Field Meter Programming and Meter Firmware Upgrades

Version 3

April 21st, 2010

1 Descriptions of Function

The Metering System enables meter programming and meter firmware upgrade locally in the field.

1.1 Function Name

Field Meter Programming and Meter Firmware Upgrades

1.2 Function ID

Identification number of the function

1.3 Brief Description

Each Meter has a secured optical port that can be interfaced and programmed with a computer equipped with GE MeterMate. A utility meter technician can connect the GE MeterMate to the Smart Meter via the optical port and upload (apply) programming and firmware upgrades.

1.4 Narrative

A Smart meter can have its firmware upgraded through the Smart meter's Opticom port. The Meter electrician will load new firmware through the ***GE MeterMate*** software using a laptop computer equipped with an Opticom probe. The meter will acknowledge the successful competition or the failure. The ***AMI Head-End*** system will receive an acknowledgment of the program change upon completion or failure.

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)
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
Metering System	System	Also called Advanced Metering Infrastructure it is the collection of devices (such as Smart Meters), systems (such as Meter Management System (MDM)) and sub-systems (such as relays or Access points) that enable the automated metering solution
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).
ODS	System	Operational Data Storage for meter events, etc.
Meter Metrology Board	Device	The board, internal to the Smart Meter, on which the functions of the Smart Meter are configured and performed.
Vendor	Organization	The Vendor provides the AMI application.

Grouping (Community)		*Group Description*
Actor Name	*Actor Type (person, organization, device, system, or subsystem)*	*Actor Description*

1.6 Information exchanged

Describe any information exchanged in this template.

Information Object Name	*Information Object Description*
New program file for meter programming	New program file that is transmitted from the AMI Head-End application to each Smart Meter of a group thru the AMI network.
Meter Update Confirmation	Confirmation coming from every Smart Meter that the programming update was applied successfully or failed.
Meter Upgrade Information	Information concerning the current firmware/programming of each Smart Meter

1.7 Activities/Services

Describe or list the activities and services involved in this Function (in the context of this Function). An activity or service can be provided by a computer system, a set of applications, or manual procedures. These activities/services should be described at an appropriate level, with the understanding that sub-activities and services should be described if they are important for operational issues, automation needs, and implementation reasons. Other sub-activities/services could be left for later analysis.

Activity/Service Name	*Activities/Services Provided*

1.8 Contracts/Regulations

Identify any overall (human-initiated) contracts, regulations, policies, financial considerations, engineering constraints, pollution constraints, and other environmental quality issues that affect the design and requirements of the Function.

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

Filed Meter Programming Firmware Update

2.1.1 Preconditions and Assumptions

Describe conditions that must exist prior to the initiation of the Function, such as prior state of the actors and activities

Actor/System/Information/Contract	*Preconditions or Assumptions*

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 section1.5.*	*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 section1.5.*	*What other actors are primarily responsible for Receiving the information? Actors are defined in section1.5.* *(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.*
	Metering Department sends metering technician to locally update one or more Smart Meters			Metering Technician connects computer with GE MeterMate software to the Smart Meter to receive the upgrade					

[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
1.1		GE MeterMate	GE MeterMate pushes new firmware to the Smart Meter	GE MeterMate pushes new firmware/program to Meter Metrology Board via the Smart Meter Optical Port	GE MeterMate	Meter Metrology Board	MeterMate .pro file C12.18 C12.19 data structure proprietary	firmware upgrade process may use manufacturing tables	
1.2		Meter Metrology Board	Loads new firmware/program	Meter Metrology Board loads new firmware/program	Meter Metrology Board	Meter Metrology Board	MeterMate .pro file C12.18 C12.19 data structure proprietary	C12.19 data structure proprietary	
1.3 A.1		Meter Metrology Board	Sends Meter Update Confirmation to NIC-ESP	Meter Metrology Board sends Meter Update Confirmation to NIC-ESP	Meter Metrology Board	NIC-ESP	Meter Update Confirmation	C12.18, C12.19	
1.3 B.1		Meter Metrology Board	Sends Meter Update Confirmation to the GE MeterMate software	Meter Metrology Board sends Meter Update Confirmation to the GE MeterMate software	Meter Metrology Board	GE MeterMate software	Meter Update Confirmation	C12.18, C12.19	
1.4		NIC-ESP	Sends Meter Update Confirmation	NIC-ESP sends Meter Update Confirmation to Metering System	NIC-ESP	Metering System	Meter Update Confirmation	proprietary	
1.5		Metering System	Sends Meter Update Confirmation	Metering System sends Meter Update Confirmation to AMI Head-End	Metering System	AMI Head-End	Meter Update Confirmation	proprietary	Use AMI Network Use Case

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environment
1.6		AMI Head-End	AMI Head-End sends Meter Update Confirmation to ODS	AMI Head-End sends Meter Upgrade Information to ODS	AMI Head-End	ODS	Meter Upgrade Information		

2.1.3 Post-conditions and Significant Results

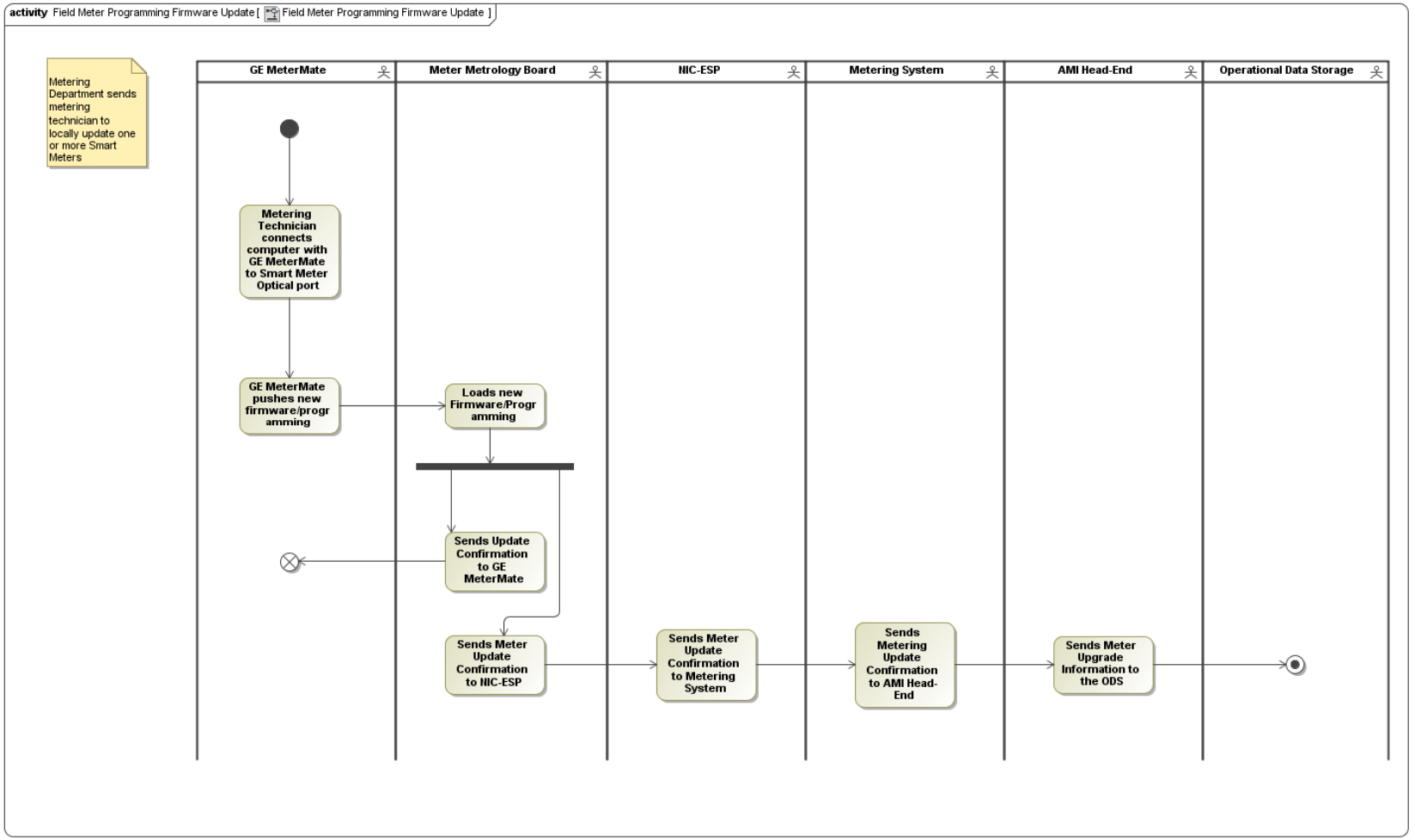
Describe conditions that must exist at the conclusion of the Function. Identify significant items similar to that in the preconditions section.

Actor/Activity	*Post-conditions Description and Results*
Smart Meter	New firmware/program loaded unless it failed
AMI Head-End	Proper status of the new meter firmware/program and current program version

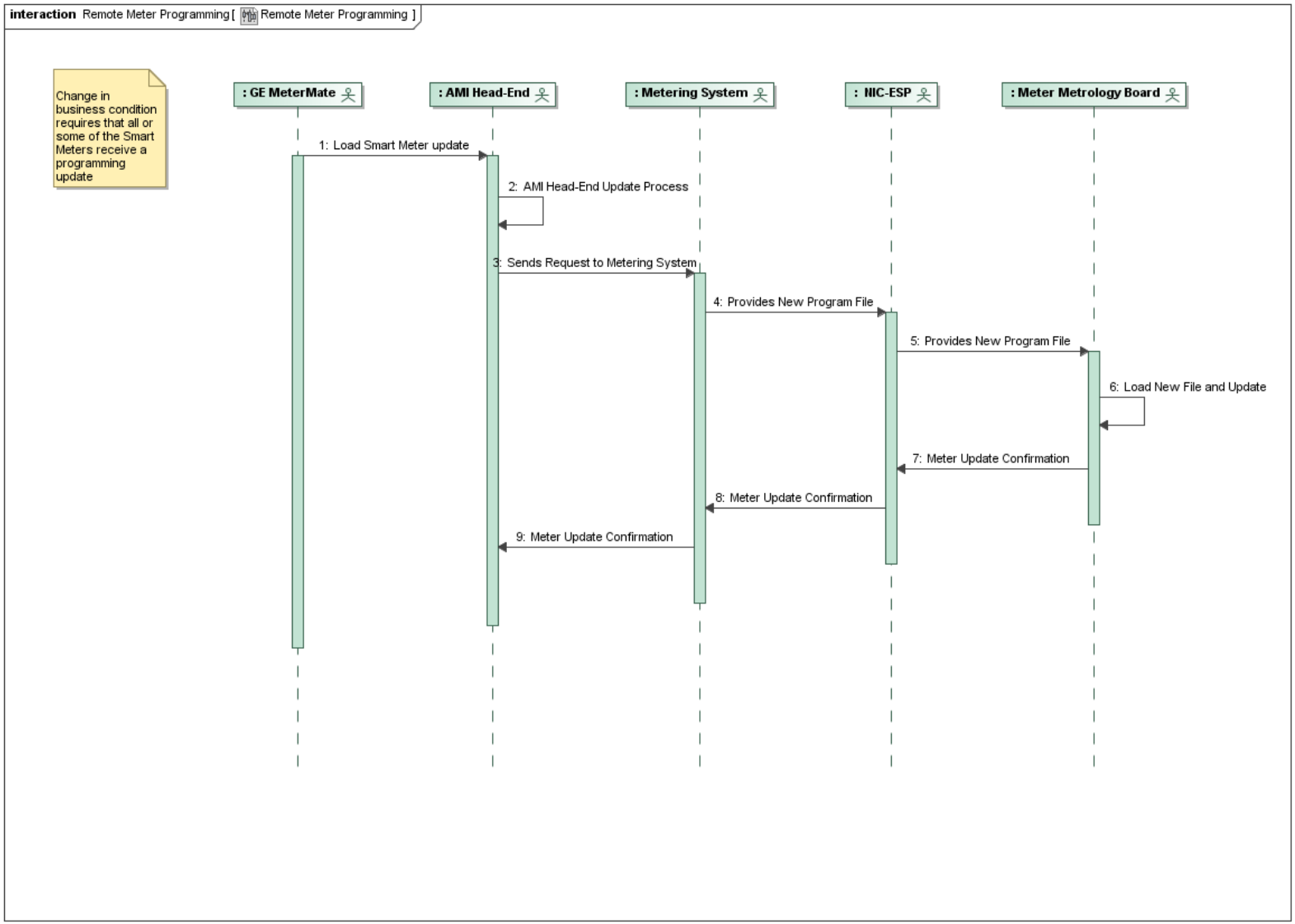
2.2 Architectural Issues in Interactions

Elaborate on all architectural issues in each of the steps outlined in each of the sequences above. Reference the Step by number. Double click on the embedded excel file – record the changes and save the excel file (this updates the embedded attachment).

2.3 Diagrams



Field Meter Programming Firmware Update Activity Diagram



Filed Meter Programming Firmware Update Sequence Diagram

3 Auxiliary Issues

3.1 References and contacts

ID	Title or contact	Reference or contact information
[1]		

3.2 Action Item List

ID	Description	Status
[1]		

3.3 Revision History

For reference and tracking purposes, indicate who worked on describing this function, and what aspect they undertook.

No	Date	Author	Description
1.	4/7/10	MHL	Rev 1
2.	4/16/10	MHL	Rev 2
3.	4/21/2010	BDG	Add Utility's corrections and diagrams