Remote Meter Programming of Smart Meter

Version 3.0

April 21st, 2010

1 Descriptions of Function

The Metering System enables automatic and remote meter programming.

1.1 Function Name

Remote Meter Programming

1.2 Function ID

Identification number of the function

1.3 Brief Description

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.

1.4 Narrative

Once a need to change the programming within the meter arises; one or all of the meters within the AMI network can be programmed automatically thru the AMI network. ***GE MeterMate*** software is used to develop meter programs. These programs are developed by meter technicians. Once a program is developed it is manually loaded into the Silver Springs's Utility IQ (UIQ), which is the head end for Silver Spring Network's AMI system. Meter Programs can be selected in the ***AMI Head-End*** which automatically distributes the new program to the targeted smart meters. The process for remote programming the meters is proprietary. This process can be completed in hours or sometime days depending on the number of meters. The ***AMI Head-End*** system will receive an acknowledgment of the program change upon completion or failure.

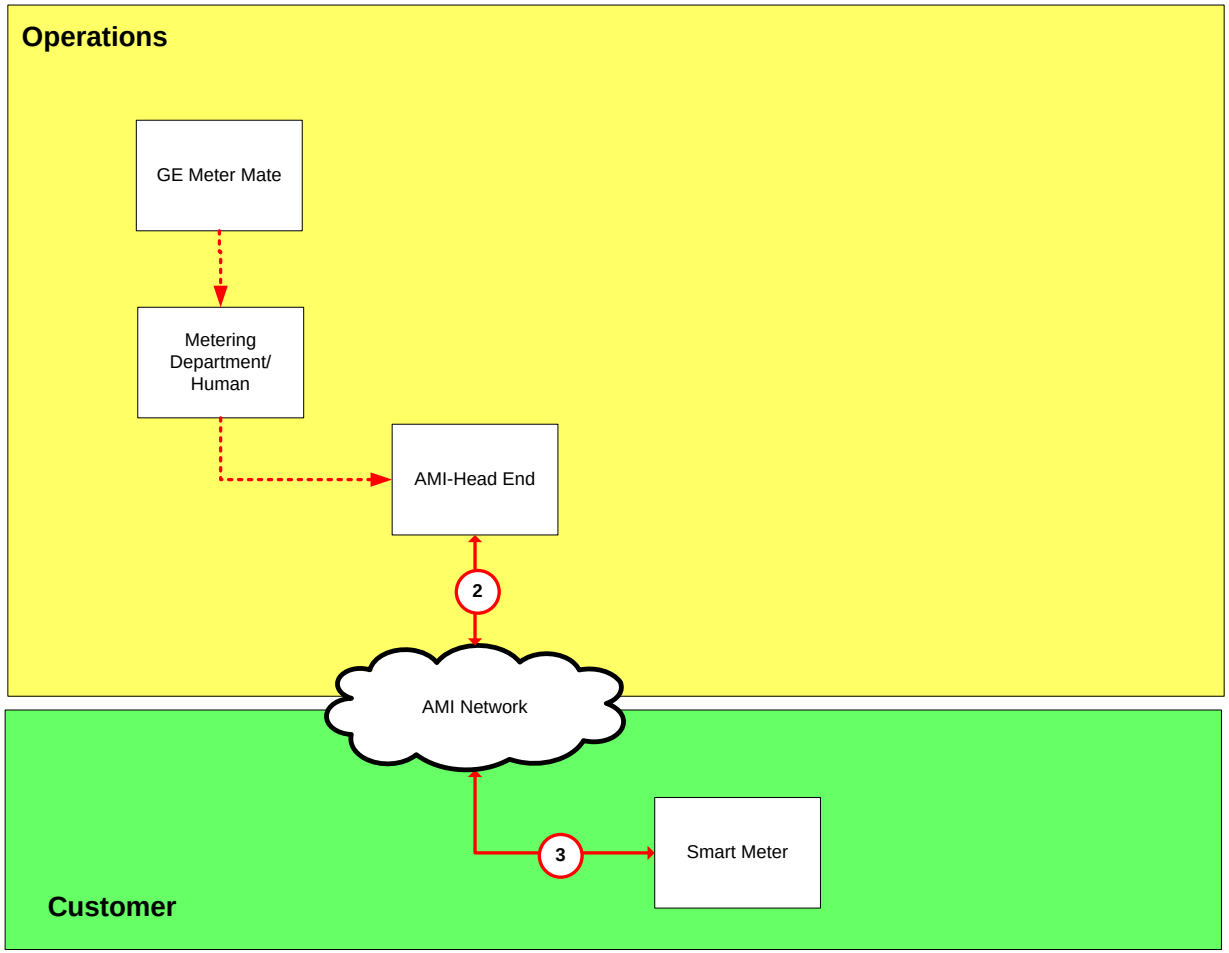


Figure 1-1
Context Diagram for Remote Programming of Smart Meter

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 Data Management (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).
Smart Meter	Device	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	Organization	The Vendor provides the AMI application.

Grouping (Community)		*Group Description*
Actor Name	*Actor Type (person, organization, device, system, or subsystem)*	*Actor Description*
Meter Metrology Board	Device	The board, internal to the Smart Meter, on which the functions of the Smart Meter are configured and performed.

1.6 Information exchanged

Information Object Name	*Information Object Description*
MeterMate pro file	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 either applied successfully or failed.

1.7 Activities/Services

Describe or list the activities and services involved in this Function (in the context of this Function).

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

Remote Meter Programming

2.1.1 Preconditions and Assumptions

Actor/System/Information/Contract	*Preconditions or Assumptions*
The AMI system	The AMI system is operating in the normal mode

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.*
	Change in business condition requires that all or some of the Smart Meters receive a programming update			Some or all of the Smart Meters need to receive a programming update					
1.1		GE MeterMate	Load Smart Meter update	Metering Department receives/develops update via GE MeterMate and loads GE MeterMate pro file to the AMI Head-End	GE MeterMate	AMI Head-End	MeterMate pro file	proprietary	

[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 update process	AMI Head-End executes update process	AMI Head-End	Metering System	MeterMate pro file	proprietary	Use AMI Network Use Case
1.3		AMI Head-End	AMI Head-End sends request to Metering System	AMI Head-End sends request to Metering System using the AMI Network Use Case	AMI Head-End	Metering System	MeterMate pro file	proprietary	Use AMI Network Use Case
1.4		Metering System	Provides new program file to NIC-ESP	Metering System provides new program file to NIC-ESP	Metering System	NIC-ESP	MeterMate pro file	proprietary	
1.5		NIC-ESP	Provides new program file to Meter Metrology Board	NIC-ESP provides new program file to Meter Metrology Board	NIC-ESP	Meter Metrology Board	MeterMate pro file	C12.18, (C12.21 used for controlling time outs) C12.19	
1.6		Meter Metrology Board	Meter Metrology Board loads new program file	Meter Metrology Board loads new program file and gets updated	Meter Metrology Board	Meter Metrology Board	MeterMate pro file		
1.7		Meter Metrology Board	Meter Metrology Board sends update confirmation	Meter Metrology Board sends update confirmation to NIC-ESP	Meter Metrology Board	NIC-ESP	Meter Update Confirmation	C12.18, (C12.21 used for controlling time outs) C12.19	
1.8		NIC-ESP	NIC- ESP sends meter update confirmation	NIC-ESP sends meter update confirmation to Metering System	NIC-ESP	Metering System	Meter Update Confirmation	proprietary	

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environment
1.9		Metering System	Update confirmation to AMI Head-End	Metering System sends update confirmation to AMI Head-End	Metering System	AMI Head-End	Meter Update Confirmation	proprietary	Use AMI Network Use Case

2.1.3 Post-conditions and Significant Results

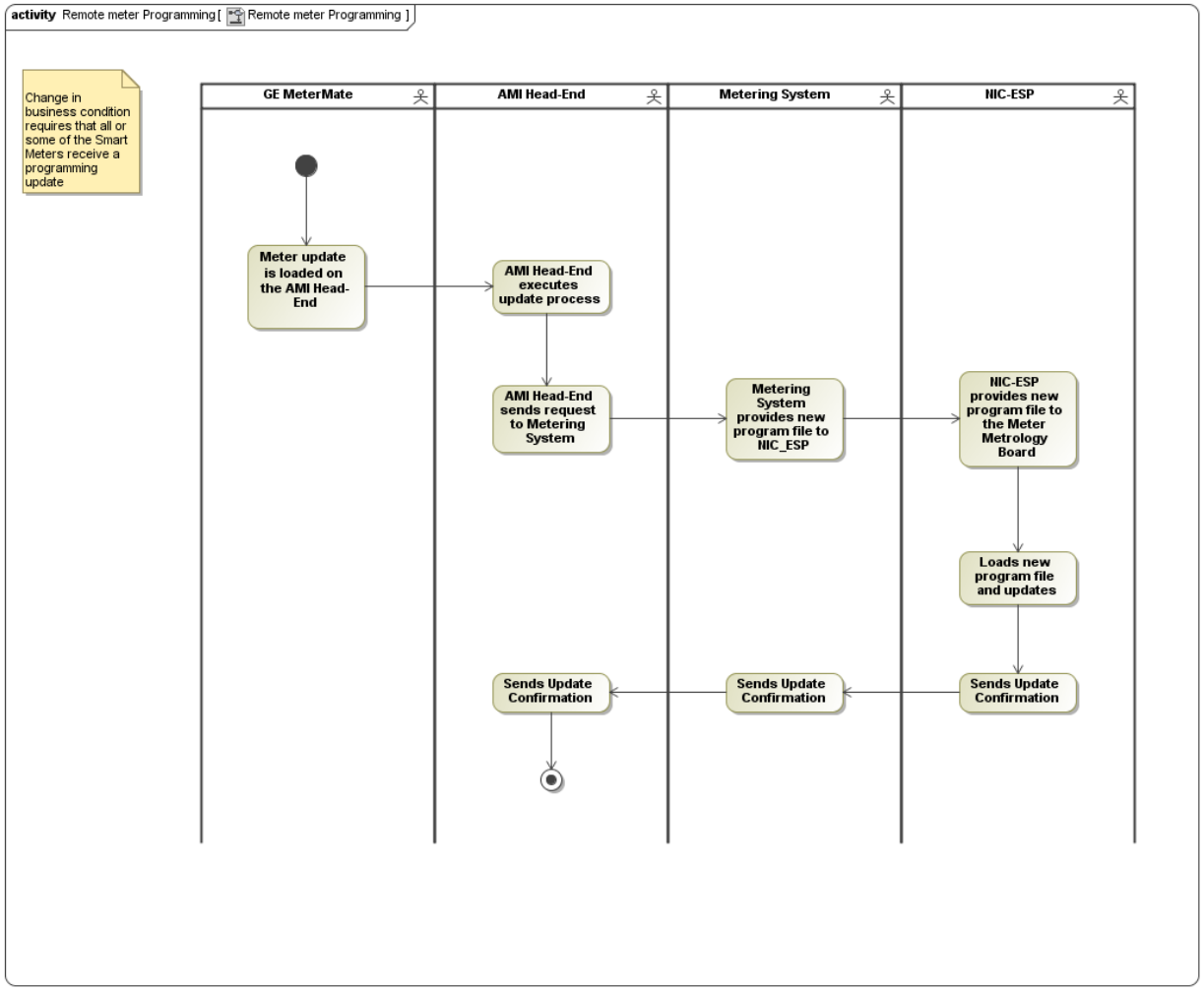
Describe conditions that must exist at the conclusion of the Function. Identify significant items similar to that in the preconditions section.

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

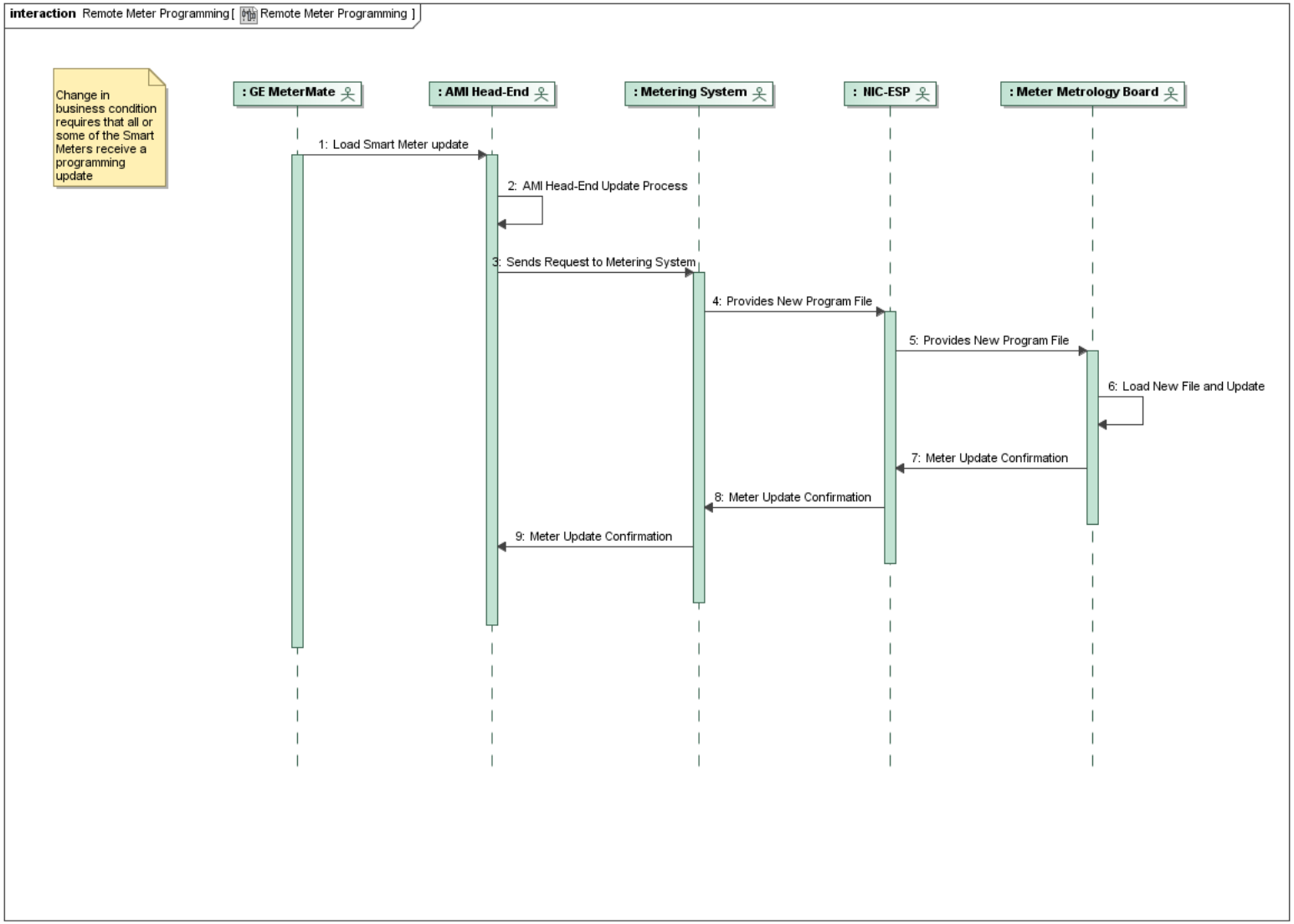
2.2 Architectural Issues in Interactions

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



Remote Meter Programming Activity Diagram



Remote Meter Programming Sequence 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]		

3.3 Revision History

No	Date	Author	Description
1	April 12th, 2010	JRC	Initial draft
2	April 16th, 2010	MHL	Rev 1
3	April 21st, 2010	BDG	Compile The Utility changes and add diagrams