June 2022 SEC Release
Testing Approach Document

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Document Control

Revision Date	Summary of Changes	Changes Marked	Version Number
23/08/2021	Initial Draft	n/a	0.1
04/10/2021	Internal Review	n/a	0.2
06/10/2021	Updated post internal review	Yes	0.3
13/10/2021	Published to TAG84 (27/10/21) for review and published to Industry for consultation.	No	1.0

References

Table 1 – References

Ref	Title	Source	Date	Version
1	Glossary of Testing Terms	ISTQB	Mar 2016	3.1
4	June 2022 Release Implementation Document	SECAS	TBC	TBC

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 2022 SEC Release Go Live.

Abbreviations & Acronyms

This document uses standard testing terminology. In addition, the meanings of abbreviations and acronyms specific to the Smart Energy Code and DCC services and systems are shown below.

This document uses standard testing terminology, a glossary of which can be found on the International Software Testing Qualification Board website www.istqb.org

Table 2 - Abbreviations & Acronyms

Abbreviation	Meaning
APC	Auxiliary Proportional Controller
CH	Communications Hub
CHF	Communications Hub Function
CHTS	Communications Hub Technical Specification
CPL	Central Products List
CR	Change Request
CSP	Communications Service Provider
CTSD	Common Test Scenarios Document – Appendix R of the SEC
DBCH	Dual Band Comms Hub
DCC	Data Communications Company
DSP	Data Service Provider
DUIS	DCC User Interface Specification
ESME	Electricity Smart Metering Equipment
ETAD	Enduring Test Approach Document – Appendix J of the SEC
FAT	Factory Acceptance Testing
FOC	Final Operating Capability
GBCS	Great Britain Companion Specification
GPF	Gas Proxy Function
GSME	Gas Smart Metering Equipment
HAN	Home Area Network
HCALCS	HAN Connected Auxiliary Load Control Switch
HHT	Hand-held Terminal
MMC	Message Mapping Catalogue
MOC	Middle Operating Capability
PIT	Pre-Integration Testing
PPMID	Pre-Payment Meter Interface Device
SAPC	Standalone Auxiliary Proportional Controller
SBCH	Single Band Comms Hub
SEC	Smart Energy Code (The Code)
SECAS	Smart Energy Code Administrator and Secretariat
SECMP	Smart Energy Code Modification Proposal
SI	System Integrator
SIT	Systems Integration Testing
SMETS	Smart Metering Equipment Technical Specifications
SM WAN	Smart Metering Wide Area Network
SP	DCC Service Provider
SRV	Service Request Variant
TAB	DCCs Test Assurance Board
TAD	Testing Approach Document
TAG	SEC Panels Testing Advisory Group

Abbreviation	Meaning
TTM	Test Traceability Matrix
TTO	Transition to Operations
UIT	User Integration Testing

Table 3 – Reference Service Requests

Reference Service Request	Definition
11.1	Update Firmware
11.2	Read Firmware Version
11.3	Activate Firmware
11.4	Update PPMID Firmware

Glossary

Table 4 defines only terms that are specifically not defined in Table 2.

Table 4 - Glossary

Term	Meaning
Communications Hubs	means a physical device that includes a Communications Hub Function together with a Gas Proxy Function
DCC Meter Protocol Emulators	Testing Stubs developed by DCC to emulate the functional aspects of smart metering Devices
Devices	means one of the following individual devices: (a) an Electricity Smart Meter; (b) a Gas Smart Meter; (c) a Communications Hub Function; (d) a Gas Proxy Function; (e) a Pre-Payment Meter Interface Device; (f) a HAN Connected Auxiliary Load Control Switch; and (g) a Standalone Auxiliary Proportional Controller; and (h) any Type 2 Device.
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 June 2022 SEC Release Go Live.
User	means a Party that has completed the User Entry Process (and, in respect of Services available in accordance with this Code to Users acting only in one or more User Roles, a Party that has completed the User Entry Process for that User Role).
Test Stubs	means Systems and actions which simulate the behaviour of Devices and User Systems

Table of Contents

1 Introduction

1.1 General

This Testing Approach Document covers the proposed changes for implementation in the June 2022 SEC Release. This approach works in conjunction with the SEC Release Implementation Document for the June 2022 SEC Release, in accordance with Section D of the SEC.

The June 2022 SEC Release includes 4 SEC modifications. The changes delivered in the June 2022 SEC Release are outlined in the Scope section of this document.

This document sets out the information required of the 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 June 2022 SEC Release.

Please note both ECoS and June 2022 share parts of MP104 – XML Signing, in regard to the DUIS 5.1 document and the XML Schema. As such each programme has its own Test Approach Document to outline DCC's approach to this change.

1.2 Approval of this Document

NB: Sections 1.2 and 1.3 confirm the SEC Panel's Change Sub Committee 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) for SEC Modifications, these sections will be amended.

- This document is produced by DCC and a draft provided to the SEC Panel's TAG for their review
- In parallel the draft document shall also be issued to SEC Parties for consultation. The link to this will also be provided on the SECAS website. DCC shall consider the feedback from this consultation and, where appropriate, will revise the draft document
- The revised draft shall be presented to the Panel's TAG for recommendation to the SEC Panel's Change Sub Committee for an approval decision
- The SEC Panel's Change Sub Committee 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

For SEC Modifications, 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
- Prior to final approval it may be revised without further consultation to remove changes from scope where development and testing has not started and has no impact to the changes which remain in the scope of the release

2 Scope

The June 2022 SEC Release will modify the DCC Total System to accommodate the changes detailed in Table 5.

Table 5 Testing Scope for June 2022 SEC Release

CR #	SEC Modification #	PIT& SIT	Description
4117 / 4374	SECMP0007 Part 2**+**	Yes	Firmware Updates to Mandated HAN devices. Part 1 - DSP System Changes on track to be Implemented as part of November 2021 Release Part 2 - CSP System Changes Implemented as part of this release • CSP North: ○ SMWAN Gateway Interface updates. ○ Communications Hub Manager updates SEC ○ Regional Network Interface (RNI) ○ Business Support Systems • CSP South and Central ○ SM2M ○ Access Gateway ○ OI/OT Changes ○ CHDB Changes
4032	SECMP0024	Yes	Enduring Approach to Communication Hub Firmware Management
4112	MP0104	Yes	Security Improvements
4391	SECMP0015	No	GPF Timestamp for reading instantaneous Gas Values DUIS/MMC document changes ONLY • DUIS /MMC updates to support the proposed solution for SECMP00015 - GPF timestamp for reading instantaneous Gas values • This is to ensure a single DUIS version uplift in 2022 and avoid the need for a second DUIS version uplift in Nov 2022 • DCC System Changes associated with this SEC Mod are part of Nov 22 SEC Release Scope

+ To provide further context of the changes please see Table 6 for SECMP0007 release details.

Part 3: CSP New Comms Hub Firmware made available for use. Delivery will be post November 2022

Part 4 of SECMP0007: CSP Roll-out begins of new Firmware Version(s) to existing deployed Comms Hubs. Delivery will be post November 2022

Changes forecast for this Approach Document

At the time of producing this Testing Approach Document, the scope of this Release has been agreed. Should there be any change of scope of this Release, DCC will notify TAG of any material change.

2.1 Documents for June 2022 SEC Release

Table 6 lists the links to the SEC modification documents that were used to create this Testing Approach Document for the June 2022 SEC Release.

Table 6 Referenced Documents for June 2022 SEC Release

SEC modification link	Number
https://smartenergycodecompany.co.uk/modifications/firmware-updates-to-ihds-and-ppmids/	SECMP0007
https://smartenergycodecompany.co.uk/modifications/gpf-timestamp-for-reading-instantaneous-gas-values/	SECMP0015
https://smartenergycodecompany.co.uk/modifications/enduring-approach-to-communication-hub-firmware-management/	SECMP0024
https://smartenergycodecompany.co.uk/modifications/security-improvements/	MP104

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

2.2 Joint Testing Strategy and other DCC Testing Approach Documents

Where relevant, or where there is an apparent conflict with the Joint Testing Strategy, this Testing Approach Document for June 2022 SEC Release and any related Solution Test Plans developed for this Release will take precedence.

Out of Scope

The following Test Assurance activities are outside the scope of the testing approach for the June 2022 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
v. SECMP0007 Parts 3 / 4 Comms Hub Development. This will be delivered as part of a subsequent release.

3 Governance Approach

The June 2022 SEC Release will follow the governance of a SEC Release outlined in Section D of the SEC.

The June 2022 SEC Release will follow a standard Release Management approach through the B stream environments the following governance will apply:

- PIT will follow the standard governance approach of;
  A PIT Exit TAB which would confirm exit of PIT for the CSP, DSP, and the P&C delivery.
  Provide approval to move into SIT B.
  This could require multiple deployments from PIT to SIT-B
- Emulator assurance will be completed by the device team, and results presented to TAB for approval prior to deployment into SIT-B
- SIT will be executed in the SIT B environment and will follow the standard governance approach of a SIT Exit TAB which would confirm the exit of SIT and provide approval to move into UIT B / SIT A
- Route to Live will follow the standard Release Management approach which would see code moved from SIT-B into SIT-A and from UIT-B into UIT-A prior to go live
- SIT Completion will be achieved via approval from TAG and the SEC Panel's Change Sub Committee

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) Enable (to the extent that it is reasonably practicable to do so for the June 2022 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 for June 2022 changes

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

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

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

g) Verify that all other functional changes that are part of the June 2022 SEC Release are functionally correct including consequential amendments

h) Assure existing production versions of SMETS2 Single Band Communications Hubs and Dual Band Communications Hubs against June 2022 SEC Release changes

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:

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 June 2022 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 June 2022 SEC Release are:

- DUIS uplift to version 5.1
- MMC uplift to version 5.1
- A new version of the Parse & Correlate version (version - to be confirmed) will be introduced which will be backward compatible with all previous active DUIS versions.
- There is also an uplift to the supported version of Oracle Java that the Parse & Correlate software operates on (supporting Oracle Java 8).
- There is no update to Device Technical Specifications included as part of the June 2022 SEC Release ie GBCS, SMETS or CHTS.

The Functional Heatmap will be provided and added to Appendix A when available. This will detail the SRs, SRVs, DCC Alerts and other scenarios which will be tested for the changes in the June 2022 SEC Release. Below is a summary of the specific detail for each change and the high-level view of testing of June 2022 SEC Release new functionalities:

SECMP0007 (CR4117/4374) – Part 2 will be delivering CSP Infrastructure Impacted changes which support the increased demand for Firmware Update Service Requests and associated processing from DCC Users.

CSP North will deliver the following:

- SMWAN Gateway Interface updates.
- Communications Hub Manager updates
- Regional Network Interface (RNI) – to support a Firmware upgrade API to support release of new HAN device types
- Business Support Systems – to support enhanced reporting

CSP Central and South will deliver the following:

- SM2M Changes:
  - Modification to DSP Firmware upgrade API to support release of new HAN device types
  - Modification to the Firmware Validation Report in SD4.4.2 to notify the DSP with the status code 21 notifying that the CSP is unable to distribute firmware imaged due to insufficient capacity in the next firmware distribution window
- Access Gateway Changes:
  - Modification of the DSP Firmware Upgrade API to support receipt of the new HAN device types in Firmware Upgrade requests
- OI/OT Changes:
  - Existing firmware traps to carry additional HAN devices firmware distribution details
- CHDB Changes:
  - Normalisation of modified firmware SNMP traps
  - Data Model changes to aid reporting

For Part 2 delivery, Testing will undertake regression testing the Part 1 delivery (which was delivered in November 2021) to support the testing of the CSP infrastructure changes in.

Part 1 was delivered as part of November 2021 Release. Part 1 delivered the Firmware Distribution Progress Tracking element. Part 1 did not include any new Device Alerts from Comms Hubs, as there was no HAN tracking in Part 1.

SECMP0007 Parts 3 and 4. This is expected to be delivered in later releases due to the unavailability of GBCS v4.1 compatible devices (mainly CHFs) along with further infrastructure modifications:

- New Device Alerts from Comms Hubs to provide notification of success/failure of HAN transfer
- Comms Hub firmware changes to support PPMID and HCALC firmware distribution and activation
- New DCC Alerts to notify Service User of Comms Hub Device Alerts and PPMID Device Alerts

The DSP Feature Switches delivery for Part 1 of SECMP0007 will be live and switched on as part of November 2021.

MP0104 (CR4112)

This CR implements a change to check that the User has used an ‘XML User Role Signing’ Private Key to Digitally Sign each Service Request and Signed Pre-Command, and shall cease processing the communication and notify the Service User if this is not the case.

The SECMOD will support the enhancement of DCC Systems which will confirm that the Certificate used for the Service Request and Signed Pre-Command has a remote Party Role of ‘xmlSign’.

Testing for this CR will include sending busines scenario Service Requests, against DUIS versions 3.0 to DUIS 5.1 to ensure the ‘xmlSign’ certificate validation is applied correctly and the new Response Codes to identify exceptions are working as per design.

SECMP0024 (CR4032)

This CR enables DCC systems to automatically notify suppliers once firmware updates have been activated on Communication Hubs (CHs).

This SECMOD supports the enhancement of DCC Systems to generate a new DCC Alert to the Service User upon successful activation of Communication Hubs firmware, containing the firmware version of the newly activated firmware.

Testing will include ensuring the new DCC Alert is sent to Users, and that the firmware version is clearly available.

SECMP0015 (CR4391)

For the June 2022 SEC Release, this SECMOD is only included as a DUIS / MMC document ONLY update. There are no DCC System changes associated with this SECMOD as part of this SEC Release. These DCC System changes will be in line with the November 2022 SEC Release.

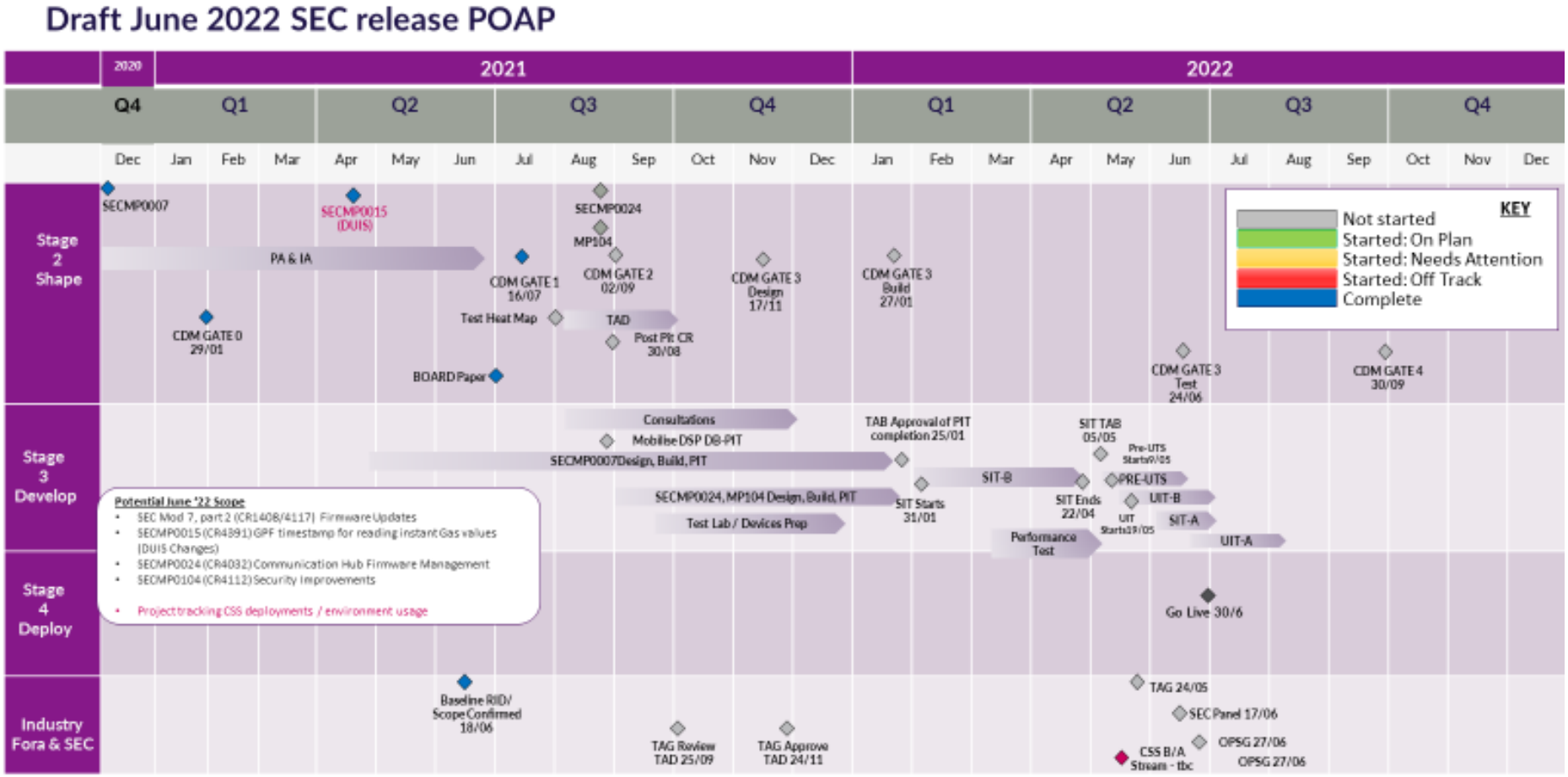
This CR enables the DCC Systems to implement changes to support Service Users and Devices reading the instantaneous values from the GPF to know the time on the GSMEs clock when the value is provided.

This SECMOD will also allow In Home Displays (IHDs) and Pre-Payment Interfaces Devices (PPMIDs) to determine and display the time of the last updates.

The GBCS / SMETS / CHTS and associated Device changes are targeted for the November 2022 SEC Release.

5.2 High Level Plan

A high-level draft plan as of 4 August 2021 is shown below. The plan is separate to the Test Approach Document, and TAG will be advised of any material changes.



Device Selection

The DCC shall recommend which of the existing Devices that are in use in production shall be employed to test the June 2022 SEC Release. As DCC are aware of Device issues outstanding from the November 2021 SEC Release, we will look to utilise alternative devices where necessary.

Emulators will be used for changes which require DUIS v5.1 GBCS v4.1 or SMETS2-November 2021, and where real Devices are yet to be available in the CPL. In addition, DCC will look to test already migrated SMETS1 Device sets to support SMETS1 testing.

The DCC shall notify TAG which Devices it recommends to use during the testing of the June 2022 SEC Release against. Where TAG believe that a Device has been wrongly excluded, they should notify the DCC within five [5] working days setting out the reasons for objecting as per the existing terms of reference. If the document is available for publication earlier, DCC will submit to the TAG chair for distribution to TAG members. DCCs expectation is that TAG will review the documentation prior to discussing it during the meeting. If there are any objections the DCC shall respond to the objection within three [3] working days of the meeting. Should the DCC and TAG continue to disagree on the exclusion of a device, then the decision will be referred to the SEC Panel for determination. The SEC Panels decision will be binding.

5.3 Description of Test Phases

The June 2022 SEC Release changes will be delivered using waterfall delivery methodology. The approach to testing of the June 2022 SEC Release will include defined Test Phases. Table 7 contains the test phases / stages, mandatory / optional, organisations involved to deliver and environments to be used.

Table 7 – Glossary of Phases and Stages

Test Phase	Test Stages	Mandatory (Y/N)	Organisation Involved	Environment Used
PIT	System Test (to include FAT)	Y	•DSP •DCC	PIT
TEF PIT	System Test (to include FAT)	Y	•CSP C&S •DCC	TEF PIT
ARQ PIT	System Test (to include FAT)	Y	•CSP N •DCC	ARQ PIT
SIT	Solution Test (using Devices/Appropriate Firmware for devices)	Y	•DSP •CSP •DCC	SIT B
	Solution Test (using Emulators)	Where Devices/Appropriate Firmware are not available)	•DSP •CSP •DCC	SIT B
	Solution Test Regression	Y	•DSP •CSP •DCC	SIT-A
UIT	UIT Proving/PreUT	Y	•SI •DCC	UIT B UIT A
	User Test	N	•Users •DCC	UIT B
	User Test	N	•Users •DCC	UIT A

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 only aspects of the changes in scope for June 2022.
- The CSP Pre-Integration Test (PIT) phase includes the testing by Communication Service Providers, undertaken individually, to verify that the solution meets the requirements. In this case it will the CSP C&S and the CSP N API and infrastructure changes in scope for June 2022.
- System Capacity Testing covers testing by DCC Service Providers to verify that the solution does not have any detrimental impact on performance and capacity
- 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/PreUT 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 Test Participants
    - For the June 2022 SEC Release, 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 June 2022 SEC Release

There may be multiple drops of code from PIT into SIT. Regression testing will commence after the final drop.

5.4 Delivery of Test Phases and Stages

The execution of the testing to support the June 2022 SEC Release will be undertaken in appropriate test environments as per Table 7.

The testing phases and stages to support the June 2022 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 DSP PIT). Should there be any contention in resources this will be escalated to the DCC for determination and any impact notified to Test Participants.

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

6 Test Phase Activity Description

This section of the June 2022 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 shall ensure that these requirements and focus areas are suitably covered by each DCC Service Provider and each testing 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 June 2022 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.

For the June 2022 SEC Release all changes will be delivered and tested in PIT for the DSP. Testing will include the feature switches for all changes both on and off.

It is expected for June 2022 SEC Release the CSP changes to the API and Infrastructure will be delivered and tested in their own PIT environment. Where the CSPs are unable to complete FAT testing in PIT due to the absence of adequate stubs/harnesses not being available FAT testing will be executed as part of SIT.

Table 8 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 Service Provider PIT shall include performance testing of the Modified DSP solution
PIT.3	DCC Test Assurance shall review the PIT test cases for the DSP, where used, for appropriateness and to ensure functional coverage
PIT.4	DCC Test Assurance shall review the PIT test cases for the CSP, where used, for appropriateness and to ensure functional coverage.
PIT.5	DCC Service Provider PIT shall cover all functional areas impacted for testing the June 2022 SEC Release
PIT.6	DCC Service Provider shall produce and maintain the PIT approach document, the System and FAT plan, test completion reports and Work Off Plans
PIT.7	The Communication Service Providers shall produce and maintain their PIT approach document, the System and FAT plan (where applicable), test completion reports and Work Off Plans.

6.2 Requirements & Focus Areas for Systems Integration Testing

SIT for the June 2022 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 June 2022 SEC Release only CR4032, and CR4112 will be tested in SIT fully. CR4117 / 4374 Part 2 will also be tested in SIT fully, however, a breakdown of CR4117 / 4374 is detailed below.

CR4117 / 4374 will be partially tested based on the scope of initial changes that will be available in June 2022 which mainly aligns to updated DUIS v5.1 implementation (DCC Alerts supported by DSP) and regression testing of the firmware distribution tracking for ESME / GSME Devices.

Note: The updated CSP solution will be tested against current production versions of the Communication Hubs, which is expected to be GBCS 3.2 and back ie 2.1. This is due to GBCS v4.1 devices are as yet available.

Similar to the November 2021 SEC Release, the remainder of the changes that fully complete and support the E2E processing parts of CR4117 / 4374 that go beyond the DSP systems for PPMIDS & HCALCS will remain behind a feature switch which will be activated once the CSP solutions (including Comms Hub updates) are implemented as part of subsequent releases. The Test Phase for this release will test the E2E delivery of firmware images to the PPMID / HCALC devices, bring in additional Comms Hub Device Alerts passed back to Users as DCC Alerts and also extend the and firmware distribution tracking to include these additional devices types.

NB: CR1408 is tested across 4 parts, with different functionality and expected outcomes based on scope of changes implemented. There will be further separate test approach documents; this document for June 2022 (Part 2), and further changes in subsequent releases, mainly additive in nature but some repeat tests, and those already delivered in Part 1 for the November 2021 SEC Release. Each part will have different outcomes expected based on updated functionality implemented.

The SI shall produce a SIT Approach Document detailing the testing to be undertaken during this Test Phase. This document shall be approved by the DCC and shall be shared with the Panel's TAG for information.

6.2.1 Testing in SIT

Table 9 SIT Requirements

Ref	Requirement
SIT.1	Regression testing will start following the final drop of code into the SIT phase. If issues are found after EOC, and fixes applied prior to Test Phase Completion, then further targeted regression testing will take place
SIT.2	2 EOC runs for June 2022 changes will be executed following SIT functional completion
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 the 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 unique 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 interfaces in DCC Systems
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 the DCC Emulator, testing must include 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	SIT will ensure 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.

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;

- There will be no deviation from test scripts
- There will be no hands-on execution by witness
- 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

UIT Proving / PreUT is expected to complete prior to the User testing window opening. To make effective use of time and reduce the timeline between SIT TAB exit and the User Testing window opening, DCC may look to split UIT Proving / PreUT activity into high and low priority. With high priority tests needing to be completed prior to opening of the User Testing window and lower priority running in parallel. Should any unplanned delays impact the start of UIT Proving / PreUT User Testing window will be maintained by running UIT Proving / PreUT in parallel. The provision of User Integration Testing (UIT) environments (UIT-A & UIT-B) and associated services is part of DCCs ongoing activities, this section describes the specific requirements and focus areas for the June 2022 SEC Release.

DCC shall 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.

There will be a 6 week period between the completion of SIT and promoting functionality to live operations where Users will be asked to volunteer to demonstrate that they can successfully operate the new June 2022 SEC Release functionality prior to the release going into production. Users may also carry out User Regression Testing to demonstrate that the June 2022 code does not adversely affect their existing production service.

Should DCC need to reduce the 6 week UIT period, then DCC will present its proposal and rationale to TAG for its endorsement. Where TAG endorses DCCs proposal, then the reduced period shall be adopted. Where TAG and DCC disagree on the duration, then the matter shall be referred to the SEC Panel for determination. Where a reduction to the planned 6 week period is agreed, this shall be promptly communicated to Test Participants.

There are no changes required to the Common Test Scenarios Document (CTSD).

Table 10 UIT Requirements

Ref	Requirement
UIT.1	UIT will enable Parties to test the June 2022 SEC Release functionality up to a 6-week window.
UIT.2	UIT will be planned for Parties to be able to test against their systems and devices ahead of the Release "Go Live"
UIT.3	The deployment of releases into UIT will be subject to specific entry criteria to ensure minimal risk of disruption to ongoing participant testing in the environment
UIT.4	UIT shall include the capability for Users to verify their end-to-end data is operating correctly over DUIS
UIT.5	Volunteer Users with Devices deployed in Production are asked to confirm whether they intend to test and also what they intend to test eg Regression, new functionality and impacted SRs, during the UIT window at least 20 working days prior to its start and agree to complete 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 environment is secure.

6.4 System Capacity Testing

The System Capacity testing requirement has been assessed for the June 2022 SEC Release and as the changes in this release do not materially impact the use of the DCC Total Systems it is deemed that System Capacity testing is not required.

6.5 Security Testing

DCC security considers security functional testing and assurance of controls as a shared responsibility between the software developer and the ANSO provider.

DCC requires an appropriate level of security assurance for entry into each test environment.

Positive testing of security functional controls is met as part of normal SIT functional testing.

As accepted and agreed with SSC, PIT can be utilised to complete specific negative tests as defined if necessary. All SPs have as part of their TTMs, test conditions mapped to SIT.

The DCC approach considers the risk model, good practice and the obligations laid out in SEC Section G2.13:

“The DCC shall ensure that an organisation which is a CHECK service provider carries out assessments that are designed to identify any vulnerability of the DCC Systems to Compromise:

(a) in respect of each DCC System, on at least an annual basis;

(b) in respect of each new or materially changed component or functionality of the DCC Systems, prior to that component or functionality becoming operational; and

(c) on the occurrence of any Major Security Incident in relation to the DCC Systems”

Scope of Security Testing covers:

P&C D5.1-G4.1	Application Security test (Code Review)
P&C Java 8 uplift	Application Security test (Code Review)

6.6 Requirements and Focus Areas for Transition to Operations Testing (TTO)

This section is added for information only and does not form part of any Exit Criteria for PIT or SIT.

The TTO Test Phase may include Business Acceptance, Operational Acceptance, and Security related requirements as focus areas to transition the June 2022 SEC Release solution to operations. TTO Testing shall focus upon the service management processes as SIT will have tested technical end-to-end functionality. Support from the DCC Systems Integrator and CSPs is required to carry out internal and external testing as part of TTO Testing.

The above TTO activities will be tracked by the Service Transition Manager who will be responsible for ensuring they are completed as part of the Operational Acceptance activities, supported by specific Service Acceptance Criteria specified by the impacted Operations team. Where the delivery of TTO activities sit outside of Operations, the Service Transition Manager will work with the programme to identify the Accountable person for delivering the required level of assurance that the TTO activities have been completed to the required level of satisfaction. The Service Transition Manager will track and ensure the activities are completed in line with the agreed Service Acceptance Criteria as documented in order to meet Operational Assurance.

7 Test Activities

For each mandatory Test Phase, the following activities will be performed;

- 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
- 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

For the June 2022 SEC Release, DCC is seeking to further improve testing throughput. By making more effective use of automation in SIT and extending the SMETS1 automation solution to encompass SMETS2 functionality we 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 June 2022 SEC Release will have the following critical areas for testing.

- 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 functionalities only for backwards compatibility
- Devices can be installed and commissioned and can operate as per the requirement using the changed code
- Changes introduced as part of the June 2022 SEC Release are working as per the requirement

Priority, within the design of testing for the June 2022 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, which are yet to be introduced into the CPL or EPCL, shall in general, only be conducted where devices are unavailable to be tested in SIT. Where testing makes use of the SIT emulator, necessary testing shall include emulator configuration to provide valid data in a service response. Where new emulator functionality is required, the device will be subject to testing and assurance.

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)
- Prerequisites
- 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

DCC will review testing progress with Parties at the DCC monthly testing forum – the Testing Design and Execution Group (TDEG).

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

Test scenarios must cover exercising all 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 Providers 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:

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 the table below.
Note: for the PPMID (v8.2) which was used across November 2021 will also be used for June 2022. This is equivalent to S2v2 GBCS 1.0.

DUIS	P&C	CH/MMC	Devices
5.0	5.1	GBCS 3.2CH* (CHTS1.3)	S2v4.2
5.0	5.1	GBCS 2.1CH SBCH/DBCH	S2v4.2
5.0	5.1	GBCS 2.1CH SBCH/DBCH	S2v3.1
4.0	5.1	GBCS 3.2CH* (CHTS1.3)	S2v4.2
4.0	5.1	GBCS 2.1CH SBCH/DBCH	S2v4.2
4.0	5.1	GBCS 2.1CH SBCH/DBCH	S2v3.1
3.1	5.1	GBCS 3.2CH GBCS 2.0CH	S2v3.1

    - Regression will cover Critical Business Scenarios and Impacted SRs
- SMETS1 Regression Test Coverage will include the following:
    - Functionality will be tested across a set of DMCs
    - Regression will include MDS & MOC Secure, and FOC
- Wherever practicable, regression testing will be automated
- Regression testing will start following the 2nd 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 Users
- 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 being used in production and available in the CPL

As the support for DUIS 1.0 and DUIS 2.0 is no longer available from November 2021, regression testing will not cover these interfaces.

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 June 2022 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 author for individual Test Phases will create the deliverable, which will be subject to the established governance processes. Below is a list of responsible teams for various test phases.

- PIT – DSP
- PIT - CSP
- SIT – DCC Systems Integrator
- TTO – DCC

The table below describes the generic content and anticipated timing of the deliverables that may be required to be produced for each Test Phase

Table 11 – 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 PreUT	Following any review cycles, a final version shall be submitted to DCC by the relevant DCC Service Providers including Communication Service Providers 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 Communication Service Providers 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 PreUT	Made available by DCC Service Providers including Communication Service Providers for review by DCC throughout test execution
Test Issue Log	Outstanding Testing Issues	PIT SIT PreUT	Made available by DCC Service Providers including Communication Service Providers 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 Communication Service Providers 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 • Test issue I.D. detail for failed tests • Number of test issues outstanding, split by severity • Number and severity of test issues raised • Explanation of any Testing Issues which have not had retests associated • Specification of test environment used • Recommendations for tests to be included in the next Test Phase • Lessons learnt during the Test Phase	PIT SIT PreUT	DCC will work closely with the DCC Service Providers including Communication Service Providers 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 Communication Service Providers at the same time as the finalised Solutions Test Plan
Work Off Plan	A plan to resolve (fix, retest and close) outstanding issues. Once the fix is made available, retesting of the issue should be completed within [5] Working Days.	PIT SIT PreUT	To be provided to DCC by DCC Service Providers including Communication Service Providers 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 applicable change as listed in Section 5.1. 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.

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.

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 coexistence 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 June 2022 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 June 2022 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, except for UIT which shall have no Test Plan, or Test Specification:

- Solution Test Plans signed off
- Test Phase Completion Certificate for preceding Test Phase issued, unless advanced agreement that Test Phases may overlap
- Test Specification & heat map prepared, including traceability to Requirements / Design documents
- Test labs, Devices, tools, stubs, environments, and data are assured and accepted as fit for purpose, including external assurance, where applicable
- Regression test pack has been prepared or updated
- DCC and all relevant Service Providers have confirmed they have resources with the requisite skills and access available to support the Test Phase
- Approval to proceed certificate issued by DCC, unless the plan states that Test Phases may overlap
- 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

9.1.2 Generic Exit Criteria

The following generic Exit Criteria will gate the exit of all Test Phases except UIT:

- For PIT it is expected all tests will be run, any exceptions documented and agreed by TAB
- For SIT all tests run, or any exceptions documented and agreed by TAB and TAG.
- All test success criteria achieved, or any exceptions documented and agreed by TAB and TAG.
- The number and severity of any outstanding Test Issues is at or below the target thresholds, or any exceptions documented and agreed by TAB and TAG.
- Test results documented, and evidence captured
- Set of test issue logs have been produced
- Regression testing successfully completed with no new testing issue arising
- Production of agreed Work Off Plans for any outstanding Test Issues that have been identified during the Test Phase
- Work Off Plans from preceding Test Phases have been completed
- Test Phase Completion Reports have been produced and, where required, Test Completion Certificates have been issued by DCC

9.2 Specific Entry and Exit Criteria for Test Phases

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 Entry Criteria for SIT shall include, among other things:

- DCC to ensure all required devices and Emulators are available 2 weeks before commencement
- The remaining generic entry criteria has been met 1 week before SIT commencement
- Successful assurance of SIT test data
- 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

9.2.2 Exit from SIT

All specific Exit Criteria for SIT documented within the Solution Test Plan has been met and any exceptions to this must be agreed at TAB, TAG and SEC Panel.

9.2.3 Entry into UIT

The Entry Criteria for UIT shall include but not limited to:

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

9.3 Acceptance Process Following SIT Completion

Following the agreement of SIT completion for SEC Modifications, DCC will:

- Notify the Panel and Parties that SIT has ended
- DCC will provide the Panel with copies of the SIT Completion Report(s) along with a list of those sections of such reports that it considers should be redacted
- DCC will review the documentation and evidence to support the relevant Entry and Exit Criteria with the Panels TAG to inform the Panel to enable their decision regarding the completion of SIT
- 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 Test Phase Success Criteria

For SIT the following Test Success Criteria will be included in the Exit Criteria:

1. 100% of the functional tests listed in the Test Specifications have been executed, or any exceptions documented and agreed with TAB, and subsequently reported to the Panels TAG for agreement, and to the Panel.
2. At least 90% of the functional tests executed relating to the new functionality have been passed, all failures are documented, and Testing Issue related to failures are as per the agreed Testing Issue Threshold in Section 9.5 of this document
3. Regression testing in SIT achieves a 100% pass rate or any exceptions documented and agreed with TAB, and subsequently reported to the Panel's TAG for agreement, and to the Panel.
4. 100% of End of Cycle Tests have been executed, with a pass rate of 90% excluding; known Testing issues or pre-existing issues at the start of End of Cycle testing; and any new Testing Issue arising since the start of End of Cycle testing where such exclusions are approved by the TAG. We expect to see the same results across End of Cycle 1 and End of Cycle 2 except in exceptional circumstances.

9.5 Testing Issues Threshold

Table 12 lists the standard thresholds for outstanding testing issues in each test phase. These shall be calculated by each Service Provider.

Table 12 – Testing Issue Threshold

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

Note that:

- The Testing Issue 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. For example, there will never be more than 15 Severity 3 defects per Service Provider at an exit gate. This release has CSP C&S, CSP N, and DSP changes so the thresholds above are applicable across all changes for the June 2022 SEC Release
- Meter manufacturer defects will not be included in the Testing Issue Threshold. Evidence will be sought that the meter manufacturer has accepted the Testing Issue. Where a meter manufacturer Issue is found, testing will be conducted using an alternative manufacturer where possible to prove functionality.
- Testing and Pre-Existing Issues identified as known Production Testing Issues will not be included in the Testing Issue Threshold
- 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 completion of SIT the DCC shall present all extant Testing Issue identified during the June 2022 SEC Release testing to the Panel's TAG 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 or UIT, and this matter impacts achievement of a Test Phase Defect threshold, the DCC may refer the matter to the Panel for its determination, which shall be final for SEC Modification defects.

9.6 Work Off Plans

Work off plans, shall be produced detailing the defects 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 quality gate meeting
- For Severity 4 defects, within 40 Working Days from the quality gate meeting
- For Severity 5 defects, within 60 Working Days from the quality gate meeting

The resolution of a test issue will require the Service Provider to fix, retest and close the Testing Issue.

If the timescales for the Work Off plan are not going to be met, the Service Provider shall promptly produce and agree a correction plan with TAB.

If a Test Phase Complete 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 shall revoke the Test Phase Complete 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 the CSP (where applicable) for PIT and the SI with input from SPs SIT and UIT Test phases, in adherence to the Joint Test Strategy, on a frequency to be detailed in the Solution Test Plans.

10.1 Tracking & Reporting

HPs Application Lifecycle Management (ALM) Test Management tool will be used to manage testing and Testing Issue [1].

All requirements, scripts, tests, execution results, and Testing Issue 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 SIT Completion Reports

DCC will produce its own Test Completion Reports when it considers that the Exit Criteria required by the SIT Solution Test Plan have been met. The report will provide evidence of:

- Testing undertaken
- The results of testing
- De-scoped Scenarios, Requirements or Test Cases
- Any Variances from the Test Approach
- Observations
- Acceptance of issues from 3rd parties such as Meter Manufacturers
- How Exit Criteria have been met.

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

[1] Except where not applicable for PIT

11 Acceptance and Test Assurance

DCC has established processes for the acceptance of testing activity completion – these will continue for the June 2022 SEC Release. The TAB will conduct quality gate meetings and review testing completion reports before 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
- Test Quality Audits
- Product Inspections
- Document Review

11.2.1 Quality Gating and the Test Assurance Board

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 from PIT into SIT and exiting SIT are operated as TAB gates.

11.2.2 Test Witnessing

DCC will agree, in advance, with the SPs, including the CSPs (where applicable), and DSPs, 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 Teams. The witness will have the skills required to fulfil the role. The SP will provide the witness with relevant documentation and access.

For the June 2022 SEC Release DCC Test Assurance 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, which includes the CSPs (where applicable), and the DSPs, 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 specific 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 obligations 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, and TTO; 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, 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

12.2 Test Stubs

This Testing Approach Document allows for the use of Test Stubs, where appropriate, across each of the Testing Phases to support entry into and completion of those Phases. Individual Service Providers, DCC, and Testing Participants may utilise Test 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 an actual device does not exist.

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

DCC uses a variety of device emulators capable of emulating:

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

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

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

DUIS 5.1, MMC v5.1, GBCS v4.1, CHTS v1.5, and SMET-November 2021

The emulators used for the November 2021 SEC Release will also be applied to June 2022, but updated to support a full OTA for HCALCS and PPMID device emulators as well as extended GBCS v4.1 Tech Spec content.

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.

Whilst there are no firmware changes required for June 2022 therefore CSP 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. Roles and Responsibilities

All parties involved in the June 2022 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, at the point of raising the issue or during triage, and recorded as such on the test management tool

12.4 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 test 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

12.5 DCC Service Providers

DCC shall ensure that the Service Providers (including DCC in its role as provider of Enterprise Systems) 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 test 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 test issues for their solution elements and undertake PIT testing (including regression testing) of any fixes required.

12.6 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, including 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

13 Environments

The June 2022 SEC Release will use the standard release approach through the B - stream DCC environments.

These environments will be available as required by the overall plan for the June 2022 SEC Release. Specific deliverables relating to the management and use of environments, particularly co-existing with other programmes, has been published by DCC. This will clarify the approaches to usage of the environments by the June 2022 SEC Release and other projects. DCC will also be presenting regular portfolio level updates to TAG on use of environments.

13.1 Code Management

DCC will operate a process to merge code changes into the test environments used by the June 2022 SEC Release. The SIT Approach Document will provide detail of the frequency of the operation of this process.

14 Appendices

14.1 Appendix A - Functional Heat Map

DCC are still defining the detail of the Functional Heat Map which will outline all the SRs, SRVs, Alerts and other scenarios which may be tested for the changes in the June 2022.

14.2 Appendix B – Device Selection Process

Test approach / planning workshops were 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 selection of Devices considered a risk-based approach to selecting appropriate meter sets.

Device selection considerations were as follows:

- Current production use (“Day 1”)
- Soon-to-be production use (“Day 2”)
- The testing of all Comms Hub types
- 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 S2V4]
- Real PPMID devices will be used as per the device availability.