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Firmware Distribution to Suppliers for SMETS2+ Meters

Guidance

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Change History

Version Number	Status	Date of Issue	Reason for Change
0.2	Initial Creation	July 2016	The original version of this document had been created by Mark Pitchford from npower; it had been reviewed and accepted by the Technical Specification Issue Resolution Sub-group (TSIRS) in 2016. The document had been reviewed again by TSIRS on 9 July 2019 and approved for publication on the SEC website.
1.0	Final Version	03/10/2019	Editing of the document to match SECAS guidance document format.

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1 Introduction

This paper is looking to recommend a standard way of delivering firmware to Suppliers to allow deployment to meters by the most elegant process possible.

2 Background

There are a number of obligations in the SEC and its subsidiary documents which detail firmware transportation and deployment.

2.1 Service Request Processing Document

The below excerpt is taken from the SEC - Appendix AB Service Request Processing Document:

A User shall only send an 'Update Firmware' Service Request in respect of a Device or a SMETS1 CH if:

- a) *the User has received the following information:*
 - i) *the OTA Header and the associated replacement Manufacturer Image;*
 - ii) *a Digital Signature, created by the person who created the Manufacturer Image, across the concatenation of the OTA Header and the associated replacement Manufacturer Image; and*
 - iii) *the Hash of the replacement Manufacturer Image*

2.2 GB Companion Specification (GBCS)

GBCS Section 11 defines the Over-The-Air (OTA) Upgrade Image, the details are shown in Figure 1:

OTA HEADER						UPGRADE IMAGE			
OTA upgrade file identifier	OTA Header version	OTA Header length	OTA Header Field control	Manufacturer code	Image type	Manufacturer Image	Force Replace	0x40	Authorising Remote Party Signature
File version	ZigBee Stack version	OTA Header string	Total Image size	Minimum hardware version	Maximum hardware version				

Figure 1 – OTA Upgrade Image

2.3 DCC User Interface Specification (DUIS)

The OTA Upgrade Image is used to populate the DUIS Service Request 11.1 'Update Firmware':

```
< UpdateFirmware>
  <sr:FirmwareImage> xs:base64Binary </sr:FirmwareImage>
  <sr:FirmwareVersion> sr:FirmwareVersion </sr:FirmwareVersion>
  <sr:DeviceIDList> xs:string </sr:DeviceIDList>
</sr:Update Firmware>
```

2.4 Supplier

In order to carry out a firmware upgrade a Supplier needs the following pieces of information:

- Manufacturer Image
- Manufacturer Signature
- OTA Header
- Hash
- Supplier Signature

Figure 2 below shows these items of information.

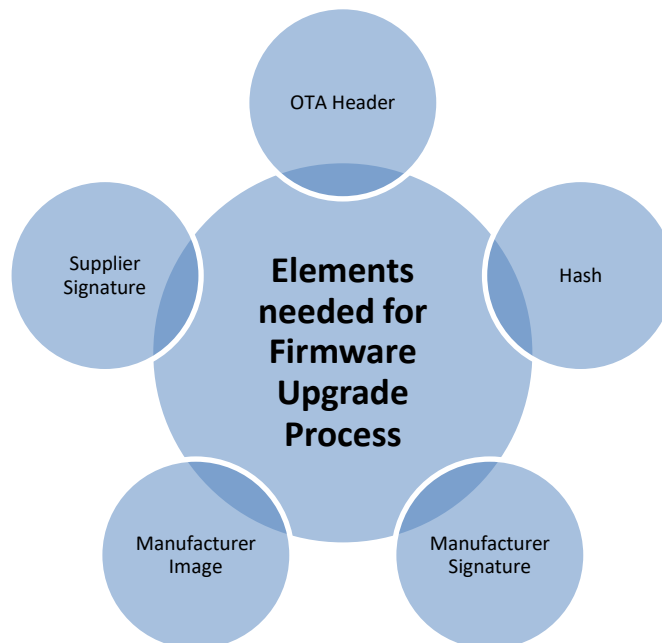


Figure 2 – Elements for Firmware Upgrade

Suppliers are responsible to transform the manufacturer provided elements into the GBCS format and then into the DUIS format.

These different elements could be delivered in a number of different ways to the Supplier:

1. Separately
2. In GBCS format as one file
3. In some other combined format

3 Option 1 - Separately

This would involve the manufacturer delivering the elements as separate files as shown in Figure 3 below:

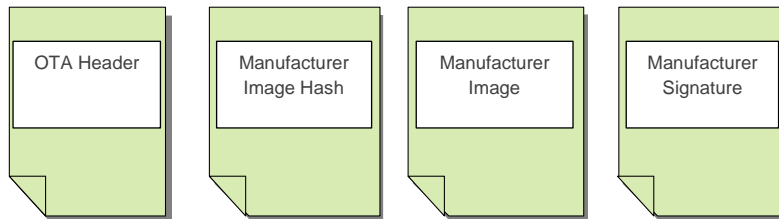


Figure 3 – Option 1, separate delivery

However, Suppliers would need to perform some manipulation of these files before any signature could be verified. Suppliers would also need to construct the GBCS OTA Upgrade Image themselves.

4 Option 2 - GBCS Format

The manufacturer would send a 'GBCS format' file to the Supplier as shown in Figure 4 below. Note that the 'Authorising Remote Party Signature' shown in Figure 4 is that of the manufacturer in order to satisfy the requirements arising from SEC - Appendix AB (see Section 2 a) ii) above):

OTA HEADER						UPGRADE IMAGE			
OTA upgrade file identifier	OTA Header version	OTA Header length	OTA Header Field control	Manufacturer code	Image type	Manufacturer Image	Force Replace	0x40	Authorising Remote Party Signature
File version	ZigBee Stack version	OTA Header string	Total Image size	Minimum hardware version	Maximum hardware version				

Figure 4 – Option 2, GBCS format

Suppliers would need to extract the OTA Header and the Manufacturer Image portions of the file to be able to verify the Manufacturer Signature.

Suppliers must replace the received Manufacturer Signature with their own signature that matches the certificate within the Trust Anchor Cell on the target device.

5 Option 3 - Combination

Due to the SEC requirement to deliver a Manufacturer Image and OTA Header with a signature calculated across both, it would seem sensible to deliver this as one file and the Hash as a separate file as shown in Figure 5 below:

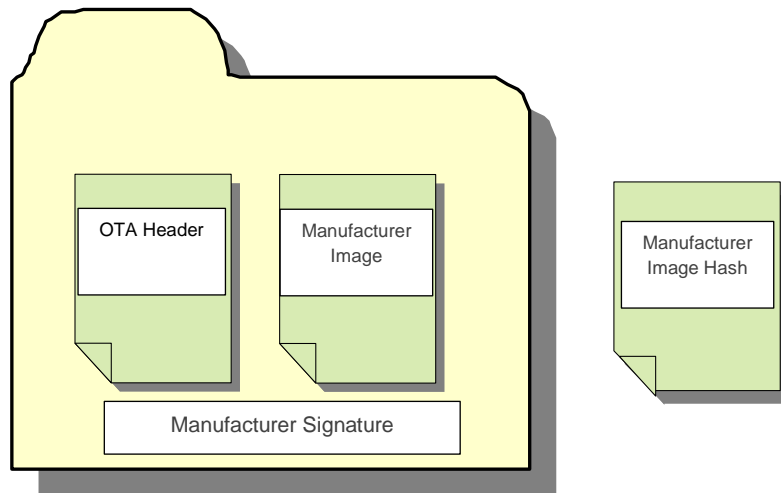


Figure 5 - Combination

This option seems to minimise the number of operations required to validate the Manufacturer Signature. However, this will also add complexity when Suppliers need to generate the subsequent GBCS commands.

6 Recommended Option

Due to the requirements in GBCS and the SEC, Suppliers recommend that Option 1 is the preferred approach for meter manufacturers to deliver the various elements required to effect a firmware upgrade on a device.

This option gives the most flexibility in meeting the requirements imposed by the SEC and GBCS.