SMETS V1.0 INTEROPERABILITY

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Summary	This paper provides the findings from an investigation into interoperability of Smart Metering Equipment Technical Specifications (SMETS) v1.0 Meters following a Change of Supplier and any impacts on BSC Settlement processes.

1. Background

1.1 At the November 2017 PAB meeting (PAB202/12), ELEXON presented its findings on the Settlement Risks associated with the mass roll-out of smart Meters, in particular SMETS v2.0 Meters serviced by the Data Communications Company (DCC). At this meeting, the PAB raised concerns with the interoperability of SMETS v1.0 Meters following a Change of Supply (CoS), namely:

i) The impact on Settlement as a result of the gaining Supplier not being able to operate a SMETS v1.0 Meter in smart mode; and

ii) If there is a related BSC compliance issue that the Performance Assurance Framework (PAF) should be addressing.

1.2 ELEXON agreed to investigate these areas of concern and report the findings back to the PAB.

2. What is a foundation smart Meter?

2.1 Supply Licence condition 39 requires that Suppliers must take all reasonable steps to ensure that a smart Metering System is installed at their domestic and smaller non-domestic customers by 31 December 2020. This activity, as directed by the Smart Metering Implementation Programme (SMIP), is being delivered in two phases: the foundation stage and mass roll-out.

2.2 The DCC provides a central service that manages all communications with smart Metering Systems and was implemented to support the mass roll-out. Currently, only SMETS v2.0 Meters can be enrolled and serviced by the DCC.

2.3 To support the smart Meter directive prior to the DCC go live date and in the early stages of the mass roll-out, a foundation stage was introduced in March 2011 as Suppliers were installing remote Meters with varying amounts of smart functionality on domestic premises. These Meters are referred to as foundation smart Meters or Advanced Domestic Meters (ADMs).

2.4 When the first version of the SMETS (SMETS v1.0) was introduced, Suppliers began installing these Meters as part of the foundation stage. Any SMETS v1.0 Meters installed before 13 July 2018 will count towards a Supplier's smart Meter roll-out targets.[1] In addition to SMETS v1.0 Meters, Suppliers have been installing ADMs that are not compliant with any version of the SMETS. These Meters, in their current configuration, do

[1] With the potential for an agreed 6 month ramp down period.

not count towards the smart Meter roll-out, however it is envisaged that the majority of these Meters will be remotely converted to be SMETS v1.0 compliant and will count towards the smart Meter roll-out.

2.5 Foundation smart Meters do not include 'advanced' Meters as defined in Supply Licence condition 12.19, and referenced in conditions 12.18, 12.21 and 12.24. For the purposes of this paper, an 'advanced' Meter as defined in the Supply Licence is synonymous with an Automatic Meter Reading (AMR) Meter. As per Supply Licence conditions 39.3 and 39.4, 'advanced' Meters already installed at Current Transformer (CT) operated domestic and all designated premises (i.e. non-domestic premises in Profile Classes 1-4) are exempt from the smart Meter roll-out, until such a time that they are replaced.

3. What processes facilitate SMETS v1.0 interoperability

3.1 To support interoperability of foundation smart Meters following a CoS, the Foundation Interim Operating Model (FIOM) was developed. The FIOM applies to all foundation smart Meters that haven't yet been enrolled into the DCC.

3.2 A new key role was introduced to support interoperability of foundation smart Meters: the Smart Metering System Operator (SMSO). Suppliers use SMSOs to operate foundation smart Meters to enable activities such as Meter reading and re-configurations to be undertaken remotely. As the SMSO role was a new function, the FIOM provided a series of guiding principles, processes, roles and responsibilities that provide participants with a consistent and agreed approach to facilitating the CoS process for a foundation smart Meter.

3.3 When a Supplier inherits a foundation smart Meter on a CoS, the FIOM provides three options as to how the new Supplier can operate the Meter:

i) Use a preferred SMSO;

ii) Use the installing Supplier's SMSO; or

iii) Operate the Meter as non-smart or dumb, i.e. retrieve physical 'eye-ball' Meter reads.

3.4 Where there is a change of appointed SMSO for a foundation smart Meter, the FIOM states that the previously appointed SMSO is required to directly share technical information about the Meter with the relevant Supplier and new SMSO. The FIOM refers to these details as 'smart MTDs' and provides that 'Suppliers and SMSOs will define the interfaces between themselves based on contractual arrangements rather than mandating message formats'.

4. What are the associated BSC obligations?

4.1 Effective from 15 May 2013, the BSC was amended to include the SMSO as a market participant role in Market Domain Data (MDD). There were no BSC qualification requirements or associated BSC processes introduced for this role, because it was not anticipated that the interim arrangements would be needed for as long as they have. Therefore, aside from registering as the role in MDD, there are no BSC obligations on an SMSO.

4.2 Following a CoS, the BSC provides the processes whereby key data items relating to the Metering System are transferred between old and newly appointed participants. These processes support the validation of CoS and future Meter reads and enable participants to maintain the Metering System.

4.3 A key item in the transfer of data on a CoS is the Meter Technical Details (MTDs) which has traditionally been undertaken by the Meter Operator Agent (MOA). However, for DCC serviced smart Meters installed as part of the mass roll-out, Suppliers are playing a new and key role in the transfer of MTDs. Modification P292 made changes to the BSC to reflect this change in responsibility for production and submission of MTDs.

4.4 For non-DCC serviced Meters, such as foundation smart Meters, the traditional MTD transfer processes are still in place. This obliges the old MOA to provide the new MOA with the D0149 'Notification of Mapping

Details' and D0150 'Non Half-Hourly Meter Technical Details' data flows on a CoS. These data flows do not contain the technical information required to retrieve data from the Metering System remotely (or, where appropriate, configure the Metering System remotely). Such technical information is provided in the D0313 'Auxiliary Meter Technical Details' data flow which is only required to be provided by MOAs under certain circumstances. These circumstances are outlined in BSCP514 Appendix 9.3 'Remotely Read Non Half Hourly Meters' and relate to AMR Meter Types only.

4.5 The BSC obligations for provision of technical information required to retrieve data from the Metering System remotely (or, where appropriate, configure the Metering System remotely) were not amended for foundation smart Meters, as this was provided for in the FIOM and is managed by Suppliers and SMSOs.

4.6 In addition to the above, there are no BSC obligations to operate NHH Meters remotely. However, Section S Annex S-1 puts an obligation on Suppliers to settle 30%, 60%, 80% and 97% of energy from their NHH Metering Systems on actual Meter readings by the first (R1), second (R2), third (R3) and final (RF) reconciliation runs respectively. In order to meet these performance standards, Suppliers may prefer to read NHH Meters remotely rather than relying on physical Meter reads. The collection and processing of NHH Meter reads, whether by remote, physical or any other means, is monitored through Settlement Risk 74 (SR0074[2]).

5. Previous investigations into SMETS v1.0 interoperability

5.1 At the request of PAB at its January 2016 meeting, ELEXON issued a Request for Information (RFI) to obtain feedback from participants on the potential impact that SMETS v.1.0 Meters were having on Settlement.

5.2 ELEXON received 10 responses to the RFI: five 'Big Six' Suppliers, four small and medium Suppliers and one Supplier Agent. These responses were presented to PAB in the closed session of its April 2016 meeting. We have included this paper as a confidential attachment for completeness. A summary of the responses to the questions posed through the RFI is as follows:

Question	Summary of responses
Risks to Settlement posed by SMETS v1.0 Meters	• All respondents agreed that SMETS v1.0 Meters posed a minimal risk to Settlement • Larger participants noted the positive impacts of SMETS1 v1.0 Meters on NHH Settlement performance • Smaller participants noted challenges with integrating these Meters with their systems • Most inherited SMETS v1.0 Meters following a CoS are being treated as dumb instead of continuing with remote capability • All agreed that interoperability issues will be resolved if and when the Meters are adopted by the DCC
To what extent does the FIOM mitigates the risks	• All respondents agreed that the FIOM provides useful guidance on the CoS process • One Supplier noted positive impacts of recent BSC changes to the CoS process • Two respondents noted lack of guidance on specific areas of the FIOM and how it ties in with BSC processes
Will SMETS v2.0 Meters be subject to the same	• The majority of respondents noted that there won't be the same issues with SMETS v2.0 due to the DCC providing a central communications service

[2] The risk that Non-Half Hourly Data Collectors (NHHDCs) do not collect and/or enter valid Meter readings resulting in old/default data entering Settlement.

issues	• Smaller Suppliers noted a risk that not all Suppliers will become DCC users
Risks to Settlement posed by SMETS v2.0 Meters	• Subject to all Suppliers becoming DCC users and all SMETS Meters being serviced by the DCC, no respondents noted a large negative impact on Settlement posed by the mass roll-out • Potential risks noted by Suppliers were: – Continued issues with the disputed read process if interoperability issues are not resolved – Data quality issues could delay the timely and efficient processing of Meter exchanges – It could become unviable to undertake traditional Meter reading activities as the number of legacy Meters diminish and they become sparely populated – It is not currently known how available and stable the DCC platform will be
What changes, if any, to BSC processes or guidance would help mitigate the risk	• The majority of respondents did not believe that changes to BSC processes were needed • Three respondents noted that additional guidance on the process would be helpful • One respondent noted that it may be too soon to fully evaluate this, but some potential changes could be: – Ensuring reads from legacy Meters are taken prior to an exchange – NHH performance standards may need reviewing over the roll-out – Reviewing NHH validation rules to ensure they remain fit for purpose

5.3 At the May 2016 PAB meeting, ELEXON presented a follow up paper on issues with remotely read Meter interoperability (PAB184/04). After an independent assessment of the process, BSC non-compliances were identified as contributing to interoperability issues with AMR Meters and a Technical Assurance audit was undertaken (PAB188/09). As no BSC non-compliances were found in relation to SMETS v1.0 interoperability, no further assurance work was undertaken.

6. What has changed since the RFI in January 2016?

6.1 Despite the DCC officially going live in November 2016, at the time of writing this paper (January 2018), we are aware of only a handful of SMETS v2.0 Meters that are currently enrolled and serviced by the DCC. Therefore, the mass roll-out phase is still to commence in earnest.

6.2 By analysing NHH MTDs sent over the Data Transfer Network (DTN), we have observed a consistent ramp up in foundation smart Meter installations over the past two years. As of the end of December 2017, we are aware of 6.24 million SMETS v1.0 and ADM[3] currently installed on Profile Class 1-4 sites. This equates to 20.5% of the energised, metered Profile Class 1-4 population.

6.3 In quarter 4 2017 (October to December), we observed 710k SMETS v1.0 and ADM installations. Such Meter installations are likely to continue at their current or an increased rate until mid-2018 where we are expecting to see a ramp down in SMETS v1.0 installs and a ramp up in SMETS v2.0 installs. Based on current foundation smart Meter install volumes, we estimate that at least 8 million will be installed prior to the mass roll-out being in full effect. This equates to over 26% of the energised, metered Profile Class 1-4 population.

[3] For the purposes of this analysis, we are classifying ADMs as Meter Types of 'NSS'. The Master Registration Agreement describes a 'NSS' Meter Types as a 'meter that meets the definition of an ADM but is not compliant with any version of SMETS'.

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6.4 Whilst the interim arrangements supported by the FIOM have been in place much longer than anticipated, the FIOM published in May 2012 noted that it 'is estimated that the number of ADMs installed will reach several million by the start of mass rollout'. These originally envisaged volumes align with our current estimation.

6.5 With the increased number of foundation smart Meters installed, a higher number are likely to have undergone a CoS and may be subject to interoperability issues. We have sought to quantify this statement in section 8 below.

7. Have participant views on SMETS v1.0 interoperability changed?

7.1 At the November 2017 PAB meeting, the PAB requested ELEXON ask NHH Suppliers which of the three options (outlined in section 3.3 of this paper) they are choosing when inheriting a SMETS v1.0 Meter.

7.2 ELEXON raised three questions related to the PAB's concerns with NHH Suppliers and received responses from 15 organisations representing 53% of the Profile Class 1-4 market. Below is a summary of the responses to each question:

Question	Summary of responses
How are SMETS v1.0 (foundation) smart Meters being operated on a Change of Supply	• 11 respondents stated that they will treat 100% of inherited SMETS v1.0 Meters as dumb • 4 respondents said they would attempt to operate the Meter in smart mode wherever possible • Based on portfolio sizes of the respondents, 95% of inherited SMETS v1.0 will be treated as dumb
What issues are being experienced with interoperability of foundation smart Meters	• Lack of actual CoS Meter reads within 5 working days of Supply Start Date • Outgoing Suppliers not removing Meters from SMSO head-end systems resulting in delays in the CoS process • Issues migrating certain Meter types between SMSO platforms • Poor communication from outgoing Suppliers on the services they can offer • High rental rates making it more commercially viable to replace the Meter • Integrating internal systems with bespoke SMSO processes • Agreeing contractual terms with SMSOs • Similar problems with the transfer of MTDs for non-smart Meters (missing, late, inaccurate etc.) • Preferred SMSOs not supporting all inherited foundation smart Meters
What are the BSC Settlement impacts associated with the interoperability of these Meters	• 8 respondents stated that they do not see the issue as posing a negative impact on BSC Settlement as they can revert to physical Meter reads • 7 respondents noted impacts on BSC Settlement such as: – Loss of opportunity to capture accurate CoS reads – Missed opportunity for regular remote reads, impacting NHH Settlement performance – Consumers refusing to provide access for reads after reverting to dumb – Less availability of Meter readers to obtain physical reads • Two respondents noted that the adoption of these Meters by the DCC should mitigate the risks associated with interoperability

7.3 The responses summarised above align with responses from the RFI conducted in early 2016, i.e. the majority of SMETS v1.0 Meters are being treated as dumb on a CoS. A number of respondents noted that they are currently in discussions with SMSOs, so their positions may change in future.

7.4 The majority of issues experienced relate to not receiving the full benefits of the foundation smart Meter (through more regular access to reads etc.), technical practicalities delivering some of the processes outlined in the FIOM or commercial arrangements.

7.5 Whilst the eventual adoption of these Meters by the DCC is seen as mitigating the risks associated with interoperability, the timescales for adoption and the proportion that will be adopted is still uncertain. As per the 'Conclusions on DCC's delivery plan for SMETS1 Services', operational services to allow the DCC to adopt SMETS v1.0 Meters is envisaged taking a phased approach (based on different types of Meters) and being available between 30 November 2018 and 30 June 2019 (at the earliest). The longer it takes for DCC adoption to occur, the more Meters that will undergo a CoS and will be operated as dumb. One respondent provided a view that adoption of these Meters by the DCC must be complete before any move to market wide Half Hourly Settlement.

7.6 Three respondents noted negative impacts on consumer billing and overall experience with the smart programme as a result of SMETS1 v1.0 interoperability. Supply licence obligations were introduced to communicate to the consumer at install that smart functionality may be lost if they changed supply, and on the gaining Supplier to inform the consumer of the functionality that may be lost if they switch, to mitigate any negative customer experience.

8. How does SMETS v1.0 interoperability impact Settlement?

8.1 The majority of BSC Settlement impacts noted by the respondents relate to not receiving the full benefits of the foundation smart Meters. As noted in section 4.6 above, the reduced availability of actual Meter reads will impact NHH Settlement performance.

8.2 To provide a high level assessment of the impact on Settlement, we have analysed average Meter read frequency for SMETS v1.0 Meters pre and post a CoS event. We used our quarterly snapshots of the Supplier Meter Registration Services (SMRS) between December 2014 and September 2017 to identify CoS events, and we combined this with our database of NHH MTDs sent over the DTN to identify where an existing SMETS v1.0 Meter was inherited as part of the CoS. Finally, we used our database of Meter reads sent over the DTN to assess the read frequency for each supply period.

8.3 The main limitation with our SMRS snapshots is that they're quarterly and therefore if there is more than one CoS event between snapshots, we only pick up the latest. And the main limitation with our database of data flows sent over the DTN is its incompleteness which we estimate provides 91.5% coverage of NHH MTDs. However, we still consider the data is sufficient to give a high level assessment to independently validate some of the issues discussed in this paper.

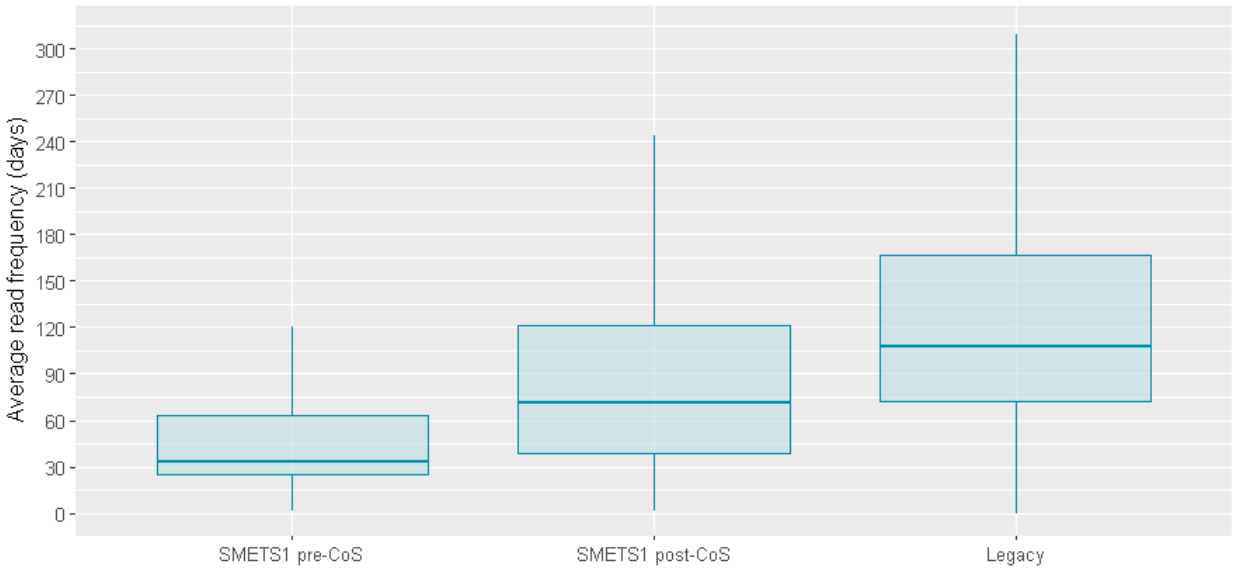
8.4 To provide a comparison of NHH Meter read performance for non-SMETS v1.0 Meters, we took a random sample of approximately 4 million Profile Class 1-4 MPANs that have a legacy Meter installed.

8.5 Below are the findings on average Meter read frequency for SMETS v1.0 Meters pre and post CoS and a random sample of legacy Meters.

Event	Unique MPANs	Avg read freq (days)
SMETS v1.0 pre-CoS	4,117,378	31
SMETS v1.0 post-CoS	457,554	64
Legacy	3,810,070	98

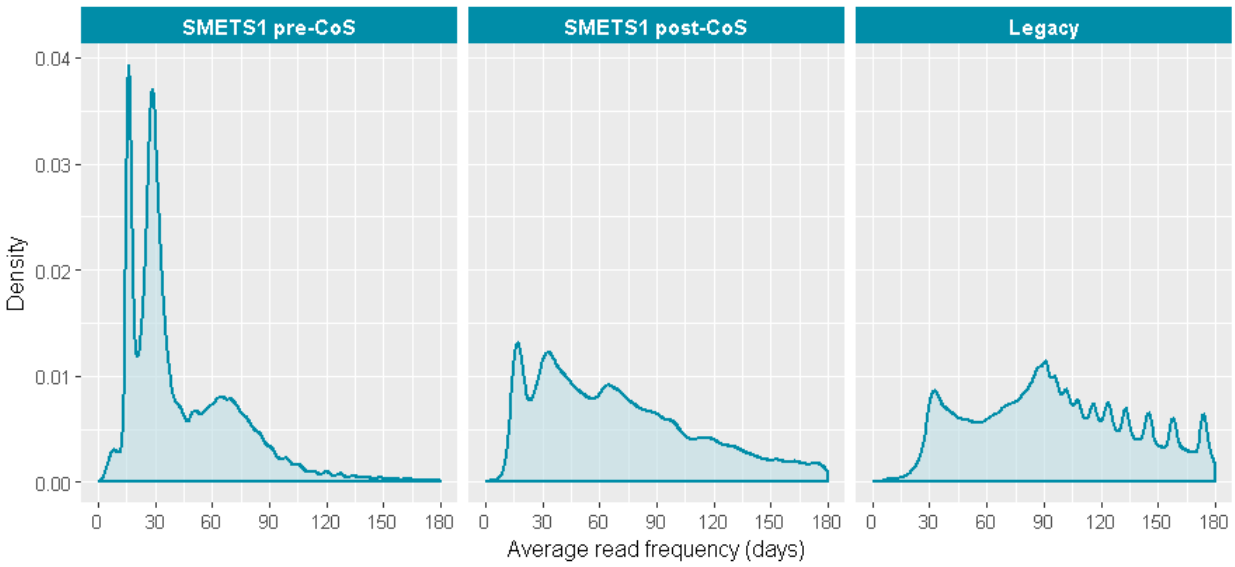
8.6 From our datasets, we have observed approx. 4.1 million MPANs where a SMETS v1.0 Meter has been installed. Of these 4.1 million MPANs, approx. 460k have since undergone a CoS. As per the above table, average read performance for a SMETS v1.0 Meter following a CoS is over two times worse (64 days) than prior to the CoS event (31 days). This aligns with the recent discussions with NHH Suppliers where it was confirmed that the vast majority of inherited SMETS v1.0 Meters as being treated as dumb. However, average read performance is better than that of the random sample of legacy Meters (98 days).

8.7 The below boxplots provide an overview of the distribution of average read frequencies for each event.



8.8 The above boxplots show a widening distribution of average read frequency for SMETS v1.0 Meter post-CoS and an even wider distribution for legacy Meters. For presentation purposes, these boxplots exclude outliers (values greater than 1.5 times the interquartile range) as over the 33 month period analysed, we observed average read frequencies in excess of 1,000 days.

8.9 The below density plots show the most common read frequencies per event.



8.10 As per the above, the most common read frequency for a SMETS v1.0 pre-CoS is approximately 15 days closely followed by 30 days. This is the same for a SMETS v1.0 post-CoS, however the proportion of sites with such read frequencies is much less. The most common read frequency for a legacy Meter is 90 days which aligns with a quarterly read cycle. For presentation purposes, the above density plots were truncated at 180 calendar days, as some of the tails spanned in excess of 1,000 days.

8.11 Any reduction in read frequency will impact NHH Settlement performance. The following table provides NHH Settlement performance at each Reconciliation Settlement Run for the latest 30 Settlement Days:

Settlement Run	Percent Actual read	Standard
R1	40.87%	30.00%
R2	72.91%	60.00%
R3	88.77%	80.00%
RF	96.47%	97.00%

8.12 For all but the Final Reconciliation Settlement Run (RF), on average, industry performance is in excess of 10% of the required standard. We can attribute this, at least in part, to the 6.24 million foundation smart Meters we have observed being installed.

9. Summary of findings and next steps

9.1 Following a review of the documentation associated with the CoS process for SMETS v1.0 Meters (BSC and non-BSC), revisiting previous work on this area, discussing current working practices and issues with NHH Suppliers, and a high level independent assessment of the Settlement impact, a summary of our findings is as follows:

- The process to enable remote functionality to be retrained for a SMETS v1.0 Meter following a CoS is governed by the FIOM which sits outside the BSC;
- No BSC non-compliances were identified as contributing to interoperability issues;
- Whilst no fundamental concerns were raised by participants with the processes set out in the FIOM, the vast majority of inherited SMETS v1.0 Meters are being treated as dumb on a CoS;
- The impact on BSC Settlement is that the full benefits of having a remote smart Meter installed are not being received;
- A high level assessment confirms that Meter read performance is worse for a SMETS v1.0 Meter following a CoS, however analysis suggests that it is better than for legacy Meters;
- NHH Settlement performance at all runs except RF is well in excess of the required standard, which can in be part attributed to the positive impacts of foundation smart Meters; and
- These interoperability issues will be mitigated when the Meters are adopted by the DCC (timescales to be finalised), however the longer the adoption process takes, the more of these Meters which will be operated as dumb on a CoS.

9.2 As no BSC non-compliances were found during this investigation, we are not proposing any additional deployment of Performance Assurance Techniques. However, if the PAB remains concerned with the impact on BSC Settlement as a result of this issue, as per section 5.4 of its Terms or Reference, the PAB can recommend the Panel writes to the relevant industry participant/body/government department to relay the concerns.

10. Recommendations

10.1 We invite you to:

a) **NOTE** the findings from the investigation into SMETS v1.0 interoperability; and

b) **COMMENT** on any further action required.

Attachments

Attachment A – Previous SMETS v1.0 RFI (confidential)

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