



Scaling and Optimisation

Consultation Conclusions on proposed changes to WAN

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1. Context and Executive Summary

1. The Data Communications Company (DCC) is Britain's digital energy spine, supporting the transformation of the energy system. DCC is licensed by the Government and regulated by the energy regulator Ofgem to connect smart meters in homes and small businesses across Great Britain to a single secure, digital network. DCC supports the roll-out and operation of second-generation (SMETS2) smart meters, as well as the migration and operation of existing first-generation (SMETS1) meters onto our network.

1.1. Executive Summary

2. The Scaling and Optimisation project has worked with stakeholders to understand the risk associated with increasing number of Communications Hubs (CHs) being connected to the Wide Area Network (WAN) in the North Region. The project validated capacity risks while also identifying and analysing solutions to help ensure the continued performance of the network to support up to 5 million CHs within this Region.
3. In addition to the capacity solutions the project also identified that a change in WAN modulation would deliver performance benefits. In April 2024 DCC consulted to gather industry opinion to the proposal to implement a change in WAN modulation and described the performance benefits it could provide.
4. Responses received to the consultation were supportive of the proposal which DCC now intends to progress.

1.2. Background

5. The operation of smart meters is reliant on communication with DCC through the Wide Area Network (WAN). Great Britain is split into three Communication Service Provider (CSP) Regions for WAN provision.
6. The CSP North (CSPN) Region utilises a Long-Range Radio (LRR) solution. When opted for, LRR was considered the optimal coverage option for the geographically diverse location due to the long-range reach and high levels of in-building penetration that the technology would afford. For these reasons the LRR solution was deemed to be more suitable for CSPN than a cellular network solution. However, the long-range reach of this technology impacts the volume of data that can be transferred.
7. As the volume of smart meters installed in CSPN has increased, so too has the demand placed on the WAN. Utilisation of the network has changed from initial concept including the size of messages, the timing of messages and the overall volume. These evolving requirements as installation volume has increased ultimately led to a requirement to increase the capacity of the network to maintain performance.
8. The CSPN Scaling and Optimisation (S&O) project was established in 2021. The project was tasked with identifying the risks of capacity being exceeded as smart metering continues to scale up in CSPN, and to identify potential solutions to reduce or manage those risks.
9. The project validated DCC's capacity concerns and assessed that requirements have evolved materially since the solution was chosen, and that the CSPN network as currently designed and implemented will not be capable of meeting demand as the utilisation of the

network has evolved as installations increase. This is described within the CSP.N Service Scaling and Optimisation CSP North Radio Network Phase 1 Report¹.

10. The S&O project has looked at the medium-term scaling where at least 5 million premises in CSPN are expected to be connected to the network by end 2026. Longer-term scaling, and further rollout beyond that point will be managed separately by the Future Connectivity Strategy.
11. The S&O project has analysed options to increase network capacity and ensure the continued performance of the network. The project has established a roadmap of solutions to support the operation of up to 5 million Communications Hubs (CHs) in CSPN by the end of 2026 and has received approval to implement those solutions. The CSP.N Service Scaling and Optimisation – CSP North Solution Phase 2 Report² is also available.
12. In addition to the capacity solutions identified in S&O project, DCC has also identified an option that would deliver performance benefits and has therefore consulted with customers to gather their input. The proposal utilises a higher order modulation technique for transmitting data, referred to as 4FSK, and it allows more data to be transmitted within a given transmission bandwidth. This would increase the number of Service Requests (SRs) that could be delivered in a single transmission (or “packet”) and more generally allow SR’s to be sent in in fewer packets.
13. The delivery and deployment of the 4FSK solution can be implemented by the end of 2026. This would enable 4FSK communication to operate where possible, alongside the current 2FSK communication. This change would provide benefits including optimisation and improved message delivery speed, first time success rates while also allowing additional SR volume to be sent across the network should demand increase. The changes required could be delivered at a cost capped at £4 million.
14. There are a number of items that will need to be developed to implement the solution, including changes to Communications Hub Firmware, Radio Network Interface, transmission Kit and the Network Control Suite. The lead time for development and testing the solution is anticipated to be approximately 30 months.
15. In April 2024 DCC consulted³ to provide details of the proposal to utilise higher modulation communication across the WAN, the benefits that it will provide, and the likely costs to make such a change. Parties were invited and encouraged to provide their feedback on the proposal.
16. DCC received five responses to the consultation, with some respondents asking for additional detail before providing their final position. Where additional information was requested DCC responded to those questions in communications directly with the organisation seeking clarity. Responses received to the consultation are summarised below including some key areas of additional questioning.
17. Further detail on the background of the scaling and optimisation project and the proposed 4FSK solution can be found in the original April 2024 consultation and is not repeated here.

2. Summary of Consultation Responses

¹ [CSP.N Service Scaling and Optimisation CSP North Radio Network Phase 1 Report](#).

² [CSP.N Service Scaling and Optimisation CSP North Radio Network Phase 2 Report](#)

³ [Scaling and Optimisation Consultation on Proposed Changes to WAN Modulation | Smart DCC](#)

18. DCC consulted with all SEC Parties and received five responses to the consultation. Four responses were from Energy Suppliers and one response was from a Network party.

Q1

Considering the proposed benefits to communications in CSPN and the cost involved, does your organisation agree with implementing the proposed changes? Please provide a rationale for your response.

19. Question One asked if Parties supported the implementation of the proposed changes in WAN modulation when considering the costs and benefits described. Four respondents supported the proposed amendments and noted the benefits the change would provide. One respondent has not provided a final position. Two of these organisations asked for clarifications before providing their final position, those clarifications have been provided and are explained below.
20. DCC were asked if masts would communicate in both 2FSK and 4FSK or just a single modulation. It is confirmed that's masts will communicate using both modulation schemes on order to provide connectivity to all CH's to which it is.
21. There were concerns that the changes would only benefit those CHs where 4FSK communication is possible and other sites would not benefit from the change, and that the changes might better serve urban where more CHs might be closer to the mast. While it is true that only those CH where 4FSK is appropriate will see an improvement in first time success rate, there are benefits for all CHs the mast communicates with. Where a proportion of CH serviced by a mast switch to 4FSK communication there is a benefit for all the CHs the mast communicates with. This is because the overall efficiency of the cell is improved, and the mast can manage increased demand regardless of whether that demand is for communications requiring 2FSK or 4FSK.
22. One respondent asked for confirmation on the noticeable improvement to service the proposal would bring. SR 4.6.1, SR 4.8.1, and SR 4.8.2 to ESME, and SR 4.8.1 to GSME account for 64% of forecasted traffic and can be transmitted in fewer data packets when utilising 4FSK communication. It is anticipated that up to 60% of CH will be able to operate in 4FSK and so the efficiency will result in ~400 million SRs per month occupying less airtime. The SRs highlighted here are those of significant volume, but other SRs (with lower forecasted volume) will also be transmitted in fewer packets. Other notable benefits include:
- a. Improvement in first time success rate, from 85% to 95% where 4FSK is utilised.
 - b. On demand SRs that move from 2 data packets to a single data packet will have quicker response times.
 - c. WAN packet load reduction allowing for an additional ~300 million SRs per month and allow increased demand to be managed without further investment.
23. DCC were asked about other SRs not highlighted in the consultation and what benefit the proposal bring to them. DCC highlighted the SRs mentioned above as those that provide the biggest benefits due to their significant proportion of total SRs and that they can see a reduction from two data packets to one data packet when using 4FSK. There are other SRs that will also see a reduction in the volume of packets they require, but they represent a smaller proportion of total SRs. Not all SRs will benefit from a reduction in packet volume, this is a constraint of the technology and not an option where additional benefits utilising additional SRs cannot be added in the future. Where 4FSK implementation allows for additional demand all SRs traffic will benefit if demand increase since the network can manage that demand without further investment.

24. Questions on CH replacement were also raised. CH currently installed are capable of operating in 4FSK, there is no need for a hardware change. When the change is implanted on CHs identified as suitable for 4FSK communication and firmware deployed, that CH will be capable of communication in both modulations (2FSK and 4FSK). Should a CHs not successfully communicate in 4FSK it will continue to operate using 2FSK communication. DCC does not foresee the need to replace any CH as part of the project.
25. More than one respondent asked questions about the project cost. DCC confirms that the Impact Assessment provided by the CSP caps the costs at £4 million and will ensure that this is captured in contracts before progressing. There may be some marginal additional costs in validating firmware changes in SIT. DCC will also complete cost governance as the change is progressed to ensure best value for money. There will be no requirement for additional transmission power or bandwidth channels allocated to the WAN, and no additional cost to Parties other than the £4 million implementation costs already highlighted.
26. One respondent asked if there would be any adverse impact during deployment of the proposal. DCC does not expect there to be any adverse impact to network performance during the firmware deployment that will deliver 4FSK support in the CSP-N Comms Hub. DCC does not expect that the implementation would require any action by Parties and that their activities can continue as normal. In addition, any changes to CH Firmware will be progressed through SIT-A testing and UIT-A testing where DCC customers will be able to participate and validate the firmware in DCC testing labs. Delivery of the 4FSK solution will be managed by DCC delivery team who will ensure relevant SEC committees are kept informed on progress through regular updates as required.
27. Respondents asked what reporting on improvements will be available and the contractual links to ensure improvements are realised. DCC will monitor and report on SR packet volumes and their success rates for those SRs that can see a reduction in packet volume to help inform on the realisation of the projects benefits. The total volume of SRs managed by the CSP solution, and the service level will also be reflected in the monthly performance measures report. Contractual changes will include necessary milestones and warranty clauses to ensure performance benefits are realised.
28. One respondent notes that the proposal does not address poor WAN connectivity. The proposal does not improve any connectivity issues but is focused on efficiencies in communications across the network. The CSP will continue to support connectivity issues through incident management process.
29. On review of the responses received DCC consider that the proposal has overall support. Four of the responses supported progression with the proposal. One response did not object to the proposal but asked for clarification, but where no further response or position was specified following provision of that clarification. DCC consider that additional detail proved to Parties directly, and that provided above give clarity on the solution to alleviate the questions and concerns highlighted. Some of the benefits highlighted in the responses received, include:
 - a. Improvements in WAN efficiency.
 - b. The proposals straightforward technical solution.
 - c. The minimal impact to DCC customers.
 - d. Improved Network reliability in terms of:
 - i. improved first time success rates.

- ii. improved speed of delivery.
- e. Mitigating the risk that the network cannot manage additional demand.
- f. Offering good value for money for the improvements it can provide.

Q2

Do you have any other comments?

30. One respondent asked if other, non-energy related, future users of the network had been considered in plans and assumptions. The CSPN Smart Energy network is a dedicated network with a set of radio channels used only by DCC.
31. One response asked if 4FSK had been utilised elsewhere. DCC confirms that 4FSK is already utilised by CHs for some uplink messages such as the uplink timeslot and acknowledging packets which proves the ability of the network to operate at the 4FSK modulation. However, 4FSK has not been used before by DCC for SR commands and responses, or for Alerts. The Service Provider has supported this feature for their other customer base in markets outside UK.
32. One response asked if Parties would have a view of the modulation utilised for individual CH. Switching between modulation will be dynamic and based on predefined thresholds where that information will not be available outside of the CSP. If this information is required changes would be required to multiple systems which would likely result in significant cost. There are no plans to make this information available at present.
33. One respondent asked about the length of the CSP contract and links to the DCC Future Connectivity Strategy. Up to five million CH are expected to be connected to the network by the end of 2026. Any decisions on the future of the network will need to consider links to existing CH and network infrastructure, and it is noted the current contract would allow an extension up to 2033.

3. Next Steps

34. Parties may seek further clarification if they require by contacting consultations@smartdcc.co.uk.
35. DCC has provided a summary of response to the Department as part of their wider interest in the Scaling and Optimisation Project.
36. DCC consider the responses to the consultation to be supportive of the 4FSK proposal and consider that sufficient support has been provided to allow the proposal to progress as outlined. DCC will progress the change request to be implemented by the CSP and will work to ensure customers are kept informed on the plan and delivery status. Further detail on timescales will be communicated separately as plans progress, likely to be available in Q4 2024.
37. DCC will ensure customers are kept up to date with progress of the project including transparency on project delivery, costs, testing and deployment.