Advanced Metering Infrastructure (AMI) Program
Use Case I1 - Utility installs, provisions, and configures the AMI system

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AMI Use Case: I1

Utility installs, provisions, and configures the AMI system

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Document History

Revision History

Revision Number	Revision Date	Revision / Reviewed By	Summary of Changes	Changes marked
1.0	060202	Ben Rankin	Original Document	N
1.1	060206	Ben Rankin	Updated document with I1W1 v2 session notes. Removed some requirement values from the use case steps table that were not clear.	N
1.2	060215	Ben Rankin	Updated requirements from I1W2 v2.2 session notes	N
1.3	060221	Ben Rankin	Updated document from I1W3 Session	Y
1.4	060223	Ben Rankin	Additional updates from I1W3 v1.0 Session Notes	N
2.0	060316	Ben Rankin	Updated from I1W3 v2.0 Session Notes	N
2.1	060403	Grant Watson	Use Case stabilization – step 8 review	N
2.2	060410	Cathy Melton	Use Case stabilization – step 9 review	N
2.3	060413	Cathy Melton	Update Use Case based on SAT comments	N

Approvals

This document requires following approvals.

Name	Title
Cathy Melton	Mega Team Lead
Cathy Melton	Use Case Team Lead
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Advanced Metering Infrastructure (AMI) Program
Use Case I1 - Utility installs, provisions, and configures the AMI system

DRAFT

Contents

1. Use Case Description

1.1 Use Case Title

Utility installs, provisions, and configures the AMI system .

1.2 Use Case Summary

The process of setting up an AMI system involves many processes ranging from developing a deployment plan through forecasting and procurement, installation of individual devices, initialization of tariffs, setting meter operating parameters, entering and verifying information in inventory, customer and geographic databases, verification of communications, and other functional testing.

Related to this scenario is the capability of the meters to "self-register" upon installation. Scheduling and installation for a few meters may take a few days; deployment in a given geographic area may be measured in weeks. Any features of the system that could reduce the time or the number of errors involved in installation would be desirable.

1.3 Use Case Detailed Narrative

Utility Forecasters from the Meter Service Organization and Procurement plan the quantities of each type of meter needed to deploy the AMI system and determine minimum and maximum inventories for each District. Based on the plan, the Forecasting System orders the appropriate numbers and types of meters. The ability of the Forecasting System to accurately set required inventory levels during and after deployment will allow the utility to keep the meter inventory at operational demand levels and avoid charges associated with carrying excessive inventory of meters and other equipment . A meter management system allows for coordination of work, makes sure that material is available when needed, tracks assets from cradle to grave, and ensures the successfully deployment of AMI and continuity of work. Standardizing the capabilities of the meter and associated elements reduces the number of different model/style of meter that must be carried. Meter capabilities, along with system checks, allow some installation errors to be detected automatically.

The meters arrive at Corporate Warehouse configured with a default program, from which selected meters are sent to the Meter Shop for sample testing. Meter Technicians perform the sample testing, which includes communications testing. Electronic tracking of AMI meters through all steps of their installation process reduces labor rework costs as the correct location of each meter will be known from cradle to grave.

The Meter Management System instructs personnel to distribute meters from the Corporate Warehouse to the District based on the minimums and maximums assigned for each District.

Prior to deployment of the meters, the equipment necessary for the communications network has been installed and provisioned (area specific).

In response to the utility deployment strategy, the Meter Management System dispatches Field Personnel and meters to each site, automatically specifying the correct type of meter to be deployed.

The Installer removes the existing meter, checks the electrical connections, and installs the AMI meter. The meter powers up, performs self-diagnostics, identifies itself to the system, acquires a communications address and establishes communications. Self-test on start-up, self-registration/provisioning, and remote health check capability reduces installation and maintenance labor costs. The Installer may perform other diagnostics that the meter cannot perform by itself. As the AMI meter is part of a greater system its installation must recognize this. Giving the Installer the necessary tools to allow for him/her to interface with not only the AMI meter but with the surrounding components eliminates the occasional need for second service calls, enables the ability of the AMI meter to provision itself and establish its own connectivity and registration, and makes the installation process faster and smoother.   The combination of the AMI system, AMI meter, wireless field tool and Meter Management System communicating together and performing validations can be used to reduce the number of mis-installed meters and the number of entry input errors.

The Installer, the meter, and the AMI system work together to ensure that the Meter Management System and the Customer Service System (CSS) are correctly updated with the address, form factor, location, type, channels, options and voltage etc. of the meter. Once these databases are synchronized, the AMI downloads the correct configuration to the meter for the tariff the customer is on if the tariff requires a program different from the default programming installed by the manufacturer prior to delivery. Preprogramming by the manufacturer saves time during installation. Programming the meters over-the-air reduces installation time and allows program changes to be made without making a trip out to the meter.

Based on its configuration, the meter ensures that communications between the AMI and any customer-site equipment have been established.

1.4   Business Rules and Assumptions

Describe any business rules, assumptions and regulatory or policy constraints that apply to this use case

Assumptions

- This use case addresses those customer sites under 200 kW.
- The utility has developed a strategy regarding the initial deployment of AMI meters, i.e. how many meters at a time shall be deployed, where, and when.
- There will be an integrated Meter Management System that incorporates some of the features of the existing Meter Equipment System (MES), Meter Tracking System, Meter Process Automation (MPA), Material Management System (MMS), etc.
- Costs will be lower if the following are reduced:
  - Number of form factors used
  - Number of options provided
  - Number of overall meter types used
  - Amount of manual provisioning required
  - Level of training required for installation
  - Number of trips to the site
- The IT organization will be responsible for installing, configuring, and deploying communications networking equipment if it is not at the meter site or in the meter.
- Communications network is installed and in service before meter deployment (area specific).
- Minimal Engineering of the installation job is required

2. Actors

Describe the primary and secondary actors involved in the use case. This might include all the people (their job), systems, databases, organizations, and devices involved in or affected by the Function (e.g. operators, system administrators, customer, end users, service personnel, executives, meter, real-time database, ISO, power system). Actors listed for this use case should be copied from the global actors list to ensure consistency across all use cases.

Actor Name	Actor Type (person, device, system etc.)	Actor Description
Meter Forecasting System	System	New System to interface with, replace and/or extend other Utility systems to identify future AMI meter inventories and deployment schedules. Also orders and track AMI meters or any other equipment needed by Utility. .Could be included or separate from "Meter Management System."
Vendor	Organization	Supplier of AMI meters or AMI communication system components
Warehouse Technician	Person	First Utility personnel to contact an AMI meter. Responsibilities are to accept the meters upon delivery from manufacturer at the central warehouse and forward to meter shop for testing, receive tested meters back from the meter shop, ship successfully tested meters to districts, and return failed meters to manufacturer for repair.
Meter Management System	System	Global data repository for information about each meter, as opposed to the AMI, which gathers metering data *from* each meter. (meter location, old read value, test results) Schedules and dispatches the installation and maintenance orders for AMI meters and sends the order to the installer's field tool device. Also coordinates the return and repair of failed meters. Meter management system will track status of meters such as never set, installed, removed, salvaged, and returned to manufacturer for repair. Could also include the capabilities described in "Meter Forecasting System." System ensures that there is sufficient inventory of AMI meters. (future vision of an amalgamation of the existing Meter Equipment System (MES), Meter Tracking System, Meter Process Automation (MPA), Material Management System (MMS), etc.).
Warehouse	Organization	Meter storage location. There are multiple warehouses and warehousing levels. For this use case the distinctions are "warehouse" for company wide warehouse and "district" for local warehouse.
Meter Shop	Organization	Meter testing location.

Actor Name	Actor Type (person, device, system etc.)	Actor Description
Meter Shop Meter Technician		Meter shop meter technician sample tests AMI meters upon receipt and also performs repairs.
AMI Meter	Device	The AMI meter to be installed, as opposed to the old meter that will be replaced.
Installer	Person	Generic term for the person who will be trained to install new and replace failed AMI meters.
Field Tool (Laptop Device)	Device	A hypothetical device derived from the laptop computers used by some installers today. It has a wireless connection to Utility systems which communicates installed service points and other information the Installer may need to perform their job function. The device also has the ability to resolve trouble reports and communicate information directly to the AMI meter. (installed service point, old meter ID and old meter final reading.) This device will likely communicate directly with AMI and/or the Meter Management System. This tool will need to have the ability to communicate with multiple technologies Utility chooses to implement (i.e. RF, PLC, pager, GPRS or other) so a common field tool is used by all. Tool should also be capable of programming meter when required, capture meter information by scanning meter (RFID or bar code), and provide GPS LAT/LONG for confirmation with the system.
AMI	System	The system responsible for communicating with the meter and gathering its metering data, may forward data to other utilities. Shall pass or carry some information from the meter to the Meter Management System and/or Customer Service System (CSS) during installation. Needs to know when the data from the meter is untrustworthy and when the meter is taken out of service. The AMI system also communicates with the meter and the field tool when installing the meter and analyzing meter problems.
Testing Tool	Device	Tool provided by manufacturer for testing and programming meter in the meter shop and in the field.
Contractor	Person	Electrical contractors will be available to repair customer meter panels when SCE feels it is appropriate to reduce roll-out delays, go-backs and customer dissatisfaction.
Meter data management system (MDMS)	System	Meter Data Management System represents either the organization or system responsible for capturing and maintaining large quantities of data produced by interval meters. System that stores meter data (e.g. usage, generation, meter logs) and makes data available to authorized systems. This system is a component of the AMI.

Advanced Metering Infrastructure (AMI) Program
Use Case I1 - Utility installs, provisions, and configures the AMI system

DRAFT

3. Step by Step analysis of each Scenario

Describe steps that implement the scenario. The first scenario should be classified as either a "Primary" Scenario or an "Alternate" Scenario by starting the title of the scenario with either the work "Primary" or "Alternate". A scenario that successfully completes without exception or relying heavily on steps from another scenario should be classified as Primary; all other scenarios should be classified as "Alternate". If there is more than one scenario (set of steps) that is relevant, make a copy of the following section (all of 3.1, including 3.1.1 and tables) and fill out the additional scenarios.

3.1 Scenario Description

Provide a scenario name that indicates whether the scenario is classified as "Primary" or "Alternate" (for example, "Primary Scenario: Distributed Generation Metering" or "Alternate Scenario: Customer unexpectedly connects DG") and an overview of the scenario.

Primary Scenario: Utility deploys meters during AMI system roll out

Triggering Event	*Primary Actor*	*Pre-Condition*	*Post-Condition*
(Identify the name of the event that start the scenario)	*(Identify the actor whose point-of-view is primarily used to describe the steps)*	*(Identify any pre-conditions or actor states necessary for the scenario to start)*	*(Identify the post-conditions or significant results required to consider the scenario complete)*
Utility installs meters for the AMI system deployment	Installer	Standard, non-AMI meters at customer site	AMI meter installed at customer site and communicating with AMI system

3.1.1 Steps for this scenario

Describe the normal sequence of events that is required to complete the scenario.

Step #	Actor	Description of the Step	Additional Notes
#	*What actor, either primary or secondary is responsible for the activity in this step?*	*Describe the actions that take place in this step. The step should be described in active, present tense.*	*Elaborate on any additional description or value of the step to help support the descriptions. Short notes on architecture challenges, etc. may also be noted in this column..*

Step #	Actor	Description of the Step	Additional Notes
1	Utility	Develops roll out strategy	
2	Forecasting System	Forecasting system determines quantity and types (meter forms) of meters to order and makes information available to other systems (i.e. CSS, MDMS and Other Systems in order to notify customers and RSO)	Reduced costs due to fewer meter types to manage. Also ensures that the right meters are available when needed.
3	Utility	Utility acquires AMI meters.	
3.1	Meter Forecasting System	Meter Forecasting System orders meters.	
3.2	Vendor	Vendor notifies warehouse of meters shipped. Meter management system starts tracking meter as it leaves vendor.	Reduction of costs due to lost assets and duplication of processes.
3.3	Utility	Meters arrive at warehouse.	
3.4	Warehouse technician	Warehouse technician verifies that received meters matches the order and utilizes scanning device for receipt.	
3.5	Meter management system	Meter management system records the arrival of the meters.	
4	Utility	Utility tests meters.	
4.1	Warehouse Technician	Warehouse technician scans meters and ships sample meters to the meter shop.	
4.2	Meter shop meter technician	Meter shop meter technician scans in arrival of meter.	Reduction of costs due to lost assets and duplication of processes.
4.3	Meter shop meter technician	Meter shop meter technician performs functional tests. (Communications, disconnect, accuracy, other's TBD.	

Step #	Actor	Description of the Step	Additional Notes
4.4	Meter management system	Meter management system records meter test results. If meter passes testing, all meters in lot are released for distribution to field.	
4.5	Meter Shop meter technican	Meter shop meter technician scans meter and ships meter back to warehouse.	
5	Warehouse Technician	Warehouse technician sends meter to district for deployment.	
5.1	Warehouse Technician	Warehouse technician scans in arrival of meter.	Reduction of costs due to lost assets and duplication of processes.
5.2	Meter management system	Meter management system dispatches meter and communications network equipment (if at the meter site) to a district and downloads work orders into the installer's field tool.	
5.3	Construction Maintenance Acct	Construction Maintenance Acct scans meter at district.	
6	Installer	Installer deploys meter at installed service point.	
6.1	Installer	Meter is issued to installer by district Construction maintenance acct (Installer scans in meter using field tool).	Reduction of costs due to lost assets and duplication of processes. This requirement is not unique to AMI meters
6.2	Installer	Installer travels to job site according to work order in field tool and verifies that the old meter ID is correct for the installed service point. *(see FR15)* If existing meter number is incorrect, energy theft is suspected, or meter panel is damaged, installer inputs this information into field tool. Field tool validates removed meter number and notifies Installer if meter number does not match (FR15)	

Step #	Actor	Description of the Step	Additional Notes
6.3	Installer	Installer gets final reading on old meter and inputs read into field tool. Field tool validates read and notifies installer if read is outside specified variance. (*see FR15)*	
6.4	Installer	Installer removes the old meter.	
6.5	Installer	Installer installs the new meter.	
6.5.1	Meter	Meter performs self-check and reports results to installer *(FR24)*	
6.6	Meter	Meter tells the installer's field tool the meter's ID. Field tool notifies installer if meter form of meter being installed is different from meter form that was removed. (*see FR15)*	
6.7	Field tool	Field tool tells the meter its physical location, LAT/LONG, installed service number, removed meter number, and removed meter final read. Field tool notifies installer if actual LAT/LONG does not compare to CSS LAT/LONG. (*see FR15)*	
7	Meter	Meter connects to AMI system.	

Step #	Actor	Description of the Step	Additional Notes
7.1	Meter	Meter self registers on the AMI (HAN/WAN/LAN) and notifies installer. (See FR24). Installer may leave at this point if communications is successful.	Prevention of costs because installer will not be required to provision communications between meter and customer equipment, nor verify customer equipment. Reduced installation cost because meter is automatically performing tests that would otherwise be performed manually.
7.1A	Meter	Meter cannot communicate with AMI system to self-register.	
7.1A.1	Meter	Meter notifies installer of communication failure.	
7.1A.2	Installer	Installer uses field tool to test network communication and meter communication.	
7.1A.3	Installer	Installer validates whether adequate AMI network coverage exists.	
7.1A.4	Installer	Installer replaces meter if appropriate.	
7.1A.5	Installer	Installer (via field tool) reports marginal coverage if appropriate. Installer may leave site at this point.	
7.1A.6	Field tool	Field tool provides meter change information ("soft-registration") to AMI (may be after installer travels to within range of AMI) (Same as step 7.2)	

Step #	Actor	Description of the Step	Additional Notes
7.2	Meter	Meter reports to AMI meter's Installed Service Number, old meter number, old meter read, LAT/LONG and results of self test in step 6.5.1. Field tool supplies information to the AMI system identifying the meter's Installed Service Number old meter removed read, new meter number plus any new information regarding LAT/LONG, corrected meter number, possible energy theft, damage to meter, etc .from step 6.2. (*see FR16)*	Reduced cost due to fewer inconsistencies when "billing through" an upgrade. Supplying the removed meter information through the AMI system bypasses the currently slow path between the meter management system and the data management/billing system. Reduced cost due to fewer mistakes in meter installation. The combination of the AMI system, AMI meter, wireless (field tool) and Meter Management System communicating together could be used to reduce the number of mis-installed meters and the number of incorrectly entered identifiers and location information.
7.3	AMI	AMI supplies old meter number and final read to the Meter Management system.	
8	Meter management system	Meter management system verifies installation	
8.1	Meter management system	Meter management system validates old and new meter IDs, LAT/LON, meter form, and read from installer's laptop (field tool) against the information received from the meter and notifies MDMS of any discrepancies.	

Step #	Actor	Description of the Step	Additional Notes
8.2	Meter management system	Meter management system validates the program ID reported by the meter against the intended program for this meter.	
8.3	Meter management system	Meter management system downloads any required program change to the meter.	Reduced training and installation costs because AMI system is automatically performing meter provisioning. Greatly reduced maintenance costs because AMI is able to make programming changes without having to roll a truck.
9	Meter	Meter installation is complete.	

Advanced Metering Infrastructure (AMI) Program
Use Case I1 - Utility installs, provisions, and configures the AMI system

DRAFT

4. Requirements

Detail the Functional, Non-functional and Business Requirements generated from the workshop in the tables below. If applicable list the associated use case scenario and step.

4.1   Functional Requirements

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
(I1FR1)A Meter Forecasting System must determine the quantity, types of meters required, schedule and deployment location (also includes maintenance orders, panel upgrades, route maintenance, incomplete installations and new accounts).	1	2
(I1FR2)Meter Forecasting System shall interface with meter management system to extract information about meter deployment (can include where to install, where to ship meters, meter material code, installer) (or could possibly be the same system)	1	2
(I1FR3)Utility personnel can identify individual meters within shipping containers and packaging. (Packing label to include: Class, voltage, wire, cycles, test amps, KH, catalog number, Purchase Order number and release, quantity, meter form, born-on date, Lot number, Utility meter numbers in box, manf. Serial number (bar codes or RFID)) This activity should have minimal manual interaction. Same system should be utilized by the various actors (Warehouse Tech, Meter Shop, Warehouse [both "corporate" & "district"] and Installer). Could be RFID or bar coding. (Concern that all meters may not be picked up with RFID if meters are in a large container.) See I1FR14	1	3.2, 3.4, 4.1, 4.2, 5.1, 5.3, 6.1
(I1FR4)The meter shall be physically assigned an Utility meter number before it arrives at Utility which identifies manufacturer, meter configuration, voltage, communications type, etc.	1	3, 3,2
(I1FR5)Testing tool for the AMI meter should be provided to Utility by the meter vendor or test equipment supplier for acceptance testing in the meter shop and for	1	4, 4.3, 7.1A.2,

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
testing in the field.		7.1A.3
(I1FR6) Meter provides one or more levels of self test capability. Features to be tested include at a minimum, but are not limited to: basic metrology, memory and remote communications. Meter would diagnose self test results to determine if failures are critical or non-critical and determine what kind of notification would be selected. A particular self test can be initiated via a schedule held at the meter, the neighbor aggregator schedule, on demand from the Data Center Aggregator or initiated locally via an onsite mechanism i.e. optical port.	1	4.3, 6.5.1
(I1FR7)A mobile mechanism for identifying meters (and providing their LAT/LONG to the Meter Management System and field tool) must exist. (may be in installers field tool) Must be able to specify unique location identifier for each meter when multiple meters are at the same lat/lon.	1	6.7
(I1FR8)The meter shall accept installed service point information from the installer's field tool.	1	6.7
(I1FR9)The AMI system shall accept old meter ID, old meter final reading and new meter ID from the field tool. Installer shall be able to correct old meter ID if it is found to be incorrect.	1	6.7
(I1FR10)The meter shall accept old meter ID from installer field tool and communicate it to the AMI system.	1	6.7, 7.2
(I1FR11)The meter shall accept old meter final reading from installer field tool and communicate it to the AMI system.	1	6.7, 7.2
(I1FR12)The meter self registers on the AMI communications network the first time the communication is established in that location.	1	7.1
(I1FR13)The meter can identify itself to the installer's field tool (related to FR7)	1	6.7

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
(I1FR14)The mechanism used to track meters shall be the same one "from cradle to grave" Same system should be utilized by the various actors (Warehouse Tech, Meter Shop, Warehouse [both "corporate" & "district"] and Installer). (such as scanners or RFID) See FR3	1	3.2, 3.4, 4.1, 4.2, 5.1, 5.3, 6.1
(I1FR15)The meter management system and the field tool shall have the ability to verify a match between planned vs actual information: • LAT/LONG of actual installation from field tool (FR7) compared to LAT/LONG known by system for the Installed Service Number • Meter identifier (which includes the meter form) (Verifies meter number removed to meter number in system, and compares meter form removed to meter form being installed) • Meter read (verifies meter read is within specified range of variance from prior meter read) Any discrepancies found by the field tool during installation will notify the installer immediately. Discrepancies identified by the Meter Management System after installation will be reported to the MDMS.	1	6.2, 6.3, 6.6, 6.7, 8.1
(I1FR16)Self-registration data includes: • New meter ID • New meter installation read • Comms address • Meter log information • Removed meter ID • Removed meter read • Security credentials • What customer devices are present (may not use this information until customer enrolls per I3) • Current program identification	1	7.1, 7.2, 7.3, 8.1, 8.2,

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
(I1FR17)All meter provisioning information captured today is also captured when provisioning AMI system **TMS:** PIN, Channel information, meter serial #, and program ID **MV90:** Meter #, phone #, device ID, channel information and recorder ID **NetComm:** lat/long, meter prefix/suffix, meter serial number, customer address, CSS install service number, CSS Service Account number, load survey number, radio serial number.,	1	7.1, 7.2
(I1FR18)Communications between meter and (field tool) will be secure.	1	6.6, 6.7
(I1FR19) Meter is preprogrammed with default configuration prior to shipment from the manufacturer.	1	3.1, 3.2
(I2FR20) (DELETED)		
(I1FR21)Residential meters will all have the following features in order to reduce the number of meter types (codes) • KWH • IDR • Local communication port which can retrieve meter & communication data as specified in other requirements • Demand • And others in RFI and meter specs (SCE_AMI_RFI.pdf dated 12/2/2005, and Specification E-100 dated-10/14/2005 • Bi-directional metering to support distributed generation (D3-FR6) (a second channel to measure the energy flowing from the customer to Utility) • Migration path for customer pulses (customers may have optical device for controlling load that needs to be retained—pulse output or optical reader)	1	2, 3.1, 3.2

Advanced Metering Infrastructure (AMI) Program
Use Case I1 - Utility installs, provisions, and configures the AMI system

DRAFT

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
• Multi-voltage • VAR • PF • PQ output configurable to specify which harmonic components and summary quantities. (D2-FR32) • Bi-directional metering to measure distributed generation (D3-FR6) • Pulse output for CT rated meters or migration path for customer pulses (customer may have pulse outputs feeding energy management system that needs to be retained)		
(I1FR23)The AMI system shall change the meter program at installation time from default to match the tariff/program	1	8.2, 8.3
(I1FR24)Meter shall communicate to Installer: • Health check results • HAN/WAN communications check (checks health of HAN but does not register devices—HAN is covered in I3)	1	7.1
(I1FR25)Meter Forecasting System shall take into consideration the billing cycle as it schedules the work and schedules installation to minimize billing cycle interference	1	2
(I1FR26)The AMI system shall synchronize the meter clock upon installation.	1	7.1
(I1FR27)The Meter Forecasting System shall make deployment information available to other systems for access by the billing department and the system which will be used to notify the customers (and all other entities affected by the installation) ,	1	2
(I1FR28)The installer shall be able to report to the meter management system any as-found conditions discovered during installation requiring correction by the customer or the utility	1	6.2
(I1FR29)The meter shall communicate locally to the field tool independently of the normal AMI communication mechanism (i.e. optical port)	1	6.6, 6.7, 7.1

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
(I1FR30)The field tool shall be able to test the neighborhood area network connectivity and the quality thereof and report that status to the installer	1	7.1A.2
(I1FR31)The field tool shall be capable of simultaneously using multiple communications paths (e.g. to the AMI system and the wireless WAN) (Installer shall be able to move from the program that provides the work order information to the program that communicates with the meter, HAN, and AMI without exiting the programs)	1	6.2, 6.6, 6.7, 7.1A.2,7.1A.3, 7.1A.6
(I1FR32)The field tool shall be capable of testing the AMI communications interface on the meter as well as the HAN interface on the meter	1	7.1A.2
(I1FR33)The field tool shall report results of the AMI communication strength to AMI.	1	7.1A.5
(I1FR34)The meter shall periodically log the communication signal strength and report it back to the Meter Management System.	1	7.2
(I1FR35)The meter shall be capable of receiving time from the field tool.	1	7.1A.6
(I1FR36)The meter management system shall make the coverage information from installer's tool available for later analysis	1	7.1A.5
(I1FR37)The field tool shall be capable of loading meter programs and setting meter configurations.	1	7.1A.6
(I1FR38) There will be no more than one field tool used to install meters for all meter vendors accommodating multiple communications technologies (RF, PLC, pager, GPRS or other).	1	

4.2   Non-functional Requirements

Non-Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
(I1NFR1)The Meter Forecasting System must maintain a 3 month safety stock of meters.	1	2, 3
(I1NFR2)The meter self-test shall require less than 2 minutes including AMI self-registration and validation. This is driven by the fact that complete installation time shall be less than 15 minutes.	1	6.5.1
(I1NFR3)In the case of self-registration failure, the AMI system shall retry self-registration at a configurable time interval. (Suggest 15 minutes)	1	7.1

4.3   Business Requirements

Business Requirement	Associated Scenario # (if applicable)	Associated Step # (if applicable)
(I1BR1)The Meter Forecasting System will ensure sufficient meters will be available for the initial deployment with some additional for a safety margin.	1	2, 3
(I1BR2)Meter Management System will track Individual Meters and asset values once the meters leave the manufacturer.	1	2, 3
(I1BR3)The test results of a meter (or meters) will permit the acceptance and release of an entire manufacturing lot. Meters found not passing sample testing, will be returned to vendor. ("SCE SPECIFICATION FOR INDUCTION AND SOLID STATE WATTHOUR	1	4.4

Advanced Metering Infrastructure (AMI) Program
Use Case I1 - Utility installs, provisions, and configures the AMI system

DRAFT

Business Requirement	Associated Scenario # (if applicable)	Associated Step # (if applicable)
METERS FOR COMPLETE METER SOURCING REQUIREMENTS, Revision 3, Table 1, page 7 "Edison's Double Sampling Plan for 1% AQL" file name "Specification E-100.pdf" dated 10-14-2005) If the failure rate exceeds testing acceptability percentage, additional units from shipment will be sample tested.		
(I1BR4)There shall be contractors available to make repairs to customer premise equipment discovered during meter installation.	1	6.2
(I1BR5) Meters failing communications shall not be removed from the manual reading system until communications have been established	1	7.1.A.6
(I1BR6) Disposal of both old electro-mechanical meters and disposal of AMI meters (e-waste) need to be covered in business cost analysis.	1	6.4
(II1BR7) Vendor shall have component tracking capability	1	3.2

Advanced Metering Infrastructure (AMI) Program
Use Case I1 - Utility installs, provisions, and configures the AMI system

DRAFT

5. Use Case Models (optional)

This section is used by the architecture team to detail information exchange, actor interactions and sequence diagrams

5.1 Information Exchange

For each scenario detail the information exchanged in each step

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
#	*Name of the step for this scenario.*	*What actors are primarily responsible for Producing the information?*	*What actors are primarily responsible for Receiving the information?*	*Describe the information being exchanged*
1	2, Meter Forecasting System determines quantity and types of meters to order	Utility rollout strategy	Forecasting System	Rollout strategy indicating location and types of meters and install schedule.
1	3.1, Meter Forecasting System orders meters.	Meter Forecasting System	Vendor	Electronic Purchase Orders
1	3.2, Vendor notifies warehouse of meters shipped.	Vendor	Meter Management System	AMI Meter shipment notification.
1	3.3, Equipment arrives at warehouse	Warehouse technician	Meter Management System	Meter inventory status and location update
1	4.1, Warehouse technician scans meters and ships sample meters to the meter shop.	Warehouse Technican	Meter Management System	Meter status and location update.

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
1	4.3, Meter shop meter technician performs functional tests. (Communications, disconnect, accuracy, other's TBD.	Meter shop meter technician	AMI System	Performs meter comm. and functional tests
1	4.4, Meter management system records meter test results. If meter passes testing, all meters in lot are released for distribution to field.	Meter Management system	Meter Management System	Records results of tests and releases lot.
1	4.5, Meter shop meter technician scans meter and ships meter back to warehouse.	Meter shop meter technician	Meter Management System	Meter status and location update.
1	5.1, Warehouse technician scans in arrival of meter.	Warehouse Technician	Meter management system	Meter status and location update.
1	5.2, Meter management system dispatches meter and communications network equipment (if at the meter site) to a district and downloads work orders into the installer's field tool	Meter Forecasting System	Meter Management System	Deployment schedule:

Scenario #	*Step #, Step Name*	*Information Producer*	*Information Receiver*	*Name of information exchanged*
1	5.2, Meter management system dispatches meter and communications network equipment (if at the meter site) to a district and downloads work orders into the installer's field tool	Meter Management System	Field Tool	Work orders for installer to complete.
1	5.3, Meter is scanned in at district.	Construction Maintenance Acct	Meter management system	Meter status and location update.
1	6.1, Meter is issued to installer by district. (Installer scans in meter using mobile system).	Installer	Field tool	Meter status and location update.
1	6.2, If existing meter number is incorrect, energy theft is suspected, or meter panel is damaged, installer inputs this information into field tool.	Installer	Field Tool	Correct meter number, suspected energy theft information, panel damage information.
1	6.2, Field tool validates removed meter number and notifies Installer if meter number does not match (FR15)	Field Tool	Installer	Notification if removed meter number does not match meter number in field tool.
1	6.3, Installer gets final reading on old meter and inputs read into field tool.	Installer	Field Tool	Validates read and notifies if read is outside specified variance.

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
1	6.5.1, Meter performs self-check and reports results to installer	AMI Meter	Installer	Self-check results
1	6.6, Meter tells the installer's field tool the meter's ID	AMI Meter	Field tool	AMI Meter ID
1	6.6, Field tool notifies installer if meter form of meter being installed is different from meter form that was removed.	Field Tool	Installer	Verifies meter form removed is the same as meter form installed and notifies installer if different.
1	6.7, Field tool tells the meter its physical location, removed meter number, and removed meter final read.	Field tool	AMI Meter	Meter location; Removed meter number and last read
1	6.7, Field tool notifies installer if actual LAT/LONG does not compare to CSS LAT/LONG. (*see FR15)*	Field Tool	Installer	Compares actual LAT/LONG to LAT/LONG in field tool (from CSS) and notifies installer if difference is greater than predetermined amount.
1	7.1, Meter self registers on the AMI (HAN/WAN/LAN) and notifies installer	AMI Meter	AMI	Registration information (location, status, configuration)

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
1	7.1, Meter self registers on the AMI (HAN/WAN/LAN) and notifies installer	AMI	Meter Management System	Old meter information (including status and location); New meter information (including configuration, location, status)
1	7.1A.1, Meter notifies installer of communication failure	AMI Meter	Field Tool	Communications failure notification.
1	7.1A.2 Installer uses field tool to test network communication and meter communication.	Field Tool	Installer	Network coverage information
1	7.1A.5, Installer (via field tool) reports marginal coverage if appropriate.	Field Tool	AMI	Coverage information
1	7.1A.6, Field tool provides as much meter change installation information ("soft-registration") as possible.	Field Tool	AMI	Soft registration information
1	7.2, Meter reports to AMI meter's Installed Service Number, old meter number, old meter read, LAT/LONG and results of self test in step 6.5.1.	AMI Meter	AMMI	Report meter's service delivery point. (Installed Service Number, old meter number, old meter read, and results of self test in step 6.5.1.)

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
1	7.2, Field tool supplies information to the AMI system identifying the meter's Installed Service Number old meter removed read, new meter number plus any new information regarding LAT/LONG, corrected meter number, possible energy theft, damage to meter, etc .from step 6.2. (*see FR16*)	Field Tool	AMI	(Installed Service Number, removed read, new meter number plus any new information regarding LAT/LONG, corrected meter number, possible energy theft, damage to meter, etc .
1	7.3, AMI supplies old meter number and final read to the Meter Management system.	AMI	Meter Management System	Old meter number and final read
1	8.1, Meter management system validates old and new meter IDs , LAT/LON, meter form, and read from installer's laptop (field tool) against the information received from the meter and notifies MDMS of any discrepancies	Meter Management System	Other Systems	Discrepancies found in comparison of meter IDs.
1	8.2, Meter management system validates the program ID reported by the meter against the intended program for this meter.	MDMA System	Meter Management System	Program required for Rate

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
1	8.3, Meter management system downloads any required program change to the meter	Meter Management System	AMI Meter	Program updates.

5.2   Diagrams

The architecture team shall use this section to develop an interaction diagram that graphically describes the step-by-step actor-system interactions for all scenarios. The diagrams shall use standard UML notation. Additionally, sequence diagrams may be developed to help describe complex event flows.

Advanced Metering Infrastructure (AMI) Program
Use Case I1 - Utility installs, provisions, and configures the AMI system

DRAFT

6. Use Case Issues

Capture any issues with the use case. Specifically, these are issues that are not resolved and help the use case reader understand the constraints or unresolved factors that have an impact of the use case scenarios and their realization.

Issue
Describe the issue as well as any potential impacts to the use case.

7. Glossary

Insert the terms and definitions relevant to this use case. Please ensure that any glossary item added to this list should be included in the global glossary to ensure consistency between use cases.

Glossary	
Term	**Definition**
Installed Service Point (ISP)	Uniquely identifies the service delivery point. This is the preferred term for identifying where a meter is installed. It identifies a specific customer and a specific meter for that customer.
HAN	Home Area Network – communication system between meter and customer premise equipment
Health Check	Operation performed by meter to determine proper functionality (it has not been decided what functionality will be tested)
NAN	Neighborhood Area Network – communication system between meter and remainder of utility system

Advanced Metering Infrastructure (AMI) Program
Use Case I1 - Utility installs, provisions, and configures the AMI system

DRAFT

8. References

Reference any prior work (intellectual property of companies or individuals) used in the preparation of this use case.

Advanced Metering Infrastructure (AMI) Program
Use Case I1 - Utility installs, provisions, and configures the AMI system

DRAFT

9. Bibliography (optional)

Provide a list of related reading, standards, etc. that the use case reader may find helpful.