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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 Meter Data Management application. This includes:

- **What Is This Book?**
- **Architecture Overview**
- **Oracle Utilities Application Framework Configuration Tools**
- **Configuration Process Overview**

What Is This Book?

This guide describes how to configure Oracle Utilities Meter Data Management. It is intended for implementers and system administrators responsible for configuration and initial setup of the application.

Oracle Utilities Meter Data Management 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 Oracle Utilities Meter Data Management.

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 the Admin Setup Reference Tables in Chapter 3 to guide you through the setup process of admin data. This section lists each object that can be configured, defines any prerequisites for configuration.

Note: The sequence in which you configure system objects is very important. Admin Setup Reference Tables describes admin data dependencies and defines the order in which admin objects should be configured. By following this sequence carefully, you can streamline the configuration process and reduce the amount of time required for setup.

This guide includes the following chapters:

- **Chapter 1: Overview** (this chapter) provides an overview of the Oracle Utilities Meter Data Management 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 system.
- **Chapter 3: Setting Up Admin Data** describes the different types of admin data that must be set up and defined as part of implementing and configuring Oracle Utilities Meter Data Management.
- **Chapter 4: Devices, Measuring Components, and, Device Configurations** provides an overview of devices and measuring components and how they are used in the system, along with technical details concerning device-related maintenance and business objects.
- **Chapter 5: Service Points and Device Installation** provides an overview of service points and device installation-related objects and how they are used in the system, along with technical details concerning related maintenance and business objects.
- **Chapter 6: Measurement Data** provides an overview of initial and final measurement data and how it is used in the system, along with technical details concerning related maintenance and business objects.
- **Chapter 7: Validation, Editing, and Estimation** provides an overview of the validation, editing, and estimation process, along with technical details concerning related maintenance and business objects.
- **Chapter 8: Usage Subscriptions** provides an overview of usage subscriptions and how they are used in the system, along with technical details concerning related maintenance and business objects.
- **Chapter 9: Usage Groups and Usage Rules** provides an overview of the usage calculation process, along with technical details concerning related maintenance and business objects.

- **Chapter 10: TOU Maps and Dynamic Options** provides an overview of TOU maps and dynamic options and how they are used in the system, along with technical details concerning related maintenance and business objects.
- **Chapter 11: Usage Transactions** provides additional information about the usage calculation process, along with technical details concerning usage transaction-related maintenance and business objects.
- **Chapter 12: Batch Processing** provides a list of the base package batch controls provided with the system.
- **Chapter 13: Importing Usage Readings** provides a description of the XML format used when importing usage readings into the system, and a high-level description of some of the steps involved in setting up a usage import process.
- **Appendix A: Measurement Services** provides a list of base package measurement services use by VEE rules and functions.
- **Appendix B: Glossary** is a list of commonly used terms.
- **Appendix C: Base Package Configuration Objects** provides lists of base package configuration objects that can be leveraged during an implementation.

Other Documentation

This section describes other documentation provided with Oracle Utilities Meter Data Management.

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 Meter Data Management Quick Install Guide
- Oracle Utilities Meter Data Management DBA Guide
- Oracle Utilities Meter Data Management 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 Administrator Guide
- Oracle Utilities Meter Data Framework User's Guide
- Oracle Utilities Meter Data Management User's Guide

Supplemental Documentation

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

- Oracle Utilities Meter Data Management Server Administration Guide
- Oracle Utilities Meter Data Management Batch Server Administration Guide

Embedded Help

Oracle Utilities Meter Data Management, 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 Meter Data Management also include 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 Meter Data Framework: Describes the features and functions provided in the meter data framework (D1)
- Oracle Utilities Meter Data Management: Describes the features and functions provided in the meter data management application (D2)

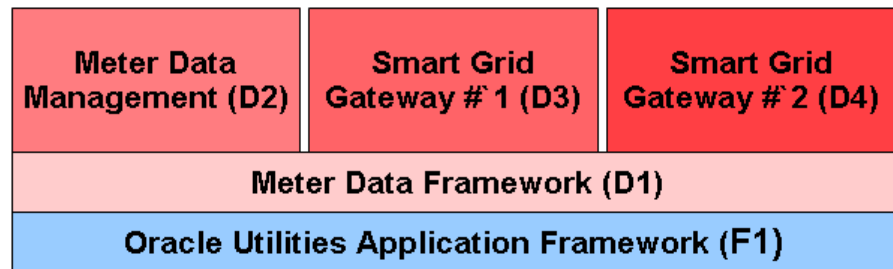
Architecture Overview

Oracle Utilities Meter Data Management is used to maintain information about meters and the service points at which they are installed. The application provides means of recording measurements and events associated with meters in the field as well as the ability to compute usage for the recorded measurements.

Oracle Utilities Meter Data Management comprises the following functional areas:

- **Device Management:** the maintenance of physical meters in the field
- **Device Installation:** the maintenance of service points and the installation of meters in the field. This includes the means of registering outside systems to Oracle Utilities Meter Data Management for provider/consumer-specific processing of meter events and activities
- **Validation, Editing, and Estimation:** the maintenance of measurement data and the engine used to validate and modify that data as it comes in
- **Usage Management:** the engine that calculates billable usage recorded on devices, applying factors and dividing the usage into configurable time of use periods

Oracle Utilities Meter Data Management is built upon the Oracle Utilities meter data framework, a framework that provides shared functionality used by Oracle Utilities Meter Data Management, Oracle Utilities Smart Grid Gateway, and other Oracle Utilities products. Oracle Utilities Meter Data Management and the Oracle Utilities meter data framework are built atop the Oracle Utilities Application Framework.



Oracle Utilities Application Framework Configuration Tools

The Oracle Utilities Application Framework (OUAF) configuration tools 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 these tools.

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 Oracle Utilities Meter Data Management 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.

The following sections discuss some specific topics related to the configuration tools.

“Lite” Business Objects

When a business object is read, the Framework dynamically constructs a SQL statement to retrieve the rows and columns associated with the business object's schema. If a process only needs only a small subset of a business object's elements, a “lite” business object that only references these elements can be used.

These “lite” business objects are used by the business processes (typically the construction of info strings) that only need a small subset of elements. Lite business objects are configured to never allow instances. In other words, they are only used to read existing instances of other business objects.

Later chapters in this book list the various “lite” business objects provided with the base package for each of the types of business objects described (devices, measuring components, service points, etc.)

Data Areas

As described in the Oracle Utilities Application Framework documentation, data areas provide a common schema location for re-used schema structures. Data areas exist solely to help eliminate redundant element declaration. For example, if you have multiple schemas that share a common structure, you can set up a stand-alone data area schema for the common elements and then include it in each of the other schemas.

Many of the base package schemas make use of data areas, and Oracle recommends that you take advantage of data areas where possible to avoid redundant data definition.

See **Appendix C: Base Package Configuration Objects** for a list of the base package data areas provided with Oracle Utilities meter data framework and Oracle Utilities Meter Data Management.

Algorithms

Many functions in the system are performed using user-defined algorithms (also referred to as plug-ins). For example, user-defined algorithms can be used to perform custom validation, editing, and estimation logic, or retrieve characteristic values for factors.

Custom algorithms allow implementers to modify how the system responds to certain system events. The system provides system where the custom algorithms can be invoked instead of the base package algorithms provided with the system. For instructions on creating custom algorithms and algorithm types, see the Framework documentation. To view information about specific algorithms provided with the base system, use the Application Viewer (also described in the

Framework documentation). The Application Viewer provides information about the base logic, inputs, and outputs of each algorithm entity or plug-in spot.

Entity Naming Conventions

Oracle Utilities Meter Data Management system uses naming conventions to identify and distinguish entities that belong to different Oracle applications. These conventions can help you locate entities and understand their context.

Each base product uses a 2-character owner code as a prefix for all its entities. For Oracle Utilities Meter Data Management, these prefixes are as follows:

- All Oracle Utilities Application Framework entities start with "F1"
- All Oracle Utilities meter data framework entities start with "D1"
- All Oracle Utilities Meter Data Management entities start with "D2"

Oracle recommends that you follow these naming conventions and develop your own set of conventions for the entities you create. If you create new entities, DO NOT use these prefixes; use the prefix "CM" (or some other unique prefix) to identify entities that have been customized.

Configuration Process Overview

This section provides a high-level overview of some of the steps involved in the configuration process when implementing Oracle Utilities Application Framework products such as Oracle Utilities Meter Data Management.

Note: The following sections are a simplification of an involved process, and are provided as guidelines only. Refer to the Oracle Utilities Application Framework documentation for detailed information about business objects and other objects referenced below.

Basic Configuration Steps - Design Your Business Objects

Much of the configuration involved in implementing Oracle Utilities Meter Data Management is centered around the creation of business objects. Nearly every object or set of data used by Oracle Utilities Meter Data Management is defined in business object, including meters and registers (devices and measuring components), service points, contacts, measurement data, validation rules, usage calculation rules, and more.

Given the prominent role that business objects play, one of the most important steps in implementing Oracle Utilities Meter Data Management is identifying the business objects you will need to create to meet the requirements of your implementation. At a high level, this includes the following steps:

1. Identify the data to be defined by each business object

This step defines the maintenance object to be used with the business object, and the data elements to include in the business object's schema. Leverage data areas where possible to minimize redundant data definition.

2. Identify the processing to be performed by each business object

This step determines the specific algorithms/algorithm types, and business services (and related scripts and service programs) that will be perform the processing required by your business objects.

3. Identify how users will access and work with each business object (if applicable)

This defines the portals, zones, navigation options, BPA scripts, etc. you will need to develop to allow users access to your business objects.

Basic Configuration Steps - Create Your Business Objects

After identifying the above information, the next step is to create the business objects used in your implementation. At a high level, this includes the following steps:

1. Create configuration objects

Before you can create your business objects, you must first create the various configuration objects used by each business object, including:

- Application Services
- UI Maps (display and maintenance)
- Navigation Options
- Service Scripts
- Algorithm Types/Algorithms
- BPA Scripts/Business Service
- Other business objects
- Etc.

Where possible, leverage base package objects instead of creating your own to minimize data redundancy.

2. Create the business object

Once the configuration objects used by the business object are in place, you can create the actual business object itself using the Business Object portal, referencing the configuration objects created in step 1 as appropriate.

Later chapters in this book provide examples of many of the base package business objects provided with the system. These are provided to illustrate how the base package objects were designed, and to serve as the basis for the business objects you create as part of your implementation.

Basic Configuration Steps - Create Portals and Zones

If the base package portals and zones are not sufficient to meet the requirements of your implementation, you may have to create your own to allow users to work with your business objects. This can include creating the following:

- Context Menus
- Menus and Menu Items
- Navigation Keys
- Navigation Options
- Portals
- Zones

Basic Configuration Steps - Create Master Data

The “master” data used by Oracle Utilities Meter Data Management includes the various entities used in your implementation, such as devices, measuring components, service points, VEE rules, etc. This data must be created in the system before you can process measurement data and create bill determinants from the data. Creating this data includes the following steps:

1. Create admin “type” data.

Many of the objects used by Oracle Utilities Meter Data Management have corresponding admin “type” objects that are used to define attributes common to instances of that type of object. For example, Device Types are used to define attributes common to devices of a specific type. One of the most important attributes defined by an admin “type” object is the business object that will be used for instances of the object of that type. For example, devices created from a Device Type that references the “D1-SmartMeter” device business object will be based on that business object.

The **Admin “Type” Objects** table below lists the core objects used by Oracle Utilities Meter Data Management and their corresponding admin “type” objects.

2. Create instances of the data.

Once the admin “type” data is in place, you can create the instances of the master data objects used in your implementation. These instances are the individual devices, measuring components, service points, VEE rules, usage subscriptions, etc. that will be used in processing measurement data, calculating usage and bill determinants, and so on.

Admin “Type” Objects.

Object	Admin “Type” Object
Activity	Activity Type
Contact	Contact Type
Device	Device Type
Device Configuration	Device Configuration Type
Dynamic Option	Dynamic Option Type
Measuring Component	Measuring Component Type
Service Point	Service Point Type
TOU Map	TOU Map Type
Usage Subscription	Usage Subscription Type

Chapter 2

General Configuration

This chapter describes configuration of general components, including the following:

- **Installation Options**
- **Master Configuration**

Installation Options

Installation options define the individual applications installed on your system and identify algorithms used to implement core system functions. These options also define global parameters such as the administrative menu style (alphabetical or functional), the country, language, currency code, as well as the base time zone to use for this implementation.

Installation options are stored in the installation record for your system. Use the **Installation Options - Framework** portal to configure these options. This portal is part of the OUAF and is described in detail in the Framework documentation.

Base Time Zone

The date/time attributes for all time-sensitive application entities, including start and end dates, are stored in the server application time zone in standard time and displayed in that time zone's legal time, which is the standard time adjusted for any seasonal shift.

The server time zone, also referred to as the Base Time Zone, must be correctly specified on the installation options record.

Note: The installation record does not dictate the server time zone, but rather must match it.

Installation Algorithms

Installation algorithms implement global system functions and can be customized for each implementation. The base package supports the following installation options for Meter Data Management-related system events:

- **Geocoding Service:** Responsible for geocoding an address (converting an address to a geocode latitude/longitude pair).
- **Global Context:** Sets global contexts (displayed in the Global Context dashboard zone) based on the value of existing global contexts. For example, if the Service Point is specified, this algorithm sets the Device by finding the most recently installed Device on the service point. It then sets the Measuring Component by finding the most effective Device Configuration and retrieving any measuring component linked to it. It then sets the Usage Subscription by finding the most recent active usage subscription linked to the service point. The contact is set by finding the main contact for the usage subscription.

Master Configuration

Master Configuration is another source of global parameter records used by a system implementation.

Oracle Utilities Meter Data Management uses a Global Configuration record that controls core system functions. This record must be set up for the system to properly operate. Refer to appendix B for more information on when to set up this record.

Key concepts related to Master Configuration are discussed in this section. Refer to the embedded help for descriptions of the settings on the Master Configuration page.

Hijri to Gregorian Date Mapping

The Hijri to Gregorian Date Mapping option is used to define the relationship between Hijri dates and Gregorian dates for each year.

Chapter 3

Setting Up Admin Data

This chapter describes the different types of admin data that must be set up and defined as part of implementing and configuring Oracle Utilities Meter Data Management, including:

- **Understanding Admin Data**
- **Admin Setup Reference Tables**

Understanding Admin Data

This section describes the admin data used by the Oracle Utilities meter data framework and Oracle Utilities Meter Data Management.

General Admin Data

General admin data are types of data used by multiple functional areas.

Activity Types

Activity types define properties common to a specific type of activity.

Activity types include types of communications between an application and a head-end system, such as a connection request, meter ping, or on-demand meter reading.

Exception Types

Exception types define the properties common to many exceptions.

When creating validation, editing, and estimation (VEE) rules, you might create an exception type for each VEE rule. You might also create more general exception types, such as "Insufficient Data" to be used to signify that a measurement didn't have sufficient data for the VEE rule to execute.

Factors

Factor are a centrally stored set of values for use in validation rules, bill determinants calculations, and other processes.

A factor can have different values depending upon some definable attribute of a system object, such as customer size associated with a service point. Examples of factors can include minimum/maximum thresholds, loss factors, etc. Classes of factors are defined that can have numeric values (as in the above examples), or values pointing to profile measuring components, or VEE groups.

A factor's values are effective-dated values - either a number, a profile measuring component, a VEE group, or some custom-defined value - assigned to a factor and associated to the value of some attribute of a system object. For example, consider a service point that can be classified as residential, commercial, or industrial. The tolerance percentage by which a customer's consumption can exceed last month's consumption can be based on the service point category. For this example, factor values for a single factor called "tolerance percentage" could be: Residential - 20% Commercial - 10% Industrial - 5%.

Service Quantity Identifiers

Service Quantity Identifiers (SQI) are used to further distinguish between measured quantities that have identical UOM/TOU combinations, including situations in which the distinguishing identifier of a UOM is not accurately described as a TOU.

SQIs can also be used as a stand-alone representation of a service quantity that is not measured (one that is not properly described as a UOM) within a usage service quantity collection (such as a billing determinant).

Service Types

Service Types define specific types of service for which usage can be recorded and captured, such as electric, gas, steam, etc.

Time of Use

Time of Use (TOU) periods are modifiers for a given unit of measure that indicate a period of time during which a quantity has been used, such as On-Peak (meaning during a time when the

greatest quantity of some consumable is being used), Off-Peak (meaning during a time when the least amount of some consumable is being used), etc.

Units of Measure

Units of Measure (UOM) identify quantities measured and recorded, such as KWH, KW, cubic feet, degrees Celsius, etc. UOMs are based on a specific service type.

Attributes used to define units of measure include the following:

- **Service Type:** The type of service (electric, gas, etc.) measured by the UOM
- **Decimal Positions:** The number of decimal places used when presenting a quantity for this UOM in Usage service quantities
- **Allowed on Measuring Component:** A flag that indicates if the UOM is allowed on Measuring Components
- **Measures Peak Quantity:** A flag that indicates if the UOM is used to measure peak quantities or not. An example of a UOM that measures peak quantities is kilowatts (KW).
- **Magnitude:** A number that indicates the relative size of the UOM as compared to a single unit of the UOM specified under "Base Unit of Measure." For example, megawatt hours (MWH) have a magnitude of 1,000 as compared to a single kilowatt hour (KWH).
- **Base Unit of Measure:** The UOM upon which the current UOM is based. Used in conjunction with magnitude. For example, the base unit of measure for megawatt hours (MWH) with a magnitude of 1,000 would be kilowatt hours (KWH).

Device Management Admin Data

Device management admin data include data that defines “types” of device-related objects.

Device Configuration Types

Device configuration types define the properties of device configurations of this type, including the valid types of measuring components that can be configured for device using configurations of this type.

Device Types

Device types define information about a class of devices, including properties that apply to all devices of a type. Properties defined for a device type can be overridden for an individual device.

Manufacturers

Manufacturers are the companies that makes devices. A device's manufacturer is defined as an attribute of the device itself.

Each manufacturer can have zero or more models defined. Models for a single manufacturer can have diverse service types.

Measuring Component Types

Measuring component types define the most important properties of a measuring component.

Measuring component types define what a measuring component measures (KWH, temperature, etc.), how regularly it measure it, and whether it should be connected to a physical device, or if it's used as a scratchpad measuring component or an aggregator measuring component. Measuring component types also specify how the measuring component's final measurements should be stored, how the measuring component's user-defined values should be calculated, and specific rules governing validation, editing, and estimation (VEE) for measuring components of the type. In addition, measuring component types define display properties and valid attribute values for measuring components belonging to the type.

Some important characteristics defined for measuring component types include:

- **Value Identifiers:** These store the values of UOM, TOU, and SQI that identify the measured amounts for measuring components of this type. Value identifiers specify the quantities stored on the measurement records for measuring components of this type.
- **Valid VEE Groups:** These define the VEE groups considered valid for measuring components of this type.
- **Fallback VEE Groups:** These define default VEE groups that can be used with all measuring components of this type. This alleviates the need to specify the same VEE groups on multiple measuring components of the same type. Each VEE group is designated a VEE group role that indicates when and how the VEE group is used (for initial load, manual override, or estimation).
- **Eligible Profile Factors (interval only):** These define the profile factors that are considered to be eligible for interval measuring components of this type. You can also specify one or more profile factors as a default.
- **Valid Profile Factors for Conversion from Scalar to Interval (scalar only):** These define the profile factors that are considered to be eligible for scalar measuring components of this type when converting scalar measurements to interval measurements. You can also specify one or more profile factors as a default.
- **Valid Scratchpad Measuring Component Types:** These define the scratchpad measuring component types considered valid for measuring components of this type.
- **Display Properties:** Defines how measurement data for measuring components of this type is displayed, including:
 - **Display Configuration:** Details related to how measurements are displayed, including the number of hours of data to display, the default TOU map used, the TOU by Day Profile factor used, and default measurement condition.
 - **Event Bar Profiles:** The event bar profiles used when displaying measurement data for measuring components of this type. Event bar profiles are defined as values for the 360 View Event Bar Profile extendable lookup.
 - **Final Values Overlay Profiles:** The final values overlay profiles used when displaying measurement data for measuring components of this type. Final values overlay profiles are defined as values for the Final Values Overlay Profile extendable lookup.

Measuring component types are described in more detail in **Chapter 4: Devices, Measuring Components, and, Device Configurations**.

Device Installation Admin Data

Device admin data includes data used to support the installation of devices.

Markets

Markets define the jurisdictions or regulatory environments in which a service point participates.

Markets also define market relationships for valid service providers and their roles within a market (distributor, etc.). While each service point specifies only one market, a utility may serve more than one market, and different service points throughout the utility's service territory can be linked to different markets.

Service Providers

Service providers are external entities that serve various roles relative to the application.

Service providers can include 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. Service providers are described in more detail in **Chapter 5: Service Points and Device Installation**.

Service Point Types

Service point types define a specific type of point at which service is delivered.

Specifically, service point types define how the application manages many aspects of the service point's behavior. A service point type may have one or more valid device types defined that limit the types of devices that can be installed at service points of this type.

Contact Types

Contact types define the properties of a class of entities (businesses, persons).

Measurement Cycles

Measurement cycles define the schedule for manual meter reading of devices at service points in that cycle. Measurement cycles can have one or more associated routes used to collect measurements.

When used with smart meters, measurement cycles can also be configured to define when to create usage transactions for usage subscriptions associated to service points in the cycle.

Measurement Cycle Schedules

Measurement cycle schedules define the dates on which devices are scheduled to be read for a given measurement cycle and the routes used to collect measurements for the measurement cycle.

VEE Rule Admin Data

VEE rule admin data include VEE groups and VEE rules. VEE groups and rules are described in more detail in **Chapter 7: Validation, Editing, and Estimation**.

VEE Groups

VEE groups are collections of VEE rules that are applied to initial measurement data.

VEE groups can be associated to a specific measuring component, or to a measuring component type (or both). VEE groups associated with a measuring component type are applied to all measuring components of that type, while those associated to a specific measuring component are applied only to that measuring component.

VEE Rules

VEE rules are standard and custom Validation, Estimation and Editing (VEE) rules that perform checking and/or manipulation of initial measurement data.

VEE rules are created for a specific VEE group. For example, if you were configuring two VEE groups and both included a specific VEE rule, you would need to create two instances of the VEE rule, one for each group.

Attributes used to define VEE rules typically include the following:

- **Basic Information:** Basic information about the VEE rule, including its name and description, the VEE group to which the rule belongs, the sequence of the rule within the group, the category, and start and end dates. This information is standard for most VEE rules.
- **Parameters:** The parameters used by the rule. Parameters are specific to each rule.
- **Exception Types and Severity:** Details about how to handle exceptions, including the Exception Type and Exception Severity for exceptions created by the rule.

VEE Rule Eligibility Criteria

VEE rule eligibility criteria are user-definable conditions that could cause a given VEE rule to be applied or skipped. This can involve the evaluation of some attribute of the device or measuring component, or something else entirely.

A VEE rule can have multiple eligibility criteria for determining if the rule should be applied or skipped, based on a user-defined sequence.

Usage Management Admin Data

Usage management admin data includes data used in usage calculations, including time of use data, usage subscription types, and usage groups and rules. Usage subscription types are described in more detail in **Chapter 8: Usage Subscriptions**. Usage groups and rules are described in more detail in **Chapter 9: Usage Groups and Usage Rules**.

Dynamic Option Types

Dynamic option types store information common to dynamic options of a specific type.

TOU Groups

TOU Groups are groups of TOUs used to limit the set of TOUs usable in a TOU schedule. TOU groups are used when defining a TOU schedule via a TOU map template.

TOU Map Templates

TOU Map Templates are the schedules used for TOU map data generation.

Attributes used to define TOU map templates include the following:

- **TOU Group:** the TOU group used by the map template
- **Default TOU:** the default TOU for the map template (from the TOU Group). This is the TOU used when creating TOU map data for dates not accounted for in the TOU Schedules section.
- **Work Calendar:** the work calendar associated with the map template. Work calendars define the days of the week on which work is performed, and specify holidays.
- **Holiday TOU:** the TOU used for holidays (from the TOU Group)
- **Holiday Template:** the TOU map template used for holidays (if applicable)
- **Interval Size:** the size of the intervals for TOU map data created from the map template, represented as hours:minutes:seconds (HH:MI:SS).
- **TOU Schedules:** date ranges (including month, day, and time ranges) and which TOUs should be used during each.

TOU Map Types

TOU Map Types define important properties of TOU maps of the type, including the interval size (SPI) and the valid TOU map templates.

Attributes used to define TOU map types include the following:

- **Time Zone:** the time zone in which TOU maps of this type are applicable
- **Interval Size:** the size of the intervals for TOU map data created from maps of this type, represented as hours:minutes:seconds (HH:MI:SS).
- **Default TOU Map Template:** the default TOU map template used by maps of this type
- **Override TOU Map Templates:** one or more TOU map templates that can be used as an override on TOU maps of this type.

Usage Subscription Types

Usage Subscription Types define a collection of properties defining a class of usage subscriptions. Usage subscription types also control valid values for various attributes of usage subscriptions.

Attributes used to define usage subscription types include the following:

- **Service Provider:** The service provider for usage subscriptions of this type
- **Valid Service Point Types:** One or more service point types considered valid for usage subscriptions of this type
- **Valid Service Providers:** One or more service providers considered valid for usage subscriptions of this type
- **Valid Usage Groups:** One or more usage groups considered valid for usage subscriptions of this type
- **Fallback Usage Groups:** One or more fallback usage groups for usage subscriptions of this type. Fallback usage groups are used in the event that a usage group defined for a usage subscription is not in effect at the time usage is to be calculated.

Usage Groups

Usage groups are collections of usage rules that are applied to measurement data to calculate bill determinants for usage subscriptions.

Usage groups are associated with specific usage subscriptions and usage subscription types (or both). When assigned to usage subscriptions, usage groups contain the usage rules to be used to calculate usage and bill determinants. Usage groups associated with usage subscription types are those groups considered valid for usage subscriptions of that type.

Usage groups can also specify a list of device configuration types that are considered valid. Usage groups should only be associated with usage subscriptions for service points related to device configurations of a valid device configuration type.

Usage Rules

Usage rules are standard and custom rules that perform calculations on measurement data to generate bill determinants and other values used by external systems, such as billing systems, customer information systems, etc.

Usage rules are created for a specific usage group. For example, if you were configuring two usage groups and both included a specific usage rule, you would need to create two instances of the usage rule, one for each group.

Attributes used to define usage rules typically include the following:

- **Basic Information:** Basic information about the usage rule, including its name and description, the usage group to which the rule belongs, the sequence of the rule within the group, and the usage rule category. This information is standard for most usage rules.
- **Parameters:** The parameters used by the rule. Parameters are specific to each rule.

Usage Rule Eligibility Criteria

Usage rule eligibility criteria are user-definable conditions that could cause a given usage rule to be applied or skipped. This can involve the evaluation of some attribute of the usage subscription or service point, or something else entirely.

A usage rule can have multiple eligibility criteria for determining if the rule should be applied or skipped, based on a user-defined sequence.

Admin Setup Reference Tables

This section lists and describes all objects that must be defined as part of the setup process for Oracle Utilities Meter Data Management. It identifies the order in which objects should be defined and any prerequisites for setup.

Note: All basic Framework setup, including system and database setup and any modifications or extensions to base business objects, must have been completed before beginning setup tasks for Oracle Utilities Meter Data Management. See the Framework documentation for more information.

Setup Sequence

In the setup tables that follow, the **Sequence** column displays the following codes:

L1 = Object has no setup prerequisites and should be defined before L2-L6 objects.

L2 = Object has some L1 prerequisites and should be defined after all L1 objects have been defined and before L3 objects.

L3 = Object should be defined after all L1 and L2 objects have been defined.

L4 = Object should be defined after all L1, L2, and L3 objects have been defined.

L5 = Object should be defined after all L1, L2, L3, and L4 objects have been defined.

Administration Setup and Maintenance

To access the maintenance portals for the objects in this section, do one of the following:

- If you are using functional menus, select **Admin Menu**>[*Functional Menu*]>[*object name*]
- If you are using alphabetical menus, select Admin Menu>[*object name*]

The [*Functional Menu*] and [*object name*] are provided in the appropriate columns in the following tables.

Application Framework Setup

Seq	Object	Functional Menu	Description	Prerequisites
L1	Country	General	Your organization's country.	None
L1	Currency	Financial	Your organization's native currency.	None
L1	Display Profile	General	Controls how dates, times, and numbers displayed.	None
L1	Language	General	The language to use for this implementation.	None
L1	Time Zone	General	Your organization's base time zone.	None
L1	To Do Role	General	Used to associate users with To Do entries.	None
L1	Work Calendar	General	The work calendar for your organization, which identifies your public holidays	None
L2	Installation Options	System	Control various aspects of the system. Refer to the Installation Options section earlier in this document.	Time Zone, Language, Currency

Seq	Object	Functional Menu	Description	Prerequisites
L2	Master Configuration	System	Enables an implementation to capture various types of information in the system.	
L2	To Do Type	General	Used to define types of To Do Entries	To Do Role
L2	User	Security	Defines a user's user groups, data access roles, portal preferences, default values, and To Do roles	Language, Display Profile, To Do Roles
L2	User Group	Security	A group of users who have the same degree of security access	User

Oracle Utilities Meter Data Management Setup

Seq	Object	Functional Menu	Description	Prerequisites
L1	Activity Type	Communications	Defines properties common to a specific type of activity	None
L1	Contact Type	Customer Information	Defines properties of a class of entities (businesses, persons)	None
L1	Exception Type	Common	Defines properties common to exceptions of a specific type	None
L1	Factor	Common	Centrally stored sets of values for use in validation rules, bill determinants calculations, and other processes	None
L1	Market	Communications	Defines jurisdictions or regulatory environments in which a service point participates	None
L1	Measurement Cycle	Device Installation	Defines the schedule for manual meter reading of devices at service points in that cycle	None
L1	Measurement Cycle Schedule	Device Installation	Define the dates on which devices are scheduled to be read for a given measurement cycle	None
L1	Service Provider	Communications	External entities that serve various roles relative to the application (head-end systems, billing systems, market participants, outage management systems, etc.)	None
L1	Service Quantity Identifier	Common	Used to further distinguish between measured quantities that have identical UOM/TOU combinations	None
L1	Service Type	Common	Defines specific types of service for which usage can be recorded and captured (electric, gas, steam, etc.)	None

Seq	Object	Functional Menu	Description	Prerequisites
L1	Time of Use	Common	Modifiers for a given unit of measure that indicate a period of time during which a quantity has been used (On-Peak, Off-Peak, etc.)	None
L1	VEE Group	VEE Rules	Collections of VEE rules that are applied to initial measurement data	None
L2	Dynamic Option Type	Usage	Defines information common to dynamic options of a specific type	Time Zone
L2	Manufacturer	Device	Individual companies that makes devices. Manufacturers also reference models.	Service Type
L2	TOU Group 2	Usage	Groups of TOUs used to limit the set of TOUs usable in a TOU schedule	Time of Use
L2	Unit of Measure	Common	Quantities measured and recorded by the system (CCF, KWH, KW, etc.)	Service Type
L2	VEE Rule	VEE Rules	Standard and custom VEE rules that perform checking and/or manipulation of initial measurement data	VEE Group, Exception Type
L3	Measuring Component Type*	Device	Defines the most important properties of a measuring component	Factor (Profile), Service Quantity Identifier, Service Type, Time of Use, Unit of Measure, VEE Group
L3	TOU Map Template	Usage	Schedules used for TOU map data generation	TOU Group, Work Calendar
L4	Device Configuration Type	Device	Defines properties of device configurations of a given type	Service Type, Measuring Component Type
L4	Device Type	Device	Defines information about a class of devices	Service Type, Device Configuration Type
L4	TOU Map Type	Usage	Define important properties of TOU maps of the type	Time Zone, TOU Map Template
L4	Usage Group	Usage Rules	Collections of usage rules that are applied to measurement data to calculate bill determinants for usage subscriptions	Device Configuration Type
L5	Service Point Type	Device Installation	Defines specific types of points at which service is delivered	Service Type, Device Type

Seq	Object	Functional Menu	Description	Prerequisites
L5	Usage Rule	Usage Rules	Standard and custom rules that perform calculations on measurement data to generate bill determinants and other values used by external systems	Service Quantity Identifier, Time of Use, Unit of Measure, Usage Group
L5	Usage Subscription Type	Usage	Defines collections of properties defining a class of usage subscriptions	Service Point Type, Service Provider, Usage Group

* Measuring component types also reference other measuring component types, TOU maps, and extendable lookups.

Chapter 4

Devices, Measuring Components, and, Device Configurations

This chapter provides descriptions of devices, device configurations, and measuring components, including:

- Understanding Devices, Measuring Components, and Device Configurations
- Devices In Detail
- Device Configurations In Detail
- Measuring Components In Detail
- Measuring Component Types In Detail
- Configuring Devices, Measuring Components, and Device Configurations

Understanding Devices, Measuring Components, and Device Configurations

This section provides an overview of devices, measuring components, and device configurations, including how they are used in Oracle Utilities meter data framework and Oracle Utilities Meter Data Management.

Devices

Devices are physical or virtual objects that hold one or more measuring components that can produce data to be handled by the system. While most devices are meters, an implementation might set up devices for every asset that measures or monitors resource usage. For example, a device could be set up to record average daily temperature (if temperature plays a part in usage calculations). Examples of devices include meters, substations, transformers, demand response devices, weather stations, etc.

Measuring Components

Measuring components are single points for which data will be received and stored in the system.

Types of Measuring Components

A measuring component can be associated to a physical device, which can have one or more measuring components, or it can be "virtual" or "stand-alone," meaning that it is not associated to a physical device. Oracle Utilities Meter Data Management supports the following types of measuring components:

- **Physical:** Physical measuring components are those that physically exist, and that are linked to a device that can be configured differently over time. Interval channels and scalar registers are examples of physical measuring components.

Note: The terms register and channel are synonyms for measuring component.

- **Standalone:** A standalone measuring component is used to record measurements for something that does not have a physical presence. For example, you might create a standalone measuring component to record the average daily temperature supplied by a weather station.
- **Scratchpad:** User create scratchpad measuring components to experiment with measurement manipulation functions before applying the functions to a physical or standalone measuring component. Examples of measurement manipulation might include experimenting with the impact of executing the "spike smooth" function on an initial measurement, or adding or removing intervals to or from the measurement. Scratchpad measuring components provide users with a means to manipulate "scratchpad" measurement data without affecting existing "live" measurement data.
- **Aggregator:** An aggregator measuring component holds summarized usage from other measuring components. For example, aggregator measuring components could be configured to hold total consumption for each postal code within a service territory.

Scalar vs. Interval

Beyond the four types described above, measuring components generally fall into one of two primary classes of: scalar measuring components, and interval measuring components.

- **Scalar** measuring components are measured at unpredictable intervals. For example, "once-a-month" is not a predictable interval as the amount of time between reads is unpredictable and inconsistent.

Scalar measuring components are typically read manually

- **Interval** measuring components are measured at predictable intervals, such as every 15 minutes, every 30 minutes, every hour, etc.

The term Seconds-per-interval (SPI) is used to define the size of an interval measuring component's intervals.

Note: A device may have any combination of interval and/or scalar measuring components

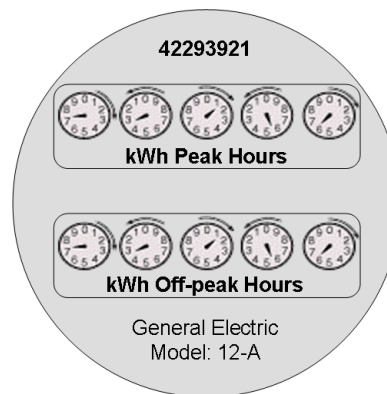
Measuring Component Measurements

Measuring components are configured to measure specific types of quantities. These include:

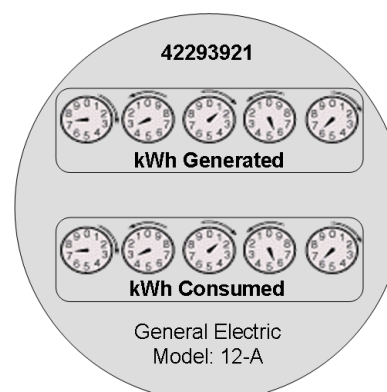
- **Unit of Measure:** The unit of measure for the quantity being recorded. Examples include kilo-watt hours (KWH), kilo-watts (KW), therms, cubic feet (CCF), temperature (Fahrenheit or Celsius), etc.
- **Time of Use:** Modifiers for a given unit of measure that indicate a period of time during which a quantity has been used, such as On-Peak (meaning during a time when the greatest quantity of some consumable is being used), Off-Peak (meaning during a time when the least amount of some consumable is being used), etc.
- **Service Quantity Identifiers:** Used to further distinguish between measured quantities that have identical UOM/TOU combinations, including situations in which the distinguishing identifier of a UOM is not accurately described as a TOU. Generally, SQI is only used when multiple measuring components measure the same thing, but in different ways. A meter that measures both generation KWH and consumption KWH could use SQIs to differentiate between the two.

The combination of UOM, TOU and SQI define what a measuring component measures. TOU and SQI are optional, but UOM must be defined for all measuring components.

For example, consider a meter (as illustrated in the image below) with two measuring components, both measuring the same unit of measure (kWh), but each measuring component measures consumption in different time of use (TOU) periods (peak and off-peak).



Another example might be a meter that records both generated KWH and consumed KWH. This meter would be configured to measure both UOM and SQI.



A measurement is recorded each time a measuring component is measured. This means that for a meter with two measuring components that is read once a month, two measurements, one for each measuring component, would be recorded each month.

Subtractive vs. Consumptive Measurements

Another attribute that defines how measuring components measure quantities is the distinction between subtractive and consumptive measuring components.

A subtractive measuring component's usage is equal to the current measurement (also known as the Stop or End Measurement or Reading) minus the previous measurement (also known as the Start Measurement or Reading). To put this more simply:

$$\text{Usage} = \text{End Measurement} - \text{Start Measurement}$$

Most residential scalar KWH meters are subtractive. The table below lists a series of measurements for a subtractive measuring component.

Date	KWH (Measurement)	Usage
01/01/2010	0	
01/31/2010	1000	1000 KWH
03/02/2010	1789	789 KWH
04/01/2010	2700	911 KWH

A consumptive measuring component's usage is equal to its current measurement. Consumptive measuring components are often used to measure demand, such as KW. The table below lists a series of measurements for a consumptive measuring component.

Date	KW (Measurement)	Usage
01/01/2010	0	
01/31/2010	10	10 KW
03/02/2010	6	6 KW
04/01/2010	5	5 KW

Interval measuring components can also be considered consumptive, in that the consumption value of each individual interval is equal to its measurement.

Interval vs. Scalar Measurements

As noted above, interval measuring components record measurements every interval, defined by the measuring component's SPI (seconds per interval). For interval measuring components, measurements are only allowed on these time boundaries. For example, measurements for an interval measuring component with an SPI of 900 (15 minutes) on January 1, 2010 might be as follows:

Date	Time	KWH
01/01/2010	10:00 AM	0
01/01/2010	10:15 AM	10
01/01/2010	10:30 AM	6
01/01/2010	10:45 AM	5

In contrast to interval measuring components, scalar measuring components are read at unpredictable (and often inconsistent) intervals and are allowed at any point in time. In practice, scalar measuring components are read monthly, bimonthly, quarterly, etc. For example, measurements for an scalar measuring component from January 1, 2010 through April 1, 2010 might be as follows

Date	KWH (Measurement)
01/01/2010	0
01/31/2010	1000
03/02/2010	1789
04/01/2010	2700

Note that interval and scalar measuring components can exist on the single meter. For these types of meters, the scalar measuring component is typically used to verify and validate the interval measurements. For example, the sum of all the interval measurements within a measurement period should equal the scalar measurement for the same period.

Device vs. Measuring Component Attributes

The distinction between attributes used to define devices and measuring components is important when creating devices and measuring components as part of an implementation. For example, if you identify additional attributes you wish to capture, it's import to store those attributes in the most appropriate place.

Devices have attributes that are applicable to the physical object, and that are the same regardless of the number of measuring components on the device. For example:

- The type of device
- Manufacturer and Model
- Serial Number
- Badge Number
- Head-End System (for smart meters)

Measuring components have attributes that may differ for each measuring component on a device, for example:

- The type of measuring component (which in turn defines the measuring component's UOM, TOU, SQI, whether it is scalar or interval (and its SPI), and others
- Channel ID (for interval channel measuring components)
- Channel (or Register) multiplier (a value by which the measured consumption is multiplied to derive usage)
- Validation, Editing, and Estimation groups used when validating initial measurement data for the measuring component.

Device Configurations

A measuring component's attributes can change over time. Device configurations record how a device's measuring components look at an instant in time. A new device configuration is required whenever a device's measuring components are reconfigured. For example, if the register multiplier on a measuring component changes as of June 1, 2010, the device would require a new device configurations dated 1-Jun-2010 to reflect the change.

Note that device configurations don't typically capture the changed information, but instead indicate that changes of some sort have taken place on one or more of the device's measuring components.

Devices In Detail

This section provides details concerning the device 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 custom devices you create as part of your implementation. This section includes:

- A description of the D1-DEVICE maintenance object
- Lists of the base package device business objects, including “lite” business objects
- Details concerning device-specific configuration options
- A sample device business object (D1-SmartMeter)

Maintenance Object - D1-DEVICE

Device business objects use the D1-DEVICE maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-DEVICE
Description	Device
Service Name	D1-DEVICE (Device Maintenance)
Tables	<ul style="list-style-type: none">• D1_DVC (Device) - Primary• D1_DVC_CHAR (Device Characteristics) - Child• D1_DVC_IDENTIFIER (Device Identifier) - Child• D1_DVC_LOG (Device Log) - Child• D1_DVC_LOG_PARM (Device Log Parameter) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following device business objects:

Business Object Name	Description
D1-ManualMeter	Manual Meter
D1-SmartMeter	Smart Meter

The base package includes the following “lite” device business objects:

Business Object Name	Description
D1-DeviceLite	Device Lite
D1-DeviceIdentifierLite	Device Identifiers

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by device business objects.

Business Object Options

Device business objects can make use of the following business object options:

- **Install Event BO:** This option identifies the install event business object to use when installing device configurations for devices defined by this business object.

For example, for the D1-SmartMeter device, this option is set to D1-SmartMeterInstallEvent, meaning that any time a device configuration for the D1- SmartMeter device is installed, the install event business object used will be D1-SmartMeterInstallEvent.

Example Device - D1-SmartMeter

This section lists some of the details of the D1-SmartMeter device business object.

Option/Field	Description
Business Object	D1-SmartMeter
Description	Smart Meter
Maintenance Object	D1-DEVICE (Device)
Application Service	D1-SMARTMTRBOAS (Smart Meter BO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none">• Install Event BO: D1-SmartMeterInstallEvent (Smart Meter Installation Event)• Display UI Map: D1-SmartMeterDisplay (Smart Meter - Display)• Portal Navigation Option: d1dvcTabMenu (Device)• Display Map Service Script: D1-RtSmMtrDs (Smart Meter - Retrieve Details for Display)• Maintenance UI Map: D1-SmartMeterMaint (Smart Meter - Maintenance)
Algorithms	<ul style="list-style-type: none">• Information: D1-SMARTINFO (Smart Meter Information)• Validation: D1-VALRETDT (Validate Device Retirement Date)
Lifecycle	<ul style="list-style-type: none">• Active (Initial)• Retired (Final)

Use the Business Object portal to view additional details concerning this business object.

Device Configurations In Detail

This section provides details concerning the device configurations 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 custom device configurations you create as part of your implementation. This section includes:

- A description of the D1-DVCCONFIG maintenance object
- Lists of the base package device configuration business objects, including “lite” business objects
- A sample device configuration business object (D1-DeviceConfiguration)

Maintenance Object - D1-DVCCONFIG

Device configuration business objects use the D1-DVCCONFIG maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-DVCCONFIG
Description	Device Configuration
Service Name	D1-DVCCONFIG (Device Configuration Maintenance)
Tables	<ul style="list-style-type: none"> • D1_DVC_CFG (Device Configuration) - Primary • D1_DVC_CFG_CHAR (Device Configuration Characteristics - Child • D1_DVC_CFG_LOG (Device Configuration Log) - Child • D1_DVC_CFG_LOG_PARM (Device Configuration Log Parameter) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Device Configuration Business Objects

The base package includes the following device configuration business objects:

Business Object Name	Description
D1-DeviceConfiguration	Device Configuration

The base package includes the following “lite” device configuration business objects:

Business Object Name	Description
D1-DeviceConfigurationLite	Device Configuration Lite

Example Device Configuration - D1-DeviceConfiguration

The table below lists the details of the D1-DeviceConfiguration device configuration business object.

Option	Description
Business Object	D1-DeviceConfiguration
Description	Device Configuration
Maintenance Object	D1-DVCCONFIG (Device Configuration)
Application Service	D1-DVCCONFIGBOAS (Device Configuration BO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> Display UI Map: D1-DeviceConfigDisplay (Device Configuration- Display) Portal Navigation Option: d1dvcfgTabMenu (Device Configuration) Display Map Service Script: D1-D1-RtDvcCfgD (Device Configuration - Retrieve Details for Display) Maintenance UI Map: D1-DeviceConfigMaint (Device Configuration- Maintenance)
Algorithms	<ul style="list-style-type: none"> Information: D1-DVCOINFO (Device Configuration Information) Pre-Processing: D1-DELMC (Delete Associated Measuring Components) Pre-Processing: D1-DEFTIMZON (Default Time Zone value based on Installation Option) Validation: D1-INSTDCVAL (Earlier Installed Device Configuration) Validation: D1-VALTIMZON (Validates BO Time Zone value against Installation Option)
Lifecycle	<ul style="list-style-type: none"> Pending (Initial) Active (Final)

Use the Business Object portal to view additional details concerning this business object.

Measuring Component Types In Detail

This section provides details concerning the measuring component type 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 custom measuring component type objects you create as part of your implementation. This section includes:

- A description of the D1-MCTYPE maintenance object
- Lists of the base package measuring component type business objects, including “lite” business objects
- Details concerning measuring component type-specific configuration options
- A sample measuring component type business object (D1-IntervalChannelTypePhysical)

Maintenance Object - D1-MCTYPE

Measuring component type business objects use the D1-MCTYPE maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-MCTYPE
Description	Measuring Component Type
Service Name	D1-MCTYPE (Measuring Component Type Maintenance)
Tables	<ul style="list-style-type: none"> • D1_MEASR_COMP_TYPE (Measuring Component Type) - Primary • D1_MC_TYPE_VALUE_IDENTIFIER (Measuring Component Type Value Identifier) - Child • D1_MEASR_COMP_TYPE_CHAR (Measuring Component Type Characteristics) - Child • D1_MEASR_COMP_TYPE_VEE_GROUP (Measuring Component Type VEE Group) - Child • D1_MEASR_COMP_TYPE_FBK_VEE_GROUP (Measuring Component Type Fallback VEE Grp) - Child • D1_MEASR_COMP_TYPE_L (Measuring Component Type Language) - Child • D1_MC_TYPE_VALUE_IDENTIFIER_L (MC Type Value Identifier Language) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following measuring component type business objects:

Business Object Name	Description
D1-GenericMCType	Generic MC Type
D1-IntervalChannelTypePhysical	Interval Channel Type - Physical
D1-IntervalChannelTypeScratchp	Interval Channel Type - Scratchpad
D1-RegisterTypePhysical	Register Type
D2-MCTypeScratchPads	Measuring Component Type Scratchpads

The base package includes the following “lite” measuring component type business objects:

Business Object Name	Description
D1-MCTypeLite	MC Type Lite
D2-MCTypeLite1	Measuring Component Type Lite

The base package includes the following additional measuring component type business objects:

Business Object Name	Description
D1-MeasuringCompTypeBundlingBO	Bundling BO for Measuring Component Type
D1-MeasuringCompTypePhysicalBO	Physical BO for Measuring Component Type
D2-MCTypeEligibleProfileFactor	Measuring Component Type Profile Factors (Used to read the eligible profile factors of a measuring component type)
D2-ScalarMCTypeProfileFactors	Measuring Component Type Profile Factors (Used to read the eligible profile factors to convert scalar to interval.)

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by measuring component type business objects.

System Events

Measuring component type business objects can make use of the following system events:

- **Calculate Interval Consumption:** This system event defines the algorithm used to calculate interval consumption for measuring components based on this measuring component type.
- **Calculate Scalar Consumption:** This system event defines the algorithm used to calculate scalar consumption for measuring components based of this type.

Other Options

Measuring component types define many attributes of the measuring components of that type. These options are specified when creating measuring components based on a measuring component business object, and include the following:

Value Identifiers

Value identifiers store the values of UOM, TOU, and SQI that identify the measured amounts for measuring components of this type. Value identifiers specify the quantities stored on the measurement records for measuring components of this type.

Value identifiers must also specify a Value Derivation Algorithm based on the D1-DERIVAQTY Algorithm Type (Derive a quantity using a formula). This algorithm is used to derive measurement elements by applying a formula to calculate a value.

VEE Groups (Valid and Fallback)

VEE Groups define the validation, editing, and estimation rules to be applied to initial measurement data for measuring components of this type.

- **Valid VEE Groups:** These define the VEE groups considered valid for measuring components of this type.
- **Fallback VEE Groups:** These define default VEE groups that can be used with all measuring components of this type. This alleviates the need to specify the same VEE groups on multiple measuring components of the same type. Each VEE group is designated a VEE group role that indicates when and how the VEE group is used (for initial load, manual override, or estimation).

Profile Factors

Profile factors are factors of type profile used when displaying initial measurement data on the Measuring Component portal of the 360 Degree View. Measuring component types reference the following types of profile factors:

- **Eligible Profile Factors (interval only):** These define the profile factors that are considered to be eligible for interval measuring components of this type. You can also specify one or more profile factors as a default.
- **Valid Profile Factors for Conversion from Scalar to Interval (scalar only):** These define the profile factors that are considered to be eligible for scalar measuring components of this type when converting scalar measurements to interval measurements. You can also specify one or more profile factors as a default.

Valid Scratchpad Measuring Component Types

These define the scratchpad measuring component types considered valid for measuring components of this type.

Display Properties

Measuring component types reference the following display properties:

- **Event Bar Profiles:** used when displaying measurement data for measuring components of this type. Event bar profiles are business objects defined as values for the “360 View Event Bar Profile” extendable lookup (D1-360EventBarProfile).
- **Final Values Overlay Profiles:** This display option is used when displaying final measurement data for measuring components of this type. Final values overlay profiles are business objects defined as values for the “Final Values Overlay Profile” extendable lookup (D1-FinalValuesOverlayProfile).

Example Measuring Component Type - D1-IntervalChannelTypePhysical

The table below lists the details of the D1-IntervalChannelTypePhysical measuring component type business object.

Option	Description
Business Object	D1-IntervalChannelTypePhysical
Description	Interval Channel Type - Physical
Maintenance Object	D1-MCTYPE (Measuring Component Type)
Application Service	D1-MCTYPE (Measuring Component Type MO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> Display UI Map: D1-IntervalChannelTypeDisplay (Interval Channel Type - Display) Portal Navigation Option: d1mctypeTabMenu (Measuring Component Type) Maintenance UI Map: D1-IntervalChannelTypeMaint (Interval Channel Type - Maintenance)
Algorithms	<ul style="list-style-type: none"> Calculate Interval Consumption: D1-IN-CNSUMP (Calculate Interval Consumption) Calculate Scalar Consumption: D1-SC-CNSUMP (Calculate Scalar Consumption) Validation: D1-INTSCRVAL (Validate List of Scratchpad Measuring Component Types) Validation: D1-DEFTOUVAL (Validate Interval Size of TOU Map for Display) Validation: D1-ELPRFTVAL (Validate Factors for Eligible Profile Factors) Validation: D1-FNVALOVAL (Validate Final Values Overlay Profiles) Validation: D1-EVTBARVAL (Validate Event Bar Profiles)

Use the Business Object portal to view additional details concerning this business object.

Measuring Components In Detail

This section provides details concerning the measuring components 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 custom measuring components you create as part of your implementation. This section includes:

- A description of the D1-MEASRCOMP maintenance object
- Lists of the base package measuring component business objects, including “lite” business objects
- Details concerning measuring component-specific configuration options
- A sample measuring component business object (D1-IntervalChannel)
- Lists of base package measurement functions including the BPA Script, Service Script, and a brief description of each

Maintenance Object - D1-MEASRCOMP

Measuring component business objects use the D1-MEASRCOMP maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-MEASRCOMP
Description	Measuring Component
Service Name	D1-MEASRCOMP (Measuring Component Maintenance)
Tables	<ul style="list-style-type: none"> • D1_MEASR_COMP (Measuring Component) - Primary • D1_MEASR_COMP_CHAR (Measuring Component Characteristics - Child • D1_MEASR_COMP_LOG (Measuring Component Log) - Child • D1_MEASR_COMP_LOG_PARM (Measuring Component Log Parameter) - Child • D1_MEASR_COMP_REL (Related Measuring Component • D1_MEASR_COMP_VEE_GROUP (Measuring Component VEE Group)

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following measuring component business objects:

Business Object Name	Description
D1-IntervalChannel	Interval Channel
D1-IntervalScratchpad	Interval Scratchpad
D1-Register	Register

The base package includes the following “lite” measuring component business objects:

Business Object Name	Description
D1-MCLite	MC Lite
D2-MCLite1	Measuring Component Attributes

The base package includes the following additional measuring component business objects:

Business Object Name	Description
D2-ConsumptionReferenceMC	Consumption Reference Measuring Component (Used to read the consumption reference measuring component associated with interval measuring components)
D2-RelatedMC	Related Measuring Components (Used to read the related measuring components of a measuring component)

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by measuring component business objects.

Business Object Options

Measuring component business objects can make use of the following business object options:

- **Estimation Initial Measurement Data BO:** This option identifies the initial measurement data business object to use when creating new “estimation” type initial measurement data for the measuring component.

For example, for the D1-IntervalChannel measuring component business object, this option is set to D1-EstimationIMDInterval, meaning that new “estimation” type initial measurement data for measuring components based on the D1-IntervalChannel business object would use the D1-EstimationIMDInterval business object.

- **Interval Initial Measurement Function:** This option defines the BPA Script used to apply a function to an interval initial measurement curve on the Initial Measurement Lens zone of the Initial Measurement portal. This option can be defined multiple times for the same measuring component.
- **Manual Override IMD BO:** This option identifies the initial measurement data business object to use when creating new “manual” type initial measurement data for the measuring component.

For example, for the D1-IntervalChannel measuring component business object, this option is set to D1-ManualIMDInterval, meaning that new “manual” type initial measurement data for measuring components based on the D1-IntervalChannel business object would use the D1-ManualIMDInterval business object.

- **Measuring Component Consumption Function:** This option defines the BPA Script used to apply a function to the measuring component's consumption on the zones of the Measuring Component portal in the 360 Degree View. This option can be defined multiple times for the same measuring component.

System Events

Measuring component business objects can make use of the following system events:

- **Find Constituent Measuring Components:** This system event defines the algorithm to use to identify constituent measuring components related to an aggregator measuring component. (An aggregator’s constituent measuring components are the individual measuring components whose measurement data is aggregated when creating aggregation measurement data).

Example Measuring Component - D1-IntervalChannel

The table below lists the details of the D1-IntervalChannel measuring component business object.

Option	Description
Business Object	D1-IntervalChannel
Description	Interval Channel
Maintenance Object	D1-MEASRCOMP (Measuring Component)
Application Service	D1-MEASURINGCOMP (Measuring Component MO)
Instance Control	Allow New Instances

Option	Description
Options	<ul style="list-style-type: none"> • Estimation Initial Measurement Data BO: D1-EstimationIMDInterval (Estimation IMD (Interval)) • Manual Override IMD BO: D1-ManualIMDInterval (Manual IMD (Interval)) • Measuring Component Consumption Functions: <ul style="list-style-type: none"> • D2-CScIntFnc (Create Scratchpad) • D2-IETExc (Export to Excel) • D2-NewIntFnc (New Reading) • D2-OvrIntFnc (Create/Override) • D2-RedValFnc (Rederive Values) • D2-SAsIntFnc (Save As) • Interval Initial Measurement Functions: <ul style="list-style-type: none"> • D2-AdjMathF (Adjust Intervals Using Math) • D2-AdjScalF (Adjust Intervals to Scalar Quantity) • D2-IIMDSAsF (Save As) • D2-InsIntF (Insert Intervals) • D2-RemIntF (Remove Intervals) • D2-SetCondsF (Set Conditions) • D2-ShiftIntF (Shift Intervals) • D2-SmoSpikeF (Smooth Spikes) • Display UI Map: D1-IntervalChannelDisplay (Interval Channel - Display) • Portal Navigation Option: d1mcTabMenu (Measuring Component) • Display Map Service Script: D1-RtMcIcChs (Interval Channel - Retrieve Details for Display) • Maintenance UI Map: D1-IntervalChannelMaint (Interval Channel - Maintenance)
Algorithms	<ul style="list-style-type: none"> • Information: D1-SMTMCINFO (Measuring Component for Smart Devices - Information) • Pre-Processing: D1-DIMDCPRE (Delete Initial Measurement Data of Measuring Component) • Validation: D1-RELMCCVAL (Validate Consumption Reference Measuring Component) • Validation: D1-INTMCVAL (Check if Measuring Component's Type is Interval)

Use the Business Object portal to view additional details concerning this business object.

Base Package Interval Initial Measurement Functions

The following table lists the back package interval initial measurement functions. Each of these functions is implemented as a BPA Script and corresponding Service Script.

Function	BPA Script	Service Script	Description
Adjust Intervals to Scalar Quantity	D2-AdjScalF	D2-AdjScalS	Adjusts all interval values within a user-defined time period in an interval measurement such that the total of all interval values equals a user-defined scalar quantity.
Adjust Intervals Using Math	D2-AdjMathF	D2-AdjMathS	Adjusts all interval values within a user-defined time period using math operations (add, subtract, multiply, or divide).
Insert Intervals	D2-InsIntF	D2-InsIntS	Inserts intervals into initial measurement data.
Remove Intervals	D2-RemIntFnc	D2-RemIntBck	Removes intervals from initial measurement data
Set Conditions	D2-SetCondsF	D2-SetCondsS	Sets condition codes within initial measurement data. Condition codes indicate the circumstances (estimated, missing, etc.) of individual measurements. Condition codes are assigned to both scalar and interval measurement data both for initial measurement data and final measurements.
Shift Intervals	D2-ShfIntFnc	D2-ShfIntBck	Shifts intervals of initial measurement data to a new start date and time.
Smooth Spikes	D2-SmSpkFnc	D2-SmoSpikeS	Reduces "spike" intervals (intervals with values that are more than a user-defined percentage higher than other intervals within the initial measurement data).

Use the Script portal to view more details about these functions. The scripts listed above use a set of base package measurement services. See **Appendix A: Measurement Services** for a list of available base package measurement services.

Base Package Measuring Component Consumption Functions

The following table lists the back package interval initial measurement functions. Each of these functions is implemented as a BPA Script and corresponding Service Script.

Function	BPA Script	Service Script	Description
Create Scratchpad	D2-CScIntFnc	D2-CScIntBck	Creates a scratchpad measuring component along with new initial measurement data by copying all or some of the final measurements from the measuring component displayed in the zone.
Convert Scalar to Interval Function	D2-CnvSTIFnc	D2-CnvSTIBck	
Create / Override	D2-OvrIntFnc D2-OvrScaFnc	D2-OvrIntBck D2-OvrScaBck	Creates new initial measurement data for a selected measuring component for all or part of a selected time period. This function can either copy existing final measurements or create new measurement data for the initial measurement it creates.
Export to Excel	D2-IETxc D2-ScaETxc		Exports measurement data to a comma-separated values spreadsheet
New Reading	D2-NewIntFnc D2-NewScaFnc	D2-NewIntBck D2-NewScaBck	Creates a new initial measurement reading (interval or scalar) for the measuring component.
Rederive Values	D2-RedValFnc	D2-RederVal	Rederives the measurement's values displayed in the zone.
Rederive Scalar Values:	D2-SRedVaFnc	D2-SRederVal	Rederives the measurement's values displayed in the zone.
Save As	D2-SAsIntFnc	D2-SAsIntBck	Creates new initial measurement data for a measuring component other than that being displayed by copying all or some of the final measurements shown in the zone.

Use the Script portal to view more details about these functions. The scripts listed above use a set of base package measurement services. See **Appendix A: Measurement Services** for a list of available base package measurement services.

Configuring Devices, Measuring Components, and Device Configurations

This section provides high-level overviews of the steps involved in configuring custom devices, device configurations, measuring component types, and measuring components. See **Configuration Process Overview** on page 1-8 for a high-level overview of the overall configuration process.

Note: The procedures below focus on specific configuration tasks and options related to each of the objects described in this chapter, and do not address all the steps involved in creating business objects and other configuration objects. For more information about these subjects, refer to the Oracle Utilities Application Framework documentation.

Configuring Custom Devices

Configuring custom devices involves the following steps:

1. Design the device business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom device-related configuration objects required for your business objects, including:
Business Object Options: Create business objects for the following business object options:
 - Install Event BO
3. Create your device business objects, referencing the configuration objects created above as appropriate.
4. Set up admin records that define the device types you will use in your implementation.

Configuring Custom Device Configurations

Configuring custom device configurations involves the following steps:

1. Design the device configuration business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom device configuration-related configuration objects required for your business objects.
3. Create your device configuration business objects, referencing the configuration objects created above as appropriate.
4. Set up admin records that define the device configuration types you will use in your implementation.

Configuring Custom Measuring Component Types

Configuring custom measuring component types involves the following steps:

1. Design the measuring component type business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom measuring component type-related configuration objects required for your business objects, including:
System Events: Create algorithms for the following system events:
 - Calculate Interval Consumption (for interval and scalar measuring component types)
 - Calculate Scalar Consumption (for scalar measuring component types)

Options: Create data as appropriate for the following options used when creating measuring component types:

- Value Identifiers: Value Derivation Algorithms (based on the D1-DERIVAQTY Algorithm Type)
 - VEE Groups
 - Profile Factors
 - Scratchpad Measuring Component Types
 - Display Properties:
 - Event Bar Profiles: Values for the D1-360EventBarProfile extendable lookup
 - Final Values Overlay Profiles: Values for the D1-FinalValuesOverlayProfile extendable lookup.
3. Create your measuring component type business objects, referencing the configuration objects created above as appropriate.
 4. Set up admin records that define the measuring component types you will use in your implementation.

Configuring Custom Measuring Components

Configuring custom measuring components involves the following steps:

1. Design the measuring component business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom measuring component-related configuration objects required for your business objects, including:

Business Object Options: Create business objects and algorithms for the following business object options:

- Estimation Initial Measurement Data BO
 - Interval Initial Measurement Function
 - Manual Override IMD BO
 - Measuring Component Consumption Function
3. Create your measuring component business objects, referencing the configuration objects created above as appropriate.

Chapter 5

Service Points and Device Installation

This chapter provides descriptions of entities related to installation of meters, including service points, contacts, install events, activities, and other entities. This chapter includes:

- **Understanding Service Points Device Installation**
- **Service Points in Detail**
- **Contacts in Detail**
- **Install Events in Detail**
- **Service Providers in Detail**
- **Processing Methods in Detail**
- **Activities in Detail**
- **Configuring Service Point and Device Installation Objects**

Understanding Service Points Device Installation

This section provides an overview of entities related to the installation of devices (service points, contacts, install events, service providers, and others) how they are used in Oracle Utilities meter data framework and Oracle Utilities Meter Data Management.

Service Points

Service points are physical locations at which a company supplies service. Devices are installed at service points. The relationship between individual service points and devices can change over time. For example, at any point in time:

- A service point may have a single device installed (or no device may be installed)
- A device may be installed at a single service point (or it may not be installed at a service points)

Over time:

- Different devices may be installed at a service point
- A device may be installed at different service points

An Aside: No Premise Object Exists

Oracle Utilities Meter Data Management (and other related meter data products) is not the system of record for premises or service points. The customer information system (or some other system) is considered the system of record for this type of information. In order to minimize the amount of data that needs to be synchronized, premise-oriented attributes used by meter data products are held on service points. This is an important distinction to keep in mind when creating custom service points for your implementation.

Contacts

Contacts are individuals or business entities with which a company has contact. Service points can have associated contacts which define the individual or business entity that uses the service (electricity, gas, water, etc.) delivered at the service point. Note that while contacts are optional for service points, usage subscriptions must reference contacts.

Note: The base-package name search on the 360° Search looks for usage subscription-related contacts. Use the Service Point Query portal to find a service point using a service point-related contact.

Installation Events

Whenever a device is installed at a service point, an installation event is created. Installation events capture the history of the devices that have been installed at a service point. This allows consumption for a service point to be calculated over time. In technical terms, installation events (or install events) link a specific device configuration to a service point.

While a device is installed at a service point, it may be turned off (and back on again). The installation event that records the original installation date and time also records the dates and times when the device has been turned on and off. When a device is removed, the original installation event is updated with the removal date and time.

Service Providers

Service providers are external entities that serve various roles relative to the application. These can include 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.

Service providers can have one or more associated processing methods that define the format or means by which a service provider receives data from the application, such as bill determinants, interval data, or meter events. Processing methods are also used to define how to create information internal to the application such as initial measurement data and usage transactions. Processing methods can also be used to define the information an external system wishes to subscribe to receive from our application.

Service Providers as Head-End Systems

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

As noted above, head-end systems are defined as service providers. Head-end systems utilize a processing method that specifies the type of initial measurement data to create for devices (and their related measuring components) based on measuring component type.

Service Providers in Deregulated Markets

Some utilities operate in deregulated markets. In implementations in deregulated markets, the system can send information to and receive information from a variety of market entities. These entities are defined as service providers.

For example, a service point's distribution company and/or energy supply company may subscribe to its consumption, or a service point's meter service provider may send requests to ping the meter that's installed at the service point to verify connectivity between the meter and its head-end system.

Different Relationship Types In Different Markets

Each market can define different relationship types between its service providers. A single instance of Oracle Utilities Meter Data Management may have service points in different markets where each market has different relationship types and service providers. For example:

- In a regulated market the distribution company is the de facto energy supplier and meter service provider.
- Another market might have two relationship types and a single service provider for each relationship:
 4. There is a single energy supply company for the entire market
 5. There is a single meter service provider for the entire market
- Yet another market might have two relationship types (energy supply and meter service). In this market, there might be multiple service providers for each relationship type. Each service point can choose any of the relationship type's service providers. If a service point does not declare a specific service provider for a given relationship type, the relationship type's "fallback" service provider is assumed.

Measurement Cycles

Measurement cycles define the schedule for manual meter reading of devices at service points. More specifically:

- A **measurement cycle** defines WHEN the service point is visited
- A **route** within a cycle defines a group of service points in a cycle that are visited by a meter reader
- A **sequence** within a route defines the physical position of the SP within a route

If the system is configured to periodically push bill determinants to subscribing systems, measurement cycles can be configured to define when to create usage transactions for usage subscriptions associated to service points in the cycle. In this case, even service points whose meters are read automatically may reference measurement cycles.

Activities

Activities are records of a communication related to a device, measuring component, or other entity in the system. Examples of activities include meter read downloads (for manually read meters) or “last gasp” messages sent by devices when they detect they are about to power down. Activities are used more extensively in Oracle Utilities Smart Grid Gateway to record meter commands such as a meter ping, meter connect, or on demand meter reading.

Service Points in Detail

This section provides details concerning the service point 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 custom service point objects you create as part of your implementation. This section includes:

- A description of the D1-SP maintenance object
- Lists of the base package service point business objects, including “lite” business objects
- Details concerning service point-specific configuration options
- A sample service point business object (D1-ServicePoint)

Maintenance Object - D1-SP

Service point business objects use the D1-SP maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-SP
Description	Service Point
Service Name	D1-SP (Service Point Maintenance)
Tables	<ul style="list-style-type: none"> • D1_SP (Service Point) - Primary • D1_SP_CHAR (Service Point Characteristics) - Child • D1_SP_CONTACT (Service Point Contact) - Child • D1_SP_IDENTIFIER (Service Point Identifier) - Child • D1_SP_LOG (Service Point Log) - Child • D1_SP_LOG_PARM (Service Point Log Parameter) - Child • D1_SP_MKT_PARTICIPANT (Service Point Market Participant) - Child • D1_SP_REL (Service Point Relationship) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following service point business objects:

Business Object Name	Description
D1-ServicePoint	Service Point

The base package includes the following “lite” service point business objects:

Business Object Name	Description
D1-SPLite	Service Point Lite
D2-SPLite1	Service Point Time Zone

The base package includes the following additional service point business objects:

Business Object Name	Description
D2-SPMainContact	Service Point's Main Contact (Used to retrieve the main contact of a service point)

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by service point business objects.

System Events

Service point type business objects can make use of the following system events:

- **Process Measurement Cycle:** This system event specifies the algorithm invoked by the Process Measurement Cycle Schedule batch process. This batch process looks for measurement cycle routes that are scheduled to be processed and populates them on the measurement cycle schedule. Once the schedule is prepared, the batch process invokes this algorithm for each device in every route that is ready for processing. The Algorithm Entity for these algorithms is “Service Point (BO) - Process Measurement Cycle.” The base package provides the following algorithm types/algorithms for use with this system event:

Algorithm Type / Algorithm	Description
D1-CRMRDACT	Create Meter Read Download Activity (Creates a meter read download activity for a service point. The service point must have a measurement cycle and route whose schedule indicates a schedule type of “Meter Read Download”)
D2-CRUSGTRN	Create Usage Transaction (Creates a usage transaction for every active usage subscription linked to the service point. The business object used to create the usage transaction is determined from the processing method of the usage subscription's service provider.)

Use the Algorithm Type / Algorithm portal and the Application Viewer to view more details about these algorithms and algorithm types.

Example Service Point - D1-ServicePoint

The table below lists the details of the D1-ServicePoint service point business object.

Option	Description
Business Object	D1-ServicePoint
Description	Service Point
Maintenance Object	D1-SP (Service Point)
Application Service	D1-SPBOAS (Service Point BO)
Instance Control	Allow New Instances

Option	Description
Options	<ul style="list-style-type: none"> • Display UI Map: D1-SPDisplay (Service Point - Display) • Portal Navigation Option: d1spTabMenu (Service Point) • Pre-Processing Service Script: D1-SPMtnPre (Service Point Maintenance Pre-Processing) • Display Map Service Script: D1-SPRetDts (Service Point - Retrieve Details for Display) • Maintenance UI Map: D1-SPMaint (Service Point - Maintenance)
Algorithms	<ul style="list-style-type: none"> • Information: D1-SPINFO (Service Point Information) • Pre-Processing: D1-DEFTIMZON (Default Time Zone Value based on Installation Option) • Validation: D1-SPADDRVAL (Validate Service Point's Address Information) • Validation: D1-MSCYCVAL (Validate Service Point's Measurement Cycle Information) • Validation: D1-VALTIMZON (Validate BO Time Zone Against Installation Option)
Lifecycle	<ul style="list-style-type: none"> • Active (Initial) • Inactive (Final)

Use the Business Object portal to view additional details concerning this business object.

Contacts in Detail

This section provides details concerning the contact 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 custom contact objects you create as part of your implementation. This section includes:

- A description of the D1-CONTACT maintenance object
- Lists of the base package contact business objects
- A sample contact business object (D1-Business)

Maintenance Object - D1-CONTACT

Contact business objects use the D1-CONTACT maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-CONTACT
Description	Contact
Service Name	D1-CONTACT (Contact Maintenance)
Tables	<ul style="list-style-type: none">• D1_CONTACT (Contact) - Primary• D1_CONTACT_CHAR (Contact Characteristics) - Child• D1_CONTACT_EMAIL (Contact Email) - Child• D1_CONTACT_IDENTIFIER (Contact Identifier) - Child• D1_CONTACT_NAME (Contact Name) - Child• D1_CONTACT_PHONE (Contact Phone) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following contact business objects:

Business Object Name	Description
D1-Business	Business
D1-Person	Person

Example Contact - D1-Business

The table below lists the details of the D1-Business contact business object.

Option	Description
Business Object	D1-Business
Description	Business
Maintenance Object	D1-CONTACT (Contact)

Option	Description
Application Service	D1-CONTACT (Contact MO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none">• Display UI Map: D1-BusinessDisplay (Business - Display)• Portal Navigation Option: d1contctTabMenu (Contact)• Display Map Service Script: D1-RtBusDtl (Contact - Retrieve Details for Display)• Maintenance UI Map: D1-BusinessMaint (Business - Maintenance)
Algorithms	<ul style="list-style-type: none">• Information: D1-BUS-INFO (Business Contact - Information)

Use the Business Object portal to view additional details concerning this business object.

Install Events in Detail

This section provides details concerning the install event 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 custom install event objects you create as part of your implementation. This section includes:

- A description of the D1-INSTLEVT maintenance object
- Lists of the base package install event business objects, including “lite” business objects
- A sample install event business object (D1-SmartMeterInstallEvent)

Maintenance Object - D1-INSTLEVT

Install event business objects use the D1-INSTLEVT maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-INSTLEVT
Description	Install Event
Service Name	D1-INSTLEVT (Install Event Maintenance)
Tables	<ul style="list-style-type: none">• D1_INSTLEVT (Install Event) - Primary• D1_INSTLEVT_CHAR (Install Event Characteristics) - Child• D1_INSTLEVT_LOG (Install Event Log) - Child• D1_INSTLEVT_LOG_PARM (Install Event Log Parameter) - Child• D1_ON_OFF_HIST (On/Off History) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following install event business objects:

Business Object Name	Description
D1-ManualMeterInstallEvent	Manual Meter Installation Event
D1-SmartMeterInstallEvent	Smart Meter Installation Event

The base package includes the following “lite” install event business objects:

Business Object Name	Description
D1-InstallEventLite	Install Event Lite
D1-SmartMeterInstallEventLite	Smart Meter Install Event Lite

Example Install Event - D1-SmartMeterInstallEvent

The table below lists the details of the D1-SmartMeterInstallEvent install event business object.

Option	Description
Business Object	D1-SmartMeterInstallEvent
Description	Smart Meter Installation Event
Maintenance Object	D1-INSTLEVT (Install Event)
Application Service	D1-SMTMTRINSEVTBOAS (Smart Event Installation Event BO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> Display UI Map: D1-SmartMeterInstallEventDisplay (Smart Meter Install Event - Display) Portal Navigation Option: d1inevtmTabMenu (Install Event) Display Map Service Script: D1-SmtIERtDt (Smart Meter Install Event - Retrieve Details for Display) Maintenance UI Map: D1-SmartMeterInstallEventMaint (Smart Meter Install Event - Maintenance)
Algorithms	<ul style="list-style-type: none"> Information: D1-INEVTINFO (Install Event Information) Pre-Processing: D1-DFLTINSTC (Default the Install Event's Installation Constant) Pre-Processing: D1-POPARMSTS (Default the Arming Status) Validation: D1-DEVCFGVAL (Validate Device the Configuration) Validation: D1-ONHISTVAL (Validate the On/Off History based on the Previous Install Event) Validation: D1-CHKHISEVT (Validate the On/Off History based on the Install Event's Status) Validation: D1-CKIFOVLEX (Validate Overlapping Install Events) Validation: D1-VALIERMDT (Validate Removal Info)
Lifecycle	<ul style="list-style-type: none"> Pending (Initial) Connected/Pre-Commissioned (Interim) Pre-Connected/Commissioned (Interim) Connected/Commissioned (Interim) Connected/Decommissioned (Interim) Disconnected/Commissioned (Interim) Disconnected/Decommissioned (Interim) Remove (Final)

Use the Business Object portal to view additional details concerning this business object.

Service Providers in Detail

This section provides details concerning the service provider 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 custom service provider objects you create as part of your implementation. This section includes:

- A description of the D1-SVCPROVDR maintenance object
- Lists of the base package service provider business objects, including “lite” business objects
- Details concerning service provider-specific configuration options
- A sample service provider business object (D1-HeadEndSystem)

Maintenance Object - D1-SVCPROVDR

Service provider business objects use the D1-SVCPROVDR maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-SVCPROVDR
Description	Service Provider
Service Name	D1-SVCPROVDR (Service Provider Maintenance)
Tables	<ul style="list-style-type: none">• D1_SPR (Service Provider) - Primary• D1_SPR_CHAR (Service Provider Characteristics) - Child• D1_SPR_L (Service Provider Language) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following service provider business objects:

Business Object Name	Description
D1-ExternalApplication	External Application
D1-HeadEndSystem	Head-End System
D1-ServiceProvider	Service Provider

The base package includes the following additional service provider business objects:

Business Object Name	Description
D1-ServiceProviderBundlingAdBO	Bundling Add BO for Service Provider
D1-ServiceProviderPhysicalBO	Physical BO for Service Provider

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by service provider business objects.

Business Object Options

Service provider business objects can make use of the following business object options:

- **Service Provider Type:** This option defines the type of service provider. Valid values are defined as values for the SPR_TYPE_FLG lookup field. The base package includes the following options:

Lookup Field Value	Description
D1EA	Edge Application
D1HE	Head-End System

Example Service Provider - D1-HeadEndSystem

The table below lists the details of the D1-HeadEndSystem service provider business object.

Option	Description
Business Object	D1-HeadEndSystem
Description	Head-End System
Maintenance Object	D1-SVCPROVDR (Service Provider)
Parent Business Object	D1-ServiceProvider
Application Service	D1-SVCPROVIDER (Service Provider MO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> • Service Provider Type: D1HE (Head-End) • Display UI Map: D1-HeadEndSystemDisplay (Head-End System - Display) • Portal Navigation Option: d1svcproTabMenu (Service Provider) • Maintenance UI Map: D1-HeadEndSystemMaint (Head-End System - Maintenance)

Use the Business Object portal to view additional details concerning this business object.

Processing Methods in Detail

This section provides details concerning the processing method 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 custom processing method objects you create as part of your implementation. This section includes:

- A description of the D1-PROCMETHOD maintenance object
- Lists of the base package processing method business objects, including “lite” business objects
- Details concerning processing method-specific configuration options
- A sample service processing method object (D1-HowToCreateMCInformation)

Maintenance Object - D1-PROCMETHOD

Processing method business objects use the D1-PROCMETHOD maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-PROCMETHOD
Description	Processing Method
Service Name	D1-PROCMETHOD (Processing Method Maintenance)
Tables	<ul style="list-style-type: none">• D1_PROC_METH (Processing Method) - Primary• D1_PROC_METH_CHAR (Processing Method Characteristics) - Child• D1_PROC_METH_L (Processing Method Language) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following processing method business objects:

Business Object Name	Description
D1-AbstractProcessingMethod	Generic Processing Method
D1-HowToCreateMCInformation	How To Create MC Related Information
D1-HowToSendActInformation	How To Send Activity Related
D2-HowToCreateUSInformation	How To Create US Related Information
D2-HowToSendUSInformation	How To Send US Related Information

The base package includes the following additional processing method business objects:

Business Object Name	Description
D1-ProcessingMethodBundlingABO	Bundling Add BO for Processing Method
D1-ProcessingMethodPhysicalBO	Physical BO for Processing Method

Configuration Options

This section outlines specific types of BO Options and System Events used by service provider business objects.

Business Object Options

Service provider business objects can make use of the following business object options:

- **Applicable Processing Role:** This option defines the processing role for the processing method. Valid values are defined as values for the PROC_ROLE_FLG lookup field. The base package includes the following options:

Lookup Field Value	Description
D1DA	Activity Notification
D1IM	Initial Measurement Creation
D2UC	Usage Transaction Creation
D2UT	Usage Transaction Notification

System Events

Service provider business objects can make use of the following system events:

- **Determine Processing Method(s):** This system event defines the algorithm used to determine the processing methods (business object or batch code) to use, based on the related entity. The Algorithm Entity for available algorithms is “Proc Method (BO) - Determine Proc Method.” The base package includes the following algorithm types and algorithms for use with this system event:

Algorithm Type / Algorithm	Description
D1-BODIFFAT / D1-BODIFFAT	BO / Batch Differs By Activity Type (Returns the BO code or batch code used to send activity-related information to a service provider for a processing role) Used with the Activity Notification service provider role.
D1-BODIFFAT / D1-BOBDIFFAT	BO / Batch Differs By Activity Type (Returns the BO code or batch code used to send activity-related information to a service provider for a processing role) Used with the Activity Notification service provider role.
D1-BODIFFMCT / D1-BODIFFMCT	BO Differs By Measuring Component Type (Returns the BO code used to create measuring component-related information for a service provider and processing role) Used with the Initial Measurement Creation service provider role.

Algorithm Type / Algorithm	Description
D2-BOBDIFFUS / D2-BOBDIFFUS	BO / Batch Differs By Usage Subscription Type (Returns the BO code or batch code used to send usage subscription-related information to a service provider for a processing role.) Used with the Usage Transaction Notification service provider role.
D2-BODIFFUST / D2-BODIFFUST	BO Differs By Usage Subscription Type (Returns the BO code used to create usage subscription-oriented information for a service provider and processing role) Used with the Usage Transaction Creation service provider role.

Example Processing Method - D1-HowToCreateMCInformation

The table below lists the details of the D1-HowToCreateMCInformation business object.

Option	Description
Business Object	D1-HowToCreateMCInformation
Description	How to Create Measuring Component Related Information
Maintenance Object	D1-PROCMEETHD (Processing Method)
Parent Business Object	D1-AbstractProcessingMethod
Application Service	D1-PROCMEETHD (Processing Method MO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> Applicable Processing Role: D1IM Portal Navigation Option: d1svcproTabMenu (Service Provider) Maintenance UI Map: D1-HowToCreateMCInfoMaint (How To Crt MC Related Info - Maintenance)
Algorithms	<ul style="list-style-type: none"> Determine Processing Method(s): D1-BODIFFMCT (BO Differs by Measuring Component Type) Validation: D1-PROMTHVAL (Validate Processing Method)

Use the Business Object portal to view additional details concerning this business object.

Activities in Detail

This section provides details concerning the activity 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 custom activity objects you create as part of your implementation. This section includes:

- A description of the D1-ACTIVITY maintenance object
- Lists of the base package activity business objects
- Details concerning activity-specific configuration options
- A sample activity business object (D1-MeterReadDownloadActivity)

Maintenance Object - D1-ACTIVITY

Activity business objects use the D1-ACTIVITY maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-ACTIVITY
Description	Activity
Service Name	D1-ACTIVITY (Activity Maintenance)
Tables	<ul style="list-style-type: none"> • D1_ACTIVITY (Activity) - Primary • D1_ACTIVITY_CHAR (Activity Characteristics) - Child • D1_ACTIVITY_LOG (Activity Log) - Child • D1_ACTIVITY_LOG_PARM (Activity Log Parameter) - Child • D1_ACTIVITY_REL (Activity Relationship) - Child • D1_ACTIVITY_REL_OBJ (Activity Related Object) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following activity business objects:

Business Object Name	Description
D1-MeterReadDownloadActivity	Meter Read Download Activity

Example Activity - D1-MeterReadDownloadActivity

The table below lists the details of the D1-MeterReadDownloadActivity business object.

Option	Description
Business Object	D1-MeterReadDownloadActivity
Description	Meter Read Download Activity
Maintenance Object	D1-ACTIVITY (Activity)
Application Service	D1-MRDOWNLDACTBOAS (Meter Read Download Activity BO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> • Related Administration BO: D1-MeterReadDownloadActType (Meter Download Activity Type) • Display UI Map: D1-MeterReadDwnldActDisp (Meter Read Dwnld Activity - Display) • Portal Navigation Option: d1actTabMenu (Activity) • Post-Processing Service Script: D1-PstMRDAct (Post Meter Read Download Activity Details) • Pre-Processing Service Script: D1-DefMRDAct (Default Meter Read Download Activity Details) • Display Map Service Script: D1-MRADRetDt (Retrieve Meter Read Download Activity Details for Display) • Maintenance UI Map: D1-MeterReadDwnldActMaint (Meter Read Download Activity - Maintenance)
Algorithms	<ul style="list-style-type: none"> • Information: D1-MRDAINFO (Meter Read Download Activity Information) • Pre-Processing: D1-DETECTTYP (Determine Activity Type) • Validation: D1-CHKVALIE (Check if Activity Install Event is Valid for Service Point and Device)
Lifecycle	<ul style="list-style-type: none"> • Pending (Initial) • Extracted (Final)

Use the Business Object portal to view additional details concerning this business object.

Configuring Service Point and Device Installation Objects

This section provides high-level overviews of the steps involved in configuring custom service points, contacts, install events, service providers, and activities. See **Configuration Process Overview** on page 1-8 for a high-level overview of the overall configuration process.

Note: The procedures below focus on specific configuration tasks and options related to each of the objects described in this chapter, and do not address all the steps involved in creating business objects, UI maps, algorithms, etc. For more information about these subjects, refer to the Oracle Utilities Application Framework documentation.

Configuring Custom Service Points

Configuring custom service points involves the following steps:

1. Design the service point business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom service point-related configuration objects required for your business objects, including:
Business Object Options: Create algorithms for the following business object options:
 - Process Measurement Cycle
3. Create your service point business objects, referencing the configuration objects created above as appropriate.
4. Set up admin records that define the service point types you will use in your implementation.

Configuring Custom Contacts

Configuring custom contacts involves the following steps:

1. Design the contact business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom contact-related configuration objects required for your business objects.
3. Set up admin records that define the contact types you will use in your implementation.

Configuring Custom Install Events

Configuring custom install events involves the following steps:

1. Design the install event business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom install event-related configuration objects required for your business objects.

Configuring Custom Service Providers

Configuring custom service providers involves the following steps:

1. Design the service provider business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom service provider-related configuration objects required for your business objects, including:

Processing Methods: Create processing method business objects for use with each service provider.

3. Create your service provider business objects, referencing the configuration objects created above as appropriate.

Note: Service provider business objects should reference D1-ServiceProvider as their Parent Business Object.

Configuring Custom Processing Methods

Configuring custom processing methods involves the following steps:

1. Design the processing method business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom processing method-related configuration objects required for your business objects, including:

System Events: Create algorithms for the following system events:

- Determine Processing Method(s)

3. Create your processing method provider business objects, referencing the configuration objects created above as appropriate.

Note: Processing method business objects should reference D1-AbstractProcessingMethod as their Parent Business Object.

Configuring Custom Activities

Configuring custom activities involves the following steps:

1. Design the activity business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom activity-related configuration objects required for your business objects.
3. Set up admin records that define the activity types you will use in your implementation.

Chapter 6

Measurement Data

This chapter provides descriptions of initial and final measurement data, including:

- **Understanding Initial Measurement Data and Final Measurements**
- **Initial Measurement Data In Detail**
- **Measurements In Detail**
- **Configuring Initial Measurements and Measurements**

Understanding Initial Measurement Data and Final Measurements

This section provides an overview of initial measurements and final measurements and how they are used in Oracle Utilities meter data framework and Oracle Utilities Meter Data Management.

Initial Measurement Data

Measurements read from a measuring component are referred to as “initial measurement data” (or initial measurements) and are used to record how much of the quantity (defined by UOM, TOU, and SQI) measured by the measuring component was consumed.

Initial measurement data for scalar measuring components contain a single “reading” or value, while initial measurement data for interval measuring components can contain multiple readings, one for each interval that falls between the start time and stop time of the measurement.

At a simple level, initial measurement data goes through the following process:

1. Initial measurements are loaded into the system.
2. Initial measurement data is validated, edited, and estimated.
3. Initial measurements are converted into final measurements.
4. Final measurements are used to calculate usage (bill determinants, etc.).

Validation, Editing, and Estimation

Once received into the system, initial measurements are subject to validation, editing, and estimation. This process involves the following:

- **Validation:** Validates that the initial measurement data is within expected tolerances, and is correct
- **Editing:** If the initial measurement data is wrong in some way, the data can be automatically changed.
- **Estimation:** If initial measurement data is incomplete (for example, if one or more interval values within an interval measurement are missing), missing values can be automatically estimated.

As noted above, the values recorded in an initial measurement can change during the validation, editing, and estimation processing, and exceptions can be raised if initial measurements are wrong in some way (such as out-of-tolerance quantities, incorrect values, etc.).

Note: The validation, editing, and estimation process is referred to as VEE, and is described in more detail in a later chapter.

Pre VEE and Post VEE Quantities

Initial measurement data contains both the original and final versions of the quantities recorded by the measuring component.

- **Pre VEE** quantities are consumption values derived from the measurements recorded by the head-end system or meter reader.
- **Post VEE** quantities are the “final” values, after VEE processing.

Pre VEE and Post VEE quantities in an initial measurement often differ based on a number of conditions, including:

1. The measuring component has a multiplier other than 1.
In this case, the Post VEE value is equal to the Pre VEE value times the multiplier.
2. The installation event has a constant other than 1.
In this case, the Post VEE value is equal to the Pre VEE value times the installation constant.

3. VEE rules have changed the quantities because they are missing or obviously wrong

In this, the Pre VEE values are adjusted based on the specifics of the VEE rules applied to the initial measurement to create the Post VEE values

4. Manual changes by a user.

Condition Codes

In addition to recorded consumption values, measurements also have condition codes, used to indicate the source and quality of a measurement. For example:

- Regularly recorded measurements might have a condition code of “Regular”
- Missing measurements might have a condition code of “Missing”
- Estimated measurements might have a condition code of “External Estimated” or “System Estimated” based on where the estimation was performed.

Both Pre VEE and Post VEE values have their own condition code, which can also change during VEE processing. For example, consider the following sample measurements from an interval measuring component:

Date / Time	Pre VEE Value	Pre VEE Condition	Post VEE Value	Post VEE Condition
01/01/2010 3:00 PM	14.678	Regular	15.1	Regular
01/01/2010 4:00 PM		Missing	20	Estimated
01/01/2010 5:00 PM	13.12	Regular	13.41	Regular
01/01/2010 6:00 PM	150.12	Regular	14.12	Estimated

For the 4:00 PM interval, note the Pre VEE condition indicates the interval is missing and the Post VEE condition highlights that it was estimated.

For the 6:00 PM interval (containing a spike, or an interval with conspicuously high usage relative to surrounding intervals), note that the system head-end (the system that recorded the measurement) indicated the interval value was fine (Pre VEE is regular), but the VEE process smoothed it, and set the Post VEE condition to “Estimated.”

Subtractive Measuring Components

Initial measurement data for subtractive measuring components (such as most scalar measuring components) also typically contain start and stop readings in addition to Pre and Post VEE usage. For example, a set of initial measurements for a subtractive scalar measuring component might look like the following:

Date / Time	Start Reading	Stop Reading	Pre VEE Usage	Pre VEE Condition	Post VEE Value	Post VEE Usage
01/01/2010 3:00 PM	0	1500	1500	Regular	1515	Regular
02/2/2010 4:11 PM	1500	2100	600	Regular	606	Regular
03/03/2010 5:22 PM	2100	2900	800	Regular	808	Regular
04/01/2010 1:00 PM	2900	3500	600	Regular	606	Regular

Final Measurements

When an initial measurement is considered “final,” that is, it has pass all VEE processing and no additional modifications or changes need to be made, it is transformed into a Final Measurement, or simply a Measurement (the terms measurement, final measurement, and final consumption all reference this same “final” measurement data).

When creating final measurements from initial measurement data:

- Final measurements are created using Post VEE quantities
- Each final measurement's condition is copied from the Post VEE condition
- Initial measurements are normalized into final measurements where each final measurement is for a specific date and time.
- Because a single initial measurement may contain many “readings,” a separate final measurement is created for each interval in the initial measurement. For example, if an initial measurement contains 24 hours of 15 minute readings, 96 measurements will be created, each with a specific date and time.

Final measurements are periodically transformed into more concise and palatable usage (also known as bill determinants) for the subscribing systems. In this example, a time-of-use map is applied to the final measurements for an entire month. The usage calculation process is described in more detail in a later chapter.

Derived Values

Final measurements can record up to 10 derived values in addition to the "as measured" value. The derivation formula for each value on a final measurement is held in an algorithm and therefore can derive anything. For example, a set of measurements can adjusted or converted into other units of measure:

Date / Time	As Measured UOM: CCF SQL: n/a	Loss Adjusted UOM: CCF SQL: n/a	Thermal Units UOM: BTU SQL: n/a
01/01/2010 3:00 PM	10	10.1	10.11
01/01/2010 4:00 PM	15	15.15	15.165
01/01/2010 5:00 PM	10	10.1	10.11

Derived values are not reliant on consumption values, but can also come from factors, historical data, or another source. For example, measurements might be compared to “normal” usage for the usage period:

Date / Time	As Measured UOM: CCF SQL: n/a	Loss Adjusted UOM: CCF SQL: n/a	Thermal Units UOM: BTU SQL: n/a	Normal CCF UOM: CCF SQL: Normal	Percent (%) of Normal UOM: CCF SQL: n/a
01/01/2010 3:00 PM	10	10.1	10.11	10	100%
01/01/2010 4:00 PM	15	15.15	15.165	10	150%
01/01/2010 5:00 PM	10	10.1	10.11	10	100%

Updating Final Measurements

Final measurements can be updated if necessary. If final measurements are discovered to be incorrect (for whatever reason), **a new initial measurement is created to correct them**. This new initial measurement contains the corrected consumption, and after the initial measurement has completed VEE processing, the existing final measurements are updated with the newly calculated consumption.

Note: The primary key on the table used to store final measurements (the Measurement table) is a combination of the measuring component ID and the date/time of the measurement. This means that it is impossible for more than one final measurement to exist for a measuring component for a given date/time.

The reason a new initial measurement must be created and completed to add or update measurements is because there is no user interface that allows users to directly edit final measurements.

Initial Measurement Data In Detail

This section provides details concerning the initial measurement data 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 custom initial measurement data objects you create as part of your implementation. This section includes:

- A description of the D1-IMD maintenance object
- Lists of the base package initial measurement data business objects, including “lite” business objects
- Details concerning initial measurement data specific configuration options
- A sample initial measurement data business object (D1-InitialLoadIMDInterval)

Maintenance Object - D1-IMD

Initial measurement business objects use the D1-IMD maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-IMD
Description	Initial Measurement
Service Name	D1-INITMSRMTDATA (Initial Measurement Maintenance)
Tables	<ul style="list-style-type: none">• D1_INT_MSRMT_DATA (Initial Measurement) - Primary• D1_INT_MSRMT_DATA_CHAR (Initial Measurement Characteristics) - Child• D1_INT_MSRMT_DATA_LOG (Initial Measurement Log) - Child• D1_INT_MSRMT_DATA_LOG_PARM (Initial Measurement Log Parameters) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following initial measurement data business objects:

Business Object Name	Description
D1-EstimationIMDInterval	Estimation IMD (Interval)
D1-EstimationIMDScalar	Estimation IMD (Scalar)
D1-IMDSeeder	IMD Seeder
D1-InitialLoadIMDInterval	Initial Load IMD (Interval)
D1-InitialLoadIMDScalar	Initial Load IMD (Scalar)
D1-ManualIMDInterval	Manual IMD (Interval)
D1-ManualIMDInterval	Manual IMD (Scalar)

The base package includes the following “lite” initial measurement data business objects:

Business Object Name	Description
D1-GenericIMDMain	IMD - Main Section Only (Lite)
D1-IMDLite	IMD Mini BO
D1-IMDPostVee	IMD Main and Post VEE Lite BO
D1-IMDPreVee	IMD Main and Pre VEE Lite BO
D1-IMDTraceZone	IMD - Trace List Section Only (Lite)
D1-InitialLoadIntervalRaw	Initial Load IMD (Interval) - Raw
D1-InitialLoadIntervalMain	Initial Load IMD - Main Section Only (Lite)
D1-PostVEE	Post VEE Only (Lite)
D1-PreVee	Pre VEE Only (Lite)

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by initial measurement data business objects.

Business Object Options

Initial measurement business objects can make use of the following business object options:

- **IMD Status Extendable Lookup:** This option defines an extendable lookup that can be used to define different statuses which can apply to initial measurement data created from this business object.
- **Initial Measurement Data Type:** This option defines the data type for initial measurement data created from this business object. Valid values are based on the D1_IMD_TYPE_FLG lookup, and include the following:

Field Value	Description
D1GA	IMD Seeder
D1IL	Initial Load
D1MO	Manual
D1ES	Estimation

Example Initial Measurement - D1-InitialLoadIMDInterval

The table below lists the details of the D1-InitialLoadIMDInterval initial measurement data business object.

Option/Field	Description
Business Object	D1-InitialLoadIMDInterval
Description	Initial Load IMD (Interval)
Maintenance Object	D1-IMD (Initial Measurement Data)

Option/Field	Description
Application Service	D1-INITLOADIMDBOAS (Initial Load IMD Interval BO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> Initial Measurement Data Type: D1IL (Initial Load) Display UI Map: D1-InitialLoadIMDIntvDisplay (Initial Load IMD (Interval) - Display) Portal Navigation Option: d1imdsaTabMenu (Initial Measurement) Display Map Service Script: D1-IntIMDInv (Retrieve Initial Load IMD Interval Status Details) Maintenance UI Map: D1-IMDMaint (Initial Load IMD (Interval) - Maintenance)
Algorithms	<ul style="list-style-type: none"> Post-Processing: D1-UPD-DTTM (Update Initial Measurement Data Date/Times) Validation: D1-IMD-VAL (Validates Status Condition for Delete) Validation: D1-IMD-COMM (Validate Initial Measurement Data Common Input) Validation: D1-INT-SPEC (Validate Interval Initial Measurement Data Input)
Lifecycle	<ul style="list-style-type: none"> Pending (Initial) Additional Mapping (Interim) Mapping Error (Interim) VEE Ready (Interim) Error (Interim) Removed from Processing (Final) VEE Complete (Interim) Exception (Interim) Discarded (Final) Force Complete (Interim) Finalized (Final)

Use the Business Object portal to view additional details concerning this business object.

Measurements In Detail

This section provides details concerning the measurement 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 custom measurement objects you create as part of your implementation. This section includes:

- A description of the D1-MSRMT maintenance object
- Lists of the base package measurement business objects, including “lite” business objects
- Details concerning measurement-specific configuration options
- A sample measurement business object (D1-Measurement)

Maintenance Object - D1-MSRMT

Measurement business objects use the D1-MSRMT maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-MSRMT
Description	Measurement
Service Name	D1-MEASUREMENT (Measurement Maintenance)
Tables	<ul style="list-style-type: none"> • D1-MSRMT (Measurement) - Primary • D1-MSRMT_CHAR (Measurement Characteristics - Child)

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Device Business Objects

The base package includes the following measurement business objects:

Business Object Name	Description
D1-Measurement	Measurement

The base package includes the following “lite” device business objects:

Business Object Name	Description
D1-MSRMTLite	Measurement Lite

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by measurement business objects.

Business Object Options

Measurement business objects can make use of the following business object options:

- **Measurement Log Business Object:** This option defines the business object that will be used to log changes that have occurred to the measurement.

Example Device - D1-Measurement

The table below lists the details of the D1-Measurement device business object.

Option/Field	Description
Business Object	D1-Measurement
Description	Measurement
Maintenance Object	D1-MSRMT (Measurement)
Application Service	D1-MEASUREMENT (Measurement MO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none">Measurement Log Business Object: D1-MeasurementLog (Measurement Log)Display UI Map: D1-MeasurementDisplay (Measurement - Display)Portal Navigation Option: d1meassaTabMenu (Measurement)
Algorithms	<ul style="list-style-type: none">Audit: D1-AMSRMTLOG (Formats the standard description of a Measurement)Information: D1-MSRMTINFO (Measurement Information)

Use the Business Object portal to view additional details concerning this business object.

Configuring Initial Measurements and Measurements

This section provides high-level overviews of the steps involved in configuring custom objects to define initial measurements and (final) measurements. See **Configuration Process Overview** on page 1-8 for a high-level overview of the overall configuration process.

Note: The procedures below focus on specific configuration tasks and options related to each of the objects described in this chapter, and do not address all the steps involved in creating business objects, UI maps, algorithms, etc. For more information about these subjects, refer to the Oracle Utilities Application Framework documentation.

Configuring Custom Initial Measurements

Configuring custom initial measurement objects involves the following steps:

1. Design the initial measurement business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom initial measurement-related configuration objects required for your business objects, including:

Business Object Options: Create business objects for the following business object options:

- IMD Status Extendable Lookup
3. Create your initial measurement business objects, referencing the configuration objects created above as appropriate.

Configuring Custom Measurements

Configuring custom measurement objects involves the following steps:

1. Design the measurement business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom measurement-related configuration objects required for your business objects, including:

Business Object Options: Create business objects for the following business object options:

- Measurement Log Business Object
3. Create your initial measurement business objects, referencing the configuration objects created above as appropriate.

Chapter 7

Validation, Editing, and Estimation

This chapter provides descriptions of validation, editing, and estimation groups and rules, including:

- **Understanding Validation, Editing, and Estimation**
- **VEE Groups In Detail**
- **VEE Rules In Detail**
- **VEE Eligibility Criteria In Detail**
- **VEE Exceptions In Detail**
- **Configuring VEE Groups, Rules, Eligibility Criteria, and Exceptions**

Understanding Validation, Editing, and Estimation

This section describes the validation, editing, and estimation (or VEE) process used Oracle Utilities meter data framework and Oracle Utilities Meter Data Management.

Overview of the Validation, Editing, and Estimation Process

As noted in **Chapter 6: Measurement Data**, once received into the system, initial measurements are subject to validation, editing, and estimation. This process involves the following:

- **Validation:** Validates that the initial measurement data is within expected tolerances, and is correct
- **Editing:** If the initial measurement data is wrong in some way, the data can be automatically changed.
- **Estimation:** If initial measurement data is incomplete (for example, if one or more interval values within an interval measurement are missing), missing values can be automatically estimated.

The values recorded in an initial measurement can change during this process, and exceptions can be raised if initial measurements are wrong in some way (such as out-of-tolerance quantities, incorrect values, etc.).

Beyond raising an exception, the VEE process can also transition an initial measurement to an Exception state if it detects a problem that it is not able or allowed to correct.

VEE Rules and VEE Groups

The specific validation, editing, and estimation processing performed on initial measurement data is defined in individual VEE rules, each performing a specific set of validation logic. Examples of VEE rules include:

- **Device Identifier Validation:** Checks to ensure that the device identifier value of the incoming initial measurement data matches the device identifier value stored on the device
- **Interval Size Validation:** Checks to ensure that the interval size of the incoming initial measurement data matches the value defined in the measuring component type
- **Multiplier Check:** Checks to ensure that the device multiplier value of the incoming initial measurement data matches the multiplier value stored on the measuring component
- **Unit of Measure Check:** Checks to ensure that the Unit of Measure (UOM) of the incoming initial measurement data matches the UOM specified on the measuring component's type

The base package contains many VEE rules you can use in your implementation, and you can also create your own custom VEE rules.

Some VEE rules create exceptions if the initial measurement data doesn't fall within parameters specified by the rule. Other rules override measurements, changing measurement values as dictated by the rule's parameters. Some rules can both create exceptions and override the measurement as part of a single process. By convention, VEE rules change the Post VEE quantities of initial measurement data, but VEE rules can change ANYTHING on an initial measurement.

VEE Groups

VEE groups are collections of VEE rules that are applied to initial measurement data. During the VEE process, the system executes the VEE rules defined in each VEE group. The rules within a VEE group are defined in a specific sequence, allowing control over the order in which the rules are executed.

VEE groups can be associated to a specific measuring component, or to a measuring component type (or both). VEE groups associated with a measuring component type are applied to all measuring components of that type, while those associated to a specific measuring component are applied only to that measuring component. VEE groups associated to a measuring component override those assigned to a measuring component type.

Effective Dates

Every VEE rule has an effective period. Rules will only be applied if the initial measurement's start date is within the rule's effective period. For example, an Interval Spike Check rule with a Start Date of 11/15/2010 will only be applied if the start date of the initial measurement is on or after 11/15/2010.

This allows you to update the specifics of a rule without removing the previous version of the rule. For example, you might change the tolerance of an Interval Spike Check rule from 1.2 to 1.5 as of a certain date. However, for initial measurement data for the period prior to the change, you would want to use the tolerance for the original version of the rule (1.2) instead of the new tolerance (1.5).

Eligibility Criteria

Each VEE rule may optionally have eligibility criteria that controls if the rule is applied. This feature can greatly reduce the number of VEE groups you need to create, because it allows a single VEE group to have conditional VEE rules based on eligibility criteria (rather than requiring a distinct VEE group for every combination of VEE rules).

For example, you might create a rule that compares interval consumption against related scalar consumption (such as might be the case with a device with both interval and scalar measuring components). This rule might use eligibility criteria that specifies that the rule is only applied if the initial measurement's measuring component has a corresponding scalar register measuring component.

Another example might be a rule that compares the current consumption against standard consumption for measuring components of a certain type for the first six months after installation. You might create eligibility criteria that specifies that the rule is only applied if the measuring component's device configuration has been installed at a service point for less than six months.

Generic Utility Rules - Tools For Creating VEE Groups

While most VEE rules are used to validate the usage (or some other attribute) in an initial measurement, Oracle Utilities meter data framework also provides a number of "generic utility" VEE rules that can be used when configuring VEE groups. These include:

- Referred VEE Group Rules
- VEE Group Matrix (Factor) Rules
- Exception Handler Rules

Referred VEE Group Rules - Reusing Groups Of Rules

A common situation in many implementations is in which several rules are to be applied to multiple different types measuring components. For example, you might want to perform device identifier validations, multiplier checks, and UOM checks on all measuring components.

One way to meet this requirement would be to repeat these three rules in multiple VEE groups. However, this solution becomes hard to maintain if changes to the rules are required (or if new "global rules" are introduced) as each group would have to be updated.

Instead of this, you can create a VEE rule that executes the rules in a referenced VEE group. Rules of this type are called Referred VEE Group (or Execute VEE Group) rules. Rules of this type can have effective dates and eligibility criteria, just like all VEE rules.

Using the example above, you could create a group called “Rules for All MCs” that contains a device identifier validations rule, a multiplier check rule, and a UOM check rule, and then reference the “Rules for All MCs” group in a Referred VEE Group rule.

Referred VEE Group rules can be “nested.” That is, a group executed by a Referred VEE Group rule can, in turn, execute the rules in another group, and so on.

VEE Group Matrix (Factor) Rules - Using Factors To Implement Dynamic VEE Groups

Another situation likely to occur in many implementations is where specific rules may need to be applied to measurement data based on specific criteria, such as geography. For example, some geographic territories may have unique VEE rules in addition to rules that are applied to all geographic territories.

This requirement could be implemented using eligibility criteria, such only applying a rule (or a group of rules) if the service point for an initial measurement is located in a hot summer area. If there are limited number of these unique rules, this solution is suitable, but if there are many territories and each territory has several unique rules, an implementation of this sort would become hard to maintain (and slow to execute) as the VEE group would have many rules with varying eligibility criteria.

Instead of this, you can create a VEE rule that dynamically executes another group's rules based on specific conditions. For example, the VEE process can be configured to execute different VEE rules based on where the service point is located, or the number of tamper events in the last 6 months, or the type of customer, or the meter's head-end system, etc. Rules of this type are called VEE Group Matrix (Factor) rules. These rule and can have effective dates and eligibility criteria, just like all VEE rules.

Factors are used to implement the dynamic selection of VEE group (note the term factor is intentionally generic as factors can be used for other purposes). Factors used for these rules have a Factor Class of “VEE group,” and use some unique rules:

- VEE group factors reference a characteristic type (with pre-defined values).
- VEE group factors reference an algorithm that retrieves or derives the value of the characteristic type at runtime.
- Factor values for a VEE group factor are effective-dated pairings of a characteristic value and a corresponding VEE group.

At run time, the rule retrieves / derives the characteristic value for the factor's characteristic type and then finds the VEE group associated with the respective characteristic value.

Factors can be related to any real or dynamic attribute, so rules of this type are very flexible. For example:

- **Real Attribute:** you could create a rule that executes a VEE group based on the head-end system of the device.
- **Dynamic Attribute:** you could create a rule that executes a VEE group based on the number of tamper events linked to the measuring component in the last 180 days, executing one group if there are 6-10 events (a characteristic value of 6-10), and another if there are more than 10 events (a characteristic value of 10+). The number of tamper events is dynamically calculated at execution time and is compared to the characteristic values defined for the factor, and executes the appropriate VEE group. In this example, if the count of tamper events was anything less than six, no VEE group would be executed.

Exception Handler Rules

Exception Handler rules are described in the section below on VEE exceptions.

VEE Roles

Initial measurement data can come from different sources, such as a head-end system or estimation processes, or it can be manually created by a user (to override or estimate consumption). Measurement data from these different sources might use different VEE rules. For example:

- Initial measurements sent a head-end system might use strict VEE rules
- Initial measurements created by a user (to override or estimate consumption) may use less strict rules
- Initial measurements created by the system to estimate consumption have very few (if any) VEE rules

Applying different numbers and types of VEE rules based on the source of the initial measurement data could be implemented using eligibility criteria (e.g., only apply a rule if the initial measurement data's source is X) or factor-based rules (e.g., the factor's characteristic is the initial measurement data's source), but both of these techniques are potentially difficult to maintain if there are many source-dependent rules.

Instead of that approach, you can define different VEE groups for different source, or roles. The three base package roles are:

- **Estimation:** Used for initial measurement data estimated by the system
- **Initial Load:** Used for initial measurement data received from a head-end system or import process
- **Manual Override:** Used for initial measurement data manually created by a user

A measuring component's Measuring Component Type can define "fallback" VEE groups for each of these roles. In addition, an individual measuring component can specify a VEE group for each role. If the measuring component doesn't have a VEE group specified for a role, the "fallback" VEE group defined for the measuring component type is used.

VEE Exceptions

Each VEE rule defines an exception type and severity that specify how exceptions are tracked by the system. When an initial measurement fails a validation, an exception of the type specified for the failed VEE rule is created. A single initial measurement can have multiple exceptions, one (or more) for each rule the measurement fails. This allows users to see all of the problems detected during the VEE process.

Exception Types

Each exception has an exception type. Exception types allow you to distinguish between different exceptions based on the rule that triggered them. Exception types can be created each VEE rule, at a more general level exception types, such as "Insufficient Data" to be used to signify that a measurement didn't have sufficient data for the VEE rule to execute.

Exception Categories

There are three categories, or severities of exceptions:

- **Info:** Used to highlight something interesting, but not sufficient to cause the initial measurement to be put into the Exception state. Exceptions of this category can be used to report on the frequency of interesting, but not fatal issues.
- **Issue:** Used to report a problem that will prevent the initial measurement from being finalized. Multiple "issue exceptions" can be created during VEE processing. If at least one issue exists after all rules have been applied, the initial measurement is transitioned to the Exception state.

- **Terminate:** Used to report a severe issue that will cause the VEE process to stop and the initial measurement to be transitioned immediately to the Exception state. Only one terminate exception can be issued (as the first one causes VEE to stop on an initial measurement).

Exceptions and To Do Entries

In addition to exceptions, VEE processing can also trigger the creation of To Do Entries related to failed validations.

If Issue or terminate exceptions exist for an initial measurement, a To Do Entry is created when the initial measurement is transitioned to the Exception state. The To Do Type and default To Do Role of this To Do Entry are defined on the Enter system event for the Exception state of the business object used to define the initial measurement.

To Do Entries created in this way can be routed to different roles depending on the exception's message category and number (using the To Do Type's Message Overrides tab).

Exception Handler Rules - Aborting When There Are Too Many Issues

There may be times when an implementation's requirements are to terminate processing for any initial measurement that contains a pre-defined number of exceptions. Exception Handler VEE rules can issue a "terminate exception" if they detect too many exceptions. This is useful when individual exceptions are not sufficient to stop VEE processing.

This criteria used by this rule can simply reference a number of exceptions of a given exception type, or can specific more complex AND/OR criteria that must be satisfied before VEE processing is terminated. For example, processing might terminate when 3 exceptions of one type AND 2 exceptions of another type have been issued, or if 2 exceptions of one type OR 2 exceptions of a different type have been issued.

The terminate exception created by Exception Handler rules can be of a specific exception type. In addition, Exception Handler rules can also create a different type of To Do Type and To Do Role than the default.

Exception Handler rules can be placed at any point throughout a VEE group where each rule can reference different exception types.

Available Actions for Initial Measurements with Exceptions

Users have a number of options for dealing with initial measurements with exceptions.

- After correcting the cause of the issues that triggered the exceptions, a user can re-VEE the initial measurement.
- A user can discard the initial measurement.
- A user can edit the Post VEE quantities (if necessary) and manually complete the initial measurement. This will cause final measurements to be created using the contents of the Post VEE quantities.

Note: No VEE processing is performed on manually completed initial measurement data.

Regardless of the action taken by the user, the system will complete any open To Do Entries that created when the initial measurement entered the Exception state.

Exceptions Are Not Deleted

Note that exceptions are not deleted when an initial measurement is adjusted or corrected. After any issues are corrected or the initial measurement is overridden (or manually completed), the exceptions persist (in the Closed state) for reporting purposes.

VEE Groups In Detail

This section provides details concerning the VEE group 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 custom VEE group objects you create as part of your implementation. This section includes:

- A description of the D1-VEEGROUP maintenance object
- Lists of the base package VEE group business objects, including “lite” business objects
- A sample VEE group business object (D1-VEEGroup)

Maintenance Object - D1-VEEGROUP

Device business objects use the D1-VEEGROUP maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-VEEGROUP
Description	VEE Group
Service Name	D1-VEEGROUP (VEE Group Maintenance)
Tables	<ul style="list-style-type: none"> • D1_VEE_GRP (VEE Group) - Primary • D1_VEE_GRP_CHAR (VEE Group Characteristics - Child • D1_VEE_GRP_L (VEE Group Language) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following VEE group business objects:

Business Object Name	Description
D1-VEEGroup	VEE Group

The base package includes the following additional VEE group business objects:

Business Object Name	Description
D1-VEEGroupBundlingAddBO	Bundling Add BO for VEE Group
D1-VEEGroupPhysicalBO	Physical BO for VEE Group

Example VEE Group - D1-VEEGroup

The table below lists the details of the D1-VEEGroup device business object.

Option/Field	Description
Business Object	D1-VEEGroup
Description	VEE Group
Detailed Description	The Smart Meter BO of the Device MO encompasses Smart Meters of different service types.
Maintenance Object	D1-VEEGROUP (VEE Group)
Application Service	D1-VEEGROUP (VEE Group MO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none">• Display UI Map: D1-VEEGroupDisplay (VEE Group - Display)• Portal Navigation Option: d1veegrpTabMenu (VEE Group)• Maintenance UI Map: D1-VEEGroupMaint (VEE Group - Maintenance)

Use the Business Object portal to view additional details concerning this business object.

VEE Rules In Detail

This section provides details concerning the VEE rule 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 custom VEE rule objects you create as part of your implementation. This section includes:

- A description of the D1-VEERULE maintenance object
- Lists of the base package VEE rule business objects, including “lite” business objects
- Details concerning VEE rule-specific configuration options
- A sample VEE rule business object (D1-IntervalSpikeCheck)
- A list of base package VEE rules, including the algorithm / algorithm type and a brief description of each

Maintenance Object - D1-VEERULE

Device business objects use the D1-VEERULE maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-VEERULE
Description	VEE Rule
Service Name	D1-VEERULE (VEE Rule Maintenance)
Tables	<ul style="list-style-type: none"> • D1_VEE_RULE (VEE Rule) - Primary • D1_VEE_RULE_CHAR (VEE Rule Characteristics - Child • D1_VEE_RULE_L (VEE Rule Language) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following VEE rule business objects:

Business Object Name	Description
D1-GenericVEERule	Generic VEE Rule
D1-VEERuleExceptionHandler	VEE Rule Exception Handler
D1-VEERuleGroupFactor	VEE Group Matrix (Factor)
D1-VEERuleReferredVEEGroup	Execute VEE Group (Referred VEE Group)
D2-DeviceIdentifierValidation	Device Identifier Validation
D2-EnsureIMDExistsforSibling	Ensure IMD Exists for Sibling MCs
D2-IntervaAdjustmentfromScalar	Interval Adjustment from Scalar
D2-IntervalAveragingEstimation	Interval Averaging Estimation
D2-IntervalInterpolationEst	Interval Interpolation Est

Business Object Name	Description
D2-IntervalProfileEstimation	Interval Profile Estimation
D2-IntervalReplacementRule	Interval Replacement Rule
D2-IntervalSizeValidation	Interval Size Validation
D2-IntervalSpikeCheck	Interval Spike Check
D2-NegativeConsumptionCheck	Negative Consumption Check
D2-RaiseMissingQuantityExcp	Raise Missing Quantity Exception
D2-RegisterMultiplierCheck	Multiplier Check
D2-ScalarCalcFromInterval	Scalar Calculation From Interval
D2-ScalarEstimation	Scalar Estimation
D2-ScalarProfileEstimation	Scalar Profile Estimation
D2-ScalarReplacementRule	Scalar Replacement Rule
D2-SumCheck	Sum Check
D2-UOMCheck	Unit of Measure Check
D2-VEERuleHighLowCheck	High/Low Check

The base package includes the following “lite” VEE rule business objects:

Business Object Name	Description
D1-VEERuleExceptionHandlerLite	VEE Rule Exception Handler Lite
D1-VEERuleGroupFactorLite	VEE Rule Group Factor Lite

The base package includes the following additional VEE rule business objects:

Business Object Name	Description
D1-VEERuleBundlingAddBO	Bundling Add BO for VEE Rule
D1-VEERuleExecReSequence	VEE Rule Execution Resequencing (Used when resequencing VEE rules in a VEE group)
D1-VEERulePhysicalBO	Physical BO for VEE Rule

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by VEE rule business objects.

System Events

VEE rule business objects can make use of the following system events:

- **Apply VEE Rule:** This system event defines the algorithm to use when executing the VEE rule.

Other Options

VEE rules use various parameters and properties. These options are specified when creating VEE rules based on a VEE rule business object, and include the following:

Exception Types

Exception types define the properties common to exceptions. When creating validation, editing, and estimation (VEE) rules, you might create an exception type for each VEE rule. You might also create more general exception types, such as "Insufficient Data" to be used to signify that a measurement didn't have sufficient data for the VEE rule to execute.

Generic Utility VEE Rules

Oracle Utilities meter data framework includes three "generic utility" base package VEE rule types that can be used when configuring VEE groups and rules. This section outlines the configuration options you need to configure before you can create rules of these types.

Referred VEE Group: Referred VEE Group rules reference a VEE group. You must create the VEE group to reference before can create rules of this type.

Exception Handler: Exception Handler rules are used to define options and logic to terminate the VEE process when a set of user configured criteria are met. VEE rules of this type can be included in a group to specify how exceptions are handled for that group, and allow for creation of a single "parent" exception for the group. Exception Handler rules use the following options:

- **To Do Type:** An override To Do Type for To Do Entries created as a result of the rule. This To Do Type is used instead of the default (specified in the Enter algorithm on the Exception state of the initial measurement data business object's lifecycle).
- **To Do Role:** An override To Do Role for To Do Entries created as a result of the rule. This To Do Role is used instead of the default (specified in the Enter algorithm on the Exception state of the initial measurement data business object's lifecycle).
- **Exception Type:** The Exception Type for exceptions created by this rule.

VEE Group Matrix (Factor): VEE Group Factor rules are used to define business logic to allow reference to a factor (of type VEE group) where the values of the factor are a list of VEE groups. This allows creating a VEE rule that can select from a list of VEE groups (referred to as a matrix) whose rules to execute next. VEE Group Matrix (Factor) rules use the following options:

- **Factor:** The factor referenced by the rule. The factor must have a Factor Class of VEE Group (i.e. it must be based on the VEE group factor business object).
- **Characteristic Type:** The characteristic type referenced by the factor. This characteristic type must be one with pre-defined values.
- **Characteristic Type Values:** Specific values for the characteristic type. These are the values retrieved and evaluated to determine the VEE group whose rules should be executed. These must be values that can be retrieved from some object (device, service point, etc.) related to the measuring component whose initial measurement data is being validated by this rule.
- **Characteristic Source Algorithm:** The algorithm used to retrieve the characteristic value (which in turn determines the VEE group whose rules should be executed). The base package includes the following algorithm types that can be used when creating this algorithm:
 - Factor Characteristic Source - Device (D1-FCSDEVICE)
 - Factor Characteristic Source Measuring Component (D1-FCSMC)
 - Factor Characteristic Source - Service Point (D1-FCSSP)
 - Factor Characteristic Source - Usage Subscription (D1-FCSUS)
- **VEE Groups:** The VEE groups associated with each characteristic value.

Example VEE Rule - D2-IntervalSpikeCheck

The table below lists the details of the D1-IntervalSpikeCheck VEE rule business object.

Option/Field	Description
Business Object	D2-IntervalSpikeCheck
Description	Interval Spike Check
Maintenance Object	D1-VEERULE (VEE Rule)
Parent Business Object	D1-GenericVEERule
Application Service	D1-VEERULE (VEE Rule MO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> Display UI Map: D2-IntervalSpikeCheckDisplay (Interval Spike Check - Display) Portal Navigation Option: d1veerleTabMenu (VEE Rule) Maintenance UI Map: D2-IntervalSpikeCheckMaint (Interval Spike Check - Maintenance)
Algorithms	<ul style="list-style-type: none"> Apply VEE Rule: D2-INTSPKCHK (Interval Spike Check) Validation: D2-INTSPKVLD (Interval Spike Check Minimum Number of Intervals Validation)

Use the Business Object portal to view additional details concerning this business object.

Base Package VEE Rules

The following table lists the back package VEE rules. Each of these VEE rules is provided as a business object and corresponding algorithm/algorithm type.

VEE Rule	Business Object	Algorithm / Algorithm Type	Description
Generic VEE Rule	D1-GenericVEERule	N/A	Parent VEE rule for all other VEE rules, contains basic VEE rule schema elements
VEE Rule Exception Handler	D1-VEERuleExceptionHandler	D1-AVEER-EEH	Allows a user to define a set of exception count criteria that, if met, results in the termination of the VEE process.
VEE Group Matrix (Factor)	D1-VEERuleGroupFactor	D1-AVEER-FCT	Uses the factor configured on the rule to determine a VEE group whose rules are to be executed
Execute VEE Group	D1-VEERuleReferredVEEGroup	D1-AVEER-RFG	Executes the rules for the VEE group configured on the rule
Device Identifier Validation	D2-DeviceIdentifierValidation	D2-DIVIDVAL	Checks to ensure that the device identifier value of the incoming initial measurement data matches the device identifier value stored on the device.
Device Multiplier Check	D2-RegisterMultiplierCheck	D2-REGMULCHK	Checks to ensure that the device multiplier value of the incoming initial measurement data matches the multiplier value stored on the measuring component.

VEE Rule	Business Object	Algorithm / Algorithm Type	Description
Energy Sum Check	D2-SumCheck	D2-SUM-CHK	Checks the difference between the total consumption of incoming initial measurement data against the total consumption (based on final measurements) for one or more related measuring components on the same device over the same time period.
Generic High/Low Check	D2-VEERuleHighLowCheck	D2-HILO-CHK	Compares consumption of incoming initial measurement data against historical data as a means of assuring the reasonableness of the data.
Ensure IMD Exists for Sibling MCs	D2-EnsureIMDExistsforSibling	D2-ENSIMDMC	Validates that initial measurements exist for all other measuring components associated to the same device configuration as the current measuring component, for the same period of time as the current initial measurement
Interval Averaging Estimation	D2-IntervalAveragingEstimation	D2-INTAVGEST	Estimates missing interval initial measurement data based on averaging historical data for the same measuring component
Interval Interpolation Est	D2-IntervalInterpolationEst	D2-INTINTEST	Estimates missing interval initial measurement data using linear interpolation
Interval Profile Estimation	D2-IntervalProfileEstimation	D2-INTPROEST	Estimates missing interval initial measurement data based on a specified profile (a profile factor)
Interval Replacement Rule	D2-IntervalReplacementRule	D2-INTREPL	Determines whether or not an incoming initial measurement will replace any existing measurements and if so, whether or not to allow this to happen.
Interval Size Validation	D2-IntervalSizeValidation	D2-INTSIZVAL	Checks to ensure that the interval size of the incoming initial measurement data matches the value defined in the measuring component type.
Interval Spike Check	D2-IntervalSpikeCheck	D2-INTSPKCHK	Examines incoming initial measurement data to identify intervals with conspicuously high usage relative to surrounding intervals.
Negative Consumption	D2-NegativeConsumptionCheck	D2-NCON-CHK	Checks for negative consumption.
Raise Missing Quantity Exception	D2-RaiseMissingQuantityExcp	D2-RAIMISQTY	Raises an exception if a percentage of the measurements within an initial measurement are marked with a condition code that falls within a specified range
Scalar Estimation	D2-ScalarEstimation	D2-SCALAREST	Estimates missing scalar initial measurement data based on historical data for the same measuring component.

VEE Rule	Business Object	Algorithm / Algorithm Type	Description
Scalar Replacement Rule	D2-ScalarReplacementRule	D2-SCAREPRL	Identifies whether or not a scalar reading will completely replace an existing measurement and if so, whether or not to allow this to happen.
Unit Of Measure Check	D2-UOMCheck	D2-UOMCHK	Checks to ensure that the Unit of Measure (UOM) of the incoming initial measurement data matches the UOM specified on the measuring component's type.

Use the Business Object portal and Algorithm portal (or Application Viewer) to view additional details about these VEE rules. The algorithm types listed above use a set of base package measurement services. See **Appendix A: Measurement Services** for a list of available base package measurement services.

VEE Eligibility Criteria In Detail

This section provides details concerning the VEE eligibility criteria 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 custom VEE eligibility criteria objects you create as part of your implementation. This section includes:

- A description of the D1-VEEELIGCR maintenance object
- Lists of the base package VEE eligibility criteria business objects, including “lite” business objects
- Details concerning VEE eligibility criteria-specific configuration options
- A sample VEE eligibility criteria business object (D1-VEEEligibilityCriteria)

Maintenance Object - D1-VEEELIGCR

VEE eligibility criteria business objects use the D1-VEEELIGCR maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-VEEELIGCR
Description	VEE Eligibility Criteria
Service Name	D1-VEEELIGCR (VEE Eligibility Criteria)
Tables	<ul style="list-style-type: none"> • D1_VEE_ELIG_CRIT (VEE Eligibility Criteria) - Primary • D1_VEE_ELIG_CRIT_CHAR (VEE Eligibility Criteria Characteristics - Child • D1_VEE_ELIG_CRIT_L (VEE Eligibility Criteria Language) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following VEE eligibility criteria business objects:

Business Object Name	Description
D1-VEEEligibilityCriteria	VEE Eligibility Criteria

The base package includes the following additional VEE eligibility criteria business objects:

Business Object Name	Description
D1-VEEEligCritBundlingAddBO	Bundling Add BO for VEE Eligibility Criteria
D1-VEEEligCritPhysicalBO	Physical BO for VEE Eligibility Criteria

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by VEE eligibility criteria business objects.

System Events

VEE eligibility criteria business objects can make use of the following system events:

- **Apply VEE Rule Eligibility Criteria:** This system event defines the algorithm to use to apply eligibility criteria to a VEE rule.

Example VEE Eligibility Criteria - D1-VEEEligibilityCriteria

The table below lists the details of the D1-SmartMeter device business object.

Option/Field	Description
Business Object	D1-VEEEligibilityCriteria
Description	VEE Eligibility Criteria
Maintenance Object	D1-VEEELIGCR (VEE Eligibility Criteria)
Application Service	D1-VEEELIGCR(VEE Eligibility Criteria MO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none">• Portal Navigation Option: d1veerleTabMenu (VEE Rule)• Maintenance UI Map: D1-VEEEligibilityCritMaint (VEE Eligibility Criteria - Maintenance)
Algorithms	<ul style="list-style-type: none">• Apply VEE Rule Eligibility Criteria: D1-ECF-APECT (Evaluate Criteria Field - Apply Eligibility Criteria)

Use the Business Object portal to view additional details concerning this business object.

VEE Exceptions In Detail

This section provides details concerning the VEE exception 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 custom VEE exception objects you create as part of your implementation. This section includes:

- A description of the D1-VEEEXCP maintenance object
- Lists of the base package VEE exception business objects, including “lite” business objects
- A sample VEE exception business object (D1-VEEException)

Maintenance Object - D1-VEEEXCP

VEE exceptions business objects use the D1-VEEEXCP maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-VEEEXCP
Description	VEE Exception
Service Name	D1-VEEEXCP (VEE Exception Maintenance)
Tables	<ul style="list-style-type: none"> • D1_VEE_EXCP (VEE Exception) - Primary • D1_VEE_EXCP_CHAR (VEE Exception Characteristics - Child • D1_VEE_EXCP_L (VEE Exception Language) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Device Business Objects

The base package includes the following VEE exception business objects:

Business Object Name	Description
D1-VEEException	VEE Exception

Example VEE Exception - D2-VEEException

The table below lists the details of the D1-SmartMeter device business object.

Option/Field	Description
Business Object	D1-VEEException
Description	VEE Exception
Maintenance Object	D1-D1-VEEEXCP (VEE Exception)
Application Service	D1-D1-VEEEXCP (VEE Exception MO)
Instance Control	Allow New Instances

Option/Field	Description
Options	<ul style="list-style-type: none">• Display UI Map: D1-VEEExceptionDisplay (VEE Exception - Display)• Display Map Service Script: D1-VEEExcptn (Display VEE Exception Message Details)
Algorithms	<ul style="list-style-type: none">• Information: D1-VEXCPINFO (VEE Exception Information)

Use the Business Object portal to view additional details concerning this business object.

Configuring VEE Groups, Rules, Eligibility Criteria, and Exceptions

This section provides high-level overviews of the steps involved in configuring custom VEE groups and rules. See **Configuration Process Overview** on page 1-8 for a high-level overview of the overall configuration process.

This section also provides information related to creating instances of the “generic utility” VEE rules described earlier in this chapter.

Note: The procedures below focus on specific configuration tasks and options related to each of the objects described in this chapter, and do not address all the steps involved in creating business objects, UI maps, algorithms, etc. For more information about these subjects, refer to the Oracle Utilities Application Framework documentation.

Configuring Custom VEE Groups

Configuring custom VEE groups involves the following steps:

1. Design the VEE group business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom VEE group-related configuration objects required for your business objects.
3. Create your VEE group business objects, referencing the configuration objects created above as appropriate.

Configuring Custom VEE Rules

Configuring custom VEE rules involves the following steps:

1. Design the VEE rule business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom VEE rule-related configuration objects required for your business objects, including:

System Events: Create algorithms for the following system events:

- Apply VEE Rule

Options: Create data as appropriate for the following options used when creating VEE rules:

- Exception Types
- Generic Utility VEE Rules: Define the following options used with “generic utility” VEE rules
 - Referred VEE Group: VEE groups to be referenced by these rules.
 - Exception Handler: To Do Type, To Do Role, and Exception Type used by these rules.
 - VEE Group Matrix (Factor): Factor, Characteristic Type and Values, Characteristic Source Algorithm, VEE groups

3. Create your VEE rule business objects, referencing the configuration objects created above as appropriate.

Note: VEE rule business objects should reference D1-GenericVEERule as their Parent Business Object.

Configuring Custom VEE Eligibility Criteria

Configuring custom VEE eligibility criteria involves the following steps:

1. Design the VEE eligibility criteria business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom VEE eligibility criteria-related configuration objects required for your business objects, including:

System Events: Create algorithms for the following system events:

- Apply VEE Rule Eligibility Criteria

3. Create your VEE eligibility criteria business objects, referencing the configuration objects created above as appropriate.

Configuring Custom VEE Exceptions

Configuring custom VEE exceptions involves the following steps:

1. Design the VEE exception business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom VEE exception-related configuration objects required for your business objects.
3. Create your VEE exception business objects, referencing the configuration objects created above as appropriate.

Creating Generic Utility VEE Rules

This section outlines the steps involved in creating instances of the “generic utility” VEE rules. Refer to the Oracle Utilities Meter Data Framework online help and user’s guide for general procedures used in creating VEE rules.

Creating Referred VEE Group VEE Rules

Use the following procedure to create Referred VEE Group (Execute VEE Group) VEE rules:

1. Create the VEE group to which the rule will belong.
2. Create the VEE group that the rule will reference
3. Create the VEE rule referencing the group created in the previous step

Creating VEE Group Matrix (Factor) VEE Rules

Use the following procedure to create VEE Group Matrix (Factor) VEE rules:

1. Create the Characteristic Type and Values to be used by the factor that will be referenced by the rule.
2. Create the Characteristic Source Algorithm to be used by the factor that will be referenced by the rule.
3. Create the VEE Groups to be associated to the characteristic values.
4. Create the Factor that will be referenced by the rule.
5. Create the Factor Values for the factor, each referencing an effective-dated characteristic value/VEE group pairings.
6. Create the rule, referencing the factor

Creating Exception Handler VEE Rules

Use the following procedure to create Exception Handler VEE rules:

1. Create the To Do Type to be used by the rule.
2. Create the To Do Role to be used by the rule.
3. Create the Exception Type to be used by the rule.
4. Create the rule, including:
 - To Do Type, To Do Role, and Exception Type created in the previous steps.
 - Criteria comparison for the rule.

Chapter 8

Usage Subscriptions

This chapter provides descriptions of usage subscriptions and usage subscription types, including:

- **Understanding Usage Subscriptions**
- **Usage Subscriptions In Detail**
- **Usage Subscription Types In Detail**
- **Configuring Usage Subscriptions and Usage Subscription Types**

Understanding Usage Subscriptions

This section describes usage subscriptions and their role in the usage calculation process.

Usage Subscriptions

Oracle Utilities Meter Data Management can calculate and send bill determinants to other systems, such as a customer information system (CIS), an external billing system, or some other application. Before bill determinants can be calculated, you must first create a usage subscription. A usage subscription can be thought of as an ongoing request to send one or more service points' usage to one or more external systems, and defines the service point's bill determinants are calculated.

Bill determinants (usage) are derived from the final measurements of the measuring components installed at the usage subscription's service points during the calculation period. A service point is linked to measuring components through a install event linked to the measuring components' device configuration.

An Aside: No Account Object Exists

Oracle Utilities Meter Data Management (and related meter data products) is not considered the system of record for accounts or usage subscriptions. The customer information system (or some other system) is considered the system of record for this type of information. In order to minimize the amount of data that must be synchronized between systems, account-oriented attributes used by the meter data products are held on usage subscriptions. For example, if an account's ID and its customer class are relevant to usage calculations, each usage subscription must reference both elements. This is an important distinction to keep in mind when creating custom usage subscriptions for your implementation.

Multiple Service Points and Multiple Measuring Components

At any instance in time:

- A usage subscriptions may be linked to multiple service points.
- A service point may be linked to a single device configuration
- A device configuration may have multiple measuring components

The calculation period for bill determinant calculations can span many days and over this period:

- The service points linked to the usage subscription can change (service points can be added and removed)
- The device configurations installed at the service point can change (due to device reconfigurations and meter exchanges)

This means that values for each bill determinants can be calculated using multiple service points and measuring components.

Contacts

Contacts are individuals or business entities with which a company has contact. A contact exists for every individual or business related to a usage subscription. A single usage subscription can have many contacts, and a single contact may be referenced on many different usage subscriptions. Contacts have a 1-to-1 correlation with a "person" in a customer information system (CIS) and the CIS is considered the system of record for contact information.

Service Points and Contacts

As noted in the description of service points, service points can reference contacts. While this is optional, all usage subscriptions must reference at least one contact.

Note: The base-package name search on the 360° Search looks for usage subscription-related contacts. Use the Service Point Query portal to find a service point using a service point-related contact.

Service Providers

As noted in the service point chapter, service providers can be associated with a market and/or the service points in a market. This is optional and typically only set up in deregulated markets.

Usage subscriptions, on the other hand, must reference a service provider. The service provider is used as the identity of the subscribing system. In other words, you must set up a service provider for any system that subscribes to bill determinants.

Usage Subscriptions In Detail

This section provides details concerning the usage subscription 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 custom usage subscription objects you create as part of your implementation. This section includes:

- A description of the D1-US maintenance object
- Lists of the base package usage subscription business objects, including “lite” business objects
- Details concerning usage subscription-specific configuration options
- A sample usage subscription business object (D2-UsageSubscription)

Maintenance Object - D1-US

Usage subscription business objects use the D1-US maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-US
Description	Usage Subscription
Service Name	D1-US (Usage Subscription Maintenance)
Tables	<ul style="list-style-type: none">• D1_US (Usage Subscription) - Primary• D1_US_CHAR (Usage Subscription Characteristics) - Child• D1_US_CONTACT(Usage Subscription - Contact) - Child• D1_US_FACTOR_OVRD (Usage Subscription Factor Override) - Child• D1_US_IDENTIFIER (Usage Subscription Identifier) - Child• D1_US_LOG (Usage Subscription Log) - Child• D1_US_LOG_PARM (Usage Subscription Log Parameters) - Child• D1_US_SP (Usage Subscription - Service Point) - Child• D1_US_SP_CHAR (Usage Subscription - SP Characteristics) - Child• D1_US_USG_GRP (Usage Subscription - Usage Group) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following usage subscription business objects:

Business Object Name	Description
D2-UsageSubscription	Usage Subscription

The base package includes the following additional usage subscription business objects:

Business Object Name	Description
D2-USMainContact	Usage Subscription's Main Contact (Used to retrieve the usage subscription's main contact)
D2-UsageSubscription-Ext-Char	Usage Subscription
D2-UsgTranProUsgSub	Usage Subscription Transaction Processing (describes the structure and rules applicable to Usage Subscription Transaction)

Example Usage Subscription - D2-UsageSubscription

The table below lists the details of the D2-UsageSubscription usage subscription business object.

Option/Field	Description
Business Object	D2-UsageSubscription
Description	Usage Subscription
Maintenance Object	D1-US (Usage Subscription)
Application Service	D2-USBOAS (Usage Subscription BO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> Display UI Map: D2-USDisplay (Usage Subscription - Display) Portal Navigation Option: d1usmTabMenu (Usage Subscription) Display Map Service Script: D2-USRetDtls (Usage Subscription Retrieve Details for Display) Maintenance UI Map: D2-USMaint (Usage Subscription - Maintenance)

Option/Field	Description
Algorithms	<ul style="list-style-type: none">• Information: D2-USINFO (Usage Subscription Information)• Pre-Processing: D1-DEFTIMZON (Default Time Zone value based on Installation Option)• Validation: D2-USSPPRVAL (Validate that US can not be linked to Non-Parent Service Points)• Validation: D2-USSPDTVAL (Validate Start and Stop Dates of Usage Subscription's Service Points)• Validation: D2-USUGDTVAL (Validate Effectivity Period of Usage Subscription's Usage Groups)• Validation: D2-USFOVAL (Validate the Start and Stop Dates of US' Factor Overrides)• Validation: D1-VALTIMZON (Validates BO Time Zone value against Installation Option)
Lifecycle	<ul style="list-style-type: none">• Active (Initial)• Inactive (Final)

Use the Business Object portal to view additional details concerning this business object.

Usage Subscription Types In Detail

This section provides details concerning the usage subscription type 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 custom usage subscription type objects you create as part of your implementation. This section includes:

- A description of the D1-USTYPE maintenance object
- Lists of the base package usage subscription type business objects, including “lite” business objects
- Details concerning usage subscription type-specific configuration options
- A sample usage subscription type business object (D2-UsageSubscriptionType)

Maintenance Object - D1-USTYPE

Usage subscription type business objects use the D1-USTYPE maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-USTYPE
Description	Usage Subscription Type
Service Name	D1-USTYPE (Usage Subscription Type Maintenance)
Tables	<ul style="list-style-type: none"> • D1_US_TYPE (Usage Subscription Type) - Primary • D1_US_TYPE_CHAR (Usage Subscription Type Characteristics) - Child • D1_US_TYPE_FB_USG_GRP (Usage Subscription Type - Fallback Usg Grp) - Child • D1_US_TYPE_L (Usage Subscription Type - Language) - Child • D1_US_TYPE_VAL_SPR (Usage Subscription Type - Valid Service Provider) - Child • D1_US_TYPE_SP_TYPE (Usage Subscription Type - Valid Valid SP Type) - Child • D1_US_TYPE_VAL_USG_GRP (Usage Subscription Type - Valid Usage Group) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following usage subscription type business objects:

Business Object Name	Description
D2-UsageSubscriptionType	Usage Subscription Type

The base package includes the following additional usage subscription type business objects:

Business Object Name	Description
D1-UsageSubscrTypeBundlingAddBO	Bundling Add BO for Usage Subscription Type
D1-UsageSubscrTypeBO	Physical BO for Usage Subscription Type
D2-UsgTranProSubTyp	Usage Subscription Type Transaction (Describes the structure and rules applicable to Usage Subscription Type Transaction)

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by usage subscription type business objects.

Other Options

Usage subscription types define many attributes of the usage subscriptions of that type. These options are specified when creating usage subscriptions based on a usage subscription business object, and include the following:

Valid Service Point Types

These define the service point types considered valid for usage subscriptions of this type.

Valid Service Providers

These define the service providers considered valid for usage subscriptions of this type.

Usage Groups (Valid and Fallback)

Usage Groups define the usage rules to be applied to initial measurement data for usage subscriptions of this type.

- **Valid Usage Groups:** These define the usage groups considered valid for measuring components of this type.
- **Fallback Usage Groups:** These define the usage groups that can be used with all usage subscriptions of this type in situations where the usage groups defined for the usage subscriptions are not in effect. at the time usage is to be calculated Fallback usage groups have effective dates which define the point in time after which they are considered in effect.

Example Usage Subscription Type - D2-UsageSubscriptionType

The table below lists the details of the D2-UsageSubscription usage subscription type business object.

Option/Field	Description
Business Object	D2-UsageSubscriptionType
Description	Usage Subscription Type
Maintenance Object	D2-USTYPE (Usage Subscription Type)
Application Service	D2-USTYPE (Usage Subscription Type BO)
Instance Control	Allow New Instances

Option/Field	Description
Options	<ul style="list-style-type: none">• Display UI Map: D2-USTypeDisplay (Usage Subscription Type - Display)• Portal Navigation Option: d1ustypeTabMenu (Usage Subscription Type)• Maintenance UI Map: D2-USTypeMaint (Usage Subscription Type - Maintenance)

Use the Business Object portal to view additional details concerning this business object.

Configuring Usage Subscriptions and Usage Subscription Types

This section provides high-level overviews of the steps involved in configuring custom usage subscriptions and usage subscription types. See **Configuration Process Overview** on page 1-8 for a high-level overview of the overall configuration process.

Note: The procedures below focus on specific configuration tasks and options related to each of the objects described in this chapter, and do not address all the steps involved in creating business objects, UI maps, algorithms, etc. For more information about these subjects, refer to the Oracle Utilities Application Framework documentation.

Configuring Custom Usage Subscriptions

Configuring custom usage subscriptions involves the following steps:

1. Design the usage subscription business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom usage subscription-related configuration objects required for your business objects.
3. Create your usage subscription business objects, referencing the configuration objects created above as appropriate.

Configuring Custom Usage Subscription Types

Configuring custom usage subscription types involves the following steps:

1. Design the usage subscription type business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom usage subscription type-related configuration objects required for your business objects, including:

Options: Create data as appropriate for the following options used when creating usage subscription types:

- Valid Service Point Types
 - Valid Service Providers
 - Usage Groups (Valid and Fallback)
3. Create your usage subscription type business objects, referencing the configuration objects created above as appropriate.
 4. Set up admin records that define the usage subscription types you will use in your implementation.

Chapter 9

Usage Groups and Usage Rules

This chapter provides descriptions of usage groups and rules, including:

- **Understanding Usage Groups and Rules**
- **Usage Groups In Detail**
- **Usage Rules In Detail**
- **Usage Eligibility Criteria In Detail**
- **Configuring Usage Rules, Groups, and Eligibility Criteria**

Understanding Usage Groups and Rules

This section describes the usage calculation process used Oracle Utilities meter data framework and Oracle Utilities Meter Data Management, including descriptions of usage groups and rules.

The Usage Calculation Process

Oracle Utilities Meter Data Management can calculate and publish usage calculated from measurement data to service providers on an ongoing basis. In addition, external systems can request usage whenever needed. Usage calculations derive a usage transaction's usage quantities using the measurements linked to a usage subscription's service points.

The usage calculation engine and process is very similar to the VEE engine in that it is driven by configurable rules. These rules calculate a usage transaction's usage (also known as bill determinants). Usage calculation rules can also be configured to validate the usage that was calculated by earlier rules. If problems are found, exceptions are created and the usage transaction is not finalized.

Most requests for usage result in the creation of a usage transaction, but it is possible for an external application to invoke the usage calculation engine real-time. In other words, usage can be retrieved for a usage subscription real-time without creating a usage transaction. This technique is only recommended for online requests, not as part of batch processes.

See **Chapter 11: Usage Transactions** for more information about the usage calculation process.

Usage Rules and Usage Groups

The specific usage calculation processing performed on (final) measurement data is defined in individual usage rules, each performing a specific set of calculations. The base package includes rules that calculate common bill determinants including:

- Scalar reads
- Time-of-use consumption (by applying a time-of-use map to an interval channel)
- Interval curves (either real or derived)
- Virtually anything else that can be calculated from the information in the system

The base package contains several usage rules you can use in your implementation, and you can also create your own custom usage rules based on your requirements.

Usage Groups

Usage groups are collections of usage rules that are applied to measurement data. During the usage calculation process, the system executes the usage rules defined in each usage group. The rules within a usage group are defined in a specific sequence, allowing control over the order in which the rules are executed.

Fallback and Valid Usage Groups

Usage groups can be associated to a specific usage subscription, or to a usage subscription type (or both). Usage groups associated to a usage subscription type are considered “fallback” usage groups. In addition, a usage subscription's usage subscription type also defines the usage groups that can be defined for individual usage subscriptions, and that are considered “valid” to override the fallback usage groups. Only the valid usage groups on the usage subscription type can be referenced on an individual usage subscription. An individual usage subscription can have override usage groups. If the usage subscription doesn't have an override usage group for a bill determinant's calculation period, the fallback group defined on the usage subscription type is used.

Effective Dates

Unlike VEE rules, usage rules do not have individual effective dates. Usage groups associated to a usage subscription have effective and expiration dates, which define the date range during which they can be applied to usage calculations for the usage subscription. A usage subscription can have many usage groups where each has a different effective period (and multiple usage groups can be effective during a usage transaction's period). In other words, the entire usage group is effective-dated rather than the individual rules.

Note: In MDM 2.0.0, the system uses the group effective at the start of the calculation period. In MDM 2.0.1, the system calculates separate sets of bill determinants for each group in effect during the usage period.

Eligibility Criteria

Each usage rule may optionally have eligibility criteria that controls if the rule is applied. This feature can greatly reduce the number of usage groups you need to create, because it allows a single usage group to have conditional usage rules based on eligibility criteria (rather than requiring a distinct usage group for every combination of v rules).

For example, you might use eligibility criteria that specifies that a rule is only applied if the customer has solar power (or some other unique characteristic).

Referred Usage Group Rules - Reusing Groups Of Rules

Just like VEE rules, a usage rule can reference a different usage group, so commonly used rules can be encapsulated in reusable usage groups. A usage rule that executes the rules in a referenced usage group is called a Referred Usage Group (or Execute Usage Group) rule. Rules of this type can have effective eligibility criteria, just like all usage rules.

Referred Usage Group rules can be “nested.” That is, a group executed by a Referred Usage Group rule can, in turn, execute the rules in another group, and so on.

Using Factors For Variables

A situation common in many implementations involves converting one unit of measure (UOM) to another. However, the conversion factor used in conversions of this can differ based on many different types of criteria, such as the location of the service point or other characteristics. This sort of calculation can be implemented as a usage rule that accumulates consumption for one UOM and converts the consumption to a different UOM by applying a factor to it.

Factors used for this purpose have a Factor Class of “Number,” and use some unique rules:

- Number factors reference a characteristic type (with pre-defined values).
- Number factors reference an algorithm that retrieves or derives the value of the characteristic type at runtime.
- Factor values for a Number factor are effective-dated pairings of a characteristic value and a corresponding value. Because these pairings are effective-dated, the value returned from the factor can change over time for each characteristic value.

At run time, the rule retrieves / derives the characteristic value for the factor's characteristic type and then finds the value associated with the respective characteristic value.

Factors can be related to any real or dynamic attribute, so rules of this type are very flexible. For example:

- **Real Attribute:** you could create a rule that retrieves a specific value based on the location of a service point.
- **Dynamic Attribute:** you could create a rule that retrieves a percentage value based on the amount the customer conserved as compared to the same period in the prior year, returning one value if the amount conserved is between 5% and 10%, another value if the amount conserved is between 10% and 20%, and yet a third value if the amount conserved is greater

than 20%. The amount conserved is dynamically calculated at execution time and is compared to the characteristic values defined for the factor, and returns the appropriate value. In this example, if the amount conserved was anything less than 5%, no percentage value would be returned.

Usage Groups In Detail

This section provides details concerning the usage group 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 custom usage group objects you create as part of your implementation. This section includes:

- A description of the D1-USGGRP maintenance object
- Lists of the base package usage group business objects, including “lite” business objects
- A sample usage group business object (D1-UsageGroup)

Maintenance Object - D1-USGGRP

Usage group business objects use the D1-USGGRP maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-USGGRP
Description	Usage Group
Service Name	D1-USAGEGRP (Usage Group Maintenance)
Tables	<ul style="list-style-type: none"> • D1_USG_GRP (Usage Group) - Primary • D1_USG_GRP_CHAR (Usage Group Characteristics - Child • D1_USG_GRP_L (Usage Group Language) - Child • D1_USG_GRP_VAL_DC_TYPE (Usage Group - Valid DC Types) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following usage group usage business objects:

Business Object Name	Description
D1-UsageGroup	Usage Group

The base package includes the following additional usage group business objects:

Business Object Name	Description
D1-UsageGroupBundlingAddBO	Bundling Add BO for Usage Group
D1-UsageGroupPhysicalBO	Physical BO for Usage Group

Example Usage Group - D1-UsageGroup

The table below lists the details of the D1-UsageGroup device business object.

Option/Field	Description
Business Object	D1-UsageGroup
Description	Usage Group
Maintenance Object	D1-USGGRP (Usage Group)
Application Service	D1-USAGEGRP (Usage Group MO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none">• Display UI Map: D1-UsageGroupDisplay (Usage Group - Display)• Portal Navigation Option: d1usggrpTabMenu (Usage Group)• Maintenance UI Map: D1-UsageGroupMaint (Usage Group - Maintenance)

Use the Business Object portal to view additional details concerning this business object.

Usage Rules In Detail

This section provides details concerning the usage rule 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 custom usage rule objects you create as part of your implementation. This section includes:

- A description of the D1-USGRULE maintenance object
- Lists of the base package usage rule business objects, including “lite” business objects
- Details concerning usage rule-specific configuration options
- A sample usage rule business object (D2-ApplyMathInt)
- A list of base package usage rules, including the algorithm / algorithm type and a brief description of each

Maintenance Object - D1-USGRULE

Device business objects use the D1-USGRULE maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-USGRULE
Description	Usage Rule
Service Name	D1-USAGERULE (Usage Rule Maintenance)
Tables	<ul style="list-style-type: none"> • D1_USG_RULE (usage Rule) - Primary • D1_USG_RULE_CHAR (usage Rule Characteristics - Child • D1_USG_RULE_L (usage Rule Language) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following usage rule business objects:

Business Object Name	Description
D1-GenericUsageRule	Generic Usage Rule
D1-UsageRuleReferredUsageGroup	Execute Usage Group
D2-ApplyMathInt	Apply Math (Interval Data)
D2-GetIntervalData	Get Interval Data
D2-GetScalar	Get Scalar Details
D2-GetTOUUsage	Get TOU Mapped Usage
D2-ValAgainstTol	Validate Against Tolerance

The base package includes the following “lite” usage rule business objects:

Business Object Name	Description
D1-UsageRuleExeReSequenceLit	Usage Rule Execution Resequencing Lite BO

The base package includes the following additional usage rule business objects:

Business Object Name	Description
D1-UsageRuleBundlingAddBO	Bundling Add BO for VEE Rule
D1-UsageRulePhysicalBO	Physical BO for VEE Rule

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by usage rule business objects.

System Events

Usage rule business objects can make use of the following system events:

- **Apply Usage Rule:** This system event defines the algorithm to use when executing the usage rule.
- **Validation:** This system event defines the algorithm to use to validate the measurement data used by the usage rule.

Other Options

Usage rules use various parameters and properties. These options are specified when creating usage rules based on a usage rule business object, and include the following:

Generic Utility VEE Rules

Oracle Utilities meter data framework includes one "generic utility" base package usage rule type that can be used when configuring usage groups and rules. This section outlines the configuration options you need to configure before you can create rules of these types.

Referred Usage Group: Referred Usage Group rules reference a usage group. You must create the usage group to reference before can create rules of this type.

Example Usage Rule - D2-ApplyMathInt

The table below lists the details of the D2-ApplyMathInt device business object.

Option/Field	Description
Business Object	D2-ApplyMathInt
Description	Apply Math (Interval Data)
Maintenance Object	D1-USGRULE (Usage Rule)
Parent Business Object	D1-GenericUsageRule
Application Service	D1-USAGERULE (Usage Rule MO)
Instance Control	Allow New Instances

Option/Field	Description
Options	<ul style="list-style-type: none"> Display UI Map: D2-ApplyMathIntDisplay (Usage Rule-Apply Math (Interval Data) Display) Portal Navigation Option: d1usgrleTabMenu (Usage Rule) Maintenance UI Map: D2-ApplyMathIntMaint (Usage Rule-Apply Math (Int) - Maintenance)
Algorithms	<ul style="list-style-type: none"> Apply Usage Rule: D2-APPMATHIN Apply Math (interval data) Validation: D2-VALAPPMTH (Apply Math on Interval Data - Validation)

Use the Business Object portal to view additional details concerning this business object.

Base Package Usage Rules

The following table lists the back package usage rules. Each of these usage rules is provided as a business object and corresponding algorithm/algorithm type.

Usage Rule	Business Object	Algorithm / Algorithm Type	Description
Generic Usage Rule	D1-GenericUsageRule	N/A	Parent usage rule for all other usage rules, contains basic usage rule schema elements
Apply Math (Interval Data)	D2-ApplyMathInt	D2-APPMATHIN	A usage rule used to summarize interval measurements and apply a mathematical formula against the results to derive a usage quantity.
Get Interval Data	D2-GetIntervalData	D2-GETINTDAT	A usage rule used to get interval data for a measuring component and date range.
Get Scalar Details	D2-GetScalar	D2-GETSCALAR	A usage rule used to assemble scalar readings and measurements (consumption).
Get TOU Mapped Usage	D2-GetTOUUsage	D2-GETTOUUSG	A usage rule used to summarize interval measurements into TOU buckets based on a TOU map (where the TOU map is created based on the schedule defined within a TOU map template).
Validate Against Tolerance	D2-ValAgainstTol	D2-VALUSGTOL	A usage rule used to validate calculated usage against a specified tolerance.

Use the Business Object portal and Algorithm portal (or Application Viewer) to view additional details about these usage rules.

Usage Eligibility Criteria In Detail

This section provides details concerning the usage rule eligibility criteria 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 custom usage rule eligibility criteria objects you create as part of your implementation. This section includes:

- A description of the D1-USGRLELIG maintenance object
- Lists of the base package usage rule eligibility criteria business objects, including “lite” business objects
- Details concerning usage eligibility criteria-specific configuration options
- A sample usage rule eligibility criteria business object (D1-UsgRuleEligibilityCriteria)

Maintenance Object - D1-USGRLELIG

usage eligibility criteria business objects use the D1-USGRLELIG maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-USGRLELIG
Description	Usage Rule Eligibility Criteria
Service Name	D1-USGRLELIG (Usage Eligibility Criteria Maintenance)
Tables	<ul style="list-style-type: none">• D1_USG_RULE_ELIG_CRIT (Usage Rule Eligibility Criteria) - Primary• D1_USG_RULE_ELIG_CRIT_CHAR (Usage Rule EC Characteristics - Child• D1_USG_RULE_ELIG_CRIT_L (Usage Rule Eligibility Criteria Language) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following usage rule eligibility criteria business objects:

Business Object Name	Description
D1-UsgRuleEligibilityCriteria	Usage Rule Eligibility Criteria

The base package includes the following additional usage rule eligibility criteria business objects:

Business Object Name	Description
D1-UsageRuleEligCritBundlingAddBO	Bundling Add BO for VEE Eligibility Criteria
D1-UsageRuleEligCritPhysicalBO	Physical BO for VEE Eligibility Criteria

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by usage rule eligibility criteria business objects.

System Events

Usage rule eligibility criteria business objects can make use of the following system events:

- **Apply Usage Rule Eligibility Criteria:** This system event defines the algorithm to use to apply eligibility criteria to a usage rule.

Example Usage Rule Eligibility Criteria - D1-UsgRuleEligibilityCriteria

The table below lists the details of the D1-UsgRuleEligibilityCriteria usage rule eligibility criteria business object.

Option/Field	Description
Business Object	D1-UsgRuleEligibilityCriteria
Description	Usage Rule Eligibility Criteria
Maintenance Object	D1-USGRLELIG (Usage Rule Eligibility Criteria)
Application Service	D1-USGRLELIG (Usage Rule Eligibility Criteria MO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> • Portal Navigation Option: d1usgrleTabMenu (Usage Rule) • Maintenance UI Map: D1-UsageEligibilityCritMaint (Usage Rule Eligibility Criteria Maintenance)
Algorithms	<ul style="list-style-type: none"> • Apply Usage Rule Eligibility Criteria: D1-ECF-APUSG (Evaluate Criteria Field - Apply Eligibility Criteria)

Use the Business Object portal to view additional details concerning this business object.

Configuring Usage Rules, Groups, and Eligibility Criteria

This section provides high-level overviews of the steps involved in configuring custom usage groups and rules. See **Configuration Process Overview** on page 1-8 for a high-level overview of the overall configuration process.

This section also provides information related to creating instances of the Referred Usage Group “generic utility” usage rule described earlier in this chapter.

Note: The procedures below focus on specific configuration tasks and options related to each of the objects described in this chapter, and do not address all the steps involved in creating business objects, UI maps, algorithms, etc. For more information about these subjects, refer to the Oracle Utilities Application Framework documentation.

Configuring Custom Usage Groups

Configuring custom usage groups involves the following steps:

1. Design the usage group business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom usage group-related configuration objects required for your business objects.
3. Create your usage group business objects, referencing the configuration objects created above as appropriate.

Configuring Custom Usage Rules

Configuring custom usage rules involves the following steps:

1. Design the usage rule business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom usage rule-related configuration objects required for your business objects, including:

System Events: Create algorithms for the following system events:

- Apply Usage Rule

Options: Create data as appropriate for the following options used when creating usage rules:

- Generic Utility Usage Rules: Define the following options used with “generic utility” usage rules
 - Referred Usage Group: Usage groups to be referenced by these rules.

3. Create your usage rule business objects, referencing the configuration objects created above as appropriate.

Note: Usage rule business objects should reference D1-GenericUsageRule as their Parent Business Object.

Configuring Custom Usage Rule Eligibility Criteria

Configuring custom usage eligibility criteria involves the following steps:

1. Design the usage eligibility criteria business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom usage eligibility criteria-related configuration objects required for your business objects, including:

System Events: Create algorithms for the following system events:

- Apply Usage Rule Eligibility Criteria
3. Create your usage eligibility criteria business objects, referencing the configuration objects created above as appropriate.

Creating Referred Usage Group Usage Rules

Use the following procedure to create Referred Usage Group (Execute Usage Group) usage rules:

1. Create the usage group to which the rule will belong.
2. Create the usage group that the rule will reference
3. Create the usage rule referencing the group created in the previous step

Creating Number Factors

Use the following procedure to create number factors used in usage rules.

1. Create the Characteristic Type and Values to be used by the factor that will be referenced by the rule.
2. Create the Characteristic Source Algorithm to be used by the factor that will be referenced by the rule.
3. Create the Factor that will be referenced by the rule.
4. Create the Factor Values for the factor, each referencing an effective-dated characteristic value/value pairings.

Chapter 10

TOU Maps and Dynamic Options

This chapter provides descriptions of time of use (TOU) maps and dynamic options. This chapter includes:

- **Understanding Time of Use, TOU Maps, and Dynamic Options**
- **TOU Maps in Detail**
- **Dynamic Options in Detail**
- **Dynamic Option Events in Detail**
- **Configuring TOU Maps and Dynamic Options**

Understanding Time of Use, TOU Maps, and Dynamic Options

This section describes time of use, TOU maps, dynamic options, and dynamic option events, and how they are used in Oracle Utilities meter data framework and Oracle Utilities Meter Data Management.

Time of Use

A type of rate used at many utilities is known as a “time of use” rate. For these rates, the price is based on when the usage occurs. For example, prices are typically higher during peak consumption periods (commonly referred to as “On Peak” periods) to encourage lower use during these times. The time range when a given price is applicable is known as a time-of-use (TOU) period.

Time of use periods can (and often do) change during the year.

For example, in the summer, TOU periods might be defined as follows:

Time of Use Period	Time Periods
On Peak	8:00 AM - 9:00 PM Monday - Friday
Off Peak	12:00 AM - 8:00 AM Monday - Friday 9:00 PM - 12:00 AM Monday - Friday 12:00 AM - 12:00 AM Saturday, Sunday, and Holidays

While winter TOU periods might be defined as follows:

Time of Use Period	Time Periods
On Peak	11:00 AM - 5:00 PM Monday - Friday
Off Peak	12:00 AM - 11:00 AM Monday - Friday 5:00 PM - 12:00 AM Monday - Friday 12:00 AM - 12:00 AM Saturday, Sunday, and Holidays

This is an example of a "simple" mass-market time-of-use schedule; commercial and industrial schedules can be much more complex.

Recording Usage for Time of Use Periods

Generally speaking, there are two different types of meters that can be installed at service points that participate in TOU rates:

- Scalar meters with dedicated registers for each TOU period. For this type of meter, the scalar measurements are the TOU consumption and no special derivation is necessary.
- Interval meters that measure how much is consumed each interval. For this type of meter, the interval measurements are used to derive the consumption in each TOU period.

TOU Periods are Used by the User Interface and Usage Calculation Process

While the requirement to aggregate interval consumption into TOU periods is the principal reason behind TOU maps, the system has many zones that display interval consumption using TOU periods.

The TOU concepts described in this chapter are also used when bill determinants are aggregated into TOU periods as part of the usage calculation process.

TOU Maps

Interval consumption is mapped into time-of-use periods using a TOU map. TOU maps define the TOU periods for each interval. TOU map data is structured in a format very similar to final measurement data, with specified intervals of time each designated a TOU period (instead of a measurement value). For example, the table below lists a set of TOU map data and corresponding final measurements for a period of 4 hours on January 1, 2010.

TOU Map: 463524764		Measuring Component ID: 31425364	
Date/Time	TOU Code	Date/Time	Final Consumption
1-Jan-10 3:00pm	ONPEAK	1-Jan-10 3:00pm	14.678
1-Jan-10 4:00pm	ONPEAK	1-Jan-10 4:00pm	29.12
1-Jan-10 5:00pm	ONPEAK	1-Jan-10 5:00pm	12.12
1-Jan-10 6:00pm	OFFPEAK	1-Jan-10 6:00pm	17.16

Any type of final measurement can be mapped to a TOU period, including derived quantities,

TOU Periods and TOU Groups

Some utilities use many TOU periods. For example, a TOU rate might have different prices depending on:

- The season of the year (winter, spring, summer, fall)
- The time of day (peak, off peak, shoulder)
- The actual temperature as compared to the historic average (normal, hotter, colder)

This rate would require 24 TOU periods (4 seasons * 3 time of days * 3 temperature bands). In contrast to this, another rate might have prices that differ only depending on the time of day (peak, off peak, shoulder). This rate would require only 3 TOU periods.

To help in tracking and maintaining TOU periods, you can create TOU groups, which define the TOU periods that can be used on a TOU map.

When TOU data is created for a TOU map, only TOU periods defined on a specified TOU group can be specified.

TOU Map Templates

Every TOU map references a TOU map template that defines the rules for generating TOU data from that TOU map. Specifically, TOU map templates define:

- The TOU group (defines the valid TOU periods for the template) used for the TOU map
- The default TOU period used for periods not explicitly defined. (This means you don't have to specify dates and times for all periods. For example, if your default TOU period is "Off Peak" you only need to define dates and days and times for On Peak or other TOU periods.)
- The specific date ranges, days of the week, and time periods designated for each TOU period.

The system periodically generates TOU map data for TOU maps by interpreting the rules defined template.

Holidays

Many utilities categorize consumption on holidays differently than on the day of week on which the holiday falls. For example, holiday consumption might be categorized as Off-Peak regardless of the day it falls on. TOU map templates can define rules for different TOU periods for holidays by specifying the following:

- A Work Calendar that defines when holidays start and end
- Either:
 - A Holiday TOU period for consumption on holiday
 - A Holiday TOU Map Template that defines the TOU codes to use for different times in the year

TOU Map Template Interval Size

TOU map templates can also specify an interval size (in seconds-per-interval, or SPI). This value specifies the duration of the individual TOU map data records, and also controls the values allowed in the Start and End Times. For example, if a TOU map template sets the interval size at 15 minutes, Start and End times must be in units of the interval size (10:00, 10:15, 10:30, etc.).

A TOU map template can be used to generate TOU map data for TOU maps whose SPI is divisible by the template's SPI. For example, a 60 minute template can be used to generate TOU data for TOU maps with SPIs of 60 minutes, 15 minutes, 5 minutes, etc. This means separate map templates are not needed for every SPI.

TOU Map Types

TOU map types define attributes shared by TOU maps of a given type. Among these are the business object used for TOU maps of the given type, as well as interval size and TOU map templates.

TOU Map Type Interval Size

As noted in the **Chapter 4: Devices, Measuring Components, and, Device Configurations**, a measuring component's measuring component type defines its interval size (or SPI), which in turn controls the times on the measuring component's measurements.

In a similar way, every TOU map references a TOU map type that defines its interval size (and other properties). This SPI controls the times on the TOU map's TOU data.

The SPI of a TOU map must divide evenly into the SPI of any measuring component that uses the map (because the system joins the date/time of the measurement to the date/time of the TOU data). This means that it is possible to use a 15 minute TOU map with a 60 minute measuring component. However, it is not OK to have a 60 minute TOU map used with a 15 minute measuring component because the join will miss 3 out of 4 measurements.

Default and Override TOU Map Templates

While most TOU maps will use the TOU map template defined on the TOU map type, TOU maps also support a fallback/override pattern used in other areas of the system.

- A TOU map's TOU map type defines the default (or "fallback") TOU map template that's used to generate its TOU data.
- A TOU map's type defines the TOU map templates that can be referenced on individual TOU maps to override the "fallback" template.
- An individual TOU map can have an override template. If the TOU map doesn't have an override template, the fallback template defined on the TOU map type is used to generate the map's TOU data.

Dynamic Options and Dynamic Option Events

There are circumstances and conditions during which the rules for creating TOU map data might need to be calculated differently than according to the utility's standard rules. Examples of this might include critical peak periods, curtailment requests, or demand response events. During these types of events, the TOU rules defined for a TOU map must be overridden. This is done through the use of dynamic options, and dynamic option events.

Dynamic options define specific types of events which can impact how TOU map data is generated. Using the examples listed above, you might create dynamic options such as the following:

- Critical Peak Period (CPP)
- Curtailment (CURTAIL)
- Demand Response Event (DR_EVENT)

Dynamic option events define the specific periods of time during which a dynamic option is in effect. For example, if the utility identifies the period between 10:00 AM and 2:00 PM on August 2 as a critical peak period, a dynamic option event for this might look like this:

- **Dynamic Option ID:** Critical Peak Period
- **Start Date/Time:** 08/02/2010 10:00 AM
- **Stop Date/Time:** 08/02/2010 2:00 PM

A dynamic option may have many dynamic option events over time.

Dynamic Options and TOU Maps

To apply a dynamic option (and one or more of its related dynamic option events), you reference the dynamic option on a TOU map, along with a corresponding “dynamic” TOU map to be used during the dynamic option event.

To continue the example from above, for Critical Peak Periods you might add a new TOU period (called “Critical Peak”), and create a new TOU map that is the same as your standard TOU map, but that also includes your Critical Peak TOU period. For example, in the summer your new set of TOU periods might be defined as follows:

Time of Use Period	Time Periods
Critical Peak	10:00 AM - 2:00 PM Monday - Friday
On Peak	8:00 AM - 9:00 PM Monday - Friday
Off Peak	12:00 AM - 8:00 AM Monday - Friday 9:00 PM - 12:00 AM Monday - Friday 12:00 AM - 12:00 AM Saturday, Sunday, and Holidays

If a dynamic option event occurs during a usage transaction period, the standard TOU map is overridden with the “dynamic” TOU map. In our example, a usage transaction period that includes August 2010 would use the dynamic TOU map when generating TOU map data for the time between 10:00 AM and 2:00 PM on August 2, but would use its standard TOU map for the rest of the month.

TOU Maps in Detail

This section provides details concerning the TOU map 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 custom TOU map objects you create as part of your implementation. This section includes:

- A description of the D1-TOUMAP maintenance object
- Lists of the base package TOU map business objects, including “lite” business objects
- Details concerning TOU map-specific configuration options
- A sample TOU map business object (D2-TOUMap)

Maintenance Object - D1-TOUMAP

Service point business objects use the D1-TOUMAP maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-TOUMAP
Description	Time of Use Map
Service Name	D1-TOUMAP (Time of Use Maintenance)
Tables	<ul style="list-style-type: none">• D1_TOU_MAP (Time of Use Map) - Primary• D1_TOU_MAP_CHAR (Time of Use Map Characteristics) - Child• D1_TOU_MAP_DYN_OPT (Time of Use Map Dynamic Option) - Child• D1_TOU_MAP_L (Time of Use Map Language) - Child• D1_TOU_MAP_LOG (Time of Use Map Log) - Child• D1_TOU_MAP_LOG_PARM (Time of Use Map Log Parameter) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following TOU map business objects:

Business Object Name	Description
D2-TOUMap	Time of Use Map

The base package includes the following “lite” service point business objects:

Business Object Name	Description
D2-TOUMapLite	Time of Use Map Lite

Configuration Options

This section outlines specific configuration options, such as business object options, system events, and other options used by TOU map business objects.

Business Object Options

TOU map business objects can make use of the following business object options:

- **TOU Map Data Business Object:** This option defines the business object used for TOU map data created by TOU maps created from this business object.

System Events

TOU map business objects can make use of the following system events:

- **TOU Map (BO) - Create TOU Map Data:** This system event defines the algorithm used for create TOU map data for TOU maps created from this business object.

Example TOU Map - D2-TOUMap

The table below lists the details of the D2-TOUMap TOU map business object.

Option	Description
Business Object	D1-TOUMap
Description	Time of Use Map
Maintenance Object	D1-TOUMAP (Time of Use Map)
Application Service	D1-TOUMAPBOAS (TOU Map BO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> • TOU Map Data Business Object: D2-TOUMapData (TOU Map Data) • Display UI Map: D2-TOUMapDisplay (TOU Map - Display) • Portal Navigation Option: d1toumapTabMenu (TOU Map) • Display Map Service Script: D2-TOUMapDis (TOU Map Display) • Maintenance UI Map: D2-TOUMapMaint (TOU Map - Maintenance)
Algorithms	<ul style="list-style-type: none"> • TOU Map (BO) - Create TOU Map Data: D2-CRETMD-CT (Create TOU Map Data) • Pre-Processing: D2-DEL-TOUMD (Delete TOU Map Data) • Validation: D2-TOUMAP-VL (TOU Map Validation)
Lifecycle	<ul style="list-style-type: none"> • Active (Initial) • Inactive (Final)

Use the Business Object portal to view additional details concerning this business object.

Dynamic Options in Detail

This section provides details concerning the dynamic option 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 custom dynamic option objects you create as part of your implementation. This section includes:

- A description of the D1-DOP maintenance object
- Lists of the base package dynamic option business objects
- A sample dynamic option business object (D2-DynamicOption)

Maintenance Object - D1-DOP

Dynamic option business objects use the D1-DOP maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-DOP
Description	Dynamic Option
Service Name	D1-DOP (Dynamic Option Maintenance)
Tables	<ul style="list-style-type: none">• D1_DYN_OPT (Dynamic Option) - Primary• D1_DYN_OPT_CHAR (Dynamic Option Characteristics) - Child• D1_DYN_OPT_L (Dynamic Option Language) - Child• D1_DYN_OPT_LOG (Dynamic Option Log) - Child• D1_DYN_OPT_LOG_PARM (Dynamic Option Log Parameter) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following dynamic option business objects:

Business Object Name	Description
D2-DynamicOption	Dynamic Option

Example Dynamic Option - D2-TOUMap

The table below lists the details of the D2-DynamicOption dynamic option business object.

Option	Description
Business Object	D2-DynamicOption
Description	Dynamic Option
Maintenance Object	D1-DOP (Dynamic Option)
Application Service	D1-DOPBOAS (Dynamic Option BO)

Option	Description
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none">• Related Transaction BO: D2-DynamicOptionEvent (Dynamic Option Event)• Display UI Map: D2-DyOpDisplay (Dynamic Option - Display)• Portal Navigation Option: d1dyopmTabMenu (Dynamic Option)• Display Map Service Script: D2-DynOpSt (Dynamic Option Status Description)• Maintenance UI Map: D2-DyOpMaint (Dynamic Option - Maintenance)
Algorithms	<ul style="list-style-type: none">• Information: D2-DOP-INFO (Dynamic Option Information)
Lifecycle	<ul style="list-style-type: none">• Active (Initial)

Use the Business Object portal to view additional details concerning this business object.

Dynamic Option Events in Detail

This section provides details concerning the dynamic option event 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 custom dynamic option event objects you create as part of your implementation. This section includes:

- A description of the D1-DOPEVT maintenance object
- Lists of the base package dynamic option event business objects
- A sample dynamic option event business object (D2-DynamicOptionEvent)

Maintenance Object - D1-DOPEVT

Dynamic option business objects use the D1-DOPEVT maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-DOPEVT
Description	Dynamic Option Event
Service Name	D1-DOPEVT (Dynamic Option Event Maintenance)
Tables	<ul style="list-style-type: none">• D1_DYN_OPT_EVENT (Dynamic Option Event) - Primary• D1_DYN_OPT_EVENT_CHAR (Dynamic Option Event Characteristics) - Child• D1_DYN_OPT_EVENT_LOG (Dynamic Option Event Log) - Child• D1_DYN_OPT_EVENT_LOG_PARM (Dynamic Option Event Log Parameter) - Child

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following dynamic option business objects:

Business Object Name	Description
D2-DynamicOptionEvent	Dynamic Option Event

Example Dynamic Option - D2-TOUMap

The table below lists the details of the D2-DynamicOption dynamic option business object.

Option	Description
Business Object	D2-DynamicOptionEvent
Description	Dynamic Option Event
Maintenance Object	D1-DOPEVT (Dynamic Option)
Application Service	D1-DOPEVTBOAS (Dynamic Option Event BO)

Option	Description
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> • Display UI Map: D2-DyOpEDisplay (Dynamic Option Event - Display) • Portal Navigation Option: d1dyopemTabMenu (Dynamic Option Event) • Pre-Processing Service Script: D2-DyOpEPre (Dynamic Option Event Preprocessing Service Script) • Display Map Service Script: D2-DyOpEStat (Dynamic Option Event Status Description) • Maintenance UI Map: D2-DyOpEMaint (Dynamic Option Event - Maintenance)
Algorithms	<ul style="list-style-type: none"> • Information: D2-DOPEVTINF (Dynamic Option Event Information) • Pre-Processing: D2-DYOPEPR (Shift Dynamic Option Event Date/Times into Standard Time)
Lifecycle	<ul style="list-style-type: none"> • Frozen (Initial)

Use the Business Object portal to view additional details concerning this business object.

Configuring TOU Maps and Dynamic Options

This section provides high-level overviews of the steps involved in configuring custom TOU maps, dynamic options, and dynamic option events. See **Configuration Process Overview** on page 1-8 for a high-level overview of the overall configuration process.

Note: The procedures below focus on specific configuration tasks and options related to each of the objects described in this chapter, and do not address all the steps involved in creating business objects, UI maps, algorithms, etc. For more information about these subjects, refer to the Oracle Utilities Application Framework documentation.

Configuring Custom TOU Maps

Configuring custom TOU maps involves the following steps:

1. Design the TOU map business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom TOU map-related configuration objects required for your business objects, including:

Business Object Options: Create business objects for the following business object options:

- TOU Map Data Business Object

System Events: Create algorithms for the following system events:

- TOU Map (BO) - Create TOU Map Data

3. Create your TOU map business objects, referencing the configuration objects created above as appropriate.
4. Set up admin records that define the TOU map types you will use in your implementation.

Configuring Custom Dynamic Options

Configuring custom dynamic options involves the following steps:

1. Design the dynamic option business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom dynamic option-related configuration objects required for your business objects.
3. Create your dynamic option business objects, referencing the configuration objects created above as appropriate.

Configuring Custom Dynamic Option Events

Configuring custom dynamic option events involves the following steps:

1. Design the dynamic option event business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom dynamic option event-related configuration objects required for your business objects.
3. Create your dynamic option event business objects, referencing the configuration objects created above as appropriate.

Chapter 11

Usage Transactions

This chapter provides descriptions of usage transactions, including:

- **Understanding Usage Transactions**
- **Usage Transactions In Detail**
- **Configuring Usage Transactions**

Understanding Usage Transactions

This section describes usage transactions and their role in the usage calculation process.

Usage Transactions Overview

Usage transactions are records of bill determinant calculations for a usage subscription. Attributes used to define usage transactions can include the following:

- **Usage Subscription:** The usage subscription for which the usage transaction was created.
- **Status:** the current state of the usage transaction
- **Start and End Date and Times:** The start and end times that define the time period for the usage transaction.
- **Usage Group:** The usage group (or groups) used to calculate usage for the usage transaction.
- **Bill Condition:** The status of the bill associated with the usage transaction (if applicable).
- **Trace:** Indicates if tracing is on for the usage transaction.
- **Interval Measuring Component:** Start and End dates and times for the interval measuring component that created the measurements used in calculating usage for the usage transaction (if applicable).
- **Scalar Measuring Component:** Start and End dates and times (and other details) for the scalar measuring component that created the measurements used in calculating usage for the usage transaction (if applicable).
- **Date Break:** One or more date breaks for the usage transaction. Date breaks are used to break up a usage period into sub-periods based on the dates on which rate changes took place for the service point (and its related account).
- **Issues:** A list of issues or exceptions related to the usage transaction
- **Scalar Detail:** Details of scalar measurements used in calculating for the usage transaction
- **Usage Period:** A list of the service quantities calculated for the usage transaction, including the following:
 - UOM, TOU, SQI (as applicable)
 - Quantity
 - Service Point
 - SQ (Service Quantity) Type
 - Measuring Component
 - TOU Map (if applicable)
 - Usage Group
 - Usage Rule

Usage Transactions - A Closer Look

This section provides more details concerning some specific aspects of usage transactions.

Calculation Period

Usage transaction requests must specify the date range for the usage transaction. This date range is referred to as the calculation period for the usage transaction. The dates that define the calculation period are specified by a subscribing system when it requests a usage transaction.

Date Breaks

As noted above, date breaks are used to break up a usage period into sub-periods based on the dates on which rate changes took place for the service point. For example, suppose a subscribing system requests usage for the month of January. The customer for this request has an interval meter, and the customer's usage is calculated by applying a TOU map to their interval consumption. The subscribing system detects that the customer's rate changed in the middle of January (January 16) and wants the TOU consumption calculated in two "chunks" (before and after the rate change). Because the customer has an interval meter, the exact consumption amounts before and after the rate change can be precisely calculated (as opposed to calculating each period's amount by dividing the total usage by the number of days in each period).

One approach to this situation would be for the subscribing system to request two usage transactions (where each has the desired date range). Another approach is for the subscribing system to request a single usage transaction with date breaks that define the date ranges before and after the rate change. To continue the above example, a usage transaction could be created with a date break on January 16.

If a usage transaction has date break(s), the usage calculation engine segregates the usage into multiple usage periods based on the date breaks. If there are no date breaks in the usage transaction, a single usage period is created for the entire calculation period.

As of the v2.0.0 release, the only way a usage transaction can have date breaks is if the subscribing system supplies these when it requests usage (only the subscribing system knows if and when its prices and pricing rules change during the billing period). If an implementation has additional criteria that causes date breaks, these criteria can be easily added to the usage transaction's business rules.

Service Quantities

Every usage period created for a usage transaction contains one or more service quantities.

Service quantities are calculated by the usage group's rules specified for the usage subscription from which the usage transaction is created. For example, a usage transaction might have service quantities calculated by a single rule that applies a TOU map to the kWh channel on the device configuration installed at the service point.

Each service quantity lists details about that quantity, including a UOM (or TOU or SQI as appropriate) and a quantity. In addition, each service quantity also references the source (measuring component) of the quantities (for audit purposes).

The base-package usage rules can calculate different types of service quantities. For example, a usage group with two rules might create the following types of service quantities:

- One that retrieves and snapshots the interval for the kWh channel
- One that applies a TOU map to the channel and saves the results

Performance Note: the base-package rule that snapshots intervals can create a large amount of data. This should only be used if the subscribing system requires the intervals. For example, you should not snapshot intervals on a usage transaction for audit purposes.

Service Quantities for Scalar Usage

Usage transactions and service quantities for scalar usage differ in some ways from those created from interval usage. For example, suppose a subscribing system requests usage for the month of January for a customer with a scalar meter that has been exchanged mid-month. In this case, the customer's usage is calculated by finding the scalar readings in the requested period (including all meter exchanges), and the subscribing system requires a record of all scalar readings AND a total of their consumption.

Scalar rules cannot use date breaks because the system doesn't store interval values so it cannot accurately compute the amount in each period. In this case, scalar usage rules retrieve scalar readings for the service points linked to the usage subscription, and then creates a single usage period for the usage transaction's entire calculation period. The individual scalar readings are captured as "scalar details" in the usage transaction.

To continue the example above, there would be 2 entries in the Scalar Details, one for each meter, and a single usage period that contains the total consumption for the entire calculation period. The tables below illustrate what this might look like.

Scalar Details:

Final Usage	Usage Group	Measured Usage UOM/TOU/SQI	Service Point	Measuring Component	Start Reading	Stop Reading
202 BTU	Residential / Retrieve Scalar	200 CCF	39191912312 (18 Main St)	8382821921 (CCF register)	1-Jan-10 3pm 10000	15-Jan-10 6pm 10200
303 BTU	Residential / Retrieve Scalar	300 CCF	39191912312 (18 Main St)	8382821921 (CCF register)	15-Jan-10 6pm 10200	30-Jan-10 4pm 10500

Usage Period:

Date/Time Range	
1-Jan-10 3:00pm to 30-Jan-10 4:00pm	
UOM/TOU/SQ	Usage
BTU	505 BTU

This example also illustrates how a usage rule can convert a Measured UOM (CCF) into a Final UOM (therms).

Usage Transaction Exceptions

Usage rules can both calculate usage and validate that the calculated usage is reasonable. The usage calculation process creates an exception for each problem encountered. Multiple exceptions can be created when a usage transaction is subject to validation. This allows users to see all of the problems detected by the usage calculate process.

Note: Usage exceptions are held within the usage transaction (in its CLOB).

This contrast to VEE exceptions is intentional as usage transaction exceptions should be very rare whereas VEE exceptions are relatively common.

Exception Categories

Similar to VEE exceptions, there are three categories, or severities of usage exceptions:

- **Info:** Used to highlight something interesting, but not sufficient to cause the usage calculation to be put into the exception state.

- **Issue:** Used to report a problem that will prevent the usage transaction from being finalized. Multiple "issue exceptions" can be created during usage calculation. If at least one issue exists after all rules have been applied, the usage transaction is transitioned to the exception state.
- **Terminate:** Used to report a severe issue that will cause the usage calculation process to stop and the usage transaction to be transitioned immediately to the exception state. Only one terminate exception can be issued (as the first one causes usage calculation to stop).

Exceptions and To Do Entries

In addition to exceptions, usage processing can also trigger the creation of To Do Entries related to failed validations.

If Issue or terminate exceptions exist for an initial measurement, a To Do Entry is created when the usage transaction is transitioned to the Exception state. The To Do Type and default To Do Role of this To Do Entry are defined on the Enter system event for the Exception state of the business object used to define the usage transaction.

To Do Entries created in this way can be routed to different roles depending on the exception's message category and number (using the To Do Type's Message Overrides tab).

Available Actions for Usage Transactions with Exceptions

Users have a number of options for dealing with usage transactions with exceptions.

- After correcting the cause of the issues that triggered the exceptions, a user can re-calculate the usage transaction.
- A user can discard the usage transaction.
- A user can manually complete the usage transaction. This sends the usage transaction to the subscribing system "as is"
- A user can edit the Post VEE quantities (if necessary) and manually complete the initial measurement. This will cause final measurements to be created using the contents of the Post VEE quantities.

Note: No VEE processing is performed on manually completed initial measurement data.

Regardless of the action taken by the user, the system will complete any open To Do Entries that created when the usage transaction entered the Exception state.

Usage Transactions In Detail

This section provides details concerning the usage transaction 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 custom usage transaction objects you create as part of your implementation. This section includes:

- A description of the D1-USAGETRAN maintenance object
- Lists of the base package usage transaction business objects, including “lite” business objects
- A sample usage transaction business object (D2-UsageTransaction)

Maintenance Object - D1-USAGETRAN

Usage transaction business objects use the D1-US maintenance object. The table below outlines some of the details of this maintenance object

Option/Field	Description
Maintenance Object	D1-USAGETRAN
Description	Usage Transaction
Service Name	D1-USAGETRAN (Usage Transaction Maintenance)
Tables	<ul style="list-style-type: none"> • D1_USAGE (Usage) - Primary • D1_USAGE_CHAR (Usage Characteristics) - Child • D1_USAGE_LOG (Usage Log) - Child • D1_USAGE_LOG_PARM (Usage Log Parameters) - Child • D1_USAGE_PERIOD (Usage Period) - Child • D1_USAGE_PERIOD_SQ (Usage Period Service Quantity) - Child • D1_USAGE_REL (Usage Relationship) - Child • D1_USAGE_SCALAR_DTL (Usage Scalar Detail) - Child
Algorithms	<ul style="list-style-type: none"> • Information: D1-USAGEINFO (Usage Transaction Information)

Use the Maintenance Object portal and the Application Viewer to view more details about this maintenance object.

Base Package Business Objects

The base package includes the following usage transaction business objects:

Business Object Name	Description
D2-UsageTransaction	Usage Transaction

The base package includes the following “lite” usage transaction business objects:

Business Object Name	Description
D1-UsageTransactionStatusLite	Usage Transaction Lite BO
D2-UsageIntervalDataLite	Usage Transaction Interval Data Lite

The base package includes the following additional usage transaction business objects:

Business Object Name	Description
D2-UsageTransactionDateBreaks	Usage Transaction Date Breaks
D2-UsageTransactionExceptions	Usage Transaction Exceptions
D2-UsageTransactionMini1	Usage Group Transaction Processing
D2-UsageTransactionUsagePeriod	D2-UsageTransactionMini1

Example Usage Transaction - D2-UsageTransaction

The table below lists the details of the D2-UsageSubscription usage transaction business object.

Option/Field	Description
Business Object	D2-UsageTransaction
Description	Usage Transaction
Maintenance Object	D1-USAGETRAN (Usage transaction)
Application Service	D2-USAGETRANBOAS (Usage transaction BO)
Instance Control	Allow New Instances
Options	<ul style="list-style-type: none"> Display UI Map: D2-UsageTranDisplay (Usage Transaction - Display) Portal Navigation Option: d1utnmTabMenu (Usage Transaction) Display Map Service Script: D2-UsgRetDts (Usage Retrieve Details for Display) Maintenance UI Map: D2-UsageTranMaint (Usage Transaction - Maintenance)
Algorithms	<ul style="list-style-type: none"> Pre-Processing: D2-DET-USGP (Determine Usage Period) Validation: D2-DEL-ACT (Delete Validation) Validation: D2-SQTYP-VAL (Validate Usage Transaction Service Quantity Entries) Validation: D2-INSCP-VAL (Interval and Scalar Period Validation)
Lifecycle	<ul style="list-style-type: none"> Pending (Initial) Calculate (Interim) Prorated (Final) Approval In Progress (Interim) Issue Detected (Interim) Approve (Interim) Sent (Final) Subsequent Correction (Final) Discarded (Final)

Use the Business Object portal to view additional details concerning this business object.

Configuring Usage Transactions

This section provides high-level overviews of the steps involved in configuring custom usage transactions. See **Configuration Process Overview** on page 1-8 for a high-level overview of the overall configuration process.

Note: The procedures below focus on specific configuration tasks and options related to each of the objects described in this chapter, and do not address all the steps involved in creating business objects, UI maps, algorithms, etc. For more information about these subjects, refer to the Oracle Utilities Application Framework documentation.

Configuring Custom Usage Transactions

Configuring custom usage transactions involves the following steps:

1. Design the usage transaction business objects you will need to create for your implementation, including the data and processing required for each.
2. Create the custom usage transaction-related configuration objects required for your business objects.
3. Create your usage transaction business objects, referencing the configuration objects created above as appropriate.

Chapter 12

Batch Processing

This chapter describes the base package batch processes provided with Oracle Utilities meter data framework and Oracle Utilities Meter Data Management.

Use the Batch Control portal and Application Viewer for more details about these batch processes.

Batch Control	Name / Description
D1-ACTVY	Activity Monitor Invokes the generic Application Framework auto-transition batch process that can do automatic/scheduled transition for activities
D1-DVEVT	Device MO Periodic Monitor Process
D1-IMD	IMD Monitor Invokes monitoring rules associated with the current state of an initial measurement. All monitoring rules throughout the initial measurement's business object's inheritance chain are considered. Batch parameters govern whether the processing is further restricted by batch code, business object, status, etc.
D1-INEVT	Install Event MO Periodic Monitor Process Invokes monitoring rules associated with the current state of an install event. All monitoring rules throughout the install event's business object's inheritance chain are considered. By default, the process periodically monitors install events whose current state is not associated with a batch code. Batch parameters govern whether the processing is further restricted by batch code, business object and status.
D1-MC	MC MO Periodic Monitor Process Invokes monitoring rules associated with the current state of a measuring component. All monitoring rules throughout the measuring component's business object's inheritance chain are considered. By default, the process periodically monitors measuring components whose current state is not associated with a batch code. Batch parameters govern whether the processing is further restricted by batch code, business object and status.

Batch Control	Name / Description
D1-MSRMT	<p>Measurement - Derive Other Values</p> <p>Initiates a reprocessing of Derive Other Values for Measurements. To do this, it moves the status of the Measurement from OK to REDERIVEVAL. The REDERIVEVAL status will have a monitor algorithm that will execute all "Derive Other Values" algorithms that have been attached to the business object's Plug-in spot.</p> <p>Batch parameters are required and are used to select the specific business object as well as the starting date and ending date for the records to be processed.</p>
D1-PMCS	<p>Process Measurement Cycle Schedule</p> <p>Looks for measurement cycle routes that are scheduled to be processed and populates them on the measurement cycle schedule. Once the schedule is prepared, the Process Measurement Cycle algorithm (specified on the service point business object) is then invoked for each device in every route that is ready for processing.</p>
D1-SMMTR	Smart Meter State Monitor Process
D1-SP	<p>Service Point MO Periodic Monitor Process</p> <p>Invokes monitoring rules associated with the current state of a service point. All monitoring rules throughout the service point's business object's inheritance chain are considered.</p> <p>By default, the process periodically monitors service points whose current state is not associated with a batch code. Batch parameters govern whether the processing is further restricted by batch code, business object and status.</p>
D1-TOUTr	<p>Time of Use Map Data Generation Monitor</p> <p>Invokes monitor algorithms for Time Of Use Map instances whose current state does not reference a monitor process.</p>

Refer to the following documentation for more information about batch processing:

- Oracle Utilities Meter Data Management Batch Server Administration Guide
- Oracle Utilities Application Framework Business Process Guide (Batch Jobs)
- Oracle Utilities Application Framework Administration Guide (Defining Background Processes)

Chapter 13

Importing Usage Readings

This chapter provides information related to import of usage readings into Oracle Utilities Meter Data Management, including:

- **Initial Measurement Data XML Format**
- **Setting Up An Import Process**

Initial Measurement Data XML Format

This section describes the XML format used for inbound initial measurement data. This includes interval and scalar examples, and descriptions of the individual XML elements.

Example - Interval Initial Measurement Data

```
<IMD-IMPORT>
  <serviceProvider>HEADEND-1</serviceProvider>
  <serviceProviderExternalId>MDCS-1</serviceProviderExternalId>
  <prevVEE>
    <dvcIdN>037090184721</dvcIdN>
    <mcId>135914144111</mcId>
    <mcIdN>123</mcIdN>
    <externalId>IMD1234567</externalId>
    <uom>KWH</uom>
    <stDt>2009-01-02-00.00.00</stDt>
    </stQty>
    <enDt>2009-01-03-00.00.00</enDt>
    </enQty>
    <imdType>D1IL</imdType>
    <inShift>N</inShift>
    <mcm>1.0</mcm>
  </nd>
  <tz>USPACIFIC</tz>
  <spi>3600</spi>
</ccond>
<sts>
  <stsL>
    <s>1</s>
    <st>REGULAR</st>
  </stsL>
</sts>
<msrs>
  <mL>
    <s>1</s>
    <q>1.6</q>
    <sts>
      <stsL>
        <s>1</s>
        <st>REGULAR</st>
      </stsL>
    </sts>
  </mL>
  <mL>
    <s>2</s>
    <q>1.57</q>
    <sts>
      <stsL>
        <s>1</s>
        <st>REGULAR</st>
      </stsL>
    </sts>
  </mL>
  <mL>
    <s>3</s>
    <q>0.0</q>
    <sts>
      <stsL>
        <s>1</s>
        <st>MISSING</st>
        <s>2</s>
        <st>OUTAGE</st>
      </stsL>
    </sts>
  </mL>
  <mL>
```



```

        <s>4</s>
        <q>0.0</q>
        <sts>
            <stsL>
                <s>1</s>
                <st>MISSING</st>
                <s>2</s>
                <st>OUTAGE</st>
            </stsL>
        </sts>
    </mL>
    <mL>
        <s>5</s>
        <q>1.0</q>
        <sts>
            <stsL>
                <s>1</s>
                <st>REGULAR</st>
            </stsL>
        </sts>
    </mL>
    <mL>
        <s>6</s>
        <q>1.45</q>
        <sts>
            <stsL>
                <s>1</s>
                <st>REGULAR</st>
            </stsL>
        </sts>
    </mL>
    ...
</msrs>
</preVEE>
</IMD-IMPORT>

```

Example - Scalar Initial Measurement Data

```

<IMD-IMPORT>
  <serviceProvider>HEADEND-2</serviceProvider>
  <serviceProviderExternalId>MDCS-2</serviceProviderExternalId>
  <preVEE>
    <dvcIdN>037090184721</dvcIdN>
    <mcId>327604570580</mcId>
    <mcIdN>123</mcIdN>
    <externalId>IMD7654321</externalId>
    <uom>KWH</uom>
    <stDt>2009-01-31-11.25.00</stDt>
    </stQty>
    <enDt>2009-02-28-13.13.00</enDt>
    <enQty>110.00</enQty>
    <imdType>DlIL</imdType>
    <inShift>N</inShift>
    <mcm>1.0</mcm>
    <nd>5</nd>
    <tz>USPACIFIC</tz>
    </ccond>
    <sts>
      <stsL>
        <s>1</s>
        <st>REGULAR</st>
      </stsL>
    </sts>
  </preVEE>
</IMD-IMPORT>

```

Element Descriptions

The table below provides descriptions of the elements used in the initial measurement data XML format.

Element	Description
<{SERVICE_NAME}>	Root element containing an initial measurement. This element should match the name of the inbound service used to import the usage.
<serviceProvider>	Name of the head-end system (defined as a service provider) in MDM
<serviceProviderExternalId>	External ID of the head-end system.
<preVEE>	Element containing Pre VEE measurement data
<dvcIdN>	Device Identifier Number, e.g. a Serial Number. The "type" of device identifier that the head-end system understands is configured within MDM - and so can differ per head-end.
<mcId>	Measuring Component ID
<mcIdN>	Measuring Component Identifier Number. Populated with channel ID. The "type" of measuring component identifier that the head-end system understands is configured within MDM
<externalId>	File name of ID of the XML document containing the measurement data
<uom>	Unit of Measure (Optional)
<stDt>	Start Date/Time. Required for interval measurement data. Optional for scalar measurement data. Must be in the following format: YYYY-MM-DD-HH.MM.SS Example:2008-12-31-00.30.00
<stQty>	Start Reading. Optional.
<enDt>	End Date/Time. Required. Must be in the following format: YYYY-MM-DD-HH.MM.SS Example:2008-12-31-00.30.00
<enQty>	End Reading. Required for scalar measurements.

Element	Description
<imdType>	Initial measurement data type. Valid values include: <ul style="list-style-type: none"> • D1IL (Initial Load) • D1MO (Manual) • D1ES (Estimation) <p>Defaults to D1IL (Initial Load) if not supplied.</p>
<inShift>	Incoming Data Shift flag. Indicates if the device is DST aware.
<mcm>	Meter multiplier.
<nd>	Number of Dials
<tz>	Time Zone
<spi>	Seconds-per-interval
<ccond>	Measurement condition
<sts>	Element containing status code information for entire measurement.
<stsL>	List of head-end system status codes for the entire measurement
<s>	Sequence
<st>	Head-end status codes applicable to the entire set of data.
<msrs>	Element containing measurement data
<mL>	Element containing an individual interval measurements. Used for interval measurement data only.
<s>	Sequence of the interval measurement
<dt>	Date and time of the interval measurement. Optional.
<q>	Quantity of the interval measurement
<ue>	Used-Edited flag. Indicates if the interval measurement has been manually edited
<fc>	Final Condition code for the interval measurement. Optional.
<sts>	Element containing lists of status codes for each interval measurement
<stsL>	Element containing a sequence/status pairing for each interval measurement

Element	Description
<s>	Sequence of the status code for this interval measurement.
<st>	Head-end status code of the interval measurement.

Setting Up An Import Process

You use the XML Application Integration (XAI) functionality of the Oracle Utilities Application Framework to set up import processes for usage data. Specifically, import of usage readings is supported through use of an XAI Inbound Service monitoring a JMS queue.

When creating an XAI Inbound Service for importing usage readings, use the following settings:

- **XAI Inbound Service Name:** The name for your inbound service. Note that this name is used as the root element for the inbound XML processed by the service.
- **Adapter:** BusinessAdapter
- **Schema Type:** Business Object
- **Schema Name:** D1-IMDSeeder (or a customer initial measurement data business object)
- **Active:** Enabled (selected)
- **Transaction Type:** Add

Refer to the following documentation for more information about setting up XAI services:

- Oracle Utilities Application Framework Administration Guide (XML Application Integration)
- Oracle Utilities Application Framework Business Process Guide (Running Your XAI Environment)

Chapter 14

Sample Implementation

This chapter describes the steps involved in configuring Oracle Utilities Meter Data Management in a simple example implementation, including the following:

- **Implementation Description and Requirements**
- **Implementation Steps**

Note: The implementation described in this chapter is intended for example purposes only, and is intentionally simple, and as such does not involve configuration of every type of object described in this book. Also, this example assumes that the base package admin business objects (device type, measuring component type, etc. meet the requirements of the implementation.

Implementation Description and Requirements

The sample implementation described in this chapter will be for a small electric utility providing service to a small town that includes residential, commercial, and industrial customers. The details and requirements of this implementation are summarized as follows

Requirement	Description
Types of Customers	<ul style="list-style-type: none"> Residential (approximately 50,000) Commercial (approximately 1,000) Industrial (approximately 100)
Types of Meters	<ul style="list-style-type: none"> Residential: Scalar, single register Commercial: Interval channel/scalar register Industrial: Two interval channels
Meter Manufacturers / Head-End Systems	<ul style="list-style-type: none"> MetersRUs: Scalar (used for residential customers) MeterTech, Inc.: Interval (used for commercial and industrial customer)
Usage Metered	<ul style="list-style-type: none"> Residential: KWH (scalar) Commercial: KWH (interval and scalar) Industrial: KWH and KVARH (interval)
Readings/Measurement Data	<ul style="list-style-type: none"> Scalar (for residential and commercial) Interval (for commercial and industrial, 15 minutes)
Validation, Editing, and Estimation Rules	<p>All meters:</p> <ul style="list-style-type: none"> Meter Multiplier Check UOM Check Device ID Check <p>Interval meters:</p> <ul style="list-style-type: none"> Interval spike check Interval size validation Interval replacement Sum Check (commercial only) KVARH Check (industrial only) - identifies intervals where reactive load (kVARh) is present and active load (kWh) is not. <p>Scalar meters:</p> <ul style="list-style-type: none"> Scalar Replacement Negative consumption
Bill Determinants	<ul style="list-style-type: none"> Residential: KWH Commercial: KWH and KW (demand) Industrial: On-Peak KWH, Off-Peak KWH, and KVA (demand)
Billing System	Oracle Utilities Customer Care and Billing

Implementation Steps

This section outlines the steps in configuring Oracle Utilities Meter Data Management to meet the requirements outlined above. These steps include:

1. **Design and Create Business Objects**

In this first step, we'll outline the specific business objects and other configuration data required to address the sample requirements.

2. **Create Admin Data**

In this step, we'll outline the admin data that would need to be created to address the sample requirements.

3. **Create Master Data**

In this step, we'll outline the master data (individual devices, service points, etc.) that would need to be created to address the sample requirements.

Design and Create Business Objects

The first step in implementing and configuring the system is to identify the business objects (and related configuration objects) needed to meet the requirements of the implementation. This section outlines the business objects and other significant configuration objects that could be created to meet the requirements of our sample implementation. This does NOT include listings of all configuration objects needed (such as individual display and maintenance UI maps, portal navigation options, etc.).

Service Points and Device Installation

For service point and device installation data, we would need to create the following:

Service Points: Service point business objects for each type of customer, as follows:

- Residential: CM-ResidentialSP
- Commercial: CM-CommercialSP
- Industrial: CM-IndustrialSP

Contacts: Contact business objects for each type of customer, as follows:

- Residential: CM-ResPerson
- Commercial: CM-ComBusiness
- Industrial: CM-IndBusiness

Install Events: Install event business objects for each type of customer, as follows:

- Residential: CM-ResidentialMeterInstallEvent
- Commercial: CM-CommercialMeterInstallEvent
- Industrial: CM-IndustrialMeterInstallEvent

Service Providers: Service provider business objects for each head-end system, and for the billing system, as follows:

- Head-End System: CM-HeadEndMRU (Meters R Us)
- Head-End System: CM-HeadEndMT (Meter Tech, Inc.)
- Billing System: CM-ExternalAppCCB

Activities: For activities, this implementation can use the base package business objects.

Devices and Measuring Components

For devices and measuring components, we would need to create the following:

Devices: Device business objects for each type of meter, as follows:

- Residential: CM-ScalarRegister
 - Install Event BO: CM-ResidentialInstallEvent (see above)
- Commercial: CM-IntChanScalarReg
 - Install Event BO: CM-CommercialInstallEvent (see above)
- Industrial: CM-Interval2Channels
 - Install Event BO: CM-IndustrialInstallEvent (see above)

Measuring Components: Measuring component business objects for scalar registers and/or interval channels, as follows:

- Residential - Scalar Register: CM-ResScalarRegister
- Commercial/Industrial - Interval Channel: CM-IntervalChannel (used for both commercial and industrial meters)
- Commercial - Scalar Register: CM-ScalarValRegister

Measurement Data

For measurement data, we would need to create the following:

Initial Measurement Data: Initial load, estimation, and manual initial measurement business objects for each reading/measurement type, as follows:

- Initial Load - Interval: CM-InitialLoadIMDInterval
- Initial Load - Scalar: CM-InitialLoadIMDScalar
- Estimation - Interval: CM-EstimationIMDInterval
- Estimation - Scalar: CM-EstimationIMDScalar
- Manual - Interval: CM-ManualIMDInterval
- Manual - Scalar: CM-ManualIMDScalar

Measurement: A single measurement business object for all final measurements, as follows:

- Final Measurement: CM-FinalMeasurement

VEE Groups and Rules

For VEE groups and rules, we would need to create the following:

VEE Rules: Business object and algorithm type / algorithm for the KVARH Check validation, as follows:

- Business Object: CM-KVARHCheck
- Algorithm Type: CM-KVARHCHK
- Algorithm: CM-KVARHCHK

Usage Subscriptions

For usage subscriptions, we would need to create the following:

Usage Subscriptions: Usage subscription business object for each type of customer, as follows:

- Residential: CM-ResidentialUS
- Commercial: CM-CommercialUS
- Industrial: CM-IndustrialUS

Usage Groups and Rules

For usage groups and rules, we would need to create the following:

Usage Rules: Business object and algorithm type / algorithm for the KVA calculation, as follows:

- Business Object: CM-CalculateKva
- Algorithm Type: CM-CALCKVA
- Algorithm: CM-CALCKVA

TOU Maps and Dynamic Options

For TOU maps and dynamic options, this implementation can use the base package business objects.

Usage Transactions

For usage transactions, we would need to create the following:

Usage Transactions: Usage transaction business object for each type of customer, as follows:

- Residential: CM-ResidentialUT
- Commercial: CM-CommercialUT
- Industrial: CM-IndustrialUT

Create Admin Data

With all of the custom business objects needed for the implementation in place, the next step would be to create admin data. This section outlines the admin data that would need to be created to meet the requirements of our sample implementation. In general these listings list only the name (or code) and description of each record to be created, and do not include details for every attribute of each record created. Where listing additional attributes is important to understanding how the data would be created, it is noted, and additional details are provided in a separate section.

The table below summarizes the common admin data needed for our implementation

Admin Data Type	Data to Create
Activity Type	N/A (will use base package activity types)
Contact Type	One for each type of customer rule, as follows: <ul style="list-style-type: none"> RESIDENTIAL (Residential - Person) Business Object: CM-ResPerson COMMERCIAL (Commercial - Business) Business Object: CM-ComBusiness INDUSTRIAL (Industrial - Business) Business Object: CM-IndBusiness
Exception Type	One for each VEE rule, as follows: <ul style="list-style-type: none"> MMULTCHK (Meter Multiplier Check) UOMCHK (UOM Check) DVCICCHK (Device ID Check) INTSPIKECHK (Interval spike check) INTSIZEVAL (Interval size validation) INTREPL (Interval replacement) INTKVARHCHK (Interval KVARH Check) SCALREPL (Scalar Replacement) NEGCONS (Negative consumption)
Factor	N/A
Market	Single market: <ul style="list-style-type: none"> SMALLTOWNUSA
Measurement Cycle	Twenty cycles for each type of customer, as follows: <ul style="list-style-type: none"> RESMC01, RESMC02, ..., RESMC20 COMMC01, COMMC02, ..., COMMC20 INDMC01, INDMC02, ..., INDMC20

Measurement Cycle Schedule	<p>One per measurement cycle per month, as follows:</p> <ul style="list-style-type: none"> • RESMC01: <ul style="list-style-type: none"> • Scheduled Selection Date: 08/02/2010 • Expected Work Date: 08/03/2010 • RESMC02: <ul style="list-style-type: none"> • Scheduled Selection Date: 08/03/2010 • Expected Work Date: 08/04/2010 • Etc.
Service Provider	<p>One for each head-end system, and one for the billing system, as follows:</p> <ul style="list-style-type: none"> • METERSRUS (Meters R Us) Business Object: CM-HeadEndMRU • METERTECH (MeterTech, Inc.) Business Object: CM-HeadEndMT • OUCCB (Oracle Utilities Customer Care and Billing) Business Object: CM-ExternalAppCCB <p>* See Service Providers on page 14-11 for additional details.</p>
Service Quantity Identifier	N/A
Service Type	<p>Single service type:</p> <ul style="list-style-type: none"> • ELECTRIC (Electric)
Time of Use	<p>One for each time of use period, as follows:</p> <ul style="list-style-type: none"> • ONPEAK (On Peak) • OFFPEAK (Off Peak)
VEE Group	See VEE Groups and Rules on page 14-12 for details.
Dynamic Option Type	N/A
Manufacturer	<p>One for each manufacturer, as follows:</p> <ul style="list-style-type: none"> • METERSRUS (Meters R Us) <ul style="list-style-type: none"> • Models: RES2010 • METERTECH (MeterTech, Inc.) <ul style="list-style-type: none"> • Models: COM2010, IND2010
TOU Group	<p>One group for TOU periods, as follows:</p> <ul style="list-style-type: none"> • ON-OFF_TOU_GRP (On-Peak / Off Peak TOU Group) - Contains ONPEAK and OFFPEAK TOU periods.
Unit of Measure	<p>One for each type of metered usage and for calculated usage, as follows:</p> <ul style="list-style-type: none"> • KVA (calculated) • KVAR (used in KVA calculation) • KVARH (measured) • KW (derived) • KWH (measured) <p>* All UOMs use the ELECTRIC service type.</p>

VEE Rule	See VEE Groups and Rules on page 14-12 for details.
Measuring Component Type	<p>Five measuring component types, as follows:</p> <ul style="list-style-type: none"> • RESSCALAR (Residential Scalar Register) Business Object: CM-ResScalarRegister • COMINTERVAL (Commercial Interval Channel) Business Object: CM-IntervalChannel • COMSCALAR (Commercial Scalar Register) Business Object: CM-ScalarValRegister • INDINTERVALKVARH (Industrial KVARH Interval Channel) Business Object: CM-IntervalChannel • INDINTERVALKWH (Industrial KWH Interval Channel) Business Object: CM-IntervalChannel <p>* All measuring component types use the ELECTRIC service type. See Measuring Component Types on page 14-13 for additional details.</p>
TOU Map Template	<p>One TOU map template for each TOU schedule, as follows:</p> <ul style="list-style-type: none"> • IND_TOU_SCHED_1 (TOU Schedule 1) • IND_TOU_SCHED_2 (TOU Schedule 2) • Etc. <p>* See TOU Map Templates and TOU Map Types on page 14-15 for additional details.</p>
Device Configuration Type	<p>One device configuration type for each type of meter installed, as follows:</p> <ul style="list-style-type: none"> • RESDVCCFG (Residential Device Configuration) Valid Measuring Component Types: <ul style="list-style-type: none"> • RESSCALAR (Residential Scalar Register) • COMDVCCFG (Commercial Device Configuration) Valid Measuring Component Types: <ul style="list-style-type: none"> • COMSCALAR (Commercial Scalar Register) • COMINTERVAL (Commercial Interval Channel) • INDDVCCFG (Industrial Device Configuration) Valid Measuring Component Types: <ul style="list-style-type: none"> • INDINTERVALKVARH (Industrial KVARH Interval Channel) • INDINTERVALKWH (Industrial KWH Interval Channel) <p>*All device configuration types use the ELECTRIC service type.</p>

Device Type	<p>One device type for each type of meter installed, as follows:</p> <ul style="list-style-type: none"> • RESDVC (Residential Device) <p>Business Object: CM-ScalarRegister</p> <p>Valid Device Configuration Types:</p> <ul style="list-style-type: none"> • RESDVCCFG (Residential Device Configurations) <ul style="list-style-type: none"> • COMDVC (Commercial Device) <p>Business Object: CM-IntChanScalarReg</p> <p>Valid Device Configuration Types:</p> <ul style="list-style-type: none"> • COMDVCCFG (Commercial Device Configurations) <ul style="list-style-type: none"> • INDDVC (Industrial Device) <p>Business Object: CM-Interval2Channels</p> <p>Valid Device Configuration Types:</p> <ul style="list-style-type: none"> • INDDVCCFG (Industrial Device Configurations) <p>*All device types use the ELECTRIC service type.</p>
TOU Map Type	<p>One TOU map type for each of three interval sizes, as follows:</p> <ul style="list-style-type: none"> • IND_TOU_MAP_15_MIN (TOU Map Type - 15 Minutes) • IND_TOU_MAP_30_MIN (TOU Map Type - 30 Minutes) • IND_TOU_MAP_60_MIN (TOU Map Type - 60 Minutes) <p>* See TOU Map Templates and TOU Map Types on page 14-15 for additional details.</p>
Usage Group	<p>One usage group for each type of customer, as follows:</p> <ul style="list-style-type: none"> • RES_USAGE_GRP (Residential Usage Rules) <p>Valid Device Configuration Types:</p> <ul style="list-style-type: none"> • RESDVCCFG (Residential Device Configurations) <ul style="list-style-type: none"> • COM_USAGE_GRP (Commercial Usage Rules) <p>Valid Device Configuration Types:</p> <ul style="list-style-type: none"> • COMDVCCFG (Commercial Device Configurations) <ul style="list-style-type: none"> • IND_USAGE_GRP (Residential Usage Rules) <p>Valid Device Configuration Types:</p> <ul style="list-style-type: none"> • INDDVCCFG (Industrial Device Configurations) <p>* See Usage Groups and Rules on page 14-16 for additional details.</p>

Service Point Type	<p>One for each type of customer rule, as follows:</p> <ul style="list-style-type: none">• RESIDENTIAL (Residential) Business Object: CM-ResidentialSP Valid Device Types:<ul style="list-style-type: none">• RESDVC (Residential Devices)• COMMERCIAL (Commercial) Business Object: CM-CommercialSP Valid Device Types:<ul style="list-style-type: none">• COMDVC (Commercial Devices)• INDUSTRIAL (Industrial) Business Object: CM-IndustrialSP Valid Device Types:<ul style="list-style-type: none">• INDDVC (Industrial Devices) <p>* All service point types use ELECTRIC service type</p>
Usage Rule	<p>Five usage rules, as follows:</p> <ul style="list-style-type: none">• RES_SCALAR_DETAILS (Retrieve KWH for Scalar Register)• COM_APPLY_MATH_KWH (Calculate KWH for Interval Channel)• COM_APPLY_MATH_KW (Calculate KW for Interval Channel)• IND_GET_TOU_DATA (Calculate TOU-based KWH for interval channel)• CALC_KVA (Calculate KVA from KWH and KVARH interval channels) <p>Business Object: CM-CalculateKva</p> <p>* See Usage Groups and Rules on page 14-16 for additional details.</p>
Usage Subscription Type	<p>One for each type of customer rule, as follows:</p> <ul style="list-style-type: none">• RESIDENTIAL (Residential) Business Object: CM-ResidentialUS Usage Recipient: OUCCB (Oracle Utilities Customer Care and Billing)• COMMERCIAL (Commercial) Business Object: CM-CommercialUS Usage Recipient: OUCCB (Oracle Utilities Customer Care and Billing)• INDUSTRIAL (Industrial) Business Object: CM-IndustrialUS Usage Recipient: OUCCB (Oracle Utilities Customer Care and Billing) <p>* See Usage Subscription Types on page 14-16 for additional details.</p>

Additional Details

This section provides additional details related to the admin data described above. Not all attributes are listed for all types of data.

Service Providers

This section provides additional details for each of the service providers listed above.

Service Provider: METERSRUS

- Business Object: CM-HeadEndMRU
- Description: Meters R Us
- External Reference ID: HE-MRU
- Our Name/ID in Their System: HE-MRU-11
- Processing Methods List:
 - Initial Measurement Creation (How To Create MC Related Information)
 - Default Processing Method (Business Object): CM-InitialLoadIMDScalar
 - Override Process Method:

Measuring Component Type	Business Object
Residential Scalar Register (RESSCALAR)	CM-InitialLoadIMDScalar

Service Provider: METERTECH

- Business Object: CM-HeadEndMT
- Description: MeterTech, Inc.
- External Reference ID: HE-MTECH
- Our Name/ID in Their System: HE-MTECH-11
- Processing Methods List:
 - Initial Measurement Creation (How To Create MC Related Information)
 - Default Processing Method (Business Object): CM-InitialLoadIMDInterval
 - Override Process Method:

Measuring Component Type	Business Object
Commercial Interval Channel (COMINTERVAL)	CM-InitialLoadIMDInterval
Commercial Scalar Register (COMSCALAR)	CM-InitialLoadIMDScalar
Industrial KVARH Interval Channel (INDINTERVALKVARH)	CM-InitialLoadIMDInterval
Industrial KWH Interval Channel (INDINTERVALKWH)	CM-InitialLoadIMDInterval

Service Provider: OUCCB

- Business Object: CM-ExternalAppCCB
- Description: Oracle Utilities Customer Care and Billing
- External Reference ID: EXT-CCB
- Our Name/ID in Their System: EXT-CCB-11
- Processing Methods List:
 - Usage Transaction Creation (How To Create Usage Subscription Related Information)
 - Default Processing Method (Business Object): CM-CommercialUT
 - Override Process Method:

Usage Subscription Type	Business Object
Residential (RESIDENTIAL)	CM-ResidentialUT
Commercial (COMMERCIAL)	CM-CommercialUT
Industrial (INDUSTRIAL)	CM-IndustrialUT

VEE Groups and Rules

The table below lists the VEE groups and corresponding VEE rules for this implementation.

VEE Group	VEE Rules
ALL_RULES Contains rules for all measuring components (referenced by VEE rule).	<ul style="list-style-type: none"> • MMULTCHK (Meter Multiplier Check) • UOMCHK (UOM Check) • DVCICCHK (Device ID Check)
INTERVAL_RULES Contains rules for interval measuring components (referenced by VEE rule).	<ul style="list-style-type: none"> • INTSPIKECHK (Interval Spike) • INTSIZEVAL (Interval Size Val) • INTREPL (Interval Replacement)
SCALAR_RULES Contains rules for scalar measuring components (referenced by VEE rule).	<ul style="list-style-type: none"> • SCALREPL (Scalar Replacement) • NEGCONS (Negative Consumption)
SCALAR_MCS Contain rules to be applied to scalar measuring components (including referenced groups).	<ul style="list-style-type: none"> • ALL_REF (References ALL_RULES) • SCALAR_REF (References SCALAR_RULES) • SCALAR_EXCEPTIONS (Exception Handler for Scalar)
COM_INTD_MCS Contain rules to be applied to commercial interval measuring components (including referenced groups).	<ul style="list-style-type: none"> • ALL_REF (References ALL_RULES) • INTERVAL_REF (References INTERVAL_RULES) • SUMCHK (Sum Check) • INTD_EXCEPTIONS (Exception Handler for Interval)

VEE Group	VEE Rules
IND_INTD_MCS Contain rules to be applied to industrial interval measuring components (including referenced groups).	<ul style="list-style-type: none"> • ALL_REF (References ALL_RULES) • INTERVAL_REF (References INTERVAL_RULES) • INTKVARHCHK (Interval KVARH Check) • INTD_EXCEPTIONS (Exception Handler for Interval)

Measuring Component Types

This section provides additional details for each of the measuring component types listed above.

Measuring Component Type: RESSCALAR

- Description: Residential Scalar Register
- Measuring Component Business Object: CM-ResScalarRegister
- Measurement Business Object: CM-FinalMeasurement
- Service Type: Electric
- Value Identifiers:

Value Identifier Type	Short-Hand Description	UOM
Measurement	KWH	KWH

- Valid VEE Groups:
 - Initial Load VEE Group - Scalar (SCALAR_MCS)
- Fallback VEE Groups:
 - Initial Load: Initial Load VEE Group - Scalar (SCALAR_MCS)

Measuring Component Type: COMINTERVAL

- Description: Commercial Interval Channel
- Measuring Component Business Object: CM-IntervalChannel
- Measurement Business Object: CM-FinalMeasurement
- Service Type: Electric
- Value Identifiers:

Value Identifier Type	Short-Hand Description	UOM
Measurement	KWH	KWH

- Valid VEE Groups:
 - Initial Load VEE Group - Commercial Interval (COM_INTD_MCS)
- Fallback VEE Groups:
 - Initial Load: Initial Load VEE Group - Commercial Interval (COM_INTD_MCS)

Measuring Component Type: COMSCALAR

- Description: Commercial Scalar Register
- Measuring Component Business Object: CM-ScalarValRegister
- Measurement Business Object: CM-FinalMeasurement
- Service Type: Electric
- Value Identifiers:

Value Identifier Type	Short-Hand Description	UOM
Measurement	KWH	KWH

- Valid VEE Groups:
 - Initial Load VEE Group - Scalar (SCALAR_MCS)
- Fallback VEE Groups:
 - Initial Load: Initial Load VEE Group - Scalar (SCALAR_MCS)

Measuring Component Type: INDINTERVALKVARH

- Description: Industrial KVARH Interval Channel
- Business Object: CM-IntervalChannel
- Measurement Business Object: CM-FinalMeasurement
- Service Type: Electric
- Value Identifiers:

Value Identifier Type	Short-Hand Description	UOM
Measurement	KVARH	KVARH

- Valid VEE Groups:
 - Initial Load VEE Group - Industrial Interval (IND_INTD_MCS)
- Fallback VEE Groups:
 - Initial Load: Initial Load VEE Group - Industrial Interval (IND_INTD_MCS)

Measuring Component Type: INDINTERVALKWH (Industrial KWH Interval Channel)

- Description: Industrial KWH Interval Channel
- Business Object: CM-IntervalChannel
- Measurement Business Object: CM-FinalMeasurement
- Service Type: Electric
- Value Identifiers:

Value Identifier Type	Short-Hand Description	UOM
Measurement	KWH	KWH

- Valid VEE Groups:
 - Initial Load VEE Group - Industrial Interval (IND_INTD_MCS)

- Fallback VEE Groups:
 - Initial Load: Initial Load VEE Group - Industrial Interval (IND_INTD_MCS)

TOU Map Templates and TOU Map Types

This section provides additional details for the TOU map templates and TOU map types listed above. In the case where different types of industrial customers use different rules for On Peak vs. Off Peak hours, different TOU map templates could be created for different TOU schedules. In this case, the primary difference between TOU map templates would be in the TOU Schedule Section.

TOU Map Template: IND_TOU_SCHED_1

- Description: TOU Schedule 1
- TOU Group: On-Peak / Off Peak TOU Group (ON-OFF_TOU_GRP)
- Default TOU: Off Peak (OFFPEAK)
- Work Calendar: Small Town USA Work Calendar (SMTUWRKCAL)
- Holiday TOU: Off Peak (OFFPEAK)
- Holiday Template: N/A
- Interval Size: 01:00:00
- TOU Schedule Section: Etc.

For each TOU map template, you might create multiple TOU map types for different interval sizes. For example:

TOU Map Type: IND_TOU_MAP_15_MIN

- Description: TOU Map Type - 15 Minutes (for Usage Calculation)
- TOU Map Business Object: D2-TOUMap
- Time Zone: US - Eastern Time
- Interval Size: 00:15:00
- Default TOU Map Template: TOU Schedule 1 (IND_TOU_SCHED_1)
- Override TOU Map Templates: N/A

TOU Map Type: IND_TOU_MAP_30_MIN

- Description: TOU Map Type - 30 Minutes (for Aggregation)
- TOU Map Business Object: D2-TOUMap
- Time Zone: US - Eastern Time
- Interval Size: 00:30:00
- Default TOU Map Template: TOU Schedule 1 (IND_TOU_SCHED_1)
- Override TOU Map Templates: N/A

TOU Map Type: IND_TOU_MAP_60_MIN

- Description: TOU Map Type - 60 Minutes (for Aggregation)
- TOU Map Business Object: D2-TOUMap
- Time Zone: US - Eastern Time
- Interval Size: 01:00:00
- Default TOU Map Template: TOU Schedule 1 (IND_TOU_SCHED_1)
- Override TOU Map Templates: N/A

Usage Groups and Rules

The table below lists the usage groups and corresponding usage rules for this implementation.

Usage Group	Usage Rules
RES_USAGE_GRP (Residential Usage Rules) Valid Device Configuration Types: <ul style="list-style-type: none"> RESDVCCFG (Residential Device Configurations) 	<ul style="list-style-type: none"> RES_SCALAR_DETAILS (Retrieve KWH for Scalar Register)
COM_USAGE_GRP (Commercial Usage Rules) Valid Device Configuration Types: <ul style="list-style-type: none"> COMDVCCFG (Commercial Device Configurations) 	<ul style="list-style-type: none"> COM_APPLY_MATH_KWH (Calculate KWH for Interval Channel) COM_APPLY_MATH_KW (Calculate KW for Interval Channel)
IND_USAGE_GRP (Residential Usage Rules) Valid Device Configuration Types: <ul style="list-style-type: none"> INDDVCCFG (Industrial Device Configurations) 	<ul style="list-style-type: none"> IND_GET_TOU_DATA (Calculate TOU-based KWH for interval channel) CALC_KVA (Calculate KVA from KWH and KVARH interval channels)

Usage Subscription Types

This section provides additional details for each of the subscription types listed above.

Usage Subscription Type: RESIDENTIAL

- Description: Residential
- Usage Subscription Business Object: CM-ResidentialUS
- Usage Recipient: OUCCB (Oracle Utilities Customer Care and Billing)
- Valid Service Point Types:
 - Residential (RESIDENTIAL)
- Valid Usage Recipients:
 - OUCCB (Oracle Utilities Customer Care and Billing)
- Valid Usage Groups:
 - Residential Usage Rules (RES_USAGE_GRP)
- Fallback Usage Groups:

Effective Date	Usage Group
08-01-2010	Residential Usage Rules (RES_USAGE_GRP)

Usage Subscription Type: COMMERCIAL

- Description: Commercial
- Usage Subscription Business Object: CM-CommercialUS
- Usage Recipient: OUCCB (Oracle Utilities Customer Care and Billing)
- Valid Service Point Types:
 - Commercial (COMMERCIAL)
- Valid Usage Recipients:
 - OUCCB (Oracle Utilities Customer Care and Billing)
- Valid Usage Groups:

- Commercial Usage Rules (COM_USAGE_GRP)
- Fallback Usage Groups:

Effective Date	Usage Group
08-01-2010	Commercial Usage Rules (COM_USAGE_GRP)

Usage Subscription Type: INDUSTRIAL

- Description: Industrial
- Usage Subscription Business Object: CM-IndustrialUS
- Usage Recipient: OUCCB (Oracle Utilities Customer Care and Billing)
- Valid Service Point Types:
 - Industrial (INDUSTRIAL)
- Valid Usage Recipients:
 - OUCCB (Oracle Utilities Customer Care and Billing)
- Valid Usage Groups:
 - Industrial Usage Rules (IND_USAGE_GRP)
- Fallback Usage Groups:

Effective Date	Usage Group
08-01-2010	Industrial Usage Rules (IND_USAGE_GRP)

Create Master Data

In this last step, we would create the actual master data (individual devices, service points, etc.) for the implementation. For purposes of this section, only a single example of each type of data is presented.

Contacts

A typical residential contact might look like this:

Residential - Person:

- Information: John Smith / 555-555-5555
- Contact Type: Residential - Person (RESIDENTIAL)
- Name: John Smith
- Home Phone: 555-555-5555

Service Points

A typical commercial service point might look like this:

Commercial Service Point:

- Information: 35 York Street, Burlington, MA, 01803, US / Commercial / Active
- Service Point Type: Commercial (COMMERCIAL)
- Status: Active
- Time Zone: US - Eastern Time
- Market: Small Town USA

- Main Contact: Phillip Jones
- Address:
 - Country: United States
 - Postal Code: 01803
 - Street Address: 35 York Street
 - City: Burlington
 - State: MA
- Measurement Cycle:
 - Measurement Cycle: Commercial Cycle 01 (COMMC01)
 - Route: Route 2
 - Sequence: 10

Devices

A typical industrial device might look like this:

Industrial Device:

- Information: 123456 / Industrial Device / Install Date/Time: 08-01-2010 12:00 AM / Pending / MeterTech, Inc. / Active
- Device Type: Industrial Device (INDDVC)
- Serial Number: 123456
- Internal Meter Number: 654321
- Pallet Number: 123456
- Manufacturer: MeterTech, Inc.
- Model: IND2010
- Incoming Data Shift: Shifted
- Arming Required: Arming Required
- Head-End System: MeterTech, Inc. (METERTECH)
- Status: Active

Device Configurations

A typical industrial device configuration might look like this:

Industrial Device Configuration:

- Information: Industrial Device / Effective Date/Time: 08-01-2010 12:00 AM / Industrial Device Configuration / 2 Measuring Component(s) / Active
- Device Configuration Type: Industrial Device Configuration (INDDVCCFG)
- Device: 123456 / Industrial Device / Install Date/Time: 08-01-2010 12:00 AM / Pending / MeterTech, Inc. / Active
- Effective Date/Time: 08-01-2010 12:00 AM
- Time Zone: US - Eastern Time
- Status: Active

Measuring Components

Typical industrial measuring components might look like this:

KVARH Interval Channel:

- Information: 123456 / 2 / Industrial KVARH Interval Channel
- Measuring Component Type: Industrial KVARH Interval Channel (INDINTERVALKVARH)
- Device Configuration: Industrial Device / Effective Date/Time: 08-01-2010 12:00 AM / Industrial Device Configuration / 2 Measuring Component(s) / Active
- Consumption Reference Measuring Component: N/A
- How to Use: Consumptive
- Number of Digits Left: 5
- Number of Digits Right: 2
- Channel Multiplier: 1.000
- Latest Read Date/Time: N/A
- Channel ID: 2

KWH Interval Channel:

- Information: 123456 / 1 / Industrial KWH Interval Channel
- Measuring Component Type: Industrial KWH Interval Channel (INDINTERVALKWH)
- Device Configuration: Industrial Device / Effective Date/Time: 08-01-2010 12:00 AM / Industrial Device Configuration / 2 Measuring Component(s) / Active
- Consumption Reference Measuring Component: N/A
- How to Use: Consumptive
- Number of Digits Left: 5
- Number of Digits Right: 2
- Channel Multiplier: 1.000
- Latest Read Date/Time: N/A
- Channel ID: 1

Install Events

A typical industrial installation event might look like this:

Industrial Install Event:

- Information: Install Date/Time: 08-01-2010 / On
- Device Configuration: Industrial Device / Effective Date/Time: 08-01-2010 12:00 AM / Industrial Device Configuration / 2 Measuring Component(s) / Active
- Service Point: 47 North Street, Burlington, MA, 01803, US / Industrial / Active
- Status: On
- Installation Date/Time: 08-01-2010
- Installation Constant: 1.00000
- Device On/Off Status: On
- On/Off History: N/A

TOU Maps

A typical industrial TOU map might look like this:

- Information: Industrial TOU Map
- TOU Map Type: TOU Map Type - 15 Minutes (IND_TOU_MAP_15_MIN)
- Status: Active
- Status Reason: N/A
- Override TOU Map Template: N/A
- Dynamic Option / Dynamic TOU Map Section: N/A
- TOU Data List:
 - 08-01-2010 00:15 AM - Off Peak
 - 08-01-2010 00:30 AM - Off Peak
 - 08-01-2010 00:45 AM - Off Peak
 - 08-01-2010 01:00 AM - Off Peak
 - Etc.

Usage Subscriptions

A typical commercial usage subscription might look like this:

Commercial Usage Subscription:

- Information: Commercial / 08-01-2010 12:00 AM / Active
- Usage Subscription Type: Commercial (COMMERCIAL)
- Status: Active
- Start Date/Time: 08-01-2010 12:00 AM
- End Date/Time: 08-01-2020 12:00 AM
- Usage Recipient: Oracle Utilities Customer Care and Billing (OUCCB)
- Usage Approval: Not Required
- External ID:
- Main Contact: Phillip Jones / Business Phone: 555-555-5555
- Time Zone: US - Eastern Time
- Factor Overrides: N/A
- Usage Groups:

Effective Date/Time	Expiration Date/Time	Usage Group
08-01-2010 12:00 AM	08-01-2011 12:00 AM	Commercial Usage Rules (COM_USAGE_GRP)

- Service Points:

Service Point	Start Date/Time	Stop Date/Time	Usage	Use Percent
35 York Street, Burlington, MA, 01803, US / Commercial / Active	08-01-2010 12:00 AM	08-01-2011 12:00 AM	Add	100

Appendix A

Measurement Services

This appendix provides brief descriptions of the base package measurement services used by VEE rules and measurement functions. The measurement services described in this appendix are implemented as business services. These business services can be used by custom algorithms or BPA/Service scripts created for your implementation.

The table below lists the available back package measurement services, including the business service that implements each service and a brief description for each.

Measurement Service	Business Service	Description
Add Scalar Value To Intervals	D1-AddScalarValueToIntervals	Uses the Apply Formula measurement service to add a scalar value to the value of a specified set of interval data.
Adjust Intervals to Supplied Value	D1-AdjustIntervalsToSuppldVal	Uses the Apply Formula measurement service to adjust the total value of a specified set of interval data to a scalar value.
Apply Formula	D1-ApplyFormula	Used to apply a formula to a specified set of interval data, either by applying a summary function against all intervals of the set, or by manipulating each individual interval in series via a formula using declared constants, or within the context of other sets of input interval data.
Apply TOU Map To Interval Measuring Component	D1-ApplyTOUMapToIntervalMC	Used to apply a TOU map to a set of intervals for a specified measuring component and date/time range, thereby isolating and summarizing those intervals that occurred during a specific time of use.
Axis Conversion	D1-AxisConversion	Used to convert interval data between units of measure (UOMs) and interval sizes (SPIs), including the conversion between peak and consumption-oriented UOMs.
Convert Scalar Consumption To Interval	D1-IntervalizeScalarConsumptn	Used to convert a scalar consumption value to a set of interval measurements.

Measurement Service	Business Service	Description
Create Intervals	D1-CreateIntervals	Used to create interval data based on supplied parameters (UOM, SPI, number of intervals, value, etc.)
Divide Intervals By Scalar Value	D1-DivideIntervalsByScalarVal	Uses the Apply Formula measurement service to divide the values of a specified set of interval data by a scalar value.
Extract Subset of Intervals	D1-ExtractSubsetOfIntervals	Used to extract a subset of interval data from a specified set of intervals.
Identify Spikes	D1-IdentifySpikes	Used to identify spikes in a specified set of interval data based on a spike percentage tolerance.
Insert Intervals	D1-InsertIntervals	Used to insert one or more intervals into a set of interval measurements.
Merge Intervals	D1-MergeIntervals	Used to merge a subset of interval data with a specified set of intervals (where overlaps occur, the subset intervals replace the original intervals).
Multiply Intervals By Scalar Value	D1-MultiplyIntervalsByScalarVal	Uses the Apply Formula measurement service to multiply the values of a specified set of interval data by a scalar value.
Remove Intervals	D1-RemoveIntervals	Used to remove one or more intervals from a set of interval measurements.
Retrieve Interval Consumption	D1-IntvConsumptionRetriever	Used to retrieve one or more interval measurements.
Retrieve Scalar Consumption	D1-ScalarConsumptionRetriever	Used to retrieve one or more scalar measurements.
Set Condition	D1-SetCondition	Used to set the condition (status) code of a specified set of interval data.
Shift Intervals	D1-ShiftIntervals	Used to shift one or more intervals forward or backward in time.
Subtract Scalar Value From Intervals	D1-SubtractScalarValToIntervls	Uses the Apply Formula measurement service to subtract a scalar value from the value of a specified set of interval data.

Use the Business Service portal to view more details concerning these measurement services.

Appendix B

Glossary

This glossary provides definitions of commonly used terms.

360 Degree View - Audit View

A zone that allows users to view an interval measurement curve for a given period overlaid with the count of audit records for each individual measurement. It also allows users to magnify a portion of the curve and see how the measurements looked at different points in time.

360 Degree View - Final Values Overlay

A zone that graphs final measurements for a measuring component, and provides the ability to overlay the graphed data with final measurements from other measuring components. The zone also permits overlaying data from the same measuring component for different time periods, as well as data from measuring components measuring different quantities, such as temperature.

360 Degree View - Time of Use by Day

A zone that displays daily TOU-mapped usage data for a measuring component based on a user-defined time period and TOU Map.

360 Degree View - Time of Use Overlay

A zone that displays an overlay of the TOU periods on a final measurement along with totalized TOU consumption based on a user-defined time period and TOU map.

360 Degree View - Timeline Zone

A zone that displays a timeline of activities and other events for a given service point, device, etc.

Activity Type

Defines properties common to a specific type of activity.

Advanced Metering Infrastructure (AMI)

Refers to systems that measure, collect and analyze energy usage, and interact with advanced devices such as electricity meters, gas meters, heat meters, and water meters, through various communication media either on request (on-demand) or on pre-defined schedules.

Aggregator

A class of measuring component that stores measurements that represent an summarization of other measurements from a potentially diverse set of devices. For example, an aggregator may derive the sum of the natural gas consumption of all residential customers in a particular postal code within the utility's service territory.

Automatic Meter Reading (AMR)

The technology of automatically collecting consumption, diagnostic, and status data from water meter or energy metering devices (water, gas, electric) and transferring that data to a central database for billing, troubleshooting, and analyzing.

Bill Determinants

Measurement data summarized for use by a billing application. Bill determinants can take the form of TOU-mapped interval consumption, scalar consumption, scalar readings, and/or interval consumption obtained via measurements. A common variety of bill determinant is TOU-mapped interval consumption, which reduces a full month's worth of interval data into several buckets of consumption based on time of use.

Consumption

A measurement by a given device of the amount of energy, water, gas, etc. consumed over a given time period. Synonymous with the term "measurement".

Consumptive

Describes a measuring component for which readings are equivalent to the consumption. For example, if we receive a reading of 400 on January 15 and a reading of 600 on February 15, a consumptive measuring component's consumption between January 15 and February 15 would be 600 (not 200).

Contact

An individual or a business entity with which a company has contact. Each contact must reference a contact type.

Contact - Email

Email addresses related to a contact

Contact - Identifier

Identifiers related to a contact, such as social security number, driver's license number, or the contact's ID in a prior system.

Contact - Name

Names related to a contact

Contact - Phone

Phone numbers related to a contact

Contact Type

Defines the properties of a class of entities (businesses, persons).

Demand

The rate at which a commodity is delivered at a given instant or averaged over a designated time. For electricity, demand is often expressed in kilowatts (kW) or kilovolt-amperes (kVa).

Device

A physical or virtual object that holds one or more measuring components that can produce data to be handled by the system. Devices can include meters, substations, transformers, demand response devices, weather stations, etc.

Device Configuration

A specific configuration of a device. Over time, a device can have many configurations. Use of effective-dated device configuration allows the device to retain its identifier(s) even while the quantities it is measuring are changing.

Device Configuration Type

Defines the properties of device configurations of this type, including the valid types of measuring components that can be configured for the device.

Device Type

Information about a class of devices, including properties that apply to all devices of a type, but can be overridden for an individual device.

Distribution Company (DISCO)

A utility company that constructs and maintains the distribution network that delivers a commodity to customers. Depending upon the regulations within the territory, a distribution company may or may not be responsible for billing the customer.

Dynamic Option

Used to specify terms that override how usage is normally calculated - such as a critical peak period that affects the TOU mapping of interval consumption.

Dynamic Option Event

The period of time during which a dynamic option is applicable. A dynamic option may have many events over time.

Dynamic Option Type

Used to define information common to dynamic options of a specific type.

Exception Type

Defines properties common to many exceptions, including the category of the exception.

Factor

A centrally stored set of values for use in validation rules, bill determinants calculations, and other processes. A factor can have different values depending upon some definable attribute of a system object, such as customer size associated with a service point. The values are effective-dated so that changes over time are retained. Examples of factors can include minimum/ maximum thresholds, loss factors, etc. Classes of factors are defined that can have numeric values (as in the above examples), or values pointing to profile measuring components or VEE groups.

Factor Value

An effective-dated value - either a number, a profile measuring component, a VEE group, or some custom-defined value - assigned to a factor and associated to the value of some attribute of a system object. For example, let's assume that a service point can be classified as residential, commercial, or industrial. The tolerance percentage by which a customer's consumption can exceed last month's consumption can be tighter as the customer's SP increases in size. An example configuration of factor values for a single factor called "tolerance percentage" could be:
Residential - 20% Commercial - 10% Industrial - 5%

Final Measurement

Measurement data that has been validated, and if necessary, edited & estimated, and is ready for use in down-stream processing such as bill determinants calculations. Only one final measurement can exist for a given date/time for a given measuring component; one final measurement exists per interval, and likewise one final measurement exists for each scalar reading. In both cases, the final measurement value stored represents the amount consumed between its date/time and the prior final measurement's date/time.

Function

An online-initiated action applied to measurement data, comprising one or more measurement services.

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.

Identifiers

Names, numbers, or other values used to identify an entity within the system, including devices, measuring components, service points, etc.

Initial Measurement Data Function (IMDF)

An online means of manipulating initial measurement data. IMD Functions typically move intervals (shift, insert, remove, etc.) or manipulate their values or conditions.

IMDF - Adjust Intervals To Scalar Quantity

A function used to adjust all interval values within a user-defined time period in an interval measurement such that the total of all interval values equals a user-defined scalar quantity. This function results in a measurement that retains the shape of the original measurement, but has been scaled up or down.

IMDF - Insert Intervals

A function used to insert intervals into initial measurement data. Intervals can be inserted at either the beginning or end of the measurement. The end date/time of the measurement is shifted to account for the inserted intervals.

IMDF - Remove Intervals

A function used to remove intervals from initial measurement data. Intervals can be removed from either the beginning or end of the measurement. The end date/time of the measurement is shifted to account for the new number of intervals in the measurement.

IMDF - Set Condition Codes

A function used to set condition codes within initial measurement data. Condition codes indicate the circumstances (estimated, missing, etc.) of individual measurements. Condition codes are assigned to both scalar and interval measurement data both for initial measurement data and final measurements.

IMDF - Shift Intervals

A function used to shift intervals of initial measurement data forward or backward time. The end result is a measurement with a different start or end time.

IMDF - Smooth Spikes

A function used to reduce "spike" intervals (intervals with values that are more than a user-defined percentage higher than other intervals within the initial measurement data). The function smooths spikes using linear interpolation as follows:

- Get the value of the interval immediately preceding the spike (the "Left Value").
- Get the value of the interval immediately after the spike (the "Right Value").
- Subtract the Left Value from the Right Value, divide result by two. The result is called the Estimation Adder
- Add the Estimation Adder to the interval immediately before the spike.

Inbound Communication

Communication sent to MDF (Meter Data Framework) from a head-end system or other external system. Each inbound communication has an associated communication type that defines common properties of the communication.

Independent System Operator (ISO)

The entity charged with reliable operation of the grid and provision of open transmission access to all market participants on a non-discriminatory basis.

Initial Measurement Data (IMD)

A set of one or more readings or measurements that have been loaded into the application, usually in a format that is standard for MDF (Meter Data Framework). Over its lifecycle (as pertains to MDM - Meter Data Management), any readings within the IMD are converted into consumption, which is then typically subject to VEE processing and then finalized - meaning stored as final measurements. Only initial measurements can be edited directly by end users of MDM. An IMD for a scalar measuring component will have a single measurement (along with a reading from

which the measurement value is derived), while an IMD for an interval measuring component will usually contain multiple interval measurements.

Installation Constant

An installation constant is set to a value other than 1 as an indication that when calculating consumption, the installation requires that measurement data be multiplied by this value to get accurate results.

Installation Event

A device's installation information at a service point. The install event represents both the installation and removal of a device. It also records turning a device on or off while it is installed at a service point.

Installation On and Off History

A single installation event records each time the device is turned on and turned off while it is installed at a service point.

Interval Channel (Measuring Component)

A business object (BO) that represents channels associated to a device.

Interval Channel Type - Physical (Measuring Component Type)

A business object (BO) that maps properties of interval measuring component types for those Measuring Components that are part of physical devices.

Interval Channel Type - Scratchpad (Measuring Component Type)

A business object (BO) that maps properties relevant to stand-alone measuring components functioning as scratchpads for interval data manipulation.

Interval Data

Time-series data in which measurements are captured in pre-defined intervals (5 minutes, 15 minutes, 1 hour, etc.). A set of interval measurements for an interval measuring component composes an individual initial measurement data record.

Interval Data Services

Services used to access and manipulate interval measurements.

Interval Scratchpad (Measuring Component)

A stand-alone measuring component that provides the user with a means to manipulate measurement data without affecting existing measurements.

Interval Size

The "size" of an interval, representing the length of time between intervals. Interval size is typically measured in seconds-per-interval (SPI).

Manual Meter

A business object (BO) used to model a meter that does not accommodate two-way communications and must be read manually.

Manual Meter Installation Event

A business object (BO) that defines the lifecycle of the installation of a manual meter at a service point.

Manual Meter Type

A business object (BO) used to model properties for meters that are manually read.

Manufacturer

The company that makes devices, defined as an attribute of the device itself.

Market

The jurisdiction or regulatory environment in which a service point participates, defining the valid service providers and their roles. While each service point specifies only one market, different service points throughout the utility's service territory can be linked to different markets.

Market - Fallback Service Provider

For a given market relationship type, a fallback service provider may be defined at the market level, rather than storing the information redundantly on each service point. For example, an entire market might have only one ISO, and if the utility wants to store this information, they can identify the ISO as a fallback service provider for the market and the market relationship type of ISO.

Market - Relationship Type

The valid roles within a market (ISO, Distribution Company, Retailer, etc.) that have some business significance in the application.

Market - Valid Service Provider

The valid service providers for each market relationship type relevant for a given market. The service providers referenced on a service point must be valid for the combination of the service point's market and the market relationship type.

Market Participant

A variety of service provider; a company with a role within a given market such as a retailer or a distribution company.

Measuring Component Consumption Function (MCCF)

An online means of initiating the process of adding or editing measurements. Measuring Component Consumption Functions typically create new initial measurements based on a copy of existing final measurements.

MCCF - Convert Scalar to Interval Consumption

A function used to convert scalar consumption into interval consumption. The converted consumption is held in a new scratchpad measuring component. The "shape" of the new interval measurement can be based on either a profile or can have a flat distribution.

MCCF - Create Scratchpad Interval Consumption

A function used save all or some of the final measurements shown in the zone as a new initial measurement for a scratchpad measuring component.

MCCF - Create/Override

A function used to create new initial measurement data for a selected measuring component for all or part of a selected time period. This function can either copy existing final measurements (for example, from a profile) or create new measurement data for the IMD it creates.

MCCF - New Scalar Reading

A function used to create new initial measurement data containing a reading (rather than consumption) for the scalar measuring component displayed in the zone for a user-defined time period. A reading refers to the measurements as read from the meter, while consumption refers to the total consumption, accounting for meter multiplier and/or offset.

MCCF - Save As Interval Consumption

A function used save all or some of the final measurements shown in the zone as a new initial measurement for a different (new or existing) measuring component.

MCCF - Adjust Intervals Using Math

A function used to adjust all interval values within a user-defined time period using math operations (add, subtract, multiply, or divide).

Measurement

A measurement in MDM is synonymous with consumption, which implies that constants or multipliers may have been applied to its value. This term can be used in the context of an IMD or in reference to Final Measurements.

Measurement Condition

Codes that indicate the circumstances (estimated, missing, etc.) of individual measurements. Conditions are assigned to both scalar and interval measurement data both for initial measurement data and final measurements.

Measurement Cycle

The measurement cycle can serve two purposes: it can define the schedule for manual meter reading of devices at service points in that cycle, and it can also be configured to define when to create usage transactions for usage subscriptions associated to service points in the cycle.

Measurement Cycle Route

The route used to collect measurements for a given measurement cycle.

Measurement Cycle Route Sequence

The sequence in which measurements are collected along a measurement route.

Measurement Cycle Schedule

Defines the dates on which devices are scheduled to be read.

Measurement Service

Java services that can be invoked to manipulate interval and scalar measurements. Measurement services are invoked by measurement functions (available through certain zones within MDM), and are also used within processing of usage and VEE rules.

Measurement Service - Add Scalar Value To Intervals

Service that uses the Apply Formula measurement service to add a scalar value to the value of a specified set of interval data.

Measurement Service - Adjust Intervals to Supplied Value

Service that uses the Apply Formula measurement service to adjust the total value of a specified set of interval data to a scalar value.

Measurement Service - Apply Formula

Service used to apply a formula to a specified set of interval data, either by applying a summary function against all intervals of the set, or by manipulating each individual interval in series via a formula using declared constants, or within the context of other sets of input interval data.

Measurement Service - Apply TOU Map To Interval Measuring Component

Service used to apply a TOU map to a set of intervals for a specified date/time range, thereby isolating and summarizing those intervals that occurred during a specific time of use.

Measurement Service - Axis Conversion

Service used to convert interval data between units of measure (UOMs) and interval sizes (SPIs), including the conversion between peak and consumption-oriented UOMs.

Measurement Service - Convert Scalar Consumption To Interval

Service used to convert a scalar consumption value to a set of interval measurements.

Measurement Service - Create Intervals

Service used to create interval data based on supplied parameters (UOM, SPI, number of intervals, value, etc.)

Measurement Service - Divide Intervals By Scalar Value

Service that uses the Apply Formula measurement service to divide the values of a specified set of

interval data by a scalar value.

Measurement Service - Extract Subset of Intervals

Service used to extract a subset of interval data from a specified set of intervals.

Measurement Service - Identify Spikes

Service used to identify spikes in a specified set of interval data based on a spike percentage tolerance.

Measurement Service - Insert Intervals

Service used to insert one or more intervals into a set of interval measurements.

Measurement Service - Merge Intervals

Service used to merge a subset of interval data with a specified set of intervals (where overlaps occur, the subset intervals replace the original intervals).

Measurement Service - Multiply Intervals By Scalar Value

Service that uses the Apply Formula measurement service to multiply the values of a specified set of interval data by a scalar value.

Measurement Service - Remove Intervals

Service used to remove one or more intervals from a set of interval measurements.

Measurement Service - Retrieve Interval Consumption

Service used to retrieve one or more interval measurements.

Measurement Service - Retrieve Scalar Consumption

Service used to retrieve one or more scalar measurements.

Measurement Service - Set Condition

Service used to set the condition (status) code of a specified set of interval data.

Measurement Service - Shift Intervals

Service used to shift one or more intervals forward or backward in time.

Measurement Service - Subtract Scalar Value From Intervals

Service that uses the Apply Formula measurement service to subtract a scalar value from the value of a specified set of interval data.

Measuring Component Summary

A zone shown on the VEE Group portal that displays a list of measuring components that reference a given VEE group.

Measuring Component

A single point for which data will be received and stored in the system. A measuring component can be associated to a physical device, which can have one or more measuring components, or it can be stand-alone, meaning that it is not associated to a physical device (for example, an aggregator or interval scratchpad).

Measuring Component Type

The definition of the most important properties of a measuring component, including what it measures, how regularly it measures it, whether it should be connected to a physical device or if it's used as a scratchpad or an aggregator, how its final measurements should be stored and how its user-defined values should be calculated, what rules govern VEE for Measuring Components of the type, as well as numerous display properties that are relevant within MDM. The measuring component type also defines sets of valid attribute values for groups of measuring components belonging to the type.

Measuring Component Types Referencing Group

A zone shown on the VEE Group portal that displays a list of Measuring Component types that reference the VEE group being viewed.

Meter

A device used to measure a quantity of a service (electricity, gas, etc.) delivered to a service point.

Meter Read Download Activity Type

The structure and business rules applicable to downloading meter read information onto a handheld device.

Model

A specific model of a device produced by a manufacturer. Models for a single manufacturer can have diverse service types.

Multiplier

A value that may be applied to adjust the consumption values calculated for a device. Examples include meter/device multiplier, installation constant, loss factor, etc.

Normalized storage

Storing measurement data in a manner that allows for aggregation and reporting of data through database logic (SQL). Applies to both scalar and interval measurements.

Off-Peak Period

A time period during which the least amount of some consumable is being used. OR A period of relatively low system demand as specified by the supplier.

On-Peak Period

A time period during which the greatest quantity of some consumable is being used OR A period of relatively high system demand as specified by the supplier.

Oracle Utilities Meter Data Management

Oracle Utilities application that provides functionality for handling large volumes of meter data to enable increased accuracy, flexibility, and scalability.

Outbound Communication

Communication sent from product MDF (Meter Data Framework) to a head-end system or other external system.

Peak

The maximum value for some measurable quantity recorded over a specified time period. A measuring component that measures peak quantities will record the highest value for the quantity over a period of time.

Peak Demand

The maximum rate of commodity consumption over a specific period of time.

Processing Method

Methods used to define the format or means by which a service provider receives data from the application, such as bill determinants, interval data, or meter events. Processing methods are also used to define how to create information internal to the application such as initial measurement data and usage transactions. Processing methods can also be used to define the information an external system wishes to subscribe to receive from our application. A BO or batch extract code are the typical processing methods defined for the transmission of data to a service provider.

Processing Role

Each processing method has a processing role, which defines the purpose of the processing method. Some examples of processing roles include: * Initial Measurement Creation (D1) *

Device Activity Notification (D1) * Usage Transaction Notification (D2) * Usage Transaction Creation (D2)

Profiling of Scalar Data

The process of applying an interval consumption "shape" to a scalar measurement, using an existing interval measuring component. The individual interval values are adjusted such that when totaled, they equal the value of the scalar measurement.

Reading

The value recorded by a measuring component at a given point in time. A reading often needs to be interpreted in the context of an earlier reading in order to derive a consumption value that would be stored as a measurement. For example, a reading of 1000 for a subtractive measuring component taken on February 1 in the context of a prior reading of 600 taken on January 15 would result in a consumption (measurement) of 400. Readings can either be consumptive or subtractive.

Register (Measuring Component)

A business object (BO) that represents a scalar register found on a standard or smart meter. It does not have a lifecycle, and should be associated with a device configuration.

Register Type - Physical (Measuring Component Type)

Measuring component type business object (BO) that enumerates the properties used by scalar registers.

Retail Company

A company that is authorized to buy and re-sell a commodity (such as electricity or gas) directly to customers based on territorial regulations.

Scalar Usage

A measurement of the amount of energy, water, gas, etc. consumed for a given measuring component for a given time period.

Seconds Per Interval

Seconds Per Interval, a way of expressing the length of time between which measurements are taken.

Service Order Requests

Requests that orchestrate the field activities (FAs) and smart meter messages (commands) necessary to change the service point and its installation, to enable or disable service, cut service for non-payment, etc.

Service Point

A location at which a company supplies service. Used to store information describing the type of service and how it is measured.

Service Point Identifier Type

Specific types of service point identifiers.

Service Point Identifier

A collection of identifiers for a given service point.

Service Point Parent

The parent of one or more service points.

Service Point Type

A specific type of service point. Defines how the application manages many aspects of the service point's behavior.

Service Provider

External entities that serve various roles relative to the application. These can be a head-end system, a billing system to which the application sends bill determinant data, a market participant in a deregulated environment, an outage management system that receives meter event data from the application, or other parties that require or provide information to the system.

Service Quantity Identifier

Further distinguishes between measured quantities that have identical UOM/TOU combinations, including situations in which the distinguishing identifier of a UOM is not accurately described as a TOU. SQIs can also be used as a stand-alone representation of a service quantity that is not measured (i.e. one that is not properly described as a UOM) within a Usage SQ collection (e.g. a billing determinant).

Service Type

Specific types of service, such as electric, gas, steam, etc.

Smart Meter

A business object (BO) used to model smart meters of different service types.

Smart Meter Installation Event

A business object (BO) that defines the lifecycle and rules for installing a smart meter at a service point.

Smart Meter Type

A business object (BO) for device type that references a head-end system as well as a collection of head-ends that are valid for devices of the type, and indicates whether incoming data incorporates the daylight savings time shift. Additionally, the smart meter type includes a list of valid device configurations for its devices.

Subtractive

Describes a measuring component for which consecutive readings must be subtracted to derive a consumption value.

Time of Use

Time of Use - modifiers for a given unit of measure that indicate a period of time during which a quantity has been used, such as On-Peak (meaning during a time when the greatest quantity of some consumable is being used), Off-Peak (meaning during a time when the least amount of some consumable is being used), etc.

TOU Group

A group of TOUs used to limit the set of TOUs usable in a TOU schedule. TOU Groups are used when defining a TOU schedule via a TOU map template.

TOU Map

A collection of TOU map data derived via a given TOU map template at a specific interval size (TOU). A TOU map is typically specified when configuring a usage calculation rule for TOU mapping. This TOU map's data will then be used when summarizing the interval data for each TOU period.

TOU Map Data

An interval date/time and its associated TOU as defined by a TOU map template. For example, if the schedule defined for a TOU map template specifies that the period on weekdays from 9 AM to 5 PM falls into On-Peak, and the data is hourly, rows would be stored in the TOU map data table with the date/time 5/3/2010 at 10 AM, 5/3/2010 at 11 AM, 5/3/2010 at 12 PM, etc., each with a value of On-Peak.

TOU Map Template

The schedule used for TOU map data generation, for example defining year, month, and day

ranges and which TOUs should be used during each.

TOU Map Type

Defines certain important properties of TOU maps of the type, including the interval size (SPI) and the valid TOU map templates.

Unit of Measure

Identifies quantities measured, such as KWH, KW, cubic feet, degrees Celsius, etc.

Usage

A generic term for the amount of energy, water, gas, etc. consumed at one or more service points, sometimes representing quantities that have been adjusted from the original calculated consumption.

Usage Calculation Group

A set of sequenced usage rules used to calculate usage for a usage subscription.

Usage Rule

Business rules / logic used to calculate usage (bill determinants), such as a TOU-mapped consumption calculation. Each rule is a modular unit that can be grouped together and sequenced within a calculation group.

Usage Rule - Apply Math (Interval Data)

A usage rule used to summarize interval measurements and apply a mathematical formula against the results to derive a usage quantity.

Usage Rule - Get Interval Data

A usage rule used to get interval data for a measuring component and date range.

Usage Rule - Get Scalar Details

A usage rule used to assemble scalar readings and measurements (consumption).

Usage Rule - Get TOU Mapped Usage

A usage rule used to summarize interval measurements into TOU buckets based on a TOU map (where the TOU map is created based on the schedule defined within a TOU map template).

Usage Rule - Validate Usage Against Tolerance

A usage rule used to validate calculated usage against a specified tolerance.

Usage Rule Eligibility Criteria

Configured criteria used to determine whether to execute a specific usage rule when calculating usage.

Usage Subscription

A record of an ongoing request to send one or more service points' usage to one or more external systems (such as a billing application).

Usage Subscription Type

A collection of properties defining a class of usage subscriptions. The usage subscription type also controls valid values for various attributes of usage subscriptions.

Usage Transaction

A record of bill determinant calculations for a usage subscription.

User-Defined Measurement Values

Additional values optionally stored with a given measurement that can be used in various calculations. For example, a customer's gas consumption might be measured in cubic feet, but needs to be sent to a billing system in therms. A user-defined value to convert consumption in cubic feet into therms can be configured, and the therm value will then be stored with the

measurement in cubic feet.

Validation, Estimation, and Editing (VEE)

The process by which initial measurement data is validated, estimated (if necessary) and edited (if necessary) based on a set of user-defined rules.

VEE Eligibility Criteria

User-definable conditions that could cause a given VEE rule to be applied or skipped. This could involve the evaluation of some attribute of the device or measuring component, or something else entirely.

VEE Exception

An exception generated during Validation, Estimation and Editing (VEE) processing of initial measurement data. Exceptions are assigned a severity that is used in determining whether or not the initial measurement data should be transitioned into an exception state.

VEE Group

A collection of VEE Rules.

VEE Group Matrix (Factor)

A VEE rule within a VEE group can be configured to pick from a list of VEE groups (referred to as a matrix) whose rules to execute next. This list of VEE groups is configured as the values of a factor. One example of its use could be to call geographically-specific VEE groups from within a larger-purpose group. A residential VEE group might contain a rule that will pick the VEE group to execute based on service point location, where the VEE Group Matrix specifies: SP in the North - VEE Group N SP in the East - VEE Group E SP in the South - VEE Group S

VEE Group Matrix (Factor) Referencing Group

A zone that displays a list of VEE group matrices (factors) that reference the VEE group being viewed in the VEE group portal.

VEE Rule

Standard and custom Validation, Estimation and Editing (VEE) Rules that perform checking and/or manipulation of initial measurement data.

VEE Rule - Device Identifier Validation

VEE Rule that checks to ensure that the device identifier value of the incoming initial measurement data matches the device identifier value stored on the device.

VEE Rule - Device Multiplier Check

VEE Rule that checks to ensure that the device multiplier value of the incoming initial measurement data matches the multiplier value stored on the measuring component.

VEE Rule - Energy Sum Check

VEE Rule that checks the difference between the total consumption of incoming initial measurement data against the total consumption (based on final measurements) for one or more related measuring components on the same device over the same time period.

VEE Rule - Generic High/Low Check

VEE Rule that compares consumption of incoming initial measurement data against historical data as a means of assuring the reasonableness of the data.

VEE Rule - Interval Overcount Check

VEE Rule that detects whether incoming initial measurement data has too many recorded intervals for the specified date/time range.

VEE Rule - Interval Replacement Rule

VEE Rule that determines whether or not an incoming initial measurement will replace any existing measurements and if so, whether or not to allow this to happen.

VEE Rule - Interval Size Validation

VEE Rule that checks to ensure that the interval size of the incoming initial measurement data matches the value defined in the measuring component type.

VEE Rule - Interval Spike Check

VEE Rule that examines incoming initial measurement data to identify intervals with conspicuously high usage relative to surrounding intervals.

VEE Rule - Interval Undercount Check

VEE Rule that either creates an exception or fills in intervals for incoming initial measurement data that has insufficient recorded intervals for the specified date/time range.

VEE Rule - Negative Consumption

VEE Rule that checks for negative consumption.

VEE Rule - Scalar Replacement Rule

VEE Rule that identifies whether or not a scalar reading will completely replace an existing measurement and if so, whether or not to allow this to happen.

VEE Rule - Unit Of Measure Check

VEE Rule that checks to ensure that the Unit of Measure (UOM) of the incoming initial measurement data matches the UOM specified on the measuring component's type.

VEE Rules Referencing Group

A zone that displays a list of VEE rules that reference the VEE group being viewed in the VEE group portal.

Appendix C

Base Package Configuration Objects

This appendix provides lists of some base package configuration objects that can aid when implementing Oracle Utilities Meter Data Management. This includes:

- **Base Package Data Areas**

Base Package Data Areas

The table below lists the available back package data areas.

Data Area	Description
D1-ActivityTypeBasis	Common Schema of Activity Type
D1-AmountandCondition	Amount and Condition Data Area
D1-BOAuditChangedValues	BO Audit Changed Values
D1-CommonFactor	Common Factor
D1-CommonFactorValue	Common Factor Value
D1-CommonIMD	Common Initial Measurement Data
D1-CommonInstantiableBOOutput	Common Instantiable BO's Output
D1-CommonMeasurementSvcsOutput	Common Measurement Service Output
D1-CommonMeterData	Common Meter Data
D1-CommonMeterTypeData	Common Meter Type Data
D1-CommnoProcMethodDetails	Common Processing Method Details
D1-CommonSrvcProvDetails	Common Service Provider Details
D1-CommonUomSpiIdentGroup	Common UOM/SPI Identification Group
D1-CommonVEEIMD	Common VEE Initial Measurement Data
D1-DeviceRelatedActivity	Device Related to Activity Data Area
D1-EligibleProfileFactors	Eligible Profile Factors for Data Creation
D1-EventBarProfileData	Event Bar Profile Data
D1-EventBarProfileList	Event Bar Profile List
D1-ExtendableLookupColumn	Extendable Lookup Common Data Area
D1-ExtendedMsmtList	Extended ML
D1-FVOverlayDefaultProfileList	Final Values Overlay Default Profile List
D1-FVOverlayProfileData	Final Values Overlay Profile Data
D1-FallbackSPrValList	Fallback Service Provider Validation List
D1-IERelatedActivityDataArea	Common Schema of IM Related Activities
D1-MRDownloadActivityCommon	Common schema Meter Read Dwnld Activity
D1-NumberOfIntervalsAndDateTm	Number of Intervals and Date Time
D1-SPRelatedActivity	SP Related to Activity Data Area
D1-ScaToIntProfileFactor	Convert Scalar to Interval Profile Factors
D1-ScratchpadMCTypes	Scratchpad MC Types
D1-StandardLogFields	Standard Log Fields
D1-StatusCodeDescriptions	Status Code Descriptions Data

Data Area	Description
D1-TraceData	Trace Data
D1-VEECommon	VEE Common Data Area
D1-VEEIMDSeeder	VEE IMD Seeder Initial Measurement Data
D2-ChartCommon	Common Chart Data
D2-ChartEvents	Chart Events
D2-ChartSummaryInformation	Chart Summary Information
D2-CommonDynamicOption	Common Dynamic Option Data Area
D2-CommonDynamicOptionEvent	Common Dynamic Option Event Data Area
D2-CommonDynamicOptionType	Common Dynamic Option Type Data Area
D2-CommonUsageSubscription	Common Usage Subscription Data Area
D2-CommonUsageSubscriptionType	Common Usage Subscription Type Data Area
D2-EventBarProfiles	Event Bar Profiles
D2-FinalValuesGraphSummary	Final Values Graph Summary
D2-Functions	Functions
D2-GetScalarValList	Get Scalar Validation List
D2-MCChartCommon	Measuring Component Common Chart Fields
D2-MCFunctionCommon	Common Fields for Measuring Component Functions
D2-SPChartCommon	Service Point-Based Common Chart fields
D2-UTChartCommon	Usage-Based Common Chart Fields

Use the Data Area portal to view more details concerning these data areas.

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