

**Oracle Utilities Smart Grid Gateway
MV-90 Adapter for Itron**

Configuration Guide

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Oracle Utilities Smart Grid Gateway MV90 Adapter for Itron Configuration Guide

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Chapter 1

Overview

This chapter provides an overview of this configuration guide and an introduction to the Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron including the following:

- **What Is This Book?**
- **Other Documentation**
- **Oracle Utilities Application Framework Configuration Tools**

What Is This Book?

This guide describes how to configure the Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron. It is intended for implementers and system administrators responsible for configuration and initial setup of the application.

The Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron is based on the Oracle Utilities Application Framework (OUAF). For information about using and configuring basic Framework functions, see the Oracle Utilities Application Framework documentation. This guide only covers configuration of functions specific to the Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron.

The body of this guide presents conceptual information to help you understand how the system works as well as how the various configuration options affect system functionality. Once you have an understanding of the system's capabilities, you can plan your data setup and design any customizations you want to implement.

When you are ready to implement your design, use **Chapter 2: General Configuration** to guide you through the setup process of admin data. This section lists each object that can be configured, defines any prerequisites for configuration.

This guide includes the following chapters:

- **Chapter 1: Overview** (this chapter) provides an overview of the Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron architecture and of the configuration tools and process used in implementing the product.
- **Chapter 2: General Configuration** provides an overview of some general configuration options used by the Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron.

Other Documentation

This section describes other documentation provided with the Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron.

Installation Documentation

Installation documentation describes the steps involved in the installation and initial set up of the system, and includes the following documents:

- Oracle Utilities Smart Grid Gateway Quick Install Guide
- Oracle Utilities Smart Grid Gateway DBA Guide
- Oracle Utilities Smart Grid Gateway Installation Guide

User Documentation

User documentation provides conceptual information and procedures related to working with the various objects used in the system, and includes the following documents:

- Oracle Utilities Application Framework Business Process Guide
- Oracle Utilities Application Framework Administration Guide
- Oracle Utilities Service and Measurement Data Foundation User's Guide
- Oracle Utilities Smart Grid Gateway User's Guide

Supplemental Documentation

Supplemental documentation provides technical information related to system administration tasks and include the following documents:

- Oracle Utilities Smart Grid Gateway Server Administration Guide

- Oracle Utilities Smart Grid Gateway Batch Server Administration Guide
- Oracle Utilities Smart Grid Gateway Configuration Guide

The Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron uses Oracle Service Bus (OSB) as middleware components. This tool is part of the Oracle SOA Suite. See the Oracle SOA Suite Documentation library (<http://www.oracle.com/technetwork/middleware/soasuite/documentation/index.html>) for more information about using these tools.

Embedded Help

Oracle Utilities Smart Grid Gateway, like all Oracle Utilities Application Framework applications, provides extensive internal documentation. For example, detailed descriptions of system objects are included in the objects' maintenance portals. The lifecycle of each business object is described on the Lifecycle tab and depicted in flow diagrams on the Summary tab. This information is extremely useful for implementers and system administrators.

Embedded help is provided for all non-obvious fields in most portals and zones. If a field has associated help text, a ? icon appears next to the field when the zone is displayed.

Online Help

Oracle Utilities Smart Grid Gateway also includes context-sensitive help for all the user interface screens users will typically work with as they use the system. Online help contains conceptual information and procedures related to working with the various objects used in the system.

The online help is divided into the following three sections:

- Oracle Utilities Application Framework: Describes the features and functions of the application framework (F1)
- Oracle Utilities Service and Measurement Data Foundation: Describes the features and functions provided in the Service and Measurement Data Foundation (D1)
- Oracle Utilities Smart Grid Gateway: Describes the features and functions provided in the smart grid gateway application (D5)

Oracle Utilities Application Framework Configuration Tools

Please refer to the general configuration guide for information on the Oracle Utilities Application Framework (OUAF) configuration tools that can be used to create and customize system entities, such as business objects, portals, zones, and UI maps. Refer to the Oracle Utilities Application Framework configuration tools documentation for instructions on using tools such as:

- **Configuration Process Overview**
- **Data Areas**
- **Algorithms**
- **Entity Naming Conventions**

This configuration guide does not duplicate the concepts and procedures presented in the Oracle Utilities Application Framework configuration tools documentation; rather, it will identify the specific objects used by the Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron that can be configured and customized using the configuration tools, as well as application parameters and objects that can be managed within the application components themselves.

This guide assumes that all individuals responsible for system configuration and implementation will be familiar with the Oracle Utilities Application Framework and will have completed training on the Oracle Utilities Application Framework Configuration Tools.

Chapter 2

General Configuration

This chapter provides details on the components and configurations required for the Smart Grid Gateway MV-90 Adapter for Itron including the following:

- **Understanding the Adapter**
- **Understanding the Adapter Processing**
- **Configuring an MV-90 Head-End System**
- **Configuring MV-90 Extendable Lookups**

Understanding the Adapter

The Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron the parsing, transformation, and loading of MV-90 binary format measurement data for use in Oracle Utilities applications. The following table describes the attributes of the adapter:

| Attribute | Details |
|-----------------------------|--|
| Currently Supported Version | SGG supports the .mv9 binary, mainframe data format. |
| Protocol | Binary file format. |
| Market(s) | Worldwide, but largely USA. |
| Architecture | AMR |

The adapter uses Oracle Service Bus (OSB) to facilitate communication between Oracle Utilities Smart Grid Gateway and MV-90.

The following functionality is included:

- **Measurement Data Loading** - data parsing and transformation from MV-90 binary format into the Oracle Utilities Service and Measurement Data Foundation unified format.
- **Measurement Data Processing** - configurable mapping for MV-90 status codes to Oracle Utilities Service and Measurement Data Foundation standard values, along with configurable device event creation based on MV-90 status codes.

Understanding the Adapter Processing

This section provides details concerning the OSB processing, BPEL Processes, OUAF objects supplied as part of the base package. This information illustrates how the base package objects were designed, and can serve as the basis for any customizations you create as part of your implementation.

This section includes:

- **Initial Measurement Data Load**
- **Base Package Business Objects**

Initial Measurement Data Load

The initial measurement data load and subsequent device event processing use OSB to poll for, parse, and transform the head-payloads into the Oracle Utilities Smart Grid Gateway service format. Payloads contain measurements in a head-end specific format OSB then places each service call into a JMS queue within the Oracle Utilities applications. The JMS client consumes the entries and invokes the respective services in parallel then a service creates initial measurements with data in a common format with head-end-specific processing as needed. A second service creates device events with data in a common format

Initial Measurement

The usage data exported from the AMI head-end system as a file in MV-90 format is loaded into Oracle Utilities as Initial measurement data. The following OSB projects, delivered in the base product, help manage the usage processing:

1. SGG-D5-USAGE-BASE - contains components responsible for the actual processing of incoming data. It should not be modified during configuration. This project can be upgraded without affecting the customization and environment settings added to the SGG-D5-USAGE-CM project.
2. SGG-D5-USAGE-CM allows for customization and simplifies future upgrades.

The runtime configuration settings for the SGG-D5-USAGE-CM project are stored in the xquery file EnvironmentSettings.xq. You can use this file to adjust initial measurement data processing. For example, if you want to load raw data you would specify “true” for the content of the populateRawIMD element.

The following table describes the elements included in the EnvironmentSettings.xq file:

| Element | Description |
|--------------------|--|
| populateRaw | Determines if the initial measurement data is populated as raw data. Valid values are: <ul style="list-style-type: none"> • true • false |
| callPreProcessing | Determines if the preprocessing proxy service is called. Valid values are: <ul style="list-style-type: none"> • true • false |
| callPostProcessing | Determines if the postprocessing proxy service is called. Valid values are: <ul style="list-style-type: none"> • true • false |

| Element | Description |
|--------------------------------|--|
| destinationRootElementInterval | Holds the name of XAI inbound service for the interval IMD seeder. |
| usePhysicalChannel | Optional value. Determines whether the physical channel ID is passed to the IMD seeder to create the measuring component identifier number. If this is set to false, the MV90 LOGCHAN field is used. Valid values are: <ul style="list-style-type: none"> true false (default) |
| fieldForDvcIdN | Optional value. Specifies which field is used as the value for the device ID. Valid values are: <ul style="list-style-type: none"> DC_RECID DC_CUSTID DC_METERID (default) |
| MV90ScalarChannelSuffix | Optional value. Holds a suffix value to be added to the measuring component identifier number when a scalar IMD is created for register reads. Default value is “_S” |
| processMV90ScalarData | Optional value. Determines if register reads are processed. Valid values are: <ul style="list-style-type: none"> true false (default) |

Processing Large Input Files

In some environments, the OSB project may begin processing a large input file before it has been completely copied to the input directory. To prevent this, configure the `MinimumAge` property in the “InboundProxyService” proxy service for the SGG-D5-USAGE-CM project. The `MinimumAge` property specifies the minimum age of files to be retrieved, based on the last modified time stamp. This enables large files to be completely copied to the input directory before they are retrieved for processing.

See *Working with Adapter OSB Projects* in the *Oracle Utilities Smart Grid Gateway Configuration Guide* for more information about setting the `MinimumAge` property.

Initial Measurement Data Load with Register Reads

In the MV90 format, measurement data can include interval data as well as register reads that can be used to create scalar measurements. For information on configuring the adapter for loading scalar data based on register reads, see **Override Processing Methods for Scalar Initial Measurement Data** on page 2-7.

Base Package Business Objects

The MV-90 Adapter for Itron base package includes the following business objects which are used for mapping and lookups:

| Business Object Name | Description |
|-----------------------------|----------------------------------|
| D5 - ChanelStatusCodeLookup | MV-90 Channel Status Code Lookup |
| D5-InitialLoadIMDInterval | MV-90 Initial Load IMD |
| D5-InitialLoadIMDScalar | MV90 - Initial Load IMD - Scalar |

| Business Object Name | Description |
|-----------------------------|---|
| D5-IntStsCdToCndMapPrLookup | Condition Mapping with Priority |
| D5-IntStsCodeToEvtMapLookup | Interval Status Code to Event Mapping |
| D5-UOMtoStdUOMCodeMapLookup | MV-90 UOM Code to Standard UOM Code Mapping |

Configuring an MV-90 Head-End System

This section outlines the configuration required for the Oracle Utilities Smart Grid Gateway MV-90 Adapter for Itron to receive usage from an MV-90 system. This includes:

- **XAI Inbound Services**
- **External System**
- **Service Provider**
- **Processing Methods for Service Provider**

XAI Inbound Services

XAI inbound services define the details of how messages are received from an external system, including incoming usage.

The following XAI Inbound Services must be configured in your system. If these are not present in your configuration, add them. Refer to the Oracle Utilities Application Framework documentation for more information about creating XAI inbound services.

| XAI Inbound Service Name | Description | Schema Type | Schema Name |
|--------------------------|----------------------------|-----------------|----------------------|
| D1-InitialLoadIMD | IMD Seeder | Business Object | D1-IMDSeeder |
| D1-PayloadErrorNotif | Payload Error Notification | Business Object | D1-PayloadErrorNotif |
| D1-PayloadStatistics | Payload Statistics | Business Object | D1-PayloadStatistics |
| D1-PayloadSummary | Payload Summary | Business Object | D1-PayloadSummary |

External System

External systems represent external applications with which the Smart Grid Gateway will exchange messages or data. In the case of the Smart Grid Gateway adapters, external systems represent the head-end systems with which the adapters communicate.

An external system that represents the MV-90 system must be present in your system. If this is not present in your configuration, add it. Refer to the Oracle Utilities Application Framework documentation for more information about creating external systems.

External System - MV-90:

- **External System:** MV90
- **Description:** MV90 - Mainframe File Format

Service Provider

Service providers represent external entities that serve various roles relative to the application, including head-end systems, billing systems to which the application sends bill determinant data, market participants in a deregulated environment, outage management systems that receive meter event data from the application, or other parties that require or provide information to the system. The head-end systems that collect and send measurement data and meter events to the application are defined as service providers.

A service provider that represents the MV-90 system must be present in your system. If this is not present in your configuration, add it. Refer to the Oracle Utilities Service and Measurement Data Foundation documentation for more information about creating service providers.

Service Provider - MV-90:

- **Service Provider:** MV90

- **Description:** Head-End System for MV90
- **External Reference ID:** MV90
- **External System:** MV90 - Mainframe File Format
- **Out Name/ID in Their System:** MV90
- **AMI Device ID Type:** Serial Number
- **AMI Measuring Component ID Type:**

Processing Methods for Service Provider

Processing methods define the format or means by which a service provider receives and/or sends data from and/or to the application, including as bill determinants, usage data, or device events. Processing methods are also used to define how to create information internal to the application such as initial measurement data and device events.

The following types of processing methods must be configured for the MV90 service provider. Refer to the Oracle Utilities Service and Measurement Data Foundation documentation for more information about configuring processing methods.

Initial Measurement Creation

Initial measurement creation processing methods define the business objects used to create initial measurements. The IMD Seeder XAI Inbound Service uses this processing method to determine which type of initial measurement business object to instantiate when receiving usage from the MV-90 system.

Processing Method - Initial Measurement Creation

- **Service Provider:** Head-End System for MV90
- **Processing Role:** Initial Measurement Creation
- **Description:** How to create Initial Load IMD - MV90
- **Status:** Active
- **Default Processing Method:**
 - **Business Object:** D5-InitialLoadIMDInterval (MV90 Initial Load IMD)
- **Override Processing Method:** based on implementation-specific requirements

Override Processing Methods for Scalar Initial Measurement Data

In the MV-90 format, meter read start and stop values can represent either a calculated read based on the interval data that is included in the MV90 data, or a register read that has been logged using a separate channel. When the values represent a register read the application can create a second file for the scalar initial measurements. The creation of a scalar initial measurement file is triggered by the Register Type flag, DC_REGTYPE, in the MV-90 data and the processMV90ScalarData variable in the EnvironmentSettings.xq file. The following register read values are valid for the DC_REGTYPE field:

| Value | Description |
|-------|--|
| V | Visual energy readings |
| D | Visual demand and energy readings |
| E | Encoder register readings (energy only). |
| B | Both encoder and visual energy readings. |

| Value | Description |
|-------|---|
| C | Calculate stop meter readings from the encoder base reading |

In order to configure your adapter to create scalar initial measurements based on register reads, first define new measuring component types and register measuring components. Then use the new measuring component types to specify override processing methods on the Initial Measurement Creation processing method for your service provider.

Measuring Component Types for Scalar Reads - To create initial measurement data for register reads, first create new measuring component types to represent the registers. These will be used to create measuring components for scalar reads.

Example Measuring Component Type

- **Measuring Component Type:** MV90_SCALAR_REG
- **Description:** MV90 Scalar Register
- **Measuring Component Business Object:** Register
- **Measurement Business Object:** Measurement
- **Service Type:** Electric Service
- **Allow Negative Consumption:** Allowed
- **Consumptive/Subtractive:** Subtractive
- **Read Method:** Automatic Read
- Other attributes such as Value Identifiers, VEE Groups, and so on, should be defined based on requirements

Register Measuring Components for Scalar Reads - Use the new measuring component types to create measuring components for the scalar measurements created by the register read process. You must create a corresponding register measuring component for each interval channel for which you will receive scalar reads. The channel number for the registers must be based on the channel numbers of the corresponding interval channels, plus the suffix defined in the “MV90ScalarChannelSuffix” environment setting. The default value for this setting is “_S”. These registers must also be added to the device configuration used by the interval channels (in other words, both measuring components - interval and scalar - must be on the same device). The following table shows examples of these values for the measuring components:

| Device Type/Serial Number | MV-90 Interval Channel Number | MV-90 Scalar Register Channel Number |
|---------------------------|-------------------------------|--------------------------------------|
| MV90 Electric/00001 | 1 | 1_S |
| MV90 Electric/00002 | 1 | 1_S |
| MV90 Electric/00003 | 1 | 1_S |

Override Processing Methods for MV-90 Service Provider - Add an override processing method to the Initial Measurement Creation processing method for the MV90 service provider for each register measuring component type. The business object for each override processing method should be “D5-InitialLoadIMDScalar”. The following tables shows examples of the override processing methods:

| Measuring Component Type | Business Object |
|--------------------------|-------------------------|
| MV90 Scalar Register | D5-InitialLoadIMDScalar |

| Measuring Component Type | Business Object |
|----------------------------|-------------------------|
| Measuring Component Type 2 | D5-InitialLoadIMDScalar |
| Measuring Component Type n | D5-InitialLoadIMDScalar |

Device Event Mapping

Device event mapping processing methods define how head-end-specific device events are mapped to standard device event names. The Device Event Seeder XAI Inbound Service uses this processing method to determine which type of device event business object to instantiate when creating device events based on interval status codes received with usage from the MV-90 system.

Processing Method - Device Event Mapping

- **Service Provider:** Head-End System for MV90
- **Processing Role:** Device Event Mapping
- **Description:** How to map device events - MV90
- **Status:** Active
- **Default Processing Method:**
 - **Business Object:** D5-IntStsCodeToEvtMapLookup (Interval Status Code to Event Mapping)
- **Override Processing Method:** based on implementation-specific requirements

UOM Mapping

UOM mapping processing methods define how head-end-specific unit of measure (UOM) codes are mapped to standard UOM codes. This processing method is used to determine how to map MV90 UOM codes to standard UOM codes when receiving usage from the MV-90 system.

Processing Method - UOM Mapping

- **Service Provider:** Head-End System for MV90
- **Processing Role:** UOM Mapping
- **Description:** How to map UOMs from MV90 when creating IMDs
- **Status:** Active
- **Default Processing Method:**
 - **Business Object:** D5-UOMtoStdUOMCodeMapLookup (MV90 UOM Code to Standard UOM Code Mapping)
- **Override Processing Method:** based on implementation-specific requirements

Configuring MV-90 Extendable Lookups

This section outlines some of the extendable lookups that must be configured for use with the MV-90 Adapter for Itron. These include:

- **Interval Status Code to Event Mapping**
- **MV90 UOM Code to Standard UOM Code Mapping**

Refer to the Oracle Utilities Application Framework documentation for more information about working with extendable lookups.

Interval Status Code to Event Mapping

The MV-90 adapter for does not accept device events from an MV-90 system, but can create device events based on specific interval status codes in an incoming usage reading. The MV-90 Interval Status Code to Event Mapping extendable lookup is used to determine which type of device event business object to instantiate when creating device events based on interval status codes received with usage from the MV-90 system.

Each value defined for the Interval Status Code to Event Mapping extendable lookup should include the following:

- **MV90 Interval Status:** The interval status code used by the MV-90 system
- **Description:** A description of the MV-90 interval status code
- **Event Duration Mode:** The duration type for the event. Can be either “Individual” or “Continuous” (used for events with a duration, such as an outage).
- **Device Event Type:** The Device Event Type for the device event created for this interval status code. For status codes with an Event Duration Mode or “Continuous” this is the start event, or the first of the paired events created for this status code.
- **End Event Type:** The Device Event Type for the “end” device event created for this interval status code. For status codes with an Event Duration Mode or “Continuous” this is the start event, or the last of the paired events created for this status code.

Example: The MV-90 “Low Voltage” status code could be configured to create a “Low Voltage” device event as follows:

- **MV90 Interval Status:** <MV-90 interval status code for low voltage>
- **Description:** Low Voltage detected for meter
- **Event Duration Mode:** “Individual”
- **Device Event Type:** Low Voltage
- **End Event Type:** N/A

Example: The MV-90 “Power Outage” status code could be configured to create a “Last Gasp” device event, and a “Power Restoration” event as follows:

- **MV90 Interval Status:** <MV-90 interval status code for outage>
- **Description:** Outage
- **Event Duration Mode:** “Continuous”
- **Device Event Type:** Last Gasp
- **End Event Type:** Power Restoration

MV90 UOM Code to Standard UOM Code Mapping

Usage received from the MV-90 system may use utility-specific unit of measures (UOMs). These custom UOMs must be mapped to standard UOM codes. The MV90 UOM Code to Standard UOM Code Mapping extendable lookup is used to determine how to map MV90 UOM codes to standard UOM codes when receiving usage from the MV-90 system.

Each value defined for the MV90 UOM Code to Standard UOM Code Mapping extendable lookup should include the following:

- **Head-End Unit of Measure:** The unit of measure code used by the MV-90 system
- **Unit of Measure:** The unit of measurement defined in the system. See Defining Units of Measure in the *Oracle Utilities Service and Measurement Data Foundation User's Guide* for more information about creating UOM codes for use with Oracle Utilities Smart Grid Gateway.
- **Description:** A description of the unit of measure code.

Example: The MV-90 “KWH” unit of measure code could be mapped to the “Kilowatt Hours” standard UOM code as follows:

- **Head-end UOM:** KWH
- **Unit of Measure:** Kilowatt Hours
- **Description:** MV90 Kilowatt Hours

Appendix

Glossary

This glossary provides definitions of commonly used terms.

Command Effective Date/Time

The date and time when a device command becomes effective.

Command Expiration Date/Time

The date and time when a device command expires.

Commissioning

A command issued to establish communication between a device and the head-end system. The goal is to ensure connectivity has been established with the device, that any information needed to communicate with the meter has been defined in both Oracle Utilities Smart Grid Gateway and the head end system, and the meter will begin capturing usage and events.

Decommissioning

A command issued to inform the head-end system when a meter needs to be removed from a service point, so that no further reads or events will arrive from the meter. Decommissioning is invoked when a meter must be removed or deactivated. The goal is to stop any communication between the device and the head-end system.

Head-End System

A system that collects measurement data and meter events for eventual submission to the application. Many devices can communicate to the application through a single head-end system. A utility may have numerous head-end systems through which they communicate with devices.

On-Demand Read

A request for the most up-to-date reading from a particular meter. It is not guaranteed to return immediately; it could require a person to manually read the meter. The purposes are to check the meter's operational status and/or obtain a more recent reading than is currently available.

Payload

An upload component which contains measurements and meter events in a format specific to the

head-end. Payloads are part of the initial upload of measurement data.

Remote Connect

A command issued when a meter needs to be connected at a service point.

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