAT from the EasyGo HUB. The TC validates the updated global NAT after download. The TC processes the updated global NAT within his back-office system. Optional: The TC distributes the updated global NAT data to his road side equipment. The TC downloads the updated global HGV from the EasyGo HUB. The TC validates the updated global HGV after download. The TC processes the updated global HGV within his back-office system. Optional: The TC distributes the updated global HGV data to his road side equipment.
Intention:	The updated global NAT is available at the TC. The validation is successful. The updated global NAT data is successfully imported into the TC's back-office system. Optional The updated global NAT data is distributed to the TC's road side equipment. The updated global HGV is available at the TC. The validation is successful. The updated global HGV data is successfully imported into the TC's back-office system. Optional The updated global HGV data is distributed to the TC's road side equipment.

5.5.2.2 E2E-Scenario-02: Blacklisted OBE first time in toll domain

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-02.01
Purpose:	Verification of the correct handling of new OBE that is blacklisted while entering a MLFF toll domain for the very first time.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) but his OBE is blacklisted (listed on the NAT file) when entering a MLFF toll domain for the first time.	

	The SU drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing all kinds of toll stations of the TC until the OBE under tests signals it being blacklisted (4 beeps). The OBE under test is not listed among the TSP's entries of the global HGV file (OBE under test is not whitelisted). The OBE under test is listed among the TSP's entries of the global NAT file (OBE under test is blacklisted).
Intention:	After 3 to 10 passages of toll stations the OBE signals an invalid transaction (4 beeps). The transactions generated with the OBE under test are correctly processed and stored in the TC's system.

Test name:	Report billing details - generate TIF files	No.: E2E-02.02
Purpose:	Verification of the correct handling of new OBE that is blacklisted while entering a MLFF toll domain for the very first time.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-02.01) were performed, will hold the first 3 to 10 transactions of the OBE under test until the TC's road side equipment got aware that the OBE is blacklisted.	
Intention:	The TIF files are correctly generated. The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.	

Test name:	Reject billing details - generate TIC files	No.: E2E-02.03
Purpose:	Verification of the correct handling of new OBE that is blacklisted while entering a MLFF toll domain for the very first time.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	

Description:	The Toll Service Provider (TSP) rejects the billing details of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files. The TSP rejects the transactions of the TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-02.01) were performed as the OBE under test has been blacklisted at that time.
Intention:	The TIF files are downloaded by the TSP. The TIC files are correctly generated. The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB. No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	TSP validates that no payment for service usage is claimed by TC	No.: E2E-02.04

Purpose:	Verification of the correct handling of new OBE that is blacklisted while entering a MLFF toll domain for the very first time.
Actor:	Toll Service Provider (TSP)
Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) validates that no payment for service usage is claimed by the Toll Charger (TC) for the transactions performed by the OBE under test in scope of Test Case E2E-02.01.
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) received from the TC does not hold the transactions performed by the OBE under test in scope of Test Case E2E-02.01.

Test name:	TC validates that no payment of issuer fee is claimed by TSP	No.: E2E-02.05

Purpose:	Verification of the correct handling of new OBE that is blacklisted while entering a MLFF toll domain for the very first time.
Actor:	Toll Charger (TC)
Executed by:	Toll Charger (TC))
Equipment:	Not applicable.
Description:	The Toll Charger (TC) validates that no payment of issuer fee is claimed by the Toll Service Provider (TSP) for the transactions performed by the OBE under test in scope of Test Case E2E-02.01.

Intention:	The TSP's claim for payment of issuer fee does not hold the transactions performed by the OBE under test in scope of Test Case E2E-02.01.

5.5.2.3 E2E-Scenario-03: OBE transactions - normal operation (incl. POS)

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-03.01
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing all kinds of toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).	
Intention:	The OBE under test signals a valid transaction (1 beep) on each of the passages of any kind of the TC's toll stations. The transactions generated with the OBE under test are correctly processed and stored in the TC's system.	

Test name:	Passages of toll stations - no transactions generated	No.: E2E-03.02
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test shielded to prevent generation of transactions while passing toll stations of the TC.	

The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted).

The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted).

A couple passages of the TC's toll stations shall be done.

Intention: The OBE under test signals no transaction (no beep) on each of the passages of any kind of the TC's toll stations.

No transactions of the OBE under test are processed and stored in the TC's system in the timeframe in which the OBE under test was shielded.

Test name:	Retroactive payment at POS - no transactions generated	No.: E2E-03.03

Purpose: Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in a MLFF toll domain.

Actor: Service User (SU)

Executed by: Toll Charger (TC)

Equipment: Not applicable.

Description: A Service User (SU) stops at a Toll Charger's (TC's) Point of Sale (POS) to do retroactive payment for passages of the TC's toll stations at which no valid transactions has been performed (see Test Case E2E-03.02).

Or a SU stops at a TC's POS to do retroactive payment for passages of the TC's toll stations at which a too low number of axles has been set at the OBE under test.

The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted).

The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted).

Hint: In the Austrian toll domain such a retroactive payment is only possible as long as the passage of the toll station for which a retroactive payment is done is less than 100 km from the location of the POS and the passage of the toll station for which a retroactive payment is done was done less than 5 hours ago from the current date and time when doing the retroactive payment at the POS.

Intention: The retroactive payment based on the Vehicle Declaration is successfully done.

No transactions of the OBE under test corresponding to the toll stations for which the retroactive payment has been performed are processed and stored in the TC's system.

Test name:	Report billing details - generate TIF files	No.: E2E-03.04
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-03.01, E2E-03.02, E2E-03.04 and E2E-03.03a if relevant for the TC) were performed, will hold the following types of transactions of the OBE under test: • C1 transactions	
Intention:	The TIF files are correctly generated. The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.	

Test name:	Acknowledge billing details - generate TIC files	No.: E2E-03.05
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) acknowledges the billing details of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files. The TSP acknowledges the transactions of the TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-03.01, E2E-03.02, E2E-03.04 and E2E-03.03a if relevant for the TC) were performed. Following types of transactions of the OBE under test are in scope of this acknowledgement:	

- C1 transactions

Intention:	The TIF files are downloaded by the TSP. The TIC files are correctly generated. The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB. No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	TC claims payment for service usage from TSP	No.: E2E-03.06
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) claims payment for service usage from from the Toll Service Provider (TSP). The TC generates and sends an account statement (in the Agency model) respectively an invoice (in the Reseller model) to the TSP.	
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) is sent to the TSP.	

Test name:	TSP validates claimed payment for service usage from TC	No.: E2E-03.07
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) validates the Toll Charger's (TC's) claimed payment for service usage against the exchanged TIF and TIC files. The TC's claim for payment for service usage shall only include such transactions that have been sent to the TSP within a TIF file and acknowledged by the TSP by sending an acknowledgement in a TIC file before.	
Intention:	The TC's claimed payment for service usage is found to correspond to the exchanged TIF and TIC files.	

Test name:	TSP claims payment of issuer fee from TC	No.: E2E-03.08
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) claims payment of issuer from the Toll Charger (TC). The TSP generates and sends an invoice for the issuer fee to the TC.	
Intention:	The invoice for the issuer fee is sent to the TC.	

Test name:	TC validates claimed payment of issuer fee from TSP	No.: E2E-03.09
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) validates the Toll Service Provider's (TSP's) claimed payment of the issuer fee.	
Intention:	The TSP's claimed payment of the issuer fee is validated.	

Test name:	TSP claims payment for service usage from SU	No.: E2E-03.10
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) claims payment for service usage from the Service User (SU). The TSP generates and sends an invoice for service usage to the SU. In the Agency model this invoice is in the name and on behalf of the TC. In the Reseller model this invoice is in the TSP's own name.	

Intention:	The invoice for service usage is sent to the SU.

Test name:	SU performs payment for service usage to TSP	No.: E2E-03.11
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in the toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Service User (SU) performs the payment for service usage to the Toll Service Provider (TSP).	
Intention:	The invoice for service usage is payed by the SU.	

Test name:	TSP performs payment for service usage to TC	No.: E2E-03.12
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) performs the payment for service usage to the Toll Charger (TC).	
Intention:	The invoice for service usage is payed by the TSP.	

Test name:	TC performs payment of issuer fee to TSP	No.: E2E-03.13
Purpose:	Verification of the normal operation (valid transaction, retroactive payment at the point of sale) in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) performs the payment of the issuer fee to the Toll Service Provider (TSP).	
Intention:	The invoice of the issuer fee is payed by the TC.	

5.5.2.4 E2E-Scenario-04: OBE transactions – blacklisted OBE

Test name:	TSP moves OBE from HGV to NAT	No.: E2E-04.01
Purpose:	Verification of the correct behaviour of blacklisting and blacklisted OBEs in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) blacklists a Service User's (SU's) OBE which was whitelisted before for any reason. The OBE is removed from the TPS's HGV data (whitelist) and added to the TSP's NAT data (blacklist). The TSP sends the updated local NAT and local HGV to the EasyGo HUB for distribution to the Toll Chargers (TCs). The TSP checks the EasyGo HUBs response to the local NAT data (NAC) and local HGV data (HGC) to see whether the update of the local NAT data and local HGV data is successfully processed by the EasyGo HUB.	
Intention:	The TSP's local NAT data is updated and ready for transmission to the EasyGo HUB. The TSP's update of the local NAT data is transmitted to the EasyGo HUB. The NAC sent by the EasyGo HUB confirms that the local NAT data is correctly processed without errors by the EasyGo HUB and will be distributed to the TCs with the next scheduled update. The TSP's local HGV data is updated and ready for transmission to the EasyGo HUB. The TSP's update of the local HGV data is transmitted to the EasyGo HUB. The HGV sent by the EasyGo HUB confirms that the local HGV data is correctly processed without errors by the EasyGo HUB and will be distributed to the TCs with the next scheduled update.	

Test name:	TC processes global NAT and HGV update	No.: E2E-04.02
Purpose:	Verification of the correct behaviour of blacklisting and blacklisted OBEs in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) downloads the updated global NAT and global HGV from the EasyGo HUB.	

	The TC validates the updated global NAT and global HGV after download. The TC processes the updated global NAT and global HGV within his back-office system. Optional: The TC distributes the updated global NAT and global HGV data to his road side equipment.
Intention:	The updated global NAT is available at the TC. The validation is successful. The updated global NAT data is successfully imported into the TC's back-office system. Optional Step: The updated global NAT data is distributed to the TC's road side equipment. The updated global HGV is available at the TC. The validation is successful. The updated global HGV data is successfully imported into the TC's back-office system. Optional Step: The updated global HGV data is distributed to the TC's road side equipment.

Test name:	Passages of toll stations - no valid transactions generated	No.: E2E-04.03

Purpose:	Verification of the correct behaviour of blacklisting and blacklisted OBEs in the toll domain.
Actor:	Service User (SU)
Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test being blacklisted passing toll stations of the TC. The OBE under test is listed among the TSP's entries of the global NAT file (OBE under test is blacklisted). The OBE under test is not listed among the TSP's entries of the global HGV file (OBE under test is not whitelisted). A couple passages of the TC's toll stations shall be done.
Intention:	The OBE under test signals an invalid transaction (4 beeps) on each of the passages of any kind of the TC's toll stations.

Only invalid transactions of the OBE under test are processed and stored in the TC's system.

Test name:	Report billing details - generate TIF files	No.: E2E-04.04
Purpose:	Verification of the correct behaviour of blacklisting and blacklisted OBEs in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-04.03) were performed, will not hold any transactions of the OBE under.	
Intention:	The TIF files are correctly generated. The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.	

Test name:	Validate billing details - generate TIC files	No.: E2E-04.05
Purpose:	Verification of the correct behaviour of blacklisting and blacklisted OBEs in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) validates the billing details to the Toll Charger (TC) checking that no transactions of the OBE under test are part of the received TIF file(s).	
Intention:	The TIF files are downloaded by the TSP. No transactions of the OBE under test were part of the received TIF file(s). The TIC files are correctly generated. The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB. No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.	

Test name:	TSP validates that no payment for service usage is claimed by TC	No.: E2E-04.06
Purpose:	Verification of the correct behaviour of blacklisting and blacklisted OBEs in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) validates that no payment for service usage is claimed by the Toll Charger (TC) for the any transactions performed by the OBE under test in scope of Test Case E2E-04.03.	
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) received from the TC does not hold the transactions performed by the OBE under test in scope of Test Case E2E-04.03.	

Test name:	TC validates that no payment of issuer fee is claimed by TSP	No.: E2E-04.07
Purpose:	Verification of the correct behaviour of blacklisting and blacklisted OBEs in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) validates that no payment of issuer fee is claimed by the Toll Service Provider (TSP) for the transactions performed by the OBE under test in scope of Test Case E2E-04.03.	
Intention:	The TSP's claim for payment of issuer fee does not hold the transactions performed by the OBE under test in scope of Test Case E2E-04.03.	

Test name:	TSP moves OBE from HGV to NAT	No.: E2E-04.08
Purpose:	Verification of the correct behaviour of blacklisting and blacklisted OBEs in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	

Description:	The Toll Service Provider (TSP) whitelists a Service User's (SU's) OBE that has been blacklisted before. The OBE is added to the TPS's HGV data (whitelist) and removed from the TSP's NAT data (blacklist). The TSP sends the updated local NAT and local HGV to the EasyGo HUB for distribution to the Toll Chargers (TCs). The TSP checks the EasyGo HUBs response to the local NAT data (NAC) and local HGV data (HGC) to see whether the update of the local NAT data and local HGV data is successfully processed by the EasyGo HUB.
Intention:	The TSP's local NAT data is updated and ready for transmission to the EasyGo HUB. The TSP's update of the local NAT data is transmitted to the EasyGo HUB. The NAC sent by the EasyGo HUB confirms that the local NAT data is correctly processed without errors by the EasyGo HUB and will be distributed to the TCs with the next scheduled update. The TSP's local HGV data is updated and ready for transmission to the EasyGo HUB. The TSP's update of the local HGV data is transmitted to the EasyGo HUB. The HGV sent by the EasyGo HUB confirms that the local HGV data is correctly processed without errors by the EasyGo HUB and will be distributed to the TCs with the next scheduled update.

Test name:	TC processes global NAT and HGV update	No.: E2E-04.09
Purpose:	Verification of the correct behaviour of blacklisting and blacklisted OBEs in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) downloads the updated global NAT and global HGV from the EasyGo HUB. The TC validates the updated global NAT and global HGV after download. The TC processes the updated global NAT and global HGV within his back-office system. Optional: The TC distributes the updated global NAT and global HGV data to his road side equipment.	
Intention:	The updated global NAT is available at the TC. The validation is successful.	

The updated global NAT data is successfully imported into the TC's back-office system.

Optional Step: The updated global NAT data is distributed to the TC's road side equipment.

The updated global HGV is available at the TC.

The validation is successful.

The updated global HGV data is successfully imported into the TC's back-office system.

Optional Step: The updated global HGV data is distributed to the TC's road side equipment.

5.5.2.5 E2E-Scenario-05: OBE transactions – OBE has blacklist bit set

Remark: This E2E-Scenario is optional and only relevant in scope of tests if the Toll Service Provider (TSP) uses the OBEs feature to set the blacklist bit on the OBE.

Test name:	TSP sets blacklist bit of OBE under test	No.: E2E-05.01
Purpose:	Verification of the correct behaviour of usage of blacklist bit of OBEs in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) sets the blacklist bit of a Service User's (SU's) OBE which is listed in the TSP's HGV data (whitelisted) for any reason.	
Intention:	The OBE under test has its blacklist bit set.	

Test name:	Passages of toll stations - no valid transactions generated	No.: E2E-05.02
Purpose:	Verification of the correct behaviour of usage of blacklist bit of OBEs in the toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test having its blacklist bit set passing toll stations of the TC.	

	The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). A couple passages of the TC's toll stations shall be done.
Intention:	The OBE under test signals an invalid transaction (4 beeps) on each of the passages of any kind of the TC's toll stations. Only invalid transactions of the OBE under test are processed and stored in the TC's system.

Test name:	Report billing details - generate TIF files	No.: E2E-05.03
Purpose:	Verification of the correct behaviour of usage of blacklist bit of OBEs in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-05.02) were performed, will not hold any transactions of the OBE under.	
Intention:	The TIF files are correctly generated. The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.	

Test name:	Validate billing details - generate TIC files	No.: E2E-05.04
Purpose:	Verification of the correct behaviour of usage of blacklist bit of OBEs in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) validates the billing details to the Toll Charger (TC) checking that no transactions of the OBE under test are part of the received TIF file(s).	
Intention:	The TIF files are downloaded by the TSP. No transactions of the OBE under test were part of the received TIF file(s).	

The TIC files are correctly generated.

The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB.

No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	TSP validates that no payment for service usage is claimed by TC	No.: E2E-05.05
Purpose:	Verification of the correct behaviour of usage of blacklist bit of OBEs in the toll domain, if used.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) validates that no payment for service usage is claimed by the Toll Charger (TC) for the any transactions performed by the OBE under test in scope of Test Case E2E-05.02.	
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) received from the TC does not hold the transactions performed by the OBE under test in scope of Test Case E2E-05.02.	

Test name:	TC validates that no payment of issuer fee is claimed by TSP	No.: E2E-05.06
Purpose:	Verification of the correct behaviour of usage of blacklist bit of OBEs in the toll domain, if used.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) validates that no payment of issuer fee is claimed by the Toll Service Provider (TSP) for the transactions performed by the OBE under test in scope of Test Case E2E-05.02.	
Intention:	The TSP's claim for payment of issuer fee does not hold the transactions performed by the OBE under test in scope of Test Case E2E-05.02.	

Test name:	TSP resets blacklist bit of OBE under test	No.: E2E-05.07
Purpose:	Verification of the correct behaviour of usage of blacklist bit of OBEs in the toll domain, if used.	

Actor:	Toll Service Provider (TSP)
Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) resets a Service User's (SU's) OBE blacklist bit that has been set before.
Intention:	The OBE under test has its blacklist bit reset.

5.5.2.6 E2E-Scenario-06: OBE transactions – enforcement

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-06.01
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in the toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing all kinds of toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).	
Intention:	The OBE under test signals a valid transaction (1 beep) on each of the passages of any kind of the TC's toll stations. The transactions generated with the OBE under test are correctly processed and stored in the TC's system.	

Test name:	Passages of enforcement stations - no transactions generated	No.: E2E-06.02
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	

Equipment:	Not applicable.
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test shielded to prevent generation of transactions while passing enforcement stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple passages of the TC's enforcement stations shall be done.
Intention:	The OBE under test signals no transaction (no beep) on each of the passages of any kind of the TC's enforcement stations. No transactions of the OBE under test are processed and stored in the TC's system in the timeframe in which the OBE under test was shielded.

Test name:	Passages of enforcement stations - too low number of axles set	No.: E2E-06.03

Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.
Actor:	Service User (SU)
Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing enforcement stations of the TC. The number of axles set on the OBE under test is lower than the actual number of axles of the vehicle which is used for performing the test including any trailer. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple passages of the TC's enforcement stations shall be done.
Intention:	The OBE under test signals a valid transaction (1 beep) on each of the passages of any kind of the TC's toll stations.

The transactions generated with the OBE under test are correctly processed and stored in the TC's system.

Test name:	Enforcement - central enforcement	No.: E2E-06.04a
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) performs enforcement of the violation of the Service User (SU) by generating an enforcement case for the SU's violation of the tolling regulations in its enforcement centre and submitting a violation ticket to the SU. A suspicion case for the SU's violation of the tolling regulations is generated by the TC's system and delivered to the enforcement centre for inspection. The suspicion case delivered to the enforcement centre for inspection is processed by the TC's employees in the enforcement centre and acknowledge being an enforcement case. The TC contacts the SU's Toll Service Provider (TSP) for the SU's contact information. The TC generates a violation ticket and sends it to the SU.	
Intention:	A new suspicion case for the SU's violation of the tolling regulations has been delivered to the enforcement centre for inspection. A new enforcement case for the SU's violation of the tolling regulations has been generated. The TSP provides the SU's contact information to the TC. The SU receives the violation ticket sent to him by the TC.	

Test name:	Enforcement - enforcement on the road (optional)	No.: E2E-06.04b
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	

Description:	The Toll Charger (TC) performs enforcement of the violation of the Service User (SU) on the road. This is an optional Test Case! It depends on the availability of a mobile enforcement unit of the TC in the vicinity of the SU's route within the toll domain of the TC. The mobile enforcement unit of the TC gets notified that a SU violating tolling regulations is driving in its vicinity in the same direction like the mobile enforcement unit. The mobile enforcement unit catches the SU that was found to be violating tolling regulations. The mobile enforcement unit reads out the OBE under test of the SU that was found to be violating tolling regulations. The mobile enforcement unit enforces the SU's violation of the tolling regulations.
Intention:	The mobile enforcement unit is aware that there is a SU violating tolling regulations is driving in its vicinity in the same direction like the mobile enforcement unit. The SU that was found to be violating tolling regulations is caught by the mobile enforcement unit. The OBE data of the OBE under test is successfully read out. The OBE data read out by the mobile enforcement unit matches the expected OBE data of the SU that was found to be violating tolling regulations. The SU's violation of the tolling regulations is enforced.

Test name:	Report billing details - generate TIF files	No.: E2E-06.05

Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.
Actor:	Toll Charger (TC)
Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-06.01, E2E-06.02 and E2E-06.03) were performed, will hold the following types of transactions of the OBE under test:

- C1 transactions
- Quality of Service C8 transactions (if Test Case E2E-06.04a has been executed before)

If the delivered TIF file does not hold Quality of Service C8 (video based) transactions for passages done in scope of Test Case E2E-06.02, those will be part of a TIF file delivered at the end of the day on which Test Case E2E-06.04a is executed.

The clearable C8 (video based) transactions for passages done in scope of Test Case E2E-06.02 will either be part of a TIF file holding the Quality of Service C8 (video based) transactions or of a TIF file one day later.

For the passages done in scope of Test Case E2E-06.03 only the tariff according to the claimed number of axles, not the one according to the actual number of axles, is stated in the TIF file!

Intention: The TIF files are correctly generated.

For the passages done in scope of Test Case E2E-06.03 only the tariff according to the claimed number of axles, not the one according to the actual number of axles, is stated in the TIF files.

The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB.

No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.

Test name:	Acknowledge billing details - generate TIC files	No.: E2E-06.06

Purpose: Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.

Actor: Toll Service Provider (TSP)

Executed by: Toll Service Provider (TSP)

Equipment: Not applicable.

Description: The Toll Service Provider (TSP) acknowledges the billing details of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files.

Intention: The TIF files are downloaded by the TSP.

The TIC files are correctly generated.

The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB.

No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	TC claims payment for service usage from TSP	No.: E2E-06.07
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) claims payment for service usage from the Toll Service Provider (TSP). The TC generates and sends an account statement (in the Agency model) respectively an invoice (in the Reseller model) to the TSP.	
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) is sent to the TSP.	

Test name:	TSP validates claimed payment for service usage from TC	No.: E2E-06.08
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) validates the Toll Charger's (TC's) claimed payment for service usage against the exchanged TIF and TIC files. The TC's claim for payment for service usage shall only include such transactions that have been sent to the TSP within a TIF file and acknowledged by the TSP by sending an acknowledgement in a TIC file before.	
Intention:	The TC's claimed payment for service usage is found to correspond to the exchanged TIF and TIC files.	

Test name:	TSP claims payment of issuer fee from TC	No.: E2E-06.09
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	

Description:	The Toll Service Provider (TSP) claims payment of issuer from the Toll Charger (TC). The TSP generates and sends an invoice for the issuer fee to the TC.
Intention:	The invoice for the issuer fee is sent to the TC.

Test name:	TC validates claimed payment of issuer fee from TSP	No.: E2E-06.10
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) validates the Toll Service Provider's (TSP's) claimed payment of the issuer fee.	
Intention:	The TSP's claimed payment of the issuer fee is validated.	

Test name:	TSP claims payment for service usage from SU	No.: E2E-06.11
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) claims payment for service usage from the Service User (SU). The TSP generates and sends an invoice for service usage to the SU. In the Agency model this invoice is in the name and on behalf of the TC. In the Reseller model this invoice is in the TSP's own name.	
Intention:	The invoice for service usage is sent to the SU.	

Test name:	SU performs payment for service usage to TSP	No.: E2E-06.12
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	

Equipment:	Not applicable.
Description:	The Service User (SU) performs the payment for service usage to the Toll Service Provider (TSP).
Intention:	The invoice for service usage is payed by the SU.

Test name:	TSP performs payment for service usage to TC	No.: E2E-06.13
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) performs the payment for service usage to the Toll Charger (TC).	
Intention:	The invoice for service usage is payed by the TSP.	

Test name:	TC performs payment of issuer fee to TSP	No.: E2E-06.14
Purpose:	Verification of the correct handling of enforcement processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) performs the payment of the issuer fee to the Toll Service Provider (TSP).	
Intention:	The invoice of the issuer fee is payed by the TC.	

5.5.2.7 E2E-Scenario-07: OBE transactions - reconstructed transactions

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-07.01
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	

Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing all kinds of toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).
Intention:	The OBE under test signals a valid transaction (1 beep) on each of the passages of any kind of the TC's toll stations. The transactions generated with the OBE under test are correctly processed and stored in the TC's system.

Test name:	Passages of toll stations - generate C4 transactions	No.: E2E-07.02
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test shielded to prevent generation of transactions while passing toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). Only 1 to 2 subsequent passages of the TC's toll stations shall be done.	
Intention:	The OBE under test signals no transaction (no beep) on each of the passages of any kind of the TC's toll stations. No transactions of the OBE under test are processed and stored in the TC's system in the timeframe in which the OBE under test was shielded. For each of the passages of the toll stations passed with the OBE under test shielded in Test Step 1 a reconstructed transaction is generated, correctly processed and stored in the TC's system.	

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-07.03

Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.
Actor:	Service User (SU)
Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing all kinds of toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).
Intention:	The OBE under test signals a valid transaction (1 beep) on each of the passages of any kind of the TC's toll stations. The transactions generated with the OBE under test are correctly processed and stored in the TC's system.

Test name:	Report billing details - generate TIF files	No.: E2E-07.04

Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.
Actor:	Toll Charger (TC)
Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-07.01 to E2E-07.03) were performed, will hold the following types of transactions of the OBE under test: • C1 transactions • C4 transactions (depending on whether the TC's reconstruction mechanism has already reconstructed missing transactions)

The TIF file(s) generated by the TC usually at the next day after the day, on which the passages with the OBE under test (see Test-Cases E2E-07.01 to E2E-07.03) were performed, will hold the following types of transactions of the OBE under test:

- C4 transactions (for reconstructed missing transactions that have not been part of TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test were performed)

Intention: The TIF files are correctly generated.

The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB.

No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.

Test name:	Acknowledge billing details - generate TIC files	No.: E2E-07.05

Purpose: Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.

Actor: Toll Service Provider (TSP)

Executed by: Toll Service Provider (TSP)

Equipment: Not applicable.

Description: The Toll Service Provider (TSP) acknowledges the billing details of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files.

The TSP acknowledges the transactions of the TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-07.01 to E2E-07.03) were performed. Following types of transactions of the OBE under test are in scope of this acknowledgement:

- C1 transactions
- C4 transactions (depending on whether the TC's reconstruction mechanism has already reconstructed missing transactions)

The TSP acknowledges the transactions of the TIF file(s) generated by the TC usually at the next day after the day, on which the passages with the OBE under test (see Test-Cases E2E-07.01 to E2E-07.03) were performed. Following types of transactions of the OBE under test are in scope of this acknowledgement:

- C4 transactions (for reconstructed missing transactions that have not been part of TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test were performed)

Intention: The TIF files are downloaded by the TSP.

The TIC files are correctly generated.

The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB.

No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	TC claims payment for service usage from TSP	No.: E2E-07.06
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) claims payment for service usage from the Toll Service Provider (TSP). The TC generates and sends an account statement (in the Agency model) respectively an invoice (in the Reseller model) to the TSP.	
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) is sent to the TSP.	

Test name:	TSP validates claimed payment for service usage from TC	No.: E2E-07.07
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) validates the Toll Charger's (TC's) claimed payment for service usage against the exchanged TIF and TIC files. The TC's claim for payment for service usage shall only include such transactions that have been sent to the TSP within a TIF file and acknowledged by the TSP by sending an acknowledgement in a TIC file before.	
Intention:	The TC's claimed payment for service usage is found to correspond to the exchanged TIF and TIC files.	

Test name:	TSP claims payment of issuer fee from TC	No.: E2E-07.08
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) claims payment of issuer from the Toll Charger (TC). The TSP generates and sends an invoice for the issuer fee to the TC.	
Intention:	The invoice for the issuer fee is sent to the TC.	

Test name:	TC validates claimed payment of issuer fee from TSP	No.: E2E-07.09
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) validates the Toll Service Provider's (TSP's) claimed payment of the issuer fee.	
Intention:	The TSP's claimed payment of the issuer fee is validated.	

Test name:	TSP claims payment for service usage from SU	No.: E2E-07.10
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) claims payment for service usage from the Service User (SU). The TSP generates and sends an invoice for service usage to the SU. In the Agency model this invoice is in the name and on behalf of the TC. In the Reseller model this invoice is in the TSP's own name.	
Intention:	The invoice for service usage is sent to the SU.	

Test name:	SU performs payment for service usage to TSP	No.: E2E-07.11
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Service User (SU) performs the payment for service usage to the Toll Service Provider (TSP).	
Intention:	The invoice for service usage is payed by the SU.	

Test name:	TSP performs payment for service usage to TC	No.: E2E-07.12
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) performs the payment for service usage to the Toll Charger (TC).	
Intention:	The invoice for service usage is payed by the TSP.	

Test name:	TC performs payment of issuer fee to TSP	No.: E2E-07.13
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) performs the payment of the issuer fee to the Toll Service Provider (TSP).	
Intention:	The invoice of the issuer fee is payed by the TC.	

5.5.2.8 E2E-Scenario-08: OBE transactions - incomplete transactions

Remark: This E2E-Scenario is only performed in E2E-TEST as incomplete transactions are not predictable to be produced in the production environment.

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-08.01
Purpose:	Verification of the correct handling of incomplete transactions (reconstruction of broken transactions) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing all kinds of toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).	
Intention:	The OBE under test signals a valid transaction (1 beep) on each of the passages of any kind of the TC's toll stations. The transactions generated with the OBE under test are correctly processed and stored in the TC's system.	

Test name:	Passages of toll stations - generate C6 transactions	No.: E2E-08.02
Purpose:	Verification of the correct handling of incomplete transactions (reconstruction of broken transactions) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating incomplete transactions (C6) while passing all kinds of toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted).	

	The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).
Intention:	The OBE under test signals no transaction (no beep) on each of the passages of any kind of the TC's toll stations. Only incomplete transactions of the OBE under test are generated, correctly processed and stored in the TC's system in the timeframe in which incomplete transactions were generated. For at least one of the passages of the toll stations passed with the OBE under test in the timeframe in which incomplete transactions were generated a restored incomplete transaction is generated, correctly processed and stored in the TC's system.

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-08.03
Purpose:	Verification of the correct handling of incomplete transactions (reconstruction of broken transactions) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing all kinds of toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).	
Intention:	The OBE under test signals a valid transaction (1 beep) on each of the passages of any kind of the TC's toll stations. The transactions generated with the OBE under test are correctly processed and stored in the TC's system.	

Test name:	Report billing details - generate TIF files	No.: E2E-08.04
Purpose:	Verification of the correct handling of incomplete transactions (reconstruction of broken transactions) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-08.01 to E2E-08.03) were performed, will hold the following types of transactions of the OBE under test: • C1 transactions • clearable C6 transactions (depending on whether the TC's reconstruction mechanism has already restored at least one of the incomplete transactions) • QoS C6 transactions (incomplete transactions that could not be restored by the TC's reconstruction mechanism) The TIF file(s) generated by the TC usually at the next day after the day, on which the passages with the OBE under test (see Test-Cases E2E-08.01 to E2E-08.03) were performed, will hold the following types of transactions of the OBE under test: • clearable C6 transactions (any further restored ones of the incomplete transactions) • QoS C6 transactions (incomplete transactions that could not be restored by the TC's reconstruction mechanism)	
Intention:	The TIF files are correctly generated. The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.	

Test name:	Acknowledge billing details - generate TIC files	No.: E2E-08.05
Purpose:	Verification of the correct handling of incomplete transactions (reconstruction of broken transactions) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	

Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) acknowledges the billing details of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files. The TSP acknowledges the transactions of the TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-08.01 to E2E-08.03) were performed. Following types of transactions of the OBE under test are in scope of this acknowledgement: • C1 transactions • clearable C6 transactions (depending on whether the TC's reconstruction mechanism has already restored at least one of the incomplete transactions) • QoS C6 transactions (incomplete transactions that could not be restored by the TC's reconstruction mechanism) The TSP acknowledges the transactions of the TIF file(s) generated by the TC usually at the next day after the day, on which the passages with the OBE under test (see Test-Cases E2E-08.01 to E2E-08.03) were performed. Following types of transactions of the OBE under test are in scope of this acknowledgement: • clearable C6 transactions (any further restored ones of the incomplete transactions) • QoS C6 transactions (incomplete transactions that could not be restored by the TC's reconstruction mechanism)
Intention:	The TIF files are downloaded by the TSP. The TIC files are correctly generated. The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB. No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	TC claims payment for service usage from TSP	No.: E2E-08.06
Purpose:	Verification of the correct handling of incomplete transactions (reconstruction of broken transactions) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	

Description:	The Toll Charger (TC) claims payment for service usage from the Toll Service Provider (TSP). The TC generates and sends an account statement (in the Agency model) respectively an invoice (in the Reseller model) to the TSP.
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) is sent to the TSP.

Test name:	TSP validates claimed payment for service usage from TC	No.: E2E-08.07

Purpose:	Verification of the correct handling of incomplete transactions (reconstruction of broken transactions) with the Toll Service Provider in a MLFF toll domain.
Actor:	Toll Service Provider (TSP)
Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) validates the Toll Charger's (TC's) claimed payment for service usage against the exchanged TIF and TIC files. The TC's claim for payment for service usage shall only include such transactions that have been sent to the TSP within a TIF file and acknowledged by the TSP by sending an acknowledgement in a TIC file before.
Intention:	The TC's claimed payment for service usage is found to correspond to the exchanged TIF and TIC files.

Test name:	TSP claims payment of issuer fee from TC	No.: E2E-08.08

Purpose:	Verification of the correct handling of incomplete transactions (reconstruction of broken transactions) with the Toll Service Provider in a MLFF toll domain.
Actor:	Toll Service Provider (TSP)
Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) claims payment of issuer from the Toll Charger (TC). The TSP generates and sends an invoice for the issuer fee to the TC.
Intention:	The invoice for the issuer fee is sent to the TC.

Test name:	TC validates claimed payment of issuer fee from TSP	No.: E2E-08.09
Purpose:	Verification of the correct handling of incomplete transactions (reconstruction of broken transactions) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) validates the Toll Service Provider's (TSP's) claimed payment of the issuer fee.	
Intention:	The TSP's claimed payment of the issuer fee is validated.	

5.5.2.9 E2E-Scenario-09: OBE transactions - crediting

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-09.01
Purpose:	Verification of the correct handling of crediting and reissuing processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing all kinds of toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). The number of axles set on the OBE under test is higher than the actual number of axles that can be reached with the vehicle with which the test is performed. A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).	
Intention:	The OBE under test signals a valid transaction (1 beep) on each of the passages of any kind of the TC's toll stations. The transactions generated with the OBE under test are correctly processed and stored in the TC's system.	

Test name:	Report billing details - generate TIF files	No.: E2E-09.02
Purpose:	Verification of the correct handling of crediting and reissuing processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Case E2E-09.01) were performed, will hold the following types of transactions of the OBE under test: • C1 transactions	
Intention:	The TIF files are correctly generated. The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.	

Test name:	Acknowledge billing details - generate TIC files	No.: E2E-09.03
Purpose:	Verification of the correct handling of crediting and reissuing processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) acknowledges the billing details of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files. The TSP acknowledges the transactions of the TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Case E2E-09.01) were performed. Following types of transactions of the OBE under test are in scope of this acknowledgement: • C1 transactions	
Intention:	The TIF files are downloaded by the TSP. The TIC files are correctly generated. The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB.	

No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	SU contacts TSP with claim	No.: E2E-09.04
Purpose:	Verification of the correct handling of crediting and reissuing processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Service User (SU) contacts the Toll Service Provider (TSP) with a claim stating that the number of axles set on the OBE under test while driving in the Toll Charger's (TC's) toll domain was higher than the actual number of axles that can be reached with the vehicle with which the test was performed. The SU provides sufficient evidence to the TSP that the set number of axles on the OBE under test was higher than the actual number of axles that can be reached with the vehicle with which the test was performed.	
Intention:	The TSP receives the SU's claim and collects the evidence provided by the SU. The claim of the SU is found valid by the TSP.	

Test name:	TSP requests credit note on behalf of SU	No.: E2E-09.05
Purpose:	Verification of the correct handling of crediting and reissuing processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) contacts the Toll Charger (TC) requesting a credit transaction in order to produce a credit note for the disputed billing details from the responsible TC. The TSP sends the evidence to support the reclamation to the TC.	
Intention:	The TC has received the reclamation, request for credit transaction and evidence from the TSP.	

Test name:	TC acknowledges requested credit	No.: E2E-09.06
Purpose:	Verification of the correct handling of crediting and reissuing processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) processes the request for a credit note and acknowledges it based on the provided evidence.	
Intention:	The reclamation is acknowledged by the TC.	

Test name:	Report billing details credit - generate TIF files	No.: E2E-09.07
Purpose:	Verification of the correct handling of crediting and reissuing processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details correction for the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. A TIF file crediting the transactions being subject of the reclamation is generated by the TC and will hold the following types of transactions of the OBE under test: • R2 transactions	
Intention:	The TIF file is correctly generated. The TIF file generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF file from the EasyGo HUB is received by the TC.	

Test name:	Acknowledge credit billing details - generate TIC files	No.: E2E-09.08
Purpose:	Verification of the correct handling of crediting and reissuing processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	

Equipment: Not applicable.

Description: The Toll Service Provider (TSP) acknowledges the billing details correction of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files.

The TSP acknowledges the credit transactions of the TIF file generated by the TC crediting the transactions being subject of the reclamation. Following types of transactions of the OBE under test are in scope of this acknowledgement:

- R2 transactions

Intention: The TIF files are downloaded by the TSP.

The TIC files are correctly generated.

The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB.

No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	Report billing details corrected debit - generate TIF files	No.: E2E-09.09

Purpose: Verification of the correct handling of crediting and reissuing processes with the Toll Service Provider in a MLFF toll domain.

Actor: Toll Charger (TC)

Executed by: Toll Charger (TC)

Equipment: Not applicable.

Description: The Toll Charger (TC) reports the billing details correction for the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files.

A TIF file debiting the corrected amount for the transactions being subject of the reclamation is generated by the TC and will hold the following types of transactions of the OBE under test:

- C3 transactions

Intention: The TIF file is correctly generated.

The TIF file generated in Test Step 1 are uploaded to the EasyGo HUB.

No rejection of the uploaded TIF file from the EasyGo HUB is received by the TC.

Test name:	Acknowledge corrected billing details - generate TIC files	No.: E2E-09.10
Purpose:	Verification of the correct handling of crediting and reissuing processes with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) acknowledges the billing details correction of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files. The TSP acknowledges the debit transactions of the TIF file generated by the TC debiting the corrected amount for the transactions being subject of the reclamation. Following types of transactions of the OBE under test are in scope of this acknowledgement: • C3 transactions	
Intention:	The TIF files are downloaded by the TSP. The TIC files are correctly generated. The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB. No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.	

Test name:	TC claims payment for service usage from TSP	No.: E2E-09.11
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) claims payment for service usage from the Toll Service Provider (TSP). The TC generates and sends an account statement (in the Agency model) respectively an invoice (in the Reseller model) to the TSP.	
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) is sent to the TSP.	

Test name:	TSP validates claimed payment for service usage from TC	No.: E2E-09.12

Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.
Actor:	Toll Service Provider (TSP)
Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) validates the Toll Charger's (TC's) claimed payment for service usage against the exchanged TIF and TIC files. The TC's claim for payment for service usage shall only include such transactions that have been sent to the TSP within a TIF file and acknowledged by the TSP by sending an acknowledgement in a TIC file before.
Intention:	The TC's claimed payment for service usage is found to correspond to the exchanged TIF and TIC files.

Test name:	TSP claims payment of issuer fee from TC	No.: E2E-09.13

Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.
Actor:	Toll Service Provider (TSP)
Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) claims payment of issuer from the Toll Charger (TC). The TSP generates and sends an invoice for the issuer fee to the TC.
Intention:	The invoice for the issuer fee is sent to the TC.

Test name:	TC validates claimed payment of issuer fee from TSP	No.: E2E-09.14

Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.
Actor:	Toll Charger (TC)
Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	The Toll Charger (TC) validates the Toll Service Provider's (TSP's) claimed payment of the issuer fee.

Intention: The TSP's claimed payment of the issuer fee is validated.

Test name:	TSP claims payment for service usage from SU	No.: E2E-09.15
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) claims payment for service usage from the Service User (SU). The TSP generates and sends an invoice for service usage to the SU. In the Agency model this invoice is in the name and on behalf of the TC. In the Reseller model this invoice is in the TSP's own name.	
Intention:	The invoice for service usage is sent to the SU.	

Test name:	SU performs payment for service usage to TSP	No.: E2E-09.16
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Service User (SU) performs the payment for service usage to the Toll Service Provider (TSP).	
Intention:	The invoice for service usage is payed by the SU.	

Test name:	TSP performs payment for service usage to TC	No.: E2E-09.17
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) performs the payment for service usage to the Toll Charger (TC).	

Intention:	The invoice for service usage is payed by the TSP.

Test name:	TC performs payment of issuer fee to TSP	No.: E2E-09.18
Purpose:	Verification of the correct handling of reconstructed transactions (gap closing) with the Toll Service Provider in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) performs the payment of the issuer fee to the Toll Service Provider (TSP).	
Intention:	The invoice of the issuer fee is payed by the TC.	

5.5.2.10 E2E-Scenario-10: OBE transactions - Service / Warning beep

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-10.01
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing all kinds of toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). The paymentMeansExpiryDate set in the OBE under test is reached in less than 62 days. A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).	
Intention:	The OBE under test signals a valid transaction with a service beep (2 beeps) on each of the passages of any kind of the TC's toll stations. The transactions generated with the OBE under test are correctly processed and stored in the TC's system.	

Test name:	Report billing details - generate TIF files	No.: E2E-10.02
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Case E2E-10.01) were performed, will hold the following types of transactions of the OBE under test: • C1 transactions	
Intention:	The TIF files are correctly generated. The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.	

Test name:	Acknowledge billing details - generate TIC files	No.: E2E-10.03
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) acknowledges the billing details of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files. The TSP acknowledges the transactions of the TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Case E2E-10.01) were performed. Following types of transactions of the OBE under test are in scope of this acknowledgement: • C1 transactions	
Intention:	The TIF files are downloaded by the TSP. The TIC files are correctly generated. The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB.	

No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	TC claims payment for service usage from TSP	No.: E2E-10.04
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) claims payment for service usage from the Toll Service Provider (TSP). The TC generates and sends an account statement (in the Agency model) respectively an invoice (in the Reseller model) to the TSP.	
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) is sent to the TSP.	

Test name:	TSP validates claimed payment for service usage from TC	No.: E2E-10.05
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) validates the Toll Charger's (TC's) claimed payment for service usage against the exchanged TIF and TIC files. The TC's claim for payment for service usage shall only include such transactions that have been sent to the TSP within a TIF file and acknowledged by the TSP by sending an acknowledgement in a TIC file before.	
Intention:	The TC's claimed payment for service usage is found to correspond to the exchanged TIF and TIC files.	

Test name:	TSP claims payment of issuer fee from TC	No.: E2E-10.06
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	

Actor:	Toll Service Provider (TSP)
Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) claims payment of issuer from the Toll Charger (TC). The TSP generates and sends an invoice for the issuer fee to the TC.
Intention:	The invoice for the issuer fee is sent to the TC.

Test name:	TC validates claimed payment of issuer fee from TSP	No.: E2E-10.07
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) validates the Toll Service Provider's (TSP's) claimed payment of the issuer fee.	
Intention:	The TSP's claimed payment of the issuer fee is validated.	

Test name:	TSP claims payment for service usage from SU	No.: E2E-10.08
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) claims payment for service usage from the Service User (SU). The TSP generates and sends an invoice for service usage to the SU. In the Agency model this invoice is in the name and on behalf of the TC. In the Reseller model this invoice is in the TSP's own name.	
Intention:	The invoice for service usage is sent to the SU.	

Test name:	SU performs payment for service usage to TSP	No.: E2E-10.09
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Service User (SU) performs the payment for service usage to the Toll Service Provider (TSP).	
Intention:	The invoice for service usage is payed by the SU.	

Test name:	TSP performs payment for service usage to TC	No.: E2E-10.10
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) performs the payment for service usage to the Toll Charger (TC).	
Intention:	The invoice for service usage is payed by the TSP.	

Test name:	TC performs payment of issuer fee to TSP	No.: E2E-10.11
Purpose:	Verification of the correct handling of the signalling of the Service / Warning beep with the Toll Service Provider's OBE in the toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) performs the payment of the issuer fee to the Toll Service Provider (TSP).	
Intention:	The invoice of the issuer fee is payed by the TC.	

5.5.2.11 E2E-Scenario-11: OBE transactions - central retroactive payment

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-11.01
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider's Service Users in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1/D1 transactions while passing all kinds of toll stations of the TC. The number of axles set on the OBE under test is lower than the actual number of axles of the vehicle which is used for performing the test including any trailer. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).	
Intention:	The OBE under test signals a valid transaction (1 beep) on each of the passages of any kind of the TC's toll stations. The transactions generated with the OBE under test are correctly processed and stored in the TC's system.	

Test name:	Retroactive payment - central solution	No.: E2E-11.02
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider's Service Users in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) contacts a Toll Charger's (TC's) Customer Service Centre (CSC) to do retroactive payment for passages of the TC's toll stations at which a too low number of axles has been set at the OBE under test (see Test Case E2E-11.01).	

	The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). Hint: In a MLFF toll domain such a retroactive payment is only possible within 96 hours after the respective passage of the TC's toll station has been performed.
Intention:	The retroactive payment is successfully done. No transactions of the OBE under test regarding the retroactive payment performed are processed and stored in the TC's system.

Test name:	Report billing details - generate TIF files	No.: E2E-11.03
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider's Service Users in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Case E2E-11.01) were performed, will hold the following types of transactions of the OBE under test: • C1 transactions	
Intention:	The TIF files are correctly generated. The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.	

Test name:	Acknowledge billing details - generate TIC files	No.: E2E-11.04
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider's Service Users in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	

Description:	The Toll Service Provider (TSP) acknowledges the billing details of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files. The TSP acknowledges the transactions of the TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Case E2E-11.01) were performed. Following types of transactions of the OBE under test are in scope of this acknowledgement: • C1 transactions
Intention:	The TIF files are downloaded by the TSP. The TIC files are correctly generated. The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB. No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	TC claims payment for service usage from TSP	No.: E2E-11.05
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider's Service Users in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) claims payment for service usage from the Toll Service Provider (TSP). The TC generates and sends an account statement (in the Agency model) respectively an invoice (in the Reseller model) to the TSP.	
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) is sent to the TSP.	

Test name:	TSP validates claimed payment for service usage from TC	No.: E2E-11.06
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider's Service Users in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	

Description:	The Toll Service Provider (TSP) validates the Toll Charger's (TC's) claimed payment for service usage against the exchanged TIF and TIC files. The TC's claim for payment for service usage shall only include such transactions that have been sent to the TSP within a TIF file and acknowledged by the TSP by sending an acknowledgement in a TIC file before.
Intention:	The TC's claimed payment for service usage is found to correspond to the exchanged TIF and TIC files.

Test name:	TSP claims payment of issuer fee from TC	No.: E2E-11.07
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider’s Service Users in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) claims payment of issuer from the Toll Charger (TC). The TSP generates and sends an invoice for the issuer fee to the TC.	
Intention:	The invoice for the issuer fee is sent to the TC.	

Test name:	TC validates claimed payment of issuer fee from TSP	No.: E2E-11.08
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider’s Service Users in a MLFF toll domain.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) validates the Toll Service Provider's (TSP's) claimed payment of the issuer fee.	
Intention:	The TSP's claimed payment of the issuer fee is validated.	

Test name:	TSP claims payment for service usage from SU	No.: E2E-11.09
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider’s Service Users in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	

Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) claims payment for service usage from the Service User (SU). The TSP generates and sends an invoice for service usage to the SU. In the Agency model this invoice is in the name and on behalf of the TC. In the Reseller model this invoice is in the TSP's own name.
Intention:	The invoice for service usage is sent to the SU.

Test name:	SU performs payment for service usage to TSP	No.: E2E-11.10
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider's Service Users in a MLFF toll domain.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Service User (SU) performs the payment for service usage to the Toll Service Provider (TSP).	
Intention:	The invoice for service usage is payed by the SU.	

Test name:	TSP performs payment for service usage to TC	No.: E2E-11.11
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider's Service Users in a MLFF toll domain.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) performs the payment for service usage to the Toll Charger (TC).	
Intention:	The invoice for service usage is payed by the TSP.	

Test name:	TC performs payment of issuer fee to TSP	No.: E2E-11.12
Purpose:	Verification of the correct handling of central retroactive payments of the Toll Service Provider's Service Users in a MLFF toll domain.	
Actor:	Toll Charger (TC)	

Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	The Toll Charger (TC) performs the payment of the issuer fee to the Toll Service Provider (TSP).
Intention:	The invoice of the issuer fee is paid by the TC.

5.5.2.12 E2E-Scenario-12: OBE transactions – retroactive connection of transits to OBE

Test name:	Passages of toll stations - generate C1 transactions	No.: E2E-12.01
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test correctly mounted on the windscreen of his vehicle generating valid C1 transactions while passing all kinds of toll stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple of transactions shall be generated on all kinds of the TC's toll stations (toll stations, enforcement stations, ...).	
Intention:	The OBE under test signals a valid transaction (1 beep) on each of the passages of any kind of the TC's toll stations. The transactions generated with the OBE under test are correctly processed and stored in the TC's system	

Test name:	Passages of enforcement stations - no transactions generated	No.: E2E-12.02
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but	

	instead initiated after a customer complaint when being invoiced in the enforcement process.
Actor:	Service User (SU)
Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC) with the OBE under test shielded to prevent generation of transactions while passing enforcement stations of the TC. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted). The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple passages of the TC's enforcement stations shall be done.
Intention:	The OBE under test signals no transaction (no beep) on each of the passages of any kind of the TC's enforcement stations. No transactions of the OBE under test are processed and stored in the TC's system in the timeframe in which the OBE under test was shielded.

Test name:	Enforcement - generate violation	No.: E2E-12.03

Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.
Actor:	Toll Charger (TC)
Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	The Toll Charger (TC) performs enforcement of the violation of the Service User (SU) by generating an enforcement case for the SU's violation of the tolling regulations in its enforcement centre and submitting a violation ticket to the SU. A suspicion case for the SU's violation of the tolling regulations is generated by the TC's system and delivered to the enforcement centre for inspection. The suspicion case delivered to the enforcement centre for inspection is processed by the TC's employees in the enforcement centre and acknowledge being an enforcement case.

	The TC contacts the SU's Toll Service Provider (TSP) for the SU's contact information.
	The TC generates a violation ticket and sends it to the SU.
Intention:	A new suspicion case for the SU's violation of the tolling regulations has been delivered to the enforcement centre for inspection.
	A new enforcement case for the SU's violation of the tolling regulations has been generated.
	The TSP provides the SU's contact information to the TC.
	The SU receives the violation ticket sent to him by the TC.

Test name:	SU does a customer complaint when being invoiced in the enforcement process	No.: E2E-12.04
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Service User (SU) does a customer complaint when being invoiced in the enforcement process.	
Intention:	The customer complaint of the SU is acknowledged by the Toll Charger (TC).	

Test name:	Prepare billing details regarding the SU’s customer complaint - generate C7 transactions	No.: E2E-12.05
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) prepares the billing details regarding the customer complaint (see Test-Cases E2E-12.04).	

Intention:	The billing details generated regarding the customer complaint (see Test-Cases E2E-12.04) are correctly processed and stored in the TC's system.

Test name:	Report billing details - generate TIF files	No.: E2E-12.06
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-12.01) were performed, will hold the following types of transactions of the OBE under test: • C1 transactions The TIF file(s) generated by the TC at the end of the day, on which the billing details generated regarding the customer complaint (see Test-Cases E2E-12.04) are processed, will hold the following types of transactions of the OBE under test: • C7 transactions	
Intention:	The TIF files are correctly generated. The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.	

Test name:	Acknowledge billing details - generate TIC files	No.: E2E-12.07
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	

Description:	The Toll Service Provider (TSP) acknowledges the billing details of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files.
Intention:	The TIF files are downloaded by the TSP. The TIC files are correctly generated. The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB. No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	TC claims payment for service usage from TSP	No.: E2E-12.08

Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.
Actor:	Toll Charger (TC)
Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	The Toll Charger (TC) claims payment for service usage from the Toll Service Provider (TSP). The TC generates and sends an account statement (in the Agency model) respectively an invoice (in the Reseller model) to the TSP.
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) is sent to the TSP.

Test name:	TSP validates claimed payment for service usage from TC	No.: E2E-12.09

Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.
Actor:	Toll Service Provider (TSP)
Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) validates the Toll Charger's (TC's) claimed payment for service usage against the exchanged TIF and TIC files.

	The TC's claim for payment for service usage shall only include such transactions that have been sent to the TSP within a TIF file and acknowledged by the TSP by sending an acknowledgement in a TIC file before.
Intention:	The TC's claimed payment for service usage is found to correspond to the exchanged TIF and TIC files.

Test name:	TSP claims payment of issuer fee from TC	No.: E2E-12.10
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) claims payment of issuer from the Toll Charger (TC). The TSP generates and sends an invoice for the issuer fee to the TC.	
Intention:	The invoice for the issuer fee is sent to the TC.	

Test name:	TC validates claimed payment of issuer fee from TSP	No.: E2E-12.11
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) validates the Toll Service Provider's (TSP's) claimed payment of the issuer fee.	
Intention:	The TSP's claimed payment of the issuer fee is validated.	

Test name:	TSP claims payment for service usage from SU	No.: E2E-12.12
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but	

	instead initiated after a customer complaint when being invoiced in the enforcement process.
Actor:	Toll Service Provider (TSP)
Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) claims payment for service usage from the Service User (SU). The TSP generates and sends an invoice for service usage to the SU. In the Agency model this invoice is in the name and on behalf of the TC. In the Reseller model this invoice is in the TSP's own name.
Intention:	The invoice for service usage is sent to the SU.

Test name:	SU performs payment for service usage to TSP	No.: E2E-12.13
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Service User (SU) performs the payment for service usage to the Toll Service Provider (TSP).	
Intention:	The invoice for service usage is payed by the SU.	

Test name:	TSP performs payment for service usage to TC	No.: E2E-12.14
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) performs the payment for service usage to the Toll Charger (TC).	

Intention:	The invoice for service usage is payed by the TSP.

Test name:	TC performs payment of issuer fee to TSP	No.: E2E-12.15
Purpose:	Verification of the correct handling of billing details which were not registered as an EasyGo transaction in the lane at the time of passing but instead initiated after a customer complaint when being invoiced in the enforcement process.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) performs the payment of the issuer fee to the Toll Service Provider (TSP).	
Intention:	The invoice of the issuer fee is payed by the TC.	

5.5.2.13 E2E-Scenario-13: Barrier based systems - manually taken transits based on Vehicle Declaration

Test name:	Passages of toll stations in barrier based systems - generate C2 transactions	No.: E2E-13.01
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	A Service User (SU) has a valid contract with a Toll Service Provider (TSP) and drives in the toll domain of the Toll Charger (TC). The OBE under test is not working properly (simulated by having the OBE under test not mounted on the windscreen of the SU's vehicle and shielded). The SU has the Vehicle Declaration matching to the OBE under test with him and presents the same at the toll station as due to the OBE under test not working properly no automatic generation of a transaction and opening of the barrier of the toll lane takes place. The TC verifies that the OBE under test has a valid contract based on the OBE under test's Vehicle Declaration presented by the SU and manually keys in the billing details and opens the barrier. The OBE under test is listed among the TSP's entries of the global HGV file (OBE under test is whitelisted).	

	The OBE under test is not listed among the TSP's entries of the global NAT file (OBE under test is not blacklisted). A couple of manually taken transits from different OBEs under test shall be generated on the TC's toll stations.
Intention:	The OBE under test signals no transaction (no beep) on each of the passages of the TC's toll stations. The transits of the passages are manually taken by the TC by manually keying in the billing details. The transactions generated from the manually taken transits of the OBE under test are correctly processed and stored in the TC's system.

Test name:	Report billing details - generate TIF files	No.: E2E-13.02
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) reports the billing details of the manually taken transits of the OBE under test to the Toll Service Provider (TSP) by submitting corresponding TIF files. The TIF file(s) generated by the TC at the end of the day, on which the manually taken transits with the OBE under test (see Test-Cases E2E-13.01) were performed, will hold the following types of transactions of the OBE under test: • C2 transactions	
Intention:	The TIF files are correctly generated. The TIF files generated in Test Step 1 are uploaded to the EasyGo HUB. No rejection of the uploaded TIF files from the EasyGo HUB is received by the TC.	

Test name:	Acknowledge billing details - generate TIC files	No.: E2E-13.03
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	

Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) acknowledges the billing details of the manually taken transits of the OBE under test to the Toll Charger (TC) by submitting corresponding TIC files. The TSP acknowledges the transactions of the TIF file(s) generated by the TC at the end of the day, on which the passages with the OBE under test (see Test-Cases E2E-13.01) were performed. Following types of transactions of the OBE under test are in scope of this acknowledgement: • C2 transactions
Intention:	The TIF files are downloaded by the TSP. The TIC files are correctly generated. The TIC files generated in Test Step 2 are uploaded to the EasyGo HUB. No rejection of the uploaded TIC files from the EasyGo HUB is received by the TSP.

Test name:	TC claims payment for service usage from TSP	No.: E2E-13.04
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) claims payment for service usage from the Toll Service Provider (TSP). The TC generates and sends an account statement (in the Agency model) respectively an invoice (in the Reseller model) to the TSP.	
Intention:	The account statement (in the Agency model) respectively the invoice (in the Reseller model) is sent to the TSP.	

Test name:	TSP validates claimed payment for service usage from TC	No.: E2E-13.05
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	

Description:	The Toll Service Provider (TSP) validates the Toll Charger's (TC's) claimed payment for service usage against the exchanged TIF and TIC files. The TC's claim for payment for service usage shall only include such transactions that have been sent to the TSP within a TIF file and acknowledged by the TSP by sending an acknowledgement in a TIC file before.
Intention:	The TC's claimed payment for service usage is found to correspond to the exchanged TIF and TIC files.

Test name:	TSP claims payment of issuer fee from TC	No.: E2E-13.06
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) claims payment of issuer from the Toll Charger (TC). The TSP generates and sends an invoice for the issuer fee to the TC.	
Intention:	The invoice for the issuer fee is sent to the TC.	

Test name:	TC validates claimed payment of issuer fee from TSP	No.: E2E-13.07
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Toll Charger (TC)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Toll Charger (TC) validates the Toll Service Provider's (TSP's) claimed payment of the issuer fee.	
Intention:	The TSP's claimed payment of the issuer fee is validated.	

Test name:	TSP claims payment for service usage from SU	No.: E2E-13.08
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Toll Service Provider (TSP)	

Executed by:	Toll Service Provider (TSP)
Equipment:	Not applicable.
Description:	The Toll Service Provider (TSP) claims payment for service usage from the Service User (SU). The TSP generates and sends an invoice for service usage to the SU. In the Agency model this invoice is in the name and on behalf of the TC. In the Reseller model this invoice is in the TSP's own name.
Intention:	The invoice for service usage is sent to the SU.

Test name:	SU performs payment for service usage to TSP	No.: E2E-13.09
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Service User (SU)	
Executed by:	Toll Charger (TC)	
Equipment:	Not applicable.	
Description:	The Service User (SU) performs the payment for service usage to the Toll Service Provider (TSP).	
Intention:	The invoice for service usage is payed by the SU.	

Test name:	TSP performs payment for service usage to TC	No.: E2E-13.10
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Toll Service Provider (TSP)	
Executed by:	Toll Service Provider (TSP)	
Equipment:	Not applicable.	
Description:	The Toll Service Provider (TSP) performs the payment for service usage to the Toll Charger (TC).	
Intention:	The invoice for service usage is payed by the TSP.	

Test name:	TC performs payment of issuer fee to TSP	No.: E2E-13.11
Purpose:	Verification of the fall-back solution with manually keyed-in billing details registered in the lane in barrier based systems.	
Actor:	Toll Charger (TC)	

Executed by:	Toll Charger (TC)
Equipment:	Not applicable.
Description:	The Toll Charger (TC) performs the payment of the issuer fee to the Toll Service Provider (TSP).
Intention:	The invoice of the issuer fee is payed by the TC.

5.6 OBE pilot operation

5.6.1 Objectives and overview

Provided the back-office interface passed the interface compatibility tests and is already up and running, all necessary commercial items are settled and the OBE passed the E2E tests successfully, start of pilot operation can be granted.

In the pilot operation phase a limited number of OBE is installed in vehicles of friendly users who are paying the toll with the EETS OBE under test in productive environment like a normal customer.

5.6.2 Organization

The TSP is responsible for the organization of the pilot operation. The organization of the pilot operation plan shall be developed and planned in close cooperation between the TSP and TC.

5.6.3 Parameters and limitations

The following values define the limitation of the pilot operation, if not other agreed:

- Number of vehicles / OBE: **50 – 500**
- Minimum duration of pilot operation: **2 months**
- Minimum required number of performed DSRC transactions during the pilot operation: 100.000

5.6.4 Result evaluation

In general, the assessment of transaction quality is carried out according to the quality requirements of the TC for his toll domain.

The TC is measuring the transaction quality and producing a report. The report including the result is delivered to the TSP.

5.6.5 End of Pilot Operation

If the result of the pilot operation with the concerned OBE is OK, the OBE has passed the complete approval process in the concerned toll context and a release for unlimited operation (With this OBE) will be issued.

6 Recertification process

6.1 Change report

6.1.1 OBE

During the system operation a planned change of the OBE hardware or software shall be reported to the TC in written form before used in the concerned toll context. The OBE software or hardware change report is the base for the decision concerning which phases and steps of the approval process shall be repeated for the recertification of the OBE.

A major change of the OBE could result in a full certification process defined for a new OBE type.

Any kind of an OBE change detected by the TC in the field without prior reporting and positive tests (if tests are decided by the TC) may result in a withdrawal of the OBE and/or TSPs "Suitability for Use" certification.

6.1.2 Back office interface

A change of the back-office interface is only possible after agreement with the TC. Such a change shall be handled with a process agreed between the TSP and the TC based on the impact of the interface change. This process is outside the scope of the current document.

Additional information can be found in [EasyGo-403], if no other agreements with the TC apply.

6.2 Basic OBE testing

It is expected, that the EETS provider (resp. his OBU manufacturer) performs a basic set of DSRC tests with prototypes after any OBE change, providing a protocol of the performed tests to the TC.

These basic tests are part of the information required for the decision which tests are necessary for a recertification.

7 Annex A – OBE personalization data example

The tables below contains the OBE personalization data test sets and the variation for the trailer axles test cases for tests acc. to chapters 5.2and 5.3 (Tests in test environment) , if not otherwise requested by the TC. This example was developed for ASFINAG.

EFCContextMark data:

ContractProvider: 0x C04001

TypeOfContract: 0x F200

ContextVersion: 0x A6

Keyset: MEDIA Testkeyset

The number of trailer axles and the trailer indicator are not part of the permanent OBE personalization and shall be set to a default value of zero. The value for the test is set immediately before the test using the OBE MMI. The values in the table below define the values set for the test cases using the MMI.

LPN no	Vehicle Class T CCC LLLL	Vehicle Axles		Euro Value
		Tractor	Trailer	
1	X 011 XXXX (bus)	2	0 - 2	3
2	X 011 XXXX (bus)	3	0 - 1	EEV *)
3	X 100 XXXX (truck < 12t)	2	0 - 1 -2- 3	0
4	X 101 XXXX (truck > 12t)	2	0 - 1 -2- 3	1
5	X 111 XXXX (vehicle > 3.5t)	2	0 – 1	2
6	X 111 XXXX (vehicle > 3.5t)	3	0 – 1	3
7	X 101 XXXX (truck > 12t)	4	0 - 2	6
8	X 001 XXXX (not liable)	2	0 - 2	4
9	X 100 XXXX (truck < 12t)	3	0 - 1 - 2	4
10	X 101 XXXX (truck > 12t)	3	0 - 1 - 2	5

Table 1: OBE personalization data test sets

*) EEV coded to VehicleSpecificCharacteristics.EuroValue with value= 15 acc. to [EasyGo-202-B]

Note: Each test OBE configuration can be identified using the DSRC communication by its unique LPN.

The table OBE personalization data test sets defines the values for the following attributes below:

Attribute 16: Vehicle License Plate Number (LPN no)

LPN no.	Country-Code b_9 b_0	Alphabet-Indicator b_4 b_0	Length deter-minant	LPN coding	LPN content
1	11000 00001 (AT)	000000 (latin 1)	14	WDST1EETS	
2	11000 00001 (AT)	000000 (latin 1)	14	WDST22EETS	
3	11000 00001 (AT)	000000 (latin 1)	14	WDST33EETS	
4	11000 00001 (AT)	000000 (latin 1)	14	WDST44EETS1234	
5	11000 00001 (AT)	000000 (latin 1)	14	WDST5EETS	
6	11000 00001 (AT)	000000 (latin 1)	14	WDST66EETS	
7	10010 10000 (DE)	000000 (latin 1)	14	TÖL777TEST	
8	00110 00011 (NO)	000000 (latin 1)	14	AZ123456789012	
9	01010 11100 (RU)	000000 (latin 1)	14	510dn09	510ДИ09
10	01010 11100 (RU)	000100 (latin/Cyrillic)	14	"510"+ 0xB4+ 0xB8 +"10"	510ДИ10

Table 2: LPN data sets

Attribute 17: Vehicle Class

The VehicleClass according to EN 15509 has the bit ordered substructure T CCC LLLL, where:

T = Trailer Indicator

CCC = Harmonized European Vehicle Class

LLLL = Local Vehicle Classes

Attribute 19: Vehicle Axles

VehicleAxlesNumber.NumberOfAxles.Trailer

VehicleAxlesNumber.NumberOfAxles.Tractor

Attribute 22: Vehicle Specific Characteristics

EnvironmentalCharacteristics.EuroValue

For additional information to the attributes see [EasyGo-202-B]and [EFC API] chapter 'EFC Attributes'.

For End2End Tests in productive environment suitable personalization data test sets and keysets are to be agreed between TC and TSP.

8 Annex B - References

Reference	Document Ref	Date / Version	Document title
[EasyGo-202]			EasyGo Roadside and On Board Equipment
[EasyGo-202-A]			EasyGo+ and EETS OBU Functional Requirements (Replacements for “Functional requirements for EasyGo+ OBUs”)
[EasyGo-202-B]			EasyGo+ and EETS DSRC Tolling Data Specification (Replacement for “EasyGo+ OBE personalisation, configuration and operating parameters”)
[EasyGo-202-C]			EasyGo+ and EETS DSRC transaction for Tolling and Enforcement (Replacement for “EasyGo+ DSRC transaction for tolling and enforcement”)
[EasyGo-202-D			EasyGo+ and EETS RSE Functional Requirements (Replacement for “EasyGo+ RSE functional requirements”)
[EasyGo-202-E]			EasyGo+ and EETS Acceptance Procedures (this document) (Replacements for “EasyGo+ OBE compatibility tests”)
[EasyGo-202-F]			Requirements and tests of EasyGo basic OBEs
[EasyGo-202-G]			Testing RSE in EasyGo basic, EasyGo+ and EETS
[EasyGo-202-H]			EasyGo basic RSE functional requirements

Reference	Document Ref	Date / Version	Document title
[EasyGo-206]			EasyGo test strategy
[EasyGo-206-A]			Test Facilities in EasyGo
[EasyGo-207]			Interface test specification Central systems – EasyGo HUB
[EasyGo-403]			EasyGo Processes
[EasyGo-201] and [EasyGo-203]			EETS Back Office Interface Specifications
[IAP]	EN 15509	2014	EN 15509:2007 Road Traffic and Transport Telematics (RTTT) – Electronic Fee Collection – Interoperability application profile for DSRC
[IAP TEST]	EN 15876-1	2016	Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to EN 15509 — Part 1: Test suite structure and test purposes
[EFC API]	EN ISO 14906:2011/ Amd1:2015	2011/ Amd1:2015	Road Traffic and Transport Telematics (RTTT) – Electronic Fee Collection – Application interface definition for dedicated short range communication

Reference	Document Ref	Date / Version	Document title
[GSS]	GSS	V3.2:2003	Global Specification for Short Range Communication (Kapsch TrafficCom AB, Kapsch Telecom GmbH, Thales e-Transactions CGA SA, version 3.2, 2003-08, http://www.etc-interop.com/pdf/gss_32.pdf)
[L1]	EN 12253	2004	Road Transport and Traffic Telematics (RTTT) – Dedicated Short-Range Communication (DSRC) – Physical layer using microwave at 5.8 GHz
[L2]	EN 12795	2003	Road Transport and Traffic Telematics (RTTT) – Dedicated Short-Range Communication (DSRC) – DSRC data link layer: Medium access and logical link control
[L7]	EN 12834 (ISO 15628)	2003	Road Transport and Traffic Telematics (RTTT) – Dedicated Short-Range Communication (DSRC) – Application Layer
[Profiles]	EN 13372	2004	Road Transport and Traffic Telematics (RTTT) – Dedicated Short-Range Communication (DSRC) – Profiles for RTTT applications
[AVI No]	EN ISO 14816	2005	Road Traffic and Transport Telematics (RTTT) – Automatic Vehicle and Equipment Identification – Numbering and Data Structures
[AVI No register]			http://www.tc278.eu/index.php/14816-register

9 Annex C – OBE functional and system compatibility test case overview for specific system architectures (informative)

Test Case No.	Test Name	Remarks	Barrier system			MLFF
1.0.5	Basic transaction – stand-alone beacon		x			x
1.1.3	Transaction – expiry date near		x			x
1.1.5	Transaction – contract expired		x			x
1.2.1	Transaction – static conditions		x			x
1.2.5	Tariff correlation and MMI axles selection (in the lab)		x			x
1.2.6	System stability – broken transactions		x			x
1.2.7	Allocation of new DSRC master-keys		x			x
1.2.8	OBE blacklisted		x			x
1.2.8 A	OBE with blacklist bit	(If used)	(x)			x
1.3.1	Transaction - timing tests		x			x
1.2.3	Transaction – software stability (Conveyor Belt Arrangement)	Small battery powered OBE	x			x
1.2.3A	Transaction – software stability (DSRC Channel Simulator)	Larger, external powered OBE	x			x
1.4.1	Transaction - behaviour at slow motion (Conveyor Belt Arrangement)	Small battery powered OBE	x			x
1.4.1A	Transaction - behaviour at slow motion (DSRC Channel Simulator)	Larger, external powered OBE	x			x
1.4.2	Transaction - behaviour with OBE under test and reference OBE	Conveyor Belt Arrangement only	x			x

Test Case No.	Test Name	Remarks	Barrier system			MLFF
14.0.1	OBE MMI – Selection of Number of Axles by User		x			x
3.0.1	Communication zone – Multilane Beacon, one beacon activated		x			x
3.0.2	Communication zone – Multilane configuration, all beacons activated					x
3.1.1	Communication zone – single lane beacon		x			x
2.0.1	OBE in dynamic conditions		x			x
2.0.3	EETS OBE and Reference OBE in the communication area		x			x
2.0.7	Multi EETS OBE in dynamic conditions		x			x
2.0.10	EETS OBE in dynamic conditions – Expiry date near		x			x
2.0.12	EETS OBE in dynamic conditions – contract expired		x			x
2.0.17	EETS OBE in dynamic conditions – OBE on blacklist		x			x
2.1.2	EETS OBE in dynamic conditions – Wrong category declared		x			x
2.1.3	EETS OBE in dynamic conditions – Wrong license plate number		x			x
13.0.2	EETS OBE and mobile enforcement equipment – Wrong category declared					x
13.0.3	EETS OBE and mobile enforcement equipment– OBE on blacklist					x
13.0.3 A	EETS OBE and mobile enforcement equipment – OBE with blacklist bit set					x

Test Case No.	Test Name	Remarks	Barrier system			MLFF
13.0.4	EETS OBE and mobile enforcement equipment – valid OBE					x
9.0.1	EETS OBE readout at mobile enforcement equipment					x
1.2.5A	Tariff correlation and MMI axles selection (on the road)		x			x
4.0.1	EETS OBE on-road tolling		x			x
5.0.1	EETS OBE on-road enforcement	(if used)	(x)			x
12.1.1	EETS OBE cross reading in toll booth environment		x			x

10 Annex D – E2E test case overview for specific toll domains (informative)

Test Case No.	Test Name	Remarks	Barrier system			MLFF
E2E-01.01	Open a new contract		X			X
E2E-01.02a	Personal OBE handout - Dist. val. data - Update local HGV	Relevant in scenario where the OBE is either personally handed out to the SU at i.e. a POS or where the OBE is sent via postal services but in a deactivated mode so that it is not able to make any transactions and thus can be right away put on the HGV.	X			X
E2E-01.03a	Personal OBE handout - Dist. val. data - Process global HGV update		X			X
E2E-01.04a	Personal OBE handout - OBE and Vehicle Declaration handover		X			X
E2E-01.02b	Postal OBE delivery - Dist. val. data - Update local NAT	Relevant in scenario where the OBE is put on the NAT while sending it to the SU and will only be put on the HGV when received and activated by the SU.	X			X
E2E-01.03b	Postal OBE delivery - Dist. val. data - Process global NAT update		X			X
E2E-01.04b	Postal OBE delivery - Send OBE and Vehicle Declaration to SU		X			X
E2E-01.05b	Postal OBE delivery - SU activates the received OBE		X			X
E2E-01.06b	Postal OBE delivery - Dist. val. data - Update local NAT and HGV		X			X
E2E-01.07b	Postal OBE delivery - Dist. val. data - Process global NAT and HGV update		X			X
E2E-02.01	Passages of toll stations - generate C1 transactions	Relevant in scenario where the OBE is on the NAT when it travels first time in a toll domain.	X			X
E2E-02.02	Report billing details - generate TIF files		X			X
E2E-02.03	Reject billing details - generate TIC files		X			X

Test Case No.	Test Name	Remarks	Barrier system			MLFF
E2E-02.04	TSP validates that no payment for service usage is claimed by TC		X			X
E2E-02.05	TC validates that no payment of issuer fee is claimed by TSP		X			X
E2E-03.01	Passages of toll stations - generate C1 transactions		X			X
E2E-03.02	Passages of toll stations - no transactions generated		X			X
E2E-03.03	Retroactive payment at POS - no transactions generated	(if used)	(X)			X
E2E-03.04	Report billing details - generate TIF files		X			X
E2E-03.05	Acknowledge billing details - generate TIC files		X			X
E2E-03.06	TC claims payment for service usage from TSP		X			X
E2E-03.07	TSP validates claimed payment for service usage from TC		X			X
E2E-03.08	TSP claims payment of issuer fee from TC		X			X
E2E-03.09	TC validates claimed payment of issuer fee from TSP		X			X
E2E-03.10	TSP claims payment for service usage from SU		X			X
E2E-03.11	SU performs payment for service usage to TSP		X			X
E2E-03.12	TSP performs payment for service usage to TC		X			X
E2E-03.13	TC performs payment of issuer fee to TSP		X			X
E2E-04.01	TSP moves OBE from HGV to NAT		X			X

Test Case No.	Test Name	Remarks	Barrier system			MLFF
E2E-04.02	TC processes global NAT and HGV update		X			X
E2E-04.03	Passages of toll stations - no valid transactions generated		X			X
E2E-04.04	Report billing details - generate TIF files		X			X
E2E-04.05	Validate billing details - generate TIC files		X			X
E2E-04.06	TSP validates that no payment for service usage is claimed by TC		X			X
E2E-04.07	TC validates that no payment of issuer fee is claimed by TSP		X			X
E2E-04.08	TSP moves OBE from NAT to HGV		X			X
E2E-04.09	TC processes global NAT and HGV update		X			X
E2E-05.01	TSP sets blacklist bit of OBE under test	Only relevant in scenario where the TSP is intending to use the possibility to set the blacklist bit of OBEs of his SUs.	(X)			X
E2E-05.02	Passages of toll stations - no valid transactions generated		(X)			X
E2E-05.03	Report billing details - generate TIF files		(X)			X
E2E-05.04	Validate billing details - generate TIC files		(X)			X
E2E-05.05	TSP validates that no payment for service usage is claimed by TC		(X)			X
E2E-05.06	TC validates that no payment of issuer fee is claimed by TSP		(X)			X
E2E-05.07	TSP resets blacklist bit of OBE under test		(X)			X
E2E-06.01	Passages of toll stations - generate C1 transactions					X

Test Case No.	Test Name	Remarks	Barrier system			MLFF
E2E-06.02	Passages of enforcement stations - no transactions generated					X
E2E-06.03	Passages of enforcement stations - too low number of axles set					X
E2E-06.04a	Enforcement - central enforcement					X
E2E-06.04b	Enforcement - enforcement on the road					X
E2E-06.05	Report billing details - generate TIF files					X
E2E-06.06	Acknowledge billing details - generate TIC files		X			X
E2E-06.07	TC claims payment for service usage from TSP					X
E2E-06.08	TSP validates claimed payment for service usage from TC					X
E2E-06.09	TSP claims payment of issuer fee from TC		X			X
E2E-06.10	TC validates claimed payment of issuer fee from TSP					X
E2E-06.11	TSP claims payment for service usage from SU					X
E2E-06.12	SU performs payment for service usage to TSP					X
E2E-06.13	TSP performs payment for service usage to TC					X
E2E-06.14	TC performs payment of issuer fee to TSP					X
E2E-07.01	Passages of toll stations - generate C1 transactions					X
E2E-07.02	Passages of toll stations - generate C4 transactions					X
E2E-07.03	Passages of toll stations - generate C1 transactions					X

Test Case No.	Test Name	Remarks	Barrier system			MLFF
E2E-07.04	Report billing details - generate TIF files					X
E2E-07.05	Acknowledge billing details - generate TIC files					X
E2E-07.06	TC claims payment for service usage from TSP					X
E2E-07.07	TSP validates claimed payment for service usage from TC					X
E2E-07.08	TSP claims payment of issuer fee from TC					X
E2E-07.09	TC validates claimed payment of issuer fee from TSP					X
E2E-07.10	TSP claims payment for service usage from SU					X
E2E-07.11	SU performs payment for service usage to TSP					X
E2E-07.12	TSP performs payment for service usage to TC					X
E2E-07.13	TC performs payment of issuer fee to TSP					X
E2E-08.01	Passages of toll stations - generate C1 transactions					X
E2E-08.02	Passages of toll stations - generate C6 transactions					X
E2E-08.03	Passages of toll stations - generate C1 transactions					X
E2E-08.04	Report billing details - generate TIF files					X
E2E-08.05	Acknowledge billing details - generate TIC files					X
E2E-08.06	TC claims payment for service usage from TSP					X
E2E-08.07	TSP validates claimed payment for service usage from TC					X

Test Case No.	Test Name	Remarks	Barrier system			MLFF
E2E-08.08	TSP claims payment of issuer fee from TC					X
E2E-08.09	TC validates claimed payment of issuer fee from TSP					X
E2E-09.01	Passages of toll stations - generate C1 transactions	OBE has more axles set than possible for the vehicle the OBE is assigned to.				X
E2E-09.02	Report billing details - generate TIF files					X
E2E-09.03	Acknowledge billing details - generate TIC files					X
E2E-09.04	SU contacts TSP with claim	Claim is to change toll tarif to the actual number of axles of the vehicle.				X
E2E-09.05	TSP requests credit note on behalf of SU					X
E2E-09.06	TC acknowledges requested credit					X
E2E-09.07	Report billing details credit - generate TIF files					X
E2E-09.08	Acknowledge credit billing details - generate TIC files					X
E2E-09.09	Report billing details corrected debit - generate TIF files					X
E2E-09.10	Acknowledge corrected billing details - generate TIC files					X
E2E-09.11	TC claims payment for service usage from TSP					X
E2E-09.12	TSP validates claimed payment for service usage from TC					X
E2E-09.13	TSP claims payment of issuer fee from TC					X

Test Case No.	Test Name	Remarks	Barrier system			MLFF
E2E-09.14	TC validates claimed payment of issuer fee from TSP					X
E2E-09.15	TSP claims payment for service usage from SU					X
E2E-09.16	SU performs payment for service usage to TSP					X
E2E-09.17	TSP performs payment for service usage to TC					X
E2E-09.18	TC performs payment of issuer fee to TSP					X
E2E-10.01	Passages of toll stations - generate C1 transactions	PaymentMeansExpiryDate of OBE under test is less than 62 days in the future of when the test is carried out.	X			X
E2E-10.02	Report billing details - generate TIF files		X			X
E2E-10.03	Acknowledge billing details - generate TIC files		X			X
E2E-10.04	TC claims payment for service usage from TSP		X			X
E2E-10.05	TSP validates claimed payment for service usage from TC		X			X
E2E-10.06	TSP claims payment of issuer fee from TC		X			X
E2E-10.07	TC validates claimed payment of issuer fee from TSP		X			X
E2E-10.08	TSP claims payment for service usage from SU		X			X
E2E-10.09	SU performs payment for service usage to TSP		X			X
E2E-10.10	TSP performs payment for service usage to TC		X			X

Test Case No.	Test Name	Remarks	Barrier system			MLFF
E2E-10.11	TC performs payment of issuer fee to TSP		X			X
E2E-11.01	Passages of toll stations - generate C1 transactions	OBE has less axles set than the axles of the vehicle used.				X
E2E-11.02	Retroactive payment - central solution					X
E2E-11.03	Report billing details - generate TIF files					X
E2E-11.04	Acknowledge billing details - generate TIC files					X
E2E-11.05	TC claims payment for service usage from TSP					X
E2E-11.06	TSP validates claimed payment for service usage from TC					X
E2E-11.07	TSP claims payment of issuer fee from TC					X
E2E-11.08	TC validates claimed payment of issuer fee from TSP					X
E2E-11.09	TSP claims payment for service usage from SU					X
E2E-11.10	SU performs payment for service usage to TSP					X
E2E-11.11	TSP performs payment for service usage to TC					X
E2E-11.12	TC performs payment of issuer fee to TSP					X
E2E-12.01	Passages of toll stations - generate C1 transactions	(applies only if C7 record is supported by TC)	(X)			X
E2E-12.02	Passages of enforcement stations - no transactions generated		(X)			X
E2E-12.03	Enforcement - generate violation		(X)			X

Test Case No.	Test Name	Remarks	Barrier system			MLFF
E2E-12.04	SU does a customer complaint when being invoiced in the enforcement process		(X)			X
E2E-12.05	Prepare billing details regarding the SU's customer complaint - generate C7 transactions		(X)			X
E2E-12.06	Report billing details - generate TIF files		(X)			X
E2E-12.07	Acknowledge billing details - generate TIC files		(X)			X
E2E-12.08	TC claims payment for service usage from TSP		(X)			X
E2E-12.09	TSP validates claimed payment for service usage from TC		(X)			X
E2E-12.10	TSP claims payment of issuer fee from TC		(X)			X
E2E-12.11	TC validates claimed payment of issuer fee from TSP		(X)			X
E2E-12.12	TSP claims payment for service usage from SU		(X)			X
E2E-12.13	SU performs payment for service usage to TSP		(X)			X
E2E-12.14	TSP performs payment for service usage to TC		(X)			X
E2E-12.15	TC performs payment of issuer fee to TSP		(X)			X
E2E-13.01	Passages of toll stations in barrier based systems - generate C2 transactions		X			
E2E-13.02	Report billing details - generate TIF files		X			
E2E-13.03	Acknowledge billing details - generate TIC files		X			

Test Case No.	Test Name	Remarks	Barrier system			MLFF
E2E-13.04	TC claims payment for service usage from TSP		X			
E2E-13.05	TSP validates claimed payment for service usage from TC		X			
E2E-13.06	TSP claims payment of issuer fee from TC		X			
E2E-13.07	TC validates claimed payment of issuer fee from TSP		X			
E2E-13.08	TSP claims payment for service usage from SU		X			
E2E-13.09	SU performs payment for service usage to TSP		X			
E2E-13.10	TSP performs payment for service usage to TC		X			
E2E-13.11	TC performs payment of issuer fee to TSP		X			