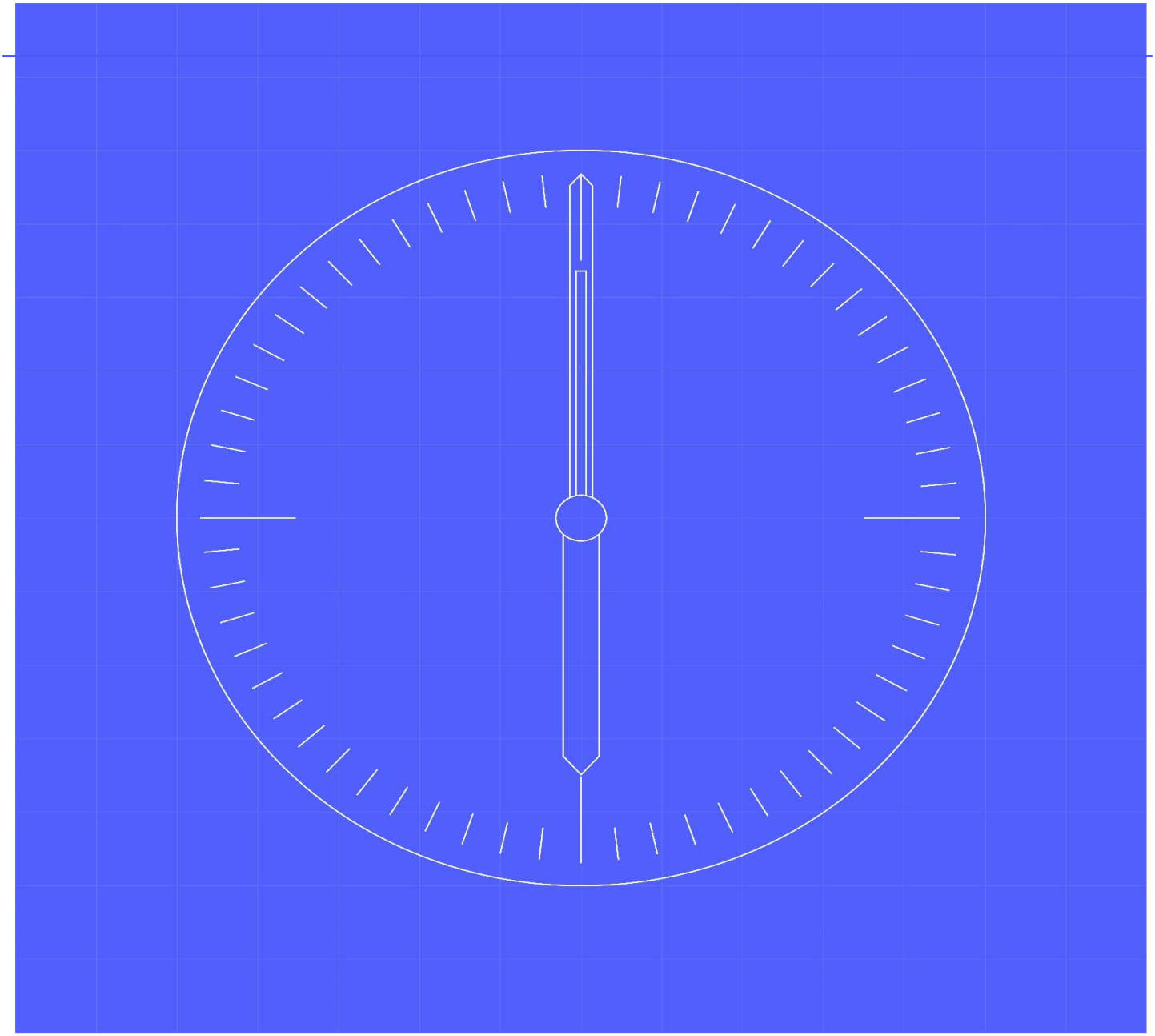
MHHS PROGRAMME
Industry-led, Elexon facilitated

SIT Scope for Voluntary Participants' Planning



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1. Contents

1.1 Change Record

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12 January 2023	Kate Goodman	0.1	Draft issued for Design Team review
18 January 2023	Kate Goodman	0.2	Draft issued for further internal review
19 January 2023	Kate Goodman	0.3	Draft issued for SITWG review
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6 March 2023	Kate Goodman	0.6	Updated draft issued to SITWG

1.2 Reviewers

Reviewer	Role
Adrian Ackroyd	SRO Test Manager
Dominic Mooney	LDP SIT Manager
SITWG	

1.3 References

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MHHS-DEL315_-_E2E_Testing_&_Integration_Strategy_v1.0.pdf (mhhsprogramme.co.uk)	MHHS Programme	April 2022	

1.4 Terminology

Term	Description
	For terminology, see programme glossary on the MHHS portal: Programme Glossary (sharepoint.com)

2 Executive Summary

The purpose of MHHS Systems Integration Testing (SIT) is to prove that the component Services are implemented in a way consistent with the MHHS E2E Design and interact in a coherent and consistent manner, in other words to "prove" the MHHS E2E Design. This will be achieved by establishing a test environment where all Central Systems, the Registration Service and at least two Services for each other Role are connected via the Data Integration Platform (DIP). End-to-end tests will then be conducted, based on business scenarios. The Programme has a defined set of documentation which will be produced to support the preparation and conduct of SIT, including an Approach & Plan document for each Stage of SIT where the high-level test scenarios will be defined.

Essentially, for SIT, each Participant will need to develop their systems so that they conform to everything described in the MHHS E2E Design for their Role in the market. For Central Systems and Registration Services, all development associated with MHHS preparedness needs to be complete in order to enter SIT. However, for the Services which are not Central Systems or Registration Services - the "voluntary services" - this is not necessarily the case. This document is aimed at these voluntary Participants and serves as a guide to the development necessary for them to enter SIT (development which is termed "DBT1" in planning material). Where a function is listed in this document, it is expected that the **system triggering the functionality** will be used in the test in order to ensure full E2E testing. This will mean for example that Suppliers will need to have developed the relevant changes to their CRM (or equivalent) in order to exercise the Change of Supplier scenarios but their customer billing would not need to be updated for SIT and would be part of "DBT2".

Each Participant taking part in SIT will be asked to:

- Present their own system/service so that **its functionality can be proved** in the context of the fully integrated eco-system, and
- Use their own system to assist in executing **test scenarios where another Participant's system is under test** (where the scenario requires the co-operative action of several Participants).

In the context of assisting in SIT tests where another Participant's system is the one under test, this document lists the business scenarios from the MHHS E2E Design which will form the basis for the SIT tests and identifies each Role implicated in that business scenario. This will help show where a Participant may be needed to assist in the testing of another system.

All Participants (except the DIP) will be required to show their systems' correct intake of the Industry Standing Data (ISD), of each relevant PUB message, generation of each relevant IF message and ability to handle D-flows that have changed. The DIP will be required to show correct intake of ISD, routing and transmission of messages. A Supplier will need to demonstrate their system's correct handling of Change of Supplier/Data Service/Metering Service, Registration changes, consumption-related events such as consumption amendment and metering events such as disconnection. A Network Operations Service will need to show intake of relevant PUB messages and update of the registration data items that they master. An UMSO will be required to show intake of relevant PUB messages. A Data Service will be required to show Change of Supplier/Data Service/Metering Service, correct intake of consumption and register read data (in the manner appropriate to the Market Segment of the Data Service), estimation and import/export meters. A Metering Service will be required to show Change of Supplier/Data Service/Metering Service and meter updates.

This document does not cover requirements relating to those Services mandated to participate in SIT (Central Systems or the Registration Service). The requirements for these Services (as well as the voluntary Services covered in this document) will be covered by the SIT E2E Scenarios, to be produced separately.

3 Introduction

This document sets out at a high level for each voluntary MHHS Role the features that will be the subject of tests in SIT. These features will therefore need to be developed and tested in time for the start of SIT in preparation for the end-to-end SIT testing (but note that each participant is responsible for delivering into SIT a coherent, fully-tested Service). Note that this document does not set out to describe the **high-level SIT test scenarios**. The high-level SIT test scenarios will be produced following this document's publication and most will be E2E scenarios, based on those described in the MHHS E2E Design. (The exception is that SIT CIT tests will not be E2E scenarios.) These E2E scenarios will reflect the way that SIT will be conducted, with a given scenario involving

multiple Roles, as described in the MHHS E2E Design. Should there be any discrepancies between this document and the MHHS E2E Design, then the Design takes precedence and this document will be amended accordingly.

This document deliberately describes functionality on a per-Role basis, in order to give a voluntary Participant an **idea of the features expected to be demonstrated by their Role during SIT**. It is intended as an aid to voluntary Participants when planning which parts of their IT estate they need to enhance in order to take part in SIT. Before reading this document, it is helpful to understand the proposed Test Phases and Stages for MHHS which are described in MHHS-DEL315_-_E2E_Testing_&_Integration_Strategy_v1.0.pdf (mhhsprogramme.co.uk).

Test scope is described on a per-Role basis to aid participants' understanding of the testing each will be required to conduct to prove the functionality of their Role is in accordance with the MHHS E2E Design. In addition to proving the correctness of their own Role, each participant will be required to support the testing of other Roles. For example, SDS will be required to demonstrate its own functionality by generating IF-021 messages which are correct and consistent with the consumption data received. In addition, SDS will be required to generate such messages as are required for the LSS or MDS to prove its own functionality. A participant reading this document therefore needs to understand the scenarios being tested by other Roles and be prepared to participate in that testing, even though their own system is not the object of the test. In order to aid this understanding, a table describes the business processes in which each Role is implicated.

For clarity, the following are the Roles/Services not described here since they are not "voluntary":

- DIP
- ECS
- DSP
- CSS
- EES
- DTN
- Registration Services.

This document sits outside the main body of SIT documentation. Its purpose relates to the planning activities currently being undertaken by Programme Participants, for which they requested more clarity about the functionality needed in their systems and services to conduct SIT. This document aims to provide a summary of that functionality in order to aid voluntary Participants' planning. This document is being issued in standalone form to make the scoping information available as early as possible.

In early drafts, this document will not be complete (for example, the scope of SIT Operational testing will not be included). Subsequent versions will contain more information until the document is complete.

This draft has been produced following review by SITWG. Some participants raised comments which are being checked with the Design team and where these are outstanding, an indication has been given on the right-hand side of the text, for example as follows (the reference number of the query is Test-92 and the nature of the query can be seen from the spreadsheet of Comments where column L contains the query reference). In addition, this version reflects the risk-based approach to SIT which will be used. The previous version called for comprehensive coverage of paths through the systems, for example for SDS, that each consumption estimation method should be demonstrated. In developing the E2E SIT Functional scenarios, we have realised that this is not appropriate and have therefore changed the scope to call for a few paths rather than full coverage. However, in deciding exactly how much coverage is required, we will consult with industry participants to identify the areas of greater risk (pointing to more testing coverage).

Design Query
Test-092

4 Scope and Objectives

4.1 Objectives

The objectives of this document are to:

- Define the tests required of each Role in each SIT stage:

- SIT Component Integration
- SIT Functional
- SIT Non-Functional
- SIT Migration
- SIT Operational.

- Act as the primary point of reference for a Participant scoping their development with a view to participating in SIT.

4.2 Scope

The testing described in this document covers all SIT test stages. In its final version, it will constitute a full statement of the scope of SIT from the viewpoint of features that need to be demonstrated in each Participant's system. Central Systems and Registration Services have not been included in this document, since it is assumed that all functionality will be needed for testing in SIT.

The areas that remain to be included are as follows (and note that existing areas may be subject to change):

- Reports transmitted over the DIP.
- SIT Migration.
- SIT Operational.

The scope of the testing is the same as that described for MHHS Design in Figure 1 - MHHS E2E Design below.

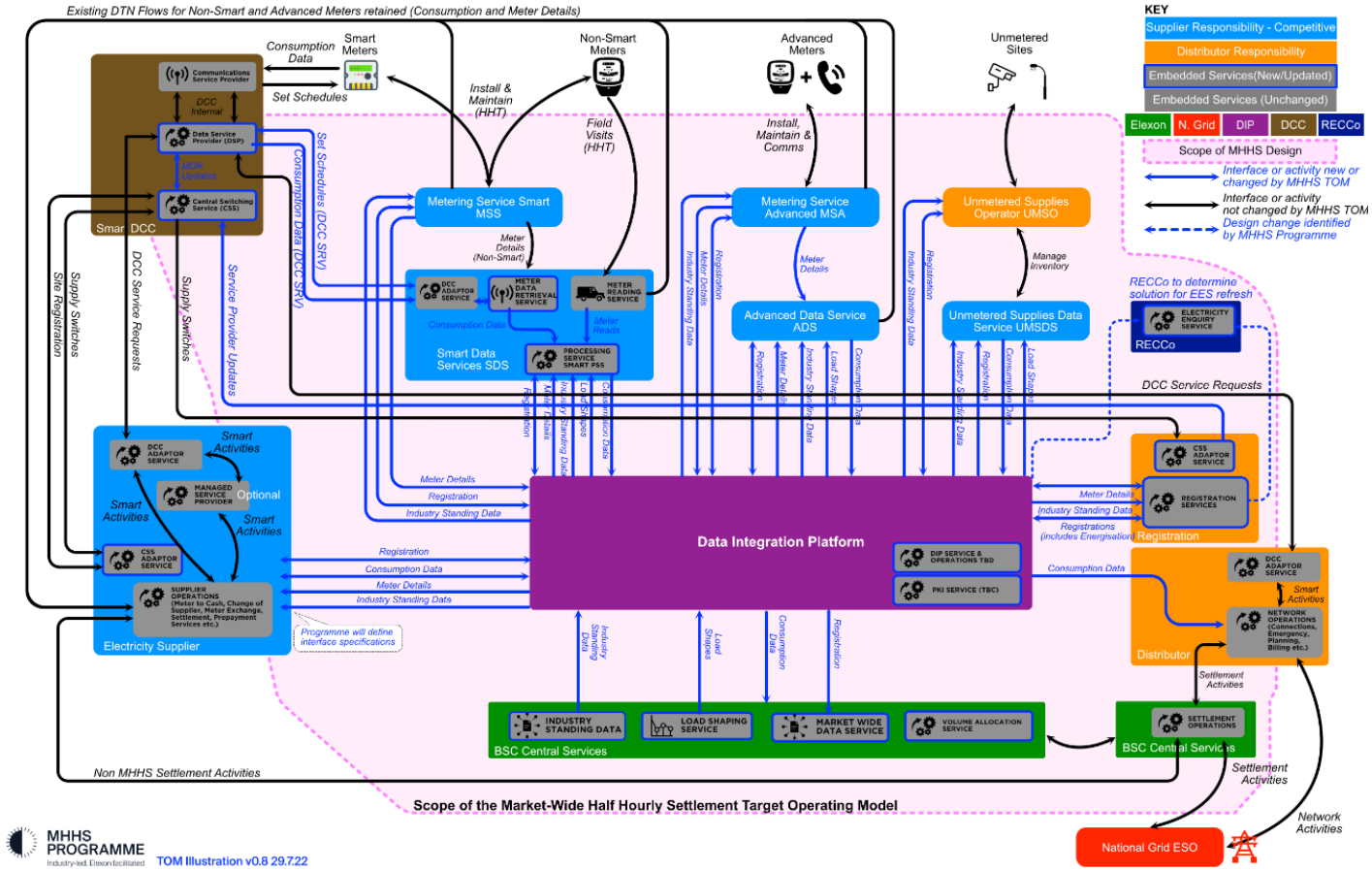

Figure 1 - MHHS E2E Design

In order to make this clear, the following example gives an indication of what is required for SIT (DBT1) and is not required (DBT2).

If it is assumed that a supplier has the following applications:

- Pricing application.
- Contract creation tool.
- [CRM] application that:
    - Loads the contract, manages the CoS, Agent, Billing, Customer, Supply Point, Meter etc.
    - Creates IF messages, CSS messages, Dataflows and receives the responses.
    - Manages the business workflows for the received and sent messages and files.
- Adaptor/Gateway that receives the messages from the CRM and sends out to the external party. Also receives messages into the supplier from the external party and forwards them to the [CRM] application.
- Reporting systems using data from the above applications.

SIT (and therefore DBT1) scope would be as follows:

- Using [CRM] application to create and send out an IF message to the adaptor/gateway which sends it onto the external party (DIP).
    - The [CRM] application would update with the result of the IF message being created and sent (be that a record update or workflow creation as an example).
- Receipt of IF Messages into the adaptor/gateway that forwards onto the [CRM] application.
- [CRM] application which updates the relevant customer/supply records/workflows on sending and receipt of IF messages ie the result of that process/scenario, such as tracking a CoS to completion.
- Additionally – where a test requirement includes it – use of the above to do the same for CSS Messages and Dataflows to run Gain/Loss/Service Provider scenarios etc.

Note that coverage of the [CRM] application's functionality which is outside of the test scenario, for example contact management, pricing and billing would **not be included in DBT1.**

Taking a slightly different example, Figure 2 - Illustration of triggering an IF and receiving a PUB, below shows how an IF-041 Smart/Advanced Readings message is triggered by an application in the Supplier's estate, in this case to record a customer's own reading. The triggering application need not be as far back as the web application where the customer enters their reading but an application which can reasonably be used to trigger the DIP Adaptor to send the relevant IF-041. This represents what is needed in order to trigger the sending of an IF. The right-hand side of the diagram shows how the LDSO Adaptor receives the message and since there is no further onward processing specified in the MHHS E2E Design within the LDSO, the "successful intake" of the PUB is verified by the DIP's receipt of a positive http response from the LDSO Adaptor. Note that in this example, should the LDSO wish to use this opportunity to test the effect of the message their systems beyond the Adapter, then they may do so. If defects arise from such testing, these can be raised as part of SIT.

Figure 2 - Illustration of triggering an IF and receiving a PUB

DBT2 scope would be all additional functionality required to operate under the new MHHS arrangements which is not already included in DBT1.

5 SIT Component Integration

The scope of SIT Component Integration is as follows:

1. For all voluntary Roles other than the DIP:
    i. **Verify ability to take on ISD** for each Participant within MHHS Architecture:
        a. Download ISD dataset relevant to the Service.
    ii. **Verify ability to send/receive IF/PUB** for each individual Participant within MHHS Architecture:
        a. Send each type of IF message (one example of each IF message type valid for the Participant's Role).
        b. Receive each type of PUB message (one example of each PUB message type valid for the Participant's Role).

2. For the DIP:
    i. **Verify DIP routing:**
        a. Route each type of IF message according to Always, Primary and Secondary. Send and receive each IF and PUB between all Participants, as progressively more components are added to the integrated environment. Note that the routing exercised will depend not only on the IF message but also on its Event Code and where appropriate on data within the message.

In (1-ii), the testing will be done by using mocked-up messages where necessary (eg for testing IF-021 going into LSS, the IF-021 will be generated by the LSS team and fed into the DIP from a test API configured for that purpose. By careful design of the tests, a single set of tests will cover both (1-ii) and (2-i). However, given the DIP routing depends on Event Codes coupled with data in the message body, of which there are many variations, additional tests may be necessary to fully prove the routing. In this case, the Participants will be required to send/receive additional messages once they have successfully completed (1-i) and (1-ii) to assist with other parties' testing.

Once a component has completed the testing described above, it is possible that bilateral testing with integrated components may take place if both parties agree to it. So following the previous example, as soon as a Data Service is integrated, then the Data Service can generate IF-021 messages to be sent to LSS. This is however not essential – the purpose of SIT CIT is fulfilled when the testing described in 1. and 2. above is complete.

6 SIT Functional

6.1 Introduction

The tests to be covered in SIT to verify the correct functioning of each Service (according to its Role) are described in the following sections. It should be noted that each participant will be required to support other participants' testing, so a participant should look at the tests for all Roles and be prepared to support those tests where involvement is needed to ensure the test can be run in an end-to-end manner.

Receipt of a PUB message is considered successful:

- If Level 3 validation is applicable, by evidence that this validation has passed.
- If Level 4 validation is applicable, by evidence that this validation has passed.
- If neither Level 3 nor Level 4 validation is applicable, that the receiving system has sent back to the DIP the correct http message.

Sending an IF is considered successful if it passes the DIP validation.

See Figure 2 - Illustration of triggering an IF and receiving a PUB for an example of sending an IF and receiving a PUB.

It should be noted that the tests described in this section are those which demonstrate correct functioning of the system for each Role. For information on the business processes in which a Role may be involved in facilitating the testing by sending or receiving messages (but is not subject to test itself), see section 6.8 - Business Processes where a Role Participates in Testing.

It is important to note that this Stage is conducting **end-to-end testing** and is not simply testing the IF and PUB interfaces. However, it is not intended to replicate all the detailed testing of PIT. A risk-based approach of selecting various paths through the design will be taken as opposed to looking for full coverage.

It is intended that SIT Functional will include some testing with smart meters in the DCC test lab but that the majority of testing will be using consumption data generated for the test purposes (likely using the Consumption Data Generator).

Note that D-flows which are a necessary part of the business process in scenarios described here but are not themselves subject to test will be described in the E2E test scenarios/test cases developed for SIT but are not described in this document.

6.2 Supplier

This section describes the testing scope for a Supplier role. Note that any functions undertaken by a Supplier which acts as its own MDR are covered in the Smart Data Services section.

The testing is broken down into Meter-to-Bank, MPAN Ownership and Metering Changes, in line with the MHHS E2E Design. The scope is broadly as follows:

- Meter-to-Bank:
  - Industry Standing Data changes.
  - Receipt of Load Shapes and reports.
  - Sending and receipt of consumption-related messages, such as a consumption amendment (these are messages to/from the Supplier Role, not the MDR/Data Service Role).
- MPAN Ownership:
  - Change of Supplier, Data Service and Metering Service.
  - Registration data updates, some of which the Supplier receives and others that are sent by the Supplier.
- Metering Changes:
  - Disconnection.
  - Change of Energisation.
  - Change of Meter.
  - Change of Market Segment/Connection Type.

In addition, any changed/removed D-flows are to be tested.

6.2.1 D-flows

The following are the tests expected for D-flows:

- **Accept all amended D-flows** – For each D-flow that still exists and has changed, verify that the Service accepts the new version of the message.
- **No longer accept removed D-flows** – For a sample of D-flows that have been removed as a result of MHHS, verify that the Service no longer accepts the message.

6.2.2 Meter-to-Bank

- **Industry Standing Data (BP021)**
  - **New Service Provider** – Verify Supplier's ability to use updates to ISD with respect to newly-created Service Providers: issue a new ISD with a new DS and MS, then Supplier demonstrates successful change of DS and MS to the new SPs. Updates to ISD are first notified by IF-047 then downloaded from the URI contained in the message.

Design Query **Test-101**

- **Interaction with MDS & LSS (non-consumption) (BP018, 019)**
  - **Load shapes** – Verify that Supplier successfully intakes IF-022 and IF-023.
  - **Reports** – Verify that Supplier successfully intakes the relevant reports.
- **Consumption (BP004, 005, 016)**
  - **Advisory Notification** - Verify that Supplier successfully sends IF-024 demonstrating at least one boundary condition for field value and combination of fields.
  - **Traditional, Smart (no comms)** – Verify that Supplier successfully sends IF-041 demonstrating at least one boundary condition for field value and combination of fields.
  - **Smart** – Verify that Supplier successfully intakes IF-021 demonstrating at least one boundary condition for field value and combination of fields.
  - **Unmetered** – Verify that Supplier successfully intakes IF-021 demonstrating at least one boundary condition for field value and combination of fields.
  - **Meter Reads – Smart** - Verify that Supplier successfully intakes IF-041 demonstrating at least one boundary condition for field value and combination of fields.
  - **Meter Reads – Advanced** - Verify that Supplier successfully intakes IF-041 demonstrating at least one boundary condition for field value and combination of fields.
  - **Annual Consumption** - Verify that Supplier successfully intakes IF-040 demonstrating at least one boundary condition for field value and combination of fields.
  - **Consumption Amendment** - Verify that Supplier successfully sends IF-027 demonstrating at least one boundary condition for field value and combination of fields and successfully intakes IF-028

response. Verify that Supplier successfully intakes related IF-021 and subsequently IF-014 in case of a rejection by MDS.

6.2.3 MPAN Ownership

- **Change of Supplier, Data Service & Metering Service (BP001, 002, 003, 003A, 003B, 003C)**
  - **Change to Supplier, DS and MS** – Verify the changes take effect correctly as described in each case below; each to be conducted with a small number of combinations of (1) smart/smart+no comms/traditional/traditional+customer-own reads/advanced/advanced+no comms/unmetered, (2) single MPAN/MPAN with linked Export/MPAN with Related MPANs, (3) forward-dated/retro-dated/same day. "No change of MS/DS" below means that the original MS or DS is re-appointed by the incoming Supplier.
    - **change of Supplier, no change of DS or MS** - Generate and send consumption data for before and after the CoS and verify that Initial Settlement run before and after the CoS settles correctly across the outgoing and incoming Supplier, using the correct MTD
    - **change of Supplier and DS, no change of MS** - Verify that new DS can access the consumption data following the change; generate and send consumption data for before and after the CoS and verify that Initial Settlement run before and after the CoS settles correctly across the outgoing and incoming Supplier
    - **change of Supplier and MS, no change of DS** - Verify that MTDs have been exchanged and that the consumption estimation is correct; include test where MS is customer-contracted
    - **change of Supplier, DS and MS** - Generate and send consumption data for before and after the CoS and verify that Initial Settlement run before and after the CoS settles correctly across the outgoing and incoming Supplier; verify that new DS can access the consumption data following the change; verify that MTDs have been exchanged and that the consumption estimation is correct
    - **change of MS, no change of Supplier or DS** – Including where change is Supplier-initiated and where Service-initiated; verify that MTDs have been exchanged and that the consumption estimation is correct
    - **change of MS and DS, no change of Supplier** - Verify that MTDs have been exchanged and that the consumption estimation is correct
    - **change of DS, no change of Supplier or MS** - Including where change is Supplier-initiated and where Service-initiated; verify that new DS can access the consumption data following the change; generate and send consumption data for before and after the CoS and verify that Initial Settlement run before and after the CoS settles correctly across the outgoing and incoming Supplier
- **Registration (BP010)**
  - **GSP Group ID/MPL Address** – Verify that Supplier successfully intakes update of MPL Address. Verify that Supplier correctly intakes update of GSP Group ID and applies the update in sending out one of IF-024, 025, 027, 031, 041 following the change.
  - **Consent Granularity** – Verify that Supplier successfully sends change to Consent Granularity (IF-025), demonstrating at least one boundary condition for field values and successfully intakes the response (PUB-026).
  - **DUoS Tariff ID** - Verify that Supplier correctly intakes PUB-018 for a change of DUoS Tariff ID.
  - **Related MPAN** - Verify that Supplier correctly intakes PUB-020 for a change of Related MPAN.
  - **Energy Direction** - Verify that Supplier correctly intakes PUB-018 for a change of Energy Direction.
  - **Metered/Unmetered Indicator** - Verify that Supplier correctly intakes PUB-018 for a change of Metered/Unmetered Indicator.
  - **IHD** – Verify that Supplier successfully sends change to IHD (IF-025) demonstrating at least one boundary condition for field values and successfully intakes the response (PUB-026).
  - **SMSO** – Verify that Supplier successfully sends change to SMSO (IF-025) demonstrating at least one boundary condition for field values and successfully intakes the response (PUB-026).
  - **Import/Export Linkage** – Verify that Supplier successfully sends change to Import/Export Linkage (IF-019) demonstrating at least one boundary condition for field values and successfully intakes the response (PUB-020).

- **Legacy Data Items** – Verify that Supplier successfully sends change to Legacy Data Items (IF-025) demonstrating at least one boundary condition for field values and successfully intakes the response (PUB-026).
- **DCC Enrolment** - Verify that Supplier correctly intakes PUB-018 for a change of DCC Enrolment.

6.2.4 Metering Changes

- **Disconnection, Change of Energisation, Change of Meter (BP007, 008, 009)**
  - **Disconnection** – Verify that for a disconnection, Supplier successfully intakes IF-037 and IF-009 (twice – once on disconnection and once on de-registration).
  - **Failed change of energisation status** – Verify that for a change of energisation status which fails, Supplier successfully intakes IF-007.
  - **Successful change of energisation status** – Verify that for a successful change of energisation status, Supplier successfully intakes IF-008 (and for non-UMS also an IF-041).
  - **Change of Meter** – Verify that for a change of meter, Supplier successfully intakes IF-006.

Design Query **Test-122**

6.3 Network Operations Service

MHHS changes to Network Operations Services are that certain D-flows have been amended or replaced by DIP messaging and that DUoS Tariff ID must be populated and maintained. The scope of testing will therefore be:

- **Accept all amended D-flows** – For each D-flow that still exists and has changed, verify that the Service accepts the new version of the message.
- **No longer accept removed D-flows** – For a sample of D-flows that have been removed as a result of MHHS, verify that the Service no longer accepts the message.
- **Accept all valid PUB with varying data combinations** - For each PUB the Service can receive, verify that the Service accepts a message with each Event Code, with repeating blocks or with any other complex data appropriate to the PUB (receiving PUB-001, 006, 008, 009, 013, 014, 018, 021, 022, 023, 026, 036, 037, 040, 043, 044).
- **Maintain DUoS Tariff ID and other data items**
  - When a change occurs in Energy Direction, Domestic Premise Indicator or Connection Type (or any combination of these items), verify that DUoS Tariff ID is correctly updated and sent to Registration Service by verifying PUB-018 sent out by Registration Service.
  - Carry out changes to the other registration data items mastered by Network Operations Service and verify their update in the same way using PUB-018.

6.4 Data Service

The Data Service is new for MHHS therefore D-flows are to be tested in addition to interactions with the DIP.

6.4.1 Smart Data Service (SDS)

For the SDS, testing broadly covers verification of correct handling of: D-flows, SRs, different forms in which Consumption Data and Register Reads can be presented (depending on the characteristics associated with the meter), Import and Export meters, validation failures, estimation, changes to estimation at different points in the settlement timetable and MTDs (for Non-Smart meters).

Design Query **Test-100**

Where a Supplier is acting as its own MDR, then relevant parts of this section will need to be demonstrated by the Supplier.

- **Industry Standing Data (BP021)**
  - **New Service Provider** – Verify SDS's ability to use updates to ISD with respect to newly-created data <test tba>. Updates to ISD are first notified by IF-047 then downloaded from the URI contained in the message.

- **D-flows** –Generate each D-flow relevant to the Service and verify it is accepted by DTN; accept each relevant D-flow from the DTN.
- **IF/PUB messages** – Send and accept all valid IF/PUB messages demonstrating all relevant Event Codes, with 4 sets of boundary conditions for field values (sending IF-021, 028, 034, 038, 041 and receiving PUB-006, 008, 013, 014, 018, 020, 022, 023, 024, 026, 027, 033, 035, 036, 037, 039, 040, 041, 043, 047).
- **Change of Supplier, Data Service & Metering Service (BP001, 002, 003)** – as described in section 6.2.3 - MPAN Ownership, for the cases relevant to this Service.
- **Different meter characteristics** – For meters with each of the following characteristics, some for import and some for export meters a few combinations of (1) Smart with Consent Granularity HH (consumption derived from SR4.8.1/4.8.3); (2) Smart with Consent Granularity not HH (consumption derived from SR4.6.1/4.6.2); (3) Smart but not communicating (no readings); (4) Non-Smart:
    - **Failures** – Receive consumption data and register reads which fail validation in at least one possible way and verify their rejection.
    - **No estimates** – Generate Settlement Period data which is not based on estimates and verify correctness.
    - **Estimates** - Generate estimates using applicable estimation method and verify their correctness (at least two different methods).
    - **Changes to consumption** – make changes (1) before II; (2) after II and verify correctness of MDS output:
        - **Fill gaps** – Fill gaps in consumption data/submit more recent register read.
        - **Override** – Amend using IF-041 (override).
        - **Amendment** – Amend using IF-027 followed by IF-021, where the IF-027 is for each relevant Measurement Quantity ID and each Supplier Consumption Amendment Reason Code.
        - **Notification** – Receive IF-024 for each valid EventCode.
- **Smart with Consent Granularity HH**:
    - **Import meter** - Generate estimates for meter with single element and for twin element and verify correctness.
    - **Export meter** - Generate estimates for meter with Active Power and verify correctness.
    - **Number of register digits** - Generate estimates for meter with 5 digits and for one with 6 digits and verify correctness.
- **Smart with Consent Granularity not HH**:
    - **Number of register digits** - Generate estimates for meter with 5 digits and for one with 6 digits and verify correctness.
- **Non-Smart** – Generate estimates for multi-rate meter with single element and for twin element and verify correctness.
- **Different Load Shape characteristics**

6.4.2 Advanced Data Service (ADS)

For the ADS, testing broadly covers different IF messages sent and received, Import and Export, validation failures, estimation.

Design Query **Test-096**

- **Industry Standing Data (BP021)**
    - **New Service Provider** – Verify the Service's ability to use updates to ISD with respect to newly-created Service Providers: <test tba>. Updates to ISD are first notified by IF-047 then downloaded from the URI contained in the message.

- **D-flows** –Generate each D-flow relevant to the Service and verify it is accepted by DTN; accept each relevant D-flow from the DTN.
- **IF/PUB messages** – Send and accept all valid IF/PUB messages demonstrating all relevant Event Codes, with at least 4 boundary conditions for field values (sending IF-015, 021, 028, 034, 038, 041 and receiving PUB-006, 008, 013, 014, 016, 018, 020, 022, 023, 024, 026, 027, 033, 035, 036, 037, 039, 040, 041, 043, 047).
- **Change of Supplier, Data Service & Metering Service (BP001, 002, 003)** – as described in section 6.2.3 - MPAN Ownership, for the cases relevant to this Service.
- **Meter Advance Reconciliation Check**
- **Differing data availability** – For both import and export, Active and Reactive power:
    - **Failures** – Receive consumption data and register reads which fail validation in at least one way and verify their rejection.
    - **No estimates** – Generate Settlement Period data which is not based on estimates and verify correctness.
    - **Estimates** - Generate estimates using applicable estimation method and verify their correctness (a few different methods):
        - **Consent Granularity HH** – Where Consent Granularity is HH.
        - **Consent Granularity not HH** – Where Consent Granularity is not HH.
    - **Changes to consumption** – Make changes (1) before II; (2) between II and SF and verify correctness of MDS output:
        - **Fill gaps** – Fill gaps in consumption data/submit more recent register read.
        - **Override** – Amend using IF-041 (override).
        - **Amendment** – Amend using IF-027 followed by IF-021, where the IF-027 is for each relevant Measurement Quantity ID and each Supplier Consumption Amendment Reason Code.
        - **Notification** – Receive IF-024 for each valid EventCode.
    - **Deeming Reads** – Verify correctness of deemed reads on CoS for both incoming and outgoing ADS.
    - **Back-Stop Readings** – Verify correctness of back-stop readings.

6.4.3 Unmetered Supply Data Service (UMSDS)

For the UMSDS, testing broadly covers different IF messages sent and received, validation failures, estimation.

Design Query
Test-092, 097

- **Industry Standing Data (BP021)**
    - **New Service Provider** – Verify the Service's ability to use updates to ISD with respect to newly-created Service Providers: <test tba>. Updates to ISD are first notified by IF-047 then downloaded from the URI contained in the message.
- **D-flows** –Generate each D-flow relevant to the Service and verify it is accepted by DTN; accept each relevant D-flow from the DTN if relevant.
- **IF/PUB messages** – Send and accept all valid IF/PUB messages demonstrating all relevant Event Codes, at least 4 boundary conditions for field values (sending IF-021, 034, 038, 040 and receiving PUB-008, 013, 014, 018, 020, 022, 023, 024, 026, 033, 035, 036, 037, 039, 047).

- **Change of Supplier, Data Service & Metering Service (BP001, 002, 003)** – as described in section 6.2.3 - MPAN Ownership, for the cases relevant to this Service.
- **Differing data availability** – For both import and export:
    - **Failures** - Receive D0388 which fails validation and verify the rejection.
    - **No estimates** – Generate Settlement Period data which is not based on estimates and verify correctness.
    - **Estimates** - Generate estimates using at least 2 estimation methods and verify their correctness; load shape data available for a year or more and less than a year.
    - **Changes to consumption** – make changes (1) before II; (2) after II and verify correctness of MDS output:
        - **Fill gaps** – Fill gaps/submit more recent data.
        - **Amendment** – Amend using IF-027, where the IF-027 is for each relevant Measurement Quantity ID and each Supplier Consumption Amendment Reason Code.
        - **Notification** – Receive IF-024 for each valid EventCode.

Design Query **Test-102,**

6.5 Metering Service Smart (MSS)

For the MSS, testing broadly covers different IF messages sent and received, Import and Export, validation failures.

- **Industry Standing Data (BP021)**
    - **New Service Provider** – Verify the Service's ability to use updates to ISD with respect to newly-created Service Providers: <test tba>. Updates to ISD are first notified by IF-047 then downloaded from the URI contained in the message.
- **D-flows** –Generate each D-flow relevant to the Service and verify it is accepted by DTN; accept each relevant D-flow from the DTN if relevant.
- **IF/PUB messages** – Send and accept all valid IF/PUB messages demonstrating all relevant Event Codes, at least 4 boundary conditions for field values (sending IF-005, 007, 020, 038, 041 and receiving PUB-006, 008, 018, 026, 035, 036, 037, 039, 043, 047 and responding to a PUB-033 with a IF-034).
- **Change of Supplier, Data Service & Metering Service (BP001, 002, 003)** – as described in section 6.2.3 - MPAN Ownership, for the cases relevant to this Service.

6.6 Metering Service Advanced (MSA)

The scope is the same as for 6.5 - Metering Service Smart (MSS) but applied to Advanced segment.

6.7 UMSO

For the UMSO, testing broadly covers different IF messages sent and received, validation failures.

- **Industry Standing Data (BP021)**
    - **New Service Provider** – Verify the Service's ability to use updates to ISD with respect to newly-created Service Providers: <test tba>. Updates to ISD are first notified by IF-047 then downloaded from the URI contained in the message.
- **D-flows** –Generate each D-flow relevant to the Service and verify it is accepted by DTN; accept each relevant D-flow from the DTN.

- **IF/PUB messages** – Accept all valid PUB messages demonstrating all relevant Event Codes, at least 2 boundary conditions for field values (sending IF-007, 034, 038 and receiving PUB-008, 018, 020, 026, 033, 035, 036, 037, 039, 047).

Design Query
Test-092, 094,

- **MPAN creation (BP001)** –Verify that UMSO receives message about creation of MPAN (IF-037), it sends out correct D-0388.
- **Disconnection (BP007)** – Intake notification of dis-connection (PUB-037).

6.8 Business Processes where a Role Participates in Testing

The following table gives a representation of the business processes as found in the MHHS E2E Design. Note that some processes have been split into more than one row, where this is helpful to represent differences in the processing (for example differences between Smart and Advanced segments).

Design Query
Test-098, 099, 100

Reference	Business Process Title	Supplier	Data Service	Metering Service	UMSO	Network Ops
BP001	Change of Supplier	Y				
BP001	Change of Supplier (UMS MPAN Creation)	Y			Y	Y
BP002	Change of Service - Metering Service	Y	Y	Y		Y
BP002	Change of Service - Metering Service (Customer-Contracted)	Y		Y		
BP003	Change of Service - Data Service	Y	Y	Y		Y
BP003A	CSS and DCC Update		Y	Y		
BP003B	Change of Existing Service Appointment Details (Supplier-Initiated)	Y	Y	Y		
BP003B	Change of Existing Service Appointment Details (Service-Initiated)	Y	Y	Y		
BP003C	Transfer of Reads - Change of Data Service (Smart)	Y	Y			
BP003C	Transfer of Reads - Change of Data Service (Customer-Own Reads)	Y	Y			
BP003C	Transfer of Reads - Change of Data Service (Traditional)	Y	Y			
BP003C	Transfer of Reads - Change of Data Service (Advanced)	Y	Y			
BP004	Data Collection (Smart)	Y	Y			
BP004	Data Collection (Advanced)	Y	Y	Y		
BP004	Data Collection (Unmetered)		Y		Y	
BP005	Data Processing (Smart Consumption)	Y	Y			Y
BP005	Data Processing (Smart Readings)	Y	Y			Y
BP005	Data Processing (Traditional)	Y	Y			Y
BP005	Data Processing (Unmetered)	Y	Y			Y
BP005	Data Processing (Annual Consumption)	Y	Y			Y
BP007	Disconnection (Supplier-Initiated)	Y	Y	Y		Y
BP007	Disconnection (Network Ops-Initiated)	Y	Y	Y	Y	Y
BP007	Disconnection (Customer-Initiated)	Y	Y	Y	Y	Y
BP008	Change of Energisation Status	Y	Y	Y		Y
BP008	Change of Energisation Status (Unmetered)	Y	Y	Y	Y	Y
BP009	Change of Meter	Y	Y	Y		Y
BP009	Change of Meter (MAP)			Y		
BP010A	Change of Registration Data (MPL, GSP)	Y	Y	Y		Y
BP010A	Change of Registration Data (Consent)	Y	Y			
BP010A	Change of Registration Data (Dom Prem)	Y	Y	Y		Y
BP010B	Change of Registration Data (DUoS Tariff)	Y				Y
BP010B	Change of Registration Data (Rel MPANs)	Y	Y	Y		Y
BP010B	Change of Registration Data (En Dir)	Y	Y	Y		Y
BP010B	Change of Registration Data (Unmetered)	Y	Y	Y		Y
BP010C	Change of Registration Data (IHD)	Y				
BP010C	Change of Registration Data (SMSO)	Y	Y	Y		
BP010C	Change of Registration Data (Import Export)	Y	Y	Y		Y
BP010D	Change of Registration Data (Legacy Data)	Y	Y	Y		Y
BP010D	Change of Registration Data (DCC Enrol)	Y	Y			
BP011A	Change of Market Segment and/or Connection Type	Y	Y	Y		Y
BP011B	Change of Market Segment and/or Connection Type - Connection Type					
BP011B	Change of Market Segment and/or Connection Type - Market Segment Re-Evaluation			Y		Y
BP011C	Change of Market Segment and/or Connection Type - Registration Service Monitoring (linked MPANs)	Y	Y	Y		Y
BP011C	Change of Market Segment and/or Connection Type - Registration Service Notification	Y	Y	Y		
BP013	Demand Disconnection Event					Y
BP016	Consumption Amendment (Override)	Y	Y			Y
BP016	Consumption Amendment	Y	Y			Y
BP018	Load Shaping Service (ECS)	Y	Y			Y
BP019	Market-Wide Data Service (ECS)	Y				Y
BP020	Volume Allocation Service (ECS)					
BP021	Industry Standing Data (ECS)	Y	Y	Y	Y	Y

Table 1 - Business Process to Role Mapping

7 SIT Non-Functional

All MHHS Non-Functional Requirements (NFRs) will be verified by one or both of:

- **Design assurance** – assurance of the participant's design by the SI Design team.
- **Testing** – PIT testing conducted by the participant and assured by the SI Test team and/or SIT testing conducted by the participant under the guidance of the SI or directly by the SI.

Some (but not all) non-functional characteristics of MHHS will be tested in SIT. Those tested in SIT can be broadly grouped as tests relating to:

- **DIP interface** – How the interface to the DIP functions, such as how duplicate messages are to be handled.
- **Transaction volumes** – The volume of transactions be supported by certain components of the eco-system when acting together.

For the DIP interface tests, one test requires a specific test to be undertaken where the connection with the DIP is broken and the resulting behaviour verified (requirement E2E0105). The others do not require specific tests to be run but can be verified by inspecting the results of other SIT tests (functional tests). These include a test such as each sender including a Sender Unique Reference (SUR) in a message.

The current proposal (to be developed with NFTWG) is that transaction volume tests in SIT will be conducted by the DIP acting in concert with the Elexon Central Systems, with a suitable performance-testing tool (such as JMeter) driving the transactions through the DIP in the requisite number. Other Roles will not be involved in SIT. All other volume testing will be conducted in PIT (with the exception of the SIT Migration volume testing – see section 8 - SIT Migration below.

For details of the requirements relevant to SIT, see the embedded spreadsheet

<tba>

Figure 3 - NFRs Design/Test Assurance

8 SIT Migration

To be added in a later version when the Migration Design has been completed. This testing will include volume testing of the migration process.

9 SIT Operational

To be added in a later version when the Operational Design has been completed.