Department of Energy & Climate Change

Government Response on Home Area Network Solutions: Implementation of 868MHz

Government Response to the Consultation on Home Area Network (HAN) Solutions: Implementation of 868MHz and Alternative HAN solutions

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Any enquiries regarding this publication should be sent to us at smartmetering@decc.gsi.gov.uk.

This document is also available from our website at www.gov.uk/decc.

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Introduction and Executive Summary

The 868MHz HAN solution is an important part of the Government's strategy to rollout smart meters to all premises in GB.

Programme Introduction

Smart meters are the next generation of gas and electricity meters which will offer a range of intelligent functions and provide consumers with more accurate information, bringing an end to estimated billing. Smart meters will provide consumers with near-real time information on their energy consumption, so that consumers may control and manage their energy use, save money and reduce emissions.

Energy suppliers are required to take all reasonable steps to install smart meters in GB domestic and smaller business premises by the end of 2020. A standard smart metering installation will generally include smart gas and electricity meters, an In-Home Display (IHD) in the domestic premises and a communications hub.

These devices will communicate with each other via a Home Area Network (HAN), as defined by the Smart Metering Equipment Technical Specifications (SMETS). Suppliers are required to make consumption and tariff information available to the consumer via the HAN. This will allow consumers to see energy information on their IHD, but will also allow them to link a range of other smart devices, such as Consumer Access Devices (CADs), to the HAN. The gas meter will also link to the smart metering system over the HAN.

The 2.4GHz ZigBee Smart Energy Profile HAN standard that is specified in the second version of the SMETS (SMETS2) and the Communications Hub Technical Specifications (CHTS), are expected to be suitable for the communications links between all smart metering equipment in approximately 70% of GB premises, without the need for range extending equipment.

Given this, the Government previously concluded[1] that an additional wireless solution (868MHz) should be specified for use in premises where the 2.4GHz solution would not work. This response document summarises stakeholder responses to the Government Consultation on the implementation of the 868MHz ZigBee HAN solution in GB and sets out the Government's conclusions on these key decisions.

Purpose of this Document

The Government Consultation on Home Area Network (HAN) Solutions: Implementation of 868MHz and Alternative Han solutions was published on 24 March 2015. The consultation

[1] Smart Metering Implementation Programme. Government Response to the Consultation on the second version of the Smart Metering Equipment Technical Specifications. Part 1. January 2013. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209841/smart_meters_equipment_technical_spec_2_consultation_response_part_1.pdf

sought views on the 868MHz HAN solution and the Alternative HAN solution. This document sets out the Government's consideration of the decisions specifically related to the 868MHz HAN solution (Questions 1 to 8).

The document Government Response on Home Area Network (HAN) Solutions: Implementation of Alternative HAN Solutions[2] sets out the Government's consideration of the decisions related to the Alternative HAN solution.

Summary of Conclusions

The Government received 44 consultation responses from a range of sectors including from large and small energy suppliers, device manufacturers, Meter Asset Providers (MAPs) and the DCC (the full list of respondents is provided in Annex A).

In the consultation document, we noted that we were considering undertaking an 868MHz propagation trial to gather further evidence to support the decision making process. We commissioned Ofcom to undertake this trial in July 2015 and have published their trial report alongside this response document[3]. The key trial finding was that the low power (up to 25mW) 868MHz HAN solution is estimated to be able serve communications links between all smart metering equipment in approximately 96.5% of GB premises (using conservative estimates).

During the consultation period the Government continued to engage with stakeholders, primarily through the DECC-chaired 868MHz HAN Solution Sub-Group to the Technical and Business Design Group (TBDG). This group actively participated in the design and execution of the Ofcom trial and provided significant input into the subsequent analysis work. We would like to thank participants for this support.

Based on the responses to the consultation and the additional evidence gathered throughout the consultation period, the Government has concluded that:

- The Data and Communications Company (DCC) should be required to provide a dual band (2.4GHz and 868MHz) communications hub, but not a single band 868MHz communications hub (it will still be required to provide a single band 2.4GHz communications hub). We will amend the CHTS to reflect this decision.
- The smart electricity meter must always be capable of using the 2.4GHz HAN solution. We will amend the SMETS to reflect this decision.
- Energy suppliers will be required to utilise the 2.4GHz HAN solution to link the communications hub to the IHD, in preference to the 868MHz solution, where technically practicable (i.e. where the connection can be made without the installation of additional equipment or the relocation of the Smart Metering System). We will amend the Supply Standard Licence Conditions to reflect this decision.
- Dual band communications hubs must be capable of supporting four high bandwidth links (i.e. frequent communication of 10 seconds or better). These links can be used to

[2] Government Response on Home Area Network (HAN) Solutions: Implementation of Alternative HAN Solutions. December 2015. Available at: https://www.gov.uk/government/consultations/consultation-on-home-area-network-solutions

[3] Ofcom Smart Meter HAN 868MHz RF Coverage Campaign - Measurement Report. December 2015. Available at: https://www.gov.uk/government/consultations/consultation-on-home-area-network-solutions

connect IHDs, CADs, etc., at the consumer's discretion. We will amend the CHTS to reflect this decision.

- The 868MHz HAN trial estimates that 96.5% of GB premises could be served by the 868MHz low power solution. Therefore, we will require that the 868MHz HAN solution must operate at low power (up to 25mW). We will amend the CHTS and SMETS to reflect this decision. We will not permit a high power solution.
- The Smart Energy Code (SEC) will be amended to require the SEC Panel to review the effectiveness of the HAN provisions (including evaluating whether the requirements continue to meet the SEC objectives).

Next Steps

The Government has published a consultation document on the legal drafting for the licence and SEC content identified above[4]. Stakeholders are asked to consider this consultation and respond with any comments by 25 February 2016.

In parallel, we are working with the 868MHz HAN Solution Sub-Group to the TBDG to develop the revised SMETS and CHTS changes to implement the decisions above. This group will also consider if any changes are needed in the Great Britain Companion Specification (GBCS). The changes to these documents will be confirmed through the TBDG Transitional change control process in early 2016 and then subsequently notified to the European Commission under the Technical Standards and Regulations Directive, if necessary.

We are also working with the DCC, ZigBee Alliance, device manufacturers and energy suppliers to develop a detailed delivery plan for 868MHz equipment availability (we currently assume that equipment will be available at scale in the second half of 2017). This planning activity is being coordinated by the DCC chaired 868MHz Project Board.

[4] Smart Metering Implementation Programme. A Consultation on aspects of the implementation of Home Area Network solutions (868MHz legal drafting and approach to pairing devices locally) and on the operation and remit of the Technical Sub-Committee. December 2015. Available at: https://www.gov.uk/government/consultations/consultation-on-implementing-home-area-network-han-solutions-and-changes-to-technical-sub-committee

Implementation of the 868MHz HAN Solution

This section sets out the Government's conclusion on the key implementation decisions for the GB 868MHz HAN solution.

Introduction

1 In the consultation document we noted that while energy suppliers and device manufacturers had been working through the ZigBee Alliance to develop the 868MHz ZigBee Smart Energy Profile HAN standard, there was still the need to set out specific implementation rules for the GB smart metering 868MHz solution.

2 The consultation identified the following key decision areas:

- Whether and how the 868MHz solution should be supported on each smart metering device. We had previously concluded that when the 868MHz solution becomes available, suppliers would be able to choose the frequency at which each device operated through their procurement activity and ordering of communications hubs from the DCC;
- The numbers and types of links that the 868MHz solution should support: the CHTS (based on 2.4GHz) currently requires that the communications hub should be capable of supporting 24 high bandwidth links between smart metering devices on the HAN, this number of high bandwidth links cannot be supported by the 868MHz solution due to its physical characteristics;
- Whether the 868MHz solution in GB should be high power (up to 500mW) capable. The emerging 868MHz ZigBee Smart Energy Profile HAN standard includes optional features to allow devices to incrementally increase the radio transmit power from 25mW to 500mW, which allows the signals to propagate further and so increase the range of the 868MHz solution. The high power solution includes active power control such that the device will always use the lowest transmit power needed to form communications links with other devices on the HAN. However, higher transmit power increases the risk of interference from neighbouring devices given that it propagates further and there is a limited number of high power channels[5];
- Whether the SEC Panel should be given a role in monitoring the appropriateness of HAN arrangements to ensure that they are performing appropriately, such that smart metering benefits can be achieved.

3 This chapter summarises stakeholder responses to the Government consultation on the implementation of the 868MHz ZigBee HAN solution in GB and sets out the Government's conclusions on these key decisions.

[5] There are 49 low power channels and 13 high power channels in the 868MHz band.

868MHz on the Communications Hub

Consultation Question 1

Do you agree that the DCC should be required to provide a dual band (2.4GHz and 868MHz) communications hub in addition to the single-band 2.4GHz communications hub, but not a single band 868MHz communications hub? Please provide evidence to support your response.

Summary of Issue

4 The Government had initially anticipated that the 868MHz solution could be implemented as a single band (868MHz) or dual band (2.4GHz and 868MHz) configuration on the communications hub but early in the development of the standard ZigBee Alliance members argued that a dual band communications hub would help protect the limited 868MHz bandwidth.

5 In the consultation we acknowledged that only providing the 868MHz solution on a dual band communications hub would have the potential to increase equipment costs in certain scenarios – for example, when a dual band communications hub is installed where a single band (2.4GHz or 868MHz) communications hub would have sufficed.

6 We proposed not to require the DCC to provide a single band 868MHz communications hub. This was because we thought the additional cost would be balanced by the benefits of providing consumers the option to connect 2.4GHz CADs and by not using the limited 868MHz bandwidth for communications between the electricity meter and the communications hub.

Government Consideration of Issue

7 There was broad support from across all sectors for the proposal that the DCC provide a dual band (2.4GHz and 868MHz) communications hub alongside a single band (2.4GHz) communications hub.

8 Energy suppliers noted that they supported the availability of both options but expressed concern about the date of availability of the dual band communications hub (second half of 2017) and a desire for it to be available sooner. Suppliers raised concern that any delays may risk rollout and the ability to meet New and Replacement Obligation (NRO) from mid-2018.

9 In the Government Response on Smart Metering Rollout, published in July 2015, the Government concluded that it intends to bring the NRO into effect from mid-2018 and that the NRO would require suppliers to take all reasonable steps to install a compliant smart meter where a meter reaches the end of its life or where a meter is installed for the first time. It also notes that whilst the Government is fully committed to bringing the NRO into effect from mid-2018, the Secretary of State will retain the right to review the date and if necessary will consult nearer the time, to ensure that the obligation can be implemented in practice. The response explicitly notes that this right could be exercised, for example, if technical solutions had not been developed as expected.

10 The consultation noted our assumption that dual band communications hub would only be installed where a single band 2.4GHz solution would not work. However, some energy suppliers argued that it may be more cost effective for them to install a dual band

communications hub in all cases, not just where an 868MHz solution is required, as they would avoid the cost of handling variant devices. Suppliers asked that this decision be left for them to make.

11 We agree that the provision of a dual band communications hub, alongside the continued provision of a single band 2.4GHz communications hub, is the best solution. A dual band communications hub will help to protect the limited 868MHz bandwidth because the communications link between the electricity meter and communications hub can utilise the 2.4GHz solution. Additionally, this solution offers consumers greater flexibility because they can use 2.4GHz CADs, for which we expect there to be a more vibrant, global market, as well as 868MHz CADs.

12 As a result, we will require that the dual band communications hub is capable of connecting to separate devices using both frequencies simultaneously; for example, it should be capable of connecting to the electricity meter and IHD using 2.4GHz whilst connecting to the gas meter using 868MHz.

13 We recognise that for some suppliers it may more cost effective to deploy dual band communication hubs by default, in order to avoid needing to carry equipment variants. However, we also continue to be of the view that it is possible for an organisation with the appropriate processes in place to be able to manage equipment variants at small or no additional costs. We will leave the decision to suppliers to make.

Summary of Government Conclusion

We will require through the provisions in the SEC and CHTS that the DCC provide a dual band (868MHz and 2.4GHz) communications hub, alongside a single band (2.4GHz) communications hub.

868MHz on the Import Electricity Meter

Consultation Question 2

Do you agree that the import electricity meter should always be capable of operating using the 2.4GHz HAN solution? Please provide evidence to support your response.

Summary of Issue

14 In the consultation, we proposed that there was no strong case for a single band 868MHz electricity meter. Electricity meters will almost always be co-located with the communications hub and therefore there should be no propagation problems when using 2.4GHz (noting that all communications hubs will be capable of operating using 2.4GHz). Utilising the 868MHz HAN solution for the high bandwidth link between the communications hub and electricity meter when it is not necessary was considered a waste of a limited resource.

15 Given this, the Government proposed that all smart electricity meters should be capable of operating using the 2.4GHz HAN solution. The consultation suggested that although 868MHz would not specifically be barred from use on electricity meters there would be a commercial disincentive to its use as it would only be allowable as a dual band device. It

was noted that this requirement would not apply to gas meters or to generation meters that are not connected to the smart metering system.

Government Consideration of Issue

16 A large majority of respondents from across all sectors agreed that the import electricity meter should always be capable of operating using the 2.4GHz solution.

17 One energy supplier raised the problem of the 'related MPAN scenario' where more than one meter is installed in a single premises for the same fuel type but in differing locations and therefore suggested that there should not be restrictions on the use of 868MHz on electricity meters. Although such scenarios could present a challenge to the installation of the smart metering system, we expect that the number of premises affected by such a scenario to be small. Our proposals would not specifically prohibit the use of 868MHz on electricity meters so these premises could be served by a dual band electricity meter if necessary.

18 A number of parties noted that generation meters may need to use the 868MHz solution due to their location. To connect a generation meter to the smart metering system the generation meter must be compliant with the requirements of an ESME, as set out in SMETS. As noted above, this means that the generation meter must always be capable of operating using 2.4GHz but a dual band device could be installed if necessary. We intend to amend the CHTS to further clarify that a generation meter can fall under the definition of an ESME.

19 There is no strong use case for an 868MHz single band electricity meter as the communications hub will almost always be co-located with the electricity meter and therefore there should be no propagation problems, especially as any communications hubs will always operate at 2.4GHz, either as a single band hub (2.4GHz) or a dual band (2.4GHz and 868MHz) communications hub. On this basis we will require all smart electricity meters to be capable of operating using the 2.4GHz HAN solution. This does not require a specific change to the SMETS, rather the SMETS requirements for all other devices will be changed to permit the use of 868MHz in single band or dual band, as well as the single band 2.4GHz solution.

Summary of Government Conclusion

We will require that smart electricity meters are always capable of operating at 2.4GHz. For other devices (also noting the decision above for communications hubs), we will amend the SMETS to also permit the use of single band 868MHz.

868MHz on the Mandated IHD

Consultation Question 3

Do you agree that energy suppliers should be required to take all reasonable steps to utilise the 2.4GHz solution on IHDs where possible but that they should be permitted to use 868MHz where this is operationally necessary? Please provide evidence to support your response.

Summary of Issue

20 The Government proposed to amend the SMETS to allow the IHD to utilise the 868MHz solution to form a communications link between the IHD and the dual band communications hub, but to introduce an 'all reasonable steps' requirement on suppliers to utilise the 2.4GHz solution, ahead of the 868MHz solution, where possible.

21 The intention of this was to protect the limited 868MHz bandwidth, yet enable the 868MHz solution to be utilised where the 2.4GHz frequency would not work.

Government Consideration of Issue

22 The majority of respondents agreed that energy suppliers should be required to take all reasonable steps to utilise the 2.4GHz solution to form a communications link between the IHD and the dual band communications hub.

23 Several large energy suppliers did not agree with an all reasonable steps approach and of those that did agree their support was caveated based on the interpretation of 'all reasonable steps'. Energy suppliers also questioned how enforceable an all reasonable steps requirement would be. A number of respondents questioned whether such a requirement would introduce further reporting overheads. Energy suppliers noted that this could increase costs.

24 An all reasonable steps approach was supported by the meter manufacturers who felt that there was a need for a formal requirement to protect the limited 868MHz bandwidth. They felt it was appropriate to favour the 2.4GHz frequency as it was proven and had more available channels to serve the consumer HAN without risk of interference. Ofgem also agreed that the proposal seemed proportionate.

25 The DCC and some energy suppliers raised concern as to how the all reasonable steps requirement would impact upon the balance between operability and consumer acceptability. For example, an installer may be able to operationally connect the communications hub to an IHD situated in the hallway of the premises using 2.4GHz, but the consumer may prefer to have the IHD in the kitchen and in this location the IHD may only be able to connect using 868MHz. Our view is that when considering where the IHD be positioned, suppliers will need to balance the requirement to use 2.4GHz in preference to 868MHz, against the requirements of the SMICOP[6].

26 We recognise that there is an incentive for suppliers to protect the 868MHz bandwidth but we also appreciate that relying only on 'all reasonable steps' drafting may not provide sufficient clarity in this case. Given this, we believe that the most appropriate mechanism to protect the limited 868MHz bandwidth and encourage deployment of the proven 2.4GHz solution is to require that suppliers should provide consumers with a 2.4GHz capable IHD, where it is technically practicable for that solution to work, noting that energy suppliers will need to also consider the requirements of the SMICOP. An installation will be considered to be technically practicable when the IHD can use 2.4GHz to connect to the communications hub without the installation of additional equipment or the relocation of (or any part of) the Smart Metering System at the premises. The Operational Licence Conditions in the supply licence will then require that suppliers take

[6] There are existing arrangements in the SMICOP which require that if an IHD is accepted by a consumer then it should be: *'installed in an appropriate location and set up as far as practicable to meet the needs of the household e.g. tariff and payment type'.*

all reasonable steps to utilise the 2.4GHz link to connect the IHD to the communications hub.

Summary of Government Conclusion

We will amend the supplier licence conditions to require that energy suppliers must form a communications link between the IHD and the dual band communications hub using the 2.4GHz frequency, in preference to 868MHz frequency, where technically practicable, noting that energy suppliers will need to also consider the requirements of the SMICOP.

Number and Type of High Bandwidth Links

Consultation Questions 4 & 5

Do you agree that the 868MHz solution provided on dual band communications hubs should be capable of supporting four high bandwidth links? Please provide evidence to support your response.

Do you agree that we should not allocate these high bandwidth links to particular devices, for example CADs? Please provide evidence to support your response.

Summary of Issue

27 The number of high bandwidth links that can be supported by the 868MHz solution is a function of the bandwidth available, power level used and local deployment density. Our analysis and that of the ZigBee Alliance suggests that the 868MHz solution could support four high bandwidth links when operating at low power, but this number reduces when high power is utilised, due to fewer high power channels being available.

28 The Government considered whether these high bandwidth links should be allocated to specific devices, for example the IHD or a CAD, but proposed that this was not necessary as ultimately it is the consumer's decision as to which devices are connected to their smart metering system.

Government Consideration of Issue

29 In general, the majority of respondents, from across all sectors, including consumer groups, agreed that the requirement for four high bandwidth links be both a minimum and a maximum requirement. This was considered to be the optimum compromise to ensure that consumers have a sufficient number of links, whilst protecting the 868MHz bandwidth. A number of respondents had caveats to their agreement and these were mostly linked to the fact that the number of links is dependent upon the specific context and local dwelling density. Given this, energy suppliers asked for flexibility and some asked for the ability to manage links remotely.

30 Since the consultation closed we have engaged further with energy suppliers. Suppliers have reiterated that they would like to have more flexibility around the provision of high bandwidth links. They have argued that not all consumers will want to utilise four high bandwidth links and so the requirement should be activated by consumer request. Suppliers argue that this will help keep costs down. They also argued that as more devices converge into one (e.g. combined IHDs and CADs), fewer links may be sufficient.

31 Since the publication of the consultation, analysis undertaken using data gathered in the Ofcom 868MHz HAN trial and subsequent analysis confirmed that almost all premises where low power 868MHz would be beneficial could be provided with four high bandwidth links. There is a risk that only three high bandwidth links could be supported in up to 300,000 premises, this represents an estimated 4% of low power 868MHz premises. However, this is dependent on the specific local situation and is a factor of the local density of 868MHz deployment, whether surrounding premises are also using 868MHz and whether surrounding premises fully utilise all of their high bandwidth links. Our conclusion is therefore that this risk may not materialise in practice.

32 We believe that the provision of four high bandwidth links will provide the consumer with appropriate opportunity and flexibility to connect devices to the smart metering system. This will ensure that consumers can enjoy the benefits of connecting IHDs, CADs, prepayment interface devices, etc. to the smart metering system.

33 Given this, we will require in the CHTS that all dual band communications hubs should be capable of supporting four high bandwidth links on 868MHz. By including this requirement in the CHTS we also trigger an all reasonable steps requirement in the Operational Licence Conditions of the supply licence conditions to connect this number of consumer devices to the smart metering system. Effectively this will mean that where a dual band communications hub is provided, suppliers will be required to take all reasonable steps to provide four high bandwidth links on 868MHz. Where a supplier cannot meet the four high bandwidth link requirement on 868MHz because the property is located in an area with dense deployment of 868MHz HAN solutions, then Alternative HAN solutions may be required; this could be triggered, for example, by consumers reporting poor HAN performance.

34 In terms of allocating these high bandwidth links to particular devices, for example IHDs or CADs, the majority of respondents, including about half of energy suppliers, supported the proposal not to allocate devices. A number of parties noted that one reason not to allocate devices is that they expect there will be convergence of devices, which will make defining devices difficult and overly restrictive.

35 Some energy suppliers did not support the approach and proposed that DECC should develop a priority order for devices that may be connected to the HAN, with metrology given the highest priority, to ensure they can retain their right to fulfil their licence obligations. Finally, a number of parties felt that it was too early to make this decision and suggested that instead the issue should be monitored during rollout.

36 In conclusion, we will not allocate the four high bandwidth links to specific devices. Our view, in line with most respondents, is that the decision on which devices to connect to the HAN is best left with the consumer. This would not affect metrology because the gas meter is a low bandwidth device and the electricity meter will almost always utilise the 2.4GHz frequency to link to the dual band communications hub.

Summary of Government Conclusion

We will amend the CHTS to require that all dual band communications hubs are capable of supporting four high bandwidth links on 868MHz. By including this requirement in the CHTS we also trigger operational requirements in the Operational Licence Conditions to take all reasonable steps to provide these links.

We will not require that these four high bandwidth links be allocated to specific devices.

Use of Low Power and/or High Power

Consultation Question 6

Please provide evidence on the relative merits of pursuing the following 868MHz deployment options: (a) a low power only approach; (b) a mandate for high power capable dual band communications hubs only (leaving other devices to supplier choice); and (c) a mandate for high power on all devices. Please provide evidence to support your response – we are particularly interested in receiving information relating to the costs (equipment and operational) and benefits of the high power solution relative to the low power solution and to the likely impact of the high power solution on the limited bandwidth available at 868MHz.

Summary of Issue

37 Evidence from the Red-M trial[7] published in 2012, estimated that 95% of GB premises could be served by the low power 868MHz HAN solution and 97% of GB premises could be served by the high power 868MHz HAN solution.

38 In response to the consultation, some energy suppliers questioned these coverage figures and argued that the dual band communications hubs utilised in the 868MHz solution should be high power capable. This was on the basis that high power would increase the number of premises that could be served by the 868MHz solution, avoiding the need to deploy the Alternative HAN solution.

39 The consultation identified that utilising high power components would increase the cost of the 868MHz solution. It also noted that the number of high bandwidth links supported when using high power is fewer than when low power is used and that using high power would also increase the risk of interference between neighbouring installations.

40 The Government acknowledged that in order to make a decision as to whether to pursue a low power or high power approach for the 868MHz solution, it would be preferable to obtain more data from industry on the following:

- The relative performance of the 868MHz high and low power solution
- The cost of implementing a high power 868MHz solution, compared to a low power solution
- The operational cost of having high and low power device variants.

41 The Government proposed to undertake a trial to gather evidence specifically on the relative performance of the 868MHz high and low power solution and on the number of high bandwidth links supported by the 868MHz high and low power solution.

Government Consideration of Issue

42 In July 2015, DECC commissioned Ofcom to conduct the 868MHz HAN trial. The trial involved Ofcom taking path-loss[8] measurements in a number of blocks of flats across GB. Analysis of these measurements produced propagation distances for the 868MHz

[7] The Smart Meters RF Survey was produced by Red-M and published in June 2012. The report can be found at: https://www.gov.uk/government/publications/smart-meters-rf-survey

[8] Pathloss is a measure of the signal propagation between the transmitter and receiver.

frequency. These distances were coupled with Ordnance Survey data which detailed the dimensions of all GB premises. By combining these data sets with data on meter locations, it was possible to estimate whether an 868MHz solution, at different power levels, would be able to propagate the length of the premises and therefore provide HAN coverage.

43 Using conservative assumptions, it was estimated that approximately 96.5% of GB premises[9] could be served by low power (25mW) 868MHz. If high power (500mW) 868MHz was used then coverage of gas meters only could increase in less than 2% of premises. Even where high power does provide additional gas links it does not provide high bandwidth links, so Alternative HAN is still necessary. Furthermore, where Alternative HAN is deployed (for the high bandwidth links) there is a high probability that the gas link could be provided at little or no additional cost.

44 Analysis of the incremental cost of implementing the high power 868MHz solution and the cost per additional gas link connected from deploying high power is detailed within Annex B. This economic analysis shows that pursuing a high power 868MHz strategy carries a significant risk of cost escalation (as seen in upper range of cost estimates).

45 Given the low number of premises that would benefit from high power, the significant cost and financial risk of providing high power (see Annex B) and seeing that high power is not a suitable solution for providing high bandwidth links, we have concluded that the low power (up to 25mW) 868MHz HAN solution is most appropriate and should be pursued. We believe that this is the most economically rational and practical solution.

46 On this basis we will amend the CHTS to require that the DCC provide a dual band communications hub which utilises the standard 2.4GHz solution and the low power 868MHz solution. We will also amend the SMETS to allow all other devices, apart from the electricity meter, to utilise the low power 868MHz solution. Suppliers will have the option to install these devices where they see fit (noting the requirement to utilise the 2.4GHz solution for the IHD link where possible). We will not permit the use of high power 868MHz.

Summary of Government Conclusion

We will amend the CHTS to require that the dual band communications hub uses the low power (up to 25mW) 868MHz dual band communications hub. We will amend the SMETS to allow all devices, apart from the electricity meter, to utilise the low power (up to 25mW) 868MHz solution.

[9] There are 26.4 million premises in GB. ‘Premises’ refer to individual dwellings, of which there may be more than one in a single building.

Monitoring and Oversight of the HAN Solutions

Consultation Question 7 & 8
Do you agree that energy suppliers, the SEC Panel and the TSC should (from DCC Live) monitor which HAN solutions are being provided in consumer premises and how they are performing, and recommend changes to the technical specifications or associated implementation rules in order to optimise their performance such that consumer interests are protected? Are any changes to the SEC needed to provide for this? Please provide evidence to support your response.
Are there any other steps that should be taken to protect the 868MHz bandwidth? Please provide evidence to support your response.

Summary of Issue

47 The consultation identified that currently, the Government has a leading role in selecting the HAN standards to be utilised in GB smart metering, defining technical specifications and associated requirements. However, there are existing requirements on the SEC Panel and the Technical Sub-Committee (TSC) to review SEC requirements and propose improvements annually.

48 We proposed introducing specific requirements on the SEC Panel, TSC and energy suppliers (who will deliver HAN solutions) to monitor the performance of HAN solutions delivered and to make recommendations to Ofgem on changes to specifications or implementation rules to optimise performance and ensure consumers receive an appropriate HAN.

Government Consideration of Issue

49 A large majority of respondents from across all sectors agreed, with some caveats, that the TSC should (from DCC Live) monitor the HAN arrangements and where necessary make recommendations to the SEC Panel and Ofgem on changes to the technical specifications or associated implementation rules. Some respondents noted that the role of the TSC needs to be clearly defined in order for the group to be able to effectively monitor HAN deployment and reach conclusions and make sound recommendations on any necessary regulatory changes.

50 We will require through changes to the SEC that the TSC periodically review the efficacy of the HAN arrangements and make recommendations on changes based upon their understanding of HAN deployment and performance. Where changes in the regulatory framework are considered appropriate, to better achieve the SEC objectives (for example, to facilitate the efficient provision, installation and operation of smart metering), the TSC will make recommendations to the SEC Panel and Ofgem. SEC parties will be required to respond to reasonable requests by the TSC for information to support their role.

Summary of Government Conclusion

We will amend the SEC to require that the TSC keep the current HAN arrangements under review and where necessary make recommendations to the SEC Panel and Ofgem on changes that are needed to the regulatory framework in order to better achieve the SEC objectives.

Annex A: Consultation Responses

The Consultation 'Home Area Network (HAN) Solutions: Implementation of 868MHz and Alternative HAN solutions' launched on 24 March 2015 and closed on 19 May 2015.

The questions in the consultation were grouped into two categories:

- 868MHz HAN Solution (Questions 1 to 8)
- Alternative HAN Solution (Questions 9 to 14)

The response to this consultation has been published in two parts. This document is one part of the Consultation Response and sets out our response to questions 1 to 8, which relate specifically to the 868MHz HAN Solution. The document 'Home Area Network (HAN) Solutions: Implementation of Alternative HAN Solutions' sets out the Government's response to questions 9 to 14, which relate specifically to Alternative HAN.

The Consultation was available on the Department of Energy and Climate Change (DECC) website and a paper version of the consultation document was made available on request. Respondents were invited to submit their comments to a consultation email address (smartmetering@decc.gsi.gov.uk).

The Consultation invited all interested parties to comment on the proposals by 19 May 2015. In total, 44 written responses were received – mostly electronically. Respondents, broken down by sector, were as follows:

Sector	Number of responses
Code Administration	1
Communications and Technology	21
Consumer Group	2
Energy Network	2
Energy Supplier (Large)	8
Energy Supplier (Small)	2
MAPs/MOPs/MAMs	2
Other Government	2
Other	4
Total	44

The following organisations responded to the consultation:

AMDEA - the Association of Manufacturers of Domestic Appliances	Association of Meter Operators
BEAMA	British Gas
Chameleon Technology (UK) ltd	Citizens Advice
DCC	E.ON Energy Solutions
EDF Energy	Electricity North West
Energy and Utilities Alliance (EUA)	Energy UK
Enzen Global	EURO-LINK Business Ltd
Future Energy Group	Gemserv Limited
Good Energy	Green Energy Options
Greenvity Communications	IMServ
Landis+Gyr Ltd	Lowri Beck Services / Community of Meter Asset Providers (CMAP)
National Grid	National Housing Federation
NEA	Ofgem
Ordnance Survey	Ovo Energy
Panasonic Automotive & Industrial Systems	Prime Alliance
ROHM Semiconductor GmbH	RWE npower
Scottish Power	Secure Meters (UK) Ltd
Siemens plc	Siemens Smart Grid
Silver Spring Networks	Smart Energy GB
Smart Energy Networks	SSE
Telegesis UK Limited	Texas Instruments
Utility Warehouse	Xsilon Ltd

Annex B: Options Analysis

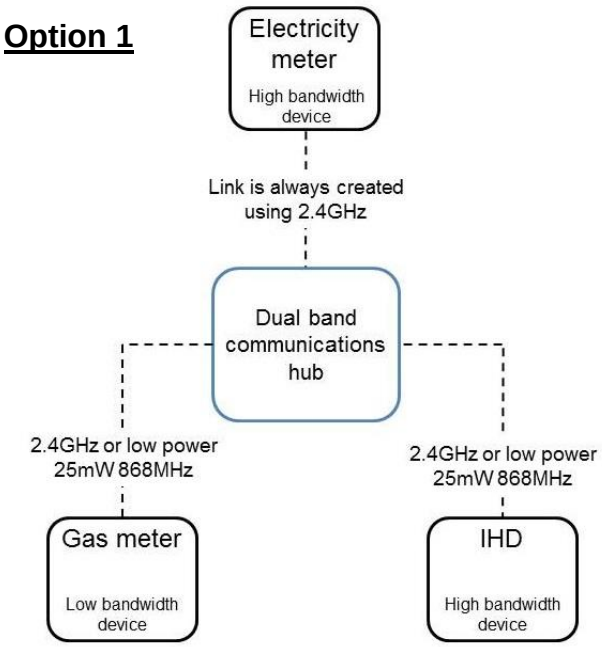
This annex provides further detail on the options analysis that underpinned the Government's decision to permit low power (up to 25mW) for all connections. The analysis focuses on the cost of deploying 868MHz devices relative to the cost of 2.4GHz devices.

Options

Five options have been considered, differing by 868MHz technology permitted. These are:

Option 1: Permit low power (25mW) for all connections (low and high bandwidth). High power (above 25mW) is not permitted. This is the policy position as per the 'Government Response to the Consultation on the second version of the Smart Metering Equipment Technical Specifications (Part 1)' published in January 2013 and provides the counterfactual against which the coverage of high power 868MHz devices is assessed.

Under this option and using conservative estimates, approximately 96.5% of premises could be served by either the 2.4GHz or 868MHz HAN solution, noting that 70% of premises could be served by 2.4GHz HAN solution based on trial results from Red-M[10]. Of the premises assumed served by low power (25mW), approx. 4% (up to 300,000) may be limited to three high bandwidth links, due to density, but the majority would be able to obtain four links. This would leave 3.5% of premises that would require Alt HAN.



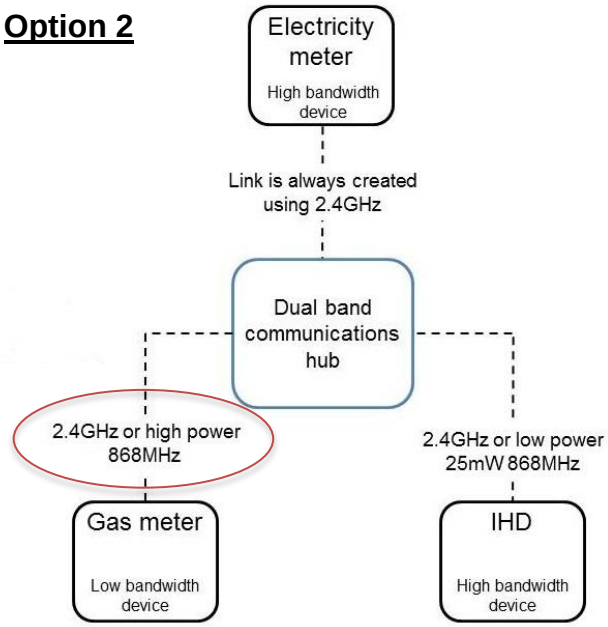
[10] Smart Meter RF Surveys. Final Report by Red-M. April 2012. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/136124/smart-meters-rf-surveys-final-report.pdf

Option 2a: Permit low power 25mW 868MHz for all connections. Permit high power up to 100mW, but only for connections between the communications hub and low bandwidth devices (currently only the gas meter and HCALCS).

In addition to the coverage as Option 1, approximately an additional 1% of premises could utilise high power to create a link to the gas meter (and any HCALCS). However, more than two-thirds of these premises would still require an Alt HAN solution to provide high bandwidth links e.g. IHD links, etc. into the premises.

Option 2b: Permit low power 25mW 868MHz for all connections. Permit high power up to 500mW, but only for connections between the communications hub and low bandwidth devices (currently only the gas meter and HCALCS).

In addition to the coverage as Option 1, approximately an additional 2% of premises could utilise high power to create a link to the gas meter (and any HCALCS). However, more than two thirds of premises would still require an Alt HAN solution to provide high bandwidth links e.g. IHD links, etc. into the premises.



Option 3a: Permit high power 100mW 868MHz for all connections.

In addition to the coverage as Option 2a, 1 high bandwidth link could be provided in less than 1% of premises. This number is low because in 80% of the premises where high power at 100mW could propagate, no high bandwidth links can be provided because of dwelling density.

Option 3b: Permit high power 500mW 868MHz for all connections.

In addition to the coverage as Option 2b, 1 high bandwidth link could be provided in less than 1% of premises. This number is low because in 85% of the premises where high power 500mW could propagate, no high bandwidth links can be provided because of dwelling density. This proportion increases at high power 500mW (compared to 100mW) because these premises are located in more dense locations.

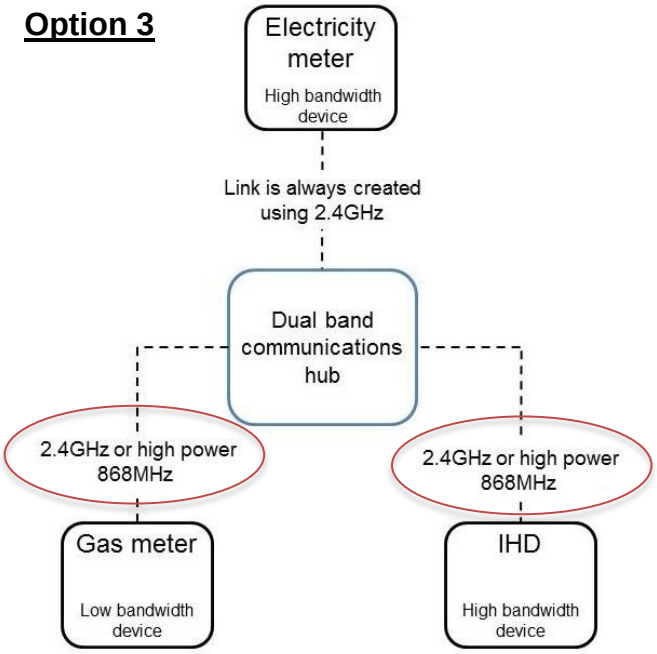


Table 1: Summary of coverage results for each option

	Option 1 Low power only (Counterfactual)	Option 2a High power 100mW for gas link only	Option 2b High power 500mW for gas link only	Option 3a High power 100mW for all links	Option 3b High power 500mW for all links
Communications hub	96.5%	97.9%	98.8%	97.9%	98.8%
Gas meter[11]	80.3%	81.4%	82.1%	81.4%	82.1%
IHD	96.5%	96.8%	97.0%	97.0%	97.3%

Economic Analysis of Options

The economic analysis estimates the costs that would be incurred under the efficient deployment of low power devices and the incremental costs of deploying high power devices for each option outlined above.

There are three sets of assumptions that underpin the estimates of the additional cost of deploying 868MHz devices:

- The number of additional premises that could be served by the deployment of 868MHz devices, compared to the deployment of 2.4GHz devices only. The coverage assumptions for each option are described in Table 1 above.

[11] Low gas meter coverage is because not all GB premises have gas meters.

- The incremental cost of 868MHz devices compared to 2.4GHz devices. Low and high cost scenarios have been adopted. Costs are based on figures provided by BEAMA (British Electrotechnical and Allied Manufacturers' Association) and EUA (Energy and Utilities Alliance). These cost assumptions are shown in Table 2 below. The cost ranges within Table 2 reflect previously submitted cost assumptions (the lower end of the range) and more recently submitted cost assumptions (the higher end of the range)[12].
- How we anticipate suppliers will behave when given the opportunity to deploy 868MHz devices. This is reflected in the two extreme scenarios modelled, which assume that once 868MHz equipment becomes available in the form of dual band communications hubs:
    - Suppliers will install 868MHz devices only where required (lower cost scenario); or
    - Suppliers will install 868MHz devices where 2.4GHz could work i.e. also in instances where it is not necessary for propagation reasons (higher cost scenario).

The deployment behaviour scenarios have been modelled because some suppliers indicated in their consultation responses that they would seek to carry as few equipment variant devices as possible. This would mean that 868MHz or dual band devices could be installed in premises where they may not necessarily be needed. For example, a dual band communications hub might be installed in premises where the 2.4GHz solution would work.

The incremental cost of 868MHz devices has been multiplied by the number of premises in which these devices would be installed under different cost and supplier behaviour scenarios to estimate the range of additional costs from allowing the deployment of 868MHz devices.

Results

Tables 3a and 3b below show the estimated total additional cost of deploying 868MHz devices, under each of the five options. The cost figures are undiscounted and expressed in 2015 prices. They are based upon a GB population estimate of 30m premises, which represents our population estimate at the end of the smart-metering roll out programme.

The results illustrate that the deployment of 868MHz devices could lead to a moderate increase in costs in a low cost scenario where 868MHz devices are deployed only where necessary. However, we do not think that the lower end of the ranges presented in Table 3a are likely to be representative of the additional costs of deploying high power 868MHz equipment. We expect that these lower costs are unrealistic because meter costs are unlikely to be at the lower end of the cost range and we expect some suppliers, for operational reasons, to install 868MHz in more premises than strictly necessary.

In addition to the total cost of deploying 868MHz devices, the cost per additional gas link from deploying high power 868MHz devices has been estimated. Table 4 below provides a summary of the estimated cost per additional gas link for each option. The cost per additional gas link has been calculated as the sum of the incremental communications hub and gas meter costs divided by the number of additional gas links established through the use of high power devices. The incremental costs and coverage for this calculation are relative to the efficient deployment of low power 868MHz devices.

[12] More recently submitted gas meter costs, which reflect the upper range of the cost estimate, are those which the key trade association identify as realistic.

Under option 2a and 3a, the cost for each of the 320,000 gas links established by deploying high power (100mW) devices ranges from £49 to £522 per link. Under option 2b and 3b, the cost for each of the 520,000 gas links established by deploying high power (500mW) devices ranges from £32 to £488 per link. The cost of deploying high power 500mW is lower than the cost of deploying high power 100mW because high power 500mW increases coverage but the cost of 100mW and 500mW devices are very similar. As noted above, the cost per gas link for each option is unlikely to be towards the lower end of this range.

Given the low number of premises that would benefit from high power, the significant cost and financial risk of providing high power and seeing that an Alternative HAN solution would separately be required to provide four high bandwidth links to many of these premises, we have concluded that the low power (up to 25mW) 868MHz HAN solution will be pursued. We believe that this is the most economically rational and practical solution.

Table 2: Incremental cost per 868MHz device relative to the cost of 2.4GHz devices

Device	Power level of device	Low cost scenario	High cost scenario	Source
Communications hub	Low power (25mW)	£1.20	£2.00	Figures for 25mW and 500mW provided by BEAMA in May 2015. DECC assumption that 100mW costs the same as 500mW.
	High power (100mW)	£1.80	£3.50	
	High power (500mW)	£1.80	£3.50	
Gas meter	Low power (25mW)	£0.00	£4.00	Figures for high scenario based on central estimate of cost provided by EUA in October 2015. All other figures based on evidence submitted to DECC previously, from a number of different sources.
	High power (100mW)	£3.00	£7.00	
	High power (500mW)	£3.00	£12.0	
In Home Display	Low power (25mW)	£0.00	£0.40	Figures for 25mW and 500mW provided by BEAMA in May 2015. DECC assumption that 100mW costs the same as 500mW.
	High power (100mW)	£2.40	£2.40	
	High power (500mW)	£2.40	£2.40	

Table 3a: Additional costs from deploying 868MHz devices only where required in a low cost and high cost scenario

	Option 1 Low power only (Counterfactual)		Option 2a High power 100mW for gas link only		Option 2b High power 500mW for gas link only		Option 3a High power 100mW for all links		Option 3b High power 500mW for all links	
	Low	High	Low	High	Low	High	Low	High	Low	High
Incremental communications hub costs (£m)	10	16	15	29	16	30	15	29	16	30
Incremental gas meter costs (£m)	0	12	10	24	11	44	10	24	11	44
Incremental IHD costs (£m)	0	3	0	3	0	3	16	16	16	16
Total incremental costs (£m)	**10**	**31**	**25**	**56**	**26**	**77**	**42**	**70**	**43**	**90**

Table 3b: Additional costs from deploying 868MHz devices where 2.4GHz equipment would work in a low cost and high cost scenario

	Option 1 Low power only (Counterfactual)		Option 2a High power 100mW for gas link only		Option 2b High power 500mW for gas link only		Option 3a High power 100mW for all links		Option 3b High power 500mW for all links	
	Low	High	Low	High	Low	High	Low	High	Low	High
Incremental communications hub costs (£m)	26	43	39	77	40	78	39	77	40	78
Incremental gas meter costs (£m)	0	67	51	119	51	206	51	119	51	206
Incremental IHD costs (£m)	0	3	0	3	0	3	52	52	52	52
Total incremental costs (£m)	**26**	**112**	**90**	**198**	**91**	**286**	**142**	**247**	**144**	**336**

Table 4: Additional cost from deploying high power 868MHz devices per additional gas link established (ranges reflect low and high cost scenarios)

	Option 2a	Option 2b	Option 3a	Option 3b
868MHz devices installed only where necessary	£49-78	£32-87	£49-78	£32-87
868MHz devices installed where 2.4GHz equipment would work	£252-522	£157-488	£252-522	£157-488

Conclusion

The deployment of high power 868MHz equipment generates relatively little benefits in terms of additional coverage, while resulting in a risk for potentially significant cost escalation (driven by uncertainty in unit costs and deployment behaviour).

It should also be borne in mind that while high power 868MHz can generate additional links to low bandwidth gas meters, it is not a suitable solution for providing high bandwidth links to devices such as IHDs or CADs. This means that for high bandwidth links there remains a dependency on the deployment of Alternative HAN solutions. It is likely that gas links can be established at little or no additional costs in Alternative HAN scenarios (because any shared Alternative HAN solution to provide high bandwidth links, can easily provide the low bandwidth gas link) further diminishing any coverage advantages of high power 868MHz over low power 868MHz solutions.

Overall the deployment of low power 868MHz solutions therefore seems the most appropriate solution and shall be pursued. We believe that this is the most economically rational and practical solution.

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