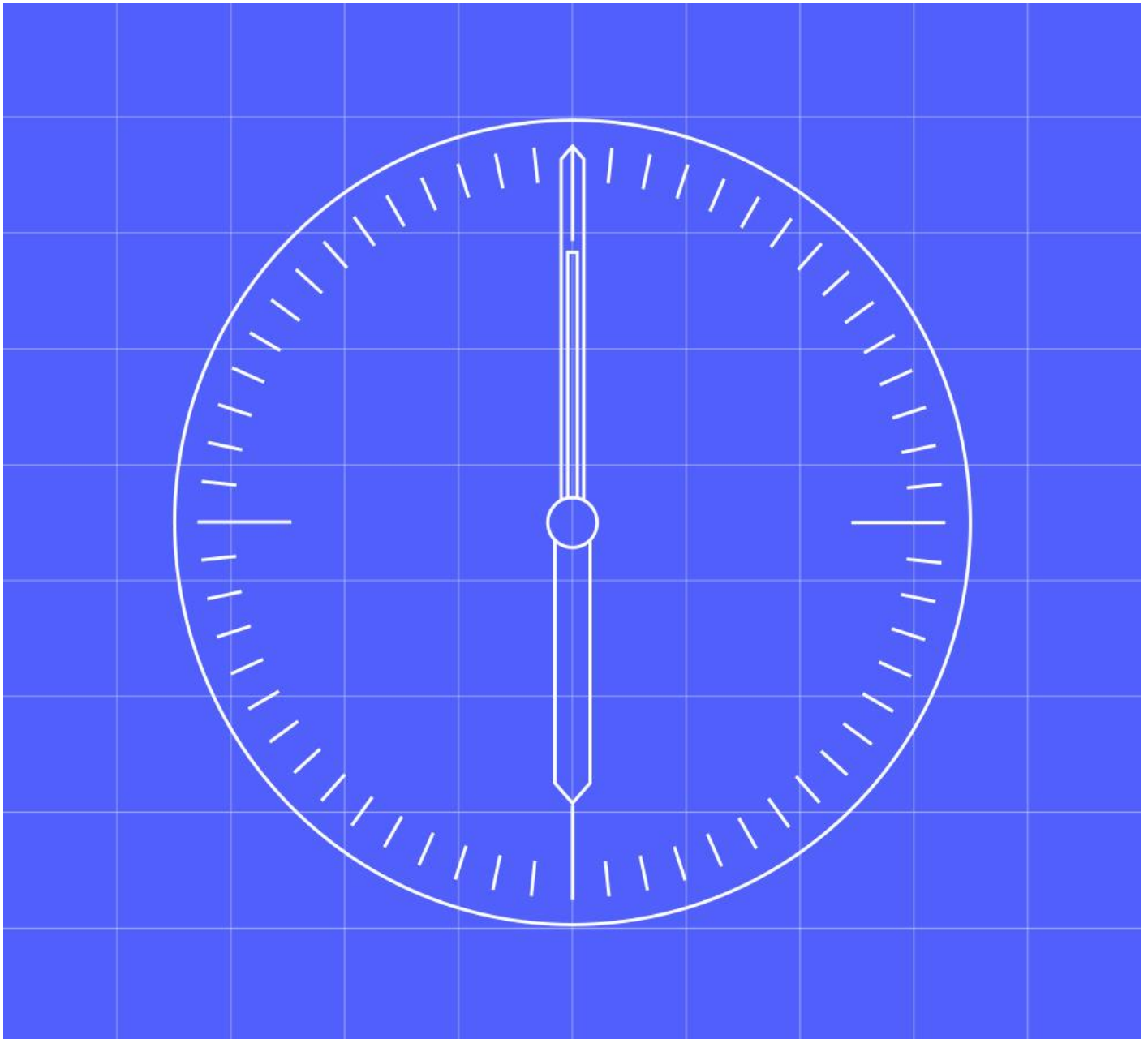


Unmetered Supplies Data Service: Methods and Functions of an Equivalent Meter

Version 5.2 27 July 2023



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1. Background

- 1.1 This document sets out the Unmetered Supplies Data Service (UMSDS) requirements for Equivalent Meter functionality. It sets out the approval process for an Equivalent Meter. It also sets out the processes for provision of data for Market-wide Half Hourly Settlement.
- 1.2 The following scenarios are covered in this document:
- Responsibilities of the UMSDS;
 - General Validation Requirements;
 - Approval of an Equivalent Meter;
 - Equivalent Meter calculations;
 - PECU Arrays;
 - Equivalent Meter Functionality;
 - UMSDS Validation of the UMS Inventory;
 - Load Shapes and Defaulting
 - Publish and Data flags; and
 - Equivalent Meter Audit Requirements.
- 1.3 The defined term Consumption refers to both Import and Export data. The defined term **UTC Period Level Consumption** data refers to consumption or export data that is of UTC Period granularity (i.e. 30 minutes or potentially 15 minutes in the future).
- The term **UTC Period Level Consumption** data refers to consumption or export data that is of UTC Period Granularity. UMSDS must have flexibility to the duration of a UTC Period. The UMSDS must be able to process varying durations of one UTC Period. The UTC Period will not change in a UTC date and there will not be different UTC durations per Load Shape Category All services should, where possible, build in the ability to configure the settlement period duration during their solution design, in order to support any future move to a different settlement period duration

2. Responsibilities of the UMSDS

- 2.1 The UMSDS is responsible for the following:-
- a) receiving a copy of the agreed UMS Inventory of the UMS Apparatus for an MPAN, together with agreed updates, from the UMSO;
 - b) validating and processing the D0388 UMS Inventory information into the EM, generating a D0389 UMS Inventory Response flow to the UMSO.
 - c) using the latitude and longitude information for the MPAN appropriate to the installed Apparatus;
 - d) validating all Charge Codes and Switch Regimes against the Operational Information Document (OID) and associated ISD;
 - e) ensuring UTC Period Level Consumption from the EM is available to BSC Central Systems to meet the Volume Allocation Run timescales set out in the VAS Timetable; and
 - f) retaining Settlement data in accordance with [PSL100] 'Non-Functional Requirements for Licensed Distribution System Operators and Party Agents'.
- 2.2 Where the UMS customer requires the UMSDS to contact a PECU array or access data from a Central Management System (CMS) or Measured Central Management System (mCMS) the UMSDS shall be required to have a direct relationship with the UMS Customer to facilitate collection of the data required for the UMSDS calculations.

Recording of data

2.3 The UMSDS shall record sufficient details in respect of a MPAN to enable the UMSDS to perform its functions as UMSDS and operate the Equivalent Meter permitted for use within the GSP group by the LDSO. These details shall include:

- the Settlement Days for which the UMSDS is appointed by the Supplier;
- the relevant MPAN;
- the UMISO appointed to the MPAN;
- the geographical position defined by the UMISO for that MPAN or, where these are defined by the UMISO, the geographical positions for related Sub-Meters of the inventory for that MPAN;
- the indicator defined by the UMISO as to whether a PECU array is required for that MPAN or for related Sub-Meters of the Summary Inventory where these Sub-Meters are agreed with the UMISO;
- the energisation status associated with the MPAN in Supplier Meter Registration Service;
- the indicator defined by the UMISO as to whether a Central Management System is required for that MPAN or for related Sub-Meters as per the D0388 UMS Inventory where these Sub-Meters are agreed with the UMISO.

The following data items are not required by the UMSDS and as such will be ignored.

- Consent Granularity (T4-COM-1857)
- Domestic/Non-domestic Indicator (T4-COM-1830/1850)
- Distributer Id (T4-COM-1826/1842/1845/1858/1859/1864/1865/1871/1875)
- DUoS (T4-COM-1856)
- LLF Data (T4-COM-1856)
- Domestic Premise Indicator (T4-COM-1830/1850)
- Metered Indicator- (D-045)

2.4 The UMSDS shall record and use such Industry Standing Data (ISD) as is considered appropriate by the BSC Panel (having regard to the UMSDS's functions) and shall, in particular, use only ISD for those items in relation to which there is a ISD entry or other information provided by the UMISO where such information does not conflict with ISD.

3. General Validation Requirements

3.1 The UMSDS must validate the following Information:

- The D0388 UMS Inventory data against the Operational Information Document (OID) and as defined in Section 8 below;
 - The PECU Array data collected; ;
 - The CMS Event data; and
- Against the Industry Standing Data (ISD).

4. Approval of an Equivalent Meter

The approval processes for an EM can be found in [BSCP700 'Unmetered Supplies Registered in SMRS'.]

5. Equivalent Meter Calculations

- 5.1 The specification below is insufficient for a Code of Practice but describes the required functionality of Equivalent Meters used to provide Settlement consumption data for Unmetered Supplies.
- 5.2 New hardware and software systems complying with the EM Specification may be developed and submitted to the UMSUG and the BSC Panel for approval in accordance with Section 4 Approval of New Equivalent Meter. Once approved, a system may be used in conjunction with any other hardware and software so long

as there is no material impact on the Equivalent Meter's original approval. Where such impact is believed to be material, further approval should be sought.

Equivalent Meter – Calculation

5.3 EMs undertake the calculation as defined below:

5.4 For the Summary Inventory effective on the relevant day for that Sub-Meter, for either:

- each CMS controlled item, or
- each Charge Code & Switch Regime combination

multiply the number of items by the circuit watts (full or dimmed as appropriate) for the relevant Charge Code by the seconds attributable (full or dimmed as appropriate) to the Switch Regime and divide by 1,000 to determine the kWh in each half hour.

5.5 For each Sub-Meter, the seconds attributable to the Switch Regime in each half hour are derived, in order, from:

(1) For CMS controlled items, the switching times and power level information in the event file received from the CMS System (or where events have not been received at the time of the calculation use defaulting arrangements defined);

(2) For PECU Array determined items, the switching events recorded by the PECUs representing the Switch Regime in the Primary PECU Array (or the Secondary PECU Array where data from the Primary Array is not available and where a Secondary Array is defined) which passes validation. Where data is not available from the Primary or Secondary PECU Array, switching times from the default Switch Regime shall be used in accordance with 3 & 4 below;

(3) For items with a Switch Regime not determined by a PECU Array but linked to the sunset/sunrise times, then the times as defined by the Switch Regime in conjunction with the Astronomical Almanac; or

(4) For items with fixed switching times, then those times defined by the Switch Regime.

For each MPAN, sum the kWh for each combination described above for each Sub-Meter, rounding the calculation for each HH period per Sub Meter to three decimal places. Repeat for each half hour of the UTC Day.

6. PECU Arrays

PECU Array Siting Procedure

Overview

6.1 The UMSSDS shall maintain and operate the PECU array or, as the case maybe, PECU arrays used for a particular MPAN. The siting of the PECU arrays will be agreed between the UMSSO and the UMSSDS and be located in an area with a high density of apparatus unless otherwise agreed between the UMSSO and the UMSSDS.

Siting Factors

6.2 The factors to be considered when determining the location and number of PECU arrays are:

- a) Centres of population and hence concentrations of load;
- b) Distance from another PECU array;
- c) Topography;
- d) Customer boundaries;
- e) GSP Group boundaries;

- f) Total load controlled; and
- g) Access

Sharing PECU Arrays

- 6.3 One PECU array may provide data for more than one EM. Also, more than one PECU array may provide data for the same EM. There will be instances when one PECU array will service the requirements of part of, or more than, one Customer.
- 6.4 The EM will log all switching actions to at least the nearest second.
- 6.5 Where a shared PECU array is being used by two or more different UMSSDs, then one should take the lead and ensure that the others are informed of any changes to PECUs or other details, in a timely manner, in advance of the changes being implemented.

Determining the Use of Multiple or Single PECU Arrays

- 6.6 The number of PECU arrays may be subject to decisions on the number of PECU types that can be populated in the PECU array. More than one PECU array may be required if the population of PECUs for a customer cannot be reasonably represented on a single PECU array of 30 PECUs. Furthermore, the size of the customer's area might require more than one PECU array to facilitate accurate calculation of Burn Hours. It is possible for the UMSSD to calculate the Annual Burn Hours for any latitude and longitude. If the differences between the proposed Array sites are very small (i.e. less than +/- 2%) then this would suggest that one Array should be sufficient. If actual Burn Hours are available for existing Arrays this data could also be used.

Research

- 6.7 The following research may be carried out to determine the siting of PECU arrays.
- 6.8 If there is latitude and longitude information contained in the customer's Detailed Inventory for each item of Equipment, then it should be possible for the UMSSO (and/or UMSSD) to perform a load weighted longitude/latitude calculation to determine the ideal location of a single PECU array.
- 6.9 Where detailed Equipment location is not known, then it is possible to perform the calculation described above using published population numbers for the major towns in the customer's area.

PECU Array Variations

- 6.10 In considering any variation of the number of PECU arrays as stated in the overview paragraph above, the parties shall have due regard to the need:
 - a) to reasonably minimise costs;
 - b) to achieve the required accuracy in each half hour.
- 6.11 If a variation in the number and location of PECU arrays is proposed by the UMSSD but is not agreed by the UMSSO research may be carried as stated above. While such research is carried out and during any period of discussions, a supply may be commenced on the basis of the lesser of the number of PECU arrays proposed.
- 6.12 Failing any agreement after research and discussion the matter may be referred to the BSC Panel for resolution.

PECU Array Operating Procedure

Types of PECUs

- 6.13 There are different types of PECUs, with different operating characteristics. Therefore, so that the operation of the PECU arrays reflect reality:

- (a) PECUs used in the PECU array are to be representative of type, manufacturer and age of the population they are representing.
- (b) The PECUs in the PECU array are to be proportional to the various types in the area covered by the PECU array.
- (c) The number and types of PECUs will be determined by the UMSDS in accordance with this section.

PECU Representation in Equivalent Meter

- 6.14 The operation of each PECU is deemed to be proportional to the population on the PECU array of that type of cell, e.g. if there are 8 cells of one type, then the operation of each one will represent the operation of one eighth i.e. 12.5% of the load controlled by that type of cell.
- 6.15 Where the calculation indicates that the load controlled requires less than one PECU in the PECU array, it may be omitted from the PECU array (and default arrangements should then apply). Where the calculation indicates that the load controlled requires more than one PECU in the PECU array, it shall be populated with at least three PECUs.

Multiple PECU Arrays

- 6.16 If more than one PECU array is used per Summary Inventory, then the operation of a PECU cell is deemed to be proportional to the population of that type of PECU controlled load within the area covered by that PECU array. Therefore, where more than one PECU array is used per Summary Inventory, the Summary Inventory must identify which PECU array is controlling each item.

PECU Array Maintenance and Upkeep

- 6.17 Each PECU array shall be installed, maintained and operated in accordance with Good Industry Practice. When contacting the PECU array, the UMSDS shall ensure that any difference between the PECU array second counter and the EM clock time equivalent does not exceed 20 seconds in any 24 hour period. When the difference does exceed 20 seconds, the PECU array switching data should not be retrieved and the EM should be reset such that time on PECU array and the EM are synchronised.
- 6.18 The UMSDS shall monitor the performance of the PECU arrays. Where the monitoring of the PECU arrays indicates that a single PECU is out of line with other PECUs of identical type in the same PECU array to such an extent that the PECU is no longer representative then such PECUs shall be removed from the calculation and a retrospective calculation will be made using the remaining cells. Failed or unrepresentative PECUs should be replaced at the next available opportunity.
- 6.19 Where the UMSDS has identified failed or unrepresentative PECUs, and set about arranging the replacement of those PECUs, the UMSDS will determine if there are enough remaining PECUs of the same type (following the rules on representation), and if not exclude all PECUs of that type from its calculations, and use either results from a Secondary PECU Array, or apply default arrangements for that cell type.
- 6.20 At least annually, or in the event of a significant change to the Summary Inventory, the UMSDS shall ensure that the PECU arrays are populated with PECUs in accordance with this section.

PECU Array Failure

- 6.21 If PECU data is not available then data from an appropriate PECU array or default data shall be used. In the event of data recovery the UMSDS will rerun EM calculations for the UTC Period day affected, and submit the corrected UTC Settlement Period data via the DIP.

PECU Array characteristic	Requirement
Minimum Specification for PECU Arrays Number of Photocells per PECU array	30
Arrangement of Cells	Any arrangement which ensures no over shadow of one cell on another.
Mounting Platform	Flat platform which can be fitted on a flat roof or supported on a single upright for wall mounting.
Mounting for Photocells	NEMA photocell sockets and 6 blanking plates to cater for miniature cells where required, in a waterproof housing.
Waterproof Housing	All equipment externally located must be protected by a weatherproof enclosure.
Data Collection	To capture the switching on and off times of each cell at time of operation for a minimum of 7 days and 28 events per cell. Rolling Barrel (data overwrites once the logger is full).
Clock or time counter	The PECU array must have a clock or time counter that can be synchronised with the EM.
Operating Temperature -20 to +50 degree Celsius.	-20 to +50 degree Celsius.
Communication	Protocol Determined by the EM to permit interrogation for remote data collection.

7. Equivalent Meter Functionality

7.1 Equivalent meters have two types of operation either as:-

- a) Passive meters which allocate the Unmetered consumption across the half hourly periods by a mathematical relationship of annual burning hours to the daily time of sunrise and sunset; and
- b) Dynamic meters which allocate the Unmetered consumption across the half hourly periods by reference to the operation of a number of actual PECUs, or by making use of actual switching times reported by a Central Management System. In either case the equivalent meter defaults to a passive mode using calculated times of switch operation in the event of the actual switching times not being available.

Functions of an EM in Passive Mode.

- a) The UMSSDS shall be able to add, delete and modify all information required to define each MPAN and to relate it to the Customer, LDSO and.
- b) The system shall be able to load and validate a file in the format of the D0388 – UMS Inventory. After processing the system shall generate a file in the format of the D0389 – UMS Response to send to the UMSSO.
- c) The UMSSDS shall be able to add, delete and modify Charge Code and their associated circuit watts for both full load circuit loading and dimmed load ratings as appropriate.
- d) The UMSSDS shall be able to add, delete and modify Switch Regimes and their associated operating times. The system shall be populated using the offsets and fixed times defined in the OID and associated ISD for each Switch Regime.

- e) The system shall use the average latitude and longitude information and a sunrise/sunset algorithm to calculate the time of sunrise and sunset for each day within two minutes of the sunrise and sunset times as derived from the Astronomical Almanac.
- f) The system shall calculate, as defined above the import kWh in each half hour period in UTC for each MPAN.
- g) The system shall publish the UTC Period Level Consumption data.

Functions of an EM in Dynamic Mode using PECU Data

- 7.2 In addition to the functions of a passive meter listed above, the following are required for a EM using PECU data:-
- a) The system shall be able to use any one PECU array for the calculations of more than one MPAN.
 - b) The system shall be able to use more than one PECU array for the calculations of one MPAN.
 - c) In the event that a PECU in a PECU array fails to operate, the system shall compensate in its calculations by dividing that portion of load allocated to the faulty cell between the functioning cells of the same type as the failed cell.
 - d) If PECU array data is not available for any day then a data from an alternative specified PECU array shall be used for the calculations. If that data is not (h) the system shall provide an audit trail of changes to data held available then default PECU Switch Regime shall be used. The appropriate default Switch Regimes are defined in the OID associated ISD.
 - e) The system shall maintain details for each PECU in a PECU array relating to location, type, manufacturer, date of manufacture and model number.
 - f) The system shall be able to download data from the PECU array.
 - g) The system shall monitor PECUs on the PECU array and advise the UMSDS of any failed units.
 - h) The system shall monitor the PECU array second counter for time keeping and advise the UMSDS when the deviation exceeds the warning level as determined by the UMSDS.
 - i) The UMSDS shall be able to produce switching times from a decoded PECU array file.
 - j) The system may provide a facility to apply time switch operations in accordance with a normal distribution about the nominal switching times. The standard deviation of the normal distribution shall be set by the UMSDS.
 - k) The system shall provide facilities to retrospectively recalculate data for resubmission to the BSC Central Systems.
 - l) The system shall be synchronised to UTC.

Functions of an EM in Dynamic Mode using CMS Data

- 7.3 Where a Customer wishes to use a CMS such customer must interact and engage the UMSDS for the purposes of providing the CMS data for the dynamic calculations.
- 7.4 An EM may use the detailed switching and load information recorded and reported by a Central Management System to allocate Half Hourly consumption data. In this case the CMS itself may be operated by the UMSDS or the Customer, however the UMSDS system (the system that is used to calculate the consumption), must be operated by a UMSDS Qualified in accordance with BSCP537, who retains the overall Settlement responsibility for the quality of the data submitted by the Customer via the CMS.
- 7.5 In addition to the functions of a passive meter listed above, the following requirements apply. Each requirement may relate to the CMS, the UMSDS system or both.

The UMSDS system shall allow the UMSDS to add, delete and modify control information for each MPAN electronically - in the case of Inventory changes these will be provided by the UMSO using the D0388 UMS Inventory. The following rules shall be followed when processing the D0388 UMS Inventory:

The Number of Items associated with each CMS Unit Reference is the same as that contained in the Detailed Inventory and shall identify the number of items (e.g. lamps) associated with each CMS Unit Reference.

The Charge Code associated with each CMS Unit Reference shall be the normal code for the lamp running at full load. The Switch Regime shall be set to one of the ISD approved codes specified for use with CMS.

a) The CMS controller devices operating each item of equipment should be summed and included as a single row in the D0388 UMS Inventory. Each different type of CMS controller shall have its own Charge Code and will be assigned a continuous Switch Regime of 998 and a CMS Unit Reference of 'ControllerXX' where XX is the used to differentiate the entries, so the first entry would be 01, followed by 02, etc. The CMS shall record the operational switching times and power levels set for each unit and shall make this data available to the UMSDS in the form of an operational event log on a daily basis. The log shall include the CMS Unit Reference, the time and date at which the load was switched and the power level expressed as a percentage of the circuit watts defined in the ISD for the relevant Charge Code

b) Where the CMS and UMSDS system are operated as separate applications, the switching time and load information shall be provided to the UMSDS in the following standard format text file. Where the CMS and UMSDS system are integrated, the application must be able to produce the file on request for testing and audit purposes, however other methods may be used for transferring data between the two applications on a routine basis:

Filename: mmmmmmmmyyyymmddvzv.log

where:

mmmmmm = Sub-Meter ID (alphanumeric)

yyymmdd = date to which the events pertain

vzv = version number

log = file extension

with all characters in lower case

File header: HMMMMMMYYYYMMDDVZV

where:

H = header identifier, capital H

MMMMMM = Sub-Meter ID (lower case alphanumeric)

YYYYMMDD = date to which the events pertain

VZV = version number

File body: UUUUUUUUUUUUHHMMSSPPP.PPI

where:

UUUUUUUUUUUU = CMS Unit Reference (alphanumeric)

HHMMSS = time in hours, minutes and seconds, in UTC throughout the year

PPP.PP = percentage of base power i.e. undimmed power level applied to the lamp, to 2 decimal places

I = information flag (alphanumeric)

File trailer: TNNNNNNN

where:

T = trailer identifier, capital T

NNNNNNN = total number of lines including header and trailer

7.6 All lines must be the correct length and terminated with a carriage return, including all tail lines.

7.7 The information flag 'I' in the file body may be used to provide any further information relating to the data contained within the operational event log, e.g. if there are omissions, errors, etc. An alphanumeric value must be provided, although the value used for this information flag and how it is used by the CMS or the UMSDS are currently not prescribed under the BSC, so the CMS manufacturer can specify its use/structure (and agree any such functionality with the relevant UMSDS if agreed by the UMSDS).

For each CMS Unit Reference which is reported in a log file the time (HHMMSS) for each entry must differ. Any revisions to previously-reported data for events of one or more CMS Unit Reference (e.g. after repair of a fault or re-establishment of communications) shall all be provided in an incremental contiguous file version number for the date to which the events pertain. Typically, subsequent file versions are incremental updates containing only that data for CMS Unit References for which data has changed or was not previously reported. On occasions it may be necessary for a subsequent file version to be a complete refresh of the previously reported CMS Unit Reference event data for that date. The approach to be used, and the way in which updated information should be identified, shall be as agreed between the CMS operator and the UMSDS.

(d) The UMSDS system shall calculate, by an approved method, the import kWh consumption in each half hour period in UTC for each MPAN using the switching times and power level information reported in the operational event log.

(e) The UMSDS system shall generate an exception list detailing any CMS Unit References reported in the D388 UMS but which are not contained in the operational event log. The exception list shall be produced for each day of the report for which any CMS Unit References are missing, and shall be provided to the contracted Customer on a monthly basis as a matter of routine, and additionally upon request from the UMISO and/or Customer.

(f) In the event that all or part of the operational event log is not available for any reason, the UMSDS system shall apply data representative of the Switch Regime indicated in the D0388 UMS Inventory provided by the UMISO (i.e. 999 or 998). This regime shall be applied for each of the affected Settlement Days affected.

(g) The UMSDS system shall recalculate the half hourly consumption once data from previous days becomes available and shall submit this revised data to the BSC Central Systems. Recalculation of consumption data will be required from time to time as more accurate data becomes available such as revised D0388 UMS Inventories, PECU Array data, CMS Event logs (limited to 28 days) and correction of standing data errors.

(h) The UMSDS system shall provide an audit trail of changes to data held.

(i) The hardware and software associated with any Central Management System shall be installed, maintained and operated in accordance with Good Industry Practice, with clocks synchronised to UTC and accurate to within ± 20 seconds.

(j) The UMSDS shall provide ad-hoc extracts of the CMS operational event data received from such system to the UMISO on request.

8. UMSDS Validation of the UMS Inventory

8.1 UMSDS shall use the following sequence to validate the information provided in the D0388 UMS Inventory which will then be used to create a subsequent D0389 UMS Response.

8.2 Using any received D0388 UMS Inventory, select an MPAN from the process queue and the record with the lowest Inventory Sequence Number for that MPAN, then process in the following order:

Initial checks

8.3 Perform initial checks which negate any further detailed validation, once failure of a check occurs, then the set of data for that MPAN and that Inventory Sequence Number is rejected. So, in order the checks are:

a) *File received from incorrect UMISO or invalid MPAN*

If received from the incorrect UMISO, identified from MPAN initial two digits and UMISO MPID; or if the MPAN is invalid (e.g. wrong length or check digit does not validate) then the Inventory is rejected. If it fails these tests then it is rejected with Response Reason Code = B

b) *Inventory Sequence Number error.*

If the Inventory Sequence Number is equal to, or lower, than the Inventory Sequence Number currently recorded as processed (accepted or rejected) by the EM for that MPAN then the Inventory is rejected; or there are two identical Inventory Sequence Numbers for a MPAN in the process queue, it is therefore uncertain which set of data is correct, both will be rejected. If it fails these tests then it is rejected with Response Reason Code = C

c) *Invalid Effective From Date.*

If the effective from date is outside the valid range, then it will be rejected. If it fails these tests then it is rejected with Response Reason Code = D

d) *No appointment*

If the UMSDS is not appointed to the MPAN for the effective from date of the inventory, then it is rejected. If it fails this test then it is rejected with Response Reason Code = E

e) *Invalid Sub-Meter*

If the Sub-Meter is not valid for the MPAN, then it is rejected. If it fails these tests then it is rejected with Response Reason Code = F

8.4 If any of the initial checks fail, then the Inventory Sequence Number will be marked for rejection, see Section 4.8.3. The information provided will not be applied to the EM.

8.5 If all the initial checks are all passed then detailed checks of the inventory content should commence.

Detailed Checks

8.6 When validating the content all the following checks should be performed for all of the inventory data provided for the Inventory Sequence Number so that a complete list of rejections is reported to the UMSO. The following sequence is a hierarchy of checking and reporting:

a) *Invalid Switch Regime*

A single entry of any invalid Switch Regime identified in any of the Sub-Meters, identified with UMS Error Code = A.

b) *Invalid Charge Code*

A single entry of any invalid Charge Code identified in any of the Sub-Meters, identified with UMS Error Code = B.

c) *Invalid combination of a valid Charge Code associated with a valid Switch Regime*

Where the combination of a valid Charge Code (including controllers) or a valid Switch Regime are identified as an invalid combination as defined in current OID and MDD, then a single entry of the invalid combination is identified with UMS Error Code = C.

Invalid Switch Regime and invalid Charge Codes will have been reported against Error Code A & B respectively and will not be reported again in this group.

d) *Invalid CMS Unit Reference*

CMS Unit Reference which are duplicated, have the incorrect number of characters, or commence with an H or T are deemed to be invalid and identified with UMS Error Code = D.

8.7 If all the detailed checks are passed, then the Inventory Sequence Number will be Response Reason Code = A, for accepted. The information provided will be applied to the EM.

8.8 If any of the detailed checks fail, then the Inventory Sequence Number will be Response Reason Code = G, for Errors with Charge Code, Switch regime or CMS Unit Reference. The information provided will not be applied to the EM.

8.9 The EM will record the last processed Inventory Sequence Number for each MPAN processed. The sequence will repeat, with the next Inventory Sequence Number.

Festive Lighting

- 8.10 Festive lightning shall treated as energised, but only de-energised if it is disconnected. In the scenario where festive lighting is not active, a zero Watt Charge Code should be submitted to the UMSDS on the D0388 UMS Inventory, and it will be up to the appointed UMISO to manage.

Creation of D0389 - UMS Response

- 8.11 The D0389 UMS Response is sent by the UMSDS to the UMISO and may contain acceptance and rejection entries for multiple MPANs but not necessarily in the order received from the UMISO.

Processing of the D0389 by the UMISO

- 8.12 The UMISO should review the D0389 responses.
- 8.13 If the Inventory Sequence Number is shown as Accepted, then the submission has been accepted and no further action is required.
- If the Inventory Sequence Number is shown as Rejected, then the reasons for rejection should be considered and resolved. Where necessary a revised submission should be prepared.

9. Load Shapes and Defaulting

- 9.1 The UMSDS shall access Load Shape Data the following Load Shape Categories (LSCs) for UMS:

Market Segment	GSP Group	Domestic Premises Indicator	Measurement Quantity	Non-Smart Switched Load Profile Class	Off-Peak Period (UTC) Start Time	Off-Peak Period (UTC) End Time	Connection Type Indicator	De-minimis Data count
U			AI				U	[50]
U			AE				U	[50]

The Unmetered Supplies Load Shapes can be identified using the Load Shape Category table contained within ISD.

Where no inventory data is available the UMSDS shall default the data for the MPAN to the Load Shape as follows:

Method 1: UMSDS defaults UMS data for a UTC Date

Where a default is required the UMSDS shall set the half hourly data for each UTC Period to be equal to the equivalent Load Shape Period Value (LSPV_D) as follows:

$$UTCP_{Dj} = LSPV_{Dj}$$

Where *D* is the UTC Date for which the default is being calculated and *j* is a UTC Period for the UTC Date

The Load Shapes are provided on the I/F-022 defined in the Interface Catalogue.

10. Publish and Data Flags

- 10.1 The UMSDS must add the following flags to the output UTC Period Level Consumption data prior to publishing the EM output:

a) Data calculated as actual using the D0388 UMS Inventory where MPAN is energised: "A" flag

b) Data based on Load Shape: “E” flag

c) Data where the MPAN is identified as de-energised the UMSO shall provide a D0388 UMS Inventory with a zero Charge Code. The UMSDS shall submit the calculated data with the following flag: “ZE” Flag

		Settlement Period Quality Indicator (DI-083)	Estimation Reason Code (DI-076)	Mandatory if SPQI (DI-083) is not "A"
	Energisation Status			Comments
UMSDS has received a D0388 UMS Inventory with load associated data in it	Energised	A	Null	No comments
UMSDS has received a D0388 UMS Inventory with load associated data in it	De-Energised	A	Null	If a D0388 has been received with load associated data and the MPAN is de-energised the load should be calculated, submitted as 'A' Flagged but with an Estimation Reason Code of De-energised
UMSDS has received a D0388 UMS Inventory with a Zero Inventory data in it	Energised	A	Null	If a D0388 has been received with a zero inventory for an energised MPAN the load should be zero, the data should be flagged as 'A' and an estimation reason code of Null.
UMSDS has received a D0388 UMS Inventory with a Zero Inventory data in it	De-Energised	ZE	7	As per the MDS & LSS Method Statement, they would get rejected if an Estimated Flag was received and IF/PUB-014 will be provided.
UMSDS has not received a D0388 UMS Inventory at all	Energised	E	2	If no D0388 has been received the Load Shape should be used for energised MPAN with and the data should be e-flagged with an estimation reason code of '2' (Missing).
UMSDS has not received a D0388 UMS Inventory at all	De-Energised	E	2	No expectation to submit data for de-energised MPAN, if submitted, the data will be rejected and IF/PUB-014 will be provided.
		A = Actual	1 = Opt Out	
		E = Estimate (UMS Only)	2 = Missing	
		ZE = De-energised	3 = Invalid	
			4 = Comms Fault	
			5 = LTV	
			6 = Disabled	
			7 = De-energised	
			8 = Disconnected	
			9 = Consultation Amendment	
			10 = Non-Smart	

11. Equivalent Meter Audit Requirements

11.1 The UMSDS shall ensure that audit trails are maintained between:

- Equivalent Meter failure reports and any subsequent actions taken.

The UTC Period Level Consumption data is provided to the Elexon Central Systems using the I/F-021 defined in the Interface Catalogue,

Change Record

Date	Author	Version	Change Detail
16/02/2023	SI Design	V5.0	Initial Version
13/06/2023	SI Design	V5.1	DIN 93
27/07/2023	SI Design	V5.2	DIN-298, 300, 301 and 302.