

SEC Modification Proposal, SECMP0208, DCC CR4906

Northbound Prioritisation of N56 Alerts Preliminary Impact Assessment (PIA)

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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 **£15,260**.
- The timescales to complete the Full Impact Assessment of 40 working days.
- ROM costs for SECMP0208, up to the end of Pre-Integration Testing (PIT) of £350,000 to £750,000.

Problem Statement and Solution

When a consumer attempts to purchase a Prepayment Meter top up from a shop, Service Reference Variant (SRV) 2.2 'Top Up Device' is generated by the Supplier, and the Payment Service Provider (PSP) 'holds' the consumer funds in preparation to transfer to the Supplier's bank account. Problems occur where the N56 Alert generation takes longer than 30 seconds from the perspective of the End Point for SMETS1 vends; 30 seconds is the maximum time the PSP keeps the transaction open before they time out the message. An alert return of over 30 seconds could lead to money being reserved in the customer's bank and the credit not being applied to the meter. Uncredited money will be released from this reserved status but that could take up to three days. The Proposer has encountered instances where the process is failing to complete in the necessary timescales.

Modification Benefits

This Modification will enable the prioritisation of N56 Alerts sent from the DSP to requesting Suppliers over all other traffic.

Outstanding Concerns

A separate Change Request, CR4630, has been raised in parallel with this Modification to provide reporting for the timing of SRV2.2 and the corresponding N56 Alerts through the DCC Total System. This report is expected to deliver in April 2023. Without this reporting, no definitive statement on the cause of the N56 Alert delays can be made. This solution does not address the processing of any SRV2.2 and corresponding alerts within the DCC Total System, only the prioritisation of the N56 Alerts as they are sent from the DSP to the originating Supplier.

DCC and the Service Providers have indicated that they do not believe the Requirement for this Modification as stated lends itself to a complete solution, but have completed the PIA.

Other SEC Modifications and changes to the DCC Total System have been proposed for managing and prioritising traffic across the DCC Total System.

Prioritising one alert over other traffic will necessarily have an impact on less or non-prioritised Service Requests and Alerts, and may result in other SRVs and/or Alerts failing their required Target Response Times. Prioritisation levels and ordering must be agreed by the Working Groups and solutions agreeing on a prioritisation order for all traffic from the DSP. The DCC will ensure that the solutions proposed are compatible with each other, and do not involve duplicate functionality or charges.

2 Document History

2.1 Revision History

Revision Date	Revision	Summary of Changes
11/01/2023	0.1	Initial version, for DCC internal review
19/01/2023	0.3	Internal review complete

2.2 Associated Documents

This document is associated with the following documents:

Ref	Title and Originator's Reference	Source	Issue Date
1	MP208 Modification Report v0.3 [Draft 1]	SECAS	07/12/2022
2	MP208 Business Requirements v0.1 [Draft 3]	SECAS	07/12/2022
3	SEC Modification Proposal, DP208, Problem Analysis	DCC	22/11/2022

References are shown in this format, [1].

2.3 Document Information

The Proposer for this Modification is Emslie Law. The proposal was initially submitted in June 2022. The request for a Preliminary Impact Assessment (PIA) was accepted by DCC on 19th December 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

When a consumer attempts to purchase a Prepayment Meter top up from a shop, Service Reference Variant (SRV) 2.2 'Top Up Device' is generated by the Supplier, and the Payment Service Provider (PSP), which is not a Smart Energy Code (SEC) Party, 'holds' the consumer funds in preparation to transfer to the Supplier's bank account. An N56 Alert contains the Unique Transaction Reference Number (UTRN).

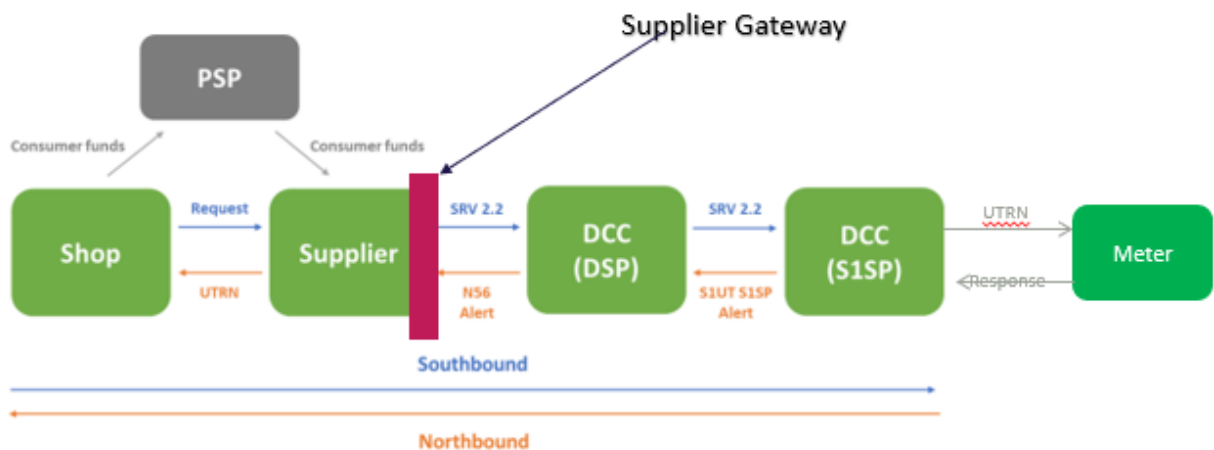


Figure 1; Schematic Showing SMETS1 Prepayment Process

3.2 What is the Issue?

For SMETS1 Prepayment Service Requests, the Supplier sends a SRV2.2; the SMETS1 Service Provider sends a SMETS1 UTRN, referred to as a S1UT Alert, and the DSP returns a N56 Alert with the (UTRN) to the Supplier. Receipt of the UTRN by the shop till is the endpoint of the process and allows the PSP to transfer the consumer funds to the Supplier's bank account.

Problems occur where the UTRN generation takes longer than 30 seconds from the perspective of the End Point for SMETS1 vends; 30 seconds is the maximum time the PSP keeps the transaction open before they time out the message, while the time for the completion of the DCC Total System processing is 16 seconds. An alert return of over 30 seconds could lead to money being reserved in the customer's bank and the credit not being applied to the meter. Uncredited money will be released from this reserved status but that could take up to three days. The Proposer has encountered instances where the process is failing to complete in the necessary timescales.

3.3 Impact of the Issue

When the SRV 2.2 is generated, the PSP 'holds' the consumer's funds in preparation to send to the Supplier's bank account. If the top up is not successful, the funds are still in a 'locked' state within the consumer's bank account, meaning they have no access to this money until the PSP releases it. As this can take several days to be processed, the consumer is not only unable to access their own money but have also not succeeded in topping up the energy allowance on their Prepayment Meter. The consumer will likely re-attempt the top up, meaning more money leaves their account.

3.4 Business Requirements

The Proposed Solution will be applied to Smart Metering Equipment Technical Specifications (SMETS)1 Devices only.

The SECAS business requirements are as follows.

Requirement 1: To apply prioritisation at the Data Service Provider (DSP) level to N56 Alerts such that they are processed ahead of other messages when they reach the Supplier gateway.

Requirement 1.1 To introduce a mechanism to ensure that non-prioritised messages do not wait indefinitely to be processed.

The Working Group noted that prioritisation of any System message, by definition, de-prioritises others. Ideally, there will be a way of ensuring that when this happens, messages with a lower priority are not required to wait for an indefinite amount of time to be processed. This is given as a 'could-have' requirement due to the urgency of delivering a solution to Requirement 1; if this can be delivered without causing significant delays to the Proposed Solution, it should be included.

4 Description of Solution

The following sections give an overview of some potential reporting to help diagnosis, and a high-level outline solution created to support the PIA discussion and associated PIA responses from DCC and its Service Providers.

4.1 CR4630, S1UT Reporting

During an initial review of this problem, DCC identified that it does not have a full set of the timing information associated with this problem, and the DSP will need to report to the DCC the amount of time between a top-up request SR2.2 being received by the DSP and a S1UT alert being returned to the Service User, where the command variant of the top-up request requires a S1UT alert to be generated.

There are three Command Variants (CV) of SRV2.2. The following diagram shows the key timing points of the data flows to and from the DSP for the three Command Variants of an SR2.2:

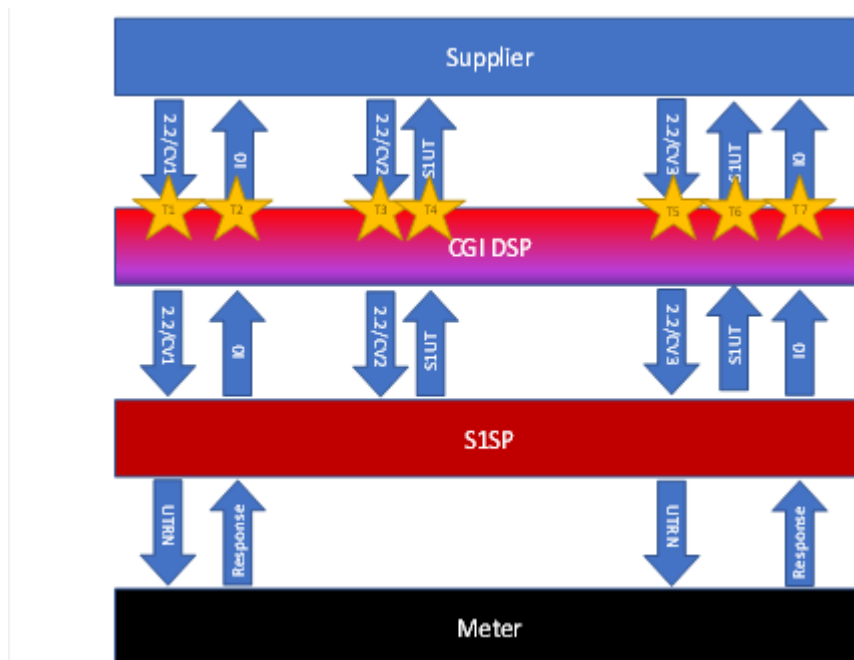


Figure 2: Timing Points for SRV2.2 and Alerts

There are multiple possible responses between the Supplier and CGI DSP, as well as DSP and the SMETS1 Service Providers.

Timings are available in the Service Audit Trail (SAT) log entries for:

- T1 to T2
- T5 to T7

Timings are available in the SAT log entries but are not linked to the original SR2.2 for:

- T3 to T4
- T5 to T6

The CR is not a solution, but is purely a report to help diagnose and identify timings associated with the transactions.

CR4630 will also provide logging in the SAT of sufficient information to allow the DCC to report the prepayment mode chosen for an Update Payment (SR1.6) request to a SMETS1 meter. This will improve the diagnostics and visibility for Sr1.6.

4.2 High Level Architecture for SECMP0208

DSP Northbound processing shall be changed to prioritise selected High Priority messages over Low Priority messages. The configuration shall be such that Northbound Prioritisation is always applied.

The prioritisation categories are outlined below:

1. High priority alerts – a list of Northbound High Priority Alerts (Config-265). For this Modification, the N56 Alert shall be the only alert configured in the list. Other alerts could be added to the list.
2. Service Responses other than Scheduled Service Request responses.
3. Other alerts – Device Alerts and DCC Alerts other than high priority alerts.
4. Scheduled Service Request responses – i.e., responses to commands sent out as a result of a scheduled operation.

This allows on demand service responses and high priority alerts to be prioritised over scheduled responses and other Alerts.

Note that the prioritisation of Service Responses other than Scheduled Service Request responses above N56 Alerts is the standard prioritisation proposed for the SECMP0028 and CR4879 Northbound Prioritisation feature as previously proposed. The requirement stated above requires that N56 Alerts are prioritised above all Service Responses and other Alerts although this could be maintained or changed via configuration of priorities.

For delivery to Service Users, the Northbound prioritisation approach is that any Service Responses or Alerts with lower priorities may be queued within the DSP to ensure that the Higher Priorities are not subject to processing delays. The flow of messages is shown in the following generalised diagram of DSP components.

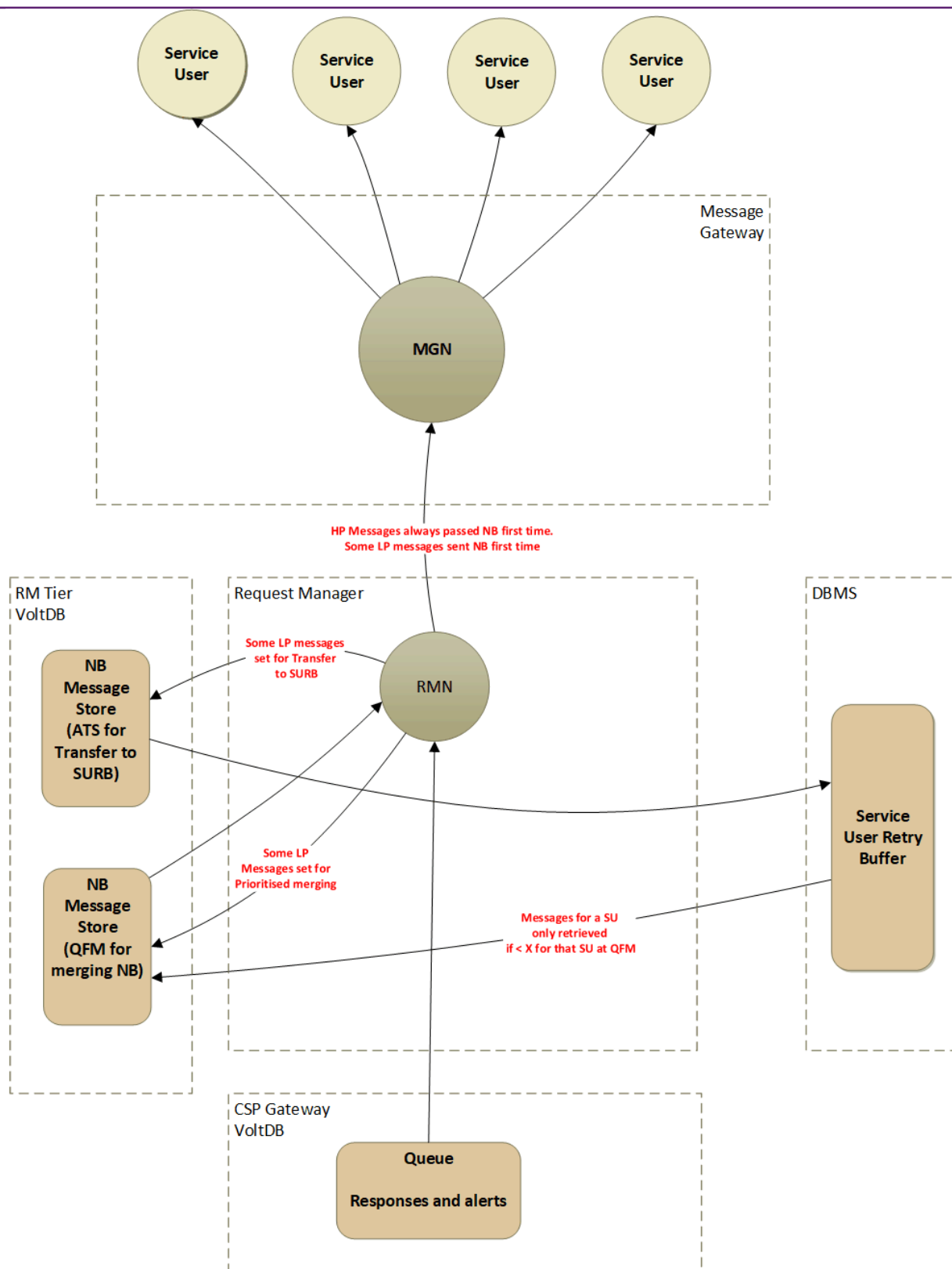


Figure 3: Proposed Message Northbound Handling from the DSP to Service Users

Currently all messages are passed from Request Manager North (RMN) to Message Gateway North (MGN) irrespective of type of message or rate limiting. This will change to minimise the chance of a High Priority alert (or message) being delayed by a Low Priority.

All High Priority messages will continue to be passed straight to Message Gateway North.

However, depending on various criteria, a Lower Priority message may now be treated as follows:

1. Passed straight to Message Gateway North
2. Stored in the Oracle-based Service User Retry Buffer (SURB)
3. Stored in the Motorway Cache-based Northbound Message Store for priority-based retrieval

Low Priority messages are passed straight to MGN only when there are no High Priority messages in SURB for that Service User, and it is within the current rate limit defined for that Service User. If this isn't the case, then if there is sufficient room in the NB Message Store and there are not already too many messages for that specific Service User (SU) in the Northbound Message Store then the message is stored in the Northbound Message Store with status Queued For Merge (QFM). QFM messages are retrieved periodically from the Northbound Message Store and merged with Business As Usual traffic according to message priority and Service User rate limits. Otherwise, the Low Priority message is set to be transferred to SURB and hence will be subject to the standard Northbound Buffering functionality.

The standard Northbound Buffering functionality for retrieval from the SURB will be amended slightly, to prevent a scenario whereby a single Service User (SU) fills the local retry buffer and prevents High Priority messages from being retrieved from the SURB. The amendment would only include a Service User in the list of SUs for SURB data retrieval if the number of messages for that Service User in the Northbound Message Store with status QFM is less than a new configurable parameter.

4.3 Solution Concerns and Alternative Approaches

There is significant overlap in the solution proposed for this Modification, SECMP0028, Prioritising System Messages, and CR4879, the Northbound Prioritisation functionality proposed in the Marketwide Half-Hourly Settlement solution. Due to the close similarity of this and the other Modifications, some requirements, characteristics, and concerns of SECMP0028 and SECMP0208 are inherent in this solution.

At the Requirements Workshop for SECMP0028 the following points were made:

- All members agreed that the prioritisation levels should always apply to avoid complicating the solution with an 'activation mechanism', and that the solution should be "digital only" i.e., with no added infrastructure.
- 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 and would require changes for all Service Users who required N56 Alert prioritisation. This approach has been discarded.

Both these points are equally applicable to the SECMP0208 solution.

A separate Change Request, CR4630, is described in section 3 of document [3] and partially described in section 4.1 above. This was raised in parallel with this Modification to provide reporting for the timing of SRV2.2 and the corresponding N56 Alerts through the DCC Total System. CR4630 is expected to be implemented by the end of March 2023, and analysis of

the results will then be carried out. Without this reporting, no definitive statement on the cause of the N56 Alert delays can be made. The solution as stated in this document does not address the processing of any SRV2.2 and corresponding alerts within the DCC Total System, only the prioritisation of the sending of the N56 Alerts from the DSP to Service Users.

DCC and the DSP have indicated that they do not believe the Requirement for this Modification as stated lends itself to a complete solution but have added a requirement from SECMP0028 that allows the configuration and simple re-configuration of the contents of, and number of, prioritisation levels. SECMP0028 proposed four priority levels as shown in note 4 below, while CR4879 proposed two, one for On Demand, the second for Scheduled, SRs and Alerts. These parameters for assigning, and potentially modifying, priority levels to Service Requests and Alerts will need to be discussed and agreed by the Working Groups associated with the Modifications before implementation. In addition, we would recommend the ability to reconfigure the priority levels and contents, with authorisation to implement those changes being sought from Operations Group, once these changes are live.

Prioritising one alert over other traffic will necessarily have an impact on less or non-prioritised Service Requests and Alerts, and may result in some SRVs and/or Alerts failing their required Target Response Times. However, this will need to be balanced by the requirement for DCC operations to ensure that the DCC Total System has adequate capacity to process all traffic daily.

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.
2. The solution will be designed such that the number of Priority Levels is not fixed at four, and is configurable.
3. The full range of system commands and 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.

If the solution contains the functionality to set multiple priority levels with configuration for selected Service Requests and Alerts, a detailed piece of work will be required prior to the FIA being issued to determine the number of priority levels and the assignment of Service Requests and Responses to each. One potential approach to implementing a solution would be to implement a “simple” Northbound Prioritisation solution in line with CR4879 and DCC’s proposed Prioritisation solution, and then implement full-blown configuration as extra functionality above and beyond CR4879.

This issue in handling the N56 Alerts in retry queues has been noted by one Service User to date. Analysis in document [3] shows there are infrastructure constraints at the Supplier Gateway which can result in some Alerts being placed in retry queues at busy times, notably between 05:00 and 06:30 as well as during maintenance and outage windows. The 05:00 to 06:30 Alert delay occurs when large numbers of scheduled reads are requested by the Supplier for the same time period. The Supplier has made changes to their systems which has reduced the number of failed Alerts to about 50 per day (as of 18th October, 2022) which is about 0.2% of the total prepayment top-up requests. The concern is that it is unclear

whether further changes to the Supplier infrastructure might remove the problem altogether, and the analysis of the reporting being delivered by CR4630 might show the problem is elsewhere in the DCC Total System.

5 Impact on DCC Systems, Processes and People

This section describes the impact of SECMP0208 solution on DCC Services and Interfaces that impact Users and/or Parties.

There are no changes to Communications Service Providers (CSPs) or S1SPs in this solution.

5.1 Security Impact

This change does not impact on security design patterns, security component configuration, change communication flows or on exposed interfaces. It involves changes to the application business logic, reuse of extant components (including SURB), and changes to the format of alerts. As such, no penetration testing is recommended, nor is there any material impact on protective monitoring.

The implementation will be security assured throughout. This assurance 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 is no anticipated impact on DUIS, GBCS, or any other technical specifications.

5.3 Integration Impact

This change involves additional work for the DSP system in prioritising messages and the resultant queuing and dispatching of those messages. The impact of these changes will be performance tested to ensure that the additional processing required to implement this prioritisation, queuing and dequeuing functionality is as efficient as possible and has no material impact on the DSP system. Any traffic queued and bypassed by higher priority traffic will, of course, spend longer 'inside' the DSP system than it would have, had it not been queued. Performance testing during PIT is required to both ensure that the performance of the system will allow the DSP to maintain Service Level Agreements (SLAs) and to establish where there is a material impact on the underlying infrastructure.

An element of regression testing will be carried out as part of the SEC Release that includes this change. However, there is no anticipated requirement for SIT and UIT testing specific to this Modification.

5.4 Infrastructure Impact

No infrastructure impact is expected from this Modification. However, it should be noted that the DSP should be designed and configured to meet expected traffic levels, and that in principle all Service Requests and Alerts should be processed within their mandated SLAs.

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 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.

5.5 Reporting

Note that DCC believes this Modification might require some sort of exceptions or acknowledgment within the Performance Measurement Report (PMR) and/or the Performance Measurement Methodology (PMM).

DCC also believes that reporting of system performance should note how many, if any, Service Requests and Alerts were assigned to a lower priority, and if any of these were processed outside of their anticipated timings due to prioritisation elsewhere.

Both these reporting requirements should be reviewed, considered, and potentially added to the requirement(s) before the commencement of the FIA.

5.6 Legal Text

DCC recommends that any specific ordering of messages is not encapsulated in the SEC. If this were not the case, any changes to the ordering, changes to business processes or changes to the nature and attributes of Alerts, Commands, or Responses would require a SEC Modification.

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 about six months to complete after the Contract Amendment Note (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 which 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 requirement 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
Prioritising Service Requests	£350,000 – £750,000

Based on the existing requirements, the total fixed price cost for a Full Impact Assessment by all Service Providers is **£15,437** 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. Two clarifications are also requested.

Further RAID may be established as part of the Working Group reviews and the FIA.

8.1 Risks

Ref.	Risk	Mitigation
SECMP208-DR1	Prioritisation applied to N56 Alerts, with all other messages not prioritised, would be contrary to the design for CR4879, Marketwide Half-Hourly Scheduling, and potentially also SECMP0028.	Detailed configuration of the Northbound Prioritisation must be agreed by SEC Parties.
SECMP208-DR2	Full analysis of the source of the delays in delivering N56 Alerts has not been completed. Some improvements have been noted after changes to the Ovo S Supplier Gateway.	It is unclear whether further changes to Supplier infrastructure might remove the problem altogether, while the analysis of the reporting being delivered by CR4630 is likely to identify the problem in the DCC Total System.
SECMP208-DR3	DCC believes this Modification might require some sort of exceptions or acknowledgment within the Performance Measurement Report (PMR) and/or the Performance Measurement Methodology (PMM).	This would be assessed as part of the Full Impact Assessment.

8.2 Issues

Ref.	Risk	Mitigation
SECMP208-DI1	The proposed solution only addresses the prioritisation of N56 Alerts received by the DSP. If the problem exists in another part of the DCC Total System, this solution will not solve the issue.	CR4630 will provide reporting on SRV2.1 and N56 Alert performance within the DCC Total System. With this reporting in place, it will be possible to identify an appropriate solution.
SECMP208-DI2	Requirements provided with this PIA request are incomplete.	Further requirements must be provided before the FIA.

8.3 Assumptions

Ref.	Assumption	Impact
SECMP208-AA1	Prioritisation applies to all northbound messaging – responses, device alerts, S1SP	Design principle.

	Alerts and DCC Alerts. For this Modification, prioritisation would apply to N56 Alerts, with all other messages not prioritised.	
SECMP208-AA2	Prioritisation of N56 Alerts only would negatively impact Target Response Times for all other SRs and Alerts.	Performance could be degraded.
SECMP208-AA3	Prioritisation will be relatively static, i.e., how messages are prioritised will not change frequently and it is assumed that any change will be less frequent than once per year.	Many changes will require frequent configuration changes and efforts.
SECMP208-AA4	Although SIT and UIT testing is not required for this Modification, regression testing will be carried out based on all Modifications and CRs in a SEC Release and will ensure this Modification is free of defects.	By testing the functionality changes in PIT, this approach reduces costs.
SECMP208-AA5	Defining only one prioritisation “band” would significantly constrain the functionality of prioritisation, and would most likely require a new Modification to customise or modify this solution.	Providing limited customisation would significantly limit the positive impact of this change.
SECMP208-AA6	Any DCC solution relating to Northbound Prioritisation will not be released as multiple solutions with duplicated charging.	Northbound Prioritisation solutions will be addressed as one workstream.

8.4 Dependencies

Ref.	Dependency	Impact
SECMP28-AD1	If Northbound Prioritisation is added to the solution by Marketwide Half Hourly Settlement (MHHS) or another DCC solution, the effort and cost to implement this change will be reduced.	DCC will monitor and review other changes.
SECMP28-AD2	If implemented, the number and content of the Priority Levels must be defined and agreed by the Working Group before solution development can begin.	Without an agreed definition, any solution will be subject to change.

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
CV	Command Variant
DCC	Data Communications Company
DSP	Data Service Provider
DUIS	DCC User Interface Specification
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
PSP	Payment Service Provider
QFM	Queued for Merge
RMN	Request Manager North
ROM	Rough Order of Magnitude (cost)
SAT	Service Audit Trail
SEC	Smart Energy Code
SECAS	Smart Energy Code Administrator and Secretariat
SIT	Systems Integration Testing
SMETS	Smart Metering Equipment Technical Specification
SR	Service Request
SRV	Service Request Variant
SU	Service User
SURB	Service User Retry Buffer
S1UT	SMETS1 UTRN Alert
TRT	Target Response Time
TTO	Transition to Operations (Implementation to Live)
UIT	User Integration Testing
UTRN	Unique Transaction Reference Number