

SEC Modification Proposal SECMP0277, DCC CR5529

Virtual Gateway Connectivity

Preliminary Impact Assessment (PIA)

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1 Executive Summary

The Change Board are asked to approve the following:

- Costs for SECMP0277 for up to 28 users of **£226,285** including one year of operation
- The Data Service Provider (DSP) and DCC teams are impacted by this Modification

No Full Impact Assessment is anticipated for this Modification.

Problem Statement

The Smart Energy Code (SEC) currently requires a physical DCC Gateway Connection at a SEC Parties' premises to allow secure data transfer with the DCC. This is the case for all DCC Service Users excluding Registered Data Providers (RDPs) which were addressed as part of MP248 'Requirements for DCC Gateway Connection'.

Non-RDP DCC Service Users are required to establish a fixed line connection to access the DCC network. Currently the DCC has approximately 130 new organisations and three existing DCC Users raising concerns about the incompatibility of having a physical DCC Gateway Connection with their cloud-based IT infrastructure who would be better served by a Virtual Gateway connection.

Modification Benefits

The Proposed Solution would provide the option for new and existing DCC Service Users to connect to the DCC using a Virtual Gateway Connection. For large-volume DCC Service Users it is expected the Virtual Gateway would save substantial running costs each month and for all potential DCC Users offers superior functionality including redundancy.

2 Document History

2.1 Revision History

Revision Date	Revision	Summary of Changes
26/11/2024	0.1	Initial version, for DCC internal review
03/12/2024	0.25	Review complete
06/12/2024	1.1	Cost revision to show maximum cost

2.2 Associated Documents

This document is associated with the following documents:

Ref	Title and Originator's Reference	Source	Issue Date
1	DP277-Modification-Report-v0.2	SECAS	14/11/2024
2	DP277-business-requirements-v0.2	SECAS	08/11/2024
3	Charging Statement Regulatory Year ending 31 March 2025 ¹	DCC	28/03/2024

References are shown in this format, [1].

2.3 Document Information

The Proposer for this Modification is Chris Barlow of the DCC.

The Preliminary Impact Assessment (PIA) was requested of DCC on 11th November, 2024.

¹ <https://www.smartdcc.co.uk/media/u31la12l/cs-ry2425-issue-10.pdf>

3 Context and Requirements

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

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

3.1 Current Arrangements

A DCC Gateway Connection is designed to ensure a secure and reliable connection for Data communication between DCC Users and the DCC. Using a fixed line connection, DCC Users connect to the DSP to send information to, and receive responses from, the DCC Total System.

3.2 What is the Issue and Potential Solution?

SEC Section H 'DCC Services' specifies that organisations connecting to the DCC must use physical, on-premises infrastructure to ensure a secure link between their system and the DCC's services. While this was appropriate when the SEC was first implemented, it has now become a barrier for many potential and existing DCC Users.

DDC have developed a Virtual Framework for allowing DCC Users to connect to the DSP using a Virtual Gateway Connection, easily and securely, which was shared with SSC and TABASC during the development of MP248. The Proposed Solution will provide the option for new and existing DCC Users to connect to the DCC via a Virtual DCC Gateway Connection by selecting a new option from the DSP Service Catalogue. This change would not directly impact the DCC Total System, although security assurance is required to ensure an effective, and at least an equivalent secure solution.

3.3 Business Requirements

The business requirements are as follows.

Ref	Requirement	MOSCOW
1	Virtual connection option available for new and existing	Must
2	DCC Users shall be able to select a virtual connection to the DSP from the DSP service catalogue	Must
3	Virtual connection must be as secure as the current physical connection	Must
4	Provision for onboarding and maintenance of virtual connections	Must
5	Functionality and support are equivalent to a physical DCC Gateway Connection	Must

3.4 Changes to the SEC

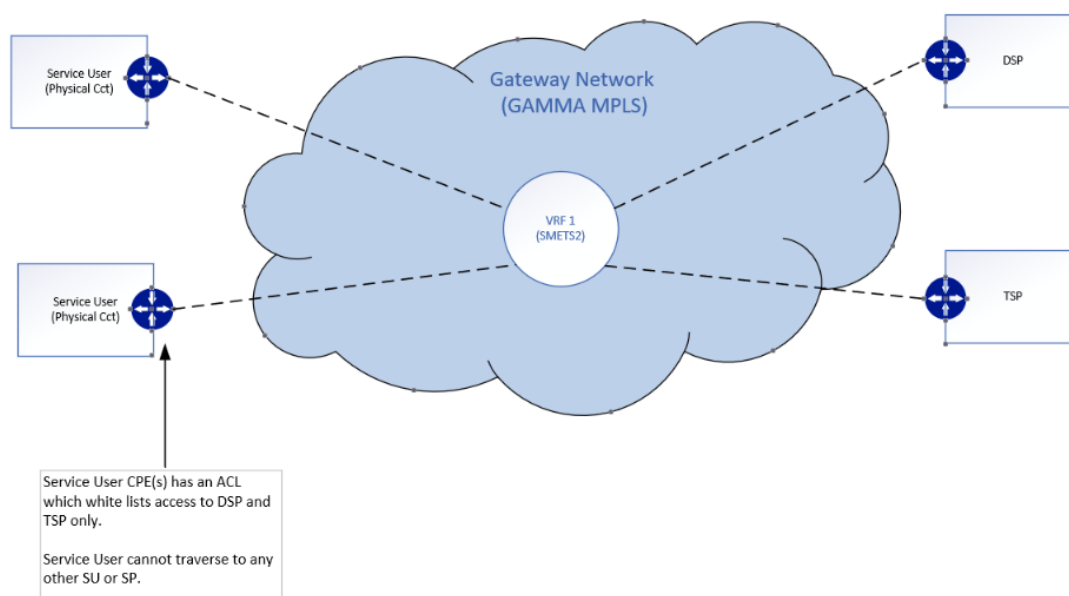
At the very least, the following parts of the SEC will be impacted :

- Section A 'Definitions and Interpretation'
- SEC Section E 'Registration Data'
- Section H 'DCC Services'
- Section G 'Security'
- Appendix G 'DCC Gateway Connection Code of Connection'

SECAS will carry out a review of all the impacted legal text, and present it as part of the Modification development.

3.5 Current Situation

Currently, all DCC Service Users have physical circuits with Gamma-managed Customer Premises Equipment (CPE) routers that terminate in VRF1. The CPEs hold an Access Control List (ACL) which ensures that DCC Service Users can only communicate with the DSP, the Trusted Service Provider (TSP) and Service Now. They cannot communicate with other DCC Service Providers / Service Users connected to the Virtual Routing and Forwarding (VRF) component of the router, referred to as VRF1. The existing solution is shown in the following diagram.



Current charges for the Physical connections are as indicated in the annual DCC Charging Statement [3]:

DCC Physical Gateway	Initial Connection Charge	Annual Charge Per Annum (3 year contract) ²
Low Volume	£3,000 - £5,000 ³	£1,000 - £15,000
High Volume	£2,500 - £8,500	£1,000 - £17,000

Details of parameters that influence these initial connection and running costs are given in Appendix A.

² Note 1 Year Contracts are also available

³ These charges vary because of multiple factors as described in Appendix A

3.6 Physical Gateway Connection Timelines

For a DCC User to currently obtain a Physical Gateway Connection the following steps with associated timelines must be completed:

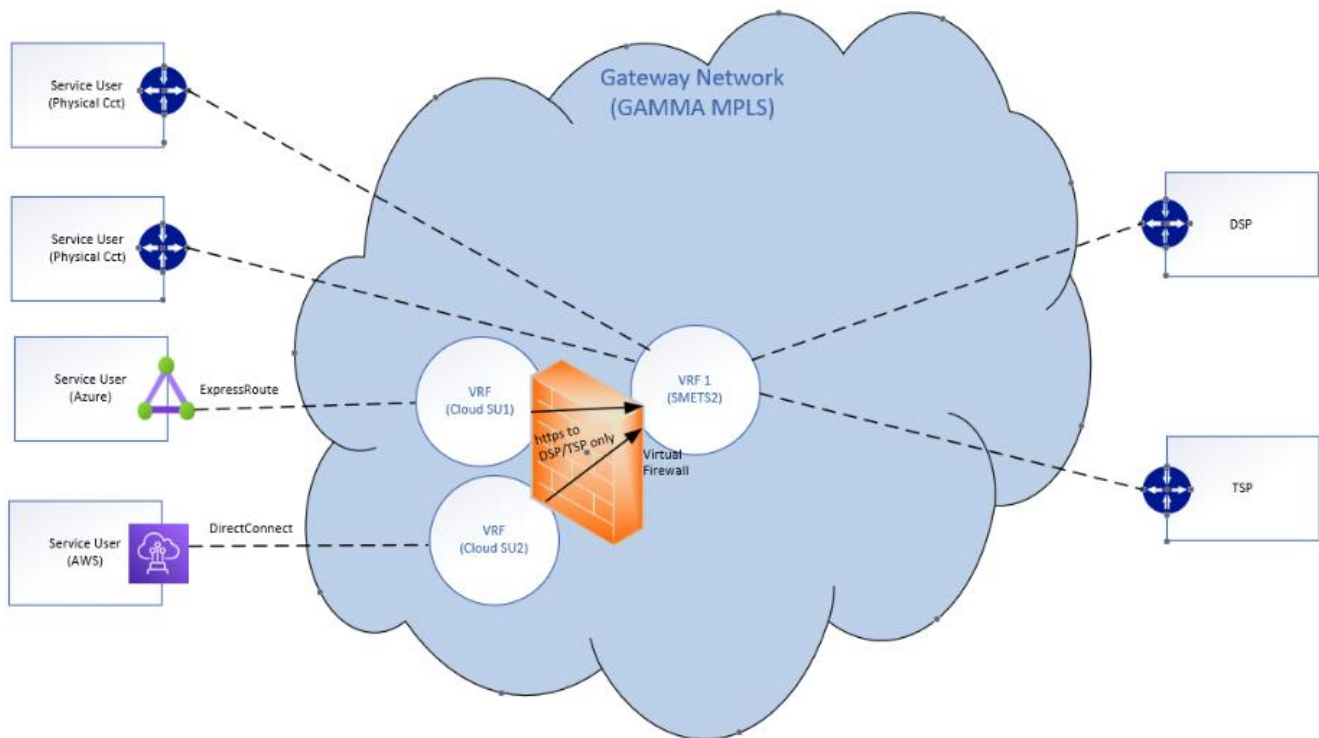
- DCC receives completed connection form
- Gateway Party receives initial quote (five Working Days)
- Gateway Party provides authority to proceed (up to 30 calendar days)
- DCC Carries out a physical site survey (30 calendar days)
- Gateway Party receives revised quote (10 Working Days)
- Gateway Party accepts revised quote (up to 30 calendar days)
- Connection and equipment are installed (within 90 Working Days for high volume connection or 25 Working Days for a low volume connection)

Notes on the anticipated delivery timelines for the Virtual Gateway are given in section 5.6.

4 Description of Solution

The solution will provide an option for new and existing DCC Service Users to be able to add connections from their cloud environments (either Azure or Amazon Web Services).

This option uses a new VRF for each cloud connected DCC Service User plus a new virtual firewall on the gateway connections network.



In this option, each new cloud connection required by a DCC Service User would require a new VRF on the gateway connections network and would be connected to the same new virtual firewall. The virtual firewall would then route traffic between each new DCC Service User's VRF and the SMETS2 VRF. The new virtual firewall would filter traffic using a generic firewall rule that would only allow cloud-based DCC Service Users to access DSP, TSP, and Service Now as they do today. The https routing ensures that the connection is available to the connected Service User only, and means that in the case of a compromise of any virtual connected Service User could not lead to an attack on any other Service User or Service Provider, regardless of whether they have a virtual or physical connection

This option is the most secure of the three options considered as it filters traffic between individual DCC Service Users on cloud connections. However, this option is the most complex and carries a greater administrative overhead and cost. It should also be noted that the virtual firewall would not allow more than 14 cloud based DCC Users to connect, before an additional virtual firewall would be required. The need for incremental firewalls makes the charging mechanism more complex for the DCC as there would be repeating service setup costs and incremental service costs from the DSP and Gamma each time a new firewall was added, even if that single additional firewall is only required for a single DCC User. Costs for the potential provision of connections is given in section 7.

4.1 Further Questions and Answers About the Virtual Gateway

Can you mix a physical and virtual gateway connection?

Yes, you can, but this is not recommended practice. Each Virtual Gateway connection comes with the resilience and redundancy making the use of a physical connection unnecessary and more expensive.

The SEC mandates operation from UK. Will you be able to prevent cloud region connection from outside the UK?

As part of the connection process, DCC will verify that the Virtual Connection is only connected to a UK Availability Zone, which is a repeat of the pattern for physical connections. However a User can technically connect from that endpoint to the rest of the Azure or Amazon Web Services (AWS) network, which is also true of a physical connection which carry out a peer-to-peer connection to any other location. It would require governance as part of the Code of Connection to limit data centre locations.

Can a DUser switch from physical to virtual connections while in a contract for a physical connection? What is the process for switching?

Users will be able to request a virtual connection and switch their contracts without any penalties. DCC will be responsible for the new Virtual connection. No dual running of physical and virtual connectivity is required.

How should a User request a virtual connection?

Users will be able to request access via a Virtual Gateway through the Service Catalogue. DCC Service Users will be responsible for establishing and configuring their link from their data centres using AWS DirectConnect or Azure ExpressRoute to the Gamma Gateway Network VRF. Note that these connections to Gamma may not be available at the same capacity as physical connections, e.g., ExpressRoute circuits are only available 50 Megabits per second (Mbps), 100Mbps, 200Mbps, 500Mbps, 1 Gigabit per second (Gbps), 2Gbps, 5Gbps, or 10Gbps. The managed ExpressRoutes that Gamma would be using are limited to a maximum of 1Gbps.

5 Impact on DCC Systems, Processes, and People

This section describes the impact of SECMP0277 solution on DCC Services and Interfaces that impact Users and/or Parties.

There will be no change to the DSP infrastructure design or DSP resilience beyond the Gamma changes. This Modification does not impact the DSP resilience or DR implementation.

5.1 Security Impact

The solution option given above would replicate most of the current ACL functionality and would provide protection commensurate with the current service for both cloud hosted DCC Service Users and those with physical circuits. This option is the most secure solution, but is technically the most complex and carries the most cost.

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

5.2 Technical Specifications

No changes to any technical specifications are required for this modification. This is not a design change.

5.3 Service Impact

There will be no significant change to the existing link ordering process through the Service Catalogue as a result of the Modification. It is likely that existing order forms that are used as part of the link ordering process will need to be modified to include additional "Cloud Connection" and associated sub options. Note that the effort estimates and ROM pricing assumes that the new Virtual Gateway will be equivalent of the existing physical link options in terms of resilience and capacity.

5.4 Integration Impact

It is not expected that there will be any change to the validation of DCC Service User connectivity to the User Integration Test (UIT) environments.

5.5 DCC Impacts

The DCC Service Desk and Service Management team will have to update existing, and potentially create new, processes to handle connectivity changes and setup.

5.6 DCC Service User Setup

To request a cloud connection, DCC Service Users will use the existing Service Desk link ordering process. Gamma will only accept an order if it has been fully completed. A 30 calendar day period will be required to implement a cloud connection following Gamma's acceptance of a fully completed form. Once the cloud connection has been implemented by Gamma, a further period will be required to configure the DSP application to use the connection. It is recommended that 3 months is allowed for each cloud connection setup initially which may reduce once the service has bedded in.

DCC will challenge these timelines as part of the implementation process.

6 Implementation Timescales and Approach

This Modification need not be implemented in a SEC Release.

The current SECAS forecast for the implementation of this Modification is May 2025, assuming Change Board approval early in February 2025.

6.1 Implementation Approach

A period of time to complete the setup phase before offering the new cloud connectivity service to DCC Service Users will include these activities:

- changing forms and the process to request a Virtual Gateway connection
- liaising with Gamma to finalise the service offering
- setup of new infrastructure
- a review of proposed firewall rules once the infrastructure has been implemented

6.2 Testing and Acceptance

No PIT testing is anticipated for each configuration. No Post-PIT Change Request providing the SIT and UIT response for the SEC Release is anticipated for this Modification.

Penetration testing is likely as part of the User setup and configuration.

7 Costs and Charges

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 is likely to result in a variation.

No integration testing costs are expected for this Modification. This PIA is based solely on the existing (Legacy) DSP system with the New DSP expected to provide a new gateway.

As noted previously, there is a limit of 14 users per added VRF. Setting up the Virtual Gateway connection has a set level of anticipated cost as shown in the following table, while if it is agreed to implement a number of VRFs at the time of the initial setup, adding those VRFs is more straightforward and less costly if it is carried out at the time of implementing the whole capability. However, if there was a period between the initial implementation and a subsequent increase of DCC Users requiring a Virtual Gateway, the increased (ROM) costs are as shown below.

VRF	DCC Users	DCC Service Setup	Operation (12 months)	Total Setup	Total Operation
First VRF	up to 14 users	110,000	50,000		
Second	15 - 28 Users	25,000	24,000	135,000	74,000
Third	29 - 42 Users	25,000	24,000	160,000	98,000
Later, Separate	add 14 Users	40,000	24,000		

The Modification cost covers the addition of the VRF, configuration, changes to the Gamma network, and the design, build, and test of the updated DSP Service Catalogue. There is also a need to amend and write up contracts for impacted Service Providers of **£17,285**. To provide a maximum figure for costs, the setup and implementation cost for up to 28 users is £135,000 with running costs of £74,000 for the first year, and contract amendment costs, giving a total of **£226,285**.

In addition, Virtual Gateway DCC Users will have the following estimated setup and annual running costs; the range allows for varying DCC User configurations.

Virtual Gateway Setup Costs per DCC User (£)	Cloud Connection 12 Months Operational (£)	First Year Total Cost (£)	Subsequent Annual Running Cost (£)
1,600 – 2,000	6,000-7,000	7,600-9,000	6,000-7,000

The costs for the setup and first 12 months of the Virtual Gateway is estimated at £7,600 to £9,000 with subsequent annual running costs at £6,000 to £7,000, based on a 2 x 100Mb

resilient Azure ExpressRoute connection. If a DCC user elected a slower 50Mbps connection, the Gamma operational costs would be approximately 25% less.

Bear in mind, as well as the annual running costs from Gamma, any Service User has to pay their own costs for the AWS or Azure:

- Circuit
- Gateway
- DTO (egress) charges for data they send

The operational costs will vary between organisations depending on their needs, and we would recommend potential Service Users work with their own IT organisations to establish these costs.

7.1 Note on Cloud Connection Costs

Both supported Cloud providers, Azure and AWS, have slightly differing pricing components, and varying charges for each component. In some components charges are based on configuration, while others relate to capacity or data transfer. For example, AWS Direct Connect charges are based on capacity, port hours, and data transfer out (DTO) through the AWS Direct Connect location. Naturally this will vary according to each DCC User's requirements.

7.2 DSP Contract and Schedule Impacts

No changes to DSP Schedule 2.2 (Performance Measures and Reporting) are expected as a result of this Modification. Changes to the DSP contracts will be implemented at a cost of no more than £17,285.

The CAN will add a single cloud connectivity option to Schedule 2.7 (Catalogue Services).

8 Risk, Assumptions, Issues, Dependencies, and Design Decisions

In the following sections, Risks, Assumptions, Issues, Dependencies and any Design Decisions are identified.

8.1 Risks

Ref.	Risk and Impact
MP265-DR1	Implementation and usage costs for Service Users connecting to the Virtual Gateway may vary significantly based on their requirements and final configuration.

8.2 Assumptions

Ref.	Assumption
MP277-DA1	Costs associated with setting up second or third VRFs are less than setting up one VRF, waiting a period of time, and then setting up another subsequently.

8.3 Design Decisions

Two other solutions were considered for the Virtual Connection, but were rejected.

In Option 1, Cloud hosted Service Users would have new cloud circuits provisioned which would terminate directly on the existing VRF1 in the Gamma network. However, the security risks and required actions for Service Users are not acceptable, e.g., a compromise of any virtual connected Service User could lead to an attack on any other Service User or Service Provider, regardless of whether they have a cloud or existing physical connection.

For Option 2, a new VRF and a new virtual firewall are required on the gateway connections network. This would replicate most of the current ACL functionality and would protect existing Service Users with physical connections, but would not filter traffic between individual DCC Service Users where both of them use virtual connections. This is a more secure solution than Option 1 but Service Users with new cloud connections, would be responsible for implementing their own security to mitigate the increased risk of attack, should another cloud-based DCC Service User be compromised.

Appendix A: Physical Connection Parameters

SEC Section H 'DCC Services' states that to interact with the DCC, a DCC User requires a DCC Gateway Connection, placed within the organisation's premises. This requires a site visit, equipment costs and can take a while to set up. This ensures data being sent between the DCC and DCC User is transferred securely. Two types of connection are available, high volume and low volume.

High Volume Connections

For a high volume connection there is likely to be 10 or 20Mbps available for the DCC User. If more bandwidth is required, high volume connections can usually be upgraded up to a maximum of 100Mbps. This upgrade is a chargeable request.

Low Volume connections

When a low volume connection is installed, there is likely to be up to 40Mbps download speed and a 10Mbps upload speed, providing there is superfast broadband connection available at the DCC Service User's Data centre. If this is not available, then a standard broadband connection will be provided which is likely to be up to 20Mbps download and a 2.5Mbps upload speed. If the Party needs to move to a high volume connection, then it can apply for a new high volume connection. The Party may then choose to cancel the low volume connection.

DCC Gateway Connection charges

There are two types of applicable charges, the connection charge and the annual charge.

The **connection charge** recovers the cost of installing and is payable to the DCC following installation. The charge will depend on the specific requirements of each individual connection, as outlined in SEC Section H15 and Appendix G. The variables that will influence the charge include:

- Physical distance from the premises of the connection to the local exchange
- Configuration of the premises i.e., whether there are existing connections that can be used or whether new lines will be required
- Type of connection determined e.g. ethernet, Fibre to the Cabinet (FTTC), Asymmetric Digital Subscriber Line (ADSL) and/or copper
- The amount of further work required as determined by a physical site inspection
- The bandwidth requested

The **annual charge** recovers the annual rental cost of the connection, and is dependent on the specific requirements on each individual connection, as outlined in Section H15 and Appendix G. The variables that will influence the level of this charge include:

- The length of the contract i.e., one year or three years
- Type of connection determined e.g. Ethernet, FTTC, ADSL and/or copper
- The bandwidth requested

Appendix B: Glossary

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

Acronym	Definition
ACL	Access Control List
ADSL	Asymmetric Digital Subscriber Line
AMS	Application Management Services
AWS	Amazon Web Services
CAN	Contract Amendment Note
CPE	Customer Premises Equipment
CR	DCC Change Request
DCC	Data Communications Company
DSP	Data Service Provider
DTO	Data Transfer Out
FTTC	Fibre to the Cabinet
Gbps	Gigabit per second
https	Hypertext Transfer Protocol Secure
Mbps	Megabits per second
PIA	Preliminary Impact Assessment
PIT	Pre-Integration Testing
RAID	Risks, Assumptions, Issues, and Dependencies
ROM	Rough Order of Magnitude (cost)
SEC	Smart Energy Code
SECAS	Smart Energy Code Administrator and Secretariat
SIT	Systems Integration Testing
SSC	Security Sub-Committee
TSP	Trusted Service Provider
TTO	Transition to Operations (Implementation)
UIT	User Integration Testing
VRF	Virtual Routing and Forwarding