AMI Use Case:

C3 - Customer prepays for electric services

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Author: Deborah Tillman

Document History

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Approvals

This document requires following approvals.

Name	Title
Deborah Tillman	*Mega-Team Lead name*
Syd Nagoshi	*Use Case Team Lead name*
Kevin Wood	*System Architecture Team Chair name*
Grant Gilchrist	*Engineering Team*

Contents

1. Use Case Description

1.1 Use Case Title

Customer prepays for electric services.

1.2 Use Case Summary

The Advanced Metering Infrastructure (AMI) will provide the utility the ability to enable prepayment electric services for it's customers. These services will allow customers to establish electric service without providing a large upfront deposit and will help enable them to control their energy spending. Other customers may prefer to prepay for electricity just because they would like to pay for their energy in advance or they may want to prepay for electricity at another site for a specific period of time.

This scenario describes the method by which customers enroll in pre-paid electricity services up to the consequences of failing to make additional prepayment before their prepayment balance expires.

1.3 Use Case Detailed Narrative

The utility needs to provide customers the ability to prepay for their electric services. The utility may offer different types of prepayment programs as described below:

Prepayment Programs:
1. **Program A** – Prepayment for the customer's home or business (for immediate activation or a specific time frame)
2. **Program B** – Prepayment services for facilities not owned by the customer for a specific date and duration (events) where the customer is requesting service for an account not their own

Prepayment Program A

The customer contacts the utility to prepay for electricity service at their home/business. The utility accesses the customer's account and confirms the customer's identity.

Immediate activation: The customer provides the payment amount and payment information to the utility using various payment methods. The utility verifies funds and applies the prepayment amount on the customer's account. The utility uses the AMI to transmit the prepayment information to the meter at the customer's site. The meter will receive, log and activate electricity service at the customer's site. The utility will provide the customer various warning messages alerting the customer when their prepayment balance on the meter is low, with a forecasted amount of the time remaining before the prepaid account reaches zero. If equipped, this information will be passed onto a display device in the customer home/business. Once the prepayment amount expires in the meter, electricity at the site will be reduced, terminated or service at the site will not be affected and the prepayment customer will be charged for electricity service on a regular billing plan (dependent of the program option the customer selects and eligibility).

Schedule for specific time frame: The customer advises the utility what start/end date/time (duration) that they would like to prepay for electrical service at their facility. The utility provides the customer the estimated energy usage and cost for the prepayment event time frame (based on a historical consumption profile). The customer provides the payment amount and payment information to the utility using various payment methods. The utility verifies funds and applies the prepayment amount on the customer's account. The utility uses the AMI to transmit the prepayment event schedule information to the meter at the customer's site. The meter will receive and log the prepayment information at the customer's site. When the date and start time of the schedule arrives, the meter will activate the electricity service at the site. The utility will provide the customer various warning messages alerting the customer when the prepayment balance on the meter is low, with a forecasted amount of the time remaining before the prepaid account reaches zero. If equipped, this information will be passed onto a display device in the customer home/business. Once the prepayment amount expires in the meter, electricity at the site will be reduced, terminated or service at the site will not be affected and the prepayment customer will be charged for electricity service on a regular billing plan (dependent on the program option the customer selects and eligibility).

Prepayment Program B

The customer contacts the utility to prepay for electricity for a specific event at a facility not owned by the customer (e.g., rental hall). The utility accesses the requesting customer's account information and the account of the utility facility for which they want to prepay for service. The utility confirms the facility that the customer has identified, has enable prepayment services. The customer provides the specific date and start/end time of the event. The utility confirms the event time has not been previously scheduled at the facility. The utility estimates the forecasted energy needed for the specific date and time based on historical usage. The utility provides the customer the estimated energy usage and cost for the prepayment event. The customer provides the prepayment amount to the utility using various payment methods. The utility verifies funds and applies the prepayment amount to the customer's account. The utility uses the AMI to transmit the prepayment information to the meter at the event site. The meter will receive and log the prepayment information. When the date and start time of the event arrives, the meter will activate the electricity service at the event site. The utility will provide the customer various warning messages alerting the customer when the prepayment balance on the meter is low and time remaining before the prepaid account reaches zero. If equipped, this information will be passed onto a display device at the event site. Once the prepayment amount expires in the meter, electricity at the event site will be reduced, terminated or the service will not be affected and the prepayment customer will be charged for electricity service provided at the facility on their own utility account, until the event is terminated by the customer (dependent on the program option the customer selected and eligibility).

The above prepayment programs will allow customers to establish electric service without providing a large upfront deposit and enable the ability for customers to control their energy spending. Prepayment services provides customers an additional payment option to make it easier to do business with the utility. This service enable customers the ability to prepay for electrical services for specific time periods at facilities they do not

own or operate, which also supports facility owners and management companies so they do not bear the burden of electricity costs for facilities they lease or rent. Prepayment services and the AMI will enable a more customer friendly way to manage poor paying customers by reducing/limiting their demand rather than a complete disconnect. Customers who participate in prepayment services will be provided visibility to their historical interval usage through a website and real-time energy costs and pricing via the meter display or onsite display device.

By using the AMI to facilitate prepayment services the utility will experience a reduced number of credit related calls to the phone center (over 50% of customer calls are credit related), reduced labor needed to perform collection activities, require fewer credit checks and minimize uncollectible debt (bad debt write-offs). There will be operational field personnel savings for the utility by not having to physically visit the customer site for disconnects and reconnects related to non-payment.

1.4   Business Rules and Assumptions

Assumptions:

On cycle billing will continue to be monthly

There will be some AMI meters (transformer rated) that will not have remote connect/disconnect abilities

Physical meters will not take payment

2. Actors

Actor Name	Actor Type (person, device, system etc.)	Actor Description
Customer	Person	Residential or business customer that receive electrical service from SCE.
Customer Representative(s)	Person	Person(s) responsible for enrolling customers in the program and answering customer questions related to the customer's energy consumption and cost data.
AMI Meter	Device	A device that measures and registers the amount of commodity consumed at a location.
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.
AMI	System	The AMI is made up of systems that are required to enable remote two-way communications with meters and data storage systems (e.g. MDMS and ADCS).
Automated Data Collection System (ADCS)	System	System that can communicate with AMI meters remotely (e.g. send prepayment schedules, program meters, test meters, retrieve data). This system is a component of the AMI
Customer Service System (CSS)	System	System that stores customer specific and site information and enables monthly billing for electrical services.
Customer Display Device	Device	This device shall be located at the customer site and be able to receive usage, cost, text messages, etc. from the utility (e.g via the meter or ADCS). The device must meet SCE requirements to enable this ability.
Website	System	A utility provided internet site where the customer can view their energy and cost information online (e.g., sce.com).

3.   Step by Step analysis of each Scenario

3.1   Primary Scenario 1 - The customer prepays for electricity service at their site (Prepayment Program A)

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)*
Customer prepays for electricity service at their site (Program A)	Customer	The AMI meter must be installed and provisioned	Customer will have prepaid for service, service will be active and they will be able to view the information on their meter, internet and/or display device

3.1.1 Steps for this 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..*
1	Customer	The customer contacts the utility or logs onto a utility website to prepay for electricity service at their home/business.	
2	Customer Representative/Website	The utility accesses the customer's account and confirms the customer's identity in the Customer Service System	

Step #	Actor	Description of the Step	Additional Notes
3	Customer Representative/Website	The Customer Representative estimates the prepayment amount needed through the next bill cycle based on historical consumption data via the CSS	
4	Customer	The customer provides a payment amount and payment information to the utility using various payment methods	
5	Customer Representative/Website	The Customer Representative verifies funds and applies the prepayment amount on the customer's account using the CSS	
6	CSS	The CSS sends the command to transmit the prepayment information to the meter at the customer's site	
7	ADCS	The ADCS will receive the request from the CSS, log the request and send the message to the AMI meter	
8	AMI Meter	The meter will receive, log, and activate electricity service at the customer's site and send a receipt of the successful processing to the ADCS	
9	ADCS	The ADCS will receive the receipt from the AMI meter and send the information to the MDMS	
10	MDMS	The MDMS will receive and log the receipt and make the information available to other system (e.g. CSS)	
11	Customer Representative/Website	The Customer Representative will view and acknowledge the confirmation in the CSS	
12	AMI Meter	The customer is able to view their prepayment account data on the AMI meter display and on a utility website (e.g., sce.com). Prepayment information includes their prepayment balance in dollars, kWh, and estimated time remaining based on historical consumption (days/hours). The customer will be able to view their daily average usage and historical usage information on a utility website.	

Step #	Actor	Description of the Step	Additional Notes
13	Customer Display Device	If equipped, this prepayment account information will be passed onto the customer's display device	

3.2   Primary Scenario 2 - The customer prepays for electricity service for their facility (e.g. vacation home) for a specific time frame (Prepayment Program A)

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)*
Customer prepays for electricity service for their facility for a specific time frame (Program A)	Customer	The AMI meter is installed and provisioned.	Customer will have prepaid for service, service will be activated and they will be able to view the information on their meter, internet and/or display device

3.2.1 Steps for this 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..*
1	Customer	Customer contacts the utility or logs onto a utility website to prepay for electricity service for an event (a specific start and end time) at their facility.	
2	Customer Representative/Website	The Customer Representative accesses the customer's account and confirms the customer's identity using the CSS.	

Step #	Actor	Description of the Step	Additional Notes
3	Customer Representative/Website	The Customer Representative verifies that the requested event date/time is not already scheduled in CSS.	
4	Customer Representative/Website	The Customer Representative estimates the prepayment amount required for the event based on historical consumption data via CSS.	
5	Customer	The customer provides a payment amount and payment information to the Customer Representative using various payment methods.	
6	Customer Representative/Website	The Customer Representative verifies funds and applies the prepayment amount to the customer's account using CSS	
7	CSS	CSS will send the prepayment schedule information to the ADCS	
8	ADCS	The ADCS will receive and log the prepayment schedule information from the CSS	
9	ADCS	The ADCS sends scheduled event information to event location meter at least 24 hours prior to the scheduled event start date/time	
10	AMI Meter	The meter at the event location will receive, log, and schedule future electricity service for the site and send a receipt of successful processing to the ADCS	
11	ADCS	The ADCS will receive the receipt from the AMI meter and send the information to the MDMS	
12	MDMS	The MDMS will receive the prepayment receipt information and make it available to other system (e.g. CSS)	

Step #	Actor	Description of the Step	Additional Notes
13	AMI Meter	The meter at event location activates electricity, continues to provide power or increases the electrical service to the required level at scheduled event start time	
14	Customer	The customer is able to view their prepayment account data on the AMI meter display and on a utility website (e.g., sce.com). Prepayment information includes their prepayment balance in dollars, kWh, and estimated time remaining based on historical consumption (days/hours). The customer will be able to view their daily average usage and historical usage information on a utility website..	
15	Customer Display Device	If equipped, prepayment balance information in dollars, kWh, and estimated time remaining will be passed onto the customer's display device within 24 hrs of the event start date/time	

3.3 Primary Scenario 3 - The customer prepays for electricity service for facilities not owned by the customer for a specific date and duration (Prepayment Program B)

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)*
Customer prepays for electricity service for facilities not owned by the customer for a specific date and duration. (Program B)	Customer	The AMI meter must be installed and provisioned	Customer will have prepaid for service for a facility not owned by the customer, service will be active and they will be able to view the information on their meter, internet and/or display device

3.3.1 Steps for this 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..*
1	Customer	Customer contacts the utility or logs onto a utility website to prepay for electricity service for an event at a facility not owned by customer.	

Step #	Actor	Description of the Step	Additional Notes
2	Customer Representative/Website	The Customer Representative accesses the customer's account (requesting to make a prepayment) and confirms the customer's identity using the CSS	
3	Customer Representative/Website	The Customer Representative accesses the facility's account (prepayment event location) in CSS and confirms that the site has enabled prepayment services.	
4	Customer Representative/Website	The Customer Representative verifies that the requested event date/time is not already scheduled for another event in CSS	
5	Customer Representative/Website	The Customer Representative estimates the prepayment amount required for the event based on historical consumption data in CSS provided by the MDMS.	
6	Customer	The customer provides payment amount and payment information to the utility using various payment methods.	
7	Customer Representative/Website	The Customer Representative verifies funds and applies the prepayment amount to the customer's account and links the prepayment to the prepayment facility account (event location).	
8		Go to Primary Scenario 2, Step 7	

3.4   Alternate Scenario 1 - The customer's prepayment balance approaches zero for their site and prepays for additional electricity (Prepayment Program A)

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)*
Customer's prepayment balance approaches zero at their site; Customer prepays for additional electricity service (Program A)	ADCS	The AMI meter is installed and provisioned	The customer's prepayment balance reaches 48 hrs remaining and they prepay for additional service (no service interruption)

3.4.1 Steps for this 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..*
1	CSS	The CSS determines that there is a configurable threshold (i.e. 48 hours) of electricity service remaining on the prepaid account	The meter could also autonomously determine the configurable threshold has been reached

Step #	Actor	Description of the Step	Additional Notes
2	ADCS	The ADCS sends a message to the meter which contains the balance remaining on the prepaid account, forecasted time remaining (days, hrs, mins) and the estimated date/time the account will reach zero. The refreshed information will be transmitted to the AMI meter in the same frequency as the meter's billing intervals length (e.g. hourly).	
3	AMI Meter	The meter will receive, log and display the prepayment information, refreshed each time new information is received from the ADCS	
4	Customer Display Device	If equipped, prepayment messages will be passed onto the customer's display device	
5	Website	The utility website (e.g. sce.com) will also display the prepayment messages in the same refresh frequency, including all prepayment account information and balance remaining.	
6	Customer	The customer contacts the utility to submit additional prepayment OR prepayment balance is auto-replenished by various payment options.	
7		Go to Primary Scenario 1, Step 2	

3.5 Alternate Scenario 2 - The customer's prepayment balance approaches zero for their site and they do NOT prepay for additional electricity (Prepayment Program A)

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)*
Customer's prepayment balance approaches zero at their site; Customer does NOT prepay for additional electricity service (Prepayment Program A)	AMI Meter	The AMI meter is installed and provisioned	The customer's service is reduced, terminated or the account is auto-replenished.

3.5.1 Steps for this 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..*
1	CSS	The CSS determines that there is a configurable threshold (i.e. 48 hrs) of electricity service remaining on the prepaid account.	

Step #	Actor	Description of the Step	Additional Notes
2	ADCS	The ADCS sends a message to the meter which contains the balance remaining on the prepaid account, forecasted time remaining (days, hrs, mins) and the estimated date/time the account will reach zero. The refreshed information will be transmitted to the AMI meter in the same frequency as the meter's billing intervals length (e.g. hourly).	
3	AMI Meter	The meter will receive, log and display the prepayment information, refreshed each time new information is received from the ADCS and send a receipt to the ADCS	
4	ADCS	The ADCS shall receive, log and send the receipt to the MDMS	
5	MDMS	The MDMS shall receive and log the receipt and make the data available to other utility system (e.g. CSS)	
6	Customer Display Device	If equipped, prepayment messages will be passed onto the customer's display device	
7	N/A	The prepayment balance reaches zero	
8	AMI Meter	Electricity service at the site will be: 1. Reduced/limited 2. Terminated/disconnected 3. The account will be transitioned to a regular billing program 4. Customer's prepayment account will be auto-replenished (e.g. credit card, debit card, etc.) These actions are dependent on the program the customer has previously chosen	

3.6 Alternate Scenario 3 - The customer prepays for electricity service at their site but there is no power (Program A)

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)*
Customer prepays for electricity service at their site but there is no power (Program A)	Customer Representative	The AMI meter is installed and provisioned	If power could not be restored, an automatic field order is issued to re-energize the customer and a trouble order is issued for the meter

3.6.1 Steps for this 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..*
1	Customer	The customer contacts the utility because they have no power	
2	Customer Representative	The Customer Representative accesses the account information in CSS to verify the customer identity	
3	Customer Representative	The Customer Representative verifies that a prepayment had been made by the customer and a command had been sent to the AMI meter to energize the account	

Step #	Actor	Description of the Step	Additional Notes
4	ADCS	The Customer Representative conducts an on-demand meter test for connectivity, energized status of service, load side of voltage and current	
5	AMI Meter	The meter receives, logs and processes the request and sends the results to the ADCS	
6	ADCS	The ADCS receives and logs the request, then sends the results to the MDMS	
7	MDMS	The MDMS receives and logs the test results and makes the information available to other systems (e.g. CSS, trouble order system)	
8	Customer Representative	The Customer Representative views the test results in CSS	
9	Customer Representative	If the meter passed the test, the Customer Representative will send a command using the CSS to the ADCS to activate the prepayment account	
10	Customer Representative	If there is still no power at customer site,or the meter failed the meter test, an automatic field order will be generated to activate service and trouble order for the meter will be issued. (See Use Case I2).	

4. Requirements

4.1 Functional Requirements

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
The meter shall have the ability to display the customer's prepayment balance in dollars, kWh, and estimated time remaining (days/hrs/mins) based on historical consumption and date/time of last update	1	12
	2	14
	4	3
	5	3
When the estimated prepay time remaining reaches a configurable threshold (i.e. 48 hrs), the meter display shall refresh display of customer's prepayment balance, kWh, and estimated time remaining (hrs/mins) at the same frequency as the meter's billing intervals.	1	12
	2	14
	4	1
	4	2
	5	1
	5	2
The meter shall be able to send all meter display information (prepayment related and other information) to the customer's display device (the device must meet SCE standards), even if the meter display is turned off at the customer's request	1	13
	2	15
	5	4
The meter shall have the ability to connect, disconnect or limit demand to customers upon a remote utility command or utility pre-configured rules	5	6
The meter shall log all prepayment messages (informational and functional) received from the ADCS with the date/time (internal meter clock) and message code	1	8
	2	10
	4	3

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
	5	3
	6	5
The AMI meter shall be able to limit demand served to the customer by a remote utility on-demand request or through utility pre-configured rules	5	6
The ADCS shall be able to receive/retrieve interval data from the meter in the same frequency as the meters recording interval length, when the estimated remaining prepay time reaches a configurable threshold (i.e. 48 hrs) remaining until the account reaches zero.	4 5	2 2
The ADCS shall be able to transmit calculated prepayment balance information in the same frequency as the meters recording interval length, when the estimated remaining prepay time reaches a configurable threshold (i.e. 48 hrs) remaining until the account reaches zero	4 5	2 2
The ADCS shall be able to transmit calculated prepayment balance information to the AMI meter at least once per day (the timing shall be configurable by the utility)	0	0
The ADCS shall have the ability to be configured to enable connect,disconnect and demand limiting rules (e.g. scheduling, customer class, extreme weather) that can be defined by the utility.	5	7
The ADCS shall be able to transmit informational and functional messages to the meter.	0	0
The ADCS shall transmit all data received/retrieve from the meter, to the MDMS.	1 2 6	9 11 6
The ADCS shall have the ability to remotely test AMI meters for connection status, energized status, load side voltage and switch status on-demand.	6	4
The ADCS shall have the ability to schedule, reschedule and cancel remote connect,disconnect and demand limiting commands for future dates/times.	5	8
The meter shall log and send a receipt to the ADCS whenever pre-payment	1	8

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
information is received and processed. The receipt shall include a message identifier (e.g. number or code), meter ID, meter process completed date/time.	2	10
The ADCS shall be able to schedule multiple prepayment event schedules for the same service location	2	4
	4	3
The ADCS will not allow prepayment schedules to co-exist that overlap or duplicate schedules for the same service location.	2	4
	4	3
The meter shall be able to store multiple, scheduled prepayment events for the same service location and send an alert when a overlapping prepayment schedules exist	2	5
	4	4
The meter shall record energy consumption in interval usage data (not to exceed hourly intervals).	1	0
	2	0
	3	0
	4	0
	5	0
	6	0
The ADCS shall collect interval data from all meters at least once per day.	1	0
	2	0
	3	0
	4	0
	5	0
	6	0
The meter shall have the ability to limit load/service, at multiple configurable steps (e.g. 90% of rated capacity, 75% of rated capacity, etc.)	5	8
The meter shall re-energize ONCE automatically (after 2 minutes) if meter trips off because the configured demand limit is exceeded.	5	8

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
The meter shall be able to be manually re-energized by the customer at the meter if the service is interrupted because the configured demand limit is exceeded. The meters original demand limit will be re-established until the ADCS sends a message to change the demand feed.	5	8
The ADCS shall be able to send alert messages to AMI meter and/or display device at a configurable frequency (e.g. each hour prior to disconnect)	4 5	2 2
The ADCS shall log all transactions (e.g. on/offs, payments, messages, alerts, schedules, resets, etc.) sent to and received from the AMI meter.	1 1 2 2 4 5 6 6	7 9 9 11 2 2 4 6
The meter shall log all transactions (e.g. on/offs, payments, messages, alerts, schedules, resets, etc.) sent to and received from the ADCS.	1 2 4 5 6	8 10 3 3 5
The AMI meter shall be able to handle prepaid services and regular billing and payment services, as well as conversions between the two. (i.e. no special prepayment meter required)	1 2 3 4	0 0 0 0

Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
	5	0
	6	0
		0
The AMI meter shall be able to converted to/from a prepayment program at the end of the meters recording interval (not in the middle of an interval) without disrupting service.	5	8
The meter display shall present text messages in English (and Spanish) when appropriate (Example only, "There is an outage in your area" = "La electricidad no esta prendida en su vencindad")	0	0
The ADCS shall have the ability to transmit prepayment event schedules to the AMI meter on-demand.	1	10
	2	9
	4	2
	5	2
The MDMS shall make meter data available to other utility systems such as CSS and the utility website. Data may include interval usage, meter logs, meter test results and prepayment information such as prepayment schedules and prepay balance.	1	3
	1	10
	2	3
	2	4
	2	12
	3	5
	6	3
	6	7
The ADCS shall be able to receive, log and process requests (e.g., prepayment schedules, connect, disconnect, demand limit request, meter tests) from other utility systems (e.g., CSS)	1	6
	2	7
	4	1

Functional Requirements	*Associated Scenario #* *(if applicable)*	*Associated Step #* *(if applicable)*
	5	1
	7	9

4.2   Non-functional Requirements

Non-Functional Requirements	*Associated Scenario #* *(if applicable)*	*Associated Step #* *(if applicable)*
The meter shall transmit all prepayment, usage, demand, utility messages, etc. to the customer's display device (the device must meet SCE standards), as soon as data is received or recorded by the meter.	1 2 5	13 15 6
The ADCS shall have the ability to transmit remote demand limit/demand restore and connect/disconnect commands to the meter and the command be executed within 60 seconds of the ADCS request time.	5	6
The meter shall be able to receive and process remote demand/limit/demand restore and connect/disconnect commands immediately upon receipt or according to a predefined (configurable by the utility) schedule.	5	6
The ADCS shall have the ability to prioritize messages (functional and non-functional) that are transmitted to the AMI meter (e.g. connect/disconnect, load control, etc). The priority shall be configurable by the utility.	5 6	6 5
The AMI meter shall have the ability to prioritize messages (functional and non-functional) received from the ADCS (e.g connect/disconnect, load control, etc). The utility shall have the ability to configure the AMI meter message processing priorities.	5 6	6 5

Non-Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
The ADCS shall transmit prepayment service information (e.g., prepayment balance) to the MDMS for utility system access (e.g. website), immediately upon receipt.	1 2 4 5	9 11 2 2 6
The MDMS shall make all data received from the ADCS and other utility systems available to other utility systems upon receipt.	1 2 6	10 12 7
The ADCS shall send prepayment event schedule information to the meter at least 24 hrs prior to the start of the event, if the event schedule start time is greater than 24hrs in the future and immediately if the event start time is less than 24 hrs.	2 3	9 8
The ADCS shall send alert messages to customer's meter and/or display device within 60 seconds of being request by other utility systems (e.g., CSS).	4 5	2 2
The ADCS shall automatically retry to transmit connect/disconnect messages to the AMI meter, if the ADCS does not receive a receipt within 45 seconds of the original transmission.	5	4
The ADCS shall be able to send alert messages to AMI meter and/or display device at a configurable frequency (e.g. each hour prior to disconnect)	4 5	2 2
The transmission of prepayment messages to the AMI meter from the ADCS shall be 99.9% successful for 99% of the meters and 98% successfully for 1% of the meters.	0	0
The meter shall successfully process commands to demand limit/demand restore and connects/disconnects 99.9% of the time for 99% of the meters and 98% successfully for 1% of the meters.	0	0
A remote meter test for connection status, energized status, load side voltage, and switch status must be completed and have results returned to the ADCS within 60	6	6

Non-Functional Requirements	Associated Scenario # (if applicable)	Associated Step # (if applicable)
seconds.		

4.3   Business Requirements

Business Requirement	Associated Scenario # (if applicable)	Associated Step # (if applicable)
The prepayment balance shall be able to be replenished by the customer via current payment options (and "like" future options, e.g. credit card). The customer will not be able to make repayments through the AMI meter.	0	0
Minimum payment amount standards will apply to Prepayment Service programs to be later defined by the utility.	0	0
SCE bill pay stations (APAs) shall process customer payments to SCE in real-time.	0	0

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	1	Customer	Customer Representative/ Website	Prepay request • Acct number • Prepay timeframe requested • Customer name • Customer address • Customer credentials
1	2	Customer Representative/ Website	CSS	Customer information request • Acct number • Prepay timeframe requested • Customer name • Customer address • Customer credentials
1	2	CSS	Customer Representative	Customer information data • Acct number • Prepay timeframe requested • Customer name • Customer address • Customer credentials

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
1	3	CSS	Customer Representative/ Website	• Historical consumption data • Prepay estimated cost for time period requested
1	3	Customer Representative/ Website	Customer	Prepayment amount estimate needed for period requested (e.g., coming billing cycle)
1	4	Customer	Customer Representative/ Website	Payment amount Payment information for various payment methods Selected prepay program options (e.g, disconnect, demand limited, auto-replenish)
1	5	Customer Representative/ Website	CSS	Prepayment amount on customer account Prepay program option selected
1	7	CSS	ADCS	Prepayment information
1	7	ADCS	AMI Meter	Prepayment information (e.g, kWh credits)
1	8	AMI Meter	ADCS	Receipt of successful processing of prepayment information
1	9	ADCS	MDMS	Receipt of successful processing of prepayment information
1	10	MDMS	CSS	Receipt of successful processing of prepayment information
1	11	CSS	Customer Representative/ Website	Receipt of successful processing of prepayment information
1	12	Customer Representative/ Website	Customer	The customer will be able to view their daily average usage and historical usage information on a utility website.
1	13	AMI Meter	In home display	Prepayment account data including prepayment balance in dollars, kWh, and estimated time remaining based on historical consumption (days/hours).

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
2	1	Customer	Customer Representative/ Website	Prepay request for an event • Acct number • Prepay timeframe requested • Customer name • Customer address • Customer credentials
2	2	Customer Representative/ Website	CSS	• Acct number • Prepay timeframe requested • Customer name • Customer address • Customer credentials
2	2	CSS	Customer Representative/ Website	Prepay event location info • Prepay already scheduled • Time frame available • Account not setup for prepay
2	4	Customer Representative/ Website	CSS	Prepayment Event time and date request
2	4	CSS	Customer Representative/ Website	Historical consumption data and prepayment cost estimate
2	4	Customer Representative/ Website	Customer	Prepayment amount estimate needed for requested period (e.g., 1 week)
2	5	Customer	Customer Representative/ Website	Payment amount using various payment methods
2	6	Customer Representative/ Website	CSS	Prepayment amount on customer account
2	7	CSS	ADCS	Prepayment schedule information

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
2	9	ADCS	AMI Meter	Prepayment information • Start/end schedule • kWh credits • Program selected
2	10	AMI Meter	ADCS	Receipt of successful processing of prepayment information
2	11	ADCS	MDMS	Receipt of successful processing of prepayment information
2	12	MDMS	CSS	Receipt of successful processing of prepayment information
2	14	Customer Representative/ Website	Customer	The customer will be able to view their daily average usage and historical usage information on a utility website.
2	15	AMI Meter	In home display	Prepayment account data including prepayment balance in dollars, kWh, and estimated time remaining based on historical consumption (days/hours).
3	1	Customer	Customer Representative/ Website	Prepay request for an event and location • Acct number(s) • Prepay timeframe requested • Customer name • Customer address • Customer credentials
3	2	Customer Representative/ Website	CSS	Prepay request for an event and location • Acct number(s) • Prepay timeframe requested • Customer name • Customer address • Customer credentials

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
3	3, 4	CSS	Customer Representative/ Website	Prepay event location info • Prepay already scheduled • Time frame available • Account not setup for prepay
3	5	Customer Representative /Website	CSS	Event start/end time and date requested
3	6	CSS	Customer Representative/ Website	Historical consumption data and prepayment cost estimate
3	6	Customer Representative	Customer	Prepayment amount estimate needed for coming billing cycle
3	7	Customer	Customer Representative/ Website	Payment amount Payment information for various payment methods
3	8	Customer Representative/ Website	CSS	Prepayment amount on customer account Link prepayment to prepayment facility account
3	9 Go to Scenario 2, Step 7			
4	1 UC39.5.1 The AMI system determines that there is a configurable threshold (i.e. 48 hours) of electricity service remaining on the prepaid account			CSS determines balance threshold has been reached or the meter determines the balance remaining (in dollars) has been reached.

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
4	2 UC39.5.2 The ADCS sends a message to the meter which contains the balance remaining on the prepaid account, forecasted time remaining (days, hrs, mins) and the estimated date/time the account will reach zero. The refreshed information will be transmitted to the AMI meter in the same frequency as the meter's billing intervals length (e.g. hourly).	ADCS	AMI Meter	Balance remaining Forecasted time remaining Estimate time and date when account will reach zero
4	2	ADCS	AMI Meter	Usage information request
4	2	AMI Meter	ADCS	Usage data over the last interval
4	2			Scenario 4 steps 1 and 2 are performed in a continuous loop
4	4	AMI Meter	In home display	Balance remaining Forecasted time remaining Estimate time and date when account will reach zero
4	5	ADCS	SCE Website	Balance remaining Forecasted time remaining Estimate time and date when account will reach zero
4	6	Customer	Customer Representative/ Website	Receives additional prepayment and sends kWh credits to AMI Meter
4	Go to Primary Scenario 1, Step 2			

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
5	2	ADCS	AMI Meter	Balance remaining Forecasted time remaining Estimate time and date when account will reach zero
5	2	ADCS	AMI Meter	Usage information request
5	2	AMI Meter	ADCS	Usage data over the last interval
5	3			Scenario 5 steps 1 and 2 are performed in a continuous loop
5	4	AMI Meter	In home display	Balance remaining Forecasted time remaining Estimate time and date when account will reach zero
	7 The prepayment balance reaches zero	AMI Meter	In home display	Account has reached zero
5	8 (alternate)	CSS	ADCS	Disconnect or Limit Request
5	8 (alternate)	ADCS	AMI Meter	Disconnect or Limit Request
5	8 (alternate)	ADCS	AMI Meter	Converts AMI Meter to regular billing/payment plan
6	1	Customer	Customer Representative	Customer report of no power
6	2	Customer Representative	CSS	Customer information request
6	2	CSS	Customer Representative	Customer information data
6	3	Customer Representative	CSS	Prepayment amount on customer account request AMI Meter activation command sent request
6	3	CSS	Customer Representative	Prepayment amount on customer account data AMI Meter activation command sent confirmation

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
6	4	Customer Representative	CSS	Meter test command for: • Connectivity • Energized status of service • Load side of voltage and current
6	4	CSS	ADCS	Meter test command for: • Connectivity • Energized status of service • Load side of voltage and current
6	4	ADCS	AMI Meter	Meter test command for: • Connectivity • Energized status of service • Load side of voltage and current
6	5	AMI Meter	ADCS	Test results for: • Connectivity • Energized status of service • Load side of voltage and current
6	6	ADCS	MDMS	Test results for: • Connectivity • Energized status of service • Load side of voltage and current
6	7	MSMS	CSS	Test results for: • Connectivity • Energized status of service • Load side of voltage and current
6	8	CSS	Customer Representative	Test results for: • Connectivity • Energized status of service • Load side of voltage and current
6	9	Customer Representative	CSS	Reactivation request

Scenario #	Step #, Step Name	Information Producer	Information Receiver	Name of information exchanged
6	9	CSS	ADCS	Prepayment information
6	9	ADCS	AMI Meter	Prepayment information
6	9	AMI Meter	ADCS	Receipt of successful processing of prepayment information
6	9	ADCS	MDMS	Receipt of successful processing of prepayment information
6	9	MDMS	CSS	Receipt of successful processing of prepayment information
6	9	CSS	Customer Representative	Receipt of successful processing of prepayment information
6	10	Customer Representative	CSS	Field Order to activate service Trouble Order for the meter

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.

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.
• Consideration: The scenarios described here assume that the amount of time and money remaining from the repayment are repeatedly calculated in the back office and transmitted out to the meter for display. Another possible design would be for the initial amount and rate to be sent to the meter, and for it to perform the calculations locally. There is a tradeoff here between accuracy of the calculation and bandwidth used for sending prepayment messages that must be resolved in design of the system. However, the requirement that the amount of time and money remaining be displayed at the meter remains the same regardless of the design.

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**

8. References

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

9. Bibliography (optional)

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