**MP193 ‘Incorporation of Category 3 Issue Resolution Proposals into the SEC – Batch 6’**

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**Annex A**

**Legal text – version 1.0**

About this document

This document contains the redlined changes to the SEC that would be required to deliver this Modification Proposal.

SEC Schedule 8 ‘Great Britain Companion Specification’ (GBCS) version 4.x

These changes have been drafted against SEC Schedule 8 version 4.0.

These changes will be applied to the next version of the GBCS v4.x series at the time the modification is implemented. These will also be applied to the next version of any subsequent GBCS series introduced on or before the modification is implemented.

## Amend Section 7.4 as follows:

**Device requirements – ZSE**

This Section 7.4 details the ZigBee clusters, attributes and commands that shall be supported by Devices in their interactions with other Devices on the same HAN, including whether the support is as a ZSE client or a server. Note, this Section does not detail the ZCL / ZSE commands that Devices will need to process as part of processing Remote Party Commands, or Commands sent by a PPMID to a GSME. Such requirements are detailed in Sections 18 and 19.

Only Devices capable of operating at Sub-GHz shall be required to support the requirements in rows of Table 7.4 where the cell in the column labelled ‘Sub GHz capable Devices only?’ contains ‘Yes’.

For clarity and as required by ZSE, all Devices shall support the Key Establishment Cluster as both Client and Server.

A GSME shall implement a ZSE *Metering Device* and shall implement all *the clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘GSME: Metering Device’.

A GPF shall implement a *ZSE Metering Device* and shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘GPF: Metering Device (Gas Mirror Endpoint)’.

A GPF shall implement a *ZSE Energy Services Interface* and shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘GPF: Energy Services Interface (Gas ESI Endpoint)’

A CHF shall implement a *ZSE Remote Communications Device* and shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘CHF: Remote Communications Device (Remote Communications Endpoint)’.

An SAPC shall implement a *ZSE Energy Services Interface* and shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘SAPC: Energy Services Interface (Electricity ESI Endpoint)’.

Where it supports the corresponding SMETS functionality, an SAPC shall implement the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘SAPC optional: Energy Services Interface (Electricity ESI Endpoint)’.

Additionally, an SAPC may support other *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘ESME: Energy Services Interface (Electricity ESI Endpoint)’.

An ESME which is not a Twin Element ESME shall implement a *ZSE Energy Services Interface* and shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘ESME: Energy Services Interface (Electricity ESI Endpoint)’.

An ESME which is a Twin Element ESME shall implement three *ZSE Energy Services Interfaces*:

1. the first which shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘ESME: Energy Services Interface (Twin ESME aggregate ESI Endpoint)’;

the second which, in relation to the primary measuring element, shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘ESME: Energy Services Interface (Twin ESME primary/secondary ESI Endpoint)’; and

the third which, in relation to the secondary measuring element, shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘ESME: Energy Services Interface (Twin ESME primary/secondary ESI Endpoint)’.

A PPMID shall implement a *ZSE In-Home Display*, shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘PPMID: In-Home Display’, and shall support the other clusters, attributes and commands necessary to meet the SMETS requirements.

An HCALCS shall implement a *ZSE Load Control Device* and shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘HCALCS: Load Control Device’.

An HHT shall implement a *ZSE Remote Communications Device* and shall implement all the *clusters, commands, attribute sets and attributes* in Table 7.4 where column A is ‘HHT: Remote Communications Device’.

An IHD shall implement all the clusters, commands, attribute sets and attributes in Table 7.4 where column A is ‘IHD: In-Home Display’ and shall support the other clusters, attributes and commands necessary to meet the SMETS requirements.

Where a row in Table 7.4 is required for a Device, that Device shall support the cluster, attribute or command specified in that row as client or server, as specified in column C (labelled ‘Client / Server’).

Support for *clusters, commands, attribute sets and attributes* shall be as defined in columns B (‘Cluster’), D (‘Command’), E (‘Attribute Set’) and F (‘Attribute’).

Note that the other columns in Table 7.4 are informative and for requirements traceability only.

Except where explicitly required by this Section 7.4 or by Section 19.3, a Device shall not execute any ZSE command, be that in a GBZ Command Payload or provided as a native ZSE command, that could, if executed, constitute a Critical action. For clarity, a Device shall not execute a ZSE *Publish Change of Supplier* command if bits 11-12 of the *Provider* *Change Control* parameter (*Meter Contactor State*) of that command has any value other than 0b11 (*Supply UNCHANGED*).

In relation to the *calendar cluster’s* use for exchanging information about the Auxiliary Controller Calendar (with its SMETS meaning) between Devices:

the *Calendar Type* value of 0x04 (named *Auxillary Load Switch Calendar*) shall be used, to differentiate from the values of 0x00 (named *Delivered Calendar*) and 0x03 (named *Friendly Credit Calendar*) for the Tariff Switching Table and Non-Disablement Calendar, respectively (with their SMETS meanings); and

the *Auxiliary Load Switch State* parameters in *PublishDayProfile* commands shall be set so that:

*bit0* to *bit4* have values corresponding to Auxiliary Controller [1] to Auxiliary Controller [5] respectively, with each such bit being 0b1 where the commanded output state is 100 for the switching instruction in question (so the value of ‘p’ with its Section 7.3.6.1 meaning), or 0b0 otherwise; and

*bit5* to *bit7* have the value 0b0.

For clarity, this means that settings related to commanded input states are not shared, and commanded output settings of 99 or less on an Auxiliary Proportional Controller (with its SMETS meaning) are all represented as 0b0 to other HAN Devices.



Table 7.4: Device Requirements

## Amend Section 10.2.2.2 as follows:

***10.2.2.2 GSME***

When a GSME has successfully established a shared secret key using *CBKE* with a Communications Hub, the GSME shall:

* send a request to the *ZigBee Gas ESI Endpoint* requesting the creation of mirrored *Basic, Metering* and *Prepayment Clusters* using the *RequestMirror* command;
* configure, using the *ConfigureMirror* command, the *ZigBee Gas Mirror Endpoint* to use the two way mirroring notification scheme ‘*Predefined Notification Scheme B’* ; and
* send a *RequestTunnel* command to the CHF to request a tunnel association with the CHF*.*

In line with ZSE, when a GPF sends a *RequestMirrorResponse* command in response to a *RequestMirror* command, the *RequestMirrorResponse* command shall contain the *EndPointID* to be used by the GSME regardless of whether the *RequestMirror* created the mirror.

A GPF shall only send a *RequestMirrorResponse* containing the *EndPointID* to the Device which caused the GPF to create the mirror.

Where a GPF receives a *ConfigureMirror* command to use the two way mirroring notification scheme ‘*Predefined Notification Scheme B*’ which has the *Disable Default Response Sub-field* in its *Frame Control Field* set to zero, the GPF shall respond with a *Default Response* indicating *SUCCESS* if it has a mirror configured to use ‘*Predefined Notification Scheme B*’, regardless of whether that was configured by the *ConfigureMirror* command.

Where the Communications Hub has successfully actioned a *ConfigureMirror* command, the GPF shall set the *Push All Static Data - Basic Cluster*, *Push All Static Data - Metering Cluster* and *Push All Static Data - Prepayment Cluster flags*.

Where a GSME reports a value for the *ManufacturerName* attribute or the *ModelIdentifier* attribute, the GPF shall accept that value. For clarity, there are no requirements for the GPF to subsequently process or make available any such value.

For clarity, the GSME:

* shall not action ZSE / ZCL commands received from the GPF in relation to any of the flags within *NotificationFlags2*, *NotificationFlags3* and *NotificationFlags5*;
* for *NotificationFlags4*, shall only action ZSE / ZCL commands received from the GPF in relation to the flags specified in Table 10.2.2.2a.

|  |  |
| --- | --- |
| **Bit Number** | **Waiting Command** |
| 6 | *Get Prepay Snapshot* |
| 7 | *Get Top Up Log* |
| 9 | *Get Debt Repayment Log* |

Table 10.2.2.2a: flags in *NotificationFlags4* to be actioned by the GSME

* for *FunctionalNotificationFlags*, shall only action ZSE / ZCL commands received from the GPF in relation to the flags specified in Table 10.2.2.2b:

|  |  |
| --- | --- |
| **Bit Number** | **Waiting Command** |
| 0 | *New OTA Firmware* |
| 1 | *CBKE Update Request* |
| 4 | *Stay Awake Request HAN* |
| 5 | *Stay Awake Request WAN* |
| 6-8 | *Push Historical Metering Data Attribute Set* |
| 9-11 | *Push Historical Prepayment Data Attribute Set* |
| 12 | *Push All Static Data - Basic Cluster* |
| 13 | *Push All Static Data - Metering Cluster* |
| 14 | *Push All Static Data - Prepayment Cluster* |
| 15 | *NetworkKeyActive* |
| 21 | *Tunnel Message Pending* |
| 22 | *GetSnapshot* |
| 23 | *GetSampledData* |
| 25 | *Energy Scan Pending* |
| 26 | *Channel Change Pending* |

Table 10.2.2.2b: flags in *FunctionalNotificationFlags* to be actioned by the GSME

* shall have access to the *Notification Flags* on the Communications Hub whenever it can communicate with the Communications Hub; and
* shall not provide any metering data to the *ZigBee Gas Mirror Endpoint* until and unless the GPF’s Entity Identifier is recorded in the GSME Device Log.

The GSME shall send a *RequestTunnel* command to the CHF to request a tunnel association with the CHF whenever it does not have a currently valid tunnel association with the CHF, and one of the following is true:

* the GSME has created an Alert or Response that is to be sent; or
* the GSME has ascertained, via the *Tunnel Message Pending* flag, that there is a Command for it buffered on the Communications Hub.

Where the GSME receives a *RequestTunnelResponse* command from the CHF with a *TunnelStatus* of 0x01 (*Busy*), the GSME shall send another *RequestTunnel* command the next time it turns its HAN Interface on.

Where the GSME receives a *RequestTunnelResponse* command from the CHF with a *TunnelStatus* of 0x02 (*No More Tunnel IDs*), the GSME shall send a *CloseTunnel* command for any *TunnelID* that may relate to an active tunnel association between it and the CHF and, after receiving responses to all such commands, send another *RequestTunnel* command.

Immediately following the first successful establishment of the tunnel between the CHF and the SAPC / ESME / GSME, the SAPC / ESME / GSME shall send an Alert with Alert Code 0x8F69.

## Amend Section 10.6.4 as follows:

**10.6.4 Sub GHz GSME - functional requirements**

Sub GHz GSME shall wait at least 2 hours from detecting SMHAN interference before indicating that the interference is continuing by way of sending a *Mgmt\_NWK\_Unsolicited\_Enhanced\_Update\_notify* command to the CH.

When operating on Sub GHz, GSME shall, on each wake up, check the *Functional Notification Flags* for bits 25 (*Energy Scan Pending*) and 26 (*Channel Change Pending*).

If either bit is set (so has a value 0b1) then the GSME shall attempt to retrieve any Commands buffered for it on the CH before turning off its SMHAN radio. For clarity and in line with Section 10.6.2.8, the GSME should attempt such retrieval before reading the CHF *Channel Change* attribute, if it is to maximise the likelihood of Command retrieval before it turns off its SMHAN radio.

If bit 25 is set, the GSME shall disable the SMETS User Interface Commands ‘4.5.2.4 Check for HAN Interface Commands’ and ‘4.5.2.8 Find Smart Metering Home Area Network and Re-establish Communications Links’ and shall not receive and execute ‘4.5.3.3 Add Credit’ and ‘4.5.3.1 Activate Emergency Credit’ Commands from a PPMID and a Gas Proxy Function (where those terms have their SMETS meanings), as required by SMETS 4.4.7.2, until it next turns on its SMHAN radio.

Note that CH may change Sub GHz Channel once every 24 hours to attempt to communicate with a lost GSME. On each such change, the CH will undertake a Sub GHz Channel Scan, meaning that it cannot communicate with a GSME for a period of time. GSME should factor both the 24 hour period and the associated Sub GHz Channel Scan in to their attempts to re-establish lost communications with the CH.

## Amend Section 13.2.4.4 as follows:

***13.2.4.4 Response Construction***

The Device shall populate Grouping Header according to the requirements of Section 7.2.6.

The @ProvideSecurityCredentialDetails.Response shall have the structure defined in Section 13.2.3.3, and the Device shall populate with values according to Table 13.2.4.4.

| **Attribute name** | **Data Type** | **Value (blank cells mean the command specific value is derived by the encoding process)** | **Mandatory, OPTIONAL or DEFAULT value** | **Notes** |
| --- | --- | --- | --- | --- |
| @ProvideSecurityCredentialDetails.Response ::= | SEQUENCE OF |  |  |  |
| SEQUENCE |  |  |  |  |
| remotePartyRole | INTEGER | root (0) ,  recovery (1) ,  supplier (2) ,  networkOperator (3) ,  accessControlBroker (4) ,  transitionalCoS (5) ,  wanProvider (6) , | Mandatory if SEQUENCE is present | The role to which the credentials in this SEQUENCE relate |
| statusCode | ENUMERATED | success (0) ,  trustAnchorNotFound (25) ,  other (127) | Mandatory if SEQUENCE is present | Whether the Device can supply the details |
| currentSeqNumber | INTEGER | The corresponding Counter value | Present if statusCode=0 | The Execution Counter held by the Device for this role’s use of the Update Security Credentials Command.  Where this role is root, the value of the anyByContingency Execution Counter shall be returned.  Where this role is transitionalCoS, the value of the transCoSByTransCos Execution Counter shall be returned.  Where this role is supplier, the value of the supplierBySupplier Execution Counter shall be returned. |
| trustAnchorCellsDetails | SEQUENCE OF |  | At least one in the SEQUENCE OF must be present if statusCode=0 |  |
| SEQUENCE |  |  |  |  |
| trustAnchorCellKeyUsage | BIT STRING | digitalSignature (0) ,  keyAgreement (4) ,  keyCertSign (5) | Mandatory if SEQUENCE is present | To what use can the public key in this Cell be put |
| trustAnchorCellUsage | INTEGER | prePaymentTopUp(1) | DEFAULT management (0) | Only needs to be present for the {supplier, keyAgreement, prePaymentTopUp} Cell |
| existingSubjectUniqueID | OCTET STRING | Entity Identifier in this Cell | Mandatory if SEQUENCE is present | See Section 12.4 and Section 12.3 |
| existingSubjectKeyIdentifier | OCTET STRING | Key Identifier of the key in this Cell | Mandatory if SEQUENCE is present |  |

## Amend Section 16.2 as follows:

**16.2 Event and Alert Codes**

Table 16.2 lists the valid Event and Alert Codes, and sets out their requirements.



Table 16.2: Event and Alert Codes

## Amend Section 16.4 as follows:

**16.4 Requirements**

Event / Alert codes shall be 2 octets in length and shall take the values specified in Table 16.2. As per the Technical Specifications, all Alerts, Event Log entries, Security Log entries, Power Event Log entries and Auxiliary Controller Event Log entries shall contain a UTC date time stamp, in addition to the Event / Alert code. For Event / Alert Codes beginning 0x80 or 0x81 in Table 16.2 which relate to a GSME or ESME, the requirements in Table 16.2 in relation to:

* sending Alerts;
* notifying events to other Devices to which it is connected by means of a Communications Link; and
* logging events in the Event Log or Power Event Log,

shall be those configured in ESME, SAPC and GSME prior to installation.

In relation to Event / Alert Codes 0x8161 and 0x8162 and the notification of those events to other Devices to which the Device is connected by means of a Communication Link, the Device shall be configured prior to installation so as to not send such notifications unless:

* the Device is an ESME which includes an APC; or
* the Device is an SAPC which includes a User Interface and that User Interface provides access to User Interface Commands detailed in Table 16.4;

in which cases:

* the Device shall be configured prior to installation so as to send such notifications; and
* when sending such notifications, the Device shall, in relation to any ZigBee Publish Event command used to send such a notification:
  + populate the Event Data parameter with the value 0x02 || (Table 16.4 ‘User Interface Command Code’ corresponding to the Command invoked); and
  + populate the Event ID parameter with either 0x8161 or 0x8162 to reflect the Outcome of that Command.

For clarity, the requirement to populate the Event Data parameter applies only to ESME with APC and SAPC with a User Interface. Other Devices, if configured after installation to notify events Event / Alert Codes 0x8161 and 0x8162, would not be required to populate that field with the Table 16.4 value, and so that value may not be present. Alternatively, for these other Devices a value may be present but may not follow the requirements of this Section 16.4.

Prior to installation, all such Event / Alert Codes shall be configured not to sound an Alarm. For clarity, Event / Alert Codes beginning 0x8F and any applying on Devices other than ESME / GSME / SAPC are not configurable and Table 16.2 specifies the fixed settings. Once installed, the configurations relating to sending Alerts, notifying other Devices, logging and sounding Alarms may be modified using the event and Alert configuration Use Cases.

GSME shall reject any ZSE *SetEventConfiguration* command containing an *Event ID* in the *Event Configuration Payload* with 0x8F in the most significant octet, to ensure Critical Alerts are always configured on. For clarity, the ESME Alert Configuration Use Cases, which may also be supported by SAPC, do not allow for Alert Codes starting 0x8F.

SAPC is not required to support the Event / Alert configuration Use Cases. Where SAPC does not support such Use Cases, the settings required by Table 16.2 shall remain unchanged, including for any Event / Alert Codes beginning 0x80 or 0x81.

As specified in Table 16.2 by way of ‘x’ in a cell, deviceType (and for ESME, variant of ESME) shall determine which Alerts a device shall issue and which Event Log and Security Log entries it shall record. Where deviceType = 0x04 (HCALCS) or 0x05 (PPMID), this Section 16 only requires the sending of Alerts, since neither Device type is required to have either an Event Log or a Security Log.

Where an Alert and a Log entry have the same trigger in a Device, the Device shall record the same UTC date time stamp and the same Event / Alert code in both.

The Remote Party to which an Alert containing a specific Event Code is addressed shall be determined by the Remote Party Role as specified in Table 16.2. Where the Remote Party Role is stated as ‘Supplier (not CHF) or WAN Provider (CHF only)’, the Alert shall be addressed:

* to the WAN Provider if deviceType = 0x02 (CHF); or
* to the Supplier for all other deviceType values.

Where the Remote Party Role is stated as ‘Transitional Change of Supplier or Supplier (not CHF) or WAN Provider (CHF only)’, the Alert shall be addressed to the Transitional Change of Supplier if the Alert is as a result of a supplierByTransCoS CS02b Update Security Credentials Command; otherwise is shall be addressed:

* to the WAN Provider if deviceType = 0x02 (CHF); or
* to the Supplier for all other deviceType values.

Where a Use Case is specified in Table 16.2 the corresponding Alert shall be constructed according to the specified Use Case. Where no Use Case is specified the Alert shall be constructed according to Section 7.

Where an Alert has two recipient roles identified, the Device shall place the Entity ID of the Supplier in the Business Target ID field and the Entity ID of the other recipient in the Supplementary Remote Party ID field.

For any Event Log entries relating to Event Codes 0x8161 and 0x8162, the Device shall record the commands input on the User Interface by including the User Interface Command Code in the Event Log entry as defined in Table 16.4.

Where an SAPC has a User Interface to support SMETS requirements, for any Event Log entries relating to Event Codes 0x8161 and 0x8162, the SAPC shall record the Commands input on the User Interface by including the User Interface Command Code in the Event Log entry as defined in Table 16.4, as if the SAPC were an ESME.

| **User Interface Command Code** | **User Interface Command (from SMETS)** | **GSME** | **ESME** | **Additionally for ESME with ALCS** | **Additionally for ESME with Boost Function** |
| --- | --- | --- | --- | --- | --- |
| 0x0001 | Activate Boost Period |  |  |  | x |
| 0x0002 | Activate Emergency Credit [PIN] | x | x |  |  |
| 0x0005 | Add Credit | x | x |  |  |
| 0x0008 | Allow Access to User Interface | x | x |  |  |
| 0x000A | Cancel Boost Period |  |  |  | x |
| 0x000B | Check for HAN Interface Commands | x |  |  |  |
| 0x000C | Disable Privacy PIN Protection [PIN] | x | x |  |  |
| 0x000E | Enable Supply [PIN] | x | x |  |  |
| 0x000F | Extend Boost Period |  |  |  | x |
| 0x0012 | Set Privacy PIN [PIN] | x | x |  |  |
| 0x0013 | Test ALCS [1] |  |  | x |  |
| 0x0014 | Test ALCS [2] |  |  | x |  |
| 0x0015 | Test ALCS [3] |  |  | x |  |
| 0x0016 | Test ALCS [4] |  |  | x |  |
| 0x0017 | Test ALCS [5] |  |  | x |  |
| 0x0018 | Test Valve | x |  |  |  |
| 0x0019 | Reset Remaining Battery Capacity | x |  |  |  |
| 0x001A | Find and Join SMHAN | x | x | x | x |

Table 16.4: User Interface Command Codes by Device

For any Event Log entries relating to Event Codes 0x8154 and 0x8155, the Device shall record the Commands received on the Network Interface by including the Message Code in the Event Log. For clarity, such entries are only required where the command received has a Message Code specified in Table 20.

Where a log entry is required to have data additional to the Alert Code and date-time stamp, that additional data shall be recorded in the 'otherInformation' field of that log entry.

For Alerts with Alert Code 0x81A0, the Device shall structure and populate the Message according to the requirements of Table 16.2 and:

* an ESME shall create a DLMS COSEM Alert Payload, which shall be as defined in Table 7.2.9c, where the Use Case specific additional content contains the concatenation 0x09 || 0x02 || otherInformation; or
* a GSME shall create a GBZ Alert Payload, which shall be as defined in Table 7.2.10c, where the Use Case specific additional content is otherInformation.

The Device shall populate the ‘otherInformation’ field with one of the following two octet long octet string values:

* 0x0000 (other);
* 0x0001 (Error Non Volatile Memory);
* 0x0002 (Error Program Execution);
* 0x0003 (Error Program Storage);
* 0x0004 (Error RAM);
* 0x0005 (Error Unexpected Hardware Reset);
* 0x0006 (Error Watchdog);
* 0x0007 (Error Metrology Firmware Verification Failure);
* 0x0008 (Error Measurement Fault); or
* 0x0009 (Unspecified Smart Meter Operational Integrity Error).

## Amend Section 18.1.1.1 as follows:

***18.1.1.1 ZSE Load Control Event command***

The ZSE Load Control Event command shall be sent by an ESME:

* following successful authentication of a Command with Message Code 0x011E (so ‘ECS47a Set Auxiliary Controller [n] State’), where that command requires an HCALCS to change its state;
* to control an HCALCS according to the Auxiliary Controller Calendar; or
* as required by Section 18.1.1.3.

In executing this command, the ESME shall send the ZCL Load Control Event command to the HCALCS identified in that Command / in that Get Scheduled Events command / in that entry of the Auxiliary Controller Calendar (as determined by the requirements of Section 7.3.6.1) with:

* the values of each field populated in the ZCL Load Control Event command as specified in Table 18.1.1.1;
* the ‘Duration in Minutes’ field set according to the respective triggers above calculated as per SMETS;
* the ‘Duty Cycle’ field set to 0x00 or to 0x64, determined according to the requirements of Section 7.3.6.1.

The recipient HCALCS shall interpret the value in Duty Cycle accordingly.

Whenever it sends a *Load Control Event* command, the ESME shall add an entry to the Auxiliary Controller Event Log where:

* hanCommandID is set to the value of the *Issuer Event ID* in the command;
* outcome is set to 0x00 (‘Outcome not known’); and
* switchNumberAndAction is set to the concatenation 0x1‘n’ (where ‘n’ is the value of Auxiliary Controller [n] for the HCALCS in question) || Duty Cycle in the command.

On successful authentication of such a ZCL command, the recipient HCALCS shall respond with a *Report Event Status* ZCL command populated as per Table 18.1.1.4, with Event Status set to:

* 0x02 (‘Event started’), if the command was successfully executed; or
* 0xFE (‘Load Control Event command Rejected’), if the command was not successfully executed.

Whenever it receives a *Report Event Status* command with an *Event Status* of either 0x02 or 0xFE, the ESME shall add an entry to the Auxiliary Controller Event Log where:

* hanCommandID is set to the value of the *Issuer Event ID* in the command;
* outcome is set to:
  + 1. 0x01 (‘Success’) if Event Status is 0x02 (‘Event started’) in the command; or
    2. 0x02 (‘Failure’) if Event Status is 0xFE (‘Load Control Event command Rejected’), in the command; and
* switchNumberAndAction is set to the concatenation 0x1‘n’ (where ‘n’ is the value of Auxiliary Controller [n] for the HCALCS in question) || Duty Cycle Applied in the command.

After the ‘Duration In Minutes’ specified in such a Load Control Event command has elapsed according to the HCALCS timer, the HCALCS shall send to the ESME a Get Scheduled Events command in accordance with Table 18.1.1.3. For clarity, an HCALCS may additionally send a Get Scheduled Events command to the ESME at any time.

| **Element** | **Meaning** | **Value** | **Octets** |
| --- | --- | --- | --- |
| ZCL header | | | |
| Frame control | Cluster-specific; not manufacturer specific; server-client; allow default response; | 0b00001001 | 1 |
| Transaction sequence number |  | 0x00 | 1 |
| Command identifier | Load Control Event | 0x00 | 1 |
| ZCL payload | | | |
| Issuer Event ID (UINT32) | Set to the ESME’s current UTC time | See ‘Meaning’ column | 4 |
| Device Class (BITMAP16) | All device types | 0xFFFF | 2 |
| Utility Enrollment Group (UINT8) | All groups | 0x00 | 1 |
| Start Time (UTCTime) | Start immediately | 0x00000000 | 4 |
| Duration In Minutes (UINT16) | A value between 1 and 1440 minutes | See ‘Meaning’ column | 2 |
| Criticality Level (UINT8) | Voluntary | 0x01 | 1 |
| Cooling Temperature Offset (UINT8) | Not used | 0xFF | 1 |
| Heating Temperature Offset (UINT8) | Not used | 0xFF | 1 |
| Cooling Temperature Set Point (INT16) | Not used | 0x8000 | 2 |
| Heating Temperature Set Point (INT16) | Not used | 0x8000 | 2 |
| Average Load Adjustment Percentage (INT8) | Not used | 0x80 | 1 |
| Duty Cycle (UINT8) | 0x00 (0) = switch OFF; 0x64 (100) = switch ON | See ‘Meaning’ column | 1 |
| Event Control (BITMAP8) | Do not randomise | 0x00 | 1 |

Table 18.1.1.1: ZSE Load Control Event command

**Add Section 18.1.2 as follows:**

**18.1.2 Message Templates for ZSE commands between SAPC / ESME with APC and PPMID / Type 2 Device**

***18.1.2.1 ZSE Load Control Event command***

In this section:

* Source Device shall mean either (1) an ESME with at least one APC or (2) an SAPC; and
* Requesting Device shall mean a Device which is (1) in the Source Device’s Device Log and (2) is a Type 2 Device or a PPMID, according to the Source Device’s Device Log.

Where the Source Device has received a *ZDO Bind Request* in relation to the *Demand Response and Load Control Cluster* from a Requesting Device (regardless of whether the Source Device supports binding with its ZigBee meaning), the Source Device shall:

* whenever, in relation to any of its Auxiliary Controller [n], the Source Device has changed the current output level; or
* when its Auxiliary Controller [n] is an APC, the Source Device has changed the current input level, or input limit level or output limit level;

Send a *ZSE Load Control Event* command to the Requesting Device, populated as specified in Table 18.1.2.1 for the Auxiliary Controller [n] whose level has changed. If:

* the Load Control Event Command issued has a value of 1440 minutes for the ‘Duration In Minutes’ parameter; and
* 1440 minutes then elapse without the Source Device sending a subsequent Load Control Event Command to the Requesting Device in relation to Auxiliary Controller [n];

then the Source Device shall send a Load Control Event Command to the Requesting Device in relation to Auxiliary Controller [n]’s now current levels.

For clarity:

* the above requirements for the Service Device pushing *ZSE Load Control Event* commands are additional to any other ZigBee or GBCS requirements to push such commands;
* the Requesting Device shall not be required to undertake any ZigBee specified client processing specific to the Load Control Event Command; and
* the Requesting Device shall not respond to the Load Control Event with a Report Event Status Command (the use of a reserved bit in the Device Class bitmap of the Load Control Event ensures that this behaviour aligns with the ZSE requirements).

Where the Source Device receives an authenticated Get Scheduled Events Command from a Requesting Device (so a Device which is not an HCALCS according to the Source Device’s Device Log), the Source Device shall, for each of Auxiliary Controller [n] (where n = 1 to 5) which has an associated ALCS or APC:

* where Auxiliary Controller [n] is an ALCS, send a ZSE Load Control Event command to the Requesting Device, populated as specified in Table 18.1.2.1 detailing the current state;
* where Auxiliary Controller [n] is an APC, send two ZSE Load Control Event commands to the Requesting Device, populated as specified in Table 18.1.2.1, one detailing the current input levels and the other detailing the current output levels; and
* where Auxiliary Controller [n] is an APC or an ALCS, send, for each of the next 25 state changes which are required by the currently configured Auxiliary Controller Calendar and which relate to Auxiliary Controller [n], a ZSE Load Control Event command to the Requesting Device, populated as specified in Table 18.1.2.1. Where there are fewer than 25 such state changes, the Source Device shall send such lower number of commands as is required to detail all such state changes, as are specified by the configured Auxiliary Controller Calendar.

For clarity, this means that 1 authenticated Get Scheduled Events Command from a Requesting Device can result in a maximum of 135 ZSE Load Control Event commands from the Source Device (specifically in the case where the Source Device has five APCs installed = 5 x (2 (current states) + 25 (future states))).

The Source Device shall not apply any ZSE specified requirements specific to the processing of Get Scheduled Events Commands, and so shall discard the values of any parameters in the ZCL payload of such Commands.

| **Element** | **Meaning** | **Value** | **Octets** |
| --- | --- | --- | --- |
| ZCL header | | | |
| Frame control | Cluster-specific; not manufacturer specific; server-client; allow default response; | 0b00001001 | 1 |
| Transaction sequence number |  | See ZigBee specifications | 1 |
| Command identifier | Load Control Event | 0x00 | 1 |
| ZCL payload | | | |
| Issuer Event ID (UINT32) | Set to the Source Device’s current UTC time | See ‘Meaning’ column | 4 |
| Device Class (BITMAP16) | See value | Bit 0: 0b1 if Auxiliary Controller [n] is an ALCS; 0b0 if it is an APC. Note that, as per SMETS 5.5.11, n is between 1 and 5 inclusive.  Bit 15: 0b1  All other bits shall have the value 0b0 except:   * If Auxiliary Controller [n] is an APC and this command relates to its output or is an ALCS, bit 2n-1 shall have the value 0b1; and * If Auxiliary Controller [n] is an APC and this command relates to its input, bit 2n shall have the value 0b1 | 2 |
| Utility Enrollment Group (UINT8) | Not used | 0x00 | 1 |
| Start Time (UTCTime) | Where this command is to report an expected, future Auxiliary Controller state change, the UTCTime and Duration in Minutes values shall be calculated by the Source Device according to Remote Party Commands successfully processed by the Source Device at the time this command is created.  Where this command is to report the Auxiliary Controller’s current state, the Source Device shall report the UTCTime at which, according to the Source Device’s Clock, this Auxiliary Controller was set to this state. For clarity, this means that where a state change is not caused by the Auxiliary Controller Calendar, the Source Device shall additionally:   * record the UTCTime of that state change (‘State Change Time’); and * record, at the time of the state change, the expected time in minutes that the state is to be maintained, if that can be established, or a value of 1440 if it cannot (for example, where it is a state change caused by SMETS required defaulting behaviour). The lesser of this expected time in minutes value, or the time in minutes between the ‘State Change Time’ recorded and the now expected next change to state (in light of subsequent Remote Party Command processing leading to a duration change but not yet a state change) shall be reported in any associated ‘Duration in Minutes’ parameter.   Where, at the time of a state change, the Source Device has a Time Status of Invalid, the Source Device shall record, and so subsequently report, a value of 0xFFFFFFFF for the UTCTime (meaning, as per ZCL 2.5.2.21, invalid value of this type) and a ‘Duration in Minutes’ of 0 minutes, to indicate the error state.  Where the Auxiliary Controller has been in the reported state throughout its life, it shall report a UTCTime of 0x00000000 and a ‘Duration in Minutes’ of the lesser of 1440 minutes and any now expected next change to state (in light of Remote Party Command processing) | See ‘Meaning’ column | 4 |
| Duration In Minutes (UINT16) | See prior ‘UTCTime’ row | See ‘Meaning’ column | 2 |
| Criticality Level (UINT8) | The value specifies the cause of the Device’s current Duty Cycle value in this command, which, in line with SMETS, will be one of:   * Auxiliary Controller Calendar; * Remote Party Command(‘ECS47a Set Auxiliary Controller [n] State’); * Boost Function; or * Default Device behaviour required by SMETS when no other causes apply | 0x0A: Default Device behaviour  0x0B: Auxiliary Controller Calendar  0x0C: Remote Party Command  0x0D: Boost Function | 1 |
| Cooling Temperature Offset (UINT8) | Not used | 0xFF | 1 |
| Heating Temperature Offset (UINT8) | Not used | 0xFF | 1 |
| Cooling Temperature Set Point (INT16) | Not used | 0x8000 | 2 |
| Heating Temperature Set Point (INT16) | Not used | 0x8000 | 2 |
| Average Load Adjustment Percentage (INT8) | See value | If Auxiliary Controller [n] is an APC and a limit is currently being applied by the Source Device in the corresponding direction (so input or output as specified in Device Class), as a result of an ‘ECS47e Limit APC [n] Level’ Command, the value between 0x00 (0) and 0x64 (100) reflecting that limit as required by section 7.3.6.1.  Otherwise, 0x64(100) | 1 |
| Duty Cycle (UINT8) | See value | If Auxiliary Controller [n] is an APC and this command relates to its input, the value of ‘q’ required by section 7.3.6.1.  Otherwise, the value of ‘p’ required by section 7.3.6.1 | 1 |
| Event Control (BITMAP8) | Do not randomise | 0x00 | 1 |

Table 18.1.2.1: ZSE Load Control Event command providing current state of Auxiliary Controller [n]

**Amend Section 21 Glossary as follows:**

Communications Link

Shall have the meaning defined in SMETS.

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These changes have been drafted against ESMETS v5.1.

These changes will be applied to the next Sub-Version of the ESMETS v5.x series at the time the modification is implemented. These will also be applied to the next Sub-Version of any subsequent SMETS series introduced on or before the modification is implemented.

## Amend Section 5.29.1 as follows:

**5.29.1 HAN Interface Commands**

***5.29.1.1 Limit APC [n] Level***

A Command to cause ESME to limit APC [n]’s maximum input or output level. The Command shall include a start date-time and an end date-time, defining the ‘APC [n] Limit Period’, and a maximum input or output level, which APC [n] shall not exceed at any time in the specified period, if the Command executes successfully. Where the Command specifies an input level, all resulting actions shall be in relation to input levels. Where the Command specifies an output level, all resulting actions shall be in relation to output levels.

ESME shall reject the Command where the specified APC [n] Limit Period has a duration of more than 24 hours.

In executing the Command, ESME shall be capable of:

1. recording the Command and Outcome to the *Auxiliary Controller Event Log(5.7.5.6)*;
2. where relevant, updating the corresponding *Auxiliary Controller [n] State(5.7.5.37)* to indicate the resulting input or output level, immediately the Command has been executed; and
3. sending an Alert to that effect via its HAN Interface containing the current UTC date and time, the resulting input or output level and the start and end time of the APC [n] Limit Period.

Where the Command is successful and ESME’s current time is within a previously set APC [n] Limit Period, ESME shall set the end date-time of that previously set APC [n] Limit Period to be now, and immediately take the actions required as a result of the end date-time of the APC [n] Limit Period being reached, before taking actions related to the APC [n] Limit Period in the Command.

Where the Command is successful, ESME shall:

1. immediately, if ESME’s current time is within the APC [n] Limit Period; or
2. if the APC [n] Limit Period is in the future according to ESME’s current time, at the start date-time of the APC [n] Limit Period; and
3. at any time in the *Auxiliary Controller Calendar [INFO](5.7.4.2)* that is both within the APC [n] Limit Period and relates to the specified APC [n],

pause the timer for any active Boost Period, if the Command relates to output level and APC [n] is specified in *Boost Function Control [n](*5.26.2.1*)*, end any active APC [n] Setting Period and ensure that APC [n] is set to a maximum input or output level. If there is an active Boost Period and the Command relates to output level and APC [n] is specified in *Boost Function Control [n](*5.26.2.1*)*, then that maximum level shall be set to the level specified in the Command. Otherwise, that maximum level shall be the lesser of:

1. the input or output level specified in the Command, or
2. the input or output level defined in the *Auxiliary Controller Calendar [INFO](5.7.4.2) for that date and time.*

Should that result in a change to the maximum input or output level of APC [n], ESME shall be capable of recording that change in the *Auxiliary Controller Event Log(5.7.5.6)*.

When the end date-time of the APC [n] Limit Period is reached, or immediately where that date-time is in the past, ESME shall:

1. if it has paused the timer for any active Boost Period as a result of processing the Command, resume the timer and set the output level for APC [n] to its maximum;
2. if ESME’s current date-time is not within an active APC [n] Setting Period, be capable of:
   1. ensuring the input or output level of the APC [n] is the level defined in the *Auxiliary Controller Calendar [INFO](5.7.4.2)* for that date and time, or the maximum possible corresponding level, if no corresponding level is defined in the calendar; and
   2. sending an Alert to that effect via its HAN Interface containing the current UTC date and time and the resulting input or output level;
3. if ESME’s current date-time is within an active APC [n] Setting Period, take no further action.

***5.29.1.2 Set APC [n] Level***

A Command to cause ESME to either (1) set APC [n]’s output level, where there is no Boost Period active, and no APC [n] Limit Period, which relates to the output level, active, for APC [n]; or (2) set APC [n]’s input level, where there is no APC [n] Limit Period, which relates to the input level, active, for APC [n]. Where the Command specifies an input level, all resulting actions shall be in relation to input levels. Where the Command specifies an output level, all resulting actions shall be in relation to output levels.

The Command shall include a start date-time and an end date-time, defining the ‘APC [n] Setting Period’ over which this setting is to apply, and the input or output level which is to be set.

ESME shall reject the Command where the specified APC [n] Setting Period has a duration of more than 24 hours.

In executing the Command, ESME shall be capable of:

1. recording the Command and Outcome to the *Auxiliary Controller Event Log(5.7.5.6); and*
2. updating the corresponding *Auxiliary Controller [n] State(5.7.5.37)* to indicate the resulting maximum input or output level.

Where a Boost Period or an APC [n] Limit Period is active for APC [n], ESME shall not change its output level in executing this Command and the Command shall not be successful.

Where the Command is successful and ESME’s current time is within a previously set APC [n] Setting Period, ESME shall set the end date-time of that previously set APC [n] Setting Period to be now, and immediately take the actions required as a result of the end date-time of the APC [n] Setting Period being reached, before taking actions related to the APC [n] Setting Period in the Command.

Where the Command is successful, ESME shall immediately, if ESME’s current time is within the APC [n] Setting Period, or at the start date-time of the APC [n] Setting Period, if the APC [n] Setting Period is in the future according to ESME’s current time, set that APC [n] to the maximum input or output level specified in the Command.

When the end date-time of the APC [n] Setting Period is reached, or immediately where that date-time is in the past, ESME shall be capable of ensuring the input or output level of APC [n] is set to the maximum corresponding level defined in the *Auxiliary Controller Calendar [INFO](5.7.4.2)* for that date and time, or the maximum possible corresponding level, if no corresponding level is defined in the calendar.

**Add Section 5.29.2 as follows:**

**5.29.2 User Interface Commands**

Where ESME is required by Section 5.6.2, 5.22.1 or 5.25.1, to be capable of logging User Interface Commands received and their Outcomes, ESME shall, for all such User Interface Commands, be capable of sending Alerts, notifying such Commands received and their Outcomes, via its HAN Interface.

**Add Section 5.30 as follows:**

**5.30 Data Requirements**

This Section describes the minimum information which ESME shall be capable of holding in its Data Store.

**5.30.1 Operational Data**

***5.30.1.1 Current ALCS and APC Settings [INFO}***

For each Auxiliary Controller [n] which is either ALCS or APC, the current settings:

1. where Auxiliary Controller [n] is ALCS, being ‘open’ or ‘closed’ as commanded by ESME; and
2. where Auxiliary Controller [n] is APC, being the currently set maximum input and output levels (where input relates to energy flowing from the attached load and output relates to energy flowing to the attached load) and, where there is an active APC [n] Limit Period, the limit set on the input or output level.

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These changes have been drafted against SAPCTS v5.0.

These changes will be applied to the next Sub-Version of the SAPCTS v5.x series at the time the modification is implemented. These will also be applied to the next Sub-Version of any subsequent SMETS series introduced on or before the modification is implemented.

**Add Section 9.5.4 as follows:**

**9.5.4 User Interface Commands**

Where SAPC has a User Interface and that User Interface supports receipt of the User Interface Commands in Section 5.6.2, 9.10.1 or 9.13.1, SAPC shall, for all such User Interface Commands, be capable of sending Alerts, notifying such Commands received and their Outcomes, via its HAN Interface.