Remote NIC - ESP Firmware Upgrades

Version 3.0

May 14th, 2010

1   Descriptions of Function

All prior work (intellectual property of the company or individual) or proprietary (non-publicly available) work should be so noted.

1.1   Function Name

Remote Firmware Upgrade

1.2   Function ID

Identification number of the function

1.3   Brief Description

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

1.4   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 Utility's Network Operations Center (NOC)*** personal will trigger and supervise this process executed by the ***AMI Head-End*** and the rest of the AMI system. Essentially a proprietary functionality offered by the AMI vendor, the 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 network and is stored into the ***NMS/Validate*** function. The ***Utility's NOC*** personnel interact with the ***NMS/validate*** functionality in order to monitor the upgrade process.
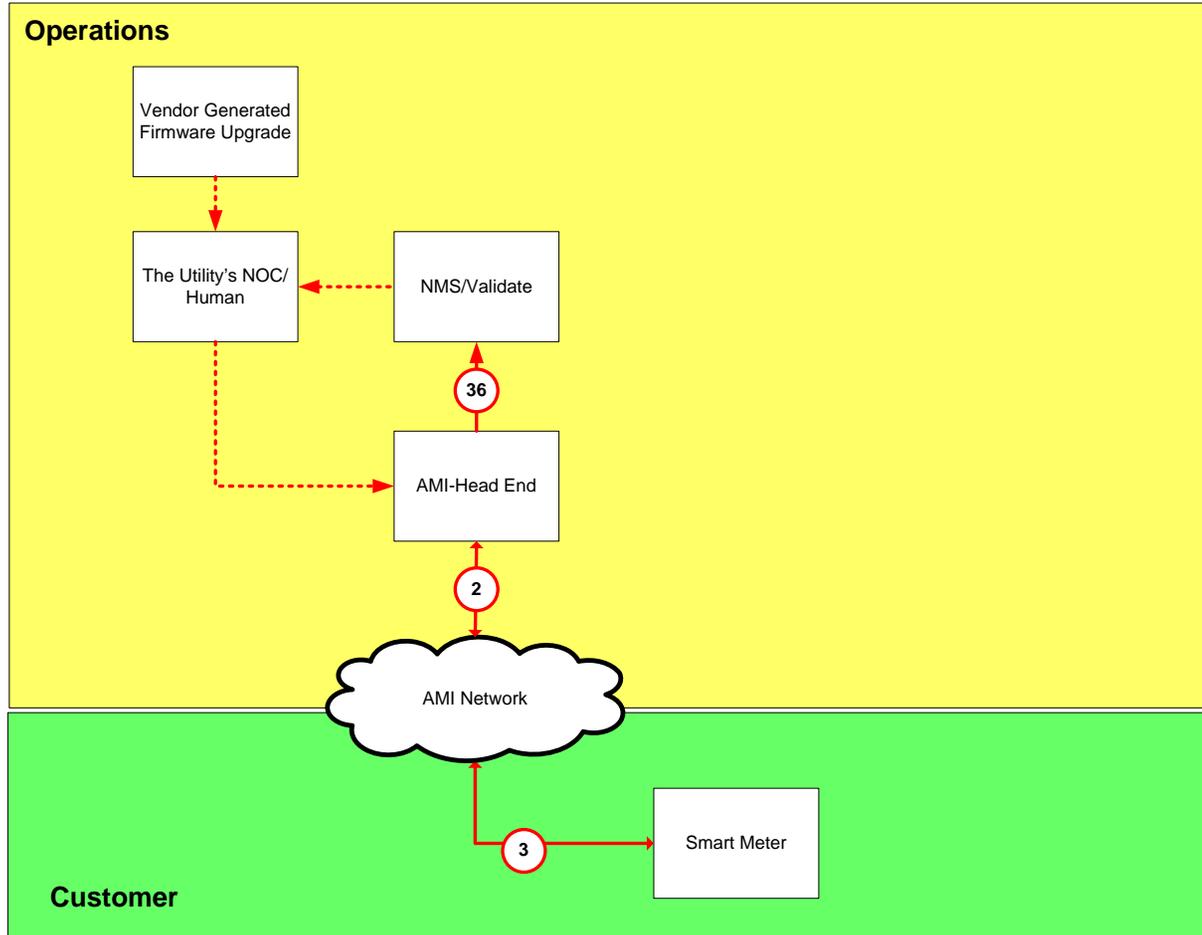
Figure 1-1
Context Diagram for Remote Programming of Smart Meter NIC

1.5 Actor (Stakeholder) Roles

Grouping (Community) '		Group Description

Actor Name	Actor Type (person, organization, device, system, or subsystem)	Actor Description
AMI Head-End	System	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-ESP	Device	The NIC is a plug-in board to the host meter that provides AMI communication. The Network Interface Card within the Smart Meter has 32 elements (NIC-ESI & NIC-ESP). The NIC-ESP provides communications with the Metering System. The NIC-ESI provides communications with the Home Area Network (HAN).
Meter Metrology Board	Device	The board, internal to the Smart Meter, on which the functions of the Smart Meter are configured and performed.
GE MeterMate	Sub-system	MeterMate is 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

1.6 Information exchanged

Information Object Name	Information Object Description
Smart Meter Firmware Update	An update of the Smart Meter's firmware
Meter Firmware Update Confirmation	Confirmation that the firmware update has been successfully completed

1.7 Activities/Services

Activity/Service Name	Activities/Services Provided

1.8 Contracts/Regulations

Contract/Regulation	Impact of Contract/Regulation on Function

Policy	From Actor	May	Shall Not	Shall	Description (verb)	To Actor

Constraint	Type	Description	Applies to

2   Step by Step Analysis of Function

Describe steps that implement the function. If there is more than one set of steps that are relevant, make a copy of the following section grouping (Steps to implement function, Preconditions and Assumptions, Steps normal sequence, Post-conditions) and provide each copy with its own sequence name.

2.1 Steps to implement function – Name of Sequence

Name of this sequence.

2.1.1 Preconditions and Assumptions

Actor/System/Information/Contract	Preconditions or Assumptions
Ami Network	AMI Network Communications are in place

2.1.2 Steps – Name of Sequence

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environment
#	*Triggering event? Identify the name of the event.[1]*	*What other actors are primarily responsible for the Process/Activity? Actors are defined in section0.*	*Label that would appear in a process diagram. Use action verbs when naming activity.*	*Describe the actions that take place in active and present tense. The step should be a descriptive noun/verb phrase that portrays an outline summary of the step. "If …Then…Else" scenarios can be captured as multiple Actions or as separate steps.*	*What other actors are primarily responsible for Producing the information? Actors are defined in section0.*	*What other actors are primarily responsible for Receiving the information? Actors are defined in section0.* *(Note – May leave blank if same as Primary Actor)*	*Name of the information object. Information objects are defined in section 1.6*	*Elaborate architectural issues using attached spreadsheet. Use this column to elaborate details that aren't captured in the spreadsheet.*	*Reference the applicable IECSA Environment containing this data exchange. Only one environment per step.*
1.1	Change in business condition requires that all or some of the Smart Meters receive a firmware update	GE MeterMate	Load Smart Meter firmware update	Metering Department receives/develops Smart Meter Firmware Update via GE MeterMate and loads Smart Meter Firmware Update to the AMI Head-End	GE MeterMate	AMI Head-End	Smart Meter Firmware Update	proprietary	

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[1] Note – A triggering event is not necessary if the completion of the prior step – leads to the transition of the following step.

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environment
1.2		AMI Head-End	AMI Head-End firmware update process	AMI Head-End executes Smart Meter Firmware Update process	AMI Head-End	AMI Head-End	Smart Meter Firmware Update	proprietary	
1.3		AMI Head-End	AMI Head-End sends request to AMI Network	AMI Head-End sends request to AMI Network using the AMI Network Use Case	AMI Head-End	AMI Network	Smart Meter Firmware Update	proprietary	Use AMI Network Use Case
1.4		Metering System	Provides new program file to NIC-ESP	AMI Network provides new Smart Meter Firmware Update to NIC-ESP	AMI Network	NIC-ESP	Smart Meter Firmware Update	proprietary	Use AMI Network Use Case
1.5		NIC-ESP	Provides new program file to Meter Metrology Board	NIC-ESP provides new Smart Meter Firmware Update to Meter Metrology Board	NIC-ESP	Meter Metrology Board	Smart Meter Firmware Update		
1.6		Meter Metrology Board	Meter Metrology Board loads new program file	Meter Metrology Board loads new Smart Meter Firmware Update and gets firmware updated	Meter Metrology Board	Meter Metrology Board	Smart Meter Firmware Update		
1.7		Meter Metrology Board	Meter Metrology Board sends firmware update confirmation	Meter Metrology Board sends Meter Firmware Update Confirmation to NIC-ESP	Meter Metrology Board	NIC-ESP	Meter Firmware Update Confirmation		

| #	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environment
1.8		NIC-ESP	NIC- ESP sends meter firmware update confirmation	NIC-ESP sends Meter Firmware Update Confirmation to AMI Network	NIC-ESP	AMI Network	Meter Firmware update Confirmation	proprietary	Use AMI Network Use Case
1.9		AMI Network	Firmware update confirmation to AMI Head-End	AMI Network sends Meter Firmware Update Confirmation to AMI Head-End	AMI Network	AMI Head-End	Meter Firmware update Confirmation	proprietary	Use AMI Network Use Case
1.10		AMI Head-End	AMI Head-End delivers	AMI Head-End delivers Meter Firmware Confirmation to MDM	AMI Head-End	MDM	Meter Firmware update Confirmation	proprietary	

2.1.3 Post-conditions and Significant Results

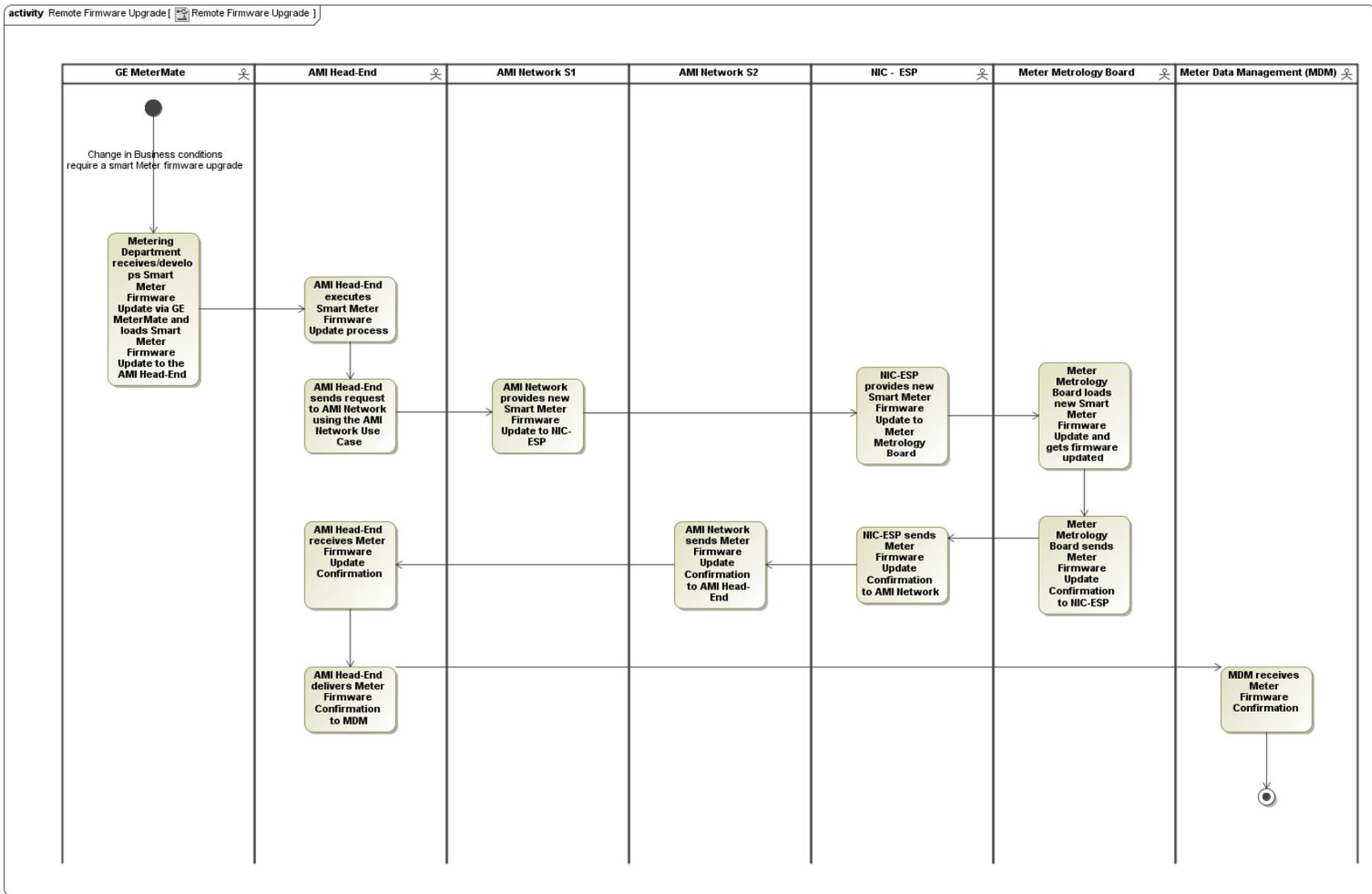| Actor/Activity	Post-conditions Description and Results
Meter Metrology Board	Now is operating with an updated firmware version

2.2 Architectural Issues in Interactions

Elaborate on all architectural issues in each of the steps outlined in each of the sequences above. Reference the Step by number.

2.3 Diagrams
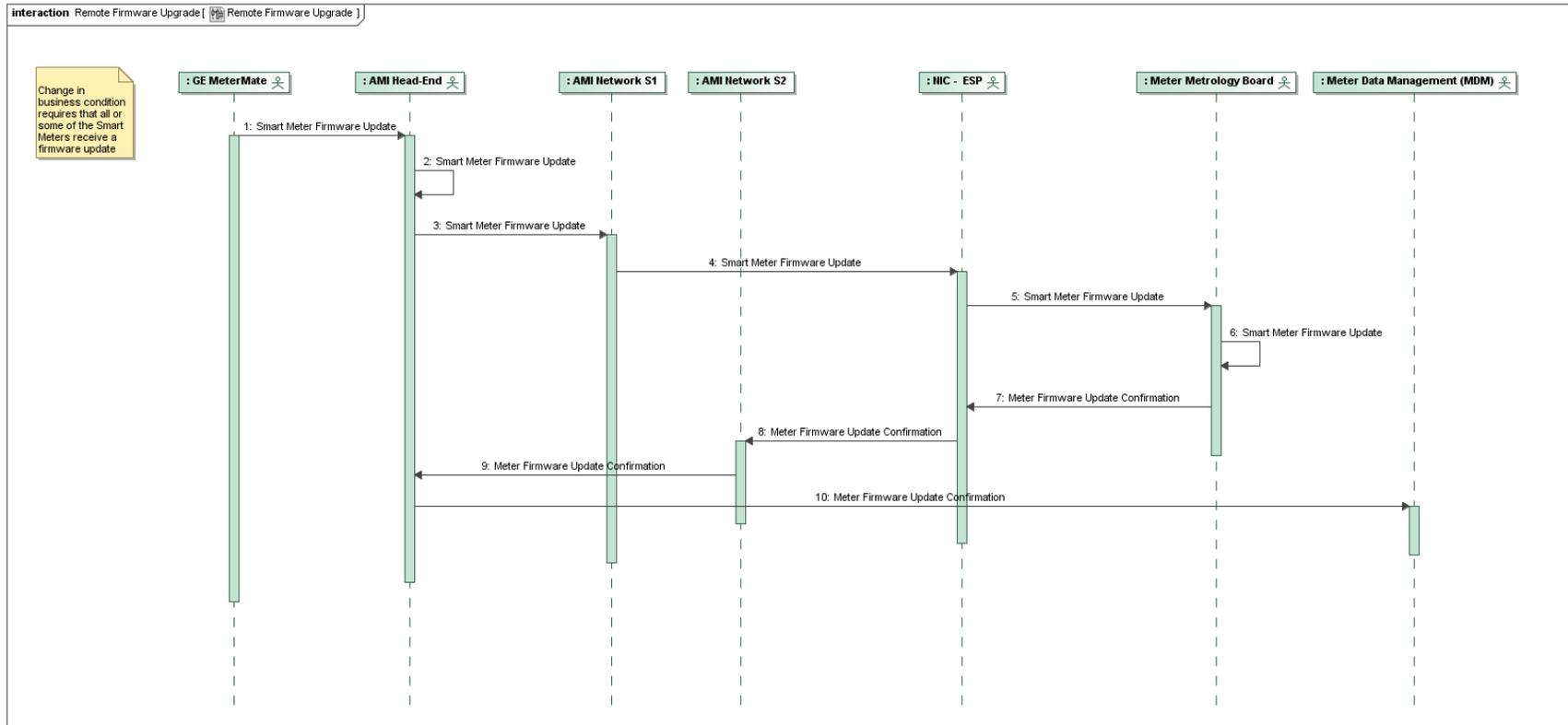
Remote Firmware Upgrade Sequence Diagram

Remote Firmware Upgrade Activity Diagram

3 Auxiliary Issues

3.1 References and contacts

ID	Title or contact	Reference or contact information
[1]		
[2]		

3.2 Action Item List

ID	Description	Status
[1]		
[2]		

3.3 Revision History

No	Date	Author	Description
2.0	4-11-2010	J. Simmins	Original Use Case
3.0	5-14-2010	B. D. Green	Revisions and add diagrams