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MP085B

**‘Synchronisation of smart meter
voltage measurement periods
(meters currently installed)’**

Modification Report

Version 0.6

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About this document

This document is a draft Modification Report. It currently sets out the background, issue, and progression timetable for this modification, along with any relevant discussions, views and conclusions. This document will be updated as this modification progresses.

Contents

1. Summary.....	3
2. Issue.....	3
3. Assessment of the proposal	8
Appendix 1: Progression timetable	11
Appendix 2: Glossary	12

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1. Summary

This proposal has been raised by Alan Creighton from Northern Powergrid.

In order to monitor the efficiency of their networks, Electricity Distribution Network Operators (DNOs) use Root Mean Square (RMS) voltage readings from all meters across their network. DNOs believed that during the development of the smart meter technical specification, the average RMS voltage readings from smart meters would be measured across a consistent period, which is essential for monitoring. An example of this would be for an average to be measured across a 30-minute period starting on the hour and on the half hour, which would match half hour consumption profile data. However, this is not currently codified in the Smart Metering Equipment Technical Specifications (SMETS) or the Great Britain Companion Specification (GBCS) and this has led to some voltage reading periods starting at different times.

There are examples where some electricity meter Manufacturers' meters begin the measurement period on the hour or half hour, however this is not uniform across the industry. This has resulted in Electricity Network Parties:

- (i) making conservative, less efficient analysis assumptions to account for the lack of data alignment; or
- (ii) recreating synchronised data by downloading high granularity (for example minute resolution) data and calculating the required data.

Investigations during the Refinement Process have found the issue affecting existing installed meters more complex than initially envisaged. This could result in a lengthy lead time for implementation where meter Manufacturers could potentially still produce Devices that do not commence average RMS voltage readings on the hour. Therefore, it was agreed that there should be two separate solutions to address the issue;

- MP085A (to be implemented as part of the November 2022 SEC Release) – a Technical Specifications document change for meter Manufacturers to ensure a predictable approach for when newly manufactured Devices commence average RMS Voltage Measurement Period readings; and
- MP085B (this modification) – a solution for meters that are already installed if SEC Parties request that already installed Devices adopt the desired functionality by a set date.

It is anticipated that this modification will impact Electricity Network Operators and Device Manufacturers.

2. Issue

What are the current arrangements?

What is average RMS voltage and what is it used for?

The RMS voltage value of an Alternating Current (AC) circuit represents an equivalent voltage of a Direct Current (DC) circuit. Electricity Network Parties use smart meter average RMS voltage and

average consumption data to monitor the performance of distribution networks and identify any problems by the recorded voltage variations.

Once there is data available from a sufficient number of smart meters on a DNO network, Network Parties will use this data to identify problems and appropriate solutions. The uptake in Low Carbon Technologies, particularly Electric Vehicles and Distributed Generation is expected to cause an increase in the number of power flow and voltage issues in distribution networks. Voltage and consumption data from smart meters will help manage these issues efficiently in the future.

What is the issue?

Electricity Network Parties have a statutory obligation to ensure that the voltage supplied to consumers' premises from Low Voltage electricity networks is always between defined limits.

In order to monitor the efficiency of their networks and meet the legal obligation of the voltage at the premises being within the prescribed limits, DNOs use RMS voltage readings from all meters across their network. When the SEC was first drafted, the Technical Specifications were silent on the average RMS voltage readings from smart meters measuring across a consistent period synchronised in time for all meters, which is essential for monitoring. An example of this would be for an average to be measured across a 30-minute period starting on the hour and on the half hour, which would match half hour consumption profile data. This has led to different Electricity Smart Metering Equipment (ESME) Device Models applying varying start times for the RMS voltage measurement. It is not possible for the DNO to configure the start time of the RMS voltage measurement period.

There are examples where some electricity meter Manufacturers' meters begin the measurement period on the hour or half hour, however this is not uniform across the industry. This has resulted in Electricity Network Parties:

- (i) making conservative, less efficient analysis assumptions to account for the lack of data alignment; or
- (ii) recreating synchronised data by downloading high granularity (for example minute resolution) data and calculating the required data.

The issue was addressed under [MP085A 'Synchronisation of smart meter voltage measurement periods'](#) for new ESME Device Models compliant with ESMETS v5.2, however the issue remains for Devices compliant with previous iterations of ESMETS (provided they do not already have the required functionality).

What is the impact this is having?

There are two headline implications if this issue is not addressed for meters currently installed:

- DNOs will either need to make conservative assumptions about network voltages which may lead to inefficient, potentially more costly solutions being implemented until all Devices are updated to SMETS v5.2; or
- DNOs will need to reconfigure the Average RMS Voltage Measurement Period for Devices currently installed from the default period of 30 minutes to one minute and download the high granularity data so that they can recreate synchronised data in their own systems. This will require DNOs to develop systems to manage a greater volume of data than originally

envisaged as well as increasing traffic on the DCC System. This is not considered to be an efficient solution.

3. Solutions

Solution 1

End dating existing versions of ESMETS

- End dating ESMETS pre v5.2 versions will force Suppliers to update Devices onto ESMETS v5.2 or later, once the Installation and Maintenance End Dates have passed.
- This will deliver MP085A functionality.
 - Pro: All Devices will benefit from updated functionality (not just MP085A).
 - Con: Devices that cannot be updated will no longer support 'smart' capabilities (once their Maintenance Validity Period (MVP) has expired), and would require replacing at one point in time.

Solution 2

Retrospective uplift to ESMETS version 4.X

- This will allow Suppliers to update Devices to the next available sub-version (v4.3), as opposed to forcing an uplift to v5.2 or later.
 - Pro: All Devices will benefit from updated MP085A functionality only.
 - Con: End Dates still need to be populated to existing versions to incentivise updates. Some Devices that cannot be updated may no longer support 'smart' capabilities (once their MVP has expired), and would require replacing at one point in time.

Solution 3 (does not require a SEC modification)

Voluntary MP085A functionality implementation

- Manufacturers including MP085A functionality (aligning the RMS voltage period with the half hour (implemented in ESMETS v5.2)) in firmware upgrades.
- Suppliers will then need to purchase these upgrades.
- DNOs would want some level of transparency on when/where the upgrades are made – the Central Products List (CPL) would potentially help if Manufacturers made information available for SECAS to identify firmware versions with the desired functionality.
- Note – this would not be codified in the SEC and would therefore not require a modification.

4. Impacts

This section summarises the impacts that would arise from the implementation of this modification.

SEC Parties

SEC Party Categories impacted			
✓	Large Suppliers	✓	Small Suppliers
✓	Electricity Network Operators		Gas Network Operators
✓	Other SEC Parties		DCC

Breakdown of Other SEC Party types impacted			
	Shared Resource Providers		Meter Installers
✓	Device Manufacturers		Flexibility Providers

This modification will impact Electricity Network Operators as once Devices are updated to an ESMETS version that supports the MP085A solution, they will benefit from RMS Voltage Measurement Periods commencing at consistent time periods.

Device Manufacturers will be impacted as they will need to design and make firmware updates that contain MP085A functionality available to Suppliers.

Suppliers will be impacted as they will need to update their Devices with the firmware updates provided by the Device Manufacturers.

DCC System

This modification will have no impact on the DCC System.

SEC and subsidiary documents

The following parts of the SEC will be impacted:

- Schedule 9 'Smart Metering Equipment Technical Specifications'
- Schedule 11 'TS Applicability Tables'

The changes to the SEC required to deliver the proposed solution will be drafted ahead of the Refinement Consultation.

Technical specification versions

This modification will result in existing versions of SMETS (pre-v5.2) being end dated. Once these versions are no longer supported, SEC Parties will be responsible for upgrading their Devices to a valid specification to ensure compliance. This will be reflected within SEC Schedule 11.

Devices

Devices impacted			
✓	Electricity Smart Metering Equipment		Gas Smart Metering Equipment
	Communications Hubs		Gas Proxy Functions
	In-Home Displays		Prepayment Meter Interface Devices
	Standalone Auxiliary Proportional Controllers		Home Area Network Connected Auxiliary Load Control Switches
	Consumer Access Devices		Alternative Home Area Network Devices

This modification will impact ESME as those that are on pre-ESMETS v5.2 versions will have to be updated once their version is no longer supported. The version that the ESME will have to be updated to will depend on the solution the Proposer wishes to take forward.

Consumers

This modification will ensure DNOs are provided with accurate data across all installed ESME in the granularity they require to enable Networks to operate more reliably and to become more efficient as the data is collated. Furthermore, aligning the Average RMS Voltage Measurement Periods across ESMES will allow DNOs to identify issues on Low Voltage feeders and forecast future voltage issues. This will result in DNOs providing a higher level of service to consumers. The aligned data across all installed ESME is likely to become even more important with the increased uptake of Low Carbon Technologies being installed at consumers' premises, and the consequential increased load on the network.

Other industry Codes

This modification will have no impact on other industry Codes.

Greenhouse gas emissions

This modification will have no impact on greenhouse gas emissions.

5. Costs

DCC costs

There are no DCC System costs to implement this modification.

SECAS costs

The estimated SECAS implementation cost to implement this as a stand-alone modification is one days of effort, amounting to approximately £600. This cost will be reassessed when combining this modification in a scheduled SEC Release. The activities needed to be undertaken for this are:

- Updating the SEC and releasing the new version to the industry.

SEC Party costs

Information on SEC Party costs will be gathered during the Refinement Consultation.

6. Implementation approach

Recommended implementation approach

SECAS is recommending an implementation date of:

- **7 November 2024** (November 2024 SEC Release) if a decision to approve is received on or before 7 November 2023; or
- **6 November 2025** (November 2025 SEC Release) if a decision to approve is received after 7 November 2023 but on or before 1 May 2025.

As this modification impacts ESMETS, it must be implemented in a November SEC Release. The current timeline means that the earliest release this modification can be implemented in is the November 2024 SEC Release. If a decision is made after 7 November 2023, the modification will be implemented as part of the November 2025 SEC Release as this will be the next release where ESMETS will be updated.

7. Assessment of the proposal

Observations on the issue

The original proposal (DP085) was taken to the Change Sub-Committee (CSC) for initial discussion. A CSC member pointed out that there were some synchronisation issues as a whole and it would be beneficial to look at all synchronisation issues together to explore any efficiencies in a solution to a number of problems. Another member pointed out that these would have been discussed at Technical Specification Issue Resolution Sub-Committee (TSIRS). This was discussed with the Proposer and Technical Operations and it was agreed that although a valid concern, it was felt that there was a separate issue to the one defined in this proposal.

During the Refinement Process SECAS were informed by a Network Party that testing had taken place to gauge the scale of the issue. The models of four meter Manufacturers were tested and two of the Manufacturers' ESME commenced their measurement period on the hour whereas the other Manufacturers' ESME did not.

Solution development

Views of the Working Group

Testing and development

SECAS presented the three solution options (Solution 1, 2 and 3) at the June 2023 SEC Working Group.

SECAS (BB) advised that as solution two would result in a new sub-version, there will likely be increased testing costs incurred by the DCC. The Energy and Utilities Alliance (EUA) representative added that the DCC is reviewing a potential new testing strategy that will result in reduced testing costs compared with the current process.

SECAS noted that during a discussion with EUA members on 6 June 2023, members advised that there would be high costs associated with upgrading Devices. Manufacturers incur costs developing the firmware upgrades and Devices to a new specification, and for Suppliers to then purchase and implement the upgrades. In the Working Group, the EUA representative confirmed there would be less development and cost to move to a new sub-version of ESMETS than a principal version. They added that they cannot see the benefit of the modification when considering the high costs for either solution (solution 1 and 2).

Impacted Devices

A Working Group member queried if the number of impacted ESME was known. SECAS advised that when the modification (MP085) was initially raised, DNOs held data showing which Manufacturers' models were affected. Volumes of Devices could perhaps be understood using this data. They also noted that a previous SEC Modification was set to review the current approach to the TS Applicability Tables (TSAT) to investigate if improvements can be made. SECAS informed the Working Group that the TABASC may initiate a project to review the TSAT and that a SEC Modification would likely deliver any recommendations.

Initial Technical Specification drafting

Another Working Group member noted that they could not see the solution's benefits and queried why the functionality was not codified in the original Technical Specifications. SECAS added that this was likely due to an oversight. The Working Group member added that the modification appears to be a 'nice to have' solution at the expense of Suppliers. They added that it would be beneficial for a cost benefit analysis to be carried out to understand how much this solution will cost Suppliers and what benefit the DNOs will receive. SECAS advised that this will be part of the Refinement Consultation.

Associated costs

A Working Group member highlighted that the cost will sit with Supplier Parties but the benefit will be with Network Parties. They added that the assumption is that cost benefit analysis should be carried out within the same Party Category, otherwise there isn't an economic conversation to have. The Working Group member added that DNOs have got a workaround solution that is labour-intensive. They also commented that due to the high financial impact on Parties, there is no net benefit, and instead the solution of MP085A should be realised over time.

Triaged Devices

The EUA representative added that either Proposed Solution would have a negative impact on triaged Devices that are in the field. They advised that it would be detrimental if the modification results in Devices having to be physically removed and potentially scrapped.

The Working Group's final view

The Working Group agreed that neither solution was appropriate, and provided no support to implement either option.

Views of BEAMA

During the MP085B Refinement Process, SECAS engaged with the British Electrotechnical and Allied Manufacturers' Association (BEAMA) to understand if there was any preference on the solution options. BEAMA advised that all of the SEC-based solutions will result in Manufacturers and Suppliers incurring substantial costs to make firmware updates available and to purchase them. As a result, BEAMA members were unsupportive of the proposed changes.

8. Case for change

Business case

This modification will ensure that all currently installed ESME will be updated to allow for RMS Voltage Measurement Periods to take place at consistent time periods. This data alignment will allow DNOs to make more timely and efficient analysis assumptions, which will provide insight when considering network design and developments.

Views against the General SEC Objectives

Proposer's views

The Proposer believes that MP085B's implementation will better facilitate SEC Objectives (a)¹ and (e)² as the Proposed Solution will provide a consistent approach for all installed ESME in relation to Average RMS Voltage Measurement Periods. The modification will bring improvements to the operation and interoperability of smart meters while also providing Network Parties with more accurate data for them to better manage their networks. Furthermore, the Proposer commented that the implementation of MP085B will improve the operation of Smart Metering Systems to record voltage information in such a way that it can more usefully be used in the development of novel techniques for the management of voltage on high voltage and low voltage distribution networks.

¹ Facilitate the efficient provision, installation, operation and interoperability of smart metering systems at energy consumers' premises within Great Britain.

² Facilitate innovation in the design and operation of energy networks to contribute to the delivery of a secure and sustainable supply of energy.

Industry views

Industry views will be gathered during the Refinement Consultation.

Views against the consumer areas

Improved safety and reliability

This modification will give DNOs better visibility of faults on the electricity network and therefore be able to build in improvements to mitigate against these faults reoccurring.

Lower bills than would otherwise be the case

This modification will have a neutral impact on the price of a consumer's bills.

Reduced environmental damage

This modification will have a neutral impact on environmental damage.

Improved quality of service

This modification will have a positive impact on service quality as DNOs will be able to respond quicker to faults on the electricity network and work to mitigate against the same fault reoccurring.

Benefits for society as a whole

This modification will have a neutral impact on benefits to society.

Appendix 1: Progression timetable

This modification is currently out for Refinement Consultation. SECAS will review the responses and will return to the Working Group to present the findings.

Timetable	
Action	Date
CSC recommendation that Panel convert into a Modification Proposal	29 Oct 2019
Panel convert Draft Proposal to Modification Proposal	15 Nov 2019
Potential solution options agreed with the Proposer	Dec 2019 – Jan 2020
Business Requirements discussed with the Proposer	Feb 2020
Potential Solution options discussed with Working Group	4 Mar 2020
Solution refined with the Proposer	Mar 2020
Modification discussed with TABASC	16 Apr 2020

Timetable	
Action	Date
Legal text developed with the Proposer	Apr 2020
Preliminary Assessment requested	July 2020
Preliminary Assessment returned	10 Sep 2020
Modification discussed at Working Group	7 Oct 2020
Request for Information issued to BEAMA	Nov 2020
Modification discussed at Working Group	3 Feb 2021
MP085 split into two separate modifications	22 Mar 2021
MP085B Request for information	26 Apr – 18 May 2022
Modification discussed at Working Group	1 Jun 2022
MP085B second request for information	Oct 2022 – Feb 2023
Modification discussed at Working Group	7 Jun 2023
Modification discussed at TABASC	3 Aug 2023
Legal text developed for Proposed Solution	Aug 2023
<i>Refinement Consultation</i>	14 Aug – 5 Sep 2023
<i>Modification Report approved by CSC</i>	19 Sep 2023
<i>Modification Report Consultation</i>	20 Sep – 11 Oct 2023
<i>Change Board Vote</i>	25 Oct 2023

Appendix 2: Glossary

This table lists all the acronyms used in this document and the full term they are an abbreviation for.

Glossary	
Acronym	Full term
AC	Alternating Current
BEAMA	British Electrotechnical and Allied Manufacturers' Association
CPL	Central Products List
CSC	Change Sub-Committee
DC	Direct Current
DCC	Data Communications Company
DNO	Distribution Network Operator
DSP	Data Service Provider
DUIS	DCC User Interface Specification
ESME	Electricity Smart Metering Equipment
EUA	Energy and Utilities Alliance
GBCS	Great Britain Companion Specification
MVP	Maintenance Validity Period

Glossary	
Acronym	Full term
AC	Alternating Current
OPSG	Operations Group
RFI	Request For Information
RMS	Root Mean Square
SEC	Smart Energy Code
SECAS	Smart Energy Code Administrator and Secretariat
SIT	Systems Integration Testing
SMETS	Smart Metering Equipment Technical Specifications
SR	Service Request
SSC	Security Sub-Committee
TABASC	Technical Architecture and Business Architecture Sub-Committee
TSAT	TS Applicability Tables
TSIRS	Technical Specification Issue Resolution Sub-Committee