

SEC Modification Proposal, SECMP0028, DCC CR4749

Southbound Prioritisation, formerly Prioritising Over The Air Messages

Full Impact Assessment (FIA)

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1.0

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DCC

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DCC Public

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1 Executive Summary

The Change Board are asked to approve:

- Total cost to implement SECMP0028 of £309,879, which comprises:
 - £305,381 in Design, Build and PIT costs
 - £4,498 in release costs (SIT, UIT and Implementation)
- A timescale to complete the implementation of 10 months, including integration testing
- Include SECMP0028 in the November 2024 SEC Release

Problem Statement and Solution

Periods of high Over The Air (OTA) message volumes going through the DCC Systems could result in message queuing and increased processing times. Without prioritisation of consumer-driven OTA messages during periods of high system traffic, consumers may experience unnecessary outages and delays to their supplies being made live following outages. Depending on the vulnerability of affected consumers, the implications could be severe if not addressed.

There have already been instances of Users not receiving important On Demand Responses in time because there was so much Scheduled data collection taking place.

Modification Benefits

The Modification would establish multiple tiers of priority in the Data Service Provider (DSP) that can categorise OTA messages depending on the relative importance of processing them quickly. Southbound OTA messages with a 'Priority Level 1' would be fast-tracked in any DSP queues such that they are resolved ahead of any lower priority level OTA messages. By including commands, responses, and alerts as part of the solution this would help ensure that consumers and Users receive key Smart Metering data and requests before less important OTA messages without a corresponding negative impact on supply and business processes.

Reconfiguring the priority levels will be a relatively simple process, allowing configuration changes as the types of traffic change.

2 Document History

2.1 Revision History

Revision Date	Revision	Summary of Changes
01/03/2023	0.1	Initial compilation
13/10/2023	0.3	DCC review completed
30/01/2024	1.0	Removed “promotion of SRVs near TRT” solution detail

2.2 Associated Documents

This document is associated with the following documents:

#	Title and Originator's Reference	Source	Issue Date
1	SECMP0028 Modification Report v0.4	SECAS	25/07/2022
2	SECMP0028 Business Requirements v0.7	SECAS	25/07/2022
3	SEC Modification Proposal, SECMP0028, DCC CR4749, Prioritising Over The Air Message	DCC	23/09/2022

2.3 Document Information

The Proposer for this Modification is Andy Knowles of Utilita. The proposal was initially submitted in December 2016. An Initial Modification Report was prepared and published in January 2017.

The Preliminary Impact Assessment (PIA) was requested of DCC on 27th July 2022. This is issued as DCC CR4749.

It should be noted that the term "OTA Message" or "OTA message" has been used throughout the Requirements and supporting documentation published by SECAS. The terms 'OTA' and 'Message' are defined terms but not used together. 'OTA' is usually only used in the context of firmware images in the SEC. DCC proposes that the term should be defined using GBCS terminology as follows.

OTA Messages can be:

- A Command, Response or Alert
- Alert: A Message generated by a Device including in response to a problem or the risk of a potential problem
- Command: An instruction to perform a function received or sent via any interface
- Response: A response to a Command received or sent over any interface

Given the nature of this change, and that it follows on from SECMP0208, “Northbound Prioritisation”, the document title has been updated.

3 Solution Context and Requirements

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

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

3.1 Current Arrangements

The Proposer has noted that periods of high Over The Air (OTA) message volumes in the DCC Total System can result in message queuing and increased processing times. As a consequence, consumers may be adversely impacted. This is because increased processing times for OTA messages driven by Consumers, e.g., prepayment meter top ups, could cause a loss of supply or a delay in regaining supply.

3.2 What is the Issue?

Currently, the DCC are required to process all OTA messages in accordance with the Target Response Times (TRTs) outlined in Smart Energy Code (SEC) Section H3.14 and SEC Appendix E 'DCC User Interface Services Schedule'. In situations where there are high volumes of OTA messages the DCC Total System could approach or exceed processing capacity. This could cause DCC Users to experience variations to service performance and delays to TRTs.

Under current arrangements, OTA messages are processed in the order in which they are received across the DCC Total System and there is no mechanism for prioritising specific OTA messages during high volume periods. It has also been noted that delays to the processing of consumer-driven Service Requests could cause the User to resend the same message until the desired Response is received, which may exacerbate the high volume of messages and cause further delays to Response times.

The Proposer believes that the SEC arrangements have been primarily drafted to cater for credit consumers and do not adequately cater for Prepayment Consumers, and has highlighted that delays to the processing of consumer-driven Service Requests, for example Service Reference Variant (SRV) 2.2 'Top Up Device', may lead to negative impacts on the consumer experience. This is because this Service Request could action the enabling or disabling of supply for Prepayment consumers.

3.3 Impact of the Issue

In the case of the DCC Systems being overloaded and not processing OTA messages, cost and reputational damage would be caused to Suppliers and to the industry as a whole.

In a Request for Information issued by SECAS in September 2021, no SEC Parties identified situations where Consumer-driven Service Requests were delayed during periods of high system traffic. Separate consultations conducted with DCC Users and Service Providers as part of the DCC's Network Enhancement Plan concluded that without technical enhancements to mitigate the increases in DCC Total System traffic, instances of process delays were highly likely to increase.

Without prioritisation of consumer-driven OTA messages during periods of high system traffic, and specifically those OTA messages relating to Prepayment top ups, the Proposer believes consumers may experience unnecessary outages and delays to their supplies being made live following outages. Depending on the vulnerability of affected consumers, the implications could be severe if not addressed.

There have already been many instances of Users not getting their important On Demand Responses in time because there was so much Scheduled data collection going on.

3.4 Business Requirements

The business requirements are as follows.

Requirement 1: To assign a priority level to all OTA messages allowing them to be processed and sent in a specific order in the DSP (Systems).

The solution would establish multiple tiers of priority in the DSP that can categorise OTA messages depending on the relative importance of processing them quickly. OTA messages with a 'Priority Level 1' would be fast-tracked in any queues so that they are processed ahead of any OTA messages with lower priority levels (subsequently higher numbers denoting lower priority). OTA messages with lower priority levels would still be processed in the order consistent with their assigned levels. The solution could establish the following criteria against each priority level:

Priority Level	Criteria
1	OTA messages relating to the continuity of a consumer's energy supply.
2	OTA messages which are required for an engineer to complete on-site activities.
3	OTA messages with an indirect impact on a consumer's energy supply, and/or OTA messages required to comply with a consumer request.
4	None of the above criteria apply.

DCC notes that:

1. The number of Priority Levels and their associated Service Requests, responses, and Alerts will need to be determined by the Working Group and industry sub-committees before Go Live. The solution described below suggests the use of five priority levels (or priority bands).
2. The solution will be designed such that the number of Priority Levels is not fixed, and is configurable.
3. The full range of OTA messages should be considered in this solution, such as emergency firmware updates, Business as Usual Device firmware updates, critical and non-critical commands.
4. In design discussions for other proposed changes, a priority level for Responses and Alerts has been suggested as follows:
 - a. Service Responses other than Scheduled Service Request responses (see item d below)
 - b. High Priority Alerts: a configurable list of Northbound¹ High Priority Alerts, which may include both Device Alerts and DCC Alerts
 - c. Other Alerts: Device Alerts and DCC Alerts other than high priority alerts

¹ Northbound; Responses and Alerts received by the DSP from Smart Metering Devices
Southbound; Requests received by the DSP from Service Users

- d. Scheduled Service Request Responses: responses to commands sent out as a result of a scheduled operation

A detailed piece of work is required prior to implementation to determine the number of priority levels and the assignment of Service Requests, Responses, and Alerts to each. DCC has provided a suggested first pass with a set of five (5) priority bands as described in Table 1 below. DCC recommends this priority setting be carried out and agreed by the Business Proposer, Working Group, and sub-committees as nominated by SECAS.

Requirement 2: To make all priority level assignments fully configurable.

It must be relatively simple to change an OTA message's assigned priority level. In the event that a new process is introduced or there is a change to an existing process, certain OTA messages with a lower priority may become part of a critical pathway for an urgent process. Equally, changes to processes may result in certain OTA messages no longer being crucial to the success of those processes. It is therefore necessary to introduce a method by which priority levels can be reconfigured as and when appropriate.

As part of the PIA, SECAS and the Proposer will engage with industry to determine which bodies or committees should have oversight for changes to the Priority Levels. This could also apply in the hypothetical instance that powers are introduced for Sub-Committees to override priority levels in an infrastructure critical event.

3.5 Other Requirements

At the Requirements Workshop for this Modification, the following points were made:

- Regarding the use of a 'Priority Lane' with dedicated infrastructure, the DCC and Service Providers advised this would likely result in a significant increase to implementation costs. All members agreed that the prioritisation levels should apply at all times to avoid complicating the solution with an 'activation mechanism', and that the solution should be "digital only" i.e., with no added infrastructure.
- Full process pathways should be considered when assigning priority levels, not just standalone OTA messages, as queueing is a bigger issue when DSP is sending messages back to the Service User rather than in the CSP network. Assigning priority levels to Alerts will be discussed and agreed by the Working Group.

4 Solution Overview

The solution will include prioritisation for southbound messages (Requests) as shown in Figure 1 below.

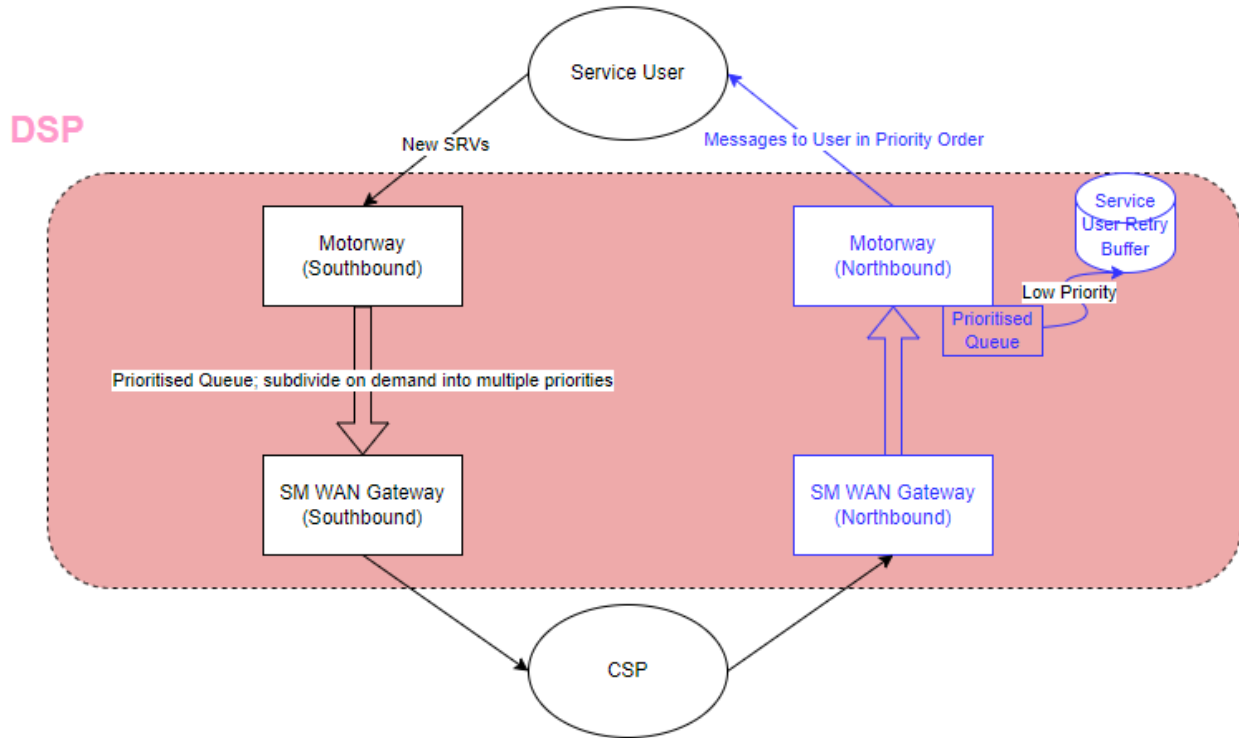


Figure 1: Northbound and Southbound Prioritisation

Northbound processing, as shown in blue on the right-side of the diagram, shall remain unchanged, since changes for prioritisation of northbound messages (Responses and Alerts) have already been implemented as part of SECMP0208, Northbound Prioritisation, under the heading of Marketwide Half-Hourly Settlement. The solution will assign a priority to all southbound messages (based on SRV and mode of operation) to be used when selecting work from queues for onward transmission to both SMETS2² and SMETS1 Communications Service Providers (CSPs) through the CSP WAN and S1SP Gateways respectively. This will also include the Comms Hubs and Networks 4G Service Provider.

Messages will be selected in priority order for delivery from the prioritised queue by the SMWAN³ Gateways (also referred to as the CSP and S1SP Gateways). Table 1 following shows an initial suggestion for assigning priorities to Southbound messages.

² SMETS = Smart Metering Equipment Technical Specification

³ SMWAN = Smart Metering Wide Area Network

Mode	Condition	Priority
On Demand	SRV relating to the continuity of a consumer's energy supply	1
	SRV required for an engineer to complete on-site activities	2
	SRV in list of messages required to comply with a consumer request	3
	Any other SRVs	4
	SRVs with 24-hour TRTs	5
Any other mode	Scheduled	5

Table 1: Suggested Priority Bands for Southbound Prioritisation

~~Messages with priority 2-5 will be promoted to priority 1 in the event that capacity is available and the DSP's southbound TRT is close to being breached.~~

It should be noted that the Priority bands and contents for Northbound Prioritisation and Southbound Prioritisation are maintained separate and independent from each other.

4.1 Impacted Components

Southbound Prioritisation requires some changes to the components described following, but after implementation the number of Priority Bands, and their contents can be reconfigured and updated during a maintenance release through the DCC Small Change process.

Feature Switches	Changes will be enabled, and can be disabled, by a Feature Switch.
Data Management	Table definition for the southbound prioritised queue will be changed to accommodate the new priority rules.
Data Communications	When writing messages to the SMWAN queue, compute the message priority according to the rules. When selecting messages from the queue in the SMWAN gateway, the new priority selection rules (as outlined in Table 1) will be used.
Technical Specifications	There are no changes to any of the Technical Specifications including DUIS.
Infrastructure	Assume that no additional infrastructure will be required to implement this Change. Performance testing is required, both to ensure that the performance of the system will allow the Contractor to maintain SLAs and to establish whether there is a material impact on the underlying infrastructure, for example by measuring CPU, memory, and latency. If there is an adverse impact on performance, it is possible that additional costs may apply for infrastructure expansion.
DSP Resilience	No change.
Disaster Recovery	No impact.
Security Team	Will assure the implementation.

4.2 Configuration and Settings

As mentioned in the above sections, DCC is requesting the input and agreement of the Business Proposer, Working Group, and SECAS-led sub-committees for the number of Priority Bands and their contents. While the configuration of these items can be quickly and easily changed, DCC recommends that the final configuration or implementation should be frozen before the start of the Pre-Integration Testing (PIT) as described following.

Any changes to the priority bands or contents after implementation need to be agreed by SEC Panel, who may designate this to the Operations Group.

5 Testing Considerations

This Full Impact Assessment includes the cost to develop, fully test, and deliver this Modification.

5.1 Pre-Integration Testing (PIT)

The PIT team will design and implement the functional updates required to the DSP for the change, and will test to ensure DSP functionality aligns with the solution described in this FIA. PIT testing will include testing both existing updated DSP Use Cases, and new Use Cases development for the Modification implementation. A series of regression tests will also be run.

Automated testing will be used where possible.

This change involves additional work being done by the DSP system in prioritising messages and the resulting queuing and dispatching of those messages. The impact of these changes will be performance tested to evaluate the impact of prioritisation, queuing, and dequeuing to identify possible bottlenecks that need to be investigated and resolved in advance of deployment to Production. One possible scenario to be tested is the potential build-up of lower priority messages due to high volume of higher priority messages and the impact that has on system resources.

5.2 System Integration Testing (SIT)

As the change is non-functional, testing is expected to be completed during the PIT phase. There will be no additional benefit derived from testing this Modification in the SIT environment.

On the basis that the Change is to be included in a wider release, the SIT team expects to execute the SMETS1 and SMETS2 Daily System Regression test packs as part of the release activity, which will verify that the processing of service requests has not regressed as a result of the changes in this Modification.

It is assumed that the Modification will be delivered as part of a SEC System Release.

5.3 User Integration Testing (UIT)

There is no User Integration Testing required, as the change does not introduce any changes to system integrations within the DCC Total System and is within limited components within the DCC Total System.

6 Implementation Timescales and Releases

This Modification is expected to be included in a SEC Release in November 2024. Implementation timescales will be finalised as part of the relevant SEC Release.

6.1 Change Lead Times and Timelines

From the date of approval (in accordance with Section D9 of the SEC), to implement Design, Build and PIT requires a lead time of approximately **six months**.

The Modification will be ready to schedule to a production release after approximately ten months on the basis that it is to be included in a SEC System Release alongside other Modifications and Changes that will be subject to post PIT activities. As this Modification would be scheduled alongside other Modifications and CRs, there might be a period of no activity for this Modification.

6.2 SEC Release Allocation and Other Code Impacts

This Modification is expected to be implemented as part of the November 2024 SEC Release, however the allocation to a release may be dependent on other Modification timings and the suitability of a release. No functionality overlap with other Modifications has been identified at the time of undertaking this FIA.

6.3 Costs and Charges

This section indicates the quote for all phases of application development stage for this Modification. Note these costs assume a release of just this SEC Modification without any other Modifications or Change Requests in the release, which is not truly reflective of what the post-PIT test costs or programme duration will look like. A calculation of those costs will be carried out when the contents of the future Release are finalised, and the post-PIT costs determined through a "Release CR" also referred to as a "Post-PIT CR".

	Design, Build, and PIT	Integration Testing, SIT and UIT	TTO	Application Support	Total
SECMP0028	£305,381	£0	£1,032	£3,466	£309,879

Design	The production of detailed System and Service designs to deliver all new requirements.
Build	The development of the designed Systems and Services to create a solution (e.g., code, systems, or products) that can be tested and implemented.
Pre-Integration Testing (PIT)	Each Service Provider tests their own solution to agreed standards in isolation of other Service Providers. This is assured by DCC.
Systems Integration Testing (SIT)	All the Service Provider's PIT-complete solutions for a Release are brought together and tested as an integrated solution, ensuring all SP solutions align and operate as an end-to-end solution.
User Integration Testing (UIT)	Users are provided with an opportunity to run a range of pre-specified tests in relation to the relevant change.
Implementation to Live (TTO)	The solution is implemented into production environments and made ready for use by Users as part of a live service.
Application Support	Expected three (3) calls per day for the first three months of operation. If configuration changes are required in this time, this is included in the costs.

6.4 Changes to the Agreement

The DSP contract updates will be agreed and detailed within the Contract Amendment Note (CAN) and will impact the following schedules:

- Schedule 2.1 (DCC Requirements): addition of new requirements for this change
- Schedule 3 (DCC Responsibilities): update to reflect the addition of new DCC Responsibilities

- Schedule 4.1 (DSP Solution): solution design documents
- Schedule 6.1 (Implementation Planning): addition of new milestones
- Schedule 7.1 (Charges and Payment): revisions to incorporate charges and payment

6.5 Changes to Reporting

Note that DCC believes that this definition and usage would require an exception or acknowledgment within the Performance Measurement Report (PMR) and/or the Performance Measurement Methodology (PMM).

Appendix A: Glossary

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

Acronym	Definition
CAN	Contract Amendment Note
CR	(DCC) Change Request
CSP	Communication Service Provider
DCC	Data Communications Company
DSP	Data Service Provider
DUIS	DCC User Interface Specification
ELS	Early Life Support
ESME	Electricity Smart Metering Equipment
FIA	Full Impact Assessment
GBCS	Great Britain Companion Specification
MGN	Message Gateway North
NMS	Northbound Message Store
OTA	Over the Air
PIA	Preliminary Impact Assessment
PIT	Pre-Integration Testing
PMM	Performance Measurement Methodology
PMR	Performance Measurement Report
RMN	Request Manager North
ROM	Rough Order of Magnitude (cost)
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
SMWAN, SM WAN	Smart Metering Wide Area Network
SR	Service Request
SRV	Service Reference Variant
SU	Service User
SURB	Service User Retry Buffer
TRT	Target Response Time
TTO	Transition to Operations (Implementation to Live)
UIT	User Integration Testing

Appendix B: Assumptions

Solution Assumptions

Ref	Assumption
A1	Assume that “OTA Messages” are all messages that are sent to or received from devices across the SMWAN so, in DSP terms, refer to requests, responses and device alerts.
A2	Assume that no additional physical infrastructure will be required to implement this Change. Further, it is assumed that no changes to existing infrastructure configuration will be required.
A3	Assume this Modification will be delivered as part of a SEC System Release, which is planned for November 2024.
A4	It is assumed that this Change will not result in a material increase in application management support required after the completion of the ELS period.