June 2023 SEC Release
Testing Approach Document

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Document Control

Revision Date	Summary of Changes	Changes Marked	Version Number
05/10/2022	Initial Draft	n/a	0.1
17/10/2022	Internal Review	Yes	0.2
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References

Table 1 – References

Ref	Title	Source	Date	Version
1	Glossary of Testing Terms	ISTQB	Mar 2016	3.1
4	June 2023 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 2023 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
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
GSME	Gas Smart Metering Equipment
HAN	Home Area Network
HCALCS	HAN Connected Auxiliary Load Control Switch
HHT	Hand-held Terminal
IOC	Initial Operating Capability
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
SCT	System Capacity Testing
SEC	Smart Energy Code (The Code)
SECAS	Smart Energy Code Administrator and Secretariat
SI	System Integrator
SIT	Systems Integration Testing
SMETS	Smart Metering Equipment Technical Specifications
SMKI	Smart Metering Key Infrastructure
SM WAN	Smart Metering Wide Area Network
SP	DCC Service Provider
SRV	Service Reference Variant
SSC	Security Sub Committee
TAB	DCC's Test Assurance Board
TAD	Testing Approach Document

Abbreviation	Meaning
TAG	SEC Panel's Testing Advisory Group
TTM	Test Traceability Matrix
UIT	User Integration Testing

Glossary

Table 3 defines only terms that are specifically not outlined in Table 2.

Table 3 - Glossary

Term	Meaning
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 2023 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 7
1.1 General 7
1.2 Approval of this Document 7
1.3 Revision of this Document 8

2 Scope 9
2.1 Documents for June 2023 SEC Release 9

3 Governance Approach 11

4 Objectives of Testing 12
4.1 Testing Objectives 12

5 Testing Approach 13
5.1 High Level CR Detail and Test Approach 13
5.2 High Level Plan 17
5.3 Description of Test Phases 18
5.4 Delivery of Test Phases and Stages 20

6 Test Phase Activity Description 21
6.1 Requirements & Focus Areas for Pre-Integration Testing 21
6.2 Requirements & Focus Areas for Systems Integration Testing 22
6.2.1 Testing in SIT 22
6.2.2 Service Provider Witness Testing in SIT 23
6.3 Requirements & Focus Areas for User Integration Testing 23
6.4 System Capacity Testing 24
6.5 Security Testing 25

7 Test Activities 26
7.1 Test Method 27
7.2 Test Scenarios 28
7.3 Regression Testing 29

8 Deliverables 30
8.1 By Test Phase 30
8.2 Requirements Traceability 33

9 Test Procedure 34
9.1 Generic Entry and Exit Criteria 34
9.1.1 Generic Entry Criteria 34
9.1.2 Generic Exit Criteria 35
9.2 Specific Entry and Exit Criteria for Test Phases 36
9.2.1 Entry into SIT 36
9.2.2 Exit from SIT 36
9.2.3 Entry into UIT 37
9.3 Acceptance Process Following SIT Completion 37
9.4 Testing Issues Threshold 37
9.5 Work off Plans 39

10 Test Result Management & Reporting 39
10.1 Tracking & Reporting 39
10.2 SIT Completion Reports 40

11 Acceptance and Test Assurance 40
11.1 Service Provider Self Assurance 40
11.2 Test Assurance by DCC 41

11.2.1 Quality Gating 41
11.2.2 Test Witnessing 42
11.2.3 Test Observation 42

12 Test Resources 43
12.1 DCC 43
12.2 Test Stubs 44
12.3 Test Laboratories 45

13 Roles and Responsibilities 45
13.1 DCC Systems Integrator 45
13.2 DCC Service Providers 46
13.3 DCC 46

14 Environments 47
14.1 Code Management 47

15 Appendices 47
15.1 Appendix A - Functional Heat Map 47
15.2 Appendix B – Device Selection Process 48

1 Introduction

1.1 General

This is a Testing Approach Document to cover the changes being implemented as the June 2023 SEC Release. This approach works in conjunction with the SEC Release Implementation Document for the June 2023 SEC Release, in accordance with Section D and the requirements of Section L of the SEC.

The June 2023 SEC Release includes three modifications and threeo DCC Internal System Changes. The changes targeted to be delivered in the June 2023 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 2023 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) for SEC Modifications, 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
- In parallel the draft document shall also be issued to SEC Parties for consultation. SEC Parties will have until 10 November 2022 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 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

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 2023 SEC Release will modify the DCC Total System to accommodate the changes detailed in Table 4.

Table 4 Testing Scope for June 2023 SEC Release

CR #	SEC Modification #	PIT & SIT	Description
4483	MP102B	Yes	Power Outage Alerts triggered by an OTA firmware upgrade – Enduring Solution
4425	MP125	Yes	Correcting Device information for the ESME Variant
4427	-	Yes	Implementation of Additional XML Signing Credentials (Enduring Scope) Part 2
4703	-	Yes	SMKI Improvements
4382	MP128A	No	Gas Network Operator SMKI Requirements
4805	-	Yes	Parse and Correlate (in alignment with DUIS v5.2; MMC v5.2; GBCS v4.2)

Changes forecast for this Approach Document

At the time of producing this Testing Approach Document, the exact scope of this release has been determined as outlined in Table 5. Should there be any change to the scope of the June 2023 SEC Release, this document will be updated and shared for further review and approval.

2.1 Documents for June 2023 SEC Release

Table 5 lists the links to the SEC modification documents that were used to create this Testing Approach Document for the June 2023 SEC Release.

Table 5 Referenced Documents for June 2023 SEC Release

SEC modification link	Number
https://smartenergycodecompany.co.uk/modifications/correcting-device-information-for-the-esme-variant/	MP102B
https://smartenergycodecompany.co.uk/modifications/power-outage-alerts-triggered-by-an-ota-firmware-upgrade-enduring-solution/	MP0125
https://smartenergycodecompany.co.uk/modifications/gas-network-operators-smki-requirements/	MP128A

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

Out of Scope

The following assurance activities are outside the scope of the testing approach for the June 2023 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

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3 Governance Approach

The June 2023 SEC Release will follow the governance of a SEC Release outlined in Section D of the SEC.

The June 2023 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 DSP, CSPs, S1SPs, DCO and the Parse & Correlate delivery.
    - Confirm support for promotion into SIT-B.
    - This will require multiple deployments from PIT to SIT-B
- If required, Emulator assurance will be completed by the device team, and results presented to TAB for approval prior to deployment into SIT-B
    - Note: No emulator assurance is required for June 2023 SEC Release, as the intention is to re-use the emulator 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) Parse & Correlate v D5-G4-4.01 PIT results will be taken to TAB for approval before deployment into SIT-B
- SIT will be executed in the SIT B Environment and will follow the standard governance approach of :
    - DCC's Test Assurance Board (TAB) confirming the exit of SIT, to support code promotion into UIT-B / SIT-A
    - TAG approving SIT Completion
- 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.

[1] Parse and Correlate deployment into SIT-B environment will be done as part of ECoS Programme to support DUIS v5.2, and is aligned to DUIS v5.2, GBCS v4.2, MMC v5.2 as per MP125

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 2023 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

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 2023 SEC Release are functionally correct including consequential amendments

h) Assure SMETS2 Single Band Communications Hubs and Dual Band / Fylingdale Communications Hubs against June 2023 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:

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 June 2023 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 2023 SEC Release are:

- DUIS uplift to version 5.2
- MMC uplift to version 5.2 (version change only to remain in line with DUIS version)
- Changed DSP functionality introduced as part of June 2023 SEC Release to support existing Technical Specifications (GBCS 4.2, SMETS and CHTS)
- Parse & Correlate version D5-G4-4.0 will be introduced which will be backward compatible with and will parse to DUIS v3.0, v3.1, v4.0 & 5.0 as well as DUIS v5.1

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 June 2023 SEC Release. Below is a summary of the specific detail for each change and the high-level view of testing of June 2023 SEC Release new functionalities:

MP102B (CR4483) is delivering an enduring solution to Power Outage Alerts triggered by an OTA firmware upgrade.

Power Outage Alerts triggered by an OTA firmware upgrade - enduring solution

- The DCC systems shall adapt Request Management in southbound processing to build a tracking mechanism that involves recording the firmware activation time for any on demand or future dated firmware activation Service Requests sent to the relevant MM1 ESME Devices
- In northbound processing, Request Management will not create an AD1 Alert for a POA that is received within 30 minutes of a firmware activation on a tracked MM1 ESME Device. The details of the suppressed AD1 Alerts will be recorded within the ‘Power Outage Suppression Log’

Testing will ensure AD1 alerts are suppressed for a period of time, following an ESME firmware OTA, for an ESME device that is included in the GUID list of devices required AD1 alert suppression along with the suppressed alerts are being logged and reported via the ESI interface to DCC.

ESME emulators will be used in lieu of a physical MM1 ESME to simulate the generation of AD1 alerts and to exercise the DSP functionality in SIT. An OTA firmware update instruction will be sent to DSP with a ESME GUID identifying a MM1 ESME. The DSP solution in test will track this instruction with the same GUID and verification that the DSP solution in test is

suppressing these AD1 alerts and adding these to the DSP 'Power Outage Suppression Log' will be verified.

MP125 (CR4425) is delivering correction of device information for the ESME Variant

The DCC systems shall validate that the ESME Variant device status is 'Whitelisted', 'Installed Not Commissioned' or 'Commissioned' within the Smart Metering Inventory (SMI) when the Responsible Supplier sends a SR8.4 'Update Inventory' to correct the ESME Variant.

- GSME validations remain
- ESME is verified for a valid status before update not just being in 'Pending' status
- ESME update is verified that the DCC Service User is authorised to execute the Service Request not just be the same that added it to the DCC Data Systems.

Note: Appendix AD 'DCC User Interface Specification' (DUIS) – DCC will provide the legal text with the DUIS documentation changes as part of the DCC Impact Assessment. This change will affect the DUIS, there are no changes to the DUIS Schema. The DCC User Gateway Interface Design Specification (DUGIDS) documentation will also be updated to describe the revised behaviour of SR8.4

This will be handled within the DSP systems.

Testing will ensure impacted SMETS2 devices with multiple DUIS versions, will go through Install and Commission process with SR8.4 to update the ESME Variant in each of Pending, Installed Not Commissioned and Commissioned statuses. This will be covered across other Business Scenarios like Change of Supplier ensuring the new Supplier is able to update the ESME Variant.

MP128A (CR4382) – Gas Network Operator SMKI Requirements

This change is not impacting DCC Systems but is updating DCC Tech Spec wording changes for (GBCS/SMETS/CHTS) for June 2023 designation versions.

Note: There will be an addition to SEC Appendix B 'Organisation Certificate Policy' Section 4.9.1 (A) 'Circumstances for Revocation' and an update to DCC internal processes to ensure these Certificate Revocation Requests are accepted as valid.This is a document only update.

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CR4427 – Implementation of Additional XML Signing Credentials (Enduring Scope) – Part 2

The DCC Systems to implement a series of changes across its Systems and Service Providers to ensure compliance with a recent SEC change in relation to the use of XML signing certificates. This change has been raised to implement the use of these new credentials across DCC systems outside of the required ones for ECoS implementation (which are covered separately as part of the ECoS Programme).

There is no current requirement for the validation of these signatures by the receiving parties at the present time, but this will need to be introduced at some point in time with a backstop date of expiry or revocation of the current certificates being used. This CR controls the implementation path.Testing will ensure the additional remote party roles will be introduced across the various impacted interfaces between the SPs.

Affected Service Providers:

- DSP (remaining changes)
- CSPs
- S1SPs
- DCO
- SI

Note: CR4427 Part 1, changes associated with the interface between DSP – Service Users has been implemented across November' 22 SEC Release.

Testing will ensure the additional remote party roles will be introduced across the various impacted interfaces between the SPs.

CR4703 – SMKI Improvements

The GNO anchor slot (Root Certificate) has been populated on approx. 1m devices with a certificate belonging to a party which does not want to take part in the SEC and these need to be replaced with the ACB cert., awaiting the on-boarding of a new GNO which when ready will use SRV 6.21 to install their cert. DSP system changes:

1. Data Management Application
    - Amend CNF validation rules to cater for new recovery method and CNF validation to support higher throughput
    - Ensure DB updates are replicated to the reporting DB in a timely manner and do not result in a significant lag.
    - Investigate potential to amend CNF validation to allow volume of devices limit to increase from 100k.
2. Sheep-dip Application
    - Amend validation for new recovery method and investigate potential to amend validation to support >100k devices
3. Recovery Application
    - As per Sheep-dip changes
    - Amend processor framework to allow work amendments during running.
    - Amend to enable the rate of processing to be varied during processing.

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- Amend GBCS signing to utilise the native HSM code rather than slower bespoke code

4. HSM Crypto Algorithm
    - Update recovery HSM algorithms within SEE to use standard commercial ECDSA not GBCS variant to allow 2k TPS not 60 TPS inc. reconfig. of key material on HSM and Hard Server on the Application to apply the new algorithm.
5. General
    - Review performance of all stages and amend design/implementation with an aim of achieving target throughput.
    - It may be necessary to upgrade hardware: Bottlenecks will need to be determined once app. has been amended.

Testing will ensure the new SMKI Recovery method allows DCC to instruct replacement of a Network Operator certificates for both Electricity Distributor and Gas Transporter roles, along with a dynamic file handling of Recovery Application files within the scope of a single Key Ceremony. Along with Regression testing to ensure existing functions are not affected.

Testing will also ensure Performance non-functionals are achieved based on a scaled set of tests reflecting smaller infrastructure footprint. (As well as confirming the performance of the revised signing mechanism.) This will be covered separately under Capactiy Based Testing.

Note: This is a change to improve the SMKI recovery process for both functional and performance aspects.

CR4805 – Parse & Correlate

Alignment of Parse and Correlate with DUIS XML Schema v5.2, GBCS v4.2, MMC v5.2 as per MP125.

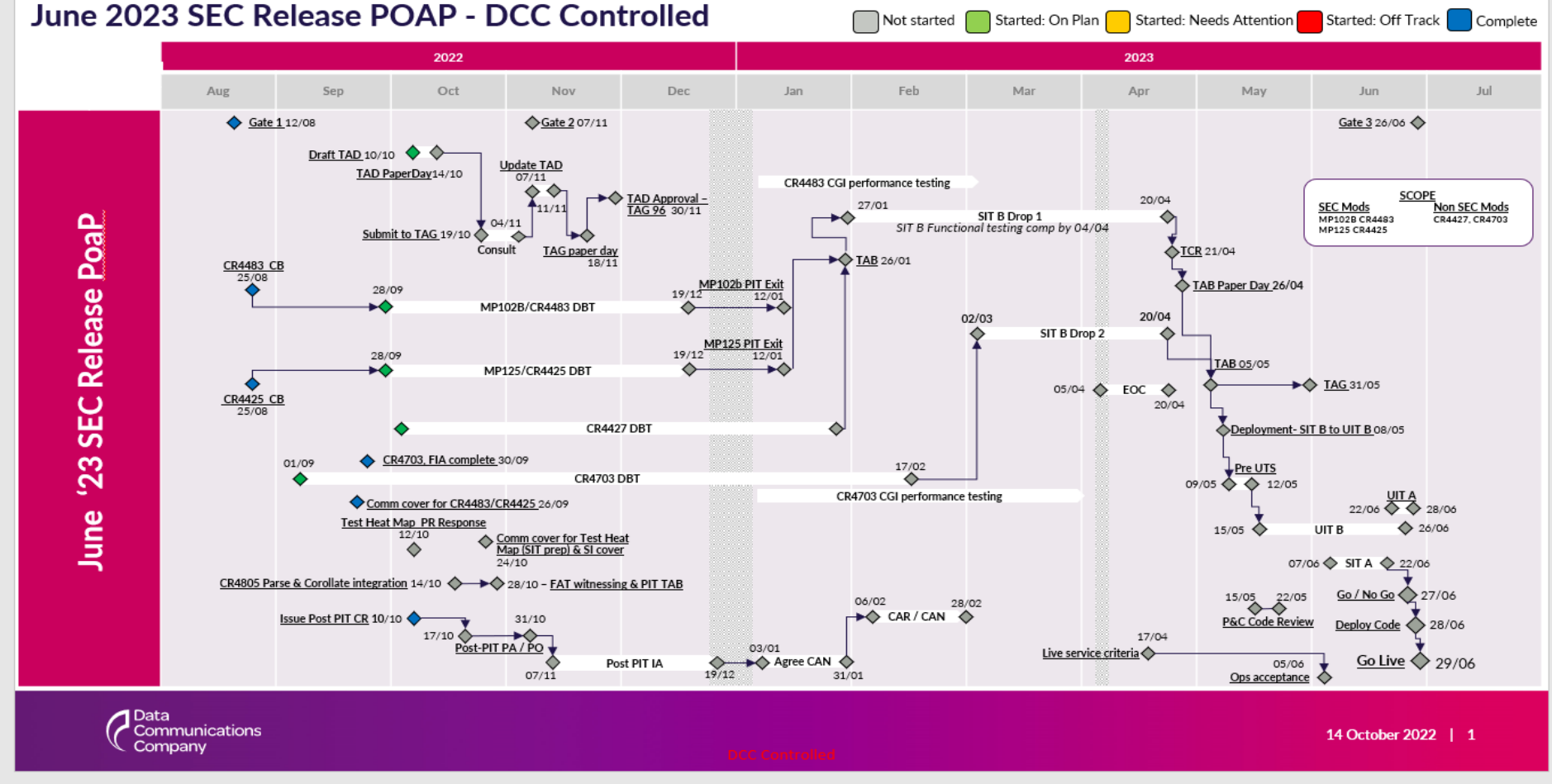
P&C version is being uplifted to D5-G4-4.0, aligning with technical specifications DUIS v5.2, MMC v5.2 and GBCS v4.2 (as confirmed in new technical specifications designated as part of June 2023 SEC Release)

Note: ECoS uses an internal ONLY development version of DUIS v5.2 with the single ECoS change to complete testing. June 2023 SEC Release testing then adds in extras (as appropriate) to create a full official DUIS v5.2. Update to Parse and Correlate software is only for June 2023 SEC Release testing scope and no interim updates are required to support ECoS testing.

Testing will ensure the new Parse & Correlate D5-G4-4.0 is compatible with DUIS v5.2 along with being backward compatible to the existing DUIS versions.

5.2 High Level Plan

A high-level final plan as of 14 October 2022 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 2023 SEC Release against.

Emulators will be used for changes which require DUIS v5.2, GBCS v4.1[2] or SMETS2 devices as outlined in this Approach Document for June 2023, and where real devices are yet to be available in the CPL or the EPCL. In addition, DCC will carry out SMETS 1 testing using pre-migrated Device sets to support CR4427 testing across migration.

The DCC shall notify TAG which Devices it recommends using during the testing of the June 2023 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 2023 SEC Release changes will be delivered using waterfall delivery methodology. The approach to testing of the June 2023 SEC Release will include defined Test Phases. Table 6 contains the Test Phases / Stages, mandatory or not, organisations involved to deliver and environments to be used.

[2] GBCS v4.1 CHs are being tested by the GBCS v4.1 Programme and is out of scope of June' 23 SEC Release testing.

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Table 6 – Testing Phases and Stages

Test Phase	Test Stages	Mandatory (Y/N)	Organisation Involved	Environment Used
PIT	System Test (to include FAT)	Y	DSP DCC	PIT
CSP-N PIT	System Test (to include FAT)	Y	CSP-North DCC	CSP-N PIT
CSP-C&S PIT	System Test (to include FAT)	Y	CSP-Central & South DCC	CSP-C&S PIT
DCO PIT	System Test (to include FAT)	Y	DCO DCC	DCO PIT
FOC S1SP PIT	System Test (to include FAT)	Y	FOC S1SP DCC	FOC S1SP PIT
MOC S1SP PIT	System Test (to include FAT)	Y	MOC S1SP DCC	MOC S1SP PIT
SIT	Solution Test (using Devices / Appropriate) Firmware for devices	Y	DSP CSP S1SP DCO	SIT-B
	Solution Test (using Emulators)	Where Devices / Appropriate Firmware are not available	DSP CSP DCC S1SP DCO	
	Solution Test Regression	Y	DSP CSP DCC S1SP DCO	
UIT	UIT Proving / Pre-UTS	Y	SI DCC	UIT-B UIT-A
	User Test	N	Service Users DCC	UIT-B
	User Test	N	Service 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 and where applicable, CSP-N, CSP-C&S, FOC S1SP, MOC S1SP and DCO that are in scope for June 2023.
- 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 2023 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 2023 SEC Release

  There will 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 2023 SEC Release will be undertaken in appropriate test environments as per Table 6.

The Test Phases and Stages to support the June 2023 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 environment). 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, S1SPs, and DCO will manage the deployment of code into their own PIT environments, and the SI will co-ordinate the activity from the CSPs, S1SPs, DCO and DSP (where applicable) into SIT.

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6 Test Phase Activity Description

This section of the June 2023 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 June 2023 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 June 2023 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.

It is expected for June 2023 SEC Release the CSPs, S1SPs and DCO changes to their existing infrastructure to support CR4427 XML Signing, will be delivered and tested in their own PIT environment. Where the CSPs / S1SPs / DCO 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 7 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 2023 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 June 2023 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 2023 SEC Release only CR's 4425, 4427, 4483 and 4703, 4805 will be tested in SIT fully. No testing is required for CR4382 as it is document only change.

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 be shared with the Panel's TAG for information with the Test Completion Report.

6.2.1 Testing in SIT

Table 8 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 June 2023 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 the DCC SIT and UIT 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 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

DCC Controlled

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 (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 2023 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 high priority Pre-UTS and promoting functionality to live operations where Users will be asked to volunteer to demonstrate that they can successfully operate the new June 2023 SEC Release functionality prior to the release going into production. Users can also carry out User Regression Testing to demonstrate that the June 2023 code does not adversely affect their existing production service. Where time permits, findings that are shared with DCC by Users will be reviewed by DCC and presented for consideration as part of the Go Live governance.

Following Code promotion into the UIT environment, DCC will undertake UIT Proving / PreUT to test the upload prior to opening the environment for User testing of the June 23 SEC Release. DCC shall ensure that all critical tests are completed prior to declaring that the User Testing window is open.

Whilst Test Participants may carry out regression testing immediately following the promotion of code into the User Test environments, they are asked to wait until Testing window is declared open prior to testing any new functionality delivered as part of the June 2023 SEC release..

Should DCC need to reduce the 6-week time boxed User Testing window period inorder to meet the implementation date, then DCC will promptly present its proposal and rationale to TAG for its endorsement. Where TAG endorses DCC's proposal, then the reduced period shall be promptly communicated to Test Participants. Where TAG and DCC disagree on a reduced duration, then the matter shall be referred to the SEC Panel for determination. In all cases where a reduction to the planned 6-week period is agreed, this shall be promptly communicated to Test Participants.

Table 9 UIT Requirements

Ref	Requirement
UIT.1	UIT will enable Parties to test the June 2023 SEC Release functionality for a time boxed 6-week User Testing 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 and DCC governance 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 e.g. Regression, new functionality, and impacted SR's, during the UIT window at least 20 Working Days prior to its start and agree to complete this 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

System Capacity testing requirements have been assessed for the June 2023 SEC Release. There will be targeted Performance Testing around the changes in scope of the release, MP102B (CR 4483) and CR4703. This will be performed in parallel, but independently to SIT testing, which will be governed by a separate TAB and shared with TAG for information only.

A separate System Capacity Testing Approach Document is not required as the change is only impacting DSP.

The testing will be in line with the change requirements outlined in section 5.1.

The scope includes:

- SMKI Recovery process improvements, in order to support recovery of upto 1 million devices along with the recovery application to run more quickly in terms of transactions per second, covering CR4703.
- Tests using AD1 alert traffic and firmware activations using large volume of messages, to demonstrate the impact of additional tracking function, covering CR4483.

DCC Controlled

Entry Criteria:

- DCC Service Providers System Capacity Test plan signed off by the DCC
- Test specification prepared, including the production of a Test Traceability Matrix for the DCC Service Provider
- Confirmation that the required resources, test laboratories, tools, stubs, environments, and data are in place, secure and are ready for testing

and

Exit Criteria:

- System Capacity Testing has been undertaken in accordance with the requirements set out in this TAD
- All evidence within scope of System Capacity Testing has been delivered by DCC Service Provider and approved by DCC, including the Test Traceability Matrix, which will be specific to the DCC Service Provider's system capacity requirements
- All planned tests detailed within the DCC Service Provider's test specifications, agreed by DCC, have been executed (unless the removal of a test is does not reduce the scope of testing)
- The number of System Capacity Testing Issues outstanding shall not exceed the threshold level, as outlined in Table 13

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 TTM's, 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"

DCC Controlled

Following discussion with DCC Security team, CR4703 Security Testing will be an activity that will carry out more granular testing to the key recovery enhancements when National Grid cert recoveries are carried out after the update. Because of the on-going work, CR4703 Security Testing will fall out of the normal test regiment. Scope of Security Testing covers:

P&C D5-G4-4.0 (CR4805)	Application Security test (Code Review)
CR4703	SMKI Recovery Improvements

7 Test Activities

For each 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

DCC Controlled

7.1 Test Method

For the June 2023 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 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 June 2023 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 2023 SEC Release are working as per the requirement
- Security and System Capacity testing will be carried out to address CR4703 changes.

Priority, within the design of testing for the June 2023 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, 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. 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.

DCC Controlled

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.

DCC Controlled

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 10 – Regression Testing Devices

DUIS	P&C	CH/MMC	Devices
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-G4-2.0	GBCS 3.2CH* (CHTS1.3)	S2v4.2 / S2v3.1
5.0	D5-G4-2.0	GBCS 2.1CH SBCH/DBCH	S2v4.2 / S2v3.1
4.0	D5-G4-2.0	GBCS 3.2CH* (CHTS1.3)	S2v4.2 / S2v3.1
4.0	D5-G4-2.0	GBCS 2.1CH SBCH/DBCH	S2v4.2 / S2v3.1
3.1	D5-G4-2.0	GBCS 3.2CH* (CHTS1.3)	S2v4.2 / S2v3.1
3.1	D5-G4-2.0	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 10 above.

Note: for the PPMID (v8.2) which was used across June and November 2022 will also be used for June 2023. This is equivalent to S2v2 GBCS 1.0.

- SMETS1 Regression Test Coverage will include the following:
  - Each DMC 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

DCC Controlled

- 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 June 2023 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 – CSP
- PIT – S1SP
- PIT – DCO
- SIT – DCC Systems Integrator

Table 11 describes the generic content and anticipated timing of the deliverables that may be required to be produced for each Test Phase

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

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 CSPs, S1SPs, DCO 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 CSPs, S1SPs, DCO 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 CSPs, S1SPs, DCO for review by DCC throughout test execution
Test Issue Log	Outstanding Testing Issues	PIT SIT PreUT	Made available by DCC Service Providers including CSPs, S1SPs, DCO 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 CSPs, S1SPs, DCO to review beforehand and monitor throughout

DCC Controlled

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 PreUT	DCC will work closely with the DCC Service Providers including CSPs, S1SPs, DCO 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 CSPs, S1SPs, DCO 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 PreUT	To be provided to DCC by DCC Service Providers including CSPs, S1SPs, DCO with the final Test Stage Completion Report.

DCC Controlled

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 CSPs, S1SPs, DCO 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.

DCC Controlled

9 Test Procedure

This section describes the requirements for the testing process to prove the solution for June 2023 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 2023 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-UT 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

DCC Controlled

In the case of User Testing in UIT there 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

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 of 90% of tests having passed

GEx4. Regression testing successfully completed – all tests passed with no new Testing Issues identified

GEx5. The number and severity of any outstanding Testing Issues is at or below the specified thresholds, with any exceptions documented and agreed

GEx6. Where practical, if a test fails with an emulator / device, it will be re-tested against on another device, if available.

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.

9.2 Specific Entry and Exit 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

9.2.2 Exit from SIT

The following shall be achieved prior to SIT completion:

Table 12 – Specific Exit Criteria

Exit Criteria	Success
Planned functional tests have been executed, or any exceptions documented and agreed with TAB and subsequently reported to the Panel's TAG for agreement and to the Panel.	**100%**
A % of Functional tests executed relating to the new functionality have been passed, all failures are documented, and defets related to failures are as per the agreed defect threshold in Section 9.5 of this document.	**90%**
Regression testing in SIT achieves a % pass rate or any exceptions documented, excluding; defects known at the start of end of cycle testing and agreed with TAB, and subsequently reported to the Panel's TAG for agreement, and to the Panel.	**100%**
End of Cycle testing successfully conducted – repeatability demonstrated with any exceptions documented and agreed.	**No new Testing Issues. No variance between EOC runs.**
A % of End of Cycle Tests have been executed, with a pass rate of 90% excluding; defects known at the start of end of cycle testing; and any new defects arising since the start of end of cycle testing where such exclusion is 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.	**100%**

9.2.3 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.

UITEn2. High Priority PreUTS is to be completed prior to the start of User Testing to the satisfaction of the DCC.

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 Test 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 Panel's 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 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 (i.e by CSP-N, CSP-C&S, FOC S1SP, MOC S1SP, DCO, and DSP)

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

Table 13 – Threshold

Test Issue Severity	PIT	SIT	SCT
1	0	0	0
2	0	0	0
3	15	15	5
4	30	30	10
5	60	60	15

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.
- Testing Issues that can be demonstrated to be:
    - Be duplicates of a Testing Issue found during testing of this Release
    - Have been identified during the testing of an earlier Release or in Production
    - Have been accepted by a Meter Manufacturer or Device Manufacturer
    - For System Capacity Testing, any Testing Issues found within the simulated components which are part of the existing Production system, will not contribute to the above SCT Testing Issues threshold.
        - SCT Testing Issues will be indepdent and will not form an aggregated total towards SIT Testing Issues.

  will be discounted. Such Testing Issue will be recorded in the Test Completion Report and discountify 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 June 2023 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, CSPs, S1SPs, DCO (where applicable) for PIT and the SI with input from SPs for the SIT and UIT Test phases, on a frequency to be detailed in the Solution Test Plans.

10.1 Tracking & 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 SIT Completion Reports

DCC will produce its own Test Completion Reports when it considers that the Exit Criteria specifies in this documenthave been met. The report will provide evidence of:

- Testing undertaken
- 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 that DCC is proposing be discounted
- Information on any Testing issues closed without a retest
- 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 June 2023 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 CSPs, S1SPs, DCO (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 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 June 2023 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, including the CSPs, S1SPs, DCO (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.

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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

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 5.2, GBCS v4.1 and SMETS2 v5

The emulators used for June 2023 SEC Release will have 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 June 2023 SEC Release is not required as it will use the same emulator that was used for November 2022 SEC Release, GBCS 4.1 and ECoS Programmes.

There are no firmware changes required for June 2023 therefore CSP / S1SP scope of PIT will not test end-device functionality. End-device functionality will begin testing in SIT.

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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 June 2023 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

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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 June 2023 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 June 2023 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 June 2023 SEC Release and other projects. DCC will also present regular portfolio level updates to TAG on use of environments.

14.1 Code Management

DCC will operate a process to merge code changes into the test environments used by the June 2023 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, SIT, SCT) Completion Reports.

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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 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 S2V5]
- Real PPMID devices will be used as per the device availability.

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