November 2020 DCC Testing Approach Document

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Document Control

Revision Date	Summary of Changes	Changes Marked	Version Number
20/03/20	Initial Draft	n/a	0.1
24/04/20	First Draft issued to TAG66	No	1.0
20/05/20	Draft issued for Industry Consultation	No	1.1
15/06/20	Final Draft issued following Industry Consultation	Yes	2.0
24/06/20	Approved Final Version	Yes	3.0

References

Table 1 – References

Ref	Title	Source	Date	Version
1	Glossary of Testing Terms	ISTQB	Mar 2016	3.1
2	Joint Test Strategy	DCC	Apr 2015	3.5
3	Testing Issue Resolution Process	DCC	Feb 2019	1.5
4	November 2020 Release Implementation Document	SECAS	TBC	TBC
5	November 2020 SV TAD	BEIS	May 2020	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 November 2020 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
CPA	Commercial Product Assurance
CPL	Central Products List
CR	Change Request
CRP	Change Resolution Proposal
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
IOC	Initial Operating Capability
IRP	Issue Resolution Proposal
MMC	Message Mapping Catalogue
MOC	Middle Operating Capability
PIT	Pre-Integration Testing
PPMID	Pre-Payment Meter Interface Device
RDP	Registration Data Provider
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
SMKI	Smart Meter Key Infrastructure

Abbreviation	Meaning
SM WAN	Smart Metering Wide Area Network
SP	DCC Service Provider
SP UAT	Service Provider User Acceptance Testing
SRV	Service Request Variant
TAB	DCC's Test Assurance Board
TAD	Testing Approach Document
TAG	SEC Panel's Testing Advisory Group
TTM	Test Traceability Matrix
TTO	Transition to Operations
UIT	User Integration Testing

Glossary

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

Table 3 - 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 November 2020 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

Approval of this Approach Document

DCC will submit the November 2020 DCC Testing Approach Document for the November 2020 SEC Release (this document) to the Panels TAG for approval and in addition for SEC Modifications the SEC Panel. Secretary of State would resolve any disputes between DCC and TAG over content to the extent that it affected testing of functionality needed to support the BEIS changes, but not where the issue related only to testing of the SEC Modifications.

Changes forecast for this Approach Document

At the time of producing this Testing Approach Document, the exact scope of this release has yet to be determined[1]. For the purposes of drafting this document, all pending changes targeted for this release have been included in assessing the test approach. Following the scope being finalised, this Testing Approach Document will be reviewed and, where the changes are material, the content may be revised.

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1 Introduction

1.1 General

This is a Testing Approach Document to cover the pending changes that are proposed for implementation in the November 2020 SEC Release. This approach works in conjunction with the SEC Release Implementation Document for the November 2020 SEC Release, in accordance with Section D of the SEC and the November 2020 SVTAD

The November 2020 SEC Release includes 8 SEC modifications (6 are non-system impacting changes), 5 BEIS directed changes (BEIS Q4 2020 Package of Change) and 1 additional DCC CR. The changes delivered in the November 2020 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 and the SV TAD for the BEIS related changes, including the manner in which testing will be conducted by DCC for the November 2020 SEC Release.

1.2 Approval of this Document

NB: Sections 1.2 and 1.3 confirm the SEC Panel as the authorising authority for SEC modifications and TAG for the BEIS directed changes and DCC CR with 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 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 June 2020 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 the SEC Modifications and shall be presented to TAG for an approval decision for content governing BEIS directed changes in accordance with the November 2020 SV TAD
- The SEC Panel for SEC Modifications 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

For BEIS Direct changes in accordance with the November 2020 SV TAD, any revisions to this Testing Approach Document by DCC shall be submitted to TAG for approval.

2 Scope

CR #	SEC Modification #	Implementing Parties	Code Drop	Description
CR1137	SECMP0062 Part 2	DSP	1	Northbound Application Traffic Management - Alert Storm Protection
CR1118	MP093	DSP	2	Implementing IRP511 and CRP535 to support GBCS v3.2 devices
N/A	MP080	N/A	N/A	Managing DUIS Uplifts
N/A	MP081	N/A	N/A	Alignment of DUIS and CHISM to reflect current DCC Processing – Non-system impacting change
N/A	MP098	N/A	N/A	Incorporation of multiple Issue Resolution Proposals into the SEC - Batch 3 – Non-System impacting change)[2]
N/A	MP112	N/A	N/A	Setting the Privacy Assessment Assurance Status
N/A	MP115	N/A	N/A	
N/A	MP120	N/A	N/A	Correcting DUIS Matrix for SRV7.7 Eligible Users
CR1145	N/A	DSP	1	Auxiliary Proportional Load Control
CR1254	N/A	CSP	N/A	CSP Testing to support Proportional Load Control
CR1277	N/A	DSP	2	Completion of CR1164 Change to Install Code Length in 8.11
CR1233	N/A	DSP	2	Future Date Command Handling
CR1355	N/A	DSP	2	Organisation Certificates for Users use to sign XML messages for communication over DUIS
CR1088	N/A	DSP	2	Production Proving DSP Change

Table 4 Testing Scope for November 2020 SEC Release

The November 2020 SEC Release will modify the DCC Total System to accommodate the changes detailed in Table 4.

System impacting changes are now confirmed for the Release and outlined in the table 4. The current approved non-system impacting SEC Modifications have been included for reference. The final list of non-system impacting SEC Modification will be documented in the Release Implementation Document (RID)

[2] Awaiting approval

2.1 Documents for November 2020 SEC Release

Table 5 lists the links to the SEC modification documents that were used to create this Testing Approach Document for the November 2020 SEC Release. All non-SEC modification changes (additional CRs) documentation is stored within the DCC change management tool. These have been considered, but no link is available.

Table 5 Referenced Documents for November 2020 SEC Release

SEC modification link	Number
https://smartenergycodecompany.co.uk/modifications/northbound-application-traffic-management-alert-storm-protection/	SECMP0062
https://smartenergycodecompany.co.uk/modifications/implementing-irp511-and-crp535-to-support-gbcs-v3-2-devices/	MP093
https://smartenergycodecompany.co.uk/modifications/managing-duis-uplifts/	MP080
https://smartenergycodecompany.co.uk/modifications/alignment-of-duis-and-chism-to-reflect-current-dcc-processing/	MP081
https://smartenergycodecompany.co.uk/modifications/incorporation-of-multiple-issue-resolution-proposals-into-the-sec-batch-3/	MP098
https://smartenergycodecompany.co.uk/modifications/setting-the-privacy-assessment-assurance-status/	MP112
https://smartenergycodecompany.co.uk/modifications/changes-to-the-ncsc-good-practice-guides/	MP115
https://smartenergycodecompany.co.uk/modifications/correcting-duis-matrix-for-srv7-7-eligible-users/	MP120

BEIS Directed Changes	
https://www.smartdcc.co.uk/media/3866/nov-20_svtad_v04-final.pdf	Section 4 Annex A – Direction Pursuant to Section X11.4 of the SEC

SEC Subsidiary Documents	SEC Appendix
Common Test Scenarios Document	Appendix R
DCC User Interface Specification v4.0	Appendix AD
Message Mapping Catalogue	Appendix AF
SEC Variation Testing Approach Document for November '20 SEC Release	Appendix A
Enduring Test Approach	Appendix J

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 November 20 SEC Release and any related Solution Test Plans developed for this Release will take precedence.

Out of Scope

The following assurance activities are outside the scope of the testing approach for the November 2020 SEC Release:

i. Testing of firmware for Meters and Other Devices (individual manufacturers are responsible for this activity)
ii. DCC is not responsible for proving Devices are compliant with SMETS 1 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

3 Governance Approach

The November 2020 SEC Release will follow the governance of a SEC release outlined in Section D of the SEC for SEC Modifications and in accordance with the November 2020 SVTAD for BEIS related changes.

Approval would be requested from TAG for all changes and in addition for SEC Modifications the SEC Panel. Secretary of State would resolve any disputes between DCC and TAG over content to the extent that it affected testing of functionality needed to support the BEIS changes, but not where the issue related only to testing of the SEC Modifications.

The November 2020 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 and provide approval to move into SIT B. This will require multiple deployments from PIT to SIT-B
- Emulator assurance will be completed, and results presented to TAB for approval prior to deployment into SIT-B
- Parse & Correlate v D4-G4 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 a SIT Exit TAB which would confirm the exit of SIT and provide approval to move into UIT B
- 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 SEC Panel for SIT completion following a successful TAB for SIT Exit

4 Objectives of Testing

4.1 Testing Objectives

The following testing objectives shall apply:

i) 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

ii) 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

iii) Enable (to the extent that it is reasonably practicable to do so for the November 2020 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 APC and SAPC changes

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

v) 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

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

vii) Verify that all other functional changes that are part of the November 2020 SEC Release are functionally correct including consequential amendments

viii) Assure SMETS2 Single Band Communications Hubs and Dual Band Communications Hubs against November 2020 SEC Release changes

ix) 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:

i) 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 November 2020 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 November 2020 SEC Release are:

- DUIS uplift to version 4.0
- Changed DSP functionality introduced as part of November 2020 SEC Release to support GBCS 4.0
- Parse & Correlate version D4-G4-1.0 will be introduced which will be backward compatible with and will parse to DUIS v1.0, v2.0 v3.0 & v3.1 as well as DUIS v4.0

The Functional Heatmap has been added in Appendix A and details the SR's, SRV's, Alert and other scenarios which will be tested for the changes in the November 2020 SEC Release. Below is a summary of the specific detail for each change and the high-level view of testing of November 2020 SEC Release new functionalities:

SECMP0062 Part 2 (CR1137)

To share the Alert Storm protection data with the Service Users, DSP will introduce two new optional fields to the definition of Device Alerts and DCC Alerts. These fields will be included in the message only when the corresponding Alert Code is subject to throttling by DCC Data Systems. The fields are:

1. **Throttled Alert Sequence ID** – The field Throttled Alert Sequence ID will hold the sequence number of a given Alert since the Alert throttling began

2. **Throttled Alert Discarded Count** – This field will hold the number of Alerts discarded by DCC Data Systems since the last forwarded Alert

The presence of these fields indicates that throttling is active for the Alert in question.

The testing for this change will include generation of an alert storm processing, Exclusion Alert Storm processing, Traffic Management of Alerts on SSI and overloaded Alert logging on ESI. The testing will also ensure that the additional new fields are populated with the correct data.

MP093 (CR1118)

DSP changes to support the following IRPs/CRPs introduced as part of GBCS v3.2 upgrade:

- CRP535 – This CRP corrects the assumed capability of the SMETS 2 service that HAN devices can be reintroduced after being removed from that HAN
- IRP511 – Introduction of a Set Clock Alert to the Event log and allow users to identify whether the event shows the need for HAN device fault correction

➢ CRP535

DUIS changes will be modified to add support for the new Use Case CCS07 in the following SRV:

8.9 - Read Device Log

➢ IRP511

DUIS changes are required to add support for 0x81C6 in the following SRVs:

6.22 - Configure Alert Behaviour

6.2.10 - Read Device Configuration (Event and Alert Behaviours)

The parse response and the MMC XML schema will also be updated for SRV 8.9.

A new error code (E080902) will be introduced to notify the Service Users if the Service Request contains the input parameter 'ReadHistoric' but the targeted device is running on an earlier version of GBCS than v3.2.

A new error code (E080903) will be introduced to notify the scenario wherein the Service Request contains the input parameter 'ReadHistoric' but targeted at a Device other than a Comms Hub. Please note that the Service Request 8.9 supports Comms Hubs, ESME and GSME device types, but the Use Case that supports 'ReadHistoric' is applicable only to Comms Hubs.

Testing for this change will include testing 0x81C6 for SR's 6.22 & 6.2.10. Testing also covers Read Historic functionality for SR8.9.

Testing will also include the new error code E080903 against an EMSE and GSME.

Testing will also include the new error code E080902 a device running an earlier version of GBCS than v3.2.

The CH functionality to support CR1118 will only be available for CSP C&S and will therefore not be tested for CSP N as part of the November 2020 SEC Release, it will be tested at a future date when available as part of the CSP N delivery of the CH's functionality to support CR1118. The change functionality is agnostic to the CSP.

CR1145

2 new ESME variants for proportional load control will be introduced which are:

- **A+F**: A fully functional ESME which has an APC (hereafter, "ESME Variant F")
- **G1**: an SAPC; this is referred to as an SAPC in SMETS but will be recorded as a Device Type ESME with Variant G1 in the Smart Metering Inventory?

To support the new ESME variants, changes are required to the following Service Requests (SR) and DCC Alerts:

- SR12.2 - Device Pre-Notification: Add support for ESME Variant F and G1
- SR8.2 - Read Inventory: Add support for ESME Variant F and G1
- SR8.4 - Update Inventory: Add support for ESME Variant F and G1
- DCC Alert N16: Add support for ESME Variant F and G1
- DCC Alert N58: Updated to provide ESME Variant and GBCS Version

New Service Requests will be introduced to cover the new functionality within DUIS v4.0. These will be required for use with ESME devices with any combination of load control variants:

- SR6.14.3 - Update Device Configuration (Auxiliary Control Schedule)
- SR7.13 - Set Auxiliary Controller State
- SR7.14 - Read Auxiliary Controller Configuration Data
- SR7.15 - Read Auxiliary Controller Operational Data

Existing load control Service Requests will be retained for use with devices compatible with older versions of GBCS and DSP configuration will be required to enforce that these are not available for devices from GBCS v4.0 onwards. These are:

- SR 6.14.2 - Update Device Configuration (Auxiliary Load Control Scheduler);
- SR 7.5 - Activate Auxiliary Load
- SR 7.6 - Reset Auxiliary Load
- SR 7.7 - Read Auxiliary Load Control Switch Data
- SR 7.8 - Reset Auxiliary Load

There is an additional SR 7.16 in scope of the DUIS uplift, however the functionality for this SR will not be fully delivered as part of this November 2020 SEC release and will be delivered and fully tested in a future release. The testing for this SR in November will be to ensure that all users roles reject/unable to process SR 7.16.

New GBCS Use Cases have been introduced with Device Alerts related to the use of APCs and SAPCs.

The following new Device Alerts may be generated by GBCS v4.0 ESME devices and require processing by the DSP:

- ECS100 (0x8F85) Command not supported by Device
- ECS200 (0x8F88) Operational Update
- Future Dated Update Load Controller Security Credentials Alert

A new term “Load Controller” has been introduced in GBCS v4.0, with corresponding new trust anchor cells (SMKI Organisation Certificate slots) in all ESME devices from GBCS v4.0 onwards.

Changes are required to the following Service Requests (SR) for reading and updating organisation certificates on devices as follows:

- SR6.15.1 Update Security Credentials:
  - Changes to add use of a new GBCS Use Case CS02g for use only when updating the new Load Controller trust anchor cells. For all other trust anchor cells and device types, GBCS Use Case CS02b will continue to be used
- SR6.24.1 Retrieve Device Security Credentials (KRP):
  - A new GBCS v4.0 Use Case CS02f replaces CS02a for reading certificate information from ESME devices of all variants and from SAPC from GBCS v4.0 onwards. This new Use Case is similar to CS02a but also includes support for reading the Load Controller trust anchor cells

Testing for this CR will test the new SR’s 6.14.3, 7.13, 7.14 & 7.15 against GBCS v4 configured Emulators and completing negative testing to ensure that these SR’s cannot be processed using older versions of DUIS and GBCS configured devices

There will be negative testing for SR 7.16 as this will be part of the DUIS Schema however will not be allocated against any DSP User Role, therefore this testing will ensure that the SR can be sent and accepted by the schema but will be rejected by the DSP.

There will be negative testing to ensure that existing SR’s 6.14.2, 7.5, 7.6, 7.7 & 7.8 cannot be processed against DUIS v4 GBCS v4 configured devices, however can still be processed using earlier DUIS and GBCS configured devices

Testing will also include existing SR’s and Alerts to support the 2 new ESME variants F (APC) and G (SAPC)

CR1254

This CR does not deliver any technical change. The CR covers CSP support to pass the new SR’s for CR 1145 through all Comms Hubs variants

CR1277

For SMETS2 Devices the length of the install code will continue to remain fixed at 16 octets.

A new validation check will be introduced to verify that the length of install code is 16 octets for the SMETS2 Devices. If the check fails, the Service Request will be rejected using the error code E081111.

Testing for this CR will include validation that any install code less than 16 Octets for SMETS2 devices fail the new check and the SR is rejected with the correct error code.

Testing will also ensure that an install code of 16 Octets passes the new check and the SR is processed as expected.

The schema does not allow an install code greater than 16 Octets and testing will include this scenario to ensure it fails schema validation as expected.

CR1233

IRP554 proposes to standardise Future Dated command handling guidance for CS02b and CS06 as they are currently not consistent across different sections within the GBCS specification

A change will be made so that if the Response for CS02b or CS06 is received after the Execution Alert, or if the Response timestamp is greater than the Command execution timestamp, then the transaction status will be recorded under a new status named '*Delayed Response*' in the SAT Log.

In situations where all the Execution Alerts for these Commands have been received and the Responses are not received within the defined timeout period, then the transaction status "Delayed Response Timeout" will be used.

These new status's will be excluded from the SLA calculations and will be ignored by SSI while showing the final status to the Service Users.

Testing will cover replicating the scenarios and ensuring the new status are correctly populated in the SAT log for Delayed Response and Delayed Response Timeout. The tests will also ensure that these new statuses are not included in SSI.

CR1355 (Organisation Certificates for Users to use to sign XML messages for communication over DUIS)

Introduction of new Organisation Certificate types which will be used to checks signatures on XML messages.

Testing for this change will include using the new Certificate credentials including MPID details, when signing XML messages.

CR1088

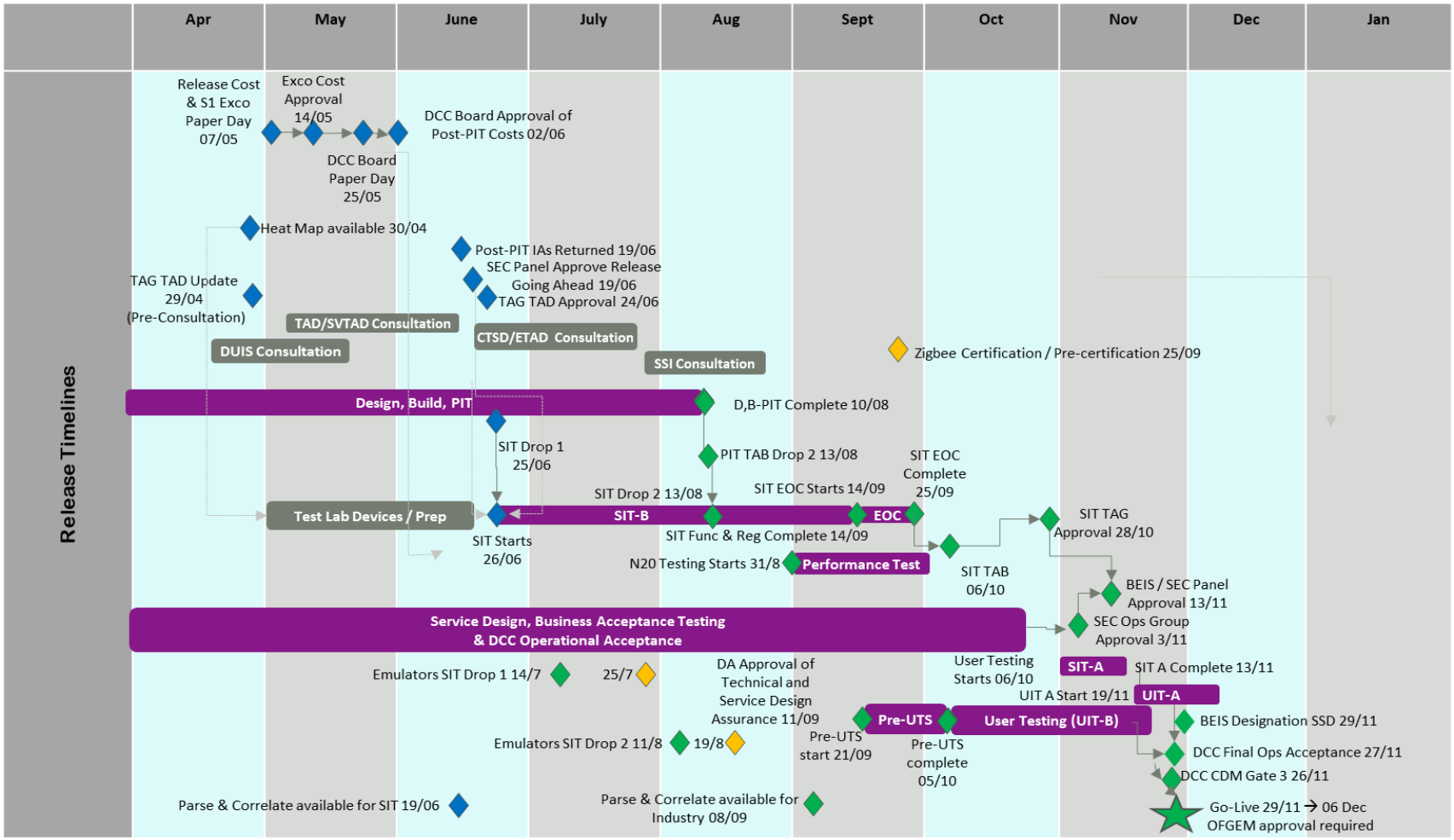
This CR will introduce a new XML Signing Role within the DSP for the Production Proving Function. This new XML Signing Role will be used when setting up a new service user in the Production Proving process within the DSP.

Testing in the November 2020 SEC Release will us a standard SBCH from CSP S&C provider, a standard ESME and existing registration data to test the creation of DSP user roles using the new Production Proving XML signing role and processing SR's using these new roles.

The remainder of the functional delivery of Production Proving will be tested as part of the Production Proving Project.

5.2 High Level Plan

A high-level outline plan as of 20 May 2020 is shown below.



Device Selection

The DCC shall recommend which of the existing devices that are in use in production shall be employed to test the November 2020 SEC Release against.

Emulators will be used for changes which require DUIS v4, GBCS v4 or SMETS2v5 configurations.

The DCC shall notify TAG which devices it recommends to test the November 2020 SEC Release against. Where TAG believe that a device has been wrongly excluded, they should notify the DCC within [3] working days setting out its reasons for objecting. The DCC shall respond to the objection within [3] working days. Should the DCC and TAG continue to disagree on the exclusion of a device, then the decision will be referred to the SEC Panel and the Secretary of State for determination. The SEC Panel and Secretary of State's decision will be binding.

5.3 Description of Test Phases

The November 2020 SEC Release changes will be delivered using waterfall delivery methodology. The approach to testing of the November 2020 SEC Release will include defined Test Phases. Table 6 contains the test phases / stages, mandatory / optional, organisations involved to deliver and environments to be used.

Table 6 – 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
SIT	Solution Test (using Devices/Appropriate Firmware for devices)	Y	•DSP •CSP •DCC	SIT B
	Solution Test (using Emulators)	Where Devices/Appropriate Firmware devices are not available)	•DSP •CSP •DCC	SIT B
	SP UAT	Y	•DSP •CSP •DCC	SIT B
	Solution Test Regression	Y	•DSP •CSP •DCC	SIT-A
UIT	Pre UTS	Y	•SI •DCC	UIT B
	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
- 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 User Acceptance Testing (SP UAT) 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.
    - Pre-UTS will be completed following code deployment into the UIT environment to test the CR changes, shakedown and regression testing the UIT environment. This testing will be completed ahead of opening up to Test Participants
    - For the November 2020 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. All such evidence will be collated and presented
    - Users will be invited to complete regression testing before moving to the new schema for November 2020 SEC Release
    - There is a general principle that in order to be eligible to use new service requests/functionality introduced via the November 2020 DUIS schema, in production, Users must complete additional SR Testing in accordance with the updated CTSD

There will be 2 drops of code from PIT into SIT. Regression testing will commence after drop 2.

Testing for the November 2020 SEC Release will be carried out in SIT-B alongside the SMETS 1 Uplift 1.2 project. There are no direct impact to the SMETS 2 changes as a result of the Uplift 1.2 project.

5.4 Delivery of Test Phases and Stages

The execution of the testing to support the November 2020 SEC Release will be undertaken in appropriate test environments as per Table 6.

The testing phases and stages to support the November 2020 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.

6 Test Phase Activity Description

This section of the November 2020 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 November 2020 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.

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, where used, for appropriateness and to ensure functional coverage
PIT.4	DCC Service Provider PIT shall cover all functional areas impacted for testing the November 2020 SEC Release
PIT.5	DCC Service Provider shall produce and maintain the PIT approach document, the System and FAT plan, test completion reports and Work Off Plans

6.2 Requirements & Focus Areas for Systems Integration Testing

SIT for the November 2020 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. It shall comprise of Solution Testing and Service Provider User Acceptance Testing (SP UAT).

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 Solution Testing in SIT

Table 8 SIT Requirements

Ref	Requirement
SIT.1	Regression will start following the second drop of code into the SIT phase. If issues are found after EOC then further regression may be needed
SIT.2	2 EOC runs for November 20 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 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 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 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 User Acceptance Testing in SIT

The SIT Phase includes the DCC Service Provider User Acceptance Testing (SP UAT) activity. This activity will operate concurrently with Solution Test and is undertaken to provide additional assurance.

SP UAT allows DCC to witness an agreed subset of the tests carried out in Solution Test. The subset of tests will be described in a SP UAT plan produced by the Service Provider.

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 WebEx where appropriate and in adherence with the SI WebEx Policy, 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

SP UAT will report to DCC before SIT exit on test completion, test failures and test pass rate independently of Solution Test, in order to ensure that 100% coverage and other success criteria of SP UAT are met.

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 DCC's ongoing activities, this section describes the specific requirements and focus areas for the November 2020 SEC Release.

DCC shall provide a Testing Service (User Integration Testing) 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). UIT shall be made available in accordance with the Enduring Test Approach Document (ETAD)

There will be a 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 November 2020 SEC Release functionality prior to using it in production. Users can also carry out User Regression Testing to demonstrate that the November 2020 code does not adversely affect their existing production service.

There are changes required to the Enduring Test Approach Document (ETAD) and Common Test Scenarios Document (CTSD) which will be consulted on separately.

Table 10 UIT Requirements

Ref	Requirement
UIT.1	UIT will enable Parties to test the November 2020 SEC Release functionality
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 i.e. Regression, new functionality and impacted SR’s, during the UIT window at least 20 working days prior to its start and agree to complete testing within the time frame given. The findings will be provided at the end of the UIT window

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 CSP and remote test labs used within UIT and demonstrating that the UIT environment is secure.

6.4 System Capacity Testing

System Capacity testing requirement has been assessed for the November 20 SEC Release. There will be regression testing completed and some targeted confidence testing around Alert Storm, the scope includes:

- High rate OnDemand Traffic (circa 400 TPS)
- High rate Alert traffic (circa 1500 TPS)
- Lower rate mixed traffic regression type test (to be developed by CR1045 project, OnDemand/Alerts/I&C for both SM1 and SM2 devices – all happening at the same time)
- Targeted testing of Alert Storm CR1137 changes.

A System Capacity Test Approach Document will be produced outlining the full detail of testing 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 SP’s 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”

Scope of Security Testing covers:

CR1137/SECMP0062	Application Security Testing for new functionality/changes
CR1118/SECMP0093	Application Security Testing required for all items (Code review and Negative Testing)
CR1145/BEIS	Application Security test (Code Review & Full Pen Test
CR1233/BEIS	Application Security test (Code Review)
CR1355/BEIS	Application Security test
CR1277	Application Security test
CR1088	Application Security test (Code Review)
P&C D4-G4	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 November 2020 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 November 2020 SEC Release, DCC is seeking to further improve testing throughput. By making more effective use of automation in SIT and extending the SMETS 1 solution to encompass SMETS 2 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 by collecting metrics that quantify both the level of automation present in a test pack as well as test execution time and triage cycle time. DCC will require the systems integrator to provide the detail of how we shall achieve this in the SIT approach document, including reporting to establish a baseline of automation effectiveness as well as 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 SMETS 1 testing. The supporting test phase approach documents will specify the detailed testing methodologies employed in each test phase.

Test design for November 2020 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 November 2020 SEC Release are working as per the requirement

Priority, within the design of testing for the November 2020 SEC Release, shall be on the changes introduced by the scope of the Release, and on the functionality and Service Requests that are considered to be of highest risk to Users in the production system and on validating there is no adverse effect on the existing devices in the DCC system. These will be derived from the heat map and the TTM.

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

In general, testing with combinations of real devices will form the basis of a default test setup. Testing with emulators in SIT shall in general only be conducted where devices are unavailable to be tested. Where testing makes use of the SIT emulator necessary, testing shall include emulator configuration to provide valid data in a service response. 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 the proposed Test Scenarios, or sequences of Service Requests, for SIT 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:

- SMETS 2 Regression Test Coverage will include the following:
  - DUIS 1.0 S2v3.2 GBCSv2
  - DUIS 2.0 S2V3.2 GBCSv2
  - DUIS 3.1 S2V4.2 GBCS v2
  - SBCH 2.0 Firmware
  - Release 1 & 2 CH's for CSP N
  - Release 1 CH's for CSP C&S
  - Regression will cover Critical Business Scenarios and Impacted SR's
- SMETS 1 Regression Test Coverage will include the following:
  - Each DMC will be tested
  - Functionality will be tested across DMC's
  - Regression will include IOC, MDS & MOC Secure
- Wherever practicable, regression testing will be automated
- Regression testing will start following the 2nd planned deployment from PIT for SMETS 2 and SMETS 1
- 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

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 November 2020 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
- 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 Pre-UTS	Following any review cycles, a final version shall be submitted to DCC by the relevant DCC Service Provider 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 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 Test Phase Approach Document	PIT SIT Pre-UTS	Made available by DCC Service Providers for review by DCC throughout test execution
Test Issue Log	Outstanding Testing Issues	PIT SIT Pre-UTS	Made available by DCC 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 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 • Specification of test environment used • Recommendations for tests to be included in the next Test Phase • Lessons learnt during the Test Phase	PIT SIT Pre-UTS	DCC will work closely with the DCC 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 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 Pre-UTS	To be provided to DCC by DCC Service Providers with the final Test Stage Completion Report.

8.2 Specific Deliverables

DCC will publish the following documents.

Table 12 – DCC Deliverables

Deliverable	Description	Timing
ETAD & CTSD Update	DCC will propose changes to update the ETAD and CTSD, where applicable, to reflect the changes for the November 2020 SEC Release	DCC will consult on the updates to the ETAD and CTSD alongside this Test Approach

8.3 Requirements Traceability

The DCC will provide a Requirement Traceability Matrix (RTM) detailing the requirements for each change 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 prepared 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 November 2020 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 November 2020 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 all tests run, or any exceptions documented and agreed by TAB
- For SIT all tests run, or any exceptions documented and agreed by TAB and TAG. Where DCC and TAG disagree in relation to the BEIS Q4 2020 SEC Variations a referral will be made to the Secretary of State for determination
- All test success criteria achieved, or any exceptions documented and agreed by TAB and TAG. Where DCC and TAG disagree in relation to the BEIS Q4 2020 SEC Variations a referral will be made to the Secretary of State for determination
- 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. Where DCC and TAG disagree in relation to the BEIS Q4 2020 SEC Variations a referral will be made to the Secretary of State for determination
- 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. For BEIS directed changes, any disagreements between DCC and TAG will be referred to Secretary of State for final decision in accordance with the November 20 SVTAD

9.2.3 Entry into UIT

The Entry Criteria for UIT shall include:

- 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 completion of SIT

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 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.

For BEIS directed changes, In accordance with the November 20 SVTAD DCC will:

- Notify the Secretary of State, the Authority, the Panel, and the Parties that the DCC considers that testing has been completed
- Provide the Authority, the Panel, and the Secretary of State with copies of the Completion Report (or where one exists, the November 2020 SEC Release Completion Report), and a list of the sections of such report that the DCC considers should be redacted
- Review the supporting documentation and evidence with regards to the relevant Exit Criteria with the TAG

9.4 Test Phase Success Criteria

For SIT and the testing for SP UAT the following Test Success Criteria will be included in the Exit Criteria:

- 100% of tests listed in the Test Specifications 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. For BEIS directed changes any disagreements between DCC and TAG will be referred to the Secretary of State for final and binding agreement
- at least 90% of the tests executed relating to the new functionality have been passed, and all failures are documented, and defects related to failures are as per the agreed defect threshold in Section 9.5 of this document
- 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. For BEIS directed changes any disagreements between DCC and TAG will be referred to the Secretary of State for final and binding agreement

9.5 Testing Issues Threshold

Table 13 lists the standard thresholds for outstanding testing issues in each test phase. These shall be calculated by Service Provider.

Table 13 – Threshold

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

Note that:

- The defect thresholds are applied as part of the Exit Criteria for relevant Test Phases and apply cumulatively if there are iterative deliveries within a Test Phase. For example, there will never be more than 15 Severity 3 defects per Service Provider at an exit gate. This release has only DSP change so the thresholds above are applicable across all changes for the November 2020 SEC Release
- Meter manufacturer defects will not be included in the testing Issues mask. Evidence will be sought that the meter manufacturer has accepted the Testing Issue. Where a meter manufacturer is found testing will be conducted using an alternative manufacturer where possible to prove functionality.
- Testing Issues identified as a known production testing issue will not be included in the testing issues mask
- 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 defects identified during the November 2020 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. DCC may refer the matter to the Secretary of State for its determination, which shall be final for BEIS related changes defects

9.6 Work Off Plans

Work off plans, shall be produced detailing the defects that are outstanding and a plan for resolving them.

As this is a DSP change only, they 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 DCC.

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 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

HP's Application Lifecycle Management (ALM) Test Management tool will be used to manage testing and testing issues[3].

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.

[3] Except where not applicable for PIT

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, 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 November 2020 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 which tests it wants to witness during Factory Acceptance Testing (FAT) and SP UAT. Details of these tests (which will be a subset of System Tests for FAT and a subset of Solution Tests for SP UAT) will be described in the FAT and SP UAT 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 Web-Ex. The witness will have the skills required to fulfil the role. The SP will provide the witness with relevant documentation and access.

For the November 2020 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 (e.g. 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

Test issues raised during witnessing will be entered in to 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 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 Testing Issue Management

The process defined in the Testing Issues Resolution Process covers SIT testing. However, there are small variations that arise due to the requirement to interact with User Testing Participants. The Testing Issues Resolution Process will be reviewed and updated where appropriate.

13 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.

13.1 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:

i) 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 and the Secretary of State as required
ii) 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
iii) 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

13.2 Test Stubs

This Testing Approach Document allows for the use of Testing 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 Testing Stubs to simulate or emulate elements of the solution which are either not available or practical for use in the relevant test phase.

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
- 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 4.0, GBCS v4 and SMETS2 v5

The emulators used for November 2020 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.

There are no firmware changes required for November 2020 therefore CSP scope of PIT will not test end-device functionality. End-device functionality will begin testing in SIT

13.3 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.

14 Roles and Responsibilities

All parties involved in the November 2020 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

14.1 DCC Systems Integrator

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

i) Producing and maintaining the SIT Solution Test Plan, and the SP UAT Plan

ii) Ensuring that SIT activities are carried out in accordance with the SIT Approach, the Solution Test Plan, and the SP UAT Plan

iii) Overall planning and control of SIT, including chairing entry Quality Gates between FAT and Solution Test, and between Solution Test and User Interface Testing

iv) Maintaining Risk, Assumption, Issue, and Dependency Logs for SIT

v) Leading the design and creation of test scenarios, test scripts, test data and test environments for SIT

vi) Preparing test execution and environment usage schedules for SIT

vii) Supporting the other SPs in their assigned test preparation and execution activities within SIT

viii) Managing test issue resolution, and supporting SPs in the resolution process for selective test phases

ix) Producing the Test Stage Plans, Test Specifications, Test Traceability Matrices, Progress Reports, and Test Completion Reports for SIT

x) Operating the master Configuration Management Plan

xi) Operating the master Release Schedule

xii) Operating the Environment Plan

xiii) Support the Interoperability Test Events

14.2 DCC Service Providers

DCC shall ensure that the Service Providers (including DCC in its role as provider of Enterprise Systems) shall:

i) 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

14.3 DCC

DCC shall:

i) Comply with its obligations under this Testing Approach Document (this document)
ii) Ensure that activities attributed to Service Providers that are described in this document are undertaken
iii) Use its reasonable endeavours to ensure that SIT is completed as soon as is reasonably practicable to do so
iv) Enter into agreements with Device manufacturers to provide and support Devices for use in SIT, following appropriate qualification or selection activity
v) Support the DCC Systems Integrator in the planning, control, and operation of testing
vi) 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
vii) 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
viii) Participate in Quality Gate Reviews

ix) Agree with the DCC Systems Integrator and Service Providers the subsets of Solution Tests to be witnessed in the SP UAT stage
x) Witness the execution of SP UAT
xi) Specify, procure, provide, and maintain the DCC Meter Protocol Emulator Devices and Service
xii) Appoint and manage the independent audit and assurance activities described in this document

15 Environments

The November 2020 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 November 2020 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 November 2020 SEC Release and other projects. DCC will also be presenting regular portfolio level updates to TAG on use of environments.

15.1 Code Management

DCC will operate a process to merge code changes into the test environments used by the November 2020 SEC Release. The SIT Approach Document will provide detail of the frequency of the operation of this process.

16 Appendix

16.1 Appendix A - Functional Heat Map

The latest version of the Functional Heat Map outlines all the SR's, SRV's, Alerts and other scenarios which will be tested for the changes in the November 2020 SEC Release (CR1088 has not been included in the current version of the Heat Map as is not yet confirmed in scope of the release and will be added in if and when confirmed)

16.2 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 device selection 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 [Device SLS version S2V5]
- Real PPMID devices will be used as per the device availability, from either Geo or Chameleon