



MDM/R RECOMMENDED UNIT TEST SCENARIOS

MDM/R Recommended Unit Test Scenarios

In an effort to prepare LDCs with their MDM/R integration, we have developed a set of business scenarios recommended for UNIT testing.

These same tests are similarly described in the Technical Interface Specifications, in section 2.3.10, however in this document we have expanded them to include steps needed to successfully complete each test, questions to answer while preparing your business process(s), suggested test variations and points of interest.

These scenarios are a starting point for your unit testing. Include all possible business scenarios in your unit testing to ensure you cover your particular LDC's meter to bill process.

Recommended Unit Test Scenarios	USDP	ISYNC	PSYNC	Meter Reading	Billing	Ref: MDM/R V1.0 Technical Interface Specifications Version 3.0 September 24, 2010
USDP ID request for 1 SDP	✓	-	-	-	-	Section 2.1: Universal SDP ID Assignment Request/Response Interface
Synchronization of 1 SDP	-	✓	-	-	-	Section 2.3: Incremental Synchronization Interface
Account Change	✓	✓	-	✓	✓	Section 2.1: Universal SDP ID Assignment Request/Response Interface Section 2.3: Incremental Synchronization Interface
Meter (add new)	-	✓	-	✓	✓	Section 2.3: Incremental Synchronization Interface Section 2.11 - Section 2.18: Meter Read Interface Section 2.4: Billing Service Standard Interface- Request (Energy IP Release 7.1) Section 2,5: Billing Service Standard Interface- Reply (Energy IP Release 7.1) Section 2.6: Billing Quantity Request Section 2.7: Billing Quantity Response Section 2.8: Billing Cycle Schedule Interface
Meter Exchange	-	✓	-	✓	✓	
Meter Removal	-	✓	-	✓	✓	
Meter Disconnect/Reconnect	-	✓	-	✓	✓	
CT/PT Changes	-	✓	-	✓	✓	
Framing Change (Current Day/Retro-active)	-	✓	-	✓	✓	
VEE Change	-	✓	-	✓	✓	
Billing Agent Change	-	✓	-	✓	✓	
AMI Operator Change	-	✓	-	✓	✓	
Energy Service Provider (Retailer) Change	-	✓	-	✓	✓	
Billing Cycle ID Change	-	✓	-	✓	✓	
Service Delivery Point/Account (add new)	✓	✓	-	✓	✓	
Synchronization - True up	-	-	✓	-	-	Section 2.2: Periodic Audit Synchronization Interface

The following table is a quick guide to help you get familiar with the reports and the related interfaces. It is recommended that you review each report daily throughout each phase of testing and MDM/R Production operations.

Ref: MDM/R V1.0 Reports Technical Specifications_ Version 3.0 29 April 2010	USDP	ISYNC	PSYNC	Meter Reading	Billing
IR01: Universal SDP ID Assignment Request Summary Exception	✓	-	-	-	-
IR03: Billing Cycle Schedule Exceptions Report	-	-	-	-	✓
IR06: Synchronization Updates Report – Version 01	-	✓	✓	-	-
IR07: Synchronization Exception Report – Version 01	-	✓	✓	-	-
IR08: Billing Request Detailed Exception Report	-			-	-
IR10: Incomplete Synchronization File Set	-	✓	✓	-	-
IR14: Synchronization Staging Table Loader Exception Report	-	✓	✓	-	-
IR17: FTS Processing Failure Report	✓	✓	✓	-	-
DC01: Daily Read Status Report	-	-	-	✓	-
DC02: Excessive Missing Reads Report	-	-	-	✓	-
DC03: <u>Interim</u> Read Validation Failure Report	-	-	-	✓	-
DC04: Missing Reads Detail Report - Version 1	-	-	-	✓	-
DC05: Daily Data Collection Report	-	-	-	✓	-
DC06: <u>Interim</u> AMCC Data Collection <u>Summary</u> Exception Report	-	-	-	✓	-
DC07: <u>Interim</u> AMCC Data Collection <u>Detailed</u> Exception Report	-	-	-	✓	-
DC08: Zero Consumption Report	-	-	-	✓	-
DC13: <u>Final</u> Read Validation Failure Report	-	-	-	✓	-
DC16: <u>Final</u> AMCC Data Collection <u>Summary</u> Exception Report	-	-	-	✓	-
DC17: <u>Final</u> AMCC Data Collection <u>Detailed</u> Exception Report	-	-	-	✓	-
BR01: Billing Delivery <u>Summary</u> Report -Version 1	-	-	-	-	✓
BR02: Unauthorized Usage Report	-	-	-	-	✓
BR03: Re-Billing Report	-	-	-	-	✓
BR04: Billing Delivery <u>Detail</u> Report	-	-	-	-	✓
BR05: Billing Validation Sum Check Failure Report	-	-	-	-	✓
BR06: Billing No Reads Report	-	-	-	-	✓
BR97: Suspect Billing Quantities With NVEs Report	-	-	-	-	✓
BR99: Suspect Billing Quantities Report	-	-	-	-	✓
VE01: <u>Interim</u> Validation Failure Detail Report - Version 01	-	-	-	✓	-
VE02: <u>Interim</u> Estimation Failure Detail Report – Version 01	-	-	-	✓	-
VE03: Missing Interval Aging Report – Version 01	-	-	-	✓	-
VE04: VEE Summary Report	-	-	-	✓	-
VE11: <u>Final</u> Validation Failure Detail Report – Version 01	-	-	-	✓	-
VE12: <u>Final</u> Estimation Failure Detail Report – Version 01	-	-	-	✓	-

Recommended Test Scenarios

Test Scenarios	Details	Considerations	Things to Know/Test Variations
Universal SDP ID Request/Response	<p>Select one (1) SDP, where a smart meter has been installed and generate a USDP ID Request file and submit to the MDM/R via FTS.</p> <p>USDP ID Response file is received and loaded into CIS to complete this test.</p>	<ul style="list-style-type: none"> • Have you established a process to assign unique SDP IDs? • Have you established a process to distinguish between SDPs with conventional and smart meters, so that only SDPs with smart meters are synchronized with the MDM/R? • Have you determined the submission frequency of the Universal SDP ID Request file? • Have you established a process for requesting Universal SDP IDs for virtual SDPs? • Have you established a process to manage Universal SDP ID Assignment Request Exception Reports? 	<p>Other scenarios could include:</p> <ul style="list-style-type: none"> • Submit a USDP ID Request file for multiple SDP IDs • Submit a duplicate USDP ID Request file for USDP IDs. • Add meters to accounts for which you are not planning to request USDP IDs (C&I? Conventional Meters?) • If applicable, create accounts with two or more meters installed and test that a USDP ID is requested for each SDP generated. <p>It is important to note that the test environment has some system limitations; therefore it is recommended that you test with a maximum number of 100 SDPs.</p>
Account Change <i>TIS: Table 2.3.10 Business Scenario 10 - Account Change</i>	<p>Select one (1) SDP, final bill the previous account and add a new account to the same service delivery point.</p> <p>Generate an Incremental Synchronization file set and submit to the MDM/R via FTS.</p> <p>Submit meter read data files to the MDM/R, and verify all the reports delivered via FTS.</p> <p>Ensure that all exceptions are resolved prior to submitting the Billing Quantity Request.</p> <p>Upon receipt of the Billing Quantity Response, load the file into CIS and proceed to your billing process.</p>	<ul style="list-style-type: none"> • Have you chosen a Billing method: Scheduled Billing Data Service (PUSH) - or Request-Response Billing Data Service (request-response)? 	<p>Select a USDP that was previously synchronized and where meter read data has been submitted. This will allow you to test right through to billing, on both accounts.</p> <p>Once you are comfortable with this process, we recommend that you test variations of this scenario. For example:</p> <ul style="list-style-type: none"> • account changes that should not have occurred and need to revert back to its original state. • multiple account changes that were not completed in CIS. • incorrect move in and move out dates. • Move out only. • future dated account change • account change with framing structure change • account change with VEE service change <p>We also suggest that - each additional scenario should be tested right through to billing.</p>

Test Scenarios	Details	Considerations	Things to Know/Test Variations
<p>Meter (add new) <i>TIS: Table 2.3.3 Business Scenario 3 - Add new meter</i></p>	<p>Select one (1) SDP and add a smart meter, generate and submit an ISYNC to the MDM/R.</p> <p>The receipt of an IR06 recording the updates and an IR07 without exceptions completes this test.</p>	<ul style="list-style-type: none"> • Have you established a process to only synchronize smart meters to the MDM/R? • Have you established a process to select the correct channel configuration set and interval length criteria to the MDM/R? • Have you established a process to submit meter reads for meters that have been recently been installed; consider those meters that have a start date in the past. • Have you decided whether you will be sending the CT/PT multiplier parameter value to the MDM/R? 	<p>Other scenarios include:</p> <ul style="list-style-type: none"> • Add multiple meters, generate and submit ISYNC, submit meter read data • Add one meter and do not generate an ISYNC however submit meter read data against this meter. Check exception reports.
<p>Meter Exchange <i>TIS: Table 2.3.1 Business Scenario 1 - Meter Change</i></p>	<p>Select one (1) SDP end existing relationship between SDP and meter. Start new meter.</p> <p>Generate and submit an ISYNC to the MDM/R.</p> <p>The receipt of an IR06 recording the updates and an IR07 without exceptions completes this test.</p>	<ul style="list-style-type: none"> • Have you established a process related to field operations, to ensure that the MDM/R is updated with the meter change prior to submitting meter reads to the MDM/R? • Delays in updating the MDM/R with meter changes will require re-submission of meter read data. Have you established a process to account for these delays? • Have you established a process to submit meter read data for past dates? • Have you established a process to only synchronize smart meters to the MDM/R? 	<p>Other scenarios could include:</p> <ul style="list-style-type: none"> • Complete a meter exchange with an incorrect time stamp in your CIS, submit meter read data as it occurred in the field. Correct the time stamp. Analyze reports. • Process bills for accounts with billing period spanning over a meter exchange, exchanges occurring at the end of the billing period, shortly after the end of the billing period. • 'Crossed Meter', where meter A was installed at SDP A and Meter B was installed at SDP B which is incorrect. Meter A should be installed at SDP B and Meter B installed at SDP A. • Complete a meter change, generate and submit ISYNC. Submit meter read data for both meters • Complete a meter change, generate and submit ISYNC. Submit meter read data for the new meter only. Check exception reports

Test Scenarios	Details	Considerations	Things to Know/Test Variations
<p>Meter Removal TIS: Table 2.3.2 Business Scenario 2 - Meter Removal</p>	<p>Select one (1) SDP end existing relationship between SDP and meter.</p> <p>Generate and submit an ISYNC to the MDM/R.</p> <p>The receipt of an IR06 recording the updates and an IR07 without exceptions completes this test.</p>	<ul style="list-style-type: none"> • Have you established a process related to field operations, to ensure that the MDM/R is updated with the meter change? • Have you developed a process handle SDPs with no meter? 	<p>Other scenarios could include:</p> <ul style="list-style-type: none"> • Remove a meter, generate and submit ISYNC. Submit meter read data after the end date of the meter. Check exception reports • Remove a meter, reactivate relationship between SDP and meter; this would occur if the meter was removed in error. <p>When a meter is removed and no new meter will be installed, it is expected that the relationship between SDP and USDP will end. The relationship can be restarted in an incremental synchronization when a new meter is installed.</p>
<p>Meter Disconnection/ Reconnect TIS: Table 2.3.4 Business Scenario 4 and 2.3.5 Business Scenario 5</p>	<p>Select two (2) SDPs and disconnect the service.</p> <ul style="list-style-type: none"> - Disconnect one at the transformer - Disconnect one by 'booting' or 'sleeving' the meter <p>Generate and submit an ISYNC to the MDM/R.</p> <p>Reconnect the service. Generate and submit an ISYNC to the MDM/R. The receipt of an IR06 recording the updates and an IR07 without exceptions completes this test.</p>	<ul style="list-style-type: none"> • Have you established a process related to field operations, to ensure that the MDM/R is updated with the meter status? The MDM/R expects to receive meter read data, therefore delays in the submitting the changes will result in the reporting exceptions. • Have you established a process to manage the exception reports? • Have you established a process to ensure the MDM/R does not estimate over the period in which the meter was disconnected? 	<p>Other scenarios could include:</p> <ul style="list-style-type: none"> • Continue sending meter read data after the service has been disconnected and the MDM/R is updated or do not update the MDM/R after the account is reconnected. Verify your reports specifically the BR02: Unauthorized Usage Report (refer to the MDM/R V1.0 Reports Technical Specifications_ Version 3.0 29 April 2010) for report description and details. • Review the content of you current meter read files when actual disconnections occur (disconnection types applicable to the LDC :remote, pole, booting meter) • Process bills for accounts with disconnections within the billing period
<p>CT-PT Change TIS: Table 2.3.9 Business Scenario 9 – CT/PT Multiplier Change</p>	<p>Select one (1) SDP, end the existing CT/PT value and add new CT/PT with a value greater than '1'.</p> <p>Generate and submit an ISYNC to the MDM/R.</p> <p>The receipt of an IR06 recording the updates and an IR07 without exceptions. Submit meter read data to complete this test.</p>	<ul style="list-style-type: none"> • Have you decided if you will be using the MDM/R default CT/PT value '1' as the initial value for synchronization? • Have you established a process to update the CT/PT value? • Have you established a process to submit meter read data after a CT/PT change? • Have you reviewed the CT/PT values configured in the MDM/R to match with the possible CT/PT values your organization uses? 	<ul style="list-style-type: none"> • Fail to update the CT/PT value. Correct in a subsequent synchronization. Bill an account with a billing period spanning over the CT/PT change.

Test Scenarios	Details	Considerations	Things to Know/Test Variations
Framing Structure Change-Current Day TIS: Table 2.3.6 Business Scenario 6 - Framing Structure Change	<p>Select one (1) SDP and change the Framing Structure.</p> <p>If the current framing is '04'-Periodic update the value to '01'-TOU. Generate and submit an ISYNC to the MDM/R.</p> <p>The receipt of an IR06 recording the updates and an IR07 without exceptions.</p>	<ul style="list-style-type: none"> • Have you decided the initial framing structure for your existing population? • Have you determined, within your billing schedule, when a framing structure requires a change? • Have you established a process to change the framing as you ramp up your population in Production? • Have you established a process to determine when or if the meter read data is submitted? 	<p>Other scenarios could include:</p> <ul style="list-style-type: none"> • Framing Structure where the start date is earlier (retroactive) than the current date • Framing Structure where the start date is after (future)the extracted date time • Framing Structure where the start date and value both change either retroactive or future <p>In cases where the framing structure starts on an earlier date than previously synchronized, the MDM/R will reframe the meter read data, only if meter read data was previously submitted, as of the start date of the framing structure.</p> <p>There are rules affecting future and retroactive dating, in the Technical Interface Specification that should be reviewed and understood before completing the scenarios noted above.</p>
Meter Data Collection Process	<p>Intentionally create the different data quality flags applicable to your technology.</p> <p>Intentionally hold data for a day or a number of days within a billing period.</p> <p>Review Data Collection and VEE Processing Reports</p>	<ul style="list-style-type: none"> • Have you established a process to deal with meter read data that requires LDC editing through the MDM/R? • Have you established a process to deal with the Data Collection Reports? • Have you established a process to resubmit meter read data? An example of this would be in the event valid data becomes available and is needed to replace estimated data in the MDM/R. 	
VEE Service Change TIS: Table 2.3.8 Business Scenario 8 - VEE Service Change	<p>Select one (1) SDP end the existing VEE Service and start new VEE service, e.g. If the current VEE service is '03' (Residential) update the value to '02' No Estimation.</p> <p>Generate and submit an ISYNC to the MDM/R. The receipt of an IR06 recording the updates and an IR07 without exceptions.</p>	<ul style="list-style-type: none"> • Have you analyzed the parameters and settings of the existing VEE services and define which ones should be applied to your meter population? • Have you established a process for assigning the appropriate Validation, Estimation and Editing (VEE) Service for each SDP in the synchronization process? • Have you established a process for changing a VEE service for an SDP? • Have you established a process to deal with the VEE processing related reports? 	<p>Other scenarios could include:</p> <ul style="list-style-type: none"> • VEE service change where the start date is before the current start date • VEE Service where the start date and the value are changed either retroactive or future • VEE Service where the start date is in after the extracted date time <p>When making a VEE Service change in the past, resubmission of meter read data is required.</p> <p>Resubmission of meter read data to drive exceptions in the various reports is also recommended.</p>

Test Scenarios	Details	Considerations	Things to Know/Test Variations
Billing Quantity Request/ Response	Select one (1) or more SDPs where meter read data is available for the entire billing period. Generate and submit a billing quantity request. Upon receipt of the response file, load into CIS.	<ul style="list-style-type: none"> • Have you established a process to generate a Billing Quantity Request? • Have you established a process for submitting on-cycle and off-cycle billing quantity requests? • Have you established a process to load multiple billing quantity records for one SDP into billing? This would relate to billing quantities over a global rate change. • Have you established a process to deal with the Billing processing related reports? 	Other scenarios could include: <ul style="list-style-type: none"> • Billing quantity request over a global rate change • Billing quantity request for account finals (off-cycle) • Billing quantity request over an account change. • Billing quantity request for a billing period that is before the start of the first meter read. • Billing quantity for an SDP that has NVEs Over a global rate change you can expect multiple records for one SDP in a file.
Billing Agent Change TIS: Table 2.3.11 Business Scenario 11	Select one (1) SDP and end the relationship between SDP and Billing Agent Change. Start new Billing Agent. Generate and submit an ISYNC to the MDM/R. The receipt of an IR06 recording the updates and an IR07 without exceptions completes the test.	<ul style="list-style-type: none"> • Have you established a process to assign a Billing Agent for each SDP? • Have you established a process to change the Billing Agent? 	Other scenarios could include: <ul style="list-style-type: none"> • Submit billing quantity request 'straddling' the Billing Agent Change.
AMI Operator Change TIS: Table 2.3.12 Business Scenario 12 - AMI Operator Change	Select one (1) SDP and end the relationship between SDP and AMI Operator. Start new AMI Operator. Generate and submit an ISYNC to the MDM/R. The receipt of an IR06 recording the updates and an IR07 without exceptions completes the test.	<ul style="list-style-type: none"> • Have you established a process to assign an AMI Operator to each SDP? • Have you established a process to change the AMI Operator for an SDP? 	It is recommended that whenever a change occurs at the SDP level, a test is executed through to billing.
Energy Service Provider (Retailer) Change TIS: Table 2.3.13 Business Scenario 13	Select one (1) SDP and end the relationship between SDP and Energy Service Provider. Start new Energy Service Provider. Generate and submit an ISYNC to the MDM/R. The receipt of an IR06 recording the updates and an IR07 without exceptions completes the test.	<ul style="list-style-type: none"> • Have you established a process to assign an Energy Service Provider to each SDP? • Have you established a process to change the Energy Service Provider for an SDP? 	It is recommended that whenever a change occurs at the SDP level, a test is executed through to billing.

Test Scenarios	Details	Considerations	Things to Know/Test Variations
Billing Cycle ID Change TIS: Table 2.3.7 Business Scenario 7 - Billing Cycle ID Change	<p>Select one (1) SDP and end the Billing Cycle ID. Start new Billing Cycle ID.</p> <p>Generate and submit an ISYNC to the MDM/R. The receipt of an IR06 recording the updates and an IR07 without exceptions completes the test.</p>	<ul style="list-style-type: none"> • Have you established a process to change the Billing Cycle ID for an SDP? • Have you decided which method you would like to MDM/R to prepare Billing Quantity data; Scheduled Billing Data Service (PUSH) or Request-Response Billing Data Service (request-response)? 	<p>The Billing Cycle ID is used primarily for a scheduled "push"; where the MDM/R will deliver the billing quantity request based on the Billing Cycle Schedule.</p> <p>Business rules, defined in the TIS, associated to this interface and should be reviewed based on your operational requirements.</p>
Service Delivery Point/Account (add new) TIS: Table 2.3.10 Business Scenario 10- Account Change (start-Part 2)	<p>Assign a SDP ID to the Service Delivery Point. Generate a USDP ID Request file and submit to the MDM/R via FTS.</p> <p>Receipt of the USDP ID Response file is to be loaded into CIS.</p> <p>Generated and submitted an ISYNC to the MDM/R, the receipt of an IR06 recording the updates and an IR07 without exceptions.</p> <p>Submit meter read data, once processed generate and submit submitting billing quantity request and processing the billing quantity response right through to billing.</p>	<ul style="list-style-type: none"> • Have you established a process to assign unique SDP IDs? • Have you established a process to distinguish between SDPs with conventional and smart meters, so that only SDPs with smart meters are synchronized with the MDM/R? • Have you established a process to handle all MDM/R reports related to USDP ID Exceptions, Synchronization Update and Exceptions, Data Collection and VEE Exceptions and Billing Exceptions? • Will this process be automated? • Will you request new USDP IDs from the MDM/R when needed, or will you keep a repository of SDP-USDP IDs in your CIS? 	<p>If multiple USDP ID request are made to the MDM/R in a day, the USDP ID response file will contain all responses generated in the current day.</p> <p>Other scenarios could include:</p> <ul style="list-style-type: none"> • Add multiple SDPs, generate and submit a USDP ID Request File, load USDP ID Response file.

Test Scenarios	Details	Considerations	Things to Know/Test Variations
Periodic Audit Sync TIS: Section 2.2 Periodic Audit Synchronization Interface	<p>Generate and submit a Periodic Synchronization File (PSYNC) set of your test SDPs.</p> <p>The receipt of an IR06 without updates and IR07 without exceptions completes this test.</p>	<ul style="list-style-type: none"> • Submit a PSYNC at the end of every testing day as an audit. • Have you determined the frequency of submitting the PSYNC file set to the MDM/R? • Have you developed a process to manage Synchronization related reports? • To capture current state data in the PSYNC will you need to process ISYNC first? 	<p>It is expected that the PSYNC contains current data, therefore there should be no updates and no exceptions (IR06 and IR07 is empty/clean). It is necessary to generated and submit to the MDM/R an ISYNC to capture current changes prior to submitting a PSYNC.</p> <p>If there are any other updates recorded in the IR06 this would indicate that ISYNC was not delivered with the updates. These will need to be reviewed and, if required, corrected via an ISYNC.</p> <p>In the case of meter exchanges processed after the last P-sync sent, it is expected that the IR06 would contain updates to the status of the meter and communication module (which change from meter shop to inactive)</p> <p>Other scenarios could include: Remove a USDP from the P-Sync files and submit making the associated relationships to the USDP inactive. Correct by submitting an I-Sync to reinstate the USDP reactivating the relationships.</p>