
	American Electric Power	4.5 Advanced Metering Infrastructure	Document ID: Use case # 5.8
	Title: Remote Meter Firmware Upgrade		
Subject Matter Expert:	Author:	Reviewed by:	
Robert Sarfi	John Simmins	Brian D. Green	

Remote Meter Firmware Update

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Version History			
Rev.	Date	Author	Change description
2.0	4-11-2010	J. Simmins	Original Use Case
3.2	5-14-2010	B. D. Green	Revisions and add diagrams
3.3	5-07-2012	R.T. Cunningham	Sequence table and diagram changes


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Summary:

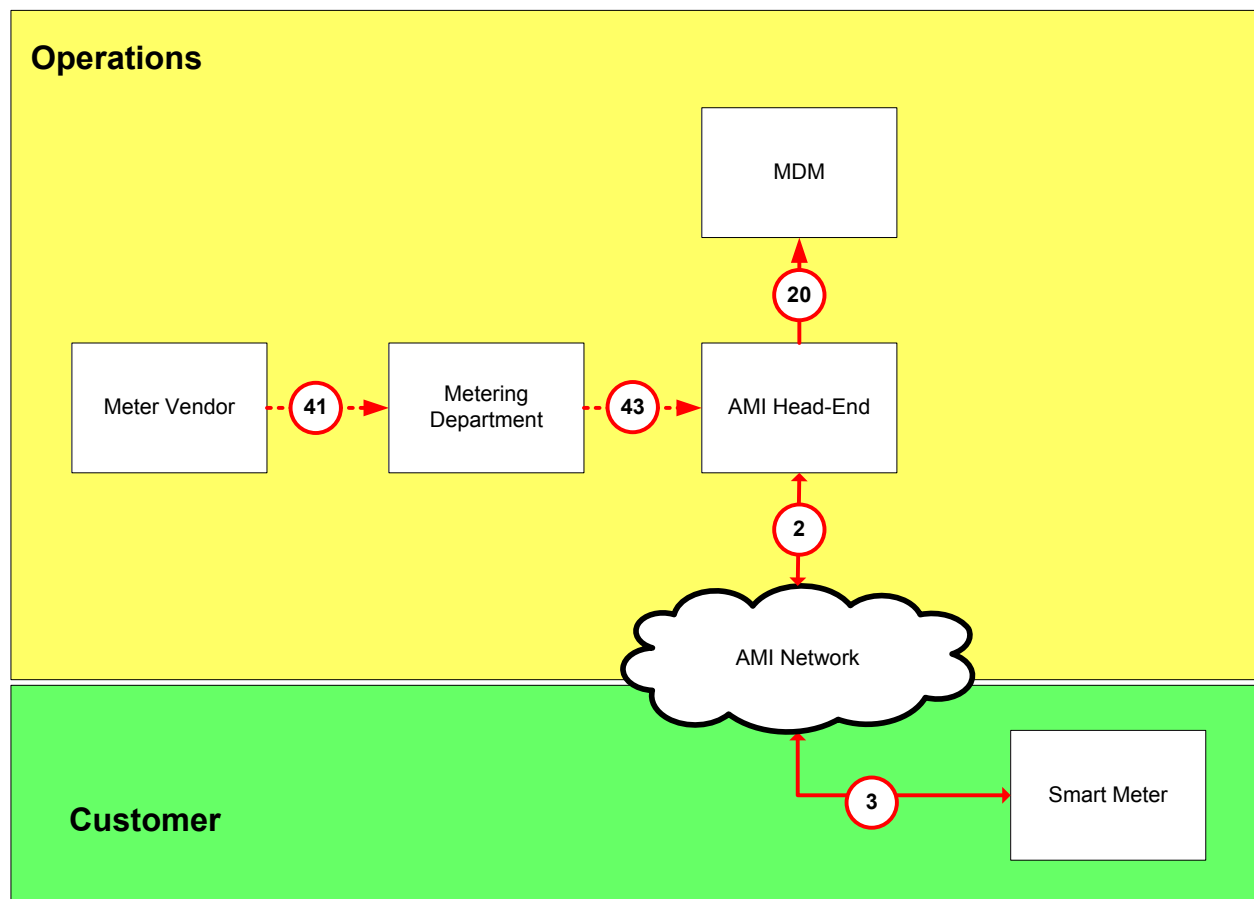
This use case describes how the Smart Meter's firmware can be upgraded remotely via the AMI Network.

Narrative:

Once an upgrade for the meter metrology firmware is made available, all meters within the AMI network can be upgraded automatically through the AMI network. The **Metering Department** personal will trigger and supervise this process as executed via the **AMI Head-End** to the in-scope **Smart Meters**. Essentially a proprietary functionality offered by the AMI vendor, the meter firmware upgrade process is self-managing and happens over several days. Once a meter has received the upgrade file and applied the new firmware to its **Metrology Board**, the confirmation of the upgrade process comes back thru the **AMI Head-End via the Network** and is stored in **Meter Data Management (MDM)**


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Interface Diagram:



Note(s):

The NIC and Meter Metrology Board are components of the Smart Meter.

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Actor(s):

The list of the actors and the roles that are participating in this use case described in the table below.

Name	Role description
AMI Head-End	The AMI Head-End is part of the total Advanced Metering Infrastructure, which serves as a repository for data extracted from the meters and manages routing and schedules of the network.(It is the brain of the AMI system)
NIC	The NIC is a plug-in board to the host meter that provides AMI communication. The Network Interface Card within the Smart Meter has different elements (ESI & NIC). The NIC provides communications with the Metering System. The ESI provides communications with the Home Area Network (HAN).
MDM	Consolidated information from Meters for this use case
Meter Metrology Board	The board, internal to the Smart Meter, on which the functions of the Smart Meter are configured and performed.


Participating Business Functions:

The participating business function, its acronym and what they provide in this use case are detailed in the table below.

Acronym	Business Function/Abstract Component	Services or Information Provided

Assumptions / Design Considerations:


- Standard International Electrotechnical Commission (IEC) 61968 Message Definition format will be followed to provide the Header, Request, Reply, and payload used when defining the messages for the design specifications. For the purpose of the use cases identified in this document these have been omitted as they are to be provided in the design specification for the Remote Meter Firmware Update use case.

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Normal Sequence:

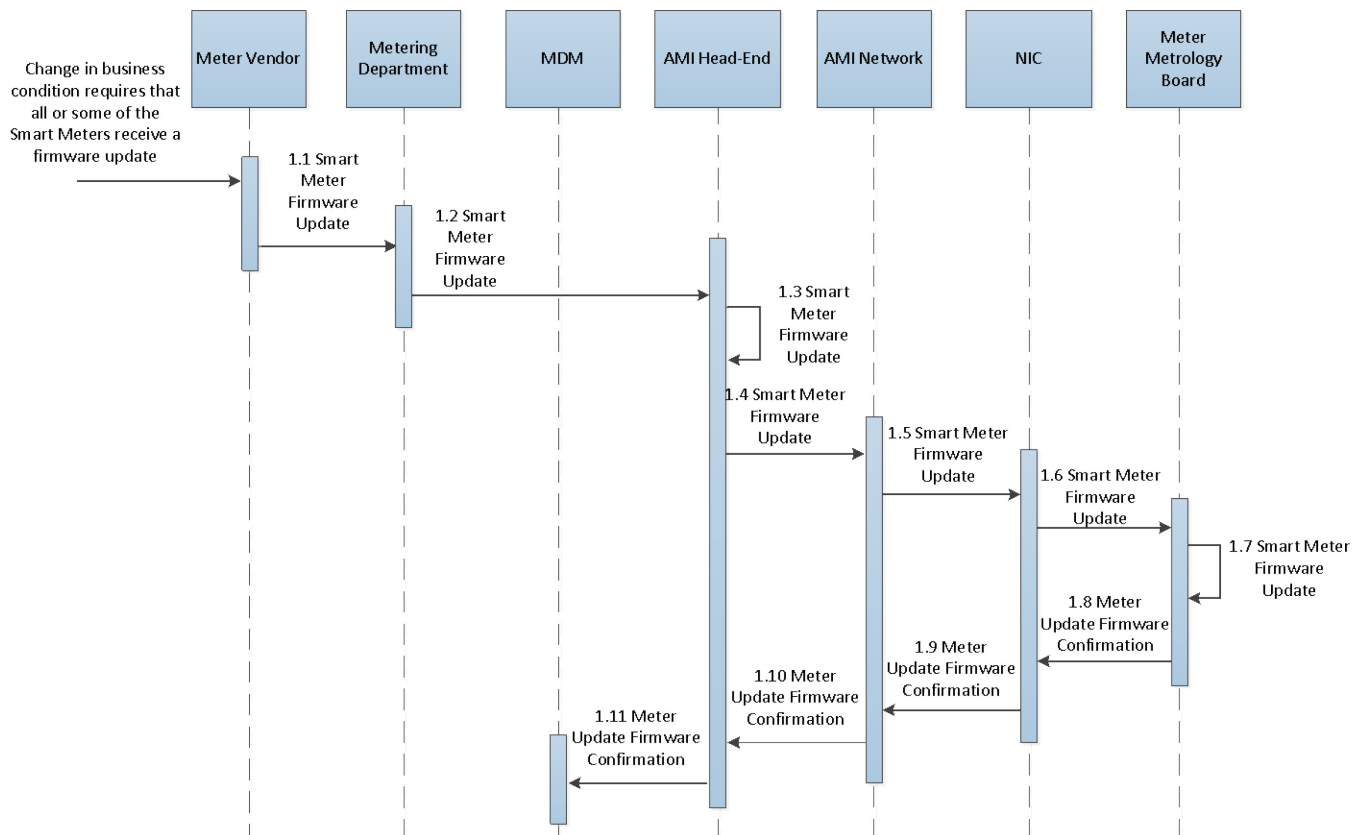
The sequences of events, showing the order in which they occur during the typical progression of this use case are provided in the table below. The Sequence Diagram that graphically depicts the events is presented immediately following the table.

Use Case Step	Triggering Event	Description Of Process	Information To Be Exchanged	Producer	Receiver	Message Type
1.1	Change in business condition requires that all or some of the Smart Meters receive a firmware update	Smart Meter Firmware Update loaded into the AMI Head-End via Metering Department	Smart Meter Firmware Update	Meter Vendor	Metering Department	proprietary
1.2		Smart Meter Firmware Update loaded into the AMI Head-End via Metering Department	Smart Meter Firmware Update	Metering Department	AMI Head-End	proprietary
1.3		AMI Head-End executes Smart Meter Firmware Update process	Smart Meter Firmware Update	AMI Head-End	Internal	proprietary
1.4		AMI Head-End sends request to AMI Network using the AMI Network Use Case	Smart Meter Firmware Update	AMI Head-End	AMI Network	proprietary
1.5		AMI Network provides new Smart Meter Firmware Update to NIC	Smart Meter Firmware Update	AMI Network	NIC	proprietary
1.6		NIC provides new Smart Meter Firmware Update to Meter Metrology Board	Smart Meter Firmware Update	NIC	Meter Metrology Board	Write ANSI C12.19 Table Data Element or proprietary
1.7		Meter Metrology Board loads new Smart Meter Firmware Update and gets firmware updated	Smart Meter Firmware Update	Meter Metrology Board	Internal	

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Use Case Step	Triggering Event	Description Of Process	Information To Be Exchanged	Producer	Receiver	Message Type
1.8	Meter Firmware Updated	Meter Metrology Board sends Meter Firmware Update Confirmation to NIC	Meter Firmware Update Confirmation	Meter Metrology Board	NIC	firmware update response: ANSI C12.19 Table Data Element or proprietary
1.9		NIC sends Meter Firmware Update Confirmation to AMI Head-End via AMI Network	Meter Firmware Update Confirmation	NIC	AMI Network	proprietary
1.10		AMI Network routes Meter Firmware Update Confirmation to AMI Head-End	Meter Firmware Update Confirmation	AMI Network	AMI Head-End	proprietary
1.11		AMI Head-End sends Meter Firmware Update Confirmation to MDM	Meter Firmware Update Confirmation	AMI Head-End	MDM	

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Remote Firmware Upgrade Sequence Diagram

Integration Scenarios

Adapters will use the Common Information Model (CIM) in Extensible Markup Language (XML) to send and receive messages and events.

The following are the points of integration that must be tested for this use case. Other non-CIM message interfaces may be testable in this use case.

Actor	Interface Points
AMI Head-End	<ul style="list-style-type: none"> NIC MDM
NIC	<ul style="list-style-type: none"> Meter Metrology Board

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Pre-conditions:

The following conditions that MUST be met before this use case can occur.

- AMI Network communications are in place

Post-conditions:

The following events or actions that may happen after or be caused by the completion of the normal use case events, as well as the exceptions or alternative sequences are:

- The Meter Metrology Board is now operating with an updated firmware version..

Exceptions / Alternate Sequences: None


Use Case Step	Triggering Event	Description Of Process	Information To Be Exchanged	Producer	Receiver	Message Type

Message Type(s) Diagram: None

An XML Schema Definition (XSD) diagram shows the normative and informative parts of the message. Not all of the International Electrotechnical Commission's (IEC) – CIM message optional elements must or will be used in the use of IEC – CIM for this specific use case.

References:

Use Cases or other documentation referenced by this use case include:.

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Issues: None

ID	Description	Status

Miscellaneous Notes: None