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EPRI CIM Conformance Testing Development Results

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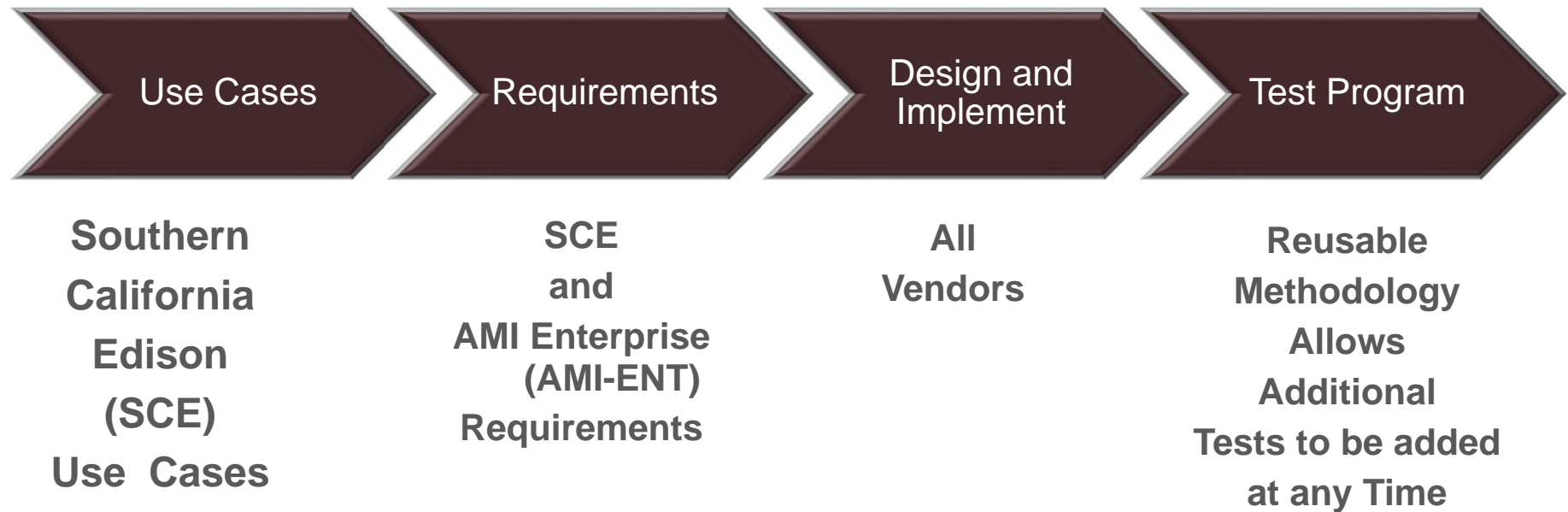
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UCAIug 2011 Fall Meeting – Austin, TX

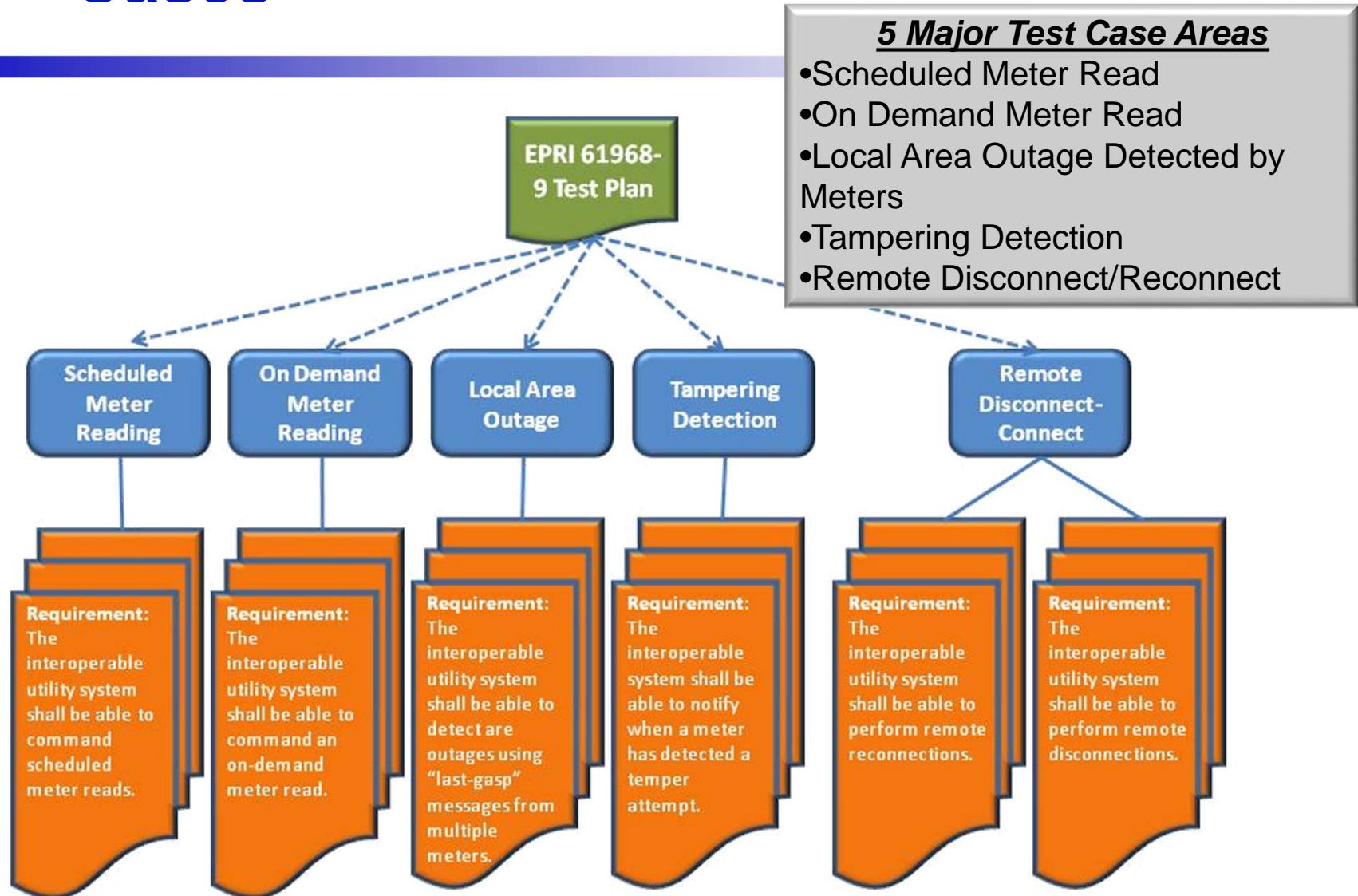
November 17, 2011

System Engineering-based Approach

Requirements derived from use cases map to test procedure steps



EPRI CIM Part-9 Interoperability Test Cases



Abstract Test Case –Test Description

Test Description:

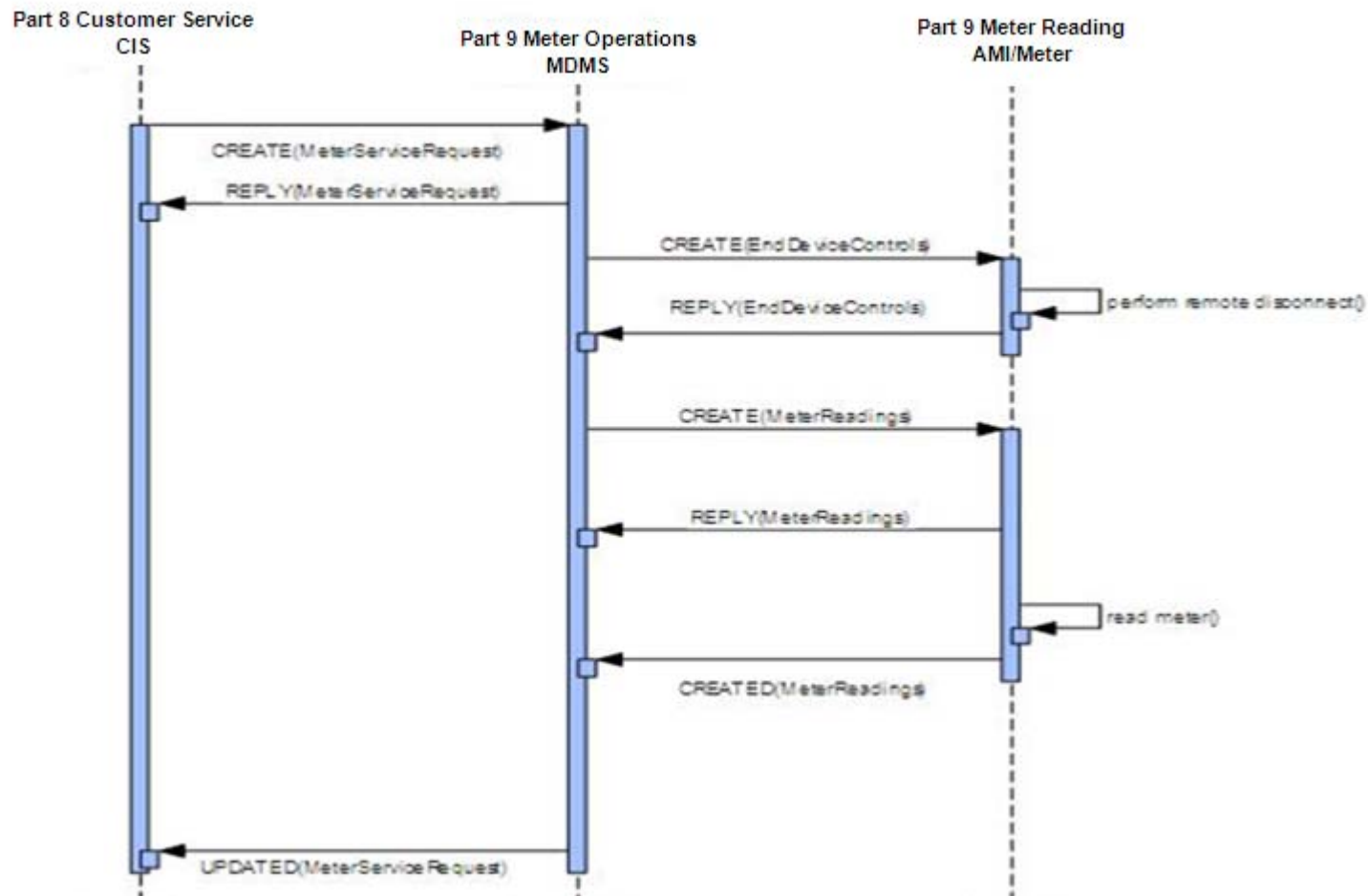
CIM standard Part-9 meter messages to/from the Meter Data Management System (MDMS) and from/to the Customer Information System (CIS) are verified to be in conformance with the IEC 61968 part 9.

Unit or Systems Under Test (SUTs/UUTs) are the MDMS and CIS or equivalent systems. A scheduled meter disconnect is initiated with the MeterServiceRequest message and the meter reading data is sent in the MeterReadings message. A scheduled meter reconnect is then initiated with the MeterServiceRequest message and the meter reading data is again sent in the MeterReadings message.

As shown in diagram MR 2.09-5, the main test steps are as follows:

- 1) The MeterServiceRequest messages is sent from the CIS to the MDMS..
- 2) The EndDeviceControl message is sent from the MDMS to the AMI Head End or similar system.
- 3) The meter performs a remote disconnect.
- 4) The MeterReadings message is sent from the MDMS to request meter usage data for the meter.
- 5) The CreatedMeterReading is sent from the meter/simulator to the MDMS and onto the CIS. The required IEC 61968 part 9 XSD is used to send the CreatedMeterReading message.
- 6) System error conditions e.g. missing and incomplete data reads are simulated and correct error processing verified.

Test Case Sequence Diagram



Test Case Requirements

Nominal and Error requirements

Use Case B2 1.050106 AMI-ENT version REQ0224 - Customer representative shall be able to schedule Date and Time for electric service turn On/Off and electric service limiting using AMI back office system(s). See <http://www.smartgridipedia.org/images/a/a3/ARCHB2USECASEv12050106.pdf>

Use Case B2 ver. 1.050106 AMI-ENT version REQ0231 - The AMI Head End shall periodically send electric service turn off messages to the Meter until the Meter acknowledges that the turn off has been completed successfully

Use Case B2 ver. 1.050106 AMI-ENT version REQ0027 REQ-B2001-Send scheduled turn off notification

Use Case B2 ver. 1.050106 AMI-ENT REQ-B2002-Send scheduled turn off command

Use Case B2 ver. 1.050106 AMI-ENT REQ-B2003-Send scheduled turn off command confirmation

Use Case B2 ver. 1.050106 AMI-ENT REQ-B2004-Send meter read (final)

Use Case B2 ver. 1.050106 AMI-ENT REQ-B2007-Send scheduled turn on command

Use Case B2 ver. 1.050106 AMI-ENT REQ-B2008-Send scheduled turn on command confirmation

Use Case B2 ver. 1.050106 AMI-ENT REQ-B2009-Send meter read (initial)

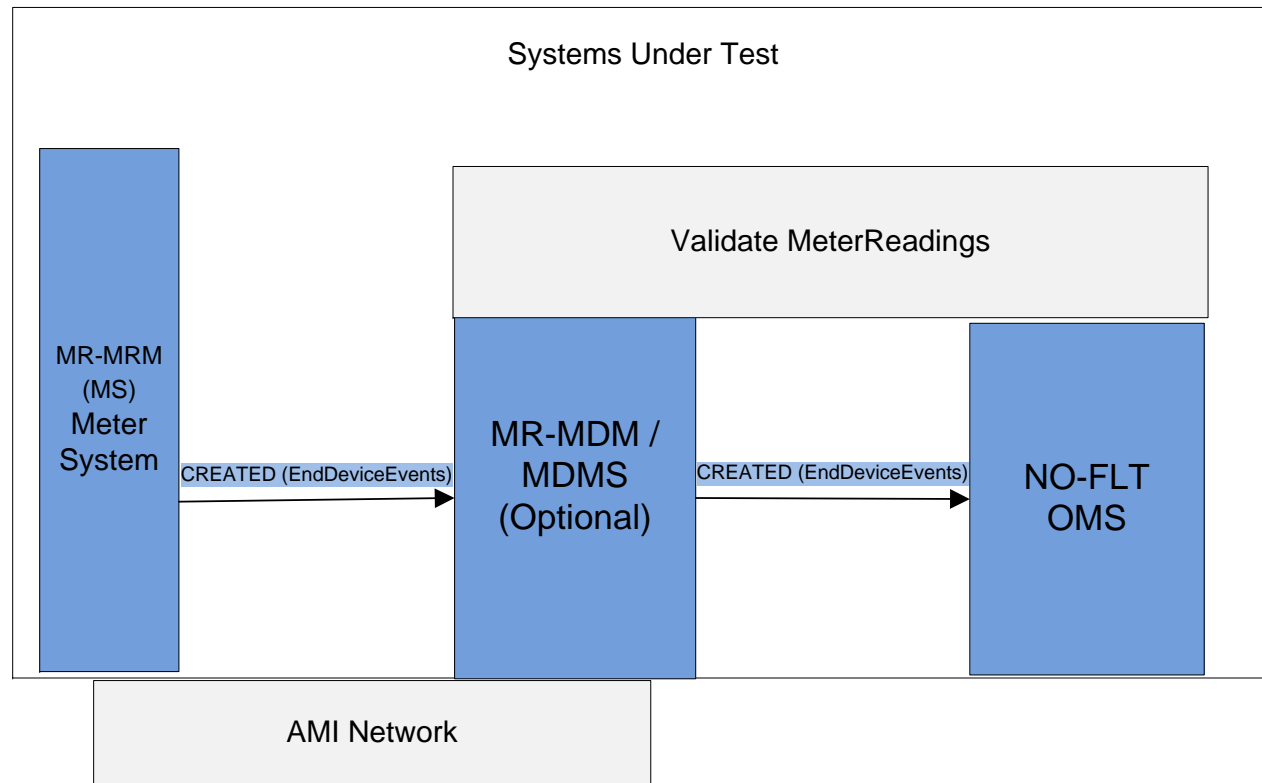
Off nominal and error requirements

Use Case B1 REQ0201 v1.2 - The Meter Data Unification System shall have the ability to automatically identify and immediately log missing or incomplete data from the previous day.

Use Case B1 REQ0202 v1.2- The Meter Data Unification System shall have the ability to identify and log Meters that have had missing or incomplete data in the past.

Use Case B1 REQ0203 v1.2- The Meter Data Unification System shall identify and log Meters where missing or incomplete meter data for the previous day was successfully recovered through the automated on-demand read request.

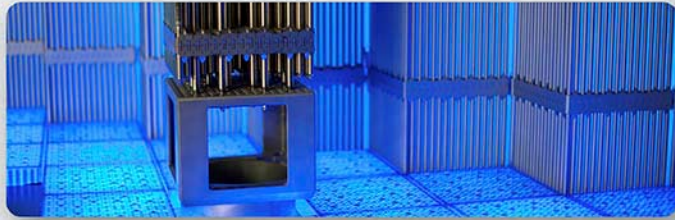
Test Procedure X-291 Diagram



Item(s) Tested



Item used in test

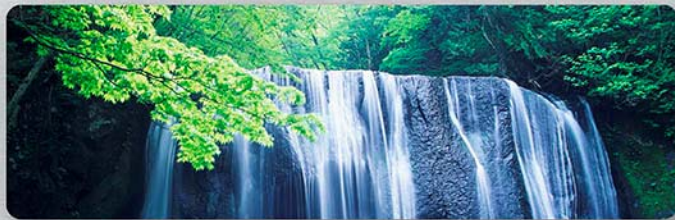


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Semantic Test Harness



Goals

- Lower cost of adopting CIM
- Provide framework for future certification
- Provide extensible framework for additional standards

Lower Cost of Adoption

- Vendor “self service” application
 - Validate outgoing messages
 - Request incoming well formed messages
- Ready to use messages and working examples
- Immediate and exact feedback on success/failure
- Amazon cloud for cost effective hosting

Future Certification

- Extend database logging
- Develop orchestration of related services

Extensible Framework

- Any XML based payload message
 - MultiSpeak
 - OpenADR, openADE
 - SEP 2.0
- Very little coding required – auto generation based on wsdl/xsd/config files
- Simple to support multiple message versions

Technology

- Amazon cloud hosting
 - Uses smallest possible instance, very cost effective
- One instance per vendor
 - multiple vendor roles can be configured
- Very simple administration
 - scripted deployment of harness

Under the hood

- Tomcat/Spring/Java
 - Application server
- MySQL
 - database
- Ruby/Rails for UI
 - UI viewer
- SoapUI
 - for working examples

Version 1 support

- Five 61968-9 packages
 - Meter Connect
 - Meter On Demand
 - Meter Scheduled
 - Meter Outage
 - Meter Tamper
- One 61968-6 package
 - Work Request

Available Web Services

RequestEndDeviceControls_Port	<ul style="list-style-type: none"> • CloseEndDeviceControls • CancelEndDeviceControls • CreateEndDeviceControls • ChangeEndDeviceControls • DeleteEndDeviceControls 	<p>Endpoint address: http://ec2-50-17-88-225.compute-1.amazonaws.com:8080/epriConnect/mdms/ami/requestReply</p> <p>WSDL : http://ws.server.sixthc.com/RequestEndDeviceControlsImplService</p> <p>Target namespace: http://ws.server.sixthc.com/</p>
RequestMeterReadings_Port	<ul style="list-style-type: none"> • CreateMeterReadings • CloseMeterReadings • ChangeMeterReadings • CancelMeterReadings • DeleteMeterReadings 	<p>Endpoint address: http://ec2-50-17-88-225.compute-1.amazonaws.com:8080/epriConnect/mdms/ami/requestMeterReading</p> <p>WSDL : http://ws.server.sixthc.com/RequestMeterReadingsImplService</p> <p>Target namespace: http://ws.server.sixthc.com/</p>
RequestMeterServiceRequests_Port	<ul style="list-style-type: none"> • CreateMeterServiceRequests • DeleteMeterServiceRequests • ChangeMeterServiceRequests • CancelMeterServiceRequests • CloseMeterServiceRequests 	<p>Endpoint address: http://ec2-50-17-88-225.compute-1.amazonaws.com:8080/epriConnect/mdms/cis/requestUpdate</p> <p>WSDL : http://ws.server.sixthc.com/RequestMeterServiceRequestsImplService</p> <p>Target namespace: http://ws.server.sixthc.com/</p>
RequestMeterServiceRequests_Port	<ul style="list-style-type: none"> • CreateMeterServiceRequests • DeleteMeterServiceRequests • ChangeMeterServiceRequests • CancelMeterServiceRequests • CloseMeterServiceRequests 	<p>Endpoint address: http://ec2-50-17-88-225.compute-1.amazonaws.com:8080/epriConnect/mdms/cis/request</p> <p>WSDL : http://ws.server.sixthc.com/RequestMeterServiceRequestsImplService</p> <p>Target namespace: http://ws.server.sixthc.com/</p>
RequestMeterServiceRequests_Port	<ul style="list-style-type: none"> • CreateMeterServiceRequests • DeleteMeterServiceRequests • ChangeMeterServiceRequests • CancelMeterServiceRequests • CloseMeterServiceRequests 	<p>Endpoint address: http://ec2-50-17-88-225.compute-1.amazonaws.com:8080/epriConnect/cis/mdms/requestCreate</p> <p>WSDL : http://ws.server.sixthc.com/RequestMeterServiceRequestsImplService</p> <p>Target namespace: http://ws.server.sixthc.com/</p>

Reporting UI

EPRI InterOp			
		Home	Logs
Test Status			
CIS	MDMS	AMI	OMS
Meter Connect 0%	Meter Connect 0%	Meter Connect 0%	Outage Management 0%
OnDemand Read 0%	OnDemand Read 0%	Meter Tamper 0%	
Meter Tamper 0%	Scheduled Read 0%	OnDemand Read 0%	
	Meter Tamper 0%	Scheduled Read 0%	
	Outage Management 0%		

Reporting UI – Package View

EPRI InterOp

[Home](#)[Logs](#)

Package Status

FAILED	MD_CIS-MDM_Create(MeterServiceRequest)	Logs
No Data	MD_CIS-MDM_Request_Reply(MeterServiceRequest)	Logs
No Data	MD_CIS-MDM_Request_Updated(MeterServiceRequest)	Logs

Reporting UI - logs

EPRI InterOp

[Home](#)[Logs](#)

Log Entry

ID: 73

create date: 2011-08-01 23:59:40 UTC

address:

result code: fail

response code: 500

http method:

header: {}

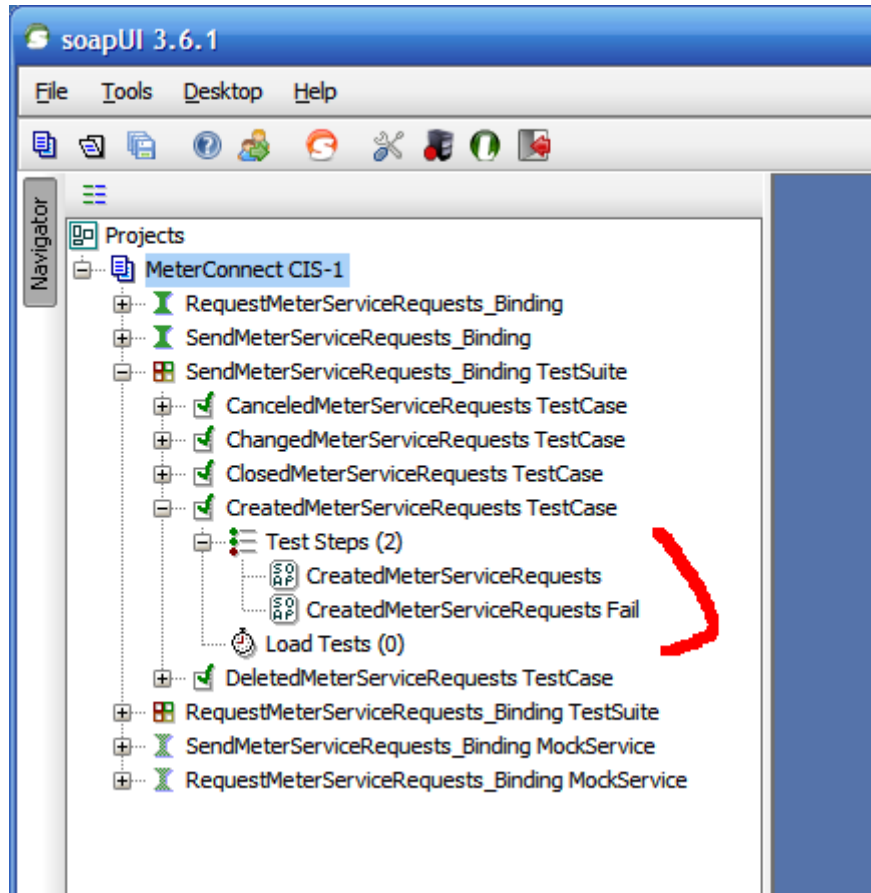
message:

operation:

payload: <soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"><soap:Body><soap:Fault>
<faultcode>soap:Client</faultcode><faultstring>Unmarshalling Error: ? [line:9] [line:9] </faultstring></soap:Fault></soap:Body>
</soap:Envelope>

[Back](#)

SoapUI



- Provides working examples
- Sending and Receiving



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