

Oracle Utilities Smart Grid Gateway Adapter for Echelon

Configuration Guide

Release 2.0.0 Service Pack 8

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Chapter 1

Overview

This chapter provides an overview of the configuration guide with the following content:

- **Introduction**
- **Other Documentation**
- **Oracle Utilities Application Framework Configuration Tools**

Introduction

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

The Oracle Utilities Smart Grid Gateway Adapter for Echelon 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 Adapter for Echelon.

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 process of setting up 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 resources available for understanding the Oracle Utilities Smart Grid Gateway Adapter for Echelon and provides an introduction to the configuration tools and process used in implementing the product.
- **Chapter 2: General Configuration** provides an overview of general configuration options used by the Oracle Utilities Smart Grid Gateway Adapter for Echelon.

Other Documentation

This section describes other documentation provided with the Oracle Utilities Smart Grid Gateway Adapter for Echelon.

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 Meter Data Framework 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
- Oracle SOA Suite Documentation library (<http://www.oracle.com/technetwork/middleware/soasuite/documentation/index.html>)

The Oracle Utilities Smart Grid Gateway Adapter for Echelon uses Oracle Service Bus (OSB) and Oracle Business Process Execution Language (BPEL) as middleware components. These tools are part of the Oracle SOA Suite. Please refer to the Oracle SOA Suite Documentation library 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 maintenance portals for every object. 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 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 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 sections:

- Oracle Utilities Application Framework: Describes the features and functions of the application framework (F1)
- Oracle Utilities Meter Data Framework: Describes the features and functions provided in the meter data framework (D1)
- Oracle Utilities Smart Grid Gateway: Describes the features and functions provided in the smart grid gateway application (D4).

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 Processes**
- **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 identifies the specific objects used by the Oracle Utilities Smart Grid Gateway Adapter for Echelon 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.

Prerequisites

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 Adapter for Echelon. Topics include:

- **Understanding the Echelon NES Adapter**
- **Understanding the Adapter Processing**
- **Base Package Objects**
- **Configuring an Echelon Head-End System**
- **Configuring Echelon Extendable Lookups**
- **Configuring Echelon Usage and Event Extract Processing**
- **Extending the Adapter for Echelon**

Understanding the Echelon NES Adapter

The Oracle Utilities Smart Grid Gateway Adapter for Echelon NES supports two-way communication with the Echelon NES server. Communications include measurement data and device event loading, and command messaging in support of commissioning, connect, disconnect, decommissioning, and on-demand read.

The adapter uses Oracle Service Bus (OSB) and Oracle Business Process Execution Language Process Manager (BPEL PM) to facilitate communication between Oracle Utilities Smart Grid Gateway and Echelon NES.

Please refer to the release notes for product version information, a summary of the release functionality, and any known issues.

The following table describes the attributes of the adapter:

Attribute	Details
Currently Supported Version	Echelon NES 4.1
Protocol	Proprietary (Echelon specific)
Market(s)	Worldwide
Architecture	ANSI and IEC, PLC

Understanding the Adapter Processing

This section provides details concerning the OSB processing, BPEL processes, and OUAFA objects supplied as part of the base package. The basic communication for all business processing is essentially the same. A communication request is sent from the Oracle Utilities application to Echelon. This request might be for a connect/disconnect, commission/decommission, measurement data or an on-demand read. The designated BPEL PM process transforms the request from Oracle Utilities format to Echelon NES format and invokes the related Echelon web service. Echelon then returns a reply, and the BPEL PM process transforms the reply message back to the appropriate format so that Oracle Utilities can receive the response.

This section includes:

- **Initial Measurement Data Load and Device Events**
- **About Security Settings**
- **Communication Flows**
- **OSB Business Services**
- **Data Setup**

Initial Measurement Data Load and Device Events

The initial measurement data load and subsequent device event processing use OSB to poll for, parse, and transform the head-end payloads into the Oracle Utilities Smart Grid Gateway service format. Payloads contain measurements and meter events in the format specific to the Echelon NES system. 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 Echelon NES processing as needed. A second service creates device events with data in a common format.

Initial Measurement

Usage data is exported from the head-end system as a file in Echelon format and 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-D4-USAGE-BASE contains components responsible for the actual processing of incoming data. This should not be modified during configuration.
2. SGG-D4-USAGE-CM allows you to segment your customizations so that future upgrades of base functionality implemented in SGG-D4-USAGE-BASE do not affecting the customization and environment settings.

The runtime configuration settings for the SGG-D4-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

Element	Description
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
destinationRootElementInterval	Holds the name of XAI inbound service for the interval IMD seeder.
destinationRootElementScalar	Holds the name of XAI inbound service for the scalar IMD seeder. In most cases it is the same as destination-RootElementInterval.
serviceProviderExternalId	Holds the name of the service provider external ID.

Device Events

1. The device event data exported from the head-end system as a file in Echelon format is loaded into Oracle Utilities as a Device Event. The following OSB projects, delivered in the base product, help manage the device events processing: SGG-D4-EVENT-BASE contains components responsible for the actual processing of incoming data. This should not be modified during configuration.
2. SGG-D4-EVENT-CM allows you to segment your customizations so that future upgrades of base functionality implemented in SGG-D4-EVENT-BASE do not affecting the customization and environment settings.

About Security Settings

All services that use the Echelon NES software require a security key. The following web services facilitate the retrieval and authentication of the security key. An authentication service, `AuthenticationMgr.GetAPIKey`, provides a valid security key and the `UserManager.Login` web service is the entry point for returning the security key to be used with the reset of Echelon NES software API methods.

Please refer to the Oracle Utilities Smart Grid Gateway Installation Guide under “Configuring Security for the SOA System to Communicate with the Head-End System” for specific instructions on configuring security settings.

GetAPIKey

Provides a valid “safe to use” security key before executing any of the Echelon NES software API methods.

AuthenticationMgr.GetAPIKey

Retrieves the security key (APIKey) before calling any of the Echelon NES API web service methods.

UserManager.Login

The entry point for returning the security key to be used with the reset of Echelon NES software API methods. The key must be used within a specific number of minutes after it is retrieved, or else it will expire.

The Login method takes three parameters, the username, password and the authentication type which defaults to a 32 character value.

Communication Flows

The table below lists the communications created for each Echelon command:

Command	Outbound Communication	Inbound Communication	Completion Event
Remote Connect	<ul style="list-style-type: none"> Retrieve Meter Information Read Load Status Read Billing Data On-Demand Connect Load 	<ul style="list-style-type: none"> Read Load Status Notification Read Billing Data On-Demand Notification Connect Load Notification 	<ul style="list-style-type: none"> Create IMD Connect Device
Remote Disconnect	<ul style="list-style-type: none"> Disconnect Load Read Billing Data On-Demand 	<ul style="list-style-type: none"> Disconnect Load Notification Read Billing Data On-Demand Notification 	<ul style="list-style-type: none"> Create IMD Disconnect Device
Device Commissioning	Add Meter Request Set ATM Configuration	Set ATM Configuration Notification	Device Commissioning
Device Decommissioning	Decommission Meter Request	Decommission Meter Notification	Device Decommissioning
On-Demand Read (Scalar)	Read Billing Data On-Demand	Read Billing Data On-Demand Notification	Create IMD
On-Demand Read (Interval)	Read Load Profile On-Demand	Read Load Profile On-Demand Notification	Create IMD

OSB Business Services

The following business services should be configured to manage objects such as notifications, proxy, service account, and static users.

OSB Notification Business Service

The NotificationBusinessService is a JMS transport based business service containing all settings about the destination queue where the processing notifications are sent. You may need to change these settings according to your deployment environment.

General

Property	Value
Service Name	NotificationBusinessService
Description	JMS transport based business service containing all settings about the destination queue where the processing notifications are sent.
Service Type	Any XML Service

Transport

These default values can be changed to accommodate the requirements of your implementation. The Protocol Type Value should not be changed.

Property	Default Value
Protocol	jms
Load Balancing Algorithm	none
Endpoint URI	jms:///NotificationQueueURL/FactoryJndiName/DestJndiName
Retry Count	0
Retry Iteration Interval	30
Retry Application Errors	yes

JMS Transport

The following default values can be changed to meet the requirements of your implementation. The “Advanced Settings” section of the “JMS Transport Configuration” screen contains default values and can also be changed.

Property	Value
Destination Type	Queue
Message Type	Text
Response Queues	None
Dispatch Policy	Default
Request Encoding	UTF-8
JMS Service Account	SGG-D4-USAGE-CM/Service Accounts/ DestinationServiceAccount

Message Handling

The default values for message handling should not be altered.

Property	Value
Result Caching	Not supported

OSB Destination Business Service

The DestinationBusinessService is a JMS transport based business service containing all settings for the destination queue where the initial load is sent. These settings can be changed as needed according to the deployment environment being used.

General

Property	Value
Service Name	DestinationBusinessService
Description	JMS transport based business service containing all settings about destination queue where the initial load IMD is sent.
Service Type	Any XML Service

Transport

The following set of values is used as default configuration. These can be modified as necessary. Protocol Type cannot be modified.

Property	Value
Protocol	jms
Load Balancing Algorithm	none
Endpoint URI	jms:///DestinationQueueURL/FactoryJndiName/DestJndiName
Retry Count	0
Retry Iteration Interval	30
Retry Application Errors	yes

Note: During the deployment process the “Endpoint URI” is replaced with a value in the form “jms:///host:port(host:port)*/FactoryJndiName/DestJndiName”.

JMS Transport

The following set of values is used as default configuration. These values can be modified as needed in the “Advanced Settings” section of the “JMS Transport Configuration” screen.

Property	Value
Destination Type	Queue
Message Type	Text
Response Queues	None
Dispatch Policy	Default
Request Encoding	UTF-8

JMS Service Account	SGG-D4-USAGE-CM/Service Accounts/ DestinationServiceAccount
---------------------	--

OSB Inbound Proxy Service

The InboundProxyService is a JCA-transport based proxy service. It receives vendor-specific messages in “plain” XML format from the JCA File Adapter and routes them to the ProcessingProxyService. The proxy service is generated from SGG-D4-USAGE-BASE/JCA Bindings/GenericFileProcessor.jca file.

Property	Value
Service Name	InboundProxyService
Description	A JCA-transport based service proxy that receives vendor-specific messages in “plain” XML format from JCA File Adapter and routes them to the ProcessingProxyService for further processing.
Service Type	WSDL Web Service
WSDL	SGG-D4-USAGE-CM/Proxy Services/InboundProxyService
Port	GenericFileProcessor-port

JCA Transport

The value of SGG_ERROR_FOLDER should be changed according the server environment being used.

Property	Value
JCA File	SGG-D4-USAGE-BASE/JCA Bindings/GenericFileProcesso
Adapter Name	File Adapter
Adapter Type	FILE
Dispatch Policy	default
JNDI Service Account	Empty
Endpoint Properties	Empty
Dynamic Endpoint Properties	
SGG_INPUT_PARSER	com.splwg.d4.osb.usage.FileParserEchUsage
SGG_ERROR_FOLDER	ErrorDirectoryPath

Advanced Settings

All Activation Spec Properties except the PipelineValves value are provided as a sample. These can be modified as needed during configuration..

Property	Value
Always use configuration from JCA File	Unchecked
Operation Name	Read

Property	Value
Activation Spec Properties	
MaxRaiseSize	5
PollingFrequency	30
UseHeaders	False
DeleteFile	True
PhysicalArchiveDirectory	PhysicalArchiveDirectoryPath
Recursive	False
IncludeFiles	*.xml
ThreadCount	10
PublishSize	1
PhysicalDirectory	PhysicalDirectoryPath
PipelineValves	com.splwg.d1.sgg.osb.common.GenericFileProcessor
MinimumAge	0

Note: During the deployment process *PhysicalDirectoryPath*, *PhysicalArchiveDirectoryPath* and *ErrorDirectoryPath* are replaced with corresponding values such as: c:\Storage\ech-usage, c:\Storage\ech-usage-arch and c:\Storage\ech-usage-error.

OSB Destination Service Account

The DestinationServiceAccount contains credentials for the destination JMS Queue if applicable.

The resource type is set to “static” as default, but this can be modified if necessary.

Property	Value
Resource Name	DestinationServiceAccount
Description	The DestinationServiceAccount contains credentials for the destination JMS Queue.
Resource Type	Static

Static User Configuration

Username and password must be entered with the credentials of the OUAF user.

Data Setup

Processing Method

A processing method with a processing role of Device Event Mapping should be established for the Echelon head-end (service provider) that references the extendable lookup BOs for Echelon Device Event Mapping.

Echelon Device Event Mapping – Extendable Lookup Configuration

The Echelon device event mapping extendable lookup does not have any values that are owned by Oracle Utilities Smart Grid Gateway Adapter for Echelon, however the lookup is configured in

the demo environment with a starter set of mappings between Echelon-specific event names and Oracle Utilities Smart Grid Gateway standard event names.

The following table contains a mapping for few sample events:

Echelon Event name	Standard Event name	Description
Device Power Failure	Outage Power out	Primary power down
Device System Reset	Demand reset detected	Reset happened either from a off-cycle peak demand reset command request from Command Center or a scheduled peak demand reset
Device Tamper Detected	Tamper indication	Tamper attempt suspected

Guidelines to Populate the D1-StdEventNameLookup Values

Field	Value
Standard Event Name	Use Standard Event Name Code
Description	Use Standard Event Descriptive Name
Status	Active
Override Description	
Detailed Description	Use Standard Event Description

Guidelines to Populate the D4-DeviceEventMappingLookup Values

Field	Value
Head-End System Event Name	Use Echelon Event Name Code
Description	Use Echelon Event Descriptive Name
Status	Active
Override Description	
Detailed Description	Use Echelon Event Description
Standard Event Name	Pick Standard Event Name

Endpoints

These default values for the endpoints and should be changed to settings applicable to your environment.

Meter Commissioning

Reference Name	Default Value
AuthenticationMgr	http://127.0.0.1:8001/soa-infra/services/echelon/ AuthenticationMgr /authenticationmgr_client_ep
DeviceManager	http://127.0.0.1/CoreServices/DeviceManager.asmx

Meter Decommissioning

Reference Name	Default Value
Connection Management	http://127.0.0.1:8001/soa-infra/services/Echelon/ ConnectionManagement/connectionmngmt_client_ep
AuthenticationMgr	http://127.0.0.1:8001/soa-infra/services/Echelon/ AuthenticationMgr/authenticationmgr_client_ep
DeviceManager	http://127.0.0.1/CoreServices/DeviceManager.asmx

Base Package Objects

The following objects are delivered with the base package. While they may not require immediate configuration, it is important to be able to identify these to better understand the processing used for the Echelon NES Adaptor. 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. These objects include:

- **Base Package Business Objects**
- **Outbound Message Types**
- **XAI Utility**
- **BPEL PM Processes**

Base Package Business Objects

The base package includes the following business objects:

General Processing

Business Object	Description	MO Description
D4-EntityTypeLookup	Entity Type	Extendable Lookup
D4-ExtServiceReturnCodeLookup	External Service Return Code	Extendable Lookup
D4-GatewayTypeLookup	Gateway Type	Extendable Lookup
D4-HeadendUOMLookup	Echelon UOM Code Mapping Extendable Lookup	Extendable Lookup
D4-IDTypeLookup	ID Type	Extendable Lookup
D4-InformationReturnTypeInfoLookup	Information Return Type	Extendable Lookup
D4-IntStsCodeToCondMapLookup	Interval Status Code to Condition Mapping	Extendable Lookup
D4-LoadVoltageStatusTypeLookup	Load Voltage Status Type	Extendable Lookup
D4-TaskPriorityLookup	Task Priority	Extendable Lookup
D4-TimeZoneManagerLookup	Time Zone Manager	Extendable Lookup

Meter Commissioning

Business Object	Description	MO Description
D4-AddMeterRequest	Add Meter Request	Communication Out
D4-AddMeterRequestType	Add Meter Request Type	Communication Type
D4-GenericAMIDeviceIdentifier	Generic AMI Device Identifier	Communication Out
D4-RetrieveMeterIdentifier	Retrieve Meter Identifier	Communication Out
D4-RetrieveMeterIdentifierType	Retrieve Meter Identifier Type	Communication Type
D4-SetATMConfigNotification	Set ATM Configuration Notification	Communication In
D4-SetATMConfiguration	Set ATM Configuration	Communication Out
D4-SetATMConfigurationType	Set ATM Configuration Type	Communication Type

Meter Decommissioning

Business Object	Description	MO Description
D4-DecommMeterNotification	Decommission Meter Notification	Communication In
D4-DecommMeterNotificatType	Decommission Meter Notification Type	Communication Type
D4-DecommMeterRequest	Decommission Meter Request	Communication Out
D4-DecommMeterRequestType	Decommission Meter Request Type	Communication Type

Device Commissioning

Business Object	Description	MO Description
D4-CommandFailureLookup	Command Failure	Extendable Lookup
D4-CommandHistoryStatusLookup	Command History Status	Extendable Lookup
D4-DeviceAtmModeTypeLookup	Device ATM Mode Type	Extendable Lookup
D4-DeviceCommandLookup	Device Command	Extendable Lookup
D4-DeviceResultTypeLookup	Device Result Type	Extendable Lookup
D4-DeviceStatusLookup	Device Status	Extendable Lookup
D4-DeviceTypeLookup	Device Type	Extendable Lookup
D4-RetrieveMeterInfo	Retrieve Meter Information	Communication Out
D4-RetrieveMeterInfoType	Retrieve Meter Information Type	Communication Type

Device Event

Business Object	Description	MO Description
D4-DeviceEventMappingLookup	Echelon Device Event Mapping	Extendable Lookup

Initial Data Load

Business Object	Description	MO Description
D4-InitialLoadIMDInterval	Echelon Initial Load IMD Interval	Initial Measurement Data
D4-InitialLoadIMDScalar	Echelon Initial Load IMD (Scalar)	Initial Measurement Data
D4-SetATMConfNotificationType	Set ATM Configuration Notification Type	Communication Type
D4-SmartMeter	Smart Meter - Echelon	Device

On Demand Read

Business Object	Description	MO Description
D4-CumuDemandStatusTypeLookup	Cumulative Demand Status Type	Extendable Lookup
D4-ReadBillingData	Read Billing Data On-Demand	Communication Out
D4-ReadBillingDataNtf	Read Billing Data On-Demand Notification	Communication In
D4-ReadBillingDataNtfType	Read Billing Data On Demand Notification Type	Communication Type
D4-ReadBillingDataType	Read Billing Data On Demand Type	Communication Type
D4-ReadLoadProfile	Read Load Profile On Demand	Communication Out
D4-ReadLoadProfileNtf	Read Load Profile On-Demand Notification	Communication In
D4-ReadLoadProfileNtfType	Read Load Profile On Demand Notification Type	Communication Type
D4-ReadLoadProfileType	Read Load Profile On Demand Type	Communication Type
D4-ReadLoadStatus	Read Load Status	Communication Out
D4-ReadLoadStatusNtf	Read Load Status Notification	Communication In
D4-ReadLoadStatusNtfTyp	Read Load Status Notification Type	Communication Type
D4-ReadLoadStatusType	Read Load Status Type	Communication Type

Remote Disconnect

Business Object	Description	MO Description
D4-DisconnectLoad	Disconnect Load	Communication Out
D4-DisconnectLoadNtf	Disconnect Load Notification	Communication In
D4-DisconnectLoadNtfTyp	Disconnect Load Notification Type	Communication Type
D4-DisconnectLoadType	Disconnect Load Type	Communication Type
D4-DisconnectPriorityLookup	Disconnect priority level	Extendable Lookup

Remote Connect

Business Object	Description	MO Description
D4-ConnectLoad	Connect Load	Communication Out
D4-ConnectLoadNtf	Connect Load Notification	Communication In
D4-ConnectLoadNtfTyp	Connect Load Notification Type	Communication Type
D4-ConnectLoadType	Connect Load Type	Communication Type
D4-RemoteReconnectStatusLookup	Remote Reconnect Status	Extendable Lookup

Usage Processing

Business Object	Description	MO Description
D4-EventExtractScheduler	Echelon Event Extract Scheduler	Request
D4-EventExtractSchedulerType	Echelon Event Extract Scheduler Type	Request Type
D4-PayloadExtractScheduler	Payload Extract Scheduler	Request
D4-PayloadExtractSchedulerType	Payload Extract Scheduler Type	Request Type
D4-UsageExtractScheduler	Echelon Usage Extract Scheduler	Request
D4-UsageExtractSchedulerType	Echelon Usage Extract Scheduler Type	Request Type

Outbound Message Types

Acknowledgement and response messages are sent and received validating that commands have been transmitted.

These notifications are based on the D1-OutboundMessage BO business object.

Outbound Message Type	Description
D4-ADDMETREQ	Add Meter Request
D4-CONLOAD	Connect Load
D4-DECMETREQ	Decommission Meter Request
D4-DISCONLD	Disconnect Load
D4-HNLBATEVT	Echelon - Handle Batch Event
D4-HNLBATUSG	Echelon - Handle Batch Usage
D4-RDLOADST	Read Load Status
D4-READLP	Read Load Profile
D4-READOUT	Read Billing Data

Outbound Message Type	Description
D4-RETMETID	Retrieve Meter Identifier
D4-RETRIEVE	Retrieve Meter Information
D4-SETATMCFG	Set ATM Configuration

XAI Utility

The XML Application Integration (XAI) utility allows you to configure your system to receive information from and to send information to external applications using XML. The Oracle Utilities Smart Grid Gateway Adapter for Echelon uses the following XAI inbound services to import usage and device events:

XAI Inbound Service	Description
D1-DeviceEventSeeder	<p>Used for upload of device events.</p> <p>Schema Name: D1-DeviceEventSeeder.</p> <p>The Device Event Seeder business object serves as a means of adding device events both from outside the application and from online. Its pre-processing algorithms determine the device event type - which in turn defines the device event BO that should be used to create the device event.</p> <p>If a device event type can't be determined, the device event is created using this BO. Such a device event can then be re-processed - and if successful, a new device event is created.</p>
D1-InitialLoadIMD	<p>Used for initial measurement upload.</p> <p>Schema Name: D1-IMDSeeder.</p> <p>The IMDSeeder business object is used to determine the type of initial measurement business object to instantiate when receiving usage readings from a head-end system.</p>

XAI Inbound Services

XAI inbound systems define the details of how messages are received from an external system, including the inbound communication business object (or business service or service script) to be invoked when the response message is received. As in the case of inbound communication business objects, the set of XAI inbound services you need to create is based on the types of messages the system is designed to send.

The Oracle Utilities Smart Grid Gateway Adapter for Echelon includes the following XAI inbound services for receiving communications from the Echelon NEs:

XAI Inbound Service Name	Description	Business Object
D4-ConnectLoadNotification	Connect Load Notification	D4-ConnectLoadNtf

XAI Inbound Service Name	Description	Business Object
D4-DecommMeterNotificationXAI	Meter Decommission Notification	D4-DecommMeterNotification
D4-DisconnectLoadNotification	Disconnect Load Notification	D4-DisconnectLoadNtf
D4-ReadBDNotificationXAI	Read Billing Data On-Demand Notification	D4-ReadBillingDataNtf Creates Read Billing Data On-Demand Notification BO.
D4-ReadLPNotificationXAI	Read Load Profile On-Demand Notification	D4-ReadLoadProfileNtf Creates Read Load Profile On-Demand Notification BO.
D4-ReadLoadStatusNotification	Read Load Status Notification	D4-ReadLoadStatusNtf
D4-ReadingATMConfigNotification	Get Response Initiate Read By Meter Number	D4-SetATMConfigNotification Retrieves response from the Initiate Read by Meter Number command.

XAI Senders

XAI senders define the details of how messages are sent to an external system. As in the case of outbound communication business objects and outbound message types, the set of XAI senders you need to create is based on the types of messages the system is designed to accept.

The Oracle Utilities Smart Grid Gateway Adapter for Echelon includes the following XAI senders:

XAI Sender	Description
D4-ADDMETREQ	Add Meter Request
D4-CONLOAD	Connect Load
D4-DECOMMIS	Device Decommissioning
D4-DISCONLD	Disconnect Load
D4-HNLBATEVT	Echelon Handle Batch Event
D4-HNLBATUSG	Echelon Handle Batch Usage
D4-RDLOADST	Read Load status
D4-READLP	Read Load Profile
D4-RETMETID	Retrieve Meter Identifier
D4-RETRIEVE	Retrieve Meter Information
D4-ReadBill	Read Billing Data

XAI Sender	Description
D4-SETATMCFG	Set ATM Configuration

BPEL PM Processes

These processes are responsible for performing the conversion from Oracle Utilities format to Echelon NES format, invoking process callouts and invoking the remote endpoint to trigger the device events.

Web Services

All web services receive XML from an incoming service then transform the call to a format which is recognized by the Echelon NES system.

CreateMeter

Receives the incoming XML from the XAIOutbound service, transforms it to the Echelon NES API parameters node, passes it to the DeviceManager.Create Echelon NES API web service method then collects XML from CreateMeter to be returned to Oracle Utilities Smart Grid Gateway.

Messages

CreateMeter RequestMessage - Contains the parameters which are formatted from Oracle Utilities Smart Grid Gateway to match the incoming XML for the Echelon NES API DeviceManager.Create method.

CreateMeter ResponseMessage - Contains the Device ID that is used when the DeviceManager.Create method validates the security key and the XML parameters successfully.

Related Processes

Meter Commissioning

ConnectLoadRemoteConnect

Receives the incoming XML from the D4-CONLOAD (Connect Load) XAI Sender in Oracle Utilities Smart Grid Gateway and transforms to Echelon NES format.

GrabBatchEvents

Retrieves the un-processed events from the event repository; transforms each batch to replace GUID identifiers with a readable form, and finally prepares a new file for OSB before deleting the batch of events. The scheduled call to this service can contain the preferred dates to query for or can accept the default which is the previous day usage.

Messages

GrabBatchEventsSoapIn

GrabBatchEventsSoapOut

GrabBatchUsage

Retrieves the un-processed usage from the usage repository; transforms each batch to replace GUID identifiers with a readable form, and finally prepares a new file for OSB before deleting the batch of usage. The scheduled call to this service can contain the preferred dates to query for or can accept the default which is the previous day usage.

Messages

GrabBatchUsageSoapIn

GrabBatchUsageSoapOut

Related Processes

Connection
Event Management
Usage Processing

MeterDecommissioning

Receives the incoming XML from the XAIOutbound service and transforms to Echelon NES API parameters node to be passed to the DeviceManager.Move Echelon NES API web service method. The process then collects the return XML to be returned to Oracle Utilities Smart Grid Gateway.

Messages

MeterDecommissioningRequestMessage - This message is the input for the Move method. The method contains the parameters conveniently formatted from Oracle Utilities Smart Grid Gateway to match the incoming XML for the Echelon NES API DeviceManager.Move method.

MeterDecommissioningResponseMessage - This message contains status stating that the DeviceManager.Create method validated the security key and the XML parameters are accepted successfully. If the status is SUCCEEDED, it also contains Tracking ID for the call, Device ID and StatusType ID.

Related Processes

Meter Decommissioning

PerformCommand

This web service facilitates most of the communication between Oracle Utilities Smart Grid Gateway and the Echelon NES system. If your implementation requires functionality that was not delivered as part of the base package this web service will play an integral part in managing those customizations.

PerformCommand executes a command which generates the events that advance the Oracle Utilities Smart Grid Gateway lifecycle then returns the output string to the caller. The output might be a tracking ID or information about a device.

Messages

PerformCommandSoapIn - The sXmlParameters input is prepared from within Oracle Utilities Smart Grid Gateway to execute primarily a group of five commands, these are Read Load Status, On-Demand Read, Connect Load, Disconnect Load and Set ATM Configuration.

PerformCommandSoapOut - The return from PerformCommand is the xml from the DeviceManager.PerformCommand for Read Load Status, On-Demand Read, Connect Load, Disconnect Load and Set ATM Configuration.

ReceivePanoramixEvents

This web service is actually never called by the implementation, but rather it is called by Echelon NES and is needed when configuring the NES server.

ReceivePanoramixEvents obtains the APIKey from the Echelon NES authentication service, then, with the event definition ID from the parameter list for this service, switches to the branch for the event definition to begin any specific processing. For example, an on-demand read completion event means that the BPEL PM process needs to retrieve the usage using the RESULTID found in the event xml. All events and usage to be passed on to Oracle Utilities Smart Grid Gateway must first be transformed to replace the GUID with a readable form items. This involves using the BPEL PM DVM lookup functionality.

Messages

ReceivePanoramixEventsSoapIn
ReceivePanoramixEventsSoapOut

Related Processes

Event Management

PrePerformCommandCallout / PostPerformCommandCallout

These web services are hooks designed to allow customization of messages just prior and just after sending them to the Echelon NES server. Your implementation may wish to modify the data for special purposes. This is the one of the only places where modification of BPEL PM code is allowed.

ReceivedPanoramixEventsCallout

This web service is a hook designed to allow customization of messages just prior and just after sending them to the Echelon NES server. Your implementation may wish to modify the data for special purposes. This is one of the only places where modification of BPEL PM code is allowed.

ReadBillingDataOnDemand

This web service method, initiate a call to Echelon NES system with formatted inbound xml parameter. First it transforms the Parameters received from the calling system in to Echelon NES system recognizable format. Then it invokes a call to the Echelon NES system's Device Manager Service. When the call is invoked the system receives the return XML from DeviceManager stating the status of the command execution and, if succeeded, the tracking ID of this call.

Messages

ReadBillingDataOnDemandRequestMessage - Contains the input parameter for DeviceManager Perform Command to read billing data OnDemand. It formats parameters from the calling system to match incoming XML for the Echelon NES DeviceManager.PerformCommand method.

ReadBillingDataOnDemandResponseMessage - Transforms the response xml from Echelon NES system format to Oracle Utilities Smart Grid Gateway format.

Related Processes

On Demand Reads

ReadLoadProfileOnDemand

This web service method, initiate a call to Echelon NES system's Device Manager Service with formatted inbound xml parameter. First it transforms the Parameters received from the calling system in to Echelon NES system recognizable format. Then it invokes a call to the Echelon NES system thru Device Manager Service. After invoking the call, the system receives the response message from DeviceManager stating the status of the command execution and, if succeeded, the tracking ID of this call.

Messages

ReadLoadProfileOnDemandRequestMessage - This message is for interval on demand read request to the Echelon NES system. Transforms the incoming XML from Oracle Utilities Smart Grid Gateway to Echelon NES recognizable format.

ReadLoadProfileOnDemandResponseMessage - Transforms the response xml for ReadLoadProfileOnDemandRequest from Echelon NES system format to Oracle Utilities Smart Grid Gateway format.

Related Processes

On Demand Reads

ReadLoadStatusRemoteConnect

Receives the incoming XML from the D4-RDLOADST (Read Load Status) XAI Sender in Oracle Utilities Smart Grid Gateway and transforms to Echelon NES format.

RemoteDisconnect

Receives the incoming XML from the D4-DISCONLD(Disconnect Load) XAI Sender in Oracle Utilities Smart Grid Gateway and transforms to Echelon NES format.

RetrieveMeterInfo

Initiates a call to the Request Management Service with formatted inbound xml parameters. First it transforms the Parameters received from the calling system in to Echelon NES system recognizable format. Then it invokes a call to the Echelon NES system thru Request Management Service and retrieves a response with Meter Information.

Messages

RetrieveMeterInformationRequestMessage - Contains the input parameter for DeviceManager Perform Command to retrieve meter information. It also formats parameters from the calling system to match incoming XML for the Echelon NES DeviceManager.PerformCommand method.

RetrieveMeterInformationResponseMessage - Transforms the response xml from Echelon NES system format to Oracle Utilities Smart Grid Gateway format.

Related Processes

Remote Disconnect

Remote Connect

RetrieveMeterIdentifier

Receives a call from Oracle Utilities Smart Grid Gateway for RetrieveMeterIdentifier process and invokes the RetrieveByParameter method in the Echelon NES system's DeviceManager service.

Converts incoming Oracle Utilities Smart Grid Gateway formatted input to sXmlParameters in Echelon NES format then invokes RetrieveMeterIdentifier.

Messages

RetrieveMeterIdentifierRequestMessage - Transforms the xml received from the calling system to match incoming XML for the Echelon NES API DeviceManager.RetrieveByParameter method. This method requires the Type of ID and the associated ID as input.

RetrieveMeterIdentifierResponseMessage - When the XML is synchronously returned from the head-end system for the RetrieveByParameter call, the DEVICEID node is only included in the APIPAYLOAD if the status of the call is Succeeded.

Related Processes

Meter Commissioning

SetATMConfiguration

This web service method is specific to set Automated Topology Management (ATM) configuration command which assigns the Meter to the Data Concentrator.

Converts incoming Oracle Utilities Smart Grid Gateway formatted input to sXmlParameters in Echelon NES format then invokes the DeviceManager PerformCommand. A connection should establish to begin the Echelon command processing.

Messages

SetATMConfigurationRequestMessage - This message is the input for the SetATMConfiguration method. The method contains the parameters conveniently formatted from Oracle Utilities Smart Grid Gateway to match the incoming XML for the Echelon NES API DeviceManager.PerformCommand method where the COMMANDID is Constants.DeviceCommands.SET_ATM_CONFIGURATION

SetATMConfigurationResponseMessage - when the XML is synchronously returned from the head-end system for the PerformCommand call, the COMMAND node is only included in the APIPAYLOAD if the status of the call is Succeeded.

Related Processes

Meter Commissioning

Web Services for Referenced Adapters

These are the web services that Oracle Utilities Smart Grid Gateway calls from the Echelon NES system. They can be accessed on the composite view in JDeveloper, however there is generally nothing to configure with these services.

AuthenticationMgr.GetAPIKey

Retrieves the API security key (APIKey) before calling any of the Echelon NES API web service methods.

Related Processes

General

ConnectionMgr.Connect

Opens a normal command priority connection to begin the Echelon Command processing.

Related Processes

Meter Decommissioning

Meter Commissioning

ConnectionMgmt.Connect

Responsible for continuing the command processing by creating either a normal or high priority connection to the data concentrator. Once this method is completed, the status of the command in Echelon is updated to IN_PROGRESS unless the execution time for the command was either set back by the system or the input specified an execution time for the command. This method does not take any input parameters, returns a status to the calling function.

ConnectSoapOutType

Connect_OutputVariableString

The return value status for this service is “COMPLETED”. This status means only that the connection request was accepted and submitted to the Echelon NES API. The connection status is actually an asynchronous event that indicates whether the connection has been established or if there is a connection failure. All the asynchronous events are processed through the ReceivePanoramixEvent asynchronous callback web service method.

Related Processes

Perform Command

DeviceManager.CreateResultBatch

This web service method is used to retrieve batch usage from the usage repository. It supports paging, so this BPEL PM process is able to retrieve reasonably sized blocks of usage for multiple files to OSB. This then allows OSB to scale and more efficiently to process the usage through to Oracle Utilities Smart Grid Gateway.

Related Processes

Connection

Event Management

Usage Processing

DeviceManager.CompleteResultBatch

This web service completes a batch of device results by setting the status of all results in it to “processed”. The batch ID from the CreateResultBatch web service call is used in the parameter

list to complete the results in the batch making them not available for duplicate processing. When the batch is selected, but not yet processed, the batch cannot be selected again unless the batch has been released with `ReleaseResultBatch`.

Related Processes

Connection
Event Management
Usage Processing

DeviceManager.DeleteResultList

Once an on-demand read command complete event usage has been retrieved, then the next duty is to delete the device results. This is done so not to slow the system down when retrieving results.

Related Processes

Connection
Event Management
Usage Processing

DeviceManager.PerformCommand

This `PerformCommnad` web service method of Echelon's Echelon NES system `DeviceManager` service is used to invoke the API with the specific Command ID populated.

Related Processes

Remote Connect

DeviceManager.Move

This `Move` web service method of Echelon's Echelon NES system `DeviceManager` service is invoked from this process to initiate decommissioning process for given meter(s).

Related Processes

Meter Decommissioning

DeviceManager.Retrieve

Invokes the API with the specific Device ID populated for Remote Connect

Related Processes

Remote Connect

DeviceManager.RetrieveCommandHistory

Gathers the commands that have been started, but which have not reached a completed state. Sometimes commands do not complete because the connection failed and did not initially begin or left the command in an `IN_PROGRESS` state. The Echelon NES `DeviceManager.RetrieveCommandHistory` command result provides the necessary values to create a connection for each outstanding command to the gateway.

Related Processes

Connection
Event Management
Usage Processing

DeviceManager.RetrieveByParameter

Retrieves meter identifier information from Echelon NES system. Only returns the Device ID if the API call is successful. Type ID and Associated ID are passed as input to this method in order to retrieve meter information.

Related Processes

Meter Commissioning

DeviceManager.RetrieveResult

This Echelon NES API web service method is used in response to an on-demand completion event. Once either an `READ_BILLING_DATA_ON_DEMAND_COMMAND_COMPLETE` or `READ_LOAD_PROFILE_ON_DEMAND_COMMAND_COMPLETE` event definition is received, the next task would be to retrieve the `RESULTID` and then call this web service to retrieve the usage.

Related Processes

Connection

Event Management

Usage Processing

EventManager.CompleteHistoryBatch

This web service completes a batch of device, gateway or system events by setting the status of all results in it to “processed”. The batch ID, from the `CreateHistoryBatch` web service call, is used in the parameter list to “complete” the results in the batch, making them not available for duplicate processing. When the batch is selected, but not yet processed, the batch cannot be selected again unless the batch has been released with `ReleaseHistoryBatch`.

Related Processes

Connection

Event Management

Usage Processing

EventManager.CreateHistoryBatch

Retrieves batch events from the event repository. This web service supports paging, so this BPEL PM process is able to retrieve reasonably sized blocks of events for multiple files to OSB. This then allows OSB to scale and more efficiently to process the events through to Oracle Utilities Smart Grid Gateway.

Related Processes

Connection

Event Management

Usage Processing

File Adapter: WriteUsage method

Creates a new file for each batch of usage returned from the `DeviceManager.CreateResultBatch` method. The file adapter only takes a single input parameter and there is a schema for the usage.

Related Processes

Connection

Event Management

Usage Processing

File Adapter: WriteEvents method

Creates a new file for each batch of events returned from the `EventManager.CreateHistoryBatch` method. The file adapter only takes a single input parameter.

Related Processes

Connection

Event Management

Usage Processing

GatewayManager.Connect

Responsible for creating the connection to the gateway from the gateway ID retrieved from the call to DeviceManager.RetrieveCommandHistory. If the gateway connection is not established already, then this method is called to create either a normal or high priority connection depending on the command or the command parameters issued during the command invocation.

Related Processes

Connection
Event Management
Usage Processing

GatewayManager.Disconnect

When the GatewayManager.Retrieve results indicate that the connection needs to be closed, then this method is called by the BPEL PM flow to queue a gateway disconnect.

Related Processes

Connection
Event Management
Usage Processing

GatewayManager.Retrieve

This web service reference from the GatewayManager allows the system to determine whether a connection already exists for the specific gateway coming from the command history before attempting the connection. The CURRENTLYCOMMUNICATINGDATETIME and LASTCOMMUNICATIONSTATUSTYPEID elements from the result are used together to determine whether there is an existing connection already working on the gateway. As a result, the BPEL PM flow does not call the GatewayManager.Connect web service if the CURRENTLYCOMMUNICATINGDATETIME has a value, and if the LASTCOMMUNICATIONSSTATUSTYPEID is a value of GatewayCommunicationHistoryStatus.CONNECTED.

Related Processes

Connection
Event Management
Usage Processing

PerfCommand.PerformCommand

This service method handles all activities to activate SetATMConfiguration command. This is a generic web service which receives input xml and does all jobs to execute the command and returns back the response xml from Echelon NES System. It could be a status of the command or Soap Fault if any fault occurs.

- Gets Authentication Key
- Invoke Device Manager's Perform Command
- Initiate Connection to the Echelon NES system
- Return Status and Tracking ID to calling service.

Related Processes

Meter Commissioning
On Demand Reads
Perform Command

SettingManager.Retrieve

The SettingManager.Retrieve method is used to retrieve the setting value for the number of minutes that must pass before the current APIKey is used again. There are two parameters to this method.

Related Processes

General

UserManager.Login

Takes the API security key which is required before executing any of the Echelon NES software API methods. The Login method takes three parameters, the username, password and the authentication type which defaults to a 32 character value.

Configuring an Echelon Head-End System

This section outlines the configuration required for the Oracle Utilities Smart Grid Gateway Echelon Adapter to communicate with the Echelon NES software. This includes:

- **XAI Inbound Services**
- **XAI Senders**
- **Outbound Message Types**
- **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. This includes incoming usage and device events, as well as messages sent from the Echelon NES in response to a command request.

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-BulkRequestHeader	Bulk Request Header	Business Object	D1-BulkRequestHeader
D1-BulkRequestUpdate	Bulk Request Update	Business Object	D1-BULKUPD
D1-BulkResponse	Bulk Response	Business Object	D1-BulkResponse
D1-DeviceEventSeeder	Device Event Seeder	Business Object	D1-DeviceEventSeeder
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
D4-ConnectLoadNotification	Connect Load Notification	Business Object	D4-ConnectLoadNtf
D4-DecommMeterNotificationXAI	Meter Decommission Notification	Business Object	D4-DecommMeterNotification
D4-DisconnectLoadNotification	Disconnect Load Notification	Business Object	D4-DisconnectLoadNtf
D4-ReadBDNotificationXAI	Read Billing Data On-Demand Notification	Business Object	D4-ReadBillingDataNtf
D4-ReadLPNotificationXAI	Read Load Profile On-Demand Notification	Business Object	D4-ReadLoadProfileNtf
D4-ReadLoadStatusNotification	Read Load Status Notification	Business Object	D4-ReadLoadStatiusNtf
D4-ReadingATMConfigNotification	Get Response Initiate Meter Read By Meter Number	Business Object	D4-SetATMConfigNotification

XAI Senders

XAI senders define the details of how messages are sent to an external system, such as messages containing device command requests.

The following XAI Senders 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 senders.

XAI Sender	Description	Operation	Process	Service
D4-ADDMETREQ	Add Meter Request	CreateMeter	CreateMeter	CreateMeterService
D4-CONLOAD	Connect Load	ConnectLoadRemoteConnect	ConnectLoadRemoteConnect	ConnectLoadRemoteConnectService
D4-DECMETREQ	Decommission Meter Request	MeterDecommissioning	Decommissioning	MeterDecommissioningProcess
D4-DISCONLD	Disconnect Load	RemoteDisconnect	RemoteDisconnect	RemoteDisconnectService
D4-READBILLDT	On-Demand Read Billing	ReadBillingDataOnDemand	ReadBillingDataOnDemand	ReadBillingDataOnDemandService
D4-READLOADDT	On-Demand Read Load Profile	ReadLoadProfileOnDemand	ReadLoadProfileOnDemand	ReadLoadProfileOnDemandService
D4-RDLOADST	Read Load Status	ConnectLoadRemoteConnect	ReadLoadStatusRemoteConnect	ConnectLoadRemoteConnectService
D4-RETMETID	Retrieve Meter Identifier	RetrieveMeterIdentifier	RetrieveMeterIdentifier	RetrieveMeterIdentifierService
D4-RETRIEVE	Retrieve Meter Information	RetrieveMeterInfor	RetrieveMeterInfor	RetrieveMeterInforService
D4-SETATMCFG	Set ATM Configuration	SetATMConfiguration	SetATMConfiguration	SetATMConfigurationService

Note: The following apply to all of the above XAI senders:

Main Tab:

- **Invocation Type:** Real-time
- **XAI Class:** RTHTPSNDR (Sender routes message via HTTP real-time)
- **MSG Encoding:** UTF-8 message encoding

Context Tab:

- **HTTP Header:** SOAPAction: http://xmlns.oracle.com/ouaf/echelon/<OPERATION>
- **HTTP Login User:** <USER_ID>
- **HTTP Login Password:** <PASSWORD>
- **HTTP Method:** POST
- **HTTP URL 1:** http://<EM_SERVER>:<EM_SERVER_PORT>/soa-infra/services/LG/<PROCESS>/<SERVICE>

where:

- **<OPERATION>:** the operation performed by the XAI Sender (see Operation column in the table above)
- **<USER_ID>:** the user ID used to log into WebLogic Enterprise Manager

- **<PASSWORD>**: the password used to log into WebLogic Enterprise Manager
- **<EM_SERVER_IP>**: the machine name or IP address of server where the WebLogic Enterprise Manager is installed
- **<EM_SERVER_PORT>**: the port where the WebLogic Enterprise Manager is installed
- **<PROCESS>**: the process invoked by the XAI Sender (see Process column in the table above)
- **<SERVICE>**: the service invoked by the XAI Sender (see Service column in the table above)

Outbound Message Types

Outbound message types define specific types of messages sent to an external system, such as messages containing device command requests.

The following outbound message types 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 outbound message types.

Outbound Message Type	Description
D4-ADDMETREQ	Add Meter Request
D4-CONLOAD	Connect Load
D4-DECMETREQ	Decommission Meter Request
D4-DISCONLD	Disconnect Load
D4-READBILLDT	On-Demand Read Billing Data
D4-READLPDATA	On-Demand Read Load Profile Data
D4-RDLOADST	Read Load Status
D4-RETME/TID	Retrieve Meter Identifier
D4-RETRIEVE	Retrieve Meter Information
D4-SETATMCFG	Set ATM Configuration

Note: The following apply to all of the above outbound message types:

- **Business Object:** D1-OutboundMessage (Outbound Message)
- **Priority:** Priority 50

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 Echelon NES must be present in your system. If this are not present in your configuration, add it, along with the following Outbound Message Types. Refer to the Oracle Utilities Application Framework documentation for more information about creating external systems.

External System - Echelon:

- **External System:** Echelon
- **Description:** Echelon
- **Outbound Message Types::**

Outbound Message Type	XAI Sender
D4-ADDMETREQ	D4-ADDMETREQ
D4-CONLOAD	D4-CONLOAD
D4-DECMETREQ	D4-DECMETREQ
D4-DISCONLD	D4-DISCONLD
D4-READBILLDT	D4-READBILLDT
D4-READLPDATA	D4-READLOADDT
D4-RDLOADST	D4-RDLOADST
D4-RETME'TID	D4-RETME'TID
D4-RETRIEVE	D4-RETRIEVE
D4-SETATMCFG	D4-SETATMCFG

Note: The following apply to all of the above outbound message types:

- **Processing Method:** Real-time
- **Message XSL:** D4-Request.xsl
- **Response XSL:** D4-Response.xsl

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 Echelon NES must be present in your system. If this are not present in your configuration, add it. Refer to the Oracle Utilities Meter Data Framework documentation for more information about creating service providers.

Service Provider - Echelon

- **Service Provider:** Echelon
- **Description:** Echelon
- **External Reference ID:** Echelon
- **External System:** D4-Echelon
- **Out Name/ID in Their System:**
- **AMI Device ID Type:** Internal Meter Number
- **AMI Measuring Component ID Type:** Channel ID

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. Processing methods can also be used to define how command requests are sent to the Echelon NES.

The following types of processing methods must be configured for the Echelon service provider. Refer to the Oracle Utilities Meter Data Framework 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 Echelon NES.

Processing Method - Initial Measurement Creation

- **Service Provider:** Echelon
- **Processing Role:** Initial Measurement Creation
- **Description:** How to create Initial Load IMD - Echelon
- **Status:** Active
- **Default Processing Method:**
 - **Business Object:** D4-InitialLoadIMDInterval (Echelon Initial Load IMD - Interval)
- **Override Processing Method:**
 - **Measuring Component Type:** Electric Scalar
 - **Business Object:** D4-InitialLoadIMDScalar (Echelon Initial Load IMD - Scalar)

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 receiving device events from the Echelon NES.

Processing Method - Device Event Mapping

- **Service Provider:** Echelon
- **Processing Role:** Device Event Mapping
- **Description:** How to map device events - Echelon
- **Status:** Active
- **Default Processing Method:**
 - **Business Object:** D4-DeviceEventMappingLookup (Extendable Lookup - Echelon Device 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 Echelon UOM codes to standard UOM code when receiving usage from the Echelon NES.

Processing Method - UOM Mapping

- **Service Provider:** Echelon
- **Processing Role:** UOM Mapping
- **Description:** How to map UOMs from Echelon when creating IMDs
- **Status:** Active
- **Default Processing Method:**
 - **Business Object:** D4-HeadendUOMLookup (Echelon UOM Code Mapping Extensible Lookup)
- **Override Processing Method:** based on implementation-specific requirements

Commands

Command processing methods define how command requests are sent to a head-end system. More specifically, they define the type of outbound communication business object to create for each type of command, and the outbound message type to send to the head-end system.

The following types of command processing methods can be configured for the Echelon service provider, based on the requirements of each implementation.

Device Commission

- **Service Provider:** Echelon
- **Processing Role:** Device Commission
- **Description:** Echelon Set ATM Configuration
- **Status:** Active
- **Processing Method:**
 - **Default Business Object:** D4-SetATMConfiguration (Set ATM Configuration)
 - **Default Outbound Message Type:** Set ATM Configuration)

Device Decommission

- **Service Provider:** Echelon
- **Processing Role:** Device Decommission
- **Description:** Device Decommissioning - Echelon
- **Status:** Active
- **Processing Method:**
 - **Default Business Object:** D4-DecommMeterRequest (Decommission Meter Request)
 - **Default Outbound Message Type:** Decommission Meter Request

On-Demand Read (Scalar)

- **Service Provider:** Echelon
- **Processing Role:** On-Demand Read (Scalar)
- **Description:** Read Billing Data On-Demand - Echelon
- **Status:** Active
- **Processing Method:**
 - **Default Business Object:** D4-ReadBillingData (Read Billing Data On-Demand)
 - **Default Outbound Message Type:** Read Billing Data

On-Demand Read (Interval)

- **Service Provider:** Echelon
- **Processing Role:** On-Demand Read (Interval)
- **Description:** Read Load Profile On-Demand - Echelon
- **Status:** Active
- **Processing Method:**
 - **Default Business Object:** D4-ReadLoadProfile (Read Load Profile On-Demand)
 - **Default Outbound Message Type:** Read Load Profile

Remote Connect

- **Service Provider:** Echelon
- **Processing Role:** Remote Connect
- **Description:** Connect Load - Echelon
- **Status:** Active
- **Processing Method:**
 - **Default Business Object:** D4-ConnectLoad (Connect Load)
 - **Default Outbound Message Type:** Connect Load

Remote Disconnect

- **Service Provider:** Echelon
- **Processing Role:** Remote Disconnect
- **Description:** Disconnect Load - Echelon
- **Status:** Active
- **Processing Method:**

- **Default Business Object:** D4-DisconnectLoad (Disconnect Load)
- **Default Outbound Message Type:** Disconnect Load

Device Status Check

- **Service Provider:** Echelon
- **Processing Role:** Device Status Check
- **Description:** Read Load Status - Echelon
- **Status:** Active
- **Processing Method:**
 - **Default Business Object:** D4-ReadLoadStatus (Read Load Status)
 - **Default Outbound Message Type:** Read Load Status

Echelon Add Meter Request

- **Service Provider:** Echelon
- **Processing Role:** Echelon Add Meter Request
- **Description:** Add Meter Request - Echelon
- **Status:** Active
- **Processing Method:**
 - **Default Business Object:** D4-AddMeterRequest (Add Meter Request)
 - **Default Outbound Message Type:** Add Meter Request

Echelon Retrieve Meter Information

- **Service Provider:** Echelon
- **Processing Role:** Echelon Retrieve Meter Information
- **Description:** Retrieve Meter Information - Echelon
- **Status:** Active
- **Processing Method:**
 - **Default Business Object:** D4-RetrieveMeterInfo (Retrieve Meter Information)
 - **Default Outbound Message Type:** Retrieve Meter Information

Configuring Echelon Extendable Lookups

This section outlines some of the extendable lookups that must be configured for use with the Echelon adapter. These include:

- **Echelon Device Event Mapping**
- **Echelon UOM Code Mapping Extendable Lookup**
- **Echelon Interval Status Code to Condition Mapping**

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

Echelon Device Event Mapping

The Echelon Device Event Mapping extendable lookup is used to determine which type of device event business object to instantiate when receiving device events from Echelon NES.

Each value defined for the Echelon Device Event Mapping extendable lookup should include the following:

- **Head-End System Event Name:** The event name used by the Echelon NES
- **Description:** A description of the device event
- **Standard Event Name:** The standard event name for device events of this type, from the “Standard Event Name” extendable lookup.

Example: The Echelon “Tampering” device event name could be mapped to the “Device Tampering” standard device event name as follows:

- **Head-End System Event Name:** Tampering
- **Description:** Tampering Detected
- **Standard Event Name:** Device Tampering

Echelon UOM Code Mapping Extendable Lookup

Usage received from Echelon may use utility-specific unit of measures (UOMs). These custom UOMs must be mapped to standard UOM codes. The Echelon UOM Code Mapping Extendable Lookup is used to determine how to map Echelon UOM codes to standard UOM codes when receiving usage from the Echelon NES.

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

- **Head-end UOM:** The unit of measure code used by the Echelon NES
- **Unit of Measure:** The unit of measure defined in the system. See Defining Units of Measure in the *Oracle Utilities Meter Data Framework 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 Echelon “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:** Echelon Kilowatt Hours

Echelon Interval Status Code to Condition Mapping

Interval usage received from the Echelon NES can include Echelon interval status codes that indicate the status or condition of the interval value. These interval status codes must be mapped to standard condition codes in the system. The Echelon Interval Status Code to Condition Mapping extendable lookup is used to determine how to map Echelon interval status codes to standard status codes when receiving usage from the Echelon NES.

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

- **Interval Status:** The Echelon interval status code
- **Condition:** The condition code to which the interval status code is to be mapped, from the Measurement Condition extendable lookup.
- **Description:** A description of the interval status code.
- **Priority:** The priority of the interval status code, represented as a numeric value where larger numbers correlate to higher priorities.

Example: The Echelon “Missing” interval status code could be mapped to the “Missing” condition code as follows:

- **Interval Status:** Missing
- **Condition:** Missing
- **Description:** Echelon Missing
- **Priority:** 10

Configuring Echelon Usage and Event Extract Processing

Usage and events received from the Echelon NES server must be requested from Oracle Utilities Smart Grid Gateway. Extract requests for usage and events are triggered by a batch process, and sent to the Echelon NES via middleware. The Echelon NES compiles a batch of usage or events and sends it to the Oracle Service Bus (OSB) services, and sends a message via BPEL services to SGG regarding the status of the request.

This section describes the processing performed by the extract request process, and the configuration steps involved, including:

- **Extract Request Processing**
- **Extract Request Configuration Steps**
- **Executing Extract Requests**

Extract Request Processing

This section provides a detailed description of the extract request process.

- The “Usage / Event Extract Scheduler Monitor” batch process (D1-EXTSC) checks for “Echelon Usage Extract Scheduler” or “Echelon Event Extract Scheduler” activities that are in the “Active” state, and transitions these to the “Send Request” state. It also updates the “Latest Request Start Date/Time” and “Latest Request End Date/Time” fields on the activity based on the date and time of the request.
- When the activity enters the “Send Request” state, an Enter algorithm (either “Usage Extract Scheduler Send Request” (D4-USGSNDREQ) or “Event Extract Scheduler Send Request” (D4-EVTSNDREQ)) sends a request via an XAI Sender to the middleware (via the GrabBatchUsage or GrabBatchEvent BPEL services), which in turn send the request to the NES server.
- After the request is sent, the “Echelon Usage Extract Scheduler” or “Echelon Event Extract Scheduler” activity to set back to the “Active” state.
- The Echelon NES server compiles a batch of usage (or events) and sends the batch to the OSB components to process the usage or events, and sends a return status message to the middleware to update SGG as to the status of the request.

Extract Request Configuration Steps

This section outlines the objects that must be configured to support batch extracts of usage and events from an Echelon head-end system. To configure the Echelon NES Adapter to support sending extract requests for usage and events, you must do the following:

- Create XAI Senders (one for usage, one for events) to send extract requests.
- Create Outbound Message Types (one for usage, one for events) for extract requests.
- Associate the XAI Senders and Outbound Message Types to the External System used with the head-end system service provider
- Create “Echelon Usage Extract Scheduler Type” and “Echelon Event Extract Scheduler Type” activity types.
- Create “Echelon Usage Extract Scheduler” and “Echelon Event Extract Scheduler” activities.

The following sections provide details for configuring these object. Refer to the Oracle Utilities Application Framework documentation for more information about creating XAI Senders, Outbound Message Types, and External Systems.

Note: Configuration of the OSB and BPEL services used by this process is done when installing and configuring the OSB and BPEL components of the Echelon NES Adapter.

XAI Sender - Echelon Handle Batch Event

Create an XAI Sender for event extracts as follows:

Main Tab:

- **XAI Sender:** Enter a code for the batch event XAI sender (D4-HNLBATEVT)
- **Description:** Echelon Handle Batch Event
- **Invocation Class:** Real-time
- **XAI Class:** RTHTTPSNDR (Sender routes messages via HTTP real-time)
- **Active:** True (checked)
- **MSG Encoding:** UTF-8 message encoding

Context Tab:

- **HTTP Header:** SOAPAction:http://xmlns.oracle.com/ouaf/echelon/GrabBatchEvents
- **HTTP Login User:** <USER_ID>
- **HTTP Login Password:** <PASSWORD>
- **HTTP Method:** POST
- **HTTP URL 1:** http://<EM_SERVER>:<EM_SERVER_PORT>/soa-infra/services/Echelon/HandleBatchEvent/BatchEventHandler

where:

- **<USER_ID>:** the user ID used to log into WebLogic Enterprise Manager
- **<PASSWORD>:** the password used to log into WebLogic Enterprise Manager
- **<EM_SERVER_IP>:** the machine name or IP address of server where the WebLogic Enterprise Manager is installed
- **<EM_SERVER_PORT>:** the port where the WebLogic Enterprise Manager is installed

XAI Sender - Echelon Handle Batch Usage

Create an XAI Sender for usage extracts as follows:

Main Tab:

- **XAI Sender:** Enter a code for the batch usage XAI sender (D4-HNLBATUSG)
- **Description:** Echelon Handle Batch Usage
- **Invocation Class:** Real-time
- **XAI Class:** RTHTTPSNDR (Sender routes messages via HTTP real-time)
- **Active:** True (checked)
- **MSG Encoding:** UTF-8 message encoding

Context Tab:

- **HTTP Header:** SOAPAction:http://xmlns.oracle.com/ouaf/echelon/GrabBatchUsage
- **HTTP Login User:** <USER_ID>
- **HTTP Login Password:** <PASSWORD>
- **HTTP Method:** POST
- **HTTP URL 1:** http://<EM_SERVER>:<EM_SERVER_PORT>/soa-infra/services/Echelon/HandleBatchUsage/BatchUsageHandler

where:

- **<USER_ID>**: the user ID used to log into WebLogic Enterprise Manager
- **<PASSWORD>**: the password used to log into WebLogic Enterprise Manager
- **<EM_SERVER_IP>**: the machine name or IP address of server where the WebLogic Enterprise Manager is installed
- **<EM_SERVER_PORT>**: the port where the WebLogic Enterprise Manager is installed

Outbound Message Type - Echelon Handle Batch Event

Create an Outbound Message Type for event extract requests as follows:

- **Outbound Message Type**: Enter a code for the batch event Outbound Message Type (D4-HNLBATEVT)
- **Description**: Echelon Handle Batch Event
- **Business Object**: F1-OutboundMessageType
- **Priority**: - Priority 20 (or lower)

Outbound Message Type - Echelon Handle Batch Usage

Create an Outbound Message Type for usage extract requests as follows:

- **Outbound Message Type**: Select a code for batch usage Outbound Message Type (D4-HNLBATUSG)
- **Description**: Echelon Handle Batch Usage
- **Business Object**: F1-OutboundMessageType
- **Priority**: Priority 20 (or lower)

External System - Echelon Batch Event Association

Add the event extract Outbound Message Type and XAI Sender to the external system used for the Echelon head-end system as follows:

- **External System**: Echelon
- **Description**: Echelon
- **Outbound Message Types**:
 - **Outbound Message Type**: D4-HNLBATEVT
 - **Processing Method**: Real-time
 - **XAI Sender**: D4-HNLBATEVT
 - **Message XSL**: D4-Request.xsl
 - **Response XSL**: D4-Response.xsl

External System - Echelon Batch Usage Association

Add the usage extract Outbound Message Type and XAI Sender to the external system used for the Echelon head-end system as follows:

- **External System**: Echelon
- **Description**: Echelon
- **Outbound Message Types**:
 - **Outbound Message Type**: D4-HNLBATUSG
 - **Processing Method**: Real-time

- **XAI Sender:** D4-HNLBATUSG
- **Message XSL:** D4-Request.xsl
- **Response XSL:** D4-Response.xsl

Activity Type - Echelon Event Extract Scheduler

Create an Activity Type for event extract requests as follows:

- **Activity Type:** Enter a code for the activity type (ECHELON-EVENT-EXTRACT)
- **Description:** Enter a description for the activity type (Echelon Event Extract Scheduler Type)
- **Related Transaction BO:** Echelon Event Extract Scheduler
- **Activity Type Status:** Active
- **Outbound Message Type:** Echelon Handle Batch Event
- **External System:** The external system used for the Echelon head-end system
- **Exception Handling:**
 - **To Do Type:** Activity To Do Type
 - **To Do Role:** System Default Role
 - **Retry Frequency:** Select retry frequency in case if Activity reaches an error state (00:03:00)
 - **Maximum Retries:** Select max number of times the activity will be retried - since it reached the error state (1)
 - **Discard Reason:** Select from the dropdown if available.

Activity Type - Echelon Usage Extract Scheduler

Create an Activity Type for usage extract requests as follows:

- **Activity Type:** Enter a code for the activity type (ECHELON-USAGE-EXTRACT)
- **Description:** Enter a description for the activity type (Echelon Usage Extract Scheduler Type)
- **Related Transaction BO:** Echelon Usage Extract Scheduler
- **Activity Type Status:** Active
- **Outbound Message Type:** Echelon Handle Batch Usage
- **External System:** The external system used for the Echelon head-end system
- **Exception Handling:**
 - **To Do Type:** Activity To Do Type
 - **To Do Role:** System Default Role
 - **Retry Frequency:** Select retry frequency in case if Activity reaches an error state (00:03:00)
 - **Maximum Retries:** Select max number of times the activity will be retried - since it reached the error state (1)
 - **Discard Reason:** Select from the dropdown if available.

Activity - Echelon Event Extract Scheduler

Initiate an Activity for event extract requests as follows:

1. Select **Main->Communication->Activity+**
2. Select "Echelon Event Extract Scheduler Type" from the **Activity Type** drop-down list.
3. Enter the number of hours for each extract request in the **Number of Hours of Data Request** field. The default is 24.
4. *Optional:* Enter start and end dates and times for the first extract request in the **Current Request Start Date/Time** and **Current Request End Date/Time** fields.

Note that these are optional fields. If not populated, the values are populated as follows:

- a. **Current Request Start Date/Time:** taken from the last request stop date/time (which is populated by the "Event Extract Scheduler Send Request" algorithm (D4-EVTSNDREQ))
- b. **Current Request End Date/Time:** the Current Request Start Date/Time plus the number of hours in the **Number of Hours of Data Request** field.

Activity - Echelon Usage Extract Scheduler

Initiate an Activity for usage extract requests as follows:

1. Select **Main->Communication->Activity+**
2. Select "Echelon Usage Extract Scheduler Type" from the **Activity Type** drop-down list.
3. Enter the number of hours for each extract request in the **Number of Hours of Data Request** field. The default is 24.
4. *Optional:* Enter start and end dates and times for the first extract request in the **Current Request Start Date/Time** and **Current Request End Date/Time** fields.

Note that these are optional fields. If not populated, the values are populated as follows:

- a. **Current Request Start Date/Time:** taken from the last request stop date/time (which is populated by the "Usage Extract Scheduler Send Request" algorithm (D4-USGSNDREQ))
- b. **Current Request End Date/Time:** the Current Request Start Date/Time plus the number of hours in the **Number of Hours of Data Request** field.

Executing Extract Requests

To schedule and execute usage and device event extract requests, set up the "Usage / Event Extract Scheduler Monitor" batch process (D1-EXTSC) to run at a frequency appropriate to when you wish to retrieve usage and device events from the Echelon NES. For example, to retrieve usage and device events on a daily basis, schedule the "Usage / Event Extract Scheduler Monitor" batch process (D1-EXTSC) to run once every 24 hours.

Extending the Adapter for Echelon

The Oracle Utilities Smart Grid Gateway Adapter for Echelon supports a number of commands, including:

- Commission Device
- Decommission Device
- Device Status Check
- On-Demand Read
- Remote Connect
- Remote Disconnect

The Adapter for Echelon can be extended to support additional commands provided by the Echelon NES. See **Creating Custom Commands** on page 9-26 of the *Oracle Utilities Smart Grid Gateway Configuration Guide* for more information about adding commands to the Echelon adapter.

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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