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**MP085B**

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

**Modification Report**

**Version 0.5**

**26 April 2022**

Corporate member of  
Plain English Campaign  
Committed to clearer  
communication

**592**



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## About this document

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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.

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This document also has two annexes:

- **Annex A** contains the MP085 business requirements for the Proposed Solution.
- **Annex B** contains the Data Communications Company (DCC) MP085 Preliminary Assessment response.

## Contact

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## 1. Summary

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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

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### 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?

The expectation of DNOs during the development of the smart meter technical specification was that the average RMS voltage readings from smart meters would be measured across a consistent period. For example, with the default being for an average to be measured across a 30-minute period starting on the hour and on the half hour as is the case with the half hour consumption profile data. However, this is not an explicit requirement codified in the SMETS or the GBCS.

Whilst some electricity meter Manufacturers' meters do work in this way, other Manufacturers' meters do not. Without voltage measurements being made in a consistent way, DNOs must either make conservative, less efficient analysis assumptions to account for the lack of data alignment or recreate synchronised data by downloading high granularity (for example minute resolution) data and calculating the required data.

During the Refinement Process, SECAS obtained information from a Network Party relating to meters that do not commence average RMS voltage readings on the hour. Of the meters tested by four Network Parties, over 50% provide average RMS voltage readings later than required.

Average RMS voltage readings that relate to 30-minute periods not starting on the hour or half hour are helpful for identifying voltage problems at an individual customer premises. However, without synchronised recording times it will be difficult to:

- understand voltage issues on Low Voltage feeders that may be affecting more than one customer;
- identify trends or forecast future voltage issues; or
- validate power flows and voltages on a network model relating to a defined 30-minute period, and hence identify the most efficient solution.

The issue will be resolved for newly manufactured Devices that are built to the SMETS specification that goes live at the time of MP085A's implementation (November 2022 SEC Release). However, the issue will remain for Devices that are currently installed that are utilising a previous version of SMETS.

## What is the impact this is having?

There are two headline implications if this issue is not addressed:

- DNOs will either need to make conservative assumptions about network voltages which may lead to inefficient, potentially more costly solutions being implemented; 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. Assessment of the proposal

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#### 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

SECAS presented the MP085 issue and three potential solution options to the Working Group.

The three Proposed Solutions were as follows:

- Potential solution 1: set SR6.5 to Future Dated.

This Service Request would be Future Dated at Data Service Provider (DSP) level with an anticipated delay in transmission and processing by the ESME of approximately 30 seconds or less. Future Dating is a current functionality and so no DCC Systems changes would be required.

- Potential solution 2: amend SMETS to state that any changes to the Average RMS Voltage Measurement Period are applied from the start of the next hour according to the Device's clock.

A retrospective firmware update would be required to add this functionality to Devices currently installed.

- Potential solution 3: amend SR6.5 to be Future Dated at the Device.

This would require changes to the DUIS to allow Future Dating at a Device level and with a configurable start time. This is a more complex version of the first potential solution; however, it would remove the approximate time delay as the DSP would send the Service Request with the datetime to the Device. This would mean the Device processes the instruction at the right time.

A Network Party stated that it had previously run tests on several smart meters to test the functionality of the first potential solution which would require setting SR6.5 to Future Dated. The Network Party confirmed that the test had returned inadequate results and therefore this solution was discarded. The Network Party confirmed that the testing they had undertaken also applied to the third potential solution and so this was also discarded. This was because although the Service Request would set the measurement period, GBCS is silent on when the revised measurement period would take effect.

The second solution received a much more positive response and was the solution taken forward. This is a Device behavioural change that will require amendments to SMETS to ensure that any changes to the Average RMS Voltage Measurement Period takes place at the start of the next hour and this was developed as MP085A and approved for implementation in November 2022 (The November 22 SEC Release). The Working Group stated that a firmware update would also be required for existing meters and it was agreed that this should undergo further research during the Refinement Process as part of MP085B.

### **Views of TABASC**

SECAS presented the MP085 business requirements to the TABASC. The Sub-Committee agreed that the business requirements would address the issue. The TABASC Chair advised that the Proposed Solution should be applied to all types of ESME.

Once developed, SECAS will present the Proposed Solution to the TABASC.

### **Views of BEAMA**

During the MP085 Refinement Process, SECAS engaged with the British Electrotechnical and Allied Manufacturers' Association (BEAMA) to further understand the functionality of the Proposed Solution for MP085. SECAS issued a Request for Information (RFI) document to gain feedback from Device Manufacturers in relation to whether existing Devices currently installed could be updated to provide average RMS voltage readings that commenced on the hour or half past the hour (whichever occurs first when a Device has first been energised or received a request to change measurement period).

The respondents confirmed that ESME Manufacturers could implement the Proposed Solution via a firmware upgrade. The respondents stated that this was generally current behaviour and advised that if time was an important factor, it should be recognised that the ESME, whilst synchronised, had the Communications Hub as a time reference, as the ESME is not aware of the time independently.

### **Device log issues**

The question was asked whether a Device would delete existing entries if a request to change the measurement period was executed. Clarification was provided that logs are not normally cleared when a change occurs. This could be safeguarded by producing an explicit business requirement. This was captured under MP085 business requirement 5.

### **Edge cases**

BEAMA sought further clarification on edge cases, to ensure that the business requirements and legal text were robust enough to cover all scenarios. SECAS provided the draft legal text to BEAMA to

distribute to its members. Following review of the legal text, BEAMA members advised that the below edge cases should be incorporated into the legal text:

- ESME will start recording on the next hour or half hour when:
  - First energised and any subsequent energisations after a supply interruption
  - There are clock adjustments
  - There is a Command to change Average RMS Voltage Measurement Period
  - There is a Command to set the clock
  - There is a Command to activate firmware
- Incomplete periods are not logged due to loss of power/firmware/time change

The responses to the MP085 request for information and the amended legal text were discussed by the Working Group in February 2021. Concern was raised regarding how the complexity of the Proposed Solution impacts ESME already commencing their Average RMS Voltage Measurement Periods on the hour or half past the hour (due to the addition of the edge cases). One of the edge case scenarios requested that incomplete periods are not logged when there is a supply interruption, a firmware update takes place, or a ESME's clock is reset. A DNO representative stated that this would impact a Manufacturer whose ESMEs' Average RMS Voltage Measurement Periods align to the hour, as they would then have to alter their functionality to facilitate this new obligation.

Including these edge cases in the Proposed Solution would impact all ESME Manufacturers and would likely increase implementation costs. For the two identified Manufacturers to make a new standalone firmware upgrade, the cost was estimated at £50,000 to £200,000 per Manufacturer. SECAS then investigated further with BEAMA who clarified that for all Manufacturers to align to the proposed legal text would have an estimated combined cost of £450,000 to £550,000 (due to several Manufacturers already utilising certain functionality). The Working Group sought clarity on who would be liable to pay for the proposed changes. It is commonplace that when Manufacturers produce new firmware, Suppliers must purchase the firmware at a cost, but this firmware upgrade would only benefit Network Parties.

It was agreed that the Network Parties must have the data alignment, whereas all other functionalities borne out of the BEAMA consultation are 'nice to have' changes. These edge cases will not be carried forward as part of the MP085B Proposed Solution.

## Firmware updates

Working Group members raised concerns that MP085 would result in a retrospective change with some of the costs being incurred by Suppliers who receive no clear benefit. The Working Group was concerned that MP085 would set a precedent for retrospective changes and, due to there being no clear benefit for Suppliers, queried if the cost allocation was reasonable for such a change. It was noted that Suppliers pay the cost of firmware updates and so it is vital to pinpoint the implementation approach and the Devices it would apply to. The Working Group suggested that the modification should only be applicable to meter Manufacturers whose ESME do not commence Average RMS Voltage Measurement Periods on the hour or half past the hour. This would be accomplished by simplifying the proposed legal text changes and reducing the scope of edge case scenarios. This was carried out through further refinement of the Proposed Solution.

For the reasons cited above, the Proposer agreed that MP085 should be split into two separate modifications. MP085A would address the issue for new Devices by amending the SEC so that once

implemented, Manufacturers will build Devices with the desired functionality. Manufacturers' existing Devices will deliver this solution via a firmware update as and when those Devices adopt the ESMETS v5.2 specifications. This will be enacted through Business-As-Usual updates triggered by Suppliers. Therefore, Devices will be updated gradually over time. Retrospective changes to Devices currently installed are to be investigated separately under this modification.

## Appendix 1: Progression timetable

SECAS will issue a Request for Information (RFI) to understand if the functionality previously approved for implementation as MP085A can be applied to Devices already installed. Following the review of the responses, SECAS will work with the Proposer to further develop the Proposed Solution before presenting the modification to the Working Group.

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
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
Request for information	26 Apr – 18 May 2022
Modification discussed at Working Group	1 Jun 2022
Legal text developed with the Proposer	Jun 2022

## 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
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
GBCS	Great Britain Companion Specification
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
TSIRS	Technical Specification Issue Resolution Sub-Committee