Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Appendix A.1

EETS Provider Technical Accreditation Procedure

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1. Purpose

The purpose of this document is to specify the technical procedures for EETS Providers (EPs) seeking to enable their customers to pay for tolled transactions relevant to the use of Irish toll roads through their account.

TII is the Toll Charger for each of the Dublin Tunnel and M50 toll schemes and therefore manages the accreditation process for these two toll schemes.

It should be noted that, as set out in Section 3.2, all the back-office transactions for all toll schemes in Ireland are passed through the interoperability management platform (IMP), which has been procured by TII in its capacity as a procuring authority and acts as a hub for toll transactions for all Toll Chargers and Toll Service Providers in Ireland. This accreditation procedure takes account of the IMP back office interface and its technical and operational requirements, and can therefore be used as a model for other EETS domains in Ireland, if the relevant Toll Charger so wishes.

This document should be read in conjunction with the EETS Domain Statement for the relevant EETS Domain. Capitalised terms used in this document shall have the meaning given to such terms in the applicable EETS Domain Statement.

References to 'Toll Charger' or 'TC' in this document refer to TII.

2. Scope

This document covers the technical part of the technical accreditation process for the M50 and Dublin Tunnel toll schemes. The purpose of the technical accreditation process is to ensure that EETS Providers comply with the technical and operational requirements of the M50 and Dublin Tunnel schemes and comply with the EETS Directive and the EETS Regulations.

This EETS technical accreditation process outlines the specification conformance and testing procedures for the following elements:

1. The Roadside interface between the EETS Provider's equipment (OBU) and the Toll Charger's roadside equipment ("**RSE**") beacons using DSRC transactions that are in accordance with EN 15509.
2. Back-office interface from the EETS Provider to the Toll Charger via the IMP.

This technical accreditation procedure forms the basis of the acceptance of an EETS provider to provide services on their domain. Once passed, the Candidate EETS Provider ("**CEP**") is then issued with an Accreditation Certificate for their On-Board Unit and their back-office interface to the Toll Charger via the IMP.

3. Technical Requirements

This section sets out the technical requirements of the interfaces between the CEP's system and the TC's systems. There are two interfaces between the CEP and the TC:

- CEP's on-board unit (OBU) to the TC's DSRC beacon; and
- CEP's back office to TC's back office (in practice this is an interface to the IMP).

3.1 OBU Interface Requirements

The OBU shall be a 5.8 GHz Microwave DSRC On Board Unit that can be read and processed by the TC's RSE and shall comply with the EN 15509 profile.

See Appendix A for further technical details of the interface requirements.

3.2 Back Office Interface Requirements

As noted previously, all back office transactions between the EP and the TC is conducted through the IMP, which acts as a hub and clearing house for all toll transactions between EP and TCs. This is illustrated in Figure 1 below.

Figure 1 Interoperability through the IMP

The interface between the EETS Provider and the IMP is based on ISO 12855:2022. The terminology used in the IMP is different to that set out in ISO 12855, and the table below lists the messages passed between the EETS Provider and the IMP, with the ISO 12855 terminology and the IMP terminology indicated.

Table 1 IMP file terminology

IMP name	ISO 12855:2022 name	Transmitting party	Receiving party	Specification
Charging and Enforcement Information (CEI)	Toll Declaration	TC	IMP Operator	Only the consolidated data sent to the EP.
Consolidated Charging and Enforcement Information (CCEI)	Billing Details	IMP Operator	EETS Provider	See Appendix A
Whitelist*	Exception list - Whitelist	EETS Provider	IMP Operator	See Appendix A
Blacklist*	Exception List - Blacklist	EETS Provider	IMP Operator	See Appendix A
Settlement Statement (SS)	Payment Claim	IMP Operator	EETS Provider	See Appendix A
Calendar Settlement Statement (CSS)	Payment Claim	IMP Operator	EETS Provider	See Appendix A

* The terms "Consolidated ETC White List" and "Consolidated ETC Black List" are also used in this document, and these are simply the Whitelists and Blacklists of all EPs on the IMP consolidated by the IMP into one list.

It should be noted there are a number of transactions in ISO 12855:2022 that are not used. These include:

- 'Trust Objects' – security keys are transferred physically to the IMP. Security keys are generated and transferred at a ceremony held by the IMP Operator. A USB drive with the key generation master excel program is provided by the IMP Operator and the procedure will be outlined by them.
- 'Toll Context Data' – the tariff and hours of operation data is set out in the relevant toll domain statement. Any changes will be communicated through the contractual change process.
- 'User Complaint' (and 'User Complaint Response') – user complaints are dealt with through the etoll.ie website where complaints can be logged by the EETS Provider, and a response from the associated TC can be viewed.

All Irish toll domains operate in a Toll Charger dominant mode, which means that the toll transaction (CEI file) is created by the Toll Charger detecting the vehicle on the road.

See Appendix A for further technical details of the back-office interface requirements and the message formats.

4. The Technical Accreditation Process

This section describes the CEP assessment process and methodology.

4.1 Overview of the Technical Accreditation Process

Once the Accreditation Agreement has been signed by both parties, the technical accreditation process can begin. At the start of the technical accreditation process:

a) There shall be a start-up meeting between the TC and the CEP, and a subsequent schedule of meetings shall be agreed.

b) The TC shall make available all required technical documents to the CEP, including the functional design of the IMP.

c) The parties shall agree arrangements for the provision by the CEP of test OBUs and decryption keys.

d) The TC shall set out arrangements for the CEP to access the IMP test environment.

e) The parties shall agree details of any pilot phase, including target number of users and transactions.

f) The TC shall set out the documentation required from the CEP and the required submission dates.

The CEP shall submit a draft test plan to the TC for review and approval. The test plan shall encompass the complete testing process, including conformance to specification (noting that no physical testing may be required if suitable evidence of previous testing is provided), suitability for use and end to end tests and shall include, but shall not be limited to:

1. The overall test strategy
2. The proposed test schedule / timetable
3. The test phases, and the reviews / tests to be carried out in each phase
4. A description of each test case indicating entry criteria, the process, the expected results and criteria for success (exit criteria)

5. Management of test failures and issues
6. Test environments and facilities to be provided by the CEP
7. CEP's requirements from the TC and the TC's contractors (facilities, staff, reviews etc.)
8. Test reporting
9. CEP's management staff and contact points
10. A health and safety plan including risk assessments
11. A proposed schedule of meetings with the TC during the accreditation period
12. An overview of where components of the CEP's solution have been tested in a similar tolling application. Further details should be provided in the conformance to specification phase.

The CEP shall not proceed to the conformance to specification tests until the test plan has been accepted by the TC.

Following acceptance of the test plan, the technical testing can commence, and once successfully completed, an Accreditation Certificate will be granted by the TC to the CEP.

Following award of the Accreditation Certificate, the execution of a Deed of Adherence to the IFA and the execution of a TCA between the CEP and the TC, the pilot phase may commence.

Once the pilot phase has been successfully completed, the CEP may commence toll services on the EETS Domain.

The overall process is set out in Figure 2, below and the parts covered by this technical accreditation procedure document are shown in blue. The greyed-out sections are covered by the relevant EETS Domain Statement.

During the accreditation process, the CEP and TC shall meet at the beginning and end of each test phase or at such other intervals as may be agreed between the parties. The CEP shall provide the proposed agenda and any background documents in advance of the meetings, and shall circulate a record of decisions and actions to all attendees within a week of the meeting which shall be subject to review and approval by the TC. The CEP shall also provide monthly process reports to the TC, setting out its progress towards completion of each of the phases, the forecast completion dates of each of the phases and shall include any significant risks and issues that have arisen and proposed measures to address these.

Figure 2 Accreditation process overview – sections covered by this document shown in blue.

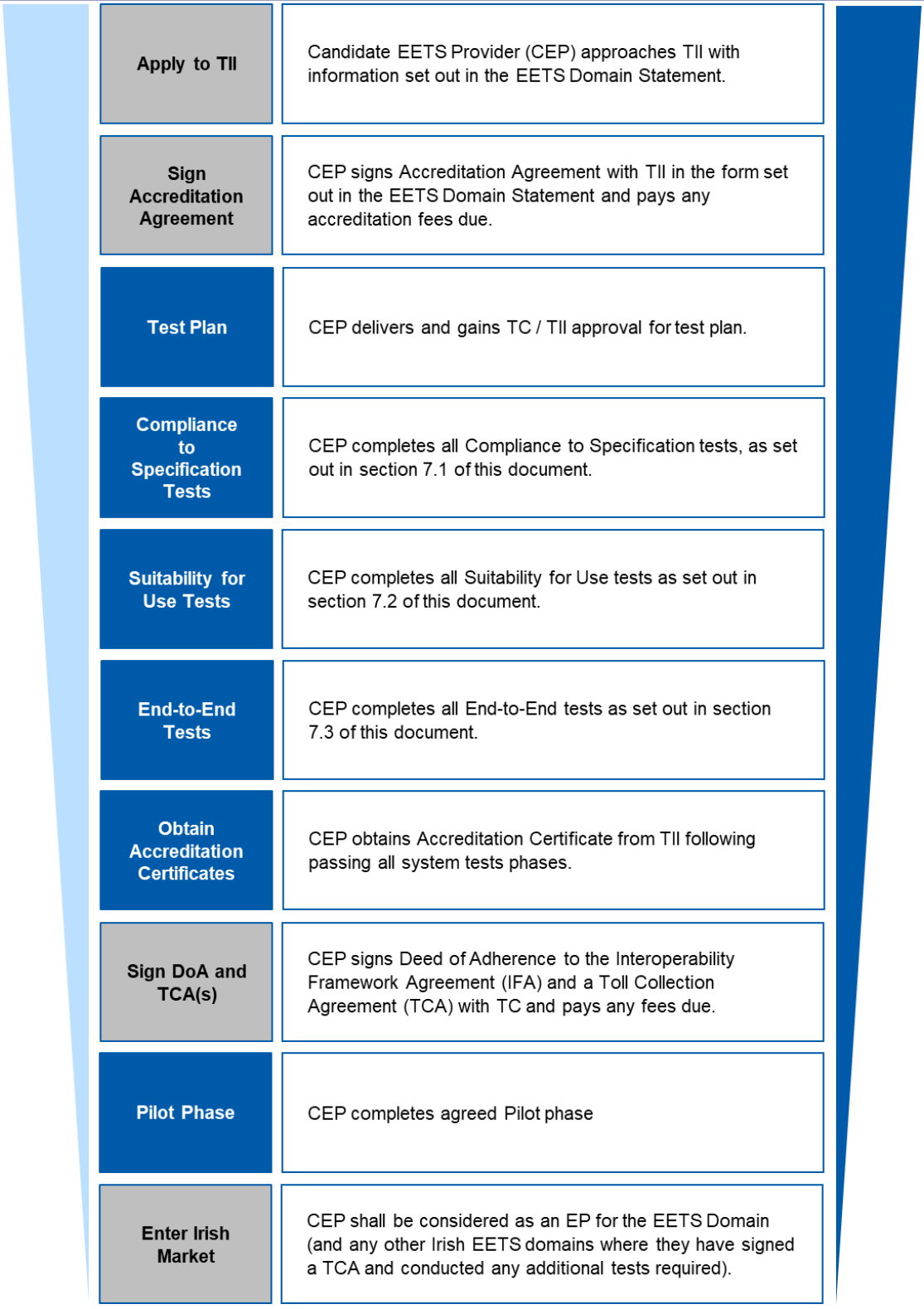

Figure 3: Accreditation Process Overview

5. Accreditation Tests

Following acceptance by the TC of the Test Plan, as set out in section 4.1 above, the technical accreditation tests set out below can commence in accordance with the following four main phases:

a) Conformance to Specification

The purpose of this phase is to ensure that the CEP's proposed systems and implementation conform to the required specifications and processes and are suitable to progress to phase 2 – the suitability for use tests.

b) Suitability for use tests

The purpose of these tests is to validate that the CEP's interoperability constituents, including its OBU and back office interface, perform in accordance with the required performance requirements, including technical and operational requirements. These tests will validate that the CEP can send and receive the required files to and from the IMP in accordance with the requirements and can perform the DSRC transaction in accordance with the TC's technical requirements.

c) End to end tests

The purpose of the end to end tests is to validate that all relevant files originating from the TC and processed through the IMP are received and processed correctly by the CEP and that all relevant files originating from the CEP and processed through the IMP are received and processed correctly by the TC.

d) Pilot Operation

The purpose of the pilot operation, the requirement for which may, at the TC's discretion, be waived, is to validate that the CEP meets all the technical and operational requirements over a period of time. The pilot operation is undertaken following the conclusion of the suitability for use tests, the issuing of an Accreditation Certificate, the execution of the Deed of Adherence to the IFA and the execution of a TCA with the TC, and is performed with a limited number of the CEP's account holders.

It should be noted that the successful certification is only valid for the Toll Charger's tested OBU with the tested hardware, firmware and software version and the back-office interface version used for the testing. Any changes shall require a re-certification process. This process is set out in Section 6 below.

The following sections describe each of the test phases in further detail.

5.1 Conformance to Specification Tests

The conformance to specification tests are a review of documentation provided by the CEP to confirm adherence to the required standards and specifications, and relevant prior testing carried out. This has two parts, covering the two interfacing items, the OBU and the back-office interface. This shall be in conformance with the Commission Implementing Regulation 2020/204 Annex III.

The documentation provided by the CEP will be reviewed and assessed by the TC and, if additional information is required, this shall be requested. When the information provided is assessed as compliant with the above requirements, it shall be approved.

This phase must be completed to the satisfaction of the TC before commencement of the suitability for use tests. It may not be necessary for the CEP to carry out testing explicitly for the EETS Domain as part of the conformance to specification phase, but they may rely instead on tests conducted previously, subject to the provision of the appropriate documentation as outlined below.

5.1.1 OBU Conformance to Specification tests

The CEP shall deliver to the TC the following documentation:

a) Documentation providing evidence of CE marking of the OBU, in compliance with the EU requirements for CE marking, including, the technical dossier and the EU declaration of conformity.

b) Test reports with content and test results that are consistent with the criteria set out in CSN EN 15876-1: Electronic fee collection - Evaluation of on-board and roadside equipment for conformity to EN 15509 - Part 1: Test suite structure and test purposes.

c) The relevant OBU manufacturer examination certificates in accordance with Decision No 768/2008/EC.

d) Details of any additional testing carried out.

5.1.2 Back-Office Interface Conformance to Specification Tests

The CEP shall deliver to the TC documentation showing that the proposed back-office interface between the IMP and the EETS Provider is compliant with the back-office interface specification set out in Appendix A.1.3.

These conformance checks only cover the interface between the CEP and the IMP and do not cover the transactions between the Toll Charger and the IMP, although the latter will be included in the end-to-end test phase.

If the CEP wishes any test results from similar toll systems to be considered as a part of the accreditation process, they shall submit all the associated test reports, interface specifications and references to applicable standards.

5.2 Suitability for Use Tests

5.2.1 Overview – Suitability for use tests

The suitability for use tests are to demonstrate to the TC's satisfaction that the technical interfaces between the CEP's systems and the IMP and TC's systems are working as required. This shall be in conformance with Annex III of Commission Implementing Regulation 2020/204. The suitability for use tests shall not be started until the conformance to specification tests have been completed to the satisfaction of the TC.

Each test carried out shall be documented in a test report, which shall be reviewed by the TC. The test reports shall contain the following as a minimum:

1. Title and description of the test
2. Date(s) of the test(s)
3. Entry criteria, exit criteria and expected results
4. Equipment used, and hardware / software versions
5. Test process carried out (including a note of any tests that could not be carried out or could not be completed, and the reasons for this)
6. Test results
7. Analysis of any test failures, including a proposed severity, and proposed rectification and re-test plan
8. Conclusions

The test reports are subject to review and acceptance by the TC.

5.2.2 OBU Suitability for Use Tests

5.2.2.1 OBU Suitability for Use Tests Overview

These functional tests focus on the compatibility of the OBU DSRC interface to the TC's RSE. It is anticipated that there may be instances where particular OBU models brought forward by the CEP possess identical hardware and software attributes to those already in use in Ireland. Should this be the case, it may allow exemption from some tests, however, this shall be at the sole discretion of the TC. All OBU suitability for use tests shall be carried out as on-road tests. There will be no simulation carried out in a laboratory or at a test site.

There are three different toll plaza types in operation in Ireland:

1. The M50 is a full multi-lane free-flow (barrier free) toll system.
2. The Dublin Tunnel is a barrier tolling system with vehicle detection in advance of the toll barriers to enable vehicles with valid ETC accounts or exempt vehicles to pass through the plaza without stopping providing they are travelling within the deign speed of the system.
3. Other EETS Domains in Ireland have conventional barrier tolling.

The types of required tests for each of these types are set out in table 2 below, although it should be noted that the required tests for EETS Domains other than the M50 and Dublin Tunnel are at the discretion of the relevant TC for that domain.

At the start of testing, the CEP shall deliver sufficient test OBUs to the IMP, and provide the test decryption keys. This would normally be five OBUs for every TC. The provision of suitable test vehicles and drivers shall be agreed between the CEP and TC during the accreditation process.

5.2.2.2 OBU Suitability for Use Test (SUT) Objectives

The key objectives of the OBU SUTs are:

a) To confirm and validate OBU DSRC transactions across the interface with roadside equipment (DSRC beacons).

b) Ensure the reliability of the OBU DSRC transaction under different conditions and situations of vehicles, position and traffic.

The following table sets out the required SUTs:

5.2.2.3 OBU Suitability for use tests

Number	Name	Description	Test elements
OBU1	Free-Flow Tolling (M50 only) Basic operation	Testing CEP OBU functionality in interaction with the user and the roadside equipment under dynamic on-road conditions. The purpose of this test is to ensure that the OBU operates normally with the roadside equipment and performs valid transactions whilst in a designated lane on the road.	1. OBU securely installed on test vehicle. 2. Vehicle passes toll gantry 3. Observe OBU signal of valid DSRC transaction (One [1] beep) 4. For each passage of any station type with each of the OBUs under test, observe that a valid DSRC transaction is performed. 5. Test to be performed a minimum of 5 times.

Number	Name	Description	Test elements
OBU2	Free-Flow Tolling (M50 only): Lateral position/In-between Lane test	The purpose of this test is to ensure that the OBU operates normally with the roadside equipment and performs valid transactions whilst straddling two lanes.	1. OBU securely installed on test vehicle. 2. Vehicle drives in between lanes and passes toll gantry 3. Observe the OBU signal of valid DSRC transaction (One [1] beep) 4. For each passage of any station type with each of the OBUs under test, observe that a valid DSRC transaction is performed. 5. Test to be performed a minimum of 5 times.
OBU3	Free-Flow Tolling M50 only): Mounting position and vehicle type	The purpose of this test is to ensure that the OBU operates normally with the roadside equipment when mounted at various angles (45 degrees -light vehicle; 90 degrees -heavy goods vehicle). It is to be assumed that the optimal position for OBU at the top centre of the windscreen (behind the rear-view mirror) The OBU is to be installed there.	1. OBU securely installed on test vehicle(s), i.e. motor vehicle and truck. 2. Vehicles pass toll gantries. 3. Observe OBU signal of valid DSRC transaction (One [1] beep). 4. For each passage with each of the OBUs under test, observe that a valid DSRC transaction is performed. 5. Test to be performed a minimum of 5 times.
OBU4	Free-Flow Tolling (M50 only): Vehicle Speed	Testing CEP OBU functionality in interaction with the user and the roadside equipment under dynamic conditions. The purpose of this test is to ensure that the OBU operates normally with the roadside equipment and performs valid transactions whilst the vehicle is travelling at different operational speeds.	1. Sample OBU securely installed on test vehicle(s), i.e., motor vehicle and truck. 2. Vehicles pass toll gantry. Toll passages are to be performed with the OBU at 40 km/h, 80 km/h and 100 km/hr. 3. Observe OBU signal of valid DSRC-transaction (One [1] beep) 4. For each passage with each of the OBUs under test, observe that a valid DSRC transaction is performed and signalled appropriately by the OBU. 5. At least five (5) passes at each speed will be required to verify functionality. 6. Note this test may be combined with test OBU1
OBU5	Barrier Toll lane Passage (for all barrier toll systems except Dublin Tunnel)	Testing CEP OBU functionality in interaction with the toll plaza equipment under normal conditions. The test for OBU functionality in interaction with traditional toll plaza technology. The main aim of this test is to ensure that the OBU communicates correctly with the beacon of the currently used toll	OBU securely installed on test vehicle(s), i.e. motor vehicle and truck. Test vehicle is assigned a specific lane. Driver approaches the toll plaza and approaches the barrier. If valid OBU account – barrier raises and vehicle proceeds, and OBU signals correct transaction (One [1] beep).

Number	Name	Description	Test elements
		lane and performs valid transactions.	If OBU is Blacklisted, barrier stays down and OBU signals Blacklisting (if used). At least 5 passes with each OBU status shall be required to verify functionality.
OBU6	Tests for Dublin Tunnel only – including advance vehicle detection	Testing CEP OBU DSRC functionality in the interface with the Low Speed Free-Flow DSRC beacons in the Dublin Tunnel hybrid low speed free-flow system. The test also tests for correct OBU functionality across the interface with the additional DSRC beacons at the barrier.	OBU securely installed on test vehicle(s), i.e., motor vehicle and truck. Test vehicle is assigned a specific lane. Driver approaches the low speed free-flow gantry at the recommended speed (30 kph). If valid OBU account – barrier raises and vehicle proceeds, and OBU signals correct transaction (One [1] beep). If OBU is Blacklisted, barrier stays down and OBU signals Blacklisting (if used). Ensure OBU has also transacted with the DSRC beacon at the barrier. At least 5 passes with each OBU status shall be required to verify functionality, tests to use different lanes.
OBU7	Tests for all barrier tolling systems including Dublin Tunnel Mounting position and vehicle type	The purpose of this test is to ensure that the OBU operates normally with the roadside equipment when mounted at various angles (45 degrees -light vehicle; 90 degrees -heavy goods vehicle). It is to be assumed that the optimal position for OBU at the top centre of the windscreen (behind the rear-view mirror) The OBU is to be installed there.	1. OBU securely installed on test vehicle(s), i.e., motor vehicle and truck. 2. Vehicles pass toll gantries. 3. Observe OBU signal of valid DSRC transaction (One [1] beep). 4. For each passage with each of the OBUs under test, observe that a valid DSRC transaction is performed. 5. Test to be performed a minimum of 5 times.

Table 2: OBU suitability for use tests

5.2.3 Back Office Suitability for Use Tests

5.2.3.1 Back Office Suitability for Use Tests overview

This section covers the suitability for use tests that must be carried out between the CEP and the IMP's back-office systems in order to gain accreditation. This section does not cover the internal system and integration testing that the CEP should have carried out on their own system in advance of any application for accreditation.

5.2.3.2 Back Office Suitability for Use Test Objectives

The objectives of the back-office suitability for use tests are:

a) Test the connectivity of the CEP's back office to the IMP.

b) Ensure all the transaction messages between the CEP and the IMP are transmitted and received correctly.

c) Ensure that incorrect or error conditions are processed correctly.

5.2.3.3 Back Office Suitability for Use Tests

All functional back-office tests will be carried out using a test environment simulating the operation of the IMP, which will be provided by the IMP. Details of how to access this IMP test environment will be provided to the CEP upon signature of the Accreditation Agreement with the TC.

The following back-office functions shall be tested:

Number	Name	Description	Test elements
BO1	Transfer full White List (EETS terminology – Exception List – Whitelist)	Transferring a full White List from the CEP's back office to the IMP.	CEP Uploads a correctly formatted White List. CEP Receives an acknowledgement of correctly formatted White List. Ensure White List is correctly imported into IMP's Consolidated White List (CWL). Repeat the above tests with error conditions (to be proposed by the CEP in their test plan) to ensure rejection notices are correctly received and processed.
BO2	Transfer full Black List (EETS terminology – Exception List – Blacklist)	Transferring a full Black List from the CEP's back office to the IMP.	Same as test BO1, but for full Black List.
BO3	Download Consolidated Charging and Enforcement Information (CCEI) file (EETS terminology – Billing Details)	CEP receives CCEI file from the IMP.	IMP sends correctly formatted CCEI files to the CEP. CEP receives CCEI file and acknowledges correct receipt. CEP ensures CCEI is correctly processed in their system. Repeat the above tests with error conditions (to be proposed by the CEP in their test plan) to ensure rejection notices are correctly received and processed.
BO4	Download Settlement Statement (SS) (EETS Terminology – Payment Claim)	CEP receives SS file from the IMP.	CEP receives SS file and acknowledges correct receipt. CEP ensures SS is correctly processed in their system. Repeat the above tests with error conditions (to be proposed by the CEP in their test plan) to ensure rejection notices are correctly received and processed.
BO5	Download Calendar Settlement Statement (CSS)	CEP receives CSS file from the IMP.	Same as test BO4 but with CSS.

Number	Name	Description	Test elements
	(EETS terminology – Payment Claim)		

Table 3: Back office suitability for use tests

5.3 End To End Tests

5.3.1 End to end test objectives and overview

The objectives of the end-to-end tests are:

1. Ensure toll transactions are correctly processed through the entire system from TC through the IMP to the CEP and in the reverse direction.
2. Ensure the billing / settlement system works correctly from CEP to TC.
3. Ensure incorrect transactions are identified by the systems.
4. Ensure the user complaints system operates correctly.

5.3.2 End-to-end test cases

The end-to-end testing should cover the following as a minimum:

Number	Name	Description	Test elements
E2E1	Vehicles to CCEI (Billing Details)	Detection of multiple vehicles over a time period to ensure that the CCEI is received correctly and contains the correct passage details.	Whitelisted vehicle Blacklisted vehicle. ANPR to OBU discrepancy
E2E2	CCEI to Settlement	Ensure that the CCEI leads to the correct settlement statement and calendar settlement statement received at the CEP's back office.	Settlement Statement Calendar Settlement Statement

Table 4: end to end tests

5.4 Issuing of Accreditation Certificate

Once all of the testing set out in the sections above has been successfully passed, and all test reports have been submitted to and approved by the TC, with no unresolved critical, major or moderate test issues, the CEP may apply for an Accreditation Certificate from the TC. This indicates that, from a technical perspective, the CEP's systems are compatible with the TC's systems.

5.5 Pilot Operation Phase

5.5.1 Pilot objectives and overview

The pilot operations test phase shall only commence after all of the conformance to specification, suitability for use and end-to-end tests have been successfully passed and an Accreditation Certificate has been issued by the TC.

In addition, all the required commercial agreements shall have been put in place, including the Deed of Adherence to the IFA, and a TCA between the TC and the EP.

The pilot operation test phase is where the EP identifies a number of Service Users (SUs) who are willing to take part in the pilot operation tests, and who will use the tolled roads. The number of SUs taking part in the pilot operation shall be agreed between the CEP and the TC. These SUs are set up as account holders in the CEP's system and are issued with OBUs.

The SUs then use the toll schemes during an agreed period, using as many of the facilities, and in as many different ways as possible.

The objectives of the pilot operation phase are:

1. To identify any residual system issues, before opening the systems to all the CEP's customers.
2. To identify any operational issues before opening the systems to all the CEP's customers.

The full range of interoperable ETC processes i.e. list generation, CEI files, settlement statements, must be in operation throughout duration of the pilot operation phase, and these are to be recorded for performance evaluation.

Please note that transactions during the Pilot Phase shall be real transactions, and not test transactions.

During the accreditation start-up phase, the TC and the CEP shall agree on the number of transactions and the defined period of operation that will be deemed sufficient to satisfy the objectives of the pilot operations phase. It is recognised that different CEPs may differ in their ability to recruit service users to participate in the phase, and the target volume of users shall be agreed between the TC and CEP in the start-up phase of the accreditation.

A pilot operation phase has benefit for both the CEP and the TC. However, in exceptional circumstances, if a pilot operation phase is not practical, the TC may agree to forgo the phase and allow full operation following issue of the Accreditation Certificate, and signing of the commercial agreements.

5.5.2 Pilot Phase Organisation

The CEP shall identify, nominate and present the SUs they propose to take part in the pilot operation test phase. This shall be subject to the approval of the TC.

The CEP shall provide the TC with the operational decryption keys for the OBUs. These shall be transferred on physical media at a keys ceremony.

The CEP, the TC and the IMP shall monitor the transactions and check for correct operations.

5.5.3 Pilot result evaluation

All issues shall be noted in an issue register and given a priority rating agreed between the CEP and the TC. All issues shall be addressed, the order dictated by the priority rating.

5.5.4 End of Pilot Operation

The pilot operations test phase shall end when an agreed volume of transactions and/ or time of operation has been completed, all high priority issues discovered during the pilot operation have been resolved to the satisfaction of the TC, and a rectification plan has been agreed for any residual low priority issues. This would normally be the final test phase and would complete the technical part of the initial accreditation process.

The CEP will then be authorised to provide their services to all their Service Users for the EETS Domain(s) included in the accreditation process.

6. Re-certification Process

Once an EETS Provider has been certified and has moved into the operation phase, it is necessary to have a process which applies to any changes to the EP's systems. This could be any of the following changes:

1. Changes to the EP's OBU; or
2. Changes to the EP's back-office system that may affect the interface to the IMP.

The overall change process will be as set out in the TCA. No changes shall be implemented by the EP without prior notification to and the agreement of the TC. It is therefore necessary for the EP to give the TC sufficient notice of any intended changes to their interfacing elements, including, but not limited to, full technical details of the proposed change and a suggested re-testing scope and programme, details of which shall be set out in a test plan by the EP. This is subject to review and approval by the TC. The degree of re-testing required shall depend on the scope and the possible effects of the proposed change.

6.1 Re-certification of the OBU

Changes to the OBU that shall require re-certification include but shall not be limited to:

a) A software or firmware update to the EP's existing model of OBU

b) Introducing a new model of OBU that has previously been used by another service provider with one or more of the Irish Toll Chargers (TC)

c) Introducing a new model of OBU that has not previously been used by another Irish TC but has been tested in accordance with the technical standards and carries CE marking

d) As per b) above, but has been tested by a Notified Body

e) A new OBU that does not have full evidence of testing

f) Changes to encryption / decryption keys

6.2 Re-certification of the back-office interface

Only changes to the EP's back office that have the potential to affect the interface to the IMP or could affect any process that impacts the IMP or one or more TCs shall be subject to a re-certification process. This shall include but not be limited to:

a) Changes of hosting

b) Software updates to the interfacing code

c) Changes to third party software

d) Changes to security processes (other than patching or minor updates)

Appendix A - Interface Specifications

A.1.1 Introduction

This section sets out the technical and operational requirements for the interfaces between the TC and the EP in further detail. There are two main interfaces:

- Roadside – EP's On-Board Unit (OBU) and the TC's DSRC beacon.
- Back office – the EP's back office to the TC's back office. In practice, this is actually all carried out through the IMP, and so this is an interface between the EP's back office and the IMP.

The technical requirements for these two interfaces are set out in this section below as well as in the IMP Solution Functional Design, which will be made available to the CEP on application for accreditation.

A.1.2 OBU to roadside DSRC interface

The OBU shall be a 5.8 GHz Microwave DSRC On Board Unit that can be read and processed by the TC's Roadside Equipment and shall comply with the EN 15509:2014 or EN 15509:2023 profile. Other legacy OBU profile standards may be accommodated at the TC's discretion. Note at the time of writing there are no GNSS-based toll schemes in Ireland, and so only the simple 'OBU' transaction to the above standards is required for all Irish toll domains, even if the OBU is a GNSS type. This may change in the future.

The EP's White List and Black List shall always associate the OBU with the vehicle's registration mark as displayed on the vehicle's number plate. OBU 'swapping' between vehicles is not permitted unless reflected in the associated White List or Black List.

OBUs and RSE must be encoded with authentication and access keys provided by the CEP in order for the OBU to be processed. There will be test keys for the suitability for use tests, and operational keys for the pilot and operational phases. Keys are exchanged on physical media at a key ceremony with the IMP.

The OBU must be so positioned as to be read by the beacons located over the lane. If the OBU does not respond or partially transmits transponder data, the Service User will normally be charged using ANPR data captured and matched against the IMP's Consolidated ETC White List. The associated transaction that is subsequently sent to the EP for settlement purposes will be clearly flagged as being a 'degraded mode' transaction.

The OBUs provided for test shall be capable of being easily attached to the relevant test vehicles and may be detached without risk of injury to persons or damage to the relevant vehicle.

The following table indicates the data fields in the EN 15509 standard and indicates which are mandatory and which are optional for OBUs in Ireland. While certain fields are indicated as optional, these are not used in practice; further guidance may be sought prior to testing. The process relies primarily on matching of the OBU ID to the Consolidated ETC White List and Consolidated ETC Black List from which attributes such as Licence Plate Number and Vehicle Class can be derived rather than such attributes being available from and communicated by the OBU. Note also that Receipt Data is not programmed into the OBU but is written to the OBU by the roadside beacon as a record of the completed transaction.

Attributes (EID>0)	AttrID	Type	Length in Bytes	TII use*	Remarks
CONTRACT					
EFC Context Mark	0	32	6	M	Contract provider's identification
PAYMENT					

Attributes (EID>0)	AttrID	Type	Length in Bytes	TII use*	Remarks
Payment means (including PAN)	32	64	14	M	Personal account Number, PAN expiry date and payment means and payment means usage control
VEHICLE					
VehicleLicensePlateNumber	16	47	Variable 13 to 17 bytes	O	
VehicleClass	17	49	1	O	
VehicleDimensions	18	50	3	O	
VehicleAxles	19	51	2	O	
VehicleWeightLimits	20	52	6	O	
VehicleSpecificCharateristics	22	54	4	O	
EQUIPMENT					
EquipmmentOBUId	24	56	5(=1+4)	M	
EquipmentStatus	26	58	2	O	
RECEIPT					
ReceiptData1 (last)	33	65	28	M	
ReceiptData2 (penultimate)	34	66	28	M	

Table 5: EN 155509 data fields

* M=mandatory O= optional N= not used

A.1.3 Back Office Interface

The interface between the back office of the EETS Provider and the Toll Charger is through the IMP.

The IMP allows, on a technical level, an EETS Provider to provide services to any Irish Toll Charger (TC), and hence, the back-office interface is between the EETS Provider and the IMP. The transactions with the toll chargers are all through the IMP, which acts as a 'clearing house' for all of the toll transactions.

Figure 4: information exchange through IMP

A.1.3.1 XSD files

Full details of the structure of the interface messages are set out in the following .xsd files available from the TC:

11_EETS_CEI.xsd

12_EETS_Settlement.xsd

13_EETS_Lists.xsd

A.1.3.2 Whitelists and blacklist files

The EP is required to provide both ETC White and Black Lists of its Service User base; these lists have to be complete as opposed to partial, meaning that they have to list each Service User that has an account with them, including all related information, especially the OBU data.

The mandatory content, schedule and update frequency for both the ETC White and Black Lists according to the Irish national interoperability scheme are detailed in the following table.

List		Content		Update	
Type	OBU Name	Full Name	Comment	Field Type	Frequency
White	cm obu vc vm	Context Mark OBU Vehicle Class Vehicle Registration Number	Unique issuer identifier Unique OBU identifier Universal class Vehicle licence plate	nvarchar(25) nvarchar(25) integer nvarchar(100)	Twice Daily at 10:00 and 16:00 (Dublin Time)
Black	cm obu rs	Context Mark OBU Reason	Unique issuer identifier Unique OBU identifier Reason code for Blacklisting	nvarchar(25) nvarchar(25) nvarchar(256)	Hourly

Table 6: ETC List transfer schedule

Service Users that are the EP's account holders will only be permitted to carry out an ETC transaction if they are on the EP's Whitelist and not on the EP's Blacklist.

Classification will be determined using the process set out in the appropriate toll domain statement (TDS) for the toll domain. It is the responsibility of the EP to ensure that the classification data for both the Licence Plate Number and associated OBU is correct and verified.

Upon receipt of a new list, classification is deemed as permanent until expiry of that list. There is no process in place to acknowledge a temporary change in classification details.

A.1.3.3 CEI (Billing Details) files

The mandatory content, schedule and update frequency for the CEI files according to the Irish national interoperability scheme are detailed in the following table:

List	Content				Update
Type	OBU Name	Full Name	Comment	Field Type	Frequency
CEI	sp	Service Provider	Detected OBU issuer identifier	Integer	Every 3 hours from 6:30 AM to 9:30 PM: 6:30 AM 9:30 AM 12:30 PM 3:30 PM 6:30 PM 9:30 PM
	cm	Context Mark	Unique TC identifier	nvarchar(25)	
	obu type	OBU Type	Detected OBU identifier.	nvarchar(256)	
	date	Date	Defaulted to ETC Date and time of the Passage (format YYYYMMDDhhmmss)	datetime	
	vc	Vehicle class	Universal class	integer	
	loc	Locality	Unique identifier of plaza/lane	integer	
	bid	Beacon Identifier	Unique beacon identifier	integer	
	avi	AVI	Toll charge including VAT	float	
	ave	AVE	Toll charge excluding VAT	Float	
	res	Resolution	Code identifier for type of transaction processing	nvarchar(10)	
	num	Num	Unique identifier of the passage in TC system	integer	
	enf	Enforcement	Passage enforcement status	nvarchar(50)	
	vrn	Vehicle Registration Number	Read vehicle licence plate	nvarchar(100)	

Table 7: CEI file details

A.1.3.4 Settlement Statement

The IMP issues a separate Settlement Statement to the EP from each TC, setting out the amounts owed by the EP to the TC.

The format of the Settlement Statement and Calander Settlement Statement is as set out in the .xsd files above.

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