

Remote Programming of Smart Meter

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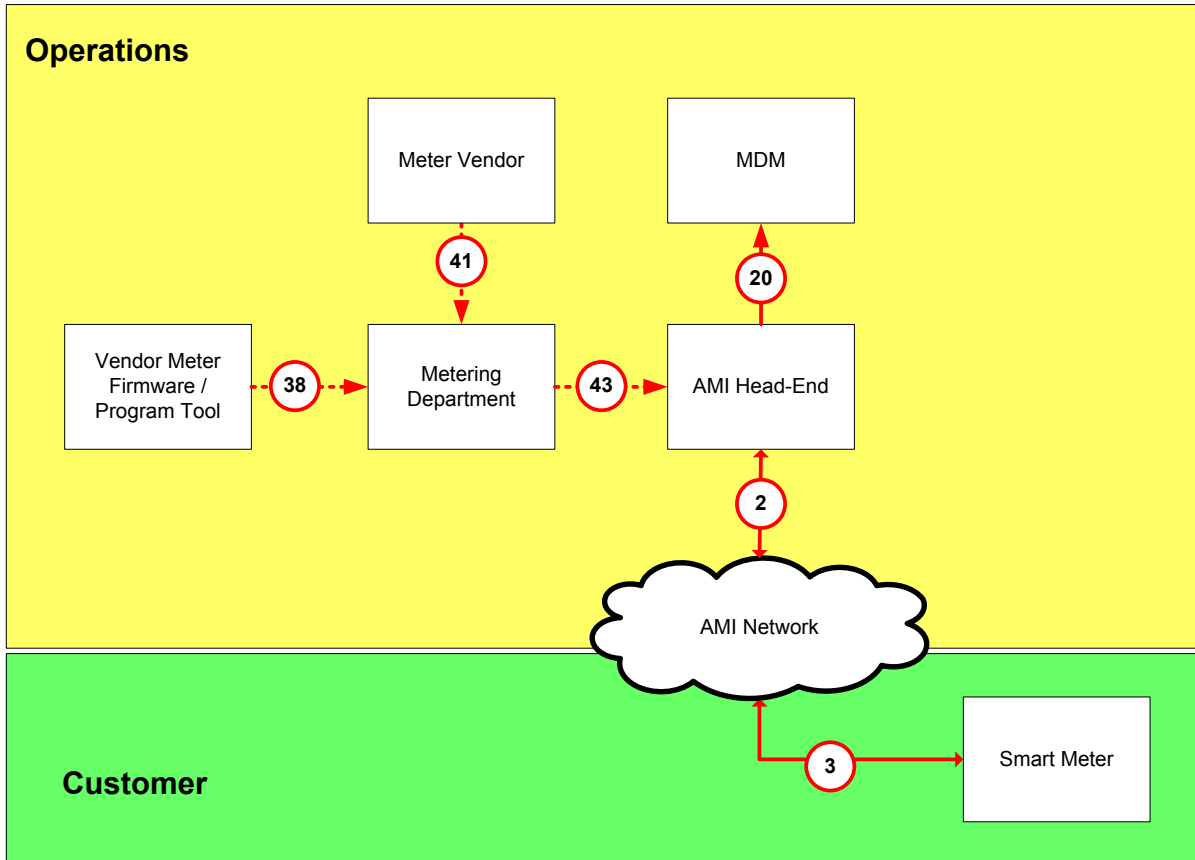
Summary:

Whether it is to update metering interval, pricing schemes, reporting or management functions; the Smart Meter is adaptive to the utility changing environment and has the capacity to be remotely programmed via the AMI network. This use case explains how this remote programming is performed.

Narrative:

Once an upgrade for the meter metrology program 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 program 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)**

Interface Diagram:



Note(s):

The NIC and the Meter Metrology Board are all parts of the Smart Meter.

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)
MDM	Consolidated information from Meters ffor 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.
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 (NIC & ESI). The NIC provides communications with the Metering System. The ESI provides communications with the Home Area Network (HAN).
Smart Meter	A Smart Meter is an electronic meter equipped with a NIC. A Smart Meter measures multiple electrical quantities and can store usage based on time intervals. The Smart Meter is a 2-way communicating device that is part of an advanced metering infrastructure (AMI). It is located on the customer premise.
Vendor Meter Firmware / Program Tool	A tool to develop meter programs. These programs are then loaded into the AMI Head-End. It also could be used in the field for direct meter updates

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 Programming of Smart Meter use case.

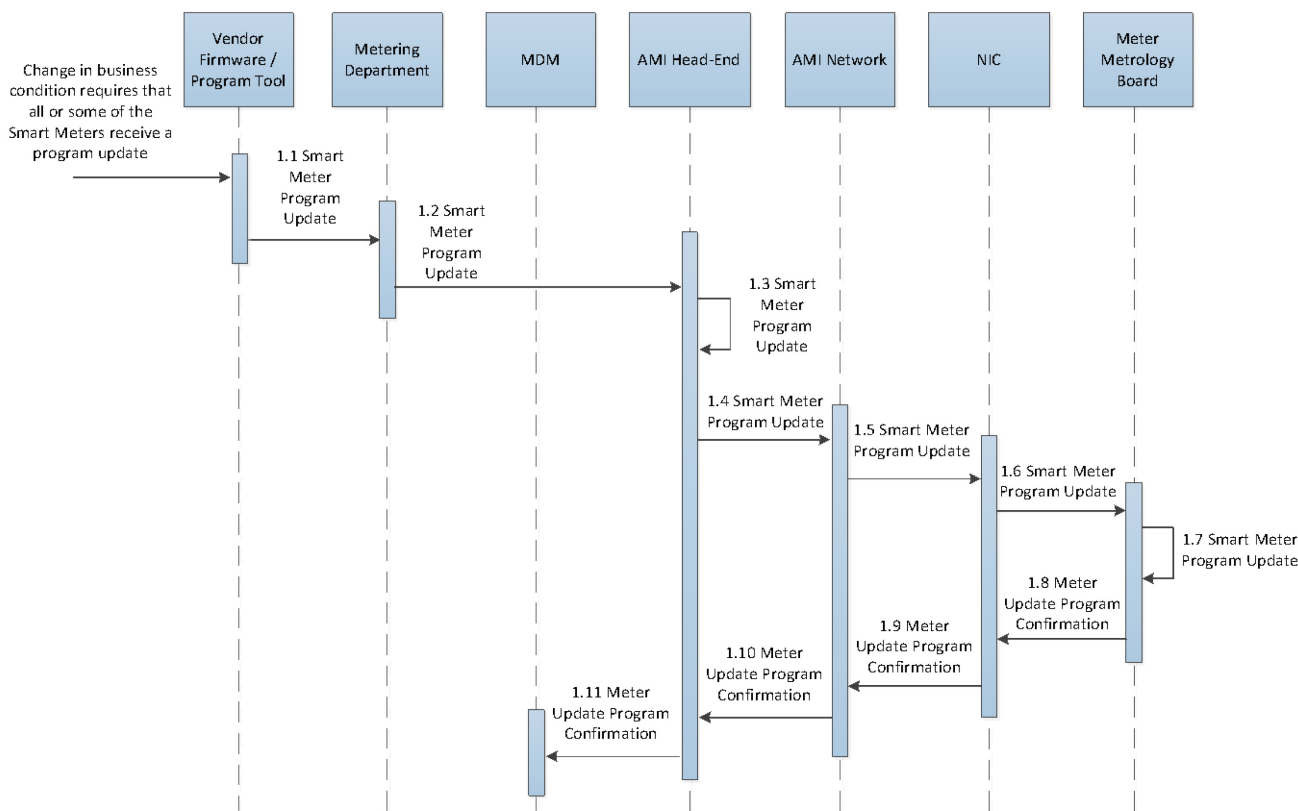
Normal Sequence:

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.

S1: Remote Programming of Smart Meter.

Use Case Step	Triggering Event	Description Of Process	Information To Be Exchanged	Producer	Receiver	Message Type or Additional Notes
1.1	Change in business condition requires that all or some of the Smart Meters receive a programming update	Smart Meter Program Update loaded into the AMI Head-End via Metering Department	Smart Meter Program Update	Vendor Meter Firmware / Program Tool	Metering Department	proprietary
1.2		Smart Meter Program Update loaded into the AMI Head-End via Metering Department	Smart Meter Program Update	Metering Department	AMI Head-End	proprietary
1.3		AMI Head-End executes Smart Meter Program Update process	Smart Meter Program Update	AMI Head-End	Internal	proprietary
1.4		AMI Head-End sends Meter Programming Update request to NIC via AMI Network	Smart Meter Program Update	AMI Head-End	AMI Network	proprietary

Use Case Step	Triggering Event	Description Of Process	Information To Be Exchanged	Producer	Receiver	Message Type or Additional Notes
1.5		AMI Network routes Meter Programming Update request to NIC	Smart Meter Program Update	AMI Network	NIC	proprietary
1.6		NIC provides new program file to Meter Metrology Board	Smart Meter Program Update	NIC	Meter Metrology Board	firmware update: ANSI C12.19 Table Data Element or proprietary
1.7	Receives new meter program file	Meter Metrology Board loads new program file and gets updated	Smart Meter Program Update	Meter Metrology Board	Internal	
1.8		Meter Metrology Board sends Meter update confirmation to NIC	Meter Update Confirmation	Meter Metrology Board	NIC	firmware update response: ANSI C12.19 Table Data Element or proprietary
1.9		NIC sends meter update confirmation to AMI Head-End via AMI Network	Meter Update Confirmation	NIC	AMI Network	proprietary
1.10		AMI Network routes meter update confirmation to AMI Head-End	Meter Update Confirmation	AMI Network	AMI Head-End	proprietary
1.11		AMI Head-End sends Meter Program Update Confirmation to MDM	Meter Update Confirmation	AMI Head-End	MDM	



Remote Meter Programming 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
Vendor Meter Firmware / Programming Tool	<ul style="list-style-type: none"> AMI Head-End
AMI Head-End	<ul style="list-style-type: none"> NIC MDM
NIC	<ul style="list-style-type: none"> Meter Metrology Board

Pre-conditions:

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

- The AMI system is operating in normal mode

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 new Smart Meter program is now loaded
- The AMI Head-End now has proper status of the remote meter programming and current program.

Exceptions / Alternate Sequences:

There are no exceptions, unusual events or alternate sequences defined for this use case.

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:

Issues: None

ID	Description	Status

Miscellaneous Notes: None