

SEC Modification Proposal, SECMP0202, DCC CR4840

Enduring Solution for SMETS1 and SMETS2+ Prepayment Meter Interface Devices (PPMIDs) Preliminary Impact Assessment (PIA)

Version:	0.2
Date:	21st October 2022
Author:	DCC
Classification:	DCC PUBLIC

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1 Executive Summary

The Change Board are asked to approve the following:

- Total cost to complete the Full Impact Assessment of **£13,211**.
- The timescales to complete the Full Impact Assessment of 40 working days.
- ROM costs for SECMP0202, up to the end of Pre-Integration Testing (PIT) of £350,000 to £750,000.

Problem Statement and Solution

The Smart Energy Code (SEC) currently differentiates between Smart Metering Equipment Technical Specification (SMETS)1 and SMETS2+ Devices and is drafted in a way such that a Device can be either SMETS1 or SMETS2+, but not both. However a number PPMID Devices can work as both a SMETS1 Device and a SMETS2+ Device, which is referred to as a 'dual mode Device'. The SEC does not currently make provisions for such Devices even if the device is physically able to behave as such, and the DCC is unable to determine for these whether to construct a Great Britain Companion Specification (GBCS) command for a SMETS2+ Device or forward a Service Request to the S1SP for a SMETS1 Device.

Following a consultation in 2021, DCC implemented a tactical interim solution by creating distinct entries in the Central Products List (CPL) for both the SMETS1 and SMETS2+ with a differentiating firmware version.

This tactical solution resolved the problem for DCC but creates logistical complications for Suppliers. Suppliers will need to ensure they are installing the correct SMETS Device at a premise. If an incorrectly notified Device is installed this will need to be physically replaced which will cause inconvenience to consumers and impact the reputation of the Smart Meter Installation Programme. There is also an issue where Suppliers who gain these Devices on Change of Supplier (CoS) cannot communicate with them or carry out firmware updates. This will result in consumer PPMIDs not being able to be upgraded accordingly.

Modification Benefits

Suppliers reported six million Devices are impacted and it is anticipated this number will increase in the future. The benefit of this Modification is that the proposed enduring solution will reduce the failed installation and commissioning of dual mode PPMIDs. This means Suppliers could install the same model of PPMID on any installation, which will improve efficiency in Suppliers' metering operations, which they can pass on to consumers.

2 Document History

2.1 Revision History

Revision Date	Revision	Summary of Changes
19/10/2022	0.1	Initial version, for DCC internal review
21/10/2022	0.2	Updated following DCC internal review

2.2 Associated Documents

This document is associated with the following documents:

Ref	Title and Originator's Reference	Source	Issue Date
1	MP202 Modification Report v0.2	SECAS	18/08/2022
2.	MP202 Business Requirements v0.1	SECAS	01/05/2022

References are shown in this format, [1].

2.3 Document Information

The Proposer for this Modification is David Walsh of the DCC. An Initial Modification Report was prepared and published in March 2022.

The Preliminary Impact Assessment (PIA) was requested of DCC on 28th September 2022.

3 Context and Requirements

In this section, the context of the Modification, assumptions, and the requirements are stated.

The requirements have been provided by SECAS, the Proposer and the Working Group.

3.1 Current Arrangements

A number of PPMID devices support both SMETS1 and SMETS2+ and these dual mode PPMID's could be installed in a Smart Metering System using either Specification.

The SEC does not permit Devices to support both SMETS1 and SMETS2+ functionality and dual mode PPMIDs capable of supporting SMETS1 and SMETS2+ must be listed twice on the CPL.

Following feedback from a consultation in 2021, the DCC stated that it would implement a tactical interim solution and raise a SEC Modification to enable the industry to assess the need for an enduring solution.

The DCC's tactical interim solution involves creating distinct entries in the CPL for both the SMETS1 and SMETS2+ with a differentiating firmware version. Both entries share the same hardware identifiers but SMETS2+ PPMID CPL entry uses the real firmware version whereas the SMETS1 PPMID CPL entry uses a 'fictitious' firmware version.

3.2 What is the Issue?

The tactical interim solution creates logistical complications for Suppliers as they must ensure that the correct version of the PPMID is pre-notified and that the correct SMETS version is installed. If the Supplier encounters an issue with the process, the Device will need to be physically replaced.

3.3 Impact of the Issue

Suppliers who are impacted by this issue reported six million Devices are impacted, but it is anticipated this number will increase in the future. This also impacts PPMIDs manufacturers and any future Users of PPMIDs that could work with both versions, for instance following a Change of Supplier (CoS). A more enduring solution would better resolve this issue in the longer-term.

3.4 Business Requirements

The business requirements are as follows.

Ref.	Requirement
1	To allow the same Pre-Payment Meter user Interface Device (PPMID) Device Model to be used in Smart Metering Equipment Technical Specifications (SMETS)1 and SMETS2+ Smart Metering Systems.
2	Remove obligation for different Firmware Versions for PPMIDs
3	Retain current arrangements for adding PPMID Device Models to the Central Products List (CPL)
4	Allow the Pre-Notification of a dual mode PPMID
5	Whitelisting of dual mode PPMID
6	Implement Verification of the SMETS version of the Smart Metering System targeted by Service Request (SR) 8.11

Ref.	Requirement
7	Enable Over The Air (OTA) firmware upgrades to a dual mode PPMID enrolled in a SMETS2+ Smart Metering System

Requirement 1: To allow the same PPMID Device Model to be used in SMETS1 and SMETS2+ Smart Metering Systems.

The tactical interim solution creates logistical complications for Suppliers as they must ensure that the correct version of the PPMID is pre-notified and that the correct SMETS version is installed. If the Supplier encounters an issue with the process, the Device will need to be physically replaced.

Any solution proposed must include the ability for the same PPMID model to be active working with both SMETS1 and SMETS2+ Devices.

The following parameters on the CPL define a unique Device Model:

- Device_Model.manufacturer_identifier
- Device_Model.model_identifier
- Device_Model.hardware_version.version
- Device_Model.hardware_version.revision
- Device_Model.firmware_version
- SMETS_CHTS Version.Version_number_and_effective_date
- GBCS Version.version_number

For a dual mode PPMID, the SMETS1 and SMETS2+ Device Model must be allowed to be present twice on the CPL and use the same Device Model parameters expect for:

- SMETS_CHTS Version.Version_number_and_effective_date
- GBCS Version.version_number

As per the Technical Specification Applicability Tables (TSAT) there could be up to four Great Britain Companion Specification (GBCS) versions associated with the Device Model on the CPL, one for SMETS1 and up to three for SMETS2+:

SMETS/CHTS Version	GBCS Version
SMETS V1.2	GBCS Version 0.0
SMETS V4.3	GBCS Version 3.2
SMETS V4.3	GBCS Version 3.3
SMETS V4.3	GBCS Version 4.0

The DCC Total System must distinguish between a dual mode PPMID Device Model for SMETS1 and SMETS2+ by virtue of these two parameters only.

Requirement 2: Remove obligation for different Firmware Versions for PPMIDs.

SEC Appendix Z section 3.3 states:

“Where a PPMID of a particular type is capable of forming part of either a SMETS1 Smart Metering System or a SMETS2+ Smart Metering System, any Device Model added to the Central Products List shall:

- a) insofar as it relates to PPMIDs of that type forming part of SMETS2+ Smart Metering Systems, be the Manufacturer of the PPMID, its model, its hardware version and its firmware version; and
- b) insofar as it relates to PPMIDs of that type forming part of SMETS1 Smart Metering Systems, be the Manufacturer of the PPMID, its model, its hardware version and a value representing its firmware version that is different to the firmware version of the PPMID of that type that forms part of a SMETS2+ Smart Metering System.”

The obligation in the SEC for dual mode PPMIDs to be listed with different Firmware Versions must be reworded to ensure the same Firmware Version is used for SMETS1 and SMETS2+ Device Models.

Requirement 3: Retain current arrangements for adding Device Models to the CPL

The SEC defines two distinct processes for adding SMETS1 and SMETS2+ Device Models to the CPL:

- Only the DCC can add SMETS1 PPMID Device Models to the CPL and the Device must be present on the Eligible Product Combination List (EPCL);
- Manufacturers and Suppliers can add SMETS2+ PPMID Device Models to the CPL.

This modification will not change the current arrangements for adding Device Models to the CPL.

Requirement 4: Allow the Pre-Notification of a dual mode PPMID

Smart Metering Devices must be pre-notified to the DCC using SR12.3 ‘Device Prenotification’. This Service Request mandates the entry of the ‘SMETSCHTSVersion’. To achieve the maximum simplicity it must be possible to pre-notify a dual mode PPMID using the SMETS_CHTS Version.Version_number_and_effective_date associated with either the SMETS1 or SMETS2+ Device Model on the CPL.

Requirement 5: Whitelisting of dual mode PPMID

Smart Metering Devices must be whitelisted on the Communications Hub using Service Request 8.11 ‘Update HAN Device Log’. This Service Request action ties the dual mode PPMID to either a SMETS1 or a SMETS2+ Communications Hub.

The details of the target Communications Hub in SR8.11 is held in the Smart Meter Inventory (SMI) and the resulting response indicating success must be used to set the supported ‘SMETSCHTSVersion’ version in the SMI for the dual mode PPMID as per the following table:

PPMID SMETS Version in SMI as per pre-notification	CH SMETS version as per whitelisting	Resulting PPMID SMETS version in SMI
SMETS1	SMETS1	SMETS1
SMETS1	SMETS2+	SMETS2+
SMETS2+	SMETS1	SMETS1
SMETS2+	SMETS2+	SMETS2+

Once the ‘SMETSCHTSVersion’ in the SMI is set, the dual mode PPMID is then associated with either a SMETS1 or a SMETS2+ Smart Metering System. Any subsequent Service

Request involving the PPMID is then constructed as either a SMETS1 message or a SMETS2+ GBCS Command.

Requirement 6: Verification of the SMETS version of the Smart Metering System targeted by SR8.11

The Device Model details are verified against the CPL as part of the Pre-Notification; mismatches will be flagged and result in an error messages being generated and send to the DCC User.

Dual mode PPMIDs are expected to be present with SMETS1 and SMETS2+ Device Models on the CPL which enables the change of the 'SMETSCHTSVersion' in the SMI following the whitelisting (see Requirement 5 in Section 2.6).

The change of 'SMETSCHTSVersion' as part of the whitelisting can be requested in situations where the CPL doesn't contain a corresponding PPMID Device Model:

- The corresponding PPMID Device Model has not yet been added to the CPL;
- The corresponding PPMID Device Model status is set to "removed" on the CPL;
- A non-dual mode PPMID is submitted in SR8.11 and the targeted Smart Metering System is not matched by a corresponding PPMID Device Model on the CPL.

To prevent these scenarios it is necessary to verify SR8.11 prior to execution and the DCC will send an error message to the DCC User detailing the issue.

Requirement 7: Enable OTA firmware upgrades to dual mode PPMID enrolled in a SMETS2+ Smart Metering System.

OTA firmware upgrades to PPMIDs are supported starting with GBCS v4.1. A dual mode PPMID which, following the whitelisting process described in Requirement 3 (see Section 2.6), is listed as a SMETS2+ compatible device in the 'SMETSCHTSVersion' must support the OTA firmware upgrade.

A dual mode PPMID which, following the whitelisting process described in Requirement 3 (see Section 2.6), is listed as a SMETS1 compatible device in the 'SMETSCHTSVersion' must not support the OTA firmware upgrade. This follows from the SMETS1 OTA process where one of the following applies:

1. The SMETS1 PPMID OTA Manufacturer Image requires a SMETS1 Supporting Requirements (S1SR) specific header. This means the Device Model must have its own CPL entry since the Manufacturer Image and the Hash are different from the SMETS2+ model. It is not possible to treat this as a dual mode PPMID.
2. The DCC disassembles the OTA firmware data and inserts the S1SR specific header and forwards the re-assembled OTA firmware data to the S1SR. This is deemed out of scope for this modification.

4 Description of Solution

The primary change to the DCC solution is on DSP and on DCC's Data Science and Analytics (DS&A) Reporting team.

4.1 Impacts on DSP

The key requirement is to allow a single PPMID Device Model (i.e. hardware and firmware version combination) to be applicable to both SMETS1 and SMETS2+.

To support this, two rows of the same firmware version for a Device Model will be included in the CPL; one row for SMETS1 and the other for SMETS2. The data received via CPL is stored in the Firmware Version table in the Smart Metering Inventory (SMI) which, with its current constraint of the Primary Key (comprising of Firmware Version, Device Model, Device Type and the Manufacturer ID), can only accept one record for each firmware version.

The existing structure of the Firmware Version table is shown below for reference.

Firmware Version
Device Model
Manufacturer ID
Device Type
Firmware Version
Firmware Version Status
Firmware Version Hash
GBCS Version
SMETS CHTS Version

Table 1: Existing Firmware Version Table

The active firmware version of a Device is stored within the Device table. However, the data held in the Firmware Version table is used to distinguish SMETS1 Devices from SMETS2 Devices and to determine the status of a firmware version.

The new CPL behaviour necessitates the need for DCC Data Systems to make two key changes:

- data model changes to allow storing of two records for the same version of firmware; and
- consequential processing logic changes to all the processing scenarios that rely on the Firmware Version table for SMETS version.

The DCC recognises that a change like this has the potential to have a negative impact on system performance if it is applied across all types of Devices. Therefore, the new processing changes will be applied in such a way that they are limited only to PPMIDs.

The data model changes to the SMI will involve changing the primary key constraints within the physical data model. This will extend the Primary Key of the Firmware Version table, which is currently formed of Firmware Version, Device Model, Device Type and the Manufacturer ID, by including a new SMETS1 Indicator field. The value of the SMETS1 Indicator field will be derived from the GBCS Version.

The data model updates to the SMI will need equivalent changes to the corresponding In-memory database (Volt DB) tables. The in-memory database data model differs from the SMI data model as the structure of the Volt tables is optimised for performance.

The data model changes described above will require changes to the way relationships are established between entities as well as changes to the corresponding processing scenarios.

The ESI-040 (Enterprise System Interface- used for sharing data between DSP and DCC's DS&A team for reporting) Firmware extract will feature two rows for the same firmware version if the PPMID is applicable for both SMETS1 and SMETS2. The format of the ESI-040 will remain unchanged. However, the SMETS version field will form part of the primary key.

The Device table records the SMETS version when a Device is pre-notified using SRV12.2. Since a Service User may not know whether this PPMID will be installed on a SMETS1 or SMETS2 HAN then either value can be supplied in the SRV12.2 request. When adding this PPMID to a HAN later using SRV8.11, if the currently allocated SMETS version is inconsistent with that of the Comms Hub for that HAN, then the system will consider the SMETS version of the Comms Hub as the valid one and update the active firmware version in the Device table accordingly.

Processing SRV11.1 Update Firmware will be amended such that, in the case of PPMIDs only, where there is a record for both a SMETS1 and SMETS2 Firmware Version (indicating a dual mode PPMID), then the SRV11.1 Update Firmware request will be rejected with a new DUIS error code E110106 indicating that this firmware cannot be applied to a SMETS1 PPMID installation. (For backwards compatibility, this will be mapped to an existing error code E110101 for older DUIS versions).

Introducing a new DUIS error code requires a new version of DUIS, including an update to the DUIS schema (refer assumption # MP202-AA2 in Section 8.2).

Processing of SRV11.2 Read Firmware, SRV11.3 Activate Firmware and Alert 0x8F8B Firmware activation alert for PPMIDs will be amended such that, if there are multiple firmware versions available, the relevant one will be determined based on the SMETS version of the associated Comms Hub.

4.2 Impacts on DCC DS&A Reporting

Changes in the ESI-040 Firmware extract report from DSP is likely to impact on reporting produced by the DCC Data Science and Analytics (DS&A) team. This will be assessed as part of the Full Impact Assessment (FIA).

5 Impact on DCC Systems, Processes and People

This section describes the impact of SECMP0202 solution on DCC Services and Interfaces that impact Users and/or Parties.

5.1 Security Impact

The implementation will be security assured during the implementation phase. This includes reviewing designs, test artefacts and providing consultancy to the implementation and test teams.

A more detailed security impact will be carried out as part of the Full Impact Assessment.

5.2 Technical Specifications

There will be changes in DUIS and corresponding changes in DUGIDS for the changes in DUIS. The DUIS Guidance document may need to be updated.

5.3 Integration Impact

An appropriate level of Systems Integration and User Integration Testing (SIT and UIT) will be carried out prior to progressing the release of this change to the Production environment, but this is not included in the PIA. A more detailed integration impact will be carried out as part of the Full Impact Assessment to evaluate SMETS1 Service Providers need to carry out any integration testing or not.

5.4 Infrastructure Impact

No infrastructure impact is expected from this Modification. It should be noted that the aggregated impact of many such changes to the DSP solution will ultimately result in a reduction of the available processing headroom assumed as part of the original Agreement. As such, it may be necessary for DSP to raise a Business as Usual (BAU) CR for the provision/ of additional infrastructure to ensure the DCC Total System does not experience performance problems that are the direct result of the accumulation of such changes.

The change does not impact the DSP resilience or Disaster Recovery implementation.

5.5 Service Impact

The changes noted above are not expected to alter traffic volumes significantly, nor to add to message processing time. No changes to Service Level Agreements (SLAs) or reporting are expected as a result of this change.

A detailed service impact will be completed as part of the Full Impact Assessment.

6 Implementation Timescales and Approach

This Modification is expected to be implemented in a future SEC Release. Design, Build, and PIT is expected to take approximately six months to complete after the CAN is signed.

Details of the implementation will be finalised in the FIA.

6.1 Implementation Approach

Implementation of this change is assumed to follow a hybrid of agile and waterfall methodology. The release lifecycle duration will be confirmed as part of the FIA.

6.2 Testing and Acceptance

It is assumed that the change will be implemented and tested as part of a major release and will include release based regression testing in SIT and UIT.

7 Costs and Charges

The scope of supply under this PIA includes design, development (build), system testing, and performance testing within the PIT environments.

The Rough Order of Magnitude cost (ROM) shown below describes indicative costs to implement the functional and non-functional requirements as assumed above. The price is not an offer open to acceptance. It should be noted that the change has not been subject to the same level of analysis that would be performed as part of a Full Impact Assessment and as such there may be elements missing from the solution or the solution may be subject to a material change. As a result, the final offer price may result in a variation.

7.1 Design, Build and Testing Cost Impact

The table below details the cost of delivering the changes and Services required to implement this Modification. For a PIA, only the Design, Build and PIT indicative costs are supplied.

£	Design, Build and PIT
SECMP0202	£350,000 to £750,000

Based on the existing requirements, the total fixed price cost for a Full Impact Assessment by all Service Providers is **£13,211** and would be expected to be completed in 40 working days.

8 Risk, Assumptions, Issues, and Dependencies

In the following sections, Risks, Assumptions, Issues, and Dependencies have been identified.

8.1 Risks and Issues

None at this time.

8.2 Assumptions

Ref.	Assumption	Impact
MP202-AA1	GBCS 4.1 CHF's will be available at the time of testing in order to successfully execute an over-the-air firmware update to the SMETS2 PPMID.	If this is not the case, the PIA will need to be revisited.
MP202-AA2	Preferred approach for handling the SMETS1 firmware update validation on SRV11.1 and whether a DUIS change (schema change) will be accepted as part of this Modification need to be agreed before the FIA.	

8.3 Dependencies

Ref.	Dependency	Impact
MP202-AD1	Suitable dual-mode PPMIDs should be available for UIT.	
MP202-AD2	Manufacturer firmware image for the OTA upgrade on the SMETS2+ Device set should be available for UIT.	

Appendix A: Glossary

The table below provides definitions of the terms used in this document.

Acronym	Definition
BaU, BAU	Business As Usual
CAN	Contract Amendment Note
CHF	Comms Hub Function
CoS	Change of Supplier
CPL	Central Products List
CR	DCC Change Request
DCC	Data Communications Company
DS&A	Data Science and Analytics
DSP	Data Service Provider
DUGIDS	DCC User Gateway Interface Design Specification
DUIS	DCC User Interface Specification
ESI	Enterprise Systems Interface
FIA	Full Impact Assessment
GBCS	Great Britain Companion Specification
OTA	Over the air (firmware download)
PIA	Preliminary Impact Assessment
PIT	Pre-Integration Testing
PPMID	Prepayment Meter Interface Device
RAID	Risks, Assumptions, Issues, and Dependencies
ROM	Rough Order of Magnitude (cost)
S1SP	SMETS1 Service Provider
SEC	Smart Energy Code
SECAS	Smart Energy Code Administrator and Secretariat
SIT	Systems Integration Testing
SLA	Service Level Agreement
SMETS	Smart Metering Equipment Technical Specification
SMI	Smart Metering Inventory
SR	Service Request
SRV	Service Request Variant
UIT	User Integration Testing