Market Wide Half Hourly Settlement SEC Release Testing Approach Document

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Author:	**DCC**
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Document Control

Revision Date	Summary of Changes	Changes Marked	Version Number
06/04/2023	Initial Draft	n/a	0.1
12/04/2023	Internal Review	n/a	0.2
14/04/2023	Issued to TAG for Review (TAG101 meeting 26/04/2023) and Industry Consultation		1.0
	Updated based on Consultation feedback		1.1
	Updated based on feedback from TAG101		1.2
	Final TAG approved version		2.0

References

Table 1 – References

Ref	Title	Source	Date	Version
1	Glossary of Testing Terms	ISTQB	Mar 2016	3.1

Where this document references sections of the Smart Energy Code (SEC), those references shall be construed by reference to any intended future variations to those Sections (and the SEC Subsidiary Documents associated with those Sections) which are due to take effect at the June 2024 SEC Release Go Live.

Glossary

Table 2 defines only terms that are specifically not outlined in the SEC.

Table 2 - Glossary

Term	Meaning
DCC Meter Protocol Emulators	Testing Stubs developed by DCC to emulate the functional aspects of smart metering Devices
Go Live	Deployment date of a change in production
Modified DCC Total System	Means the DCC Total System as modified in order to meet (or to be designed to meet) the DCC's obligations under the Code at the MHHS SEC Release Go Live.

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1 Introduction

1.1 General

This is the Testing Approach Document to cover the changes being delivered in the Market Wide Half Hourly (MHHS) SEC Release. This release is a component of the overall Elexon-led MHHS Programme which includes a parallel and related Retail Energy Code (REC) release.

The SEC changes in scope will enable the introduction of the new User Role of Meter Data Retrieval Agent (MDRA). MDRAs will use a limited set of existing non-critical read only SRVs and alerts to retrieve half hourly meter readings. Enabling this will require changes to the DSP to accommodate the new User Role. The DSP will also employ a new data flow from the Central Switching Service (CSS) to maintain and store MDRA appointment data. Complementary enabling changes will also be made to the S1SPs for SMETS1. Finally a new version of Parse and Correlate will be introduced which will allow for the new MDRA role.

Whilst implementation of the SEC changes will be given effect through the June 2024 SEC Release (when these changes will be enabled), they need to be integrated and tested with the changes being made under other industry codes. To enable this, the MHHS SEC Release will be delivered significantly in advance of other elements of the June 2024 SEC Release, with MHHS SIT Testing being conducted overlapping with SIT for the November 2023 SEC Release.

The MHHS SEC Release comprises one Modification (MP162) as outlined in the Scope section of this document. A separate Test Approach Document will be prepared to cover the remainder of the June 2024 changes, and these will be taken through the same process in due course.

This document sets out the information required of a SEC Release Testing Approach Document, Section D10.18 - D10.20 of the SEC, including the manner in which testing will be conducted by DCC for the MHHS SEC Release.

1.2 Approval of this Document

Sections 1.2 and 1.3 of this document confirm the SEC Panel as the authorising authority for this document and any subsequent material changes to it. Should delegated authority be given to the Panel's Test Assurance Group (TAG), these sections shall be interpreted as referring to TAG.

- This document shall be produced by DCC, and a draft provided to the Panel's TAG for their review (TAG 101 on 26 April 2023)
- In parallel the draft document shall also be issued to SEC Parties for consultation. SEC Parties will have until 5 May 2023 to review and provide feedback via the DCC website. The link to this will also be provided on the SECAS website; DCC shall consider the feedback from these consultations and, where appropriate, will revise the draft document
- The revised draft shall be presented to the Panel's TAG (TAG102 on 31 May 2023) for recommendation to the SEC Panel for an approval decision
- The SEC Panel shall consider the views of the TAG and shall:

Either	Approve the Testing Approach Document
Or	Reject the Testing Approach Document and specify to the DCC the areas requiring further work

1.3 Revision of this Document

Following approval of this document it:

- Shall be revised by DCC in accordance with any direction to do so made by the SEC Panel
- May be revised by DCC following consultation with the Panel's TAG, and the Panel, provided that:
  - Prior to making any such revision, DCC must present to the SEC Panel a summary of the views of the Panel's TAG and an explanation of how the DCC has taken them into account
  - The document may not be revised to the extent that the SEC Panel directs otherwise
- It may be revised by DCC without consultation where the revision is of a minor typographical nature, or where the revision does not have any material effect on the rights or obligations of SEC Parties or any other person who is entitled to undertake testing in accordance with this document

2 Scope

The MHHS SEC Release will modify the DCC Total System to accommodate the changes defined in Table 3.

Table 3 Testing Scope for MHHS SEC Release

CR #		SEC Modification #	PIT & SIT	Description
4813		MP162	Yes	SEC changes required to deliver MHHS

Changes forecast for this Approach Document

At the time of producing this Testing Approach Document v1.0 no changes are forecast.

2.1 Documents for MHHS SEC Release

Table 4 lists the links to the SEC modification documents that were used to create this Testing Approach Document for the MHHS SEC Release.

Table 4 Referenced Documents for MHHS SEC Release

SEC Modification Link	Number
https://smartenergycodecompany.co.uk/modifications/sec-changes-required-to-deliver-mhhs/	MP162

SEC Subsidiary Documents	SEC Appendix
DCC User Interface Specification (Draft)*	Appendix AD
Message Mapping Catalogue (Draft)*	Appendix AF
Definitions and Interpretations	Section A

* See section 3.2 for further information regarding the status of these documents.

Out of Scope

Modification MP162 contains one Change Request (CR):

- CR4813 (Marketwide Half Hourly Settlement, MDR User Functionality)

This Test Approach Document (TAD) therefore addresses CR4813 only. A complementary CR, which also concerns MHHS, CR4879 (Capacity Uplift Associated with Market Wide Half Hourly Settlement (MHHS)), will be included as part of the overall June 24 SEC Release, and will therefore be covered under a separate and later TAD.

Functionality relating to Opt-In / Opt-Out of profile reads is excluded from this release.

The following assurance activities are outside the scope of the testing approach for the MHHS SEC Release:

i. Testing of firmware for Meters and Other Devices such as Comms Hubs, PPMID & HCALCS (individual manufacturers are responsible for this activity)

ii. DCC is not responsible for proving Devices are compliant with SMETS1 and SMETS2 requirements

iii. Testing of the Home Area Network (HAN) except for:

   a. Its interaction with the Modified DCC System;

   b. Where the HAN is tested as part of System Integration Testing and User Integration Testing

iv. Testing the inter-changeability of Devices connected to the Home Area Network

2.2 Release in Context of Overall MHHS Programme and REC

Whilst the MHHS SEC Release will be run in accordance with established processes in full compliance with the requirements of the SEC, it is a component part of a broader overall industry programme to introduce Market Wide Half-Hourly Settlement as a whole (the ELEXON MHHS Programme). This drives both the form of the release and use of environments. Key aspects of this are as follows.

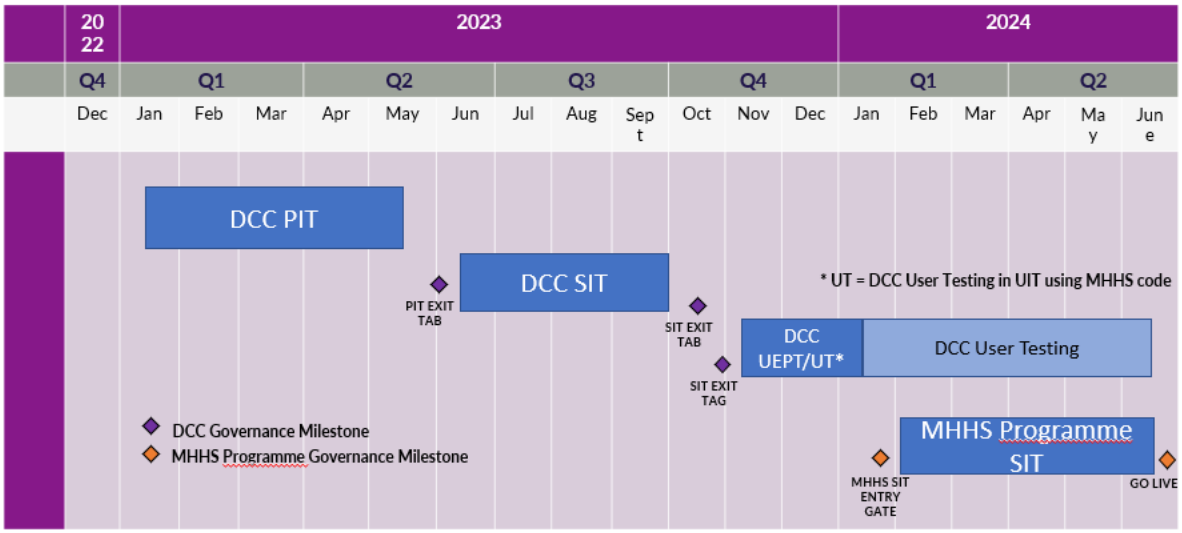
There is an overall MHHS Programme requirement to facilitate MDRA Users being available to participate in MHHS Programme SIT (currently scheduled for early February 2024). This means that before that date:

- The Modified DCC Total System compliant with the requirements of MHHS must be in place;
- A minimum of 1 MDRA User (currently an assumption on the overall MHHS Programme) has completed the UEPT test phase using their modified system, as well as completing other entry pre-requisites such as SEC Accession, DCC Gateway and SMKI set up and SREPT testing;
- Sufficient time must be allowed for the MDRA User(s) to complete these activities, in particular UEPT (other activities need to be undertaken ahead of UEPT and are not dependent on system availability)

The net result of these factors is that the overall timeline for the release is extended, creating a number of challenges:

- It must start development (and therefore testing) earlier to facilitate the MHHS Programme's timelines;
- It must run in parallel with other releases, most notably the November 2023 release, which goes live earlier than this release, that in turn presents special challenges for test execution (covered further under section 2.3);
- It must still complete to allow Go Live in June 2024.

The diagram below illustrates these activities and illustrates the flow of activity into the ELEXON MHHS Programme, as well as key governance milestones.



A further factor to note with regard to MHHS Programme context is that in parallel with the required changes under the SEC there is a parallel and related REC Modification (R44) which interacts with this Release. The area of inter dependency is that the existing Central Switching Service Interface to DSP will be extended as is described in section 5.1. The needs of this REC Modification are further outlined within this document to provide further context.

2.3 Release in Context of November 2023 SEC Release

Due to the earlier than usual commencement of SIT for this release, it is likely that SIT for the MHHS SEC Release will overlap with that of the November 23 SEC Release. Analysis has shown that (using the Feature Switch) MHHS functional code could be left 'on' in SIT-B and would not adversely impact the November 23 SIT-B testing. However it is important that the November 23 SEC Release recognises that when testing in SIT-B the release needs to be tested with MHHS code both 'on' and 'off' for for the release to ensure nothing has been introduced that might cause a failure. The November 23 Release will need to test the functionality in SIT with the feature switch turned 'off' to align with the codebase that is applicable for PROD uplift at November 23 Release Go Live.

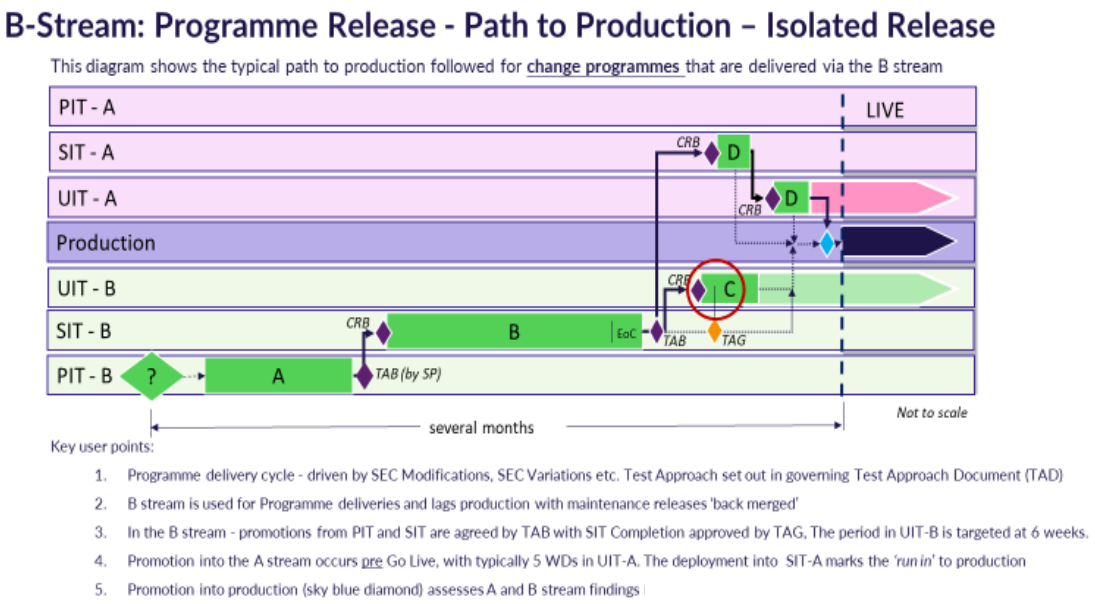
3 Governance Approach

3.1 Overall Governance

The MHHS SEC Release will follow the governance of a SEC Release outlined in Section D of the SEC.

The MHHS SEC Release will follow a standard Release Management approach through the B stream environments, except that the period on UIT-B will be much longer than the standard 6 weeks period.

The diagram below summarises this standard approach.



The following governance will apply:

- Pre-Integration Testing (PIT) will follow the standard DCC governance approach of:
    - A PIT Exit TAB which would confirm PIT Completion for the DSP, S1SPs and the Parse & Correlate deliveries, to support code promotion into SIT-B
    - At present all deliveries out of PIT (code change / configuration change) are planned to be taken into SIT-B as a group. All PIT deliveries and TABs are due to be completed prior to SIT execution commencement.
- Emulator assurance will not be required. There is no GBCS uplift applicable for MHHS. The intention is to re-use the emulators used across November 2022 SEC Release and GBCS 4.1 Programmes. A.2.0.5 emulator has been assured and approved at PIT TAB (27 January 2022). The circumstances under which emulators will be used are described under section 5.3.
- SIT will be executed in the SIT-B Environment and will follow the standard governance approach of:
    - DCC's Test Assurance Board (TAB) agreeing SIT completion, to support code promotion into UIT-B
    - TAG subsequently approving SIT completion
- Upon completion of SIT the Release will be promoted to the UIT environment. Following UIT Proving/Pre-UTS testing:
    - User Entry Process Testing (UEPT) for the new MDRA role will be undertaken for any incoming MDRAs
    - Users with Devices deployed in Production will be invited to undertake testing of against the Modified DCC Solution
- Route to Live will follow the standard Release Management approach, which would see code moved from SIT-A into UIT-A prior to go live and account taken of any findings from User Testing in the UIT environments.

- Note that the MHHS SEC Release goes into PROD at the same time as the remainder of the June 24 SEC Release.

3.2 SEC Subsidiary Documents

To support the implementation of the MHHS SEC Release, updates are required to the following key SEC Subsidiary documents that impact DCC System Design, Build and Test (DBT) activities. These are expected to be formally designated as part of the June 2024 SEC Release.

- SEC Appendix AD - DCC User Interface Specification
- SEC Appendix AF - Message Mapping Catalogue

In order to progress with DBT activities for MP162, the DCC requires draft working versions of these documents to be available now (more significantly the XML Schema definitions rather than the full written documents).

Further to this DCC has discussed this topic with SECAS and proposed that, as per previous SEC Releases, draft working versions of these documents and the associated XML Schema definitions will be created by the DCC as part of the current Design activity, and shared with Users as soon as they have passed internal design assurance checks. These draft working versions will include mark-up and commentary against each change, identifying the modification that triggered each change to provide full transparency for all parties.

Updated versions may be created and published by DCC as modifications within the scope of the overall June 2024 SEC Release may still change, until the Release scope is finalised by SECAS (following existing governance arrangements).

In creating these draft Working Versions, DCC has made the following assumptions,

- All updates will be based on the proposed June 2023 SEC Release, DUIS version 5.2 and MMC version 5.2 documents, both available on the SECAS website.
- The November 2023 SEC Release is assumed not to require any updates to these SEC Subsidiary documents.
- The next DUIS and MMC draft working versions will assume updated versions of 5.3 for both documents.
- These DUIS and MMC draft working versions will include all SEC Modifications, Government led changes and DCC Internal System changes targeted for inclusion in the June 2024 Release window.

4 Objectives of Testing

4.1 Testing Objectives

The following testing objectives shall apply:

a) Demonstrate that the changes brought into the DCC System by the in-scope items conform to the requirements and do not have any adverse impact on the DCC System

b) Demonstrate that DCC and the component parts of the Modified DCC System and Devices compliant with GBCS technical specifications can operate and interoperate with each other, and with User Systems and to the extent necessary that DCC can comply with its obligations for Security and DCC Services

c) Demonstrate that Users can successfully adopt the role of MDRA User and operate in accordance with that role in the UIT environment

d) Enable (to the extent that it is reasonably practicable to do so for the MHHS SEC Release Go Live) Users to test the interoperability of their User Systems with the Modified DCC System together with selected versions of SMETS1 and SMETS2 Devices on the CPL or Emulators

e) Demonstrate that Users can continue to successfully install and commission and operate a number of Devices on the CPL using the Modified DCC System

f) Demonstrate that the Modified DCC System can operate successfully within the wider Smart metering ecosystem comprised of Devices operating to different technical specifications in a consistent manner

g) Test end-to-end communication from an authorised User Device and back again for all technical specifications in operation, together with security modules

h) Verify that all other functional changes that are part of the MHSS SEC Release are functionally correct including consequential amendments

i) Ensure that the changes do not materially adversely impact the security risks associated with the Modified DCC System, and that any changes impacting security are identified, tested (where necessary), and accepted. Consideration should be given to the security capabilities in the DCC security architecture including the protection of data and infrastructure

In respect of the testing objectives described above:

a) References to the Smart Energy Code shall be construed as a reference to the version of the Smart Energy Code (including any Subsidiary Documents) which are due to have effect with the MHHS SEC Release

5 Testing Approach

This section describes the testing approach for each testing phase, provide a release timeline, detailed overview of the changes in the release, Device selection and an environment usage overview.

5.1 High Level CR Detail and Test Approach

The elements below form the high-level areas of change which will be applied in the MHHS SEC Release are:

- DUIS uplift to version 5.3 (however note this version will need to be designated as part of the June 2024 SEC Release).
- MMC uplift to version 5.3 (version change only to remain in line with DUIS version)
- The ability to accept Service Requests from a new MDRA User Role to retrieve Import consumption data (HH Intervals, Daily Consumption totals and Register Reads) and where configured, Export generation data (HH Intervals, Daily Consumption totals and Register Reads) from specified SMETS1 and SMETS2 or later Electricity Smart Meters enrolled within the DCC Systems.
- All Service requests received from MRDA Users will be subject to access control authentication against the identity of the MDRA stored and provided to DCC within the Registration Data to ensure that only registered MDRA Users can retrieve the relevant Import consumption / Export generation data.
- All authenticated data requests from MDRA Users shall be retrieved from each Smart Meter using DSP scheduling services wherever possible to smooth the message request volumes across the Smart Metering communication networks in order to collect the required data on a periodic [Daily] basis to an agreed set of Target Response Times. Where data is successfully retrieved from both SMETS1 and SMETS2 Smart Meters this data shall be returned across the Smart Metering communication networks and these Service Responses shall be returned to the requesting User for use in the wider Settlements purposes.

The Functional Heatmap will be provided and added to Appendix A when available. This will detail the SRs, SRVs, Alerts and other scenarios which will be tested for the changes in the MHHS Release. Below is a summary of the specific detail for each change and the high-level view of testing of MHHS SEC Release new functionalities:

CR4813 – Functionality Changes to Support the new MDR User Role in MHHS

MP162 will introduce the changes needed to allow Supplier Agents to be able to collect half-hourly meter readings from ESME for MHHS. This CR will enable the creation of a new User Role for non-Supplier Parties carrying out the Meter Data Retrieval service and enable the set of Service Requests the MDRA User Role will have access to and the associated Target Response Times.

Affected Service Providers:

- DSP
- CSW – SMETS 2 (Parse & Correlate)
- S1SPs (Trilliant, DXC (from a Trilliant support perspective – see below) and Secure only)
- SI

The changes for each Service Provider are summarised as follows:

DSP

The DSP will support a new MDRA DCC User Role with access to a limited set of Non-Critical Read Only SRVs and, where applicable, to Scheduling SRVs in respect of those SRVs. The DSP will deliver to the sending Market Data Retriever all DCC Alerts and Future Dated Execution Device Alerts associated with the SRVs they have initiated.

The DSP will maintain MDRA appointments to Meter Points within the Smart Metering Inventory by processing a new data flow received over the Central Switching Service interface; the DSP will require updates to store and maintain MDRA appointment data. DSP will perform standard Role-Based Access Control with respect to Service Requests received from MDRAs.

The existing CSS Interface to DSP will be extended to add MDRA appointment information to the supported data set.

MDRA users will be able to use the Self-Service Interface with the same access rights as users with the SNA User Role; and hence will be able to view Service Audit Trail records for their own requests.

The Self-Service Management Interface will be modified in order for a DCC Service User to be assigned to an MDRA role.

The MDRA User Role will be included in all relevant Reports to the DCC/SSMI and Data Extracts to the S1SPs.

CSW – SMETS 2

Creation of a new Parse & Correlate Software version to support new DUIS version (v5.3), including updates to DUIS/MMC schemas.

New DCC BOXED solution.

New GFI Version (including RDTS).

S1SP - CGI IE

The registration data required for MHHS MDRAs will be received, in the usual way, via the Management Interface files sent from DSP. The Service Requests IE S1SP support for the collection of half hourly settlement reads are Non-Critical SRVs which don't require specific User Eligibility validation checks. Therefore, IE S1SP will not implement Access Control, assuming this will be handled by DSP.

S1SP - Trilliant

Changes to the Inventory loader process will be required to support the new MDRA user. The DUIS xml schema will need to be uplifted to the newest version from the currently supported version (DS.0243 DUIS Schema Draft 3.0c v50.10).

S1SP - DXC

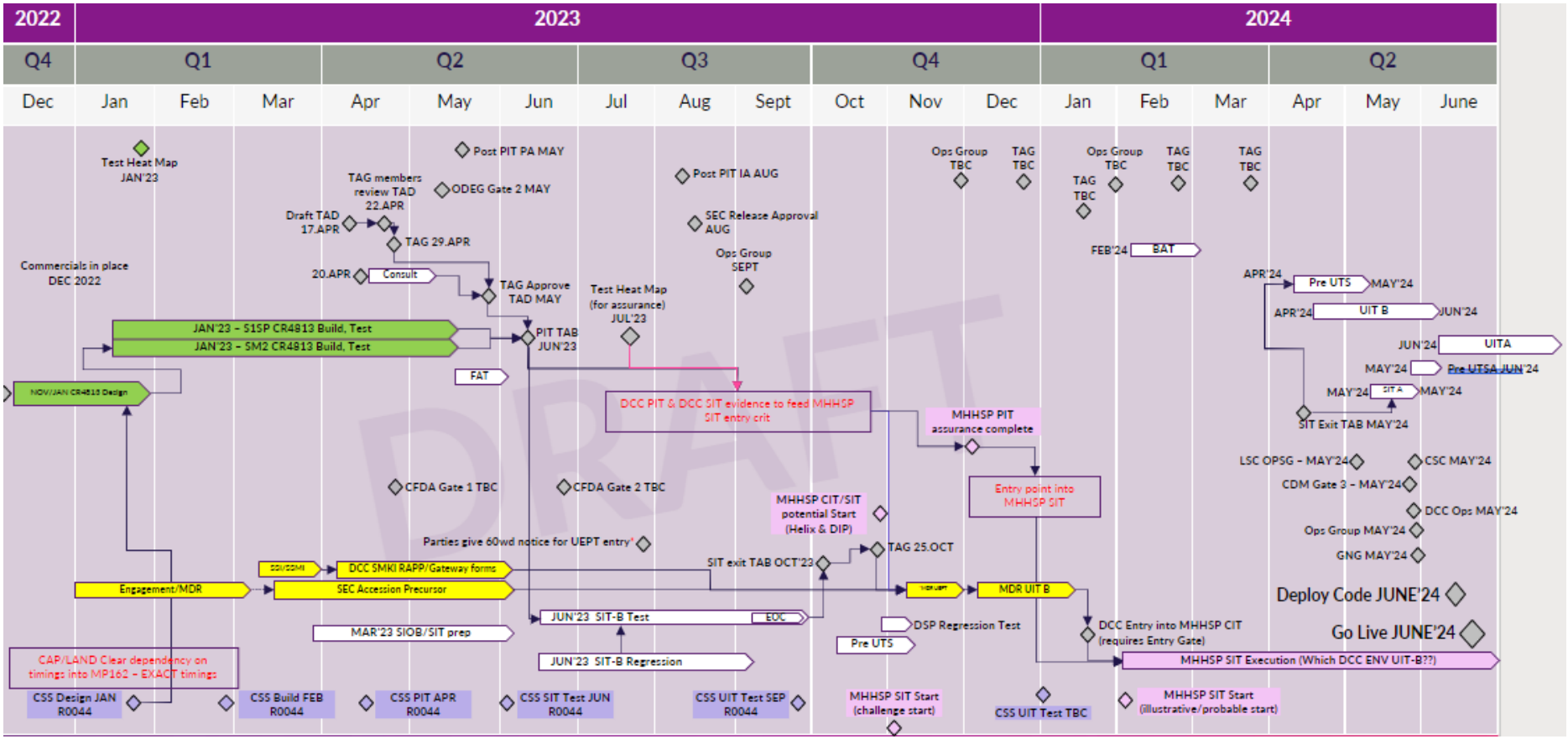
PIT and SIT support for Trilliant only will be required.

S1SP - Secure

Update of reference data for the MDRA role. Due to the MDRA role being added, the Secure S1SP enumerated DCC User role list is required to be amended. System modified to allow MDRA relevant SRVs that are applicable to SMETS1 to be sent to the Secure S1SP system.

5.2 High Level Plan

A high-level final plan as of 14th April 2023 is shown below. The plan is separate to this Test Approach Document. Should the plan change, this TAD will not be updated but TAG will be advised of any material impact on this TAD and will need to approve any consequential changes to the test approach set out in tis TAD.



5.3 Device Selection

The DCC shall recommend which of the existing Devices that are in use in production shall be employed to test the MHHS SEC Release against. Given that this release does not include changes to Devices, and SRs run against them, a subset of existing production Devices will be used to allow in scope Service Provider systems to be exercised.

Emulators will be used for changes which require DUIS v5.3, GBCS v4.1 or SMETS2 Devices as outlined in this Test Approach Document, and where real Devices are yet to be available in the CPL or the EPCL. There are no specific changes applicable to the Release for GBCS elements. However as the Release will be testing a new DUIS uplift, there will be a requirement to test the new schema with existing GBCS versions in PROD, that is include real Devices such as v3.2 and also test it against emulators which are compliant with GBCS v4.1.

The DCC shall notify TAG which Devices it recommends using during the testing of the MHHS SEC Release and seek TAG's endorsement of the devices to be used. Should the DCC and TAG disagree on the selected Devices, then the decision will be referred to the SEC Panel for determination. The SEC Panel's decision will be binding.

5.4 Description of Test Phases

The MHHS SEC Release changes will be delivered using waterfall delivery methodology. The approach to testing of the MHHS SEC Release will include defined Test Phases. Table 5 contains the Test Phases / Stages, whether mandatory or not, organisations involved to deliver and environments to be used.

Table 5 – Testing Phases and Stages

Test Phase	Test Stages	Mandatory (Y/N)	Organisation Involved	Environment Used
PIT	System Test (to include FAT)	Y	DSP DCC S1SP CSW	PIT
SIT	Solution Test (using Devices / Appropriate Firmware for Devices or Emulators)	Y	DSP DCC S1SP DCO CSPs CSS	SIT-B
	Solution Test Regression	Y	DSP DCC S1SP DCO CSPs CSS	
UIT	UIT Proving / Pre-UTS	Y	SI DCC MDRA(s)	UIT-B
	User Test (new MDRA role) - UEPT	Y	Service Users SI DCC MDRA(s)	UIT-B
	User Test	N	Service Users DCC	UIT-B

Note: DCO, CSS and CSPs are to be involved in a supporting role for purposes of testing in the scope of this release only.

The Test Phases are as follows:

- The Pre-Integration Test (PIT) phase covers the testing by DCC Service Providers, undertaken individually, to verify that the solution meets the requirements. In this case it will be the DSP, CSW (for Parse & Correlate) and S1SPs that are in scope for the MHHS SEC Release.
- Systems Integration Testing (SIT) confirms:
    - Solution Testing by DCC Service Providers collectively, to verify the end-to-end functionality using Devices and where not available, emulators. It also confirms interoperability between the modified DCC System and existing Devices in production
    - Service Provider System Integration Testing to initiate the Quality Gate Review for exiting the SIT phase
- User Integration Testing (UIT) allows Users to test their systems and Devices with the Modified DCC System before changes are made available in the production environment.
    - UIT Proving/Pre-UTS will be completed following code deployment into the UIT environment to test the CR changes and regression testing the UIT environment.

The critical aspects of this testing will be completed ahead of opening up the service to Testing Participants

- UEPT for the new MDRA role will be undertaken either by new incoming MDRAs, or for existing Users who wish to add the new role to existing roles.
- Users with Devices deployed in Production will be invited to undertake testing of their DUIS systems against the Modified DCC Solution and to self-certify the results of this testing to the DCC.
- Users will be invited to complete regression testing before moving to the new schema for MHHS SEC Release

Regression testing will commence after the final drop from PIT into SIT within SIT testing (currently only one drop expected).

5.5 Delivery of Test Phases

The execution of the testing to support the MHHS SEC Release will be undertaken in appropriate test environments as per Table 5.

The Test Phases to support the MHHS SEC Release will be subject to the DCC quality gating process including the DCC Test Assurance Board (TAB).

The SI will manage the usage of environments (except Service Providers' PIT environments). Should there be any contention in resources this will be escalated to the DCC for determination and any impact notified to Testing Participants.

It is expected the S1SPs will manage the deployment of code into their own PIT environments (where applicable), and the SI will co-ordinate the activity from the S1SPs and DSP (where applicable) into SIT.

6 Test Phase Activity Description

This section of the MHHS SEC DCC Testing Approach Document defines the testing activities and assurance requirements for individual Test Phases.

The provision of the testing deliverables detailed in section 8 of this document shall ensure that these requirements and focus areas are suitably covered by each DCC Service Provider and each Test Phase and are assured accordingly. All requirements and deliverables for each phase shall ensure that the test objective is met.

6.1 Requirements & Focus Areas for Pre-Integration Testing

The PIT Phase for the MHHS SEC Release is required to provide assurance of the quality of the Service Provider solutions early in the development cycle.

As an overall requirement, any and all testing which can be reasonably and cost effectively undertaken prior to SIT should be undertaken in PIT. Should any testing initially planned for the PIT Phase prove to be untestable during that Test Phase the test(s) will be added to the scope of testing to be conducted during the SIT Phase. Any such movement will be reported to TAG.

For the MHHS SEC Release all changes will be delivered and tested in PIT for all the impacted Service Providers. Testing will include the feature switches for all changes both on and off.

Table 6 PIT Requirements

Ref	Requirement
PIT.1	DCC Test Assurance will perform assurance activities in PIT across all activities except unit and link testing, as subsequent activities within PIT provide assurance of outputs from those tests
PIT.2	DCC Test Assurance shall review the PIT test cases for the DSP, where used, for appropriateness and to ensure functional coverage
PIT.3	DCC Test Assurance shall review the PIT test cases for the S1SP, where used, for appropriateness and to ensure functional coverage.
PIT.4	DCC Test Assurance shall assure Parse & Correlate delivery against the business processes, impacted use cases and ensure backward compatibility.
PIT.5	DCC Service Provider PIT shall cover all functional areas impacted for testing the MHHS SEC Release
PIT.6	DCC Service Providers shall produce and maintain individual PIT approach documents, the System and FAT plans, and shall produce test completion reports and Work off Plans

6.2 Requirements & Focus Areas for Systems Integration Testing

SIT for the MHHS SEC Release shall be planned and based on successful testing in PIT. It shall confirm the successful integrated operation of the Service Provider solutions and shall support delivery of final, assured code for User testing.

For the MHHS SEC SEC Release only CR 4813 will be tested in SIT.

The SI shall produce a SIT Approach Document detailing the testing to be undertaken during this Test Phase. This document shall be reviewed and assured by the DCC and shall, on request, be shared with the SEC Panel's TAG for information. The Test Completion Report shall also be provided to TAG members on request.

6.2.1 Testing in SIT

Table 7 SIT Requirements

Ref	Requirement
SIT.1	Regression testing will be undertaken following the final drop of code into the SIT phase. If issues are found after End-of-Cycle (EOC) testing, and fixes applied prior to Test Phase Completion, then further targeted regression testing will take place
SIT.2	Two EOC runs for MHHS changes will be executed following SIT functional testing completion on the final drop of code
SIT.3	SIT will be undertaken using scenario testing and will ensure that Service Requests are validated for the correctness and consistency of content, alongside the correctness of formatting
SIT.4	SIT coverage will be proved using a test traceability matrix. This will be used to report SIT progress
SIT.5	SIT will be designed to make use of automation where practicable to improve testing throughput rates
SIT.6	SIT will use agreed Devices available in CPL and/or EPCL to perform the Service Request testing
SIT.7	SIT will include verification of the correct operation of all modified interfaces in the Modified DCC System
SIT.8	SIT will include verification that the correct end-to-end data is contained in all relevant DCC enterprise system produced report feeds
SIT.9	Where SIT makes use of emulators, testing must include an emulator configuration to provide valid data in a Service Response. A blank / null response cannot result in a passed test. The response **must** include valid data that can be successfully parsed and, where relevant, decrypted, to prove the response data received is as expected based on the emulator configuration for that test
SIT.10	The SI will ensure that the agreed selection of Devices and Emulators are installed and commissioned in the test environment prior to the deployment of the changes, then deploying the code and carrying out regression testing of the existing functionalities only for backwards compatibility

6.2.2 Service Provider Witness Testing in SIT

The SIT Phase includes Witness Testing which allows DCC to witness an agreed subset of the tests carried out in SIT either real time or via post event evidence reviews.

The DCC Systems Integrator will provide DCC with a schedule of when and where tests will be executed and invite DCC to witness either on-site or via video conferencing where appropriate giving at least 1 Working Days' notice should there be a change to the agreed schedule.

Witnessing of the test execution, or reviewing evidence of executed tests, will adhere to three key rules;

1. There will be no deviation from test scripts
2. There will be no hands-on execution by witness
3. Where a gap in testing is witnessed, this will be recorded as an observation for further testing

Witness Testing will be reported to DCC before SIT exit on test completion, test failures and test pass rate as part of SIT Testing.

6.3 Requirements & Focus Areas for User Integration Testing

The provision of User Integration Testing (UIT) environments and associated services is part of DCCs ongoing activities, this section describes the specific requirements and focus areas for the MHHS SEC Release.

Following Code promotion into the UIT environment, DCC will undertake Pre-UTS to test this promotion prior to opening the environment for any User testing of the MHHS SEC Release. DCC shall ensure that all critical tests are completed prior to declaring that UEPT can commence.

As has been outlined in section 2.2, one of the key drivers for the release timelines has been the need to allow new MDRA Users to become approved under DCC governance to enable participation in the overall MHHS Programme. Following the completion of Pre-UTS activities UEPT will be opened for the new MDRA role, for either new incoming MDRA Users or for existing Users who wish to add the new role to existing roles.

DCC shall subsequently provide a Testing Window (User Testing Window) that allows Users to test the interoperability of its User Systems and Devices (or Emulators where needed) with the Modified DCC System (including via the Self-Service Interface). The UIT environment shall be made available in accordance with the Enduring Test Approach Document (ETAD)–Appendix J of the SEC. Whilst a period of 6 weeks has been allowed for prior to commencement of the overall MHHS Programme SIT activity, Users will be able to continue this testing beyond this period. This testing is thus not time-boxed. This will also allow any User to carry out User Regression Testing to demonstrate that the MHHS code does not adversely affect their existing production service.

Whilst Testing Participants could carry out regression testing immediately following the promotion of code into the User Test environments, they will be asked to wait until the

Testing Window is declared open prior to testing any new functionality delivered as part of the MHHS SEC release.

It should be noted that, as described in 2.2, a key driver for the release is making MDRA User(s) available to participate in MHHS Programme SIT. The intention is to use the UIT-B environment for DCC elements of MHHS Programme SIT, with qualified MDRA User(s) in place ready to participate in this.

Table 8 UIT Requirements

Ref	Requirement
UIT.1	UEPT will enable new MDRA Users to become approved under DCC governance.
UIT.2	UIT will enable Testing Participants to test the MHHS SEC Release functionality within the User Testing window.
UIT.3	UIT will be planned for Parties to be able to test against their systems and Devices ahead of the Release Go Live.
UIT.4	The deployment of the release into UIT will be subject to specific entry criteria and DCC governance to ensure minimal risk of disruption to ongoing Testing Participant testing in the environment.
UIT.5	UIT shall include the capability for Users to verify their end-to-end data is operating correctly over DUIS.
UIT.6	Volunteer Testing Participants with Devices deployed in production are asked to confirm whether they intend to test and also what business processes they intend to test during the UIT window at least 20 Working Days prior to its start. Also they will agree to cover their required testing within the time frame given.

It is noted that DCC maintains its obligations to provide and support an integrated environment for the purposes of User Testing, which includes ongoing assurance of the provision of DCC Test Lab and Remote Test Labs used within UIT and demonstrating that the UIT environments are secure.

6.4 System Capacity Testing

There is no performance testing required as part of MHHS SEC Release testing. Consideration of performance and capacity impact of MHHS data collection is outside of the scope of this CR4813 and will be addressed by a separate Change Request.

6.5 Security Testing

There is no specific security testing required as part of MHHS SEC Release testing. This will be further considered during the remainder of the June 24 SEC Release testing.

7 Test Activities

The following activities will be performed during the execution of testing for this SEC Release, as determined on a Phase by Phase basis:

- Prepare and maintain Solution Test Plans
- Implementation of the testing infrastructure
- Test Phase planning
- Identification of appropriate test scenarios
- Design of test scripts
- Produce a test specification document
- Produce a test traceability matrix, or equivalent
- Design and preparation of test Data, including loading of test Data into the test environment
- Preparation of a test execution schedule
- Execution of testing
- Performance quality gate reviews
- Test issue management (including assessment of severity and priority)
- Test issue resolution
- Release management
- Configuration management
- Test progress reporting
- Production of a Test Phase Completion Report
- Test assurance of third-party components
- Definition and execution of a Work off Plan
- Test metrics collected for each test run, execution time, triage cycle time and daily volume report for Test Assurance

7.1 Test Method

DCC continues to seek to further improve testing throughput. By making more effective use of automation in SIT DCC are aiming to increase throughput and regression coverage. DCC shall also seek to measure the effectiveness of the use of automation in SIT across releases by collecting metrics that quantify the coverage and efficiency of automation throughout the overall test pack, which will include both functional and regression tests. More detail will be provided in the SIT approach document, including reporting to demonstrate that expectations around the use of automation have been met.

For manual and automated testing, DCC shall use scenarios that based on DCC SMETS 2 Business scenarios in addition to existing SMETS1 testing. The supporting test phase approach documents will specify the detailed testing methodologies employed in each test phase.

Test design for the MHHS SEC Release will have the following critical areas for testing.

- Changes introduced as part of the MHHS SEC Release are working as per the specified requirements
- Devices are installed and commissioned in the test environment prior to the deployment of the changes, then deploying the code and carrying out regression testing of the existing functionality to demonstrate backwards compatibility
- Devices can be installed and commissioned and can operate as per the requirement using the changed code

Priority, within the design of testing for the MHHS SEC Release, shall be on the changes introduced by the scope of the Release, and on the functionality and Service Requests that are considered to be of highest risk to Users in the production system and on validating there is no adverse effect on the existing Devices in the DCC system. These will be derived from the heat map and the TTM.

Testing will cover both functional and non-functional aspects of the dynamic interaction between solution elements and shall cover, to an agreed level, of the DCC service request variables – User Role, Command Variant, and mode of operation. Where a changed interface is to be tested, all associated or impacted interfaces shall also be tested. Similarly, testing should account for all elements of the Modified DCC System, for example the internal DCC-Enterprise components that support billing and reporting.

In general, testing with combinations of real Devices will form the basis of a default test setup. Testing with emulators in SIT shall in general only be conducted where Devices are unavailable to be tested. Where testing makes use of the SIT emulator necessary, testing shall include emulator configuration to provide valid data in a service response.

Note that there is no new, Device impacting functionality being delivered in the MHHS SEC Release. DCC will therefore utilise the emulators that have been tested and assured for the June 2022, November 2022, June 2023 SEC Releases and the GBCS v4.1 Programme.

The tests planned to be executed using an emulator will be reviewed against the known Testing Issues identified against the emulators. Where the recorded emulator issues could impact the planned tests, then DCC will look to employ alternative Devices available to complete the test. Should this prove impossible, then DCC will promptly discuss with TAG the impact of this on the overall planned testing.

In relation to the design of testing for SIT, consideration has been given to the coverage of DUIS and how testing between regression and new elements is balanced across the interfaces and Communications Hubs types and CHTS versions.

7.2 Test Scenarios

Test scenarios may, within the context of the individual Test Phases, be represented by defined sequences of Service Requests and/or other relevant activities.

Each Test Phase will define test scenarios as a deliverable as appropriate, but as a minimum the definition of test scenarios will include:

- Description
- Responsibility for development
- Type (Normal, Exception, Alternative)

- Pre-requisites
- Test conditions
- Verification method
- Traceability to requirements (or use case for DSP PIT)
- Test variations – User Roles, Communications Hub, mode of operation, Command variant, Device, DUIS and GBCS versions

The definition of Test Scenarios for SIT shall include and consider:

- Key common scenarios that will be experienced by the Parties in production
- A relevant subset of scenarios (or Service Request sequences) to reflect Network Operator Party use cases

For SIT, DCC will review testing progress with Parties at the DCC monthly testing forum – the Testing Design and Execution Group (TDEG) and following the start of SIT shall provide an update to the monthly TAG meeting.

Test Scenarios may be updated to take account of activities from live operation, subject to suitable change controls.

Test scenarios must cover exercising all modified / impacted interfaces in DCC Systems in an end-to-end manner verifying functionality as well as that data is reported correctly.

Where emulators are needed to be used, test scripts should define the required emulator configuration to provide valid data in a Service Response.

7.3 Regression Testing

All new releases of any element of the solution from every DCC Service Provider will be subject to completion of a successful regression test prior to being accepted into subsequent Testing Phases and environments.

The following requirements for regression testing shall apply:

- SMETS2 Regression Test Coverage will include the following as a minimum:

Table 9 – Regression Testing Devices

DUIS	P&C	CH/MMC	Devices
5.2	D5-G4-4.1	GBCS 4.1CH* (CHTS1.4(CHM2))	S2v4.2 / S2v3.1
5.2	D5-G4-4.1	GBCS 3.2CH* (CHTS1.3)	S2v4.2 / S2v3.1
5.2	D5-G4-4.1	GBCS 2.1CH SBCH/DBCH	S2v4.2 / S2v3.1
5.1	D5-G4-3.0	GBCS 3.2CH* (CHTS1.3)	S2v4.2 / S2v3.1
5.1	D5-G4-3.0	GBCS 2.1CH SBCH/DBCH	S2v4.2 / S2v3.1
5.0	D5-G4-3.0	GBCS 3.2CH* (CHTS1.3)	S2v4.2 / S2v3.1
5.0	D5-G4-3.0	GBCS 2.1CH SBCH/DBCH	S2v4.2 / S2v3.1
4.0	D5-G4-3.0	GBCS 3.2CH* (CHTS1.3)	S2v4.2 / S2v3.1
4.0	D5-G4-3.0	GBCS 2.1CH SBCH/DBCH	S2v4.2 / S2v3.1
3.1	D5-G4-3.0	GBCS 3.2CH* (CHTS1.3)	S2v4.2 / S2v3.1
3.1	D5-G4-3.0	GBCS 2.1CH SBCH/DBCH	S2v4.2 / S2v3.1

- Regression will cover Critical Business Scenarios and Impacted SRs

Note: the GBCS indicated by * will be tested if available. If this is not available, then GBCS 2.1 (CHTS1.1) will be used as an alternative. This is indicated in Table 9 above.

- SMETS1 Regression Test Coverage will include the following:
  - A selection of DMCs will be tested
  - Functionality will be tested across a set of DMCs
- Regression will include IOC, MDS & MOC Secure, and FOC
  - There will be no migration activities planned for IOC and MDS.
- Wherever practicable, regression testing will be automated
- Regression testing in SIT-B environment will start following the final planned deployment from PIT for SMETS2 and SMETS1
- The full regression test approach for each phase will be outlined in the Regression Heat Map and described in each detailed Test Plan Document
- The scope of regression, where appropriate, is permitted to be risk-based with regard for combinations of User Role, command variant etc. The exact scope of regression shall be defined in the detailed Test Plan Document for each phase
- If risk-based regression testing is used within a Test Phase, as a minimum it should include key Service Requests. The key Service Requests will be derived from the heat map and TTM. This will then be discussed and agreed between DCC and SI
- The Regression Test Pack (test scripts, test data and documentation) will be available to the DCC during the test phase within ALM, with any agreed omissions being rectified promptly
- Regression testing for SIT shall be completed using real Devices that are used in production and available in the CPL

8 Deliverables

DCC will follow the testing documentation practices established for earlier releases. These are described at a high level in this section, and specific enhancements and requirements for the MHHS SEC Release are highlighted.

8.1 By Test Phase

Various deliverables will be produced for each Test Phase. The Test Phase Approach Documents will detail the deliverables required for the individual Test Phase.

The relevant Service Provider for each individual Test Phases will create the deliverable, which will be subject to the established governance processes. Below is a list of responsible Service Providers for various test phases.

- PIT – DSP

- PIT – S1SP
- PIT – Parse & Correlate (CSW)
- SIT – DCC Systems Integrator
- UIT – DCC Systems Integrator

Table 10 describes the generic content and anticipated timing of the deliverables that may be required to be produced for each Test Phase

Note: Pre-UTS is an activity performed by UIT team, to facilitate the opening of User Testing window.

Table 10 – Deliverables

Deliverable	Description	Test Phase	Timing
Detailed Test Plan	Describes the relevant test phase: the activities, participants, resources, roles and responsibilities, assurance requirements, reporting, success criteria, and other information relating to the execution of the Test Phase. Where relevant, the Test Phase Approach Documents shall also define the entry and exit criteria, and the basis of any risk for regression	PIT SIT Pre-UTS	Following any review cycles, a final version shall be submitted to DCC by the relevant DCC Service Providers including DSP and S1SPs no later than (10) Working Days before the commencement of test execution.
Test Specifications	Test Traceability Matrix, Test Scenarios and Heatmap	PIT SIT	To be provided to DCC-by-DCC Service Providers including DSP and S1SPs no later than (10) days before the commencement of test execution.
Test Results	Details may vary by Test Phase – report content and frequency will be defined by the Detailed Test Plan	PIT SIT Pre-UTS	Made available by DCC Service Providers including DSP and S1SPs for review by DCC throughout test execution.
Test Issue Log	Outstanding Testing Issues	PIT SIT Pre-UTS	Made available by DCC Service Providers including DSP and S1SPs for review by DCC throughout test execution.
Regression Test Pack	A Regression Test pack is a set of test cases run to ensure the core product remains unaffected by new feature additions.	PIT SIT	Access granted to DCC-by-DCC Service provider including DSP and S1SPs to review beforehand and monitor throughout

Deliverable	Description	Test Phase	Timing
Test Phase Completion Report	Will follow the format and content established for earlier DCC releases, and will include; • Overview of testing undertaken • Actual number of tests run, passed, failed, and not run • Explanation of any tests not run • Testing Issue IDs and details of the associated failed tests • Number of Testing Issues outstanding, split by severity • Number and severity of all Testing Issues raised • Explanation of any Testing Issues which have been closed without a fix and successful retest • Specification of test environments, devices and firmware used • Recommendations for any tests to be added to the next Test Phase • Lessons learnt during the Test Phase	PIT SIT Pre-UTS	DCC will work closely with the DCC Service Providers including DSP and S1SPs during test execution window to ensure the completion report is issued on the final day of testing.
Test Scenarios	Shall comprise of planned and sequenced series of Service Requests.	PIT SIT	To be available from DCC Service Providers including DSP and S1SPs at the same time as the finalised Solutions Test Plan
Work off Plan	A plan to resolve (fix, retest and close) all assigned outstanding issues. Once the fix is made available, retesting of the issue should be completed within [5] Working Days.	PIT SIT Pre-UTS	To be provided to DCC-by-DCC Service Providers including DSP and S1SPs with the final Test Stage Completion Report.

8.2 Requirements Traceability

The DCC will provide a Requirement Traceability Matrix (RTM) detailing the requirements for each change. This will be provided to the SI. The test teams will use this RTM to generate the required Test Traceability Matrix (TTM).

The DSP will use their own tools to manage their requirements and demonstrate traceability to both the solution design and the Pre-Integration Tests. The DSP will provide DCC with a PIT TTM, extracted from these separate tools.

For the changes that are being implemented by other Service Providers that includes S1SPs will provide DCC with a PIT TTM individually, mapping requirements to test cases planned for execution.

The scope of testing in both PIT and SIT will be validated by use of Test Traceability Matrix (TTM), setting out how each requirement within the scope of the release is met. Should any testing initially planned for PIT be untestable during that Test Phase the test(s) will be added to the scope of testing to be conducted during SIT. Any such movement will be reported to TAG.

The TTM will be generated by the SI, based on the updates to the specifications listed in section 2.1, and will consider the resulting impact of those changes and resulting co-existence of enrolled Devices operating to different variations of versions of those specifications as well as current version of those specifications. Production of the TTM is a requirement for SIT to commence.

At the completion of SIT, any additional tests which have been created during SIT will be added to the TTM.

The TTM will be used by DCC to demonstrate the completion of SIT, alongside the heat map.

9 Test Procedure

This section describes the requirements for the testing process to prove the solution for MHHS SEC Release.

The Solution Test Plans will define specific Entry and Exit Criteria for the individual Test Phases, with generic requirements for these described below.

The Solution Test Plans will also define specific entry and exit criteria for individual Test Phases, the governance process relating to the approval of the criteria, and the evaluation of success against them.

9.1 Generic Entry and Exit Criteria

Progression through Testing Phases for the MHHS SEC Release will be gated using generic and specific Entry and Exit Criteria.

The Solution Test Plans will provide detail of the evidence to be gathered in the form of an evidence pack.

9.1.1 Generic Entry Criteria

The following generic Entry Criteria will gate the entry to all Test Phases:

GEn1. Solution Test Plans signed off
GEn2. Test Phase Completion Certificate for any preceding Test Phase issued, unless advanced agreement from TAG that the Test Phases may overlap, i.e. from SIT to UIT, where Pre-UTS may be in progress prior to the SIT exit
GEn3. Test Specification and heat map prepared, including traceability to Requirements / Design documents
GEn4. Test labs, Devices, tools, stubs, environments, and data are assured and accepted as fit for purpose, including external assurance, where applicable
GEn5. Regression test pack has been prepared or updated
GEn6. DCC and all relevant Service Providers have confirmed they have resources with the requisite skills and access available to support the Test Phase
GEn7. Approval to proceed certificate issued by DCC, where contractually required, unless the plan states that Test Phases may overlap, i.e. from PIT to SIT, where Work-Off plans are in progress
GEn8. A Device selection process will be used to select a subset of Devices, from the CPL, to be used for testing. These Devices will be used to successfully complete SIT

In the case of User Testing in UIT there will be no Test Plan, or Test Specification:

9.1.2 Generic Exit Criteria

The following generic Exit Criteria will gate the exit of PIT and SIT. All test success criteria are to be achieved, with any exceptions documented and agreed by:

- TAB for PIT
- TAB and TAG for SIT

Section 9.2.2 details specific targets for GEx1, GEx3 and GEx4 for the SIT Test Phase.

GEx1. All planned tests run, with any exceptions documented and agreed
GEx2. Any variations to the scope of testing set out in this TAD documented and agreed
GEx3. Functional testing successfully completed – a minimum percentage of 90% of tests having passed
GEx4. Regression testing successfully completed – all tests passed with no new Testing Issues identified
GEx5. End of Cycle testing successfully completed – no variance between End of Cycle runs
GEx6. The number and severity of any outstanding Testing Issues is at or below the specified thresholds, with any exceptions documented and agreed
GEx7. All test results documented, and evidence captured
GEx8. A full set of Testing Issue logs have been produced
GEx9. Production of agreed Work off Plans for all outstanding Testing Issues that remain Open at Test Phase completion
GEx10. Work off Plans from preceding Test Phases have been discharged. (Pending closure, such Testing Issues shall be included against the Testing Issue count of the following Test Phase)
GEx11. The Test Phase Completion Report has been approved by TAB for PIT and TAB and TAG for SIT and Test Completion Certificates issues, where required.

Note: Where practical, if a test fails with an emulator / device, it will be re-tested against on another device, if available. If / when a Testing Issue arises while using an emulator and the test cannot be run in any other way, the Testing Issues will be discussed with TAG as part of early engagement for transparency and completeness.

9.2 Specific Entry Criteria for Test Phases

Any additional specific Entry and Exit criteria for individual Test Phases shall be detailed in the relevant Solution Test Plans.

9.2.1 Entry into SIT

The following shall be achieved prior to SIT commencement:

SEn1. DCC to ensure all required devices and emulators are available 2 weeks before commencement

SEn2. The remaining generic entry criteria has been met at least 1 week before SIT commencement

SEn3. Given that both DSP and CSS can start their SIT using emulators and the CSS Simulator, the CSS simulator must been made available to DSP 1 week before SIT commencement

9.2.2 Entry into UIT

The Entry Criteria for UIT shall include:

UITEn1. Successful completion of testing, assurance and DCC governance of the SIT phase for the functionality to be promoted into UIT, including completion of TAG governance requirements.

UITEn2. Pre-UTS is to be completed prior to the opening of UIT 'window' and the start of User Testing to the satisfaction of the DCC.

9.3 Acceptance Process Following SIT Completion

Following the agreement of SIT completion, DCC will:

- DCC will review the documentation and evidence to support the relevant Entry and Exit Criteria with the Panel's TAG to inform the Panel to enable their decision regarding the completion of SIT
- Notify the Panel and Parties that SIT has ended
- DCC will provide the Panel with copies of the SIT Test Completion Report(s) along with a list of those sections of such reports that it considers should be redacted
- On direction from the Panel, DCC will provide the Parties and Service Providers with copies of the Test Completion Report(s) having first redacted any sections specified by the Panel

9.4 Testing Issues Threshold

Table 12 lists the standard thresholds for outstanding testing issues in each test phase.

These shall be calculated by Service Provider for PIT.

A single threshold will apply to all Service Providers for SIT.

Table 12 – Threshold

Test Issue Severity	PIT	SIT
1	0	0
2	0	0
3	15	15
4	30	30
5	60	60

Note that:

- The defect thresholds are applied as part of the Exit Criteria for relevant Test Phases and apply cumulatively if there are iterative deliveries within a Test Phase.
- All Testing Issues that have been closed without a retest shall be presented to confirm that they were closed appropriately. Agreement from TAB will be sought for PIT and TAB and TAG for SIT.
- Testing Issues that can be demonstrated to:
    - be duplicates of a Testing Issue found during testing of this Release
    - have been accepted by a Meter Manufacturer or Device Manufacturer
    - known Testing Issues that were previously identified during the testing of an earlier Release or in Production
    - pre-existing Testing Issues which although not previously identified can be proved to pre-exist by running against a version that does not contain the MHHS code

  will be discounted. Such Testing Issues will be recorded in the Test Completion Report and discounts will need to be ratified by TAB for PIT and TAB and TAG for SIT. In the cases of a Device manufacturer Testing Issue, testing using an alternative manufacturer will be conducted where possible to prove functionality.

- TAB may judge that the SIT Phase can start even if the thresholds set in the PIT Exit Criteria have been exceeded, provided that an agreed Work off Plan is in place. This decision will be reported to the Panel's TAG and Panel, but is not subject to their agreement

- As part of confirming the Test Phase completion, DCC shall present all extant Testing Issues identified during the MHHS SEC Release testing to TAB for PIT and TAB and TAG for SIT to confirm that the correct Severity has been assigned

- Where the DCC and the Panel's TAG cannot agree on the Severity of a Testing Issue identified in SIT, and this matter impacts achievement of the Test Phase Testing Issue Threshold, the DCC may refer the matter to the Panel for its determination, which shall be final for SEC Modification defects.
- Any Testing Issue found during the PIT Test Phase, that remains open at SIT exit shall be included in the SIT Exit Testing Issue Threshold and will be reported to TAG.

9.5 Work off Plans

Work off Plans, shall be produced detailing the Testing Issues that are outstanding and a plan for resolving them.

The Service Provider shall resolve all items within the Work off Plan within the following timescales;

- For Severity 3 defects, within 20 Working Days from the TAB meeting
- For Severity 4 defects, within 40 Working Days from the TAB meeting
- For Severity 5 defects, within 60 Working Days from the TAB meeting

The resolution of a Testing Issue will require the Service Provider to fix, retest and close the Testing Issue. Exceptions to these timescales may be proposed by the Service Provider but shall be subject to TAB approval.

If the Service Provider becomes aware that the timescales for the Work off Plan are not going to be met, the Service Provider shall promptly produce a correction plan for approval by TAB.

If a Test Phase Completion Certificate has been issued subject to completion of a Work off Plan, and the Work off Plan has not been completed within the applicable time period, then DCC may revoke the Test Phase Completion Certificate unless the failure relates solely to Severity 5 test issues.

10 Test Result Management & Reporting

Test Result Management and Reporting is to be provided to DCC by the DSP and S1SPs for PIT and the SI with input from SPs for SIT, on a frequency to be detailed in the Solution Test Plans. For UIT Test phases progress information is provided by Testing Participants.

10.1 Tracking and Reporting

HP's Application Lifecycle Management (ALM) Test Management tool will be used to manage testing and Testing Issues in SIT. In the case of PIT, a Service Provider may employ a different tool to manage Testing and Testing Issues.

All requirements, scripts, tests, execution results and defects are to be maintained in ALM. Connectivity between requirements, tests and defects is to be maintained for traceability and reporting purposes.

Overall responsibility of maintaining traceability of test and defects lies with the SI for all Test Phases.

The SI shall provide enhanced visibility and reporting of the progress, completion, and coverage of testing for SIT across a number of parameters. This should include test automation metrics previously referenced in Section 6.

10.2 PIT and SIT Completion Reports

DCC will produce its own Test Completion Reports when it considers that the Test Phase Completion criteria set out in this document have been met. It shall include:

- The results of testing
- De-scoped Scenarios, Requirements or Test Cases
- Any Variances from this Testing Approach Document
- The total count of extant Testing Issues
- Information on any Testing issues closed without a retest
- Information on any Testing Issues that DCC is proposing be discounted
- Information to support the Severity assigned to any extant Testing Issues that are not subject to discounting
- Any observations
- How the specified Exit Criteria have been met.

This report, together with any relevant independent assurance reports, will be provided to the TAB, Panel's TAG, and the Panel.

11 Acceptance and Test Assurance

DCC has established processes for the acceptance of testing activity completion – these will continue for the MHHS SEC Release. The DCC's Test Assurance Board (TAB) will conduct quality gate meetings for test phase exit and review Test Completion Reports before, where required, issuing Test Completion and Approval to Proceed Certificates.

11.1 Service Provider Self Assurance

Service Providers will continue to assure their own PIT activities against this Testing Approach Document and their specific PIT Phase and Test Plan. Service Providers will also continue to make their relevant testing deliverables available to the other Service Providers and exchange constructive comments to ensure solution and testing compatibility.

11.2 Test Assurance by DCC

DCC will continue to assure Service Provider testing using the processes and activities established for earlier releases, and will include the following methods, at times determined by the individual Solution Test Plans:

- Test Assurance Board quality gates
- Test Witnessing
- Test Observation
- Product Inspections
- Document Review

11.2.1 Quality Gating

DCC will continue to operate the Quality Gating process developed for prior Releases and enhanced through experience. The Quality Gate process provides:

- Controlled entry of functionality into subsequent Test Phases
- Confirmation that the scope of tests shall provide adequate assurance of the changes introduced to the DCC System
- Formal and objective evidence that test criteria have been met for a Stage / Phase
- Transparency of test activities and outcomes to facilitate DCC Test Assurance
- Formal evidence for signoff of Service Provider test milestones and/or associated payments
- A mechanism for managing remedial work associated with closure of test stages / Phase

The Quality Gates for PIT and SIT exit are operated as TAB gates.

11.2.2 Test Witnessing

DCC will agree, in advance, with the SPs, including the S1SPs and DSP, which tests it wants to witness during Factory Acceptance Testing (FAT). Details of these tests (which will be a subset of System Tests for FAT) will be described in the FAT plans. The SPs will provide DCC with a schedule of when the tests will be executed and invite DCC to witness on-site or via MSTeams. The witness will have the skills required to fulfil the role. The SP will provide the witness with relevant documentation and access.

For the MHHS SEC Release DCC Test Assurance team must be given full access to attend and witness such testing.

Execution of the agreed set of tests will be performed by the relevant SP test analyst, and there will be:

- No deviation from the scripts (eg in response to “what if” questions raised by witnesses)
- No hands-on execution by witnesses
- Where a gap in testing is witnessed, this will be recorded as an observation for further testing

Testing Issues raised during witnessing will be entered into the relevant Test Issue Management tool and progressed through the Test Issue Management process.

As far as possible, any queries and issues arising during the witnessing period will be addressed at the time with the relevant Subject Matter Experts (SMEs). A wash-up session will be convened at the end of the witnessing period to discuss the outcome of witnessing and to agree any outstanding queries and issues.

11.2.3 Test Observation

With prior agreement with the SPs, including the S1SPs and the DSP, on the timing, duration, and scope, DCC staff may observe test execution and test issue management activities during System Testing and Solution Testing in order to familiarise themselves with SP processes and the systems under test. The DCC observers will have the skills required to fulfil the role.

12 Test Resources

This document will not provide detail of the DCC internal teams or the Service Providers who will be undertaking the actual testing but does provide details of the DCC Test Assurance Team and Testing Services Team who are responsible for assuring compliance with this Testing Approach Document.

This section also describes the Testing Stubs which will be used, and the other Testing Tools.

12.1 DCC

Notwithstanding, any organisational change at DCC affecting the structure of the team, dedicated DCC resources will support the assurance of testing described in this document.

The functions and services delivered by the DCC shall include:

a) Test Assurance – responsible for reporting progress to industry, assuring the progress of testing, including witnessing, and observing testing within PIT, SIT, reviewing test plans, scripts, and scenarios; co-ordinating with Product and Design teams to provide Device assurance, assuring reporting by Service Providers, providing evidence and documents into the TAB meetings, conducting TAB meetings; managing independent audit and assurance providers (where necessary), maintaining this Testing Approach Document, submitting evidence and reporting to Panel as required.

b) Issue Management – responsible for operating the issue management process; including chairing the Issue Resolution Board and reporting on issues for all Test Phases except PIT. Responsible for producing reports on Testing Issues, including providing regular reporting to DCC problem management on issues potentially affecting the DCC production solution.

c) Testing Services – responsible for being the point of escalation for Testing Participants, approving entry into UIT and associated entry criteria, responsible for supporting user testing and managing relationships with Testing Participants; reporting on user testing. Will also provide communications including notification of intention to take part in UIT, notification of 5 days to UIT opening and notification of UIT opening.

12.2 Test Stubs

This Testing Approach Document allows for the use of Testing Stubs, where appropriate, across each of the Test Phases to support entry into and completion of those phases. Individual Service Providers, DCC and Testing Participants may utilise Testing Stubs to simulate or emulate elements of the solution which are either not available or practical for use in the relevant test phase.

The utilisation of test stubs, in particular Device emulators, will only be utilised if a real Device does not exist.

For example, within SIT, a User Simulator will be used to act in the role of a DCC User.

DCC uses a variety of device emulators capable of emulating:

- ESME (incl. APC and ALCS)
- SAPC
- GSME
- IHD
- PPMID
- HCALCS
- HHT (used to deliver service requests locally over the HAN)

Each emulated Device is capable of operating in single or dual band mode.

The emulators have specific functionality which will be used to generate test scenarios for:

DUIS 5.3, GBCS v4.1 and SMETS2 v5

The emulators used for MHHS SEC Release have previously been through separate assurance and a TAB approval prior to use in SIT.

Once deployed into SIT the emulators will be undergo Pre-Zigbee Certification by the emulator providers.

Once Pre-Certification is completed, Zigbee Certification will be requested and completed at the earliest opportunity.

Note: Emulator Assurance for MHHS SEC Release is not required as it will use the same emulator that was used for June 2023 SEC Release, GBCS 4.1 and ECoS Programmes.

There are no firmware changes required for MHHS SEC Release therefore S1SP scope of PIT will not test end-device functionality. End-device functionality will begin testing in SIT.

12.3 Test Laboratories

The DCC will provide a test lab facility and supporting services to enable Parties to test with their own Devices and DCC Communications Hubs and SM WAN infrastructure in the User Integration Testing environment.

13 Roles and Responsibilities

All parties involved in the MHHS SEC Release testing shall:

- Follow Good Industry Practice, as define in the SEC
- Take all reasonable steps to facilitate achievement of the testing objectives
- Ensure that all Testing Issues are evaluated for the potential impact on the DCC production solution and its Users, at the point of raising the issue or during triage, and recorded as such on the test management tool

13.1 DCC Systems Integrator

DCC shall ensure that the SI will manage SIT and be responsible for the following activities:

a) Producing and maintaining the SIT Test Plan
b) Ensuring that SIT activities are carried out in accordance with the SIT Approach, the SIT Test Plan
c) Overall planning and control of SIT, including chairing entry Quality Gates between FAT and Solution Test, and between Solution Test and User Interface Testing
d) Maintaining Risk, Assumption, Issue, and Dependency Logs for SIT
e) Leading the design and creation of test scenarios, test scripts, test data and test environments for SIT
f) Preparing test execution and environment usage schedules for SIT
g) Supporting the other SPs in their assigned test preparation and execution activities within SIT
h) Managing Testing Issue resolution, and supporting SPs in the resolution process for selective Test Phases
i) Producing the Test Stage Plans, Test Specifications, Test Traceability Matrices, Progress Reports, and Test Completion Reports for SIT
j) Operating the master Configuration Management Plan
k) Operating the master Release Schedule
l) Operating the Environment Plan
m) Support the Interoperability Test Events

13.2 DCC Service Providers

DCC shall ensure that the Service Providers shall:

Support the Systems Integrator in:

- Planning and control of test phases
- Design and creation of test scenarios, test scripts, test data and test environments
- Preparing test execution and environment usage schedules
- Diagnosing Testing Issues
- Producing Test Plans, Test Specifications, TTM, Progress Reports, and Test Completion Reports
- Contributing to the master Configuration Plan
- Contributing to the master Release Schedule
- Contributing to the Environment Plan
- Establish, maintain, and control their own test environments, in terms of software / hardware configuration and access control

For tests within their agreed test boundary, under the direction of the Systems Integrator

- Execute and monitor test scripts
- Capture evidence
- Report progress
- Resolve Testing Issues for their solution elements and undertake PIT testing (including regression testing) of any fixes required.

13.3 DCC

DCC shall:

a) Comply with its obligations under this Testing Approach Document (this document)

b) Ensure that activities attributed to Service Providers that are described in this document are undertaken

c) Use its reasonable endeavours to ensure that SIT is completed as soon as is reasonably practicable to do so

d) Enter into agreements with Device manufacturers to provide and support Devices for use in SIT, following appropriate qualification or selection activity

e) Support the DCC Systems Integrator in the planning, control, and operation of testing

f) Assure planning, preparation and execution activities undertaken by the DCC Systems Integrator and Service Providers as detailed in this document and through the Test Traceability Matrix

g) Operate and Chair the DCC TAB process to review and approve the relevant Test Documents and issue the Approval to Proceed certificates (where applicable), Test Completion Certificates, and the approval of Test Phase Completion Reports

h) Participate in Quality Gate Reviews

i) Agree with the DCC Systems Integrator and Service Providers Tests to be witnessed

j) Witness the execution of SP SIT

k) Specify, procure, provide, and maintain the DCC Meter Protocol Emulator Devices and Service

l) Appoint and manage the independent audit and assurance activities described in this document (where applicable)

14 Environments

The MHHS SEC Release will use the standard release approach through the B - stream DCC environments.

These environments are available as required by the overall plan for the MHHS SEC Release. Specific deliverables relating to the management and use of environments, particularly co-existing with other programmes, will be published by DCC. This will clarify the approaches to usage of the environments by the MHHS SEC Release and other projects. DCC will also present regular portfolio level updates to TAG on use of environments.

Note that it is acknowledged that it is likely that SIT for the MHHS SEC Release will overlap with that of the November 23 SEC Release. Therefore as described in section 2.3 processes will be in place to ensure separation of the two releases and that Feature Switches are included to allow the November SEC Release to be tested with MHHS code both ‘on’ and ‘off’ for the release to ensure nothing has been introduced that might cause a failure.

14.1 Code Management

DCC will operate a process to merge code changes into the test environments used by the MHHS SEC Release. The SIT Approach Document will provide detail of the frequency of the operation of this process.

15 Appendices

15.1 Appendix A - Functional Heat Map

The Functional Heat Map is currently work in progress and will be included in the Test Phase (PIT and SIT) Completion Reports.

15.2 Appendix B – Device Selection Process

DCC Test approach/planning workshops are to be held to determine the Devices to be used in SIT. The attendees included the SIT test team, the DCC product team, the DCC Devices team and DCC Test Assurance. The device selection considered a risk-based approach to selecting appropriate meter sets.

Device selection considerations will consider the following:

- Current production use (“Day 1”)
- Soon-to-be production use (“Day 2”)
- The Meter Manufacturer used for each meter was based on availability and stability of required meters and as per the contract with DCC
- Real ESME and GSME devices to be used for regression device sets using combinations which were already available in production / testing
- Emulators will only be used for testing the new functionality where real devices are not available, e.g. GBCS4.1 [Device SLS version S2V5]
- Real PPMID devices will be used as per the device availability.

The devices proposed for use will be presented to TAG in accordance with Section 5.3.