

SEC Modification Proposal, SECMP0100, DCC CR1441

Service Response Traffic Management Preliminary Impact Assessment (PIA)

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|------------------------|--|
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1 Document History

1.1 Revision History

| Revision Date | Revision | Summary of Changes |
|---------------|----------|-------------------------------------|
| 25/09/2020 | 0.2 | Initial version, DCC and DSP review |
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1.2 Associated Documents

This document is associated with the following documents:

| Ref | Title and Originator's Reference | Source | Issue Date |
|-----|----------------------------------|--------|------------|
| 1 | MP100 Business Requirements v0.2 | SECAS | 07/08/2020 |

References are shown in this format, [1].

1.3 Document Information

The Proposer for this Modification is Terry Underwood of Utiligroup. The original proposal was submitted on 12th December 2019.

The Preliminary Impact Assessment was requested of DCC on 10th August 2019.

2 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 and the Proposer, with input from the DSP and the DCC Design Authority.

2.1 Problem Statement

Service Responses can be received by Users after a Service Request is sent by the same User. After a maintenance period or an outage, when the DCC Systems or User systems are restored, all queued messages are sent to the User at once which could overwhelm their systems. Additionally high priority messages might be queued instead of being processed immediately. The SEC does not currently specify how Service Response should be released after an outage. Given the time critical nature of some of these messages (e.g. Prepayment and certificate related activity) the Proposer wishes to prioritise those high priority messages over messages which are less time critical.

The DCC should also take into account the in-flight DCC CR on message cache/storage when considering its solution.

This solution will be applied to Smart Metering Equipment Technical Specifications (SMETS)1 and SMETS2 Devices.

DCC notes that the existing DCC Change Request is CR1344, "DSP Platform Buffering". After discussion with all parties concerned, it was noted that the solution should apply in cases of both DSP outages and Service User system outages.

2.2 Business Requirements

This section contains the considerations and assumptions for each business requirement.

| Req. | Requirement |
|------|---|
| 1 | DCC will create a time-critical priority list of messages/responses where in the event of restoration after an outage, these listed messages/responses will be sent to Users first. |
| 2 | DCC will create a throttling mechanism to slow down any messages/responses deemed with a lower priority so that Users' systems can cope with messages and responses in the event of restoration. |
| 3 | DCC will create a means of reducing the number of hypertext transfer protocol (HTTP) 501/503 response codes once a User has received a configurable number of this code so that additional response traffic is avoided. |

Table 1: Business Requirements for SECMP0100, CR1341

2.2.1 Requirement 1, Create a time-critical priority list of messages/responses

This requirement requests the DCC to create a time-critical priority list of messages and/or responses where those with shorter targeted turnaround times and that are essential to on

site activities are prioritised over messages and/or responses that can be dealt with by Users later.

This priority list of time-critical responses should include, but not be limited to:

- Responses relating to Unique Transaction Reference Numbers (UTRNs)
- Responses relating to certificate/joining/on site activity that requires personnel at a location
- Responses relating to Installing and Commissioning

This list should be configurable so that future priority messages and/or responses can be added and removed from the list as appropriate. The priority list should be able to take into account any Responses and alerts. For example, N24/25 alerts that are a key aspect of business orchestrations according to the Proposer. This priority list would likely be agreed with a SEC sub group such as TABASC to be reflective of overall industry priorities as part of its wider governance.

Regarding Business As Usual (BAU) Service Request/Response/Alerts, any activity occurring during the clearing of the backlog would ideally be prioritised in line with Requirement 1 until the backlog is cleared. If this is not possible then the DCC may not have much option other than just treat them as BAU and send them straight through.

2.2.2 Requirement 2, Create a throttling mechanism to slow down any messages or responses deemed with a lower priority

This requirement requests the DCC to create a means of slowing down the messages and/or responses that aren't included on the priority list. This is so that the User's systems can handle and process the number of messages and/or responses that they receive after the DCC System(s) is restored after an outage or maintenance period (or after a Service User system outage). Currently, the Proposer has stated a HTTP 501 code is used. However, the Proposer has concerns that this will contribute to the amount of traffic in the DCC Systems and takes up space where additional messages and/or responses could be given.

2.2.3 Requirement 3, Create a means of reducing the number of HTTP 501/503 response codes

This requirement requests the DCC to devise a means of reducing the number of HTTP response codes (both 501 – wait and 503 – service unavailable) so that a User's capacity of received messages and/or responses aren't comprised of a large volume of HTTP response codes. This adds wasted traffic to the DCC System and to the User's systems. The Proposer requests a system should be developed where the response codes are reduced if a number of repeated and expected HTTP response codes exceed a reasonable amount for the User.

3 Description of Solution

Elements of changes to the solution are identified in the following sections, with the main solution components as follows:

1. Prioritise the delivery of northbound messages, based on a list of time-critical responses when either the DCC Total System has been restored after a planned outage or the Service User's systems become available following an outage.
2. Introduce a flow control mechanism within DSP to proactively regulate the rate of northbound messages to prevent flooding the Service Users.
3. Introduce a mechanism to control and or stop the flow of messages based on the feedback from the Service Users to help them deal with temporary processing issues within their systems.

DCC Total System changes are limited to the DSP for this Modification.

3.1 Prioritise Delivery

The DSP will build a mechanism to prioritise the delivery of northbound messages based on a priority list of time-critical responses that will apply to all Service Users. This priority list will be able to take into account any Responses and Alerts, including the DCC Alerts.

This priority list of time-critical responses is expected to include, but not be limited to:

- Responses relating to Unique Transaction Reference Numbers (UTRNs)
- Responses relating to certificates, joining or on-site activity that requires personnel at a location
- Responses relating to Installing and Commissioning

This list will be configurable so that in future, priority messages and responses can be added and removed from the list as appropriate. Any such changes to the priority list would require a small operational change.

3.2 Regulate the Rate of Messages

In order to prevent flooding the Service Users' systems with messages once the connection has been restored, DSP will add a mechanism to limit the number of messages that are sent to a Service User in a given second. This is referred to as "Message Flow", with the management of the flow referred to as "Flow Rate Management".

This Message Flow will be introduced within the system as an attribute named 'Northbound Message Rate' applicable to each Service User ID. By design, this will be initially set to a default value common to all Service User IDs. It will be possible to set different values for individual Service User IDs and the suitable values will need to be agreed by the DCC with each of the Service Users for implementation.

This list will be configurable so that in future changes to the Message Flow could be requested by individual Service Users and the updated values would require a small operational change.

3.3 Control the Message Flow Based on Service User Feedback

Even with an agreed maximum 'Northbound Message Rate', it may still be possible that the Service User's system could be overloaded. In such situations, the Service User's system may respond using the HTTP Status 429 Too Many Messages with the Retry-After header populated with a time attribute indicating how long to wait before sending a new message. Service Users can use this mechanism if they are experiencing any temporary processing issues. It should be noted that there will be an upper limit to the value of Retry-After, which needs to be agreed in consultation with the Service Users.

If the DSP receives a HTTP 429 Too Many Messages from the Service User, then no messages, including the BAU messages, will be delivered to the Service User until the Retry-After duration elapses. The Target Response Service Level Agreement (SLA) calculation of the BAU messages received during this time will need to be updated to reflect this.

3.4 Overlap of Functionality with DCC Change Request 1344

As mentioned previously, there is a degree of overlap and even a dependency on CR1344, DSP Platform Buffering, as requested in the requirements above. The following table compares the functionality included in the Modification and CR1344.

| Ref | Functionality | Scope SECMP0100 | Scope CR1344 |
|-----|--|--------------------|-----------------|
| 1 | Move messages that need to be held longer within DSP from Volt DB to Oracle DB | x | ✓ |
| 2 | Prioritise delivery of messages | ✓ | ✓ |
| 3 | Regulate the rate of message flow by DSP | ✓ | ✓ |
| 4 | Control the flow of messages based on Service User Feedback | ✓ | x |

Table 2: Compare Functionality in SECMP0100 and CR1344

The functionality of Ref 2 and 3 in the table above will not change between SECMP0100 and CR1344. It is also expected that CR1344 will be implemented in June 2021 before SECMP0100, potentially reducing the scope of the Modification to Ref 4 in the table above.

This PIA presents the price estimates in section 6.1 as two options:

- Option 1: Effort and costs for building the functionality which is exclusively in the scope of SECMP0100 (Ref.4 in Table 2) i.e., assumes that CR1344 has already been implemented
- Option 2: Effort and costs for building all the three functional changes that constitute the full scope of CR1441 (Ref 2, 3 and 4 in Table 2) i.e., assumes that CR1344 has not been implemented

4 Impact on Systems, Processes and People

This section describes the impact of SECMP0100 on DCC Services and Interfaces that impact Users and/or Parties.

4.1 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.

There are no material changes to interfaces or the security solution as part of this Modification and therefore a penetration test is not required. There will not be any changes to the DSP protective monitoring solution as result of this Modification.

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

4.2 Request Management

Request Management requires changes to handle prioritising the messages for delivery and regulating their flow rate based on the target Service User's capacity.

4.3 Data Management

Data Management will require updates to support the associated configuration parameters.

4.4 Technical Specifications

DUIS and DUGIDS documentation will require updates to describe the change in behaviour of the interface as a result of adding support for HTTP status 429 and the Retry-After header.

Areas of the SEC that will likely be affected by any potential solution include SEC Appendix AD 'DCC User Interface Specification' (DUIS), SEC Section H 'DCC Services' and SEC Section A 'Definitions and Interpretations'. This will be due to having to explicitly detail where DCC are providing a means of Service Response prioritisation and/or throttling in the SEC, and any accompanying terminology that will be created for SEC Section A.

4.5 Integration Impact

The functionality will need to be validated in both the Systems Integration Testing (SIT) and User Integration Testing (UIT) environments. An initial estimate of the costs for integration (PIT) testing of the Modification are included in this PIA. The costs exclude release based regression testing in SIT and UIT.

4.6 Infrastructure Impact

There will be no change to the infrastructure design as a result of this change. Additional processing and storage will be required; however, they are not sufficiently large to warrant the procurement of additional compute power or storage as part of this Modification. Note 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 DSP agreement. As such, DSP may need to raise a Change Request (CR) for the provision of additional infrastructure should the DCC Data System experience performance problems that are the direct result of such changes.

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

4.7 Application Support

No changes to Application Support are expected.

4.8 Service Impact

There is expected to be a service impact and a more detailed service impact will be carried out as part of the Full Impact Assessment.

DCC Service Design work is expected in identifying the expected Maximum Northbound Message Rate for each Service User.

4.9 Safety Impact

No impact is expected, but a full Safety Impact Assessment will be carried out as part of the production of the Full Impact Assessment (FIA).

4.10 Service User System Impact

It should be noted that changes to the Service User's systems will be required, namely the ability to set a http 429 message with a time attribute as required.

4.11 Priority List and Flow Rate Management

After this Modification is implemented, changes to the Priority List as described in section 3.1 will be managed by the Operations Group. Any changes will be carried out as a configuration change.

For the Maximum Northbound Message Rate, an initial value will be agreed between each Service User and the DCC. Changes to this can be requested by the Service User contacting the DCC and raising a ticket. Any changes will be carried out as a configuration change.

5 Implementation Timescales and Approach

Notwithstanding in which release this change is implemented, based on the currently stated requirements, the elapsed time for DSP implementation will be approximately 3 months following the provision of full commercial cover.

The release lifecycle duration will be confirmed as part of the FIA. As currently planned, the standard ongoing major release model could provide drops to the production environment in November 2021.

5.1 Implementation Approach

Implementation of this change is assumed to follow a waterfall methodology. The release lifecycle duration will be confirmed as part of the full impact assessment. The standard ongoing major release model will provide drops to the production environment in June and November each year.

6 Costs and Charges

The table below details the cost of delivering the changes and Services required to implement this Modification Proposal.

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 requirements as assumed now. 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 during discussions with the DCC. As a result the final offer price may result in a variation.

6.1 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, DSP Cost Range |
|-------------------------------|---------------------------------------|
| Option 1, CR1344 in Place | £151,000 - £350,000 |
| Option 2, CR1344 not in Place | £600,000 – 900,000 |

| | |
|-------------------------------|--|
| 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. It includes Unit Testing (also referred to as System Testing), Performance Testing and Factory Acceptance Testing by the Service Provider or supplier. |
| Pre-Integration Testing (PIT) | Each Service Provider tests its own solution to agreed standards in isolation of other Service Providers. This is assured by DCC. |

Based on the existing requirements, the fixed price cost for a Full Impact Assessment is **£11,642.07 for Option 1** and **£15,520.52 for Option 2** and would be expected to be completed in 30 days.

Appendix A: Glossary

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

| .Acronym | Definition |
|-----------------|--|
| BAU | Business as Usual |
| CR | DCC Change Request |
| DCC | Data Communications Company |
| DSP | Data Service Provider |
| DUIS | DCC User Interface Specification |
| FIA | Full Impact Assessment |
| GSME | Gas Smart Metering Equipment |
| HTTP | Hypertext Transfer Protocol |
| PIA | Preliminary Impact Assessment |
| PIT | Pre-Integration Testing |
| ROM | Rough Order of Magnitude (cost) |
| SEC | Smart Energy Code |
| SECAS | Smart Energy Code Administrator and Secretariat |
| SIT | Systems Integration Testing |
| SMETS | Smart Metering Equipment Technical Specification |
| SP | Service Provider |
| TABASC | Technical Architecture and Business Architecture Sub-Committee |
| UIT | User Integration Testing |
| UTRN | Unique Transaction Reference Number |