

Intimate Communications Hub Interface Specification

Report to Secretary of State

DCC
V1.0
28/02/14

Executive Summary

1. DCC is required in accordance with the terms of its Licence to produce, consult, finalise, approve and publish an Intimate Communications Hub Interface Specification (ICHIS) for publication on the DCC Website¹.
2. As part of this process, DCC is required to provide a report to the Secretary of State, which must include information on costs and expenses relating to the ICHIS, including the costs and expenses that are likely to result from initial design and any subsequent necessary development of Smart Meters, Communications Hubs, and Communications Hub Hot Shoes².
3. DCC must, by 28th February 2014, have:
 - Approved an initial draft of the ICHIS
 - Consulted with SEC Parties on that initial draft
 - Published comments received as part of the consultation process
 - Finalised the ICHIS document and issued an Authority to Proceed (ATP) Notice to the Communication Service Providers
 - Approved the ICHIS document and submitted this to the Secretary of State in accordance with Schedule 5 to the Licence.
4. DCC believes it has met its regulatory obligations in terms of production, review, approval and publication of the ICHIS V1.0. In addition, as part of this process DCC believes that ICHIS V1.0 is fit for purpose and that this report complies with our obligation to provide supporting information.

¹ Schedule 3: IM 6 and Schedule 5: Annex 5 and Annex 12, Smart Meter Communication Licence

² A Hot Shoe allows an installer to place the Communications Hub in a different location to the Smart Meter, and/or to provide power to the Communications Hub without an ICHIS compliant Smart Meter.

Structure of this document

5. This document is the report to the Secretary of State and has five core sections. Firstly it sets out summary detail of how the DCC developed and approved the DCC draft version of ICHIS V1.0. Secondly it explains the consultation process established by the DCC. Thirdly it discusses details of Prototype Development and Testing. Next there is a summary setting out indicative costs. The fifth section summarises why the DCC believes the 'DCC ICHIS V1.0 draft' is fit for purpose. A final conclusions section summarises a DCC review of lessons learned and other key points.

6. Further details are then set out in the Appendices:

Appendix 1: 2D and 3D Drawings

Appendix 2: Attendees of DCC Design Forums where ICHIS was discussed

Appendix 3: Key Feedback and Detailed Comments Spreadsheet

Appendix 4: Tolerance Review

Appendix 5: DCC Design Assurance Board Minutes

A. DCC approval of ICHIS V1.0

7. The DCC is required in accordance with the terms of its Licence to produce, consult, finalise, approve and publish an Intimate Communications Hub Interface Specification (ICHIS) for publication on the DCC Website³.
8. As part of this process, DCC is required to provide a report to the Secretary of State, which must include information on costs and expenses relating to the ICHIS, including the costs and expenses that are likely to result from initial design and any subsequent necessary development of Smart Meters, Communications Hubs, and Communications Hub Hot Shoes.
9. DCC established the following seven step process to comply with its regulatory obligations:
 - (1) Develop and approve an initial draft of the ICHIS
 - (2) Publish this initial draft ICHIS on the DCC website at <http://www.smartdcc.co.uk/documents-and-publications/> (23rd December 2013)
 - (3) Hold DCC Design Forum sessions with SEC Parties and Metering Equipment Manufacturers and DECC in December 2013 and early January 2014 to provide briefing information
 - (4) Liaise with SECAS to ensure that SEC Parties are informed
 - (5) Formally issue a request for feedback on 8th January 2014, to be provided by 22nd January 2014
 - (6) Collate and review comments received in order to finalise and approve the ICHIS document
 - (7) Submit the ICHIS document alongside a Secretary of State report.

³ Schedule 3: IM 6 and Schedule 5: Annex 5 and Annex 12, Smart Meter Communication Licence

Development of the DCC ICHIS Draft

10. The BEAMA⁴ ICHIS⁵ version produced at the ISFT⁶ stage of the procurement was used as a starting point.
11. The DCC, each Communications Services Provider (CSP) and their respective Communications Hub vendors reviewed the document during October 2013.
12. A Detailed Product Description (DPD) for the ICHIS was developed by the DCC, setting out the following decisions:
 - Remove informative sections (elaborate Communications Hub and ESME⁷ mounting diagrams, and EUK⁸ paper on RF⁹ characteristics)
 - Streamline ICHIS draft into five parts:
 - Mechanical Interface
 - DC Power
 - Optional AC signalling
 - Digital Signalling pins including connector, tamper & EMC
 - RF Implementation, addressing the major concerns of radio proximity and noise
 - Undertake agreed validation/prototype testing to support document finalisation.
13. The DPD was submitted to DCC on 15th October 2013 and an ATP for ICHIS development was approved on 18th October 2013.
14. The Mechanical Interface section was updated based on thorough theoretical tolerance reviews that were conducted and reviewed by each Communications Hub vendor. Further information on this is included in section titled 'DCC ICHIS Prototype Development and Testing', in points 40 - 53 below.

⁴ BEAMA refers to a trade organisation representing the electrotechnical supply chain, described in more detail at <http://www.beama.org.uk> and involved in the development of ICHIS representing Metering Equipment Manufacturers.

⁵ The BEAMA ICHIS draft was under version number 0.1, issued 5th April 2013.

⁶ ISFT refers to the Invitation to Submit Final Tender stage of the Service Provider Procurement that concluded in June 2013.

⁷ Electricity Smart Metering Equipment, also known as Electricity Smart Meter in SEC Stage 2, defined as a Device meeting the requirements placed on Electricity Smart Metering Equipment in SMETS 2.

⁸ EUK refers to Energy UK, a trade association for the energy industry described in more detail at <http://www.energy-uk.org.uk>.

⁹ RF refers to Radio Frequency.

15. The mechanical connector pin diagrams were updated and pin positions defined and labelled. Updated 2D drawing files and 3D models were produced based on agreements between the CSPs and their Communications Hub manufacturers and were made available alongside the ICHIS¹⁰.
16. The DC power characteristics were left largely unchanged as there was consensus among both CSPs, although additional detail was added to cover conducted noise. This additional detail was based on published standards for other low voltage DC supplies used for radio communications equipment.
17. A new RF Implementation section was added as there was a need to specify a test to determine noise interference that could be permitted without adversely affecting the Communications Hub performance.
18. A DCC 'Consultation ICHIS draft' was approved by DCC and published on the DCC website on 23rd December 2013.
19. Post consultation, feedback received was analysed jointly by the DCC with the CSPs and their Communications Hub vendors during the weeks starting January 20th and January 27th 2014. All CSPs and their Communications Hub vendors participated in the feedback review process, where comments on every feedback item received were agreed.
20. Following the consultation process, a revised 'DCC ICHIS V1.0 draft' was circulated, alongside a tracked changes version, to SEC Parties and Metering Equipment Manufacturers on 19th February 2014.
21. This DCC ICHIS V1.0 draft has been published on the DCC website to comply with regulatory obligations.

B. Consultation Process

22. DCC Design Forum sessions¹¹ were held on 5th December and 20th December 2013, where the DCC 'Consultation ICHIS draft' was discussed.
23. The DCC timetable for formal consultation was discussed in DCC Design Forums and then confirmed at SMDG, TBDG, and IMF Transition Governance meeting sessions on 12th, 17th and 18th December 2013 respectively.
24. The DCC ICHIS draft was discussed at DCC Design Forum Sessions held on 5th December 2013 and 20th December 2013, to which SEC Parties and Metering Equipment Manufacturers were invited.
25. The 'Consultation ICHIS draft' was published on the DCC website on 23rd December 2013, and SECAS were asked to notify SEC Parties that this had taken place.
26. On 6th January 2014, an email was sent to all SEC Parties requesting formal feedback, with a summary briefing note, with a deadline for submission of comments

¹⁰ 2D and 3D drawings are included in this document in Appendix 1

¹¹ Attendees of these DCC Design Forum Sessions are included at Appendix 2

of 20th January 2014. SEC Parties were encouraged to consult with their Metering Equipment Manufacturers as they felt appropriate. In addition, a formal feedback request was sent to BEAMA and EUA were notified.

27. As part of the formal DCC Consultation, three questions were posed:
 1. Do you agree that the Intimate Communications Hub Interface Specification is achievable?
 2. Do you agree with the wording concerning cradles, adaptors and flying leads?
 3. Is there a market requirement or desire to mount a Communications Hub on other devices apart from an ESME, Hot Shoe or Cradle as defined in ICHIS?
28. On 7th January, a DCC Design Forum was held specifically to brief Smaller Suppliers on DCC Design. This session included a briefing on ICHIS, with a question and answer session. An information pack was provided to attendees including references to the ICHIS on the DCC website.
29. A DCC Design Forum was held inviting SEC Parties, Metering Equipment Manufacturers and BEAMA on 30th January 2014. This session was provided to give an early view of feedback points and for the purposes of openness and transparency. Summary information was provided on feedback received. At this session the following feedback was discussed:
 - Answers to specific questions raised in the consultation
 - Costs
 - Size of the Communications Hub
 - RF Testing and Exclusion Zones
 - Next Steps.
30. A further DCC Design Forum was scheduled for 20th February 2014, to share all DCC comments on feedback received and the revised DCC ICHIS draft, showing amendments made. For this session three additional material points of feedback were discussed:
 - Scope of ICHIS
 - Tamper detection over the flying lead
 - Specification of length of flying lead.
31. In terms of addressing any points of disagreement, DCC has provided a written response to all comments received. Alongside this, at the DCC Design Forum sessions, participants were encouraged to raise any material points for discussion. This was in order to ensure every reasonable opportunity was provided for resolution of any points of disagreement within the timescales available.
32. The 'DCC ICHIS V1.0 draft' was approved by the DCC Design Assurance Board on 17th February 2014. ATP approvals were issued on 24th February 2014.

33. Details of key feedback points discussed are set out in Appendix 3. This Appendix also includes a complete response to all consultation comments received. These consultation comments, and the 'DCC ICHIS V1.0 draft' have been published on the DCC website.
34. DCC believes that all key points of feedback have been responded to in a positive and collaborative manner and a clear explanation has been given in all cases for the stated DCC design position, insofar as can be reasonably expected at this stage of the ICHIS development process.
35. Accordingly, no remedial plans are required to address outstanding matters of disagreement arising on the content of the ICHIS following this consultation.
36. However, DCC plans to provide additional information to support ICHIS. A Communications Hub Data Sheet, which will set out information to support Suppliers' concerns regarding the size of Communications Hubs will be published on the DCC Website at the end of March 2014. In addition, a Test Data Sheet and Test Harness will be provided by DCC as soon as possible, by the end of June 2014 at the latest.
37. In addition, DCC Design or Test Forum sessions can be arranged to discuss this material, by teleconference or as a meeting session, as appropriate and as required.
38. Following submission of the 'DCC ICHIS V1.0 draft' to the Secretary of State on 28th February 2014, a DCC Design Forum session will be held to brief SEC Parties on the report to ensure there is full visibility and transparency of the DCC Consultation process right through to submission.
39. DCC believes that this document development process has applied the spirit and the letter of the DCC Licence and that it meets regulatory requirements.

C. DCC ICHIS Prototype development and testing

40. There are three aspects to the validation of ICHIS as a specification (Mechanical, Electrical and Radio performance) which the CSPs set to achieve as part of ICHIS validation as covered in the DPD. The DCC believes at this stage of development that these aspects can be tested individually and a summary of findings is described in points 41 -53 below.

Mechanical:

41. For ICHIS to stand alone as an interoperable specification, it must be possible for a Host¹² manufacturer to build a product to the worst case tolerance of any dimension, and for a Device¹³ manufacturer to build a product with the opposite end of that tolerance and for the two products to fit together and meet the ingress protection requirements in any circumstance.

¹² Host refers to the side of an ICHIS interface which provides power and a physical mount for a Device.

¹³ Device refers to the side of an ICHIS interface which draws power from an ICHIS Host, and derives physical stability from the mount.

42. It is a costly exercise to try to physically build every permutation of the dimensions. Instead, this has been done in the theoretical tolerance analysis performed by the CSP Communications Hub manufacturers.
43. This tolerance analysis showed several conflicts, summarised in the ICH Tolerance review documentation attached in Appendix 4. The tolerance review document pack consists of five documents including a Revision History for ICH - BEAMA Tolerance Review.
44. The tolerance review versions 1.0 to 1.4 explain the ICHIS mechanical validation conducted by the CSP Communications Hub manufacturers and how a consensus was formed with regards to the mechanical interface specifications.
45. The ICH was prototyped using both 3D printing technology and silicon moulding. The Communications Hub PCBs¹⁴ were also prototyped (including all PCB components) and fitted together in some cases.

Electrical:

46. The electrical requirements of the output of the Host have quite a large range of acceptable output, as originally specified by the Metering Equipment Manufacturers in the BEAMA ICHIS working group. This has been accepted without modification by the CSP Communications Hub manufacturers.
47. For ICHIS to stand alone as an interoperable specification, it must be possible for a Host manufacturer to build a product to the worst case tolerance of any aspect of the power supply (noise, voltage, power limiting), and for a Device manufacturer to build a product which continues to operate to its fullest extent in those circumstances.
48. There is agreement within the CSPs that, given their experience, these specifications are sufficiently well defined and sufficiently wide to allow the economical manufacture and development of both the meter and Communications Hub.
49. There is no specific validation plan for the electrical definition within ICHIS, and each Communications Hub manufacturer will build prototypes of their Communications Hub as necessary within their development cycles and refine the design to operate across the potential ranges defined within the specification. Meter (and Hot Shoe) manufacturers will equally design and test their ICHIS devices to be within the limits defined by the specification.
50. Consideration should be given to the power loss due to impedance in the Adapter and Cradle solution with flying lead as Energy Suppliers will have to procure meters with slightly higher power output compared to intimate and Hot Shoe connectivity solutions. Suitable screening or filtering to prevent the flying lead acting as an antenna will also be required if the noise limits are to be met.

Radio performance:

51. Concerns about the close proximity of meters and Communications Hubs with radios have been raised by a number of parties within the industry. The CSPs have defined a testing methodology in Part F of ICHIS to determine the limits of operation of the

¹⁴ PCB refers to a Printed Circuit Board.

meter or Hot Shoe in the frequency bands across the communications solution and the ZigBee operations.

52. The tests defined in Part F provide an option for Meter manufacturers and Communications Hub vendors to work on repeatable tests which can define level of noise within particular frequency bands that may adversely affect the functioning of the meter or the Communications Hub.
53. As the RF parameters are out of scope of ICHIS, the ICHIS will only describe the RF validation test mechanism. Actual noise emission levels for respective frequency bands of interest will be included in a separate Communications Hub Test Data Sheet which will be published to SEC parties by the DCC.

The DCC believes that the prototype testing and development activity undertaken has been appropriate to this stage of the development of the ICHIS.

D. Costs and Expenses likely to result from the DCC ICHIS

(and any subsequent necessary development of Smart Meters, Communications Hubs, and Communications Hub Hot Shoes)

54. Smart Meters

Feedback received from BEAMA has indicated the following estimated ICHIS related costs. There is no significant difference between the costs resulting from the BEAMA ICHIS v0.1 and DCC ICHIS v 1.0. All costs in this report are the same for both the BEAMA ICHIS v0.1 and DCC ICHIS v1.0 unless explicitly stated otherwise in points 56 – 63 below.

55. The estimated cost of an interface that meets the minimum requirements defined in ICHIS:
 - Mechanical and DC power only = £1.25
56. The estimated cost of an interface that meets the minimum requirements defined in ICHIS, and provides additional AC connector for wired HAN functionality:
 - Mechanical, DC power, AC connector for HAN will range between £1.68 and £3.12
57. The estimated cost of an interface that meets the minimum requirements defined in ICHIS, and provides additional AC connector for both wired HAN and WAN functionality
 - Mechanical, DC power, AC connections for HAN and WAN will range between £1.76 and £3.75.
58. Please note that the costs that include AC HAN and WAN functionality identify that AC lines need protection. The type of protection provided can affect the cost, resulting in a range of costs being specified, depending on the level of protection required.
59. Feedback received from BEAMA has indicated that for a SMETS2 compliant meter which conforms to the minimum specification described by ICHIS following the DCC 'ICHIS V1.0 draft' as compared to the BEAMA ICHIS v0.1 draft, there is a small

reduction in cost as a result of the DCC design, resulting in an estimated £0.08 reduction in price (mechanical switch removed, pins added).

60. **Communications Hubs**

As provided by the CSP's Communications Hub vendors and agreed by BEAMA members, the estimated cost of a Communications Hub which provides an ICHI following the DCC ICHIS V1.0 draft compared to the BEAMA ICHIS draft is:

- Cost estimate of BEAMA v0.1 ICHI = £0.90
- Cost estimate of DCC v0.3 ICHI = £0.82

61. There is a small reduction in cost as a result of the DCC design, resulting in an estimated £0.08 reduction in price (mechanical switch removed, pins added). For context this saving represents the difference in cost between implementing the minimum specification described in ICHIS on a Communications Hub based on the BEAMA specification 0.1 draft, versus implementing the minimum specification described in ICHIS based on the DCC specification 1.0 draft.

62. **Communications Hub Hot Shoes (for use with stand-alone communications hubs)**

Initial estimated costs of a Hot Shoe compliant with the 'DCC ICHIS V1.0 draft' as provided by BEAMA indicated that a Hot Shoe with an ICHIS compliant mechanical and electrical interface providing DC power only (i.e. that meets the minimal DCC ICHI specification) would cost £7.11 whilst a Hot Shoe with an ICHIS compliant mechanical and electrical interface providing DC power and AC connections for HAN PLC (i.e. that meets the minimum DCC ICHI specification and adds AC power line HAN functionality) ranged between £7.26 and £9.51 (noting that AC lines need protection and the type of protection significantly affects the cost as reflected within this cost range). ICHIS is agnostic regarding the type of protection required and Energy suppliers will need to specify their requirements in this regard when procuring Hot-shoes.

63. **Adaptors, cradles and flying leads (for use with stand-alone communications hubs)**

The estimated cost as provide by BEAMA for an ICHIS compliant adaptor and cradle is approximately £3.85, +/- 40p. The flying lead required to connect the adaptor to the cradle can be of any length or thickness provided it is capable of delivering the required DC power within the specified tolerance range to the Communications Hub ICHI and consequently is deemed out of scope for ICHIS. Energy suppliers will need to specify their requirements in this regard when procuring adaptor and cradle solutions; however the DCC expects that flying leads will cost approximately £1 per metre for an appropriate type of cable and connectors.

E. Why DCC considers the ICHIS Draft to be fit for purpose

64. DCC has considered the fit for purpose measure in terms of Regulatory, Technical, Commercial, and Business Requirements measures.

Fit for purpose: Regulatory Requirements

65. DCC established a consultation process, to publish the ICHIS specification, and consult with SEC Parties and Metering Equipment Manufacturers, which was also communicated in SMIP Transition Governance Forums.
66. In addition, DCC hosted seven Design Forum Sessions, attended by Large Suppliers, Smaller Suppliers and representatives from the Association of Meter Operators, and Metering Equipment Manufacturers.
67. DCC received comments from 15 parties and total of 215 comments. Responses were received from Large Suppliers, Metering Equipment Manufacturers and Trade Associations (BEAMA and Meter Forum) and one other SEC Party.
68. DCC considered and responded to all consultation comments received, as described in summary terms in Appendix 3. In addition, the DCC has published comments and responses made on the DCC website as required in the terms of the Licence.
69. DCC has provided an approved DCC ICHIS Consultation Draft, and an amended final DCC ICHIS V1.0 draft (alongside a version which tracks changes between the two documents) and published these on the DCC Website.
70. The DCC believes that the ICHIS V1.0 draft and this Secretary of State report demonstrate Regulatory compliance, and as such are fit for purpose.

Fit for Purpose: Technical Requirements

71. The DCC has considered and approved ICHIS prototype and development testing appropriate for this DCC ICHIS V1.0 draft as described in this document and the appendices.
72. As part of the formal DCC Consultation, three questions were posed:
- Do you agree that the Intimate Communications Hub Interface Specification is achievable?
 - Do you agree with the wording concerning cradles, adaptors and flying leads?
 - Is there a market requirement or desire to mount a Communications Hub on other devices apart from an ESME, Hot Shoe or Cradle as defined in ICHIS?
73. On Question 1) all parties, with one exception agreed the ICHIS is achievable. A DCC response has been provided in response to the dissenting comment and the DCC feels that, on the basis of comments received, there is a strong consensus that the specification as drafted is achievable.
74. On Question 2) wording for cradles, adaptors and flying leads has been satisfactorily agreed following comments received, with an Energy Supplier action agreed to work with BEAMA/Metering Equipment Manufacturers to specify length of flying leads

required. The DCC feels that, on basis of this response to comments received, that wording within the ICHIS is appropriate.

75. On Question 3) one party felt that Industrial Non Domestic Meters could require an ICHIS. The DCC response to this has been a point of clarification. DCC proposes that it is acceptable to move forward on the basis that there is no immediate requirement to mount a Comms Hub on any other devices apart from the ESME, Cradle or Hot Shoe
76. In addition, DCC has provided written responses to all points of feedback received.
77. DCC believes that the ICHIS, the Consultation process and the contents of this report demonstrate Technical compliance, and as such are fit for purpose.

Fit for Purpose: Commercial Requirements

78. DCC has requested details on indicative costs for ICHIS, Communications Hubs and Hot Shoes in accordance with Licence obligations and has provided details in this document and in DCC Design Forum briefing sessions. Further detail is set out in this report in points 54 - 61 above.
79. DCC has published the ICHIS on the DCC Website, and will, in accordance with Licence obligations, require the use of such tangible and intangible property (including physical components and Intellectual Property Rights) as is readily available on a reasonable and non-discriminatory basis.
80. DCC hereby confirms its intention to comply with its regulatory obligation to maintain the ICHIS, in a form that can be readily accessed and used by SEC Parties on a royalty-free basis (whether for the purposes of the SEC or otherwise), as an Other Enabling Service, referred to in Part F of Condition 17 (Requirements for the provision of Services) of the DCC Licence.
81. DCC believes that actions taken to publish the ICHIS, to provide and communicate requested cost information, and the ongoing DCC commitment to publish the ICHIS and supporting information going forwards, demonstrate compliance with Commercial measures required.

Fit for Purpose: Business Requirements

82. DCC has considered concerns raised during the consultation process, associated with the ICHIS, such as Communications Hub size and installation process and has committed to actions which address business needs raised, in proposed Communications Hub Data Sheets, and within Communications Hub Installation Support Materials under DCC development.
83. DCC has also undertaken a lessons learned exercise associated with its consultation process, and proposes to implement a longer consultation period, and ongoing communications regarding ICHIS and related matters, through the DCC website and other activity as appropriate to support market development.
84. DCC believes that these business requirements meet the spirit of the General and Interim objectives of the SEC, and demonstrate that DCC ICHIS activity undertaken as part of this consultation exercise, and this report, are fit for purpose.

Concluding Points

85. DCC has reviewed its processes and identified some opportunities for improvement as described below.
86. In reviewing lessons learned, DCC is of the view that a four week consultation period should be the minimum going forwards as a two week consultation period imposes an onerous burden on SEC Parties to review and respond. That said, the 'DCC ICHIS V1.0 draft' is a final iteration building on work that has taken place over two years to develop, so DCC believes that an extra two weeks time to provide feedback would not have altered the outcome of the consultation in this case.
87. Additionally, DCC will look for ways to encourage continuity of individuals representing SEC Parties involved in consultation processes, and also briefing across Design Forum Sessions going forwards.
88. DCC will align and communicate delivery milestones more closely with Service Providers to ensure that the spirit as well as the provisions of the Licence and the Smart Energy Code are a common goal.
89. DCC has a clearer view of the high burden of work involved with Consultation and will build this into delivery planning going forwards.
90. DCC will aim to provide more focused outreach to SEC Parties not regularly engaged with the DCC Design Forums with a wider range of communications activities, including using the DCC Website to provide core briefing information as appropriate going forwards.
91. DCC feels that, in addition to formal consultation activity required in terms of its Licence Agreement, it will seek wherever possible, to provide information that is useful to SEC Parties, Metering Equipment Manufacturers and others via the DCC Website in order to support the delivery of an effective and compliant ICHIS for use in the Smart Metering Programme.
92. As a final point, DCC would like to express sincere thanks for the time and effort that SEC Parties, BEAMA, Metering Equipment Manufacturers, DECC, Ofgem and Industry have taken to contribute to this process.