Oracle Utilities Live Energy Connect

Configuration Manager User Guide

Release 7.1.0.0.0

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Oracle Utilities Live Energy Connect Configuration Manager User Guide, Release 7.1.0.0.0

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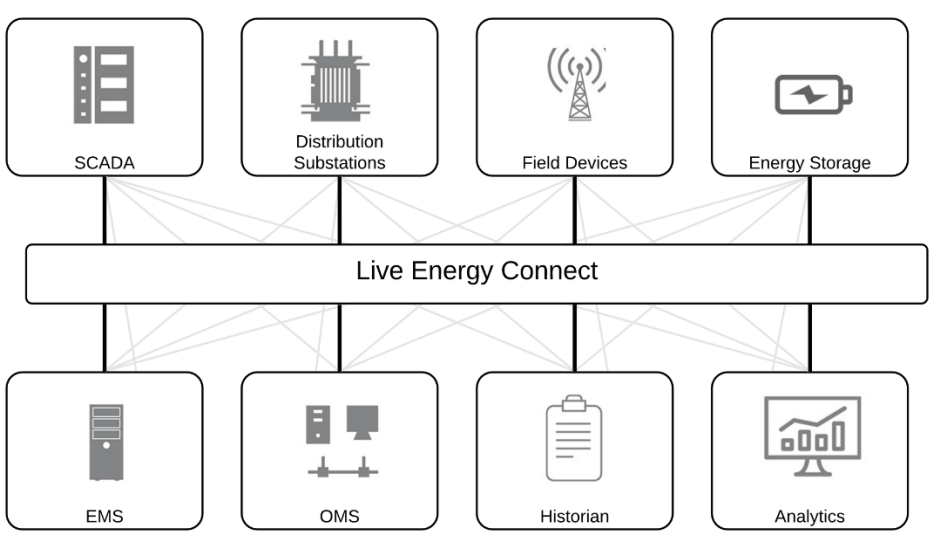
Contents

Preface

The Oracle Utilities Live Energy Connect Configuration Manager is a GUI application that gives users the ability to design, modify, and monitor their Oracle Utilities Live Energy Connect server configurations.

Introduction to Live Energy Connect

The Oracle Utilities Live Energy Connect is a highly configurable middleware product that enables real-time communication between any number of IT and OT systems.



Oracle Utilities Live Energy Connect simplifies and reduces the interfaces between OT systems. In the above figure, the gray connectors represent the many possible interfaces between systems in a business without middleware. The solid black lines show how you can use Oracle Utilities Live Energy Connect to reduce the complexity of your organization's systems.

Currently, the Oracle Utilities Live Energy Connect supports 20+ protocols used in the Utilities industry, including MMS, ICCP (TASE.2), DNP, Modbus, and OPC UA.

This document assumes the reader has access to a recent release of Oracle Utilities Live Energy Connect (v7.0.0.0.0 or later). For information about installing Oracle Utilities Live Energy Connect products, refer to the *Oracle Utilities Live Energy Connect Installation Guide* or contact My Oracle Support.

Note: Oracle Utilities Live Energy Connect was formerly known as LiveData Utilities Real Time Integration (RTI) Server Platform.

User Guide Conventions

The following text conventions are used in this document:

Convention	Meaning
Boldface	Boldface type indicates term definitions, GUI elements associated with an action, or specifiable fields in a GUI tool.
Italic	Italic type indicates document titles, emphasis, or the name of the type of an object in an Oracle Utilities Live Energy Connect server configuration.
“quoted”	Type inside of double-quotation marks indicates file paths, file names, a value to be entered for a particular field in a GUI tool, or the name of an instance of an object in an Oracle Utilities Live Energy Connect server configuration.

Oracle Utilities Live Energy Connect Concepts and Terminology

This section provides a list of concepts and terms used to describe Oracle Utilities Live Energy Connect configurations. Some of these terms are specific to Oracle Utilities Live Energy Connect but some terms originate from industry protocols and standards.

ICCP and MMS

The **Inter-Control Center Communications Protocol** (ICCP), also known as "TASE.2", is a protocol that allows for real-time data exchange between utility systems over WANs or LANS. The ICCP standard is maintained by the International Electrotechnical Commission as IEC 60870.

For more information about ICCP, refer to the IEC's website or Appendix B: ICCP Reference.

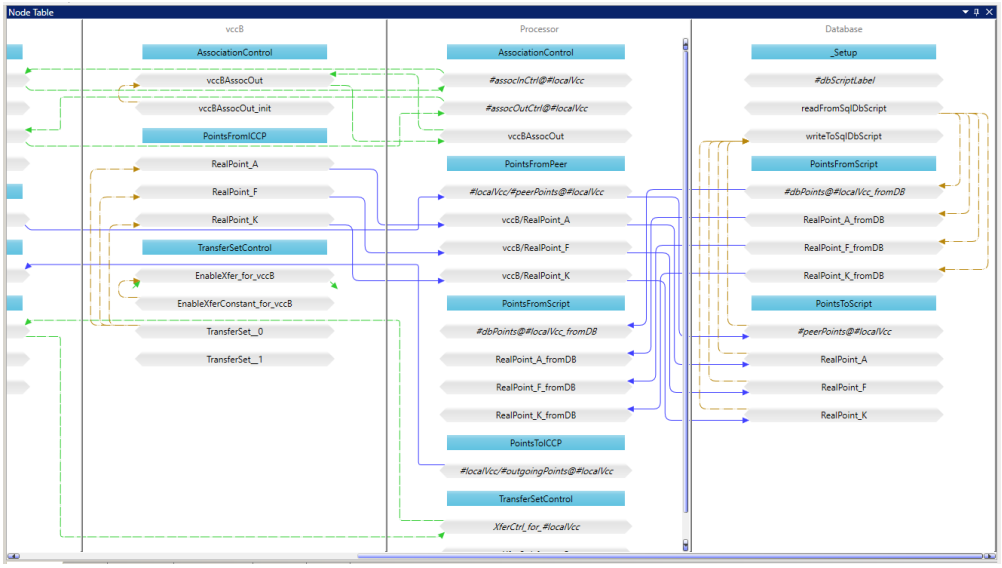
ICCP itself is built on top of the **Manufacturing Message Specification** (MMS) standard, which is maintained by International Standards Organization as ISO 9506. MMS defines a standard for data exchange consisting of real-time monitoring and control data between two devices.

The design and organization of Oracle Utilities Live Energy Connect is very much influenced by MMS. Much of the high-level organization finds its origins in MMS concepts. This means that many of the rules of Oracle Utilities Live Energy Connect find their origin in the MMS specification. For example, MMS variable names can only consist of 32 characters and can only contain the alpha-numeric characters and underscores (character '_'). This rule is enforced in Oracle Utilities Live Energy Connect for explicit input and output ICCP points. For more information about MMS refer to the ISO's website.

VMD

Oracle Utilities Live Energy Connect uses the MMS concept of **Virtual Manufacturing Devices** (VMD's) to represent component devices and systems. For example, a VMD on in an Oracle Utilities Live Energy Connect server configuration might represent a VCC (a VMD in the ICCP protocol) or a device from an entirely unrelated protocol, for example: A DNP master station, a Modbus slave, or an OPC UA server. Each type of VMD in an Oracle Utilities Live Energy Connect configuration is associated with a specific type of communication protocol or application interface, for example: ICCP, DNP, Modbus, ODBC, etc.

A VMD within an Oracle Utilities Live Energy Connect server configuration can connect to a device that exists outside of the Oracle Utilities Live Energy Connect server or to the other VMD's within the Oracle Utilities Live Energy Connect server. VMD's allow Oracle Utilities Live Energy Connect to capture, transform, and route data to devices, systems, or applications in a form that the other devices, systems, or applications can understand.



In the Oracle Utilities Live Energy Connect Configuration Manager, VMD's are displayed as vertical rectangular panels. In the above figure, the Oracle Utilities Live Energy Connect Configuration Manager is displaying three VMD's: "vccB," "Processor," and "Database."

Configuration Aliases

The Oracle Utilities Live Energy Connect Configuration Manager uses **Configuration Aliases** to organize and manage multiple Oracle Utilities Live Energy Connect server configurations on the same machine. Each configuration created, edited, or viewed in Oracle Utilities Live Energy Connect Configuration Manager is associated with a particular Configuration Alias. Typically, customers will only use one Oracle Utilities Live Energy Connect server instance per machine in production. By convention, that configuration alias is named “cfg”.

Configuration Manager VMD

Each Oracle Utilities Live Energy Connect configuration contains at least one VMD called the **Configuration Manager VMD**. It represents the local machine (the machine running Oracle Utilities Live Energy Connect) as a VMD within the configuration. This VMD is used to define certain nodes that represent variables in the Oracle Utilities Live Energy Connect configuration that are related to the local machine, like a system variable or the status of a TCP connection. Configuration Manager VMD’s are automatically created and named after the Configuration Alias and suffixed with the string “_LDSMGR”.

Points

Points are representations of measurements, states, signals, commands, or messages.

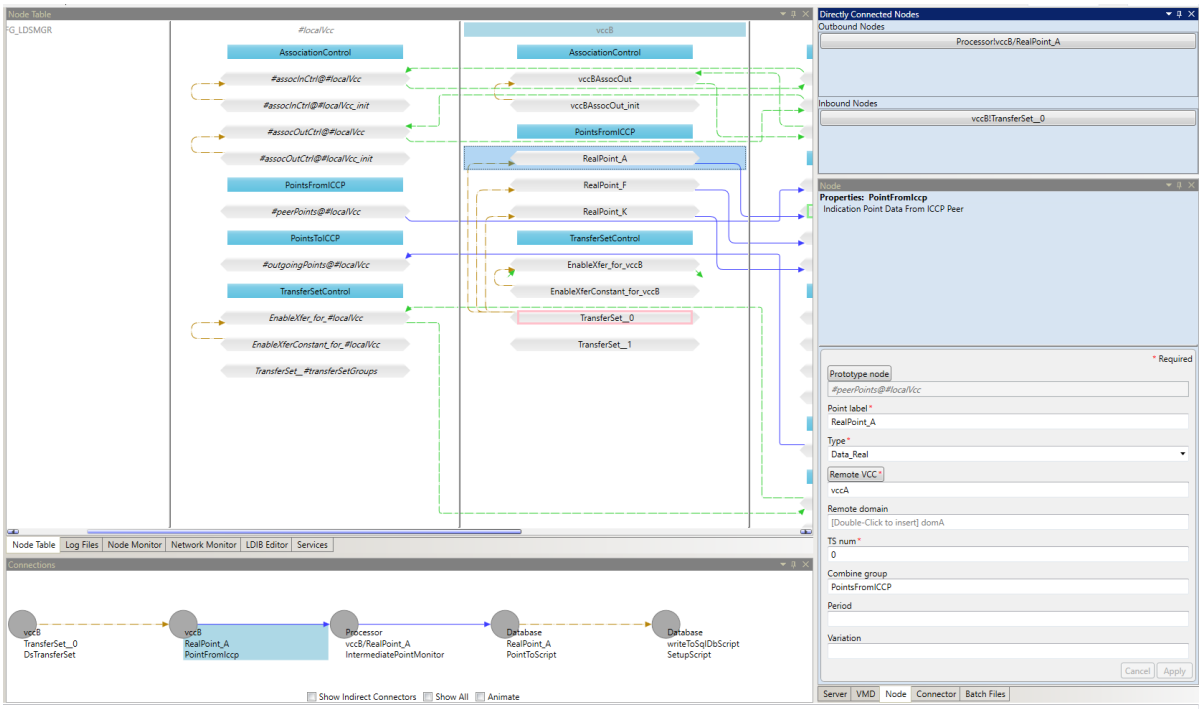
For example, your Oracle Utilities Live Energy Connect server configuration might have a point that represents the measured output of a power plant. Other points in your configuration might represent the temperature inside a transformer or the control signal to open a circuit breaker. Points live inside VMD’s. Oracle Utilities Live Energy Connect orchestrates where these points come from, where they go, and it applies any required logic, filtering, or transformations along the way.

Nodes

A **node** is the representation of a point at a particular step in its dataflow through the Oracle Utilities Live Energy Connect server. In an Oracle Utilities Live Energy Connect configuration, a single point is often associated with a number of nodes.

For example, if there is a point on a SCADA Server that represents the current through a line, then that point might start in the Oracle Utilities Live Energy Connect server configuration as a *PointFromDnp* node, get filtered in the Processor VMD as a *DeadbandFilter* node, and finally leave the server as a *PointToIccp* node.

Every node in Oracle Utilities Live Energy Connect exists as an in-memory variable. Nodes are displayed in the **Connections** panel, the **Node Table**, and the **Node Monitor**.



In the above figure, nodes are displayed as gray horizontal bars inside VMD's in the Oracle Utilities Live Energy Connect Configuration Manager. The blue horizontal bars are just labels used to visually group nodes within a VMD called **Combine Groups**.

Connectors

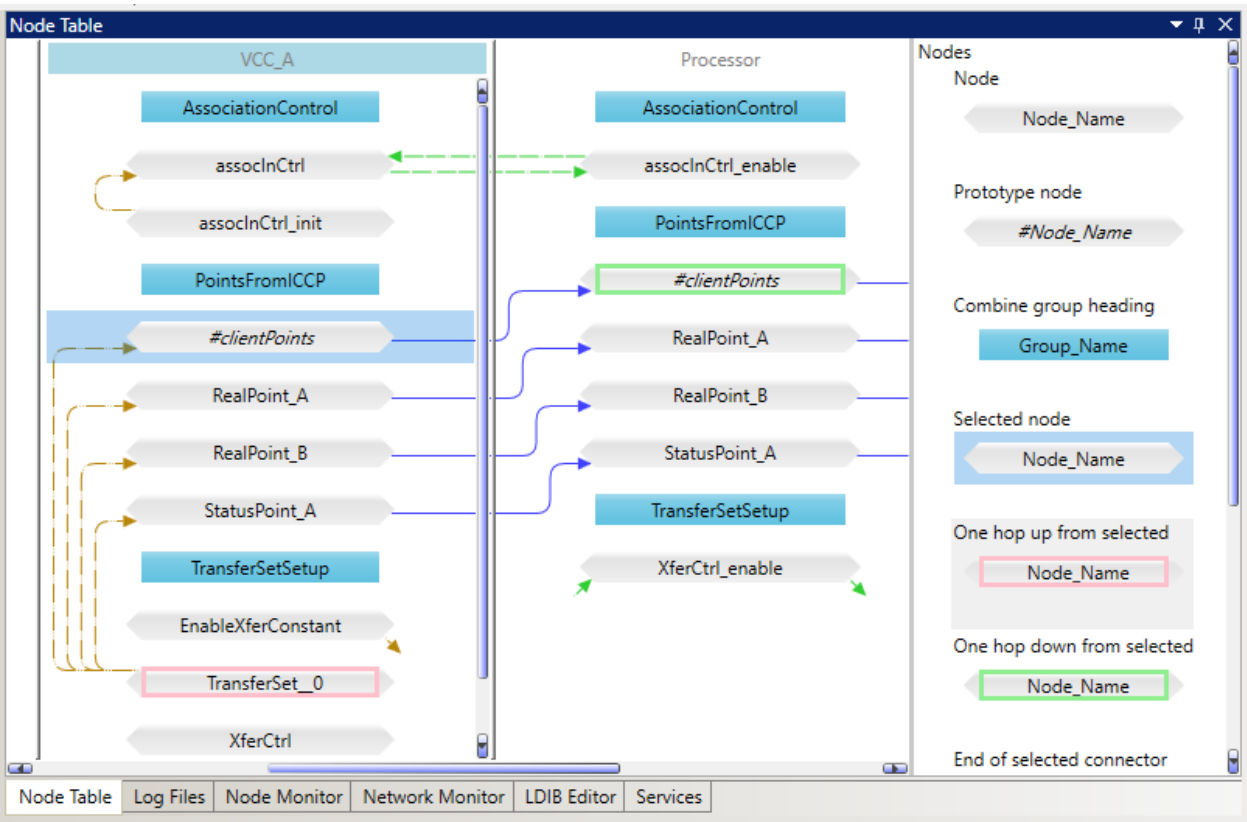
A **connector** connects two nodes in an Oracle Utilities Live Energy Connect server configuration. It defines under which circumstances and in which direction data should flow between two nodes. Connectors are displayed as arrows in the Oracle Utilities Live Energy Connect Configuration Manger. The types of connectors are: *Implicit*, *Update*, *Demand*, and *Two Way*.

Filter Nodes

A **filter node** is a special type of node in the Oracle Utilities Live Energy Connect server. It is used to transform data or apply logic to the flow of data through that node. An example of a filter is the *DeadbandFilter* node. It is one of the many built-in filters that ship with Oracle Utilities Live Energy Connect. This filter propagates data past itself (further along in the dataflow) if and only if the value of the data has changed by some configurable amount or percentage.

Prototype Configurations

Most Oracle Utilities Live Energy Connect server configurations perform the same operations on large numbers of similar points. It is not practical to individually specify each node in the Oracle Utilities Live Energy Connect Configuration Manager. Instead, you can use a **Prototype Configuration** as a model of the actual configuration. In a prototype configurations, VMD's, nodes, and connectors in the configuration act as placeholders and templates. Prototype VMD's and prototype nodes have names that begin with a '#' character. At startup, the Oracle Utilities Live Energy Connect server populates all prototype VMD's, nodes, and connectors with actual VMD's, nodes, and connectors using information provided to it in a batch file.



The above figure shows the "VCC_A" VMD that contains a prototype node named "#clientPoints". The "RealPoint_A" node in "VCC_A" is generated by this prototype node from information included in a batch file.

Batch File

A **batch file** provides the information necessary to populate any prototype VMD's or prototype nodes with meaningful server configuration information.

Batch files are text files in CSV or JSON format that contain one or more tables. Each table has a header row with column values that correspond to various parameters of prototype VMD's and prototype nodes in an Oracle Utilities Live Energy Connect prototype configuration. Every other row in the table specifies the exact value of these parameters for an actual VMD or node in the dataflow. Connectors are not explicitly specified within a batch file. They are automatically built based on the connections between prototype nodes in the prototype configuration.

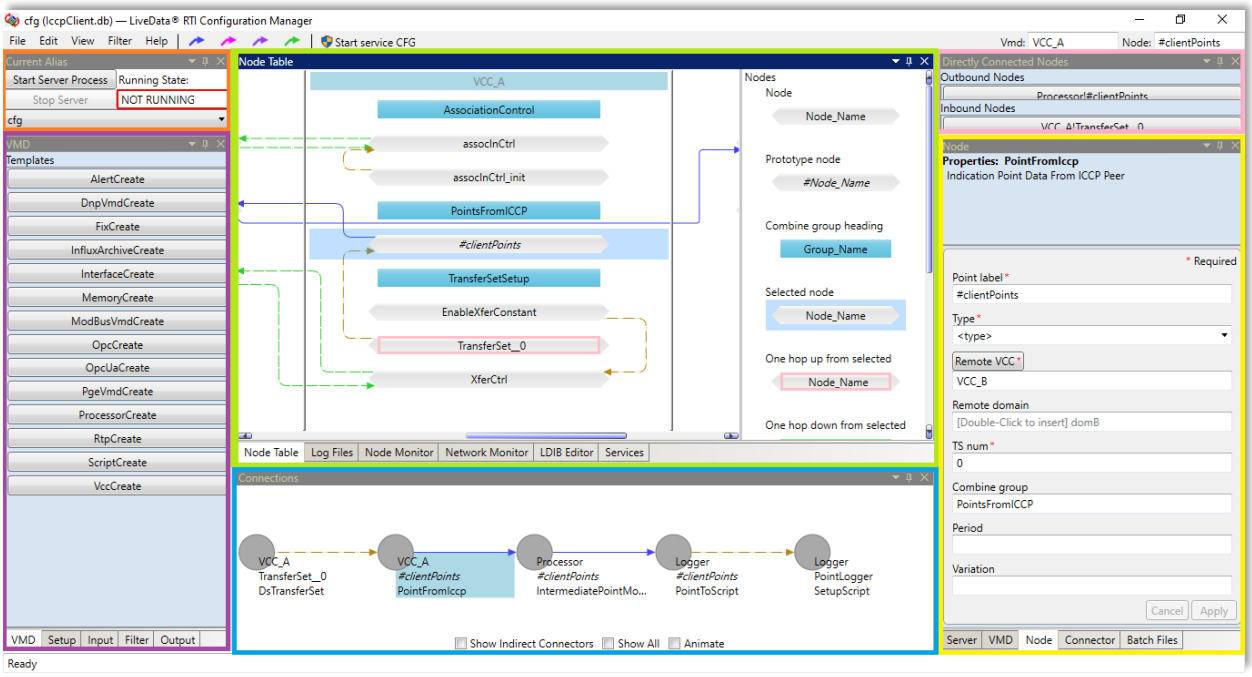
PDI Macros

PDI macros, sometimes referred to as just "**macros"** in Oracle Utilities Live Energy Connect Configuration Manager menus, are pieces of reusable **Programmable Data Interface** (PDI) code used to define an Oracle Utilities Live Energy Connect configuration. PDI is a declarative language created to define how data should flow through the Oracle Utilities Live Energy Connect server. The Oracle Utilities Live Energy Connect Configuration Manager uses a collection of PDI macros defined in a file called "DataflowMacros.pdi" at server start-up to implement server configurations defined in the Configuration Manager. Before the Oracle Utilities Live Energy Connect had a GUI-based configuration tool, text-based PDI files were used exclusively to define configurations.

Each type of node, connector, and VMD in the Oracle Utilities Live Energy Connect Configuration Manager corresponds to a PDI macro defined in the "DataflowMacros.pdi" file or a macro defined in a customer-specific PDI file or Python file. The parameters shown in the Oracle Utilities Live Energy Connect Configuration Manager **Properties** panel are used as inputs for these PDI macros.

User Interface

The Oracle Utilities Live Energy Connect Configuration Manager is a Windows desktop application that allows users to design, view, and edit their Oracle Utilities Live Energy Connect server configurations, and to monitor and manage a running Oracle Utilities Live Energy Connect server instance. The UI is organized into a Menu Bar and six different panels. Three of these panels have additional tabs that are used to access various tools and functions of the Configuration Manager.



This figure above shows the six panels in the default view of the Oracle Utilities Live Energy Connect Configuration Manager. In the figure, the **VMD** tab is open in the **Templates** panel, the **Node Table** tab is open in the **Central** panel, and the **Node** tab is open in the **Properties** panel.

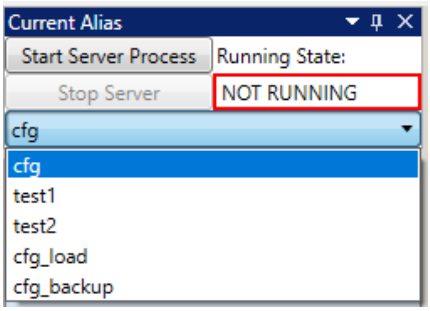
This section provides detailed information about the six panels:

- Current Alias Panel
- Central Panel
- Directly Connected Nodes Panel
- Properties Panel
- Connections Panel
- Templates Panel
- Menu Bar

Current Alias Panel

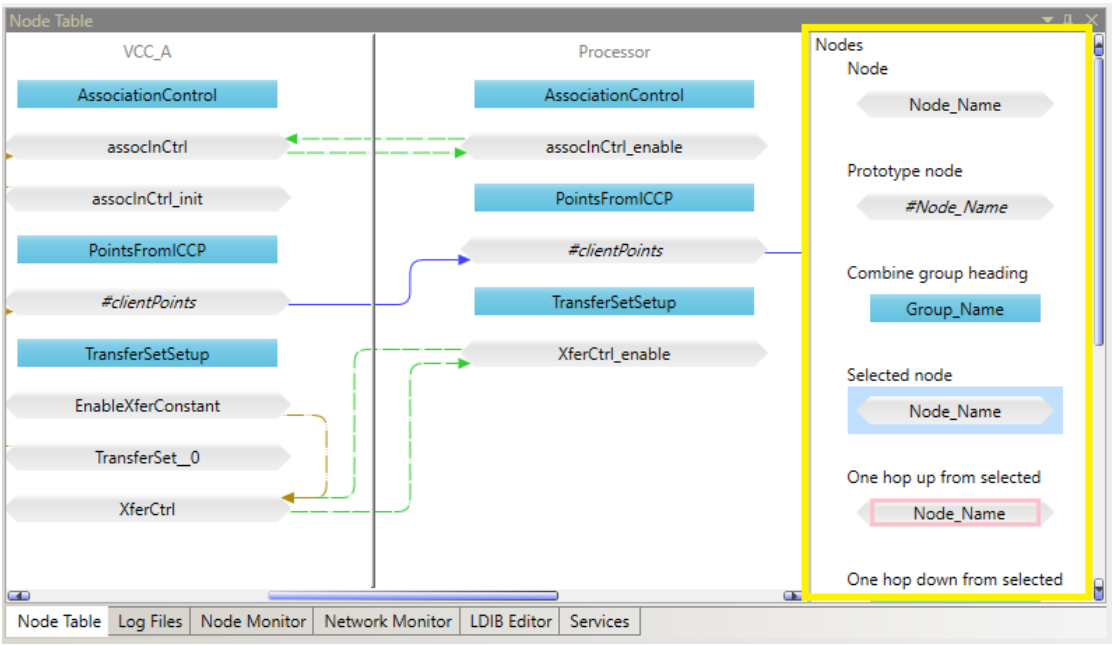
This panel displays the configuration alias that is currently selected and allows you to switch between different configuration aliases. Multiple configuration aliases can be created, though typically only one is used in a production environment. It also shows the running state of the Oracle Utilities Live Energy Connect server associated with the current configuration alias and lets you start and stop the server as a Windows process instead of running it as Windows service, which is useful in testing and troubleshooting scenarios.

The below screenshot shows the “cfg” configuration alias currently selected. Click the name of a configuration alias in the drop-down menu to switch to a different alias. The **Running State** box shows that the Oracle Utilities Live Energy Connect server instance associated with this configuration alias is currently not running.



Central Panel

This panel has tools used to explore an Oracle Utilities Live Energy Connect server configuration and to monitor it if it is running.



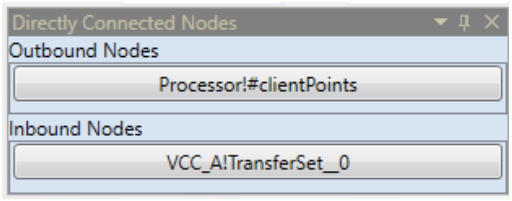
The figure above shows the **Node Table** tab open in a configuration with two VMD's. The **Node Table** will display VMD's, the nodes inside them, connectors between the nodes, and combine group labels. The legend at the right (outlined in yellow) describes how items are displayed in the **Node Table**.

You can select tabs at the bottom of the Central panel to change what is displayed. Each tab provides the information about Oracle Utilities Live Energy Connect configuration:

- **Node Table** - Contains a visual representation of the Oracle Utilities Live Energy Connect server configuration. Use it to view, build, and edit the configuration. Select VMD's, nodes, and connectors from the Node Table to edit their properties in the **Properties** panel.
- **Log Files** – Displays the running log of the Oracle Utilities Live Energy Connect server.
- **Node Monitor** - Allows to monitor the current values of certain nodes in real-time. This is useful for testing and troubleshooting.
- **Network Monitor** - Shows the status of MMS and ICCP associations for each VMD in the configuration.
- **LDIB Editor** - Displays the MMS and ICCP association parameters table for VMD's.
- **Services** - Lists the Oracle Utilities Live Energy Connect configuration aliases that are registered as Windows services and the status of each service.

Directly Connected Nodes Panel

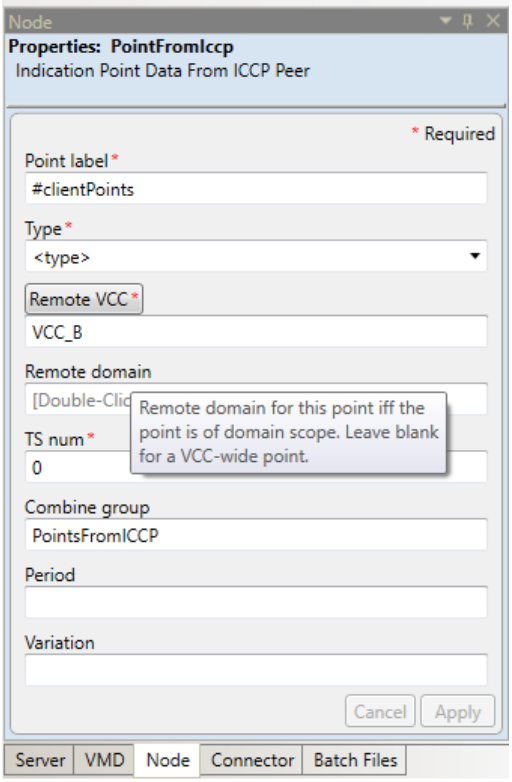
This panel displays the full name of the input and output nodes attached to the currently selected node by connectors. You can use it to select a node connected to the currently selected node if it is not easy to select them from the **Node Table** in the **Central** panel or from the map in the **Connections** panel.



Properties Panel

This panel specifies the properties of selected VMD's, nodes, and connectors in the Oracle Utilities Live Energy Connect server configuration. It also specifies batch files to be loaded and some parameters that need to be specified for the Oracle Utilities Live Energy Connect server to start.

There are various VMD, node, and connector types. Each type has its own set of properties. To identify what a field in the **Properties** panel is used for, hover over the field to read its tool tip. Fields that are required to create a particular VMD, node, or connector are marked with a red asterisk.



The screenshot above shows the **Properties** panel when a *PointFromIccp* node is selected. Most nodes have **Point label** and **Type** parameters.

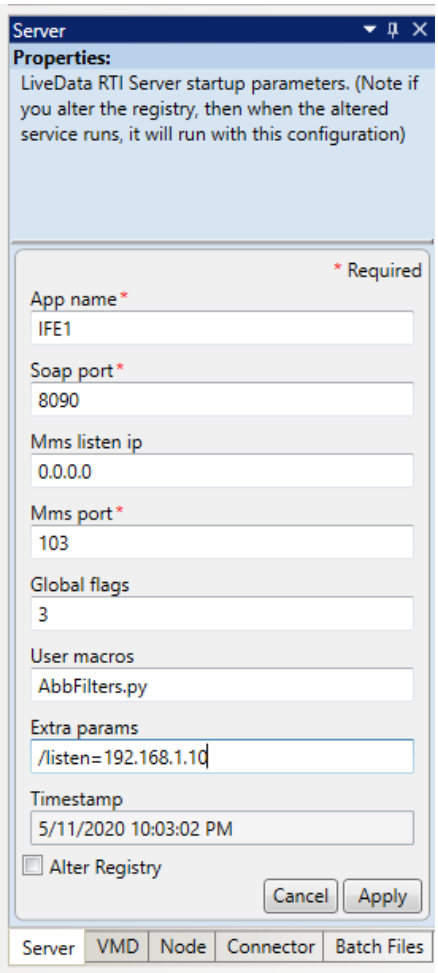
Selecting an item in the configuration (by clicking a node or VMD in the **Node Table**) automatically opens the relevant **Properties** panel for that item.

In the **Properties** panel, you can switch between the following tabs:

- **VMD** - Specify the properties of a selected VMD in the configuration. Each type of VMD has its own defined set of parameters.
- **Node** - Specify the properties of a selected node in the configuration. Some commonly used node types are: *IntermediatePointMonitor*, *PointToIccp*, *PointToDnp*," and *PointFromMemory*. Each type of node has its own defined set of parameters.
- **Connector** - Specify the properties of a selected connector in the configuration. The types of connectors are: *UpdateConnector*, *TimedConnector*, *DemandConnector*, and *TwoWayConnector*. Each type of connector has its own defined set of parameters.

- **Batch Files** – Allows to load and unload batch files into an Oracle Utilities Live Energy Connect server configuration. It also shows which batch files are currently loaded in the open configuration.
- **Server** - Specify server-specific information for the Oracle Utilities Live Energy Connect server.

Note: By default, the Oracle Utilities Live Energy Connect server listens on LOCALHOST (i.e. 127.0.0.1) for incoming MMS/ICCP associations. If you're configuration requires inbound MMS/ICCP associations from remote peers (i.e. VCC's on other machines), you will need to modify your Oracle Utilities Live Energy Connect configuration to allow the server to listen on the appropriate external interface. To do this, with the appropriate configuration alias selected, open the **Server** tab of the **Properties** panel. In the **Extra params** field, add "/listen=<ip_address>" where "<ip_address>" is the IP address of the network interface you want the server to listen on (e.g. "/listen=192.168.1.10").



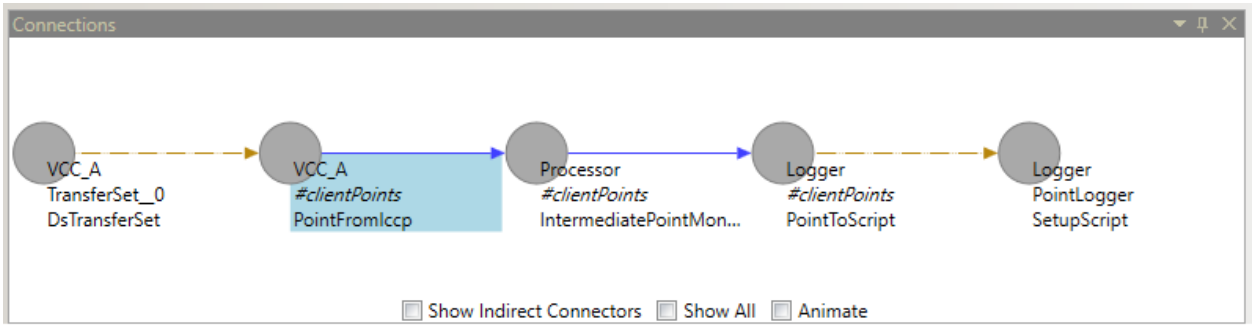
In the screenshot above, the value in the Extra params field tells the Oracle Utilities Live Energy Connect server to listen for inbound ICCP associations from remote ICCP peers on the interface with the IP address of "192.168.1.10".

Connections Panel

This panel displays a map of the selected node and the nodes connected to the selected node. It is used to visually represent the dataflow or path of a given point through the Oracle Utilities Live Energy Connect server. Each node in the map will be listed with the name of its VMD, its own name, and the type of node it is.

You can select any node that appears in the **Connections** panel. It can be useful to select nodes in a configuration from the **Connections** panel so that you don't have to search for them in the **Node Table**.

In the **Connections** panel, you can specify a limit on how "close" connected nodes have to be to the selected node in order to appear in the map.

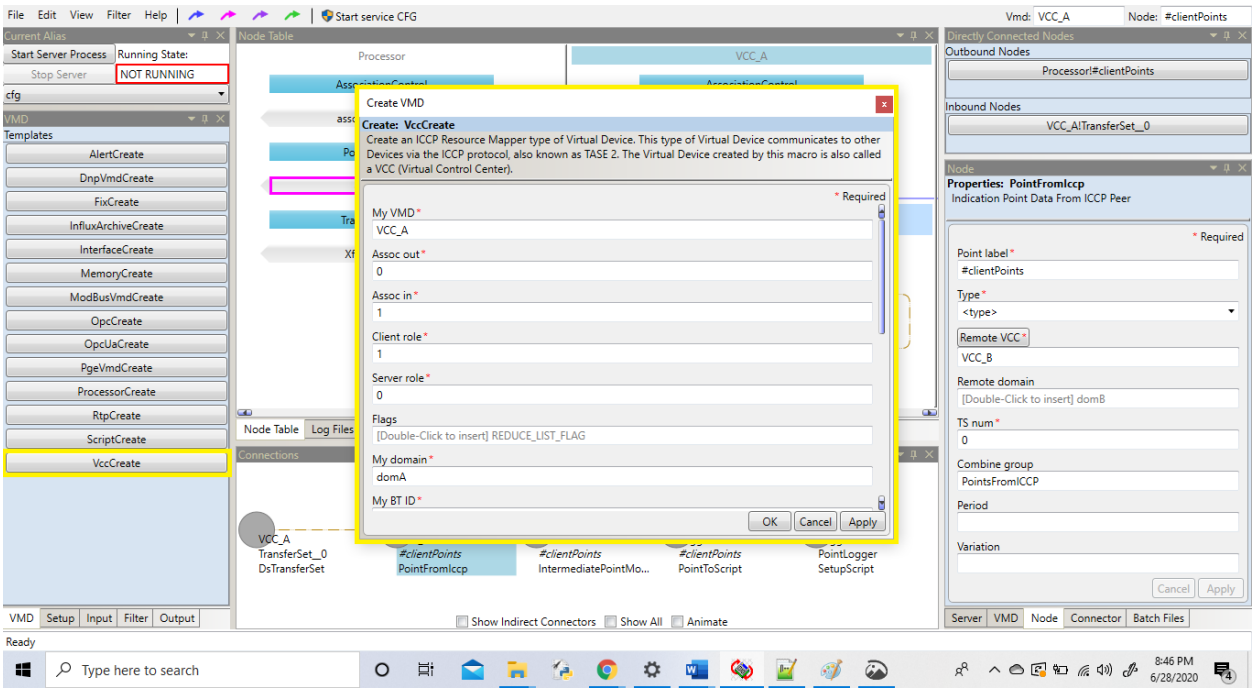


The above screenshot from Oracle Utilities Live Energy Connect Configuration Manager shows the map of the dataflow around a selected node and its connected nodes in the **Connections** panel. The "#clientPoints" inside "VCC_A" VMD is the selected node.

Templates Panel

This panel is used to add new VMD's and nodes to your Oracle Utilities Live Energy Connect server configuration. It contains a library of VMD and node templates. The types of node templates available are organized into four tabs: **Setup**, **Input**, **Filter**, and **Output**.

You can browse through the tabs in this panel to find the type of VMD or node you are looking looking to create. Select an item to launch a **Create** window that will allow you to specify the appropriate Properties and create the object.



In the figure above, the **VccCreate** option was selected from the **VMD** tab in the **Templates** panel so the **Create VMD** tool for a *VccCreate* VMD was launched. By default, each field will be populated with the last value specified for that field.

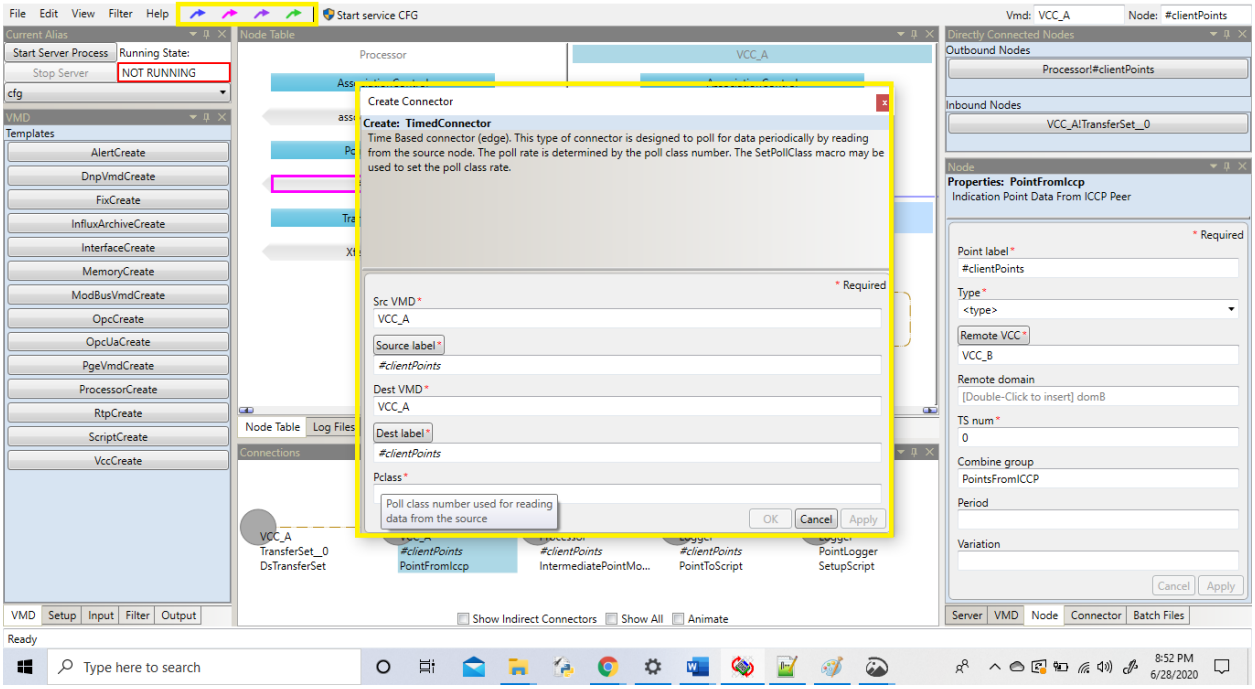
From the **Templates** panel, you can create items from the following tabs:

- **VMD -** Lists the types of VMD's that can be created in the configuration. Some common VMD types are: *ProcessorCreate*, *VccCreate*, and *ScriptCreate*.
- **Setup** - Lists the setup nodes types available for a selected VMD. The nodes listed in this tab will differ depending on what type of VMD is currently selected before clicking the tab. Setup nodes are often nodes that give the Oracle Utilities Live Energy Connect server access to variables that control associations (or connections) between devices or the organization of points inside a device
- **Input** - Lists the input node types available for a selected VMD. The nodes listed in this tab also differ depending on what VMD is selected before selecting the tab. Input nodes are used to specify data coming into the VMD.
- **Filter** - Lists the types of filter nodes available for a selected VMD. Filter nodes allow you to apply transformations to the points in your dataflow or apply rules to their flow through the configuration. Oracle Utilities Live Energy Connect comes with built-in filter nodes that provide a number of different functions, such as deadbanding, scaling, and quality filtering.

- **Output -** Lists the types of output nodes available for a selected VMD. The nodes listed in this tab also differ depending on what VMD is selected before selecting the tab. Output nodes are used to specify data leaving the VMD.

Menu Bar

The **Menu Bar** organizes the remaining tools in the Oracle Utilities Live Energy Connect Configuration Manager and provides quick access to some of the most used features of the software. It also contains a group of buttons used to create connectors between nodes and an easy-to-find button that can be used to stop or start the Oracle Utilities Live Energy Connect server.



Again, in addition to providing access to the **File**, **Edit**, **View**, **Filter**, and **Help** menus, the **Menu Bar** consists of buttons that launch the **Create Connector** tool and allow you to create new connectors. The figure above displays the **Create Connector** window for creating a *TimedConnector*.

The **Menu Bar** in the Configuration Manager has various tabs.

Open the **File** menu to:

- Open, import or save server configurations
- Create new configuration aliases
- Create new Windows services for a configuration alias
- Load or unload batch files
- Reload macros

Open the **Edit** menu to:

- Delete selected VMD's, nodes, or connectors
- Copy and paste selected VMD's

Open the **View** menu to:

- Hide and unhide certain tools in the Configuration Manager
- Restore the default layout of the Configuration Manager
- Open the **Variable Access Tool**

Open the **Filter** menu to:

- Specify which VMD's and nodes are visible in the **Node Table** tab, **Node Monitor** tab, and **Connections** panel
- Hide and unhide VMD's

Open the **Help** menu to:

- Find the which version of Oracle Utilities Live Energy Connect is installed
- Gather diagnostic data for troubleshooting and support

Use the **Connector** buttons to create connectors. A connector is represented by an arrow that starts at a source node and ends at a destination node. The types of connectors available are:

- An ***UpdateConnector*** subscribes to receive notifications from the source node. In other words, when the value of the source node changes, the destination node is updated. *UpdateConnectors* are displayed as blue arrows.
- A ***TimedConnector*** polls for data from the source and updates the destination periodically. Timed connectors are associated with an Oracle Utilities Live Energy Connect server poll class that defines the polling period. Poll classes are defined as setup node in the configuration VMD. *TimedConnectors* are displayed as pink arrows.
- A ***DemandConnector*** reads from the source node whenever another connector or device reads from the destination node. *DemandConnectors* are displayed as purple arrows.
- A ***TwoWayConnector*** subscribes to receive notifications from the source node and the destination node. In other words, when the value of the either node changes, the other node is updated. *TwoWayConnectors* are displayed as green arrows.
- An ***ImplicitConnector*** is a connector created automatically by the Configuration Manager when using one node as a parameter input to another node. *ImplicitConnectors* are displayed as brown arrows.

Use the **Start service** or **Stop service** button to start or stop the Oracle Utilities Live Energy Connect service for the currently selected configuration alias.

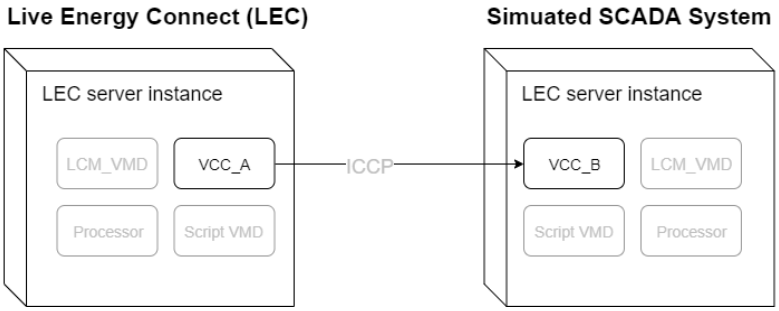
Getting Started: A Quick Configuration Manager Tutorial

This tutorial uses two provided example configurations to get familiar with using the Oracle Utilities Live Energy Connect Configuration Manager as quickly as possible. For a more detailed tutorial, refer to Appendix A: Creating an ICCP Client with Oracle Utilities Live Energy Connect Configuration Manager.

Scenario for the Example ICCP Client Configuration

The goal of this tutorial is to use Oracle Utilities Live Energy Connect to get information over ICCP from a remote SCADA system. For more information on the ICCP protocol, see Appendix B: ICCP Reference.

The main Oracle Utilities Live Energy Connect server configuration used in this tutorial acts as an ICCP client. The simulated SCADA system acts as an ICCP server. In this configuration, the Oracle Utilities Live Energy Connect server receives information about points on the remote SCADA system and logs the information to a file. For details about creating the ICCP client configuration, refer to Appendix A: Creating an ICCP Client with Oracle Utilities Live Energy Connect Configuration Manager.



The above diagram shows the systems involved in the tutorial. In this scenario the main Oracle Utilities Live Energy Connect server configuration (left) acts as an ICCP client. It makes an outbound association to the remote SCADA system that acts as an ICCP server.

To simulate the remote SCADA system, we will use another Oracle Utilities Live Energy Connect server instance on the same machine. This simulated SCADA system will generate random data values, using a *Script* VMD that hosts a Python script called “Volts.py”.

Note: These configurations are provided in the example files that come with the Oracle Utilities Live Energy Connect installation. In addition to this tutorial, there are other example configuration files and batch files (with README’s). These examples are available in the “C:\ProgramData\LiveEnergyConnect” directory. Some of these examples demonstrate using Oracle Utilities Live Energy Connect to communicate with devices over other protocols like DNP or Modbus or as an interface to other systems like a SQL Server database.

Most customers do not need to create their own Oracle Utilities Live Energy Connect Server configurations. Instead, they are provided with configurations by Oracle Utilities and only use the Configuration Manager to edit these configurations or monitor their LEC Server instances.

Importing Oracle Utilities Live Energy Connect Server Configurations

Oracle Utilities Live Energy Connect server configurations are saved as SQLite files with ".db" extensions. Most configuration files define a prototype configuration that, when loaded with one or more batch files, will define a complete and useable server configuration.

To Import an Oracle Utilities Live Energy Connect Server Configuration:

1. Open Oracle Utilities Live Energy Connect Configuration Manager as an Administrator.
2. Select **Import configuration…** from the **File** menu.
3. Navigate to the "C:\ProgramData\LiveEnergyConnect" directory in the file browser that opens.
4. Select the "IccpClient.db" file and select **Open**.

The provided ICCP client example configuration has four VMD's:

- "CFG_LDSMGR" (the *Configuration Manager* VMD),
- "VCC_A" (a *VCC* acting as an ICCP client)
- "Processor" (a *Processor* VMD)
- "Logger" (a *Script* VMD).

Loading a Batch File

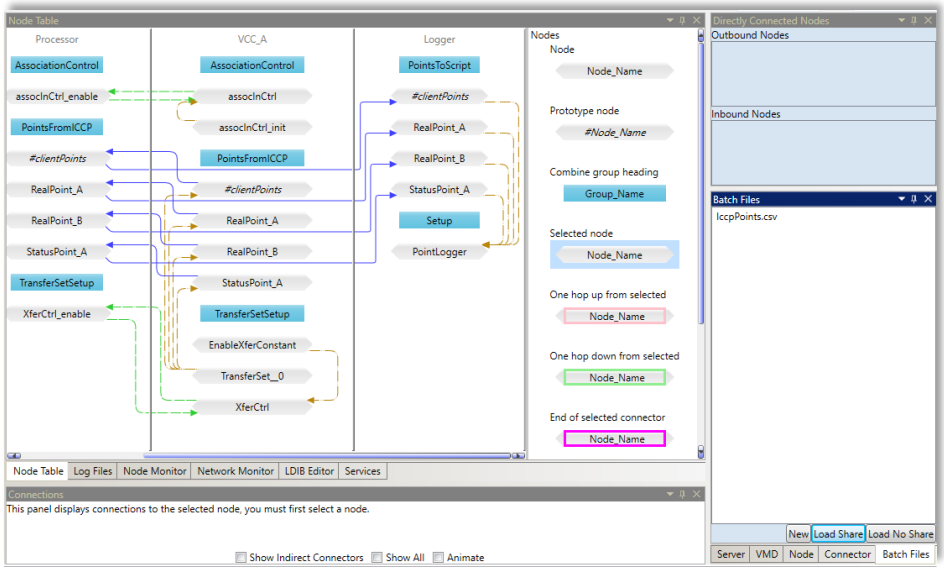
The Oracle Utilities Live Energy Connect Configuration Manager loads one or more batch files into a prototype configuration. After the batch files are loaded, the Configuration Manager has the information needed to define a specific, useable server configuration. Batch files are text files in CSV or JSON format that specify lists of point names and parameters. Sometimes batch files also contain lists of VMD names and parameters if the Prototype Configuration uses prototype VMD's.

Typically, Oracle Utilities engineers will help you create your prototype configuration and batch files.

To Load a Batch File:

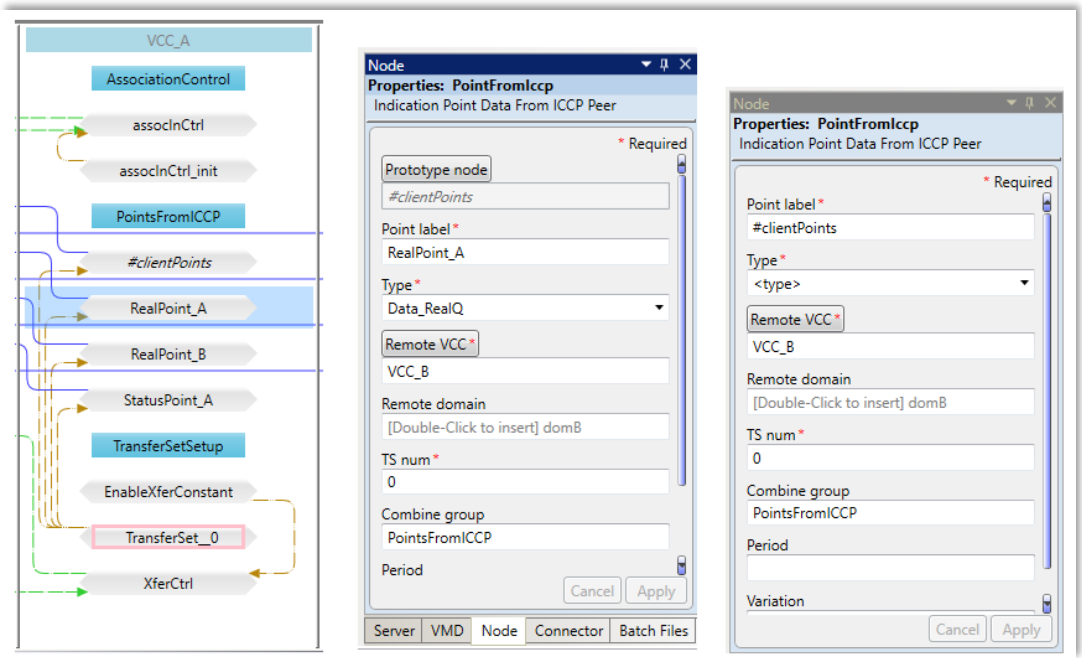
1. Select **Load batch (share)…** from the **File** menu.
2. Navigate to the "C:\ProgramData\LiveEnergyConnnect\Config" directory in the file browser that opens.
3. Choose the "IccpPoints.csv" batch file and select **Open**.
4. The file will load and appear in the **Batch Files** tab in the **Properties** panel (lower right).
   Note: Most server configurations use batch files that are loaded using the **Load batch (share)…** option. The other option, **Load batch (no Share)…**, is used less often. The **Load batch (share)…** option treats a collection of batch files as a single batch file (the tables in one batch file can reference something defined in an earlier-loaded batch file). If loading only one batch file, you can use either option.

The figure below shows what the example configuration looks like in the Configuration Manager after loading the "IccpPoints.csv" batch file. The prototype nodes (the nodes whose labels start with the '#' character) have generated new nodes based on the information in the batch file. In this example, only nodes were created, but batch files can also be used to build VMD's from prototype VMD's as well.



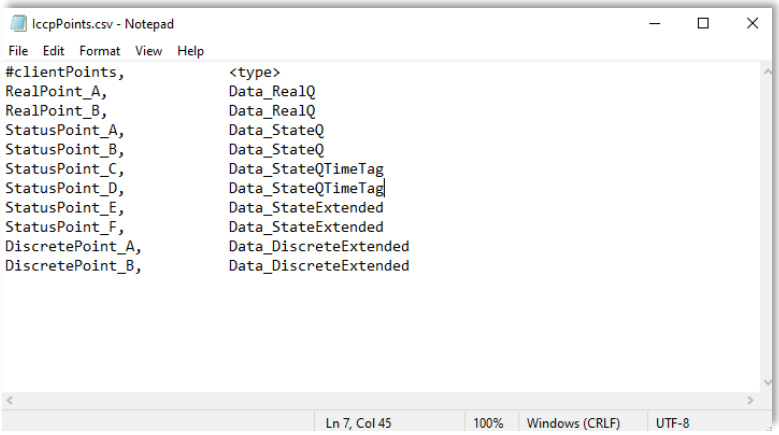
After loading the "IccpPoints.csv" batch file, the Configuration Manager generates new nodes based on the prototype nodes in the configuration. For example, in "VCC_A", the node "RealPoint_A" is generated from the prototype node "#clientPoints".

Consider the nodes in the “VCC_A” VMD that were generated by the batch file. “VCC_A” includes a prototype node “#clientPoints”. The figure below shows the properties of this node. Click the node in the **Node Table** and select the **Node** tab in the **Properties** panel to view the nodes properties.



The Configuration Manager generates the node “RealPoint_A” from the placeholder parameters for the **Point label** and **Type** parameters specified in the prototype node “#clientPoints”.

The figure below shows the structure of the “IccpPoints.csv” batch file. **Point label** and **Type** are common parameters for many types of nodes. In a batch file, each row after the header row corresponds to a node (or VMD) that should be generated. Each column corresponds to a parameter of prototype node (or prototype VMD) in the prototype configuration.



In the example configuration, the **Type** parameter refers to an ICCP type like “Data_RealQ” or “Data_StateTimeTag” but in other server configurations, valid values for **Type** might be an MMS type like “<integer:32>”, a type native to another industry protocol, or even a custom type defined by the user’s configuration. For more information about ICCP types, refer to Appendix B: ICCP Reference.

Saving a Configuration in the Configuration Manager

After the batch file is loaded, let's save the server configuration.

To Save the Configuration:

1. Click **Save Configuration** from the **File** menu.
2. Since this is the first time saving the configuration, the **Save As** menu appears.
3. Enter the desired name for the configuration file and click **Save**.

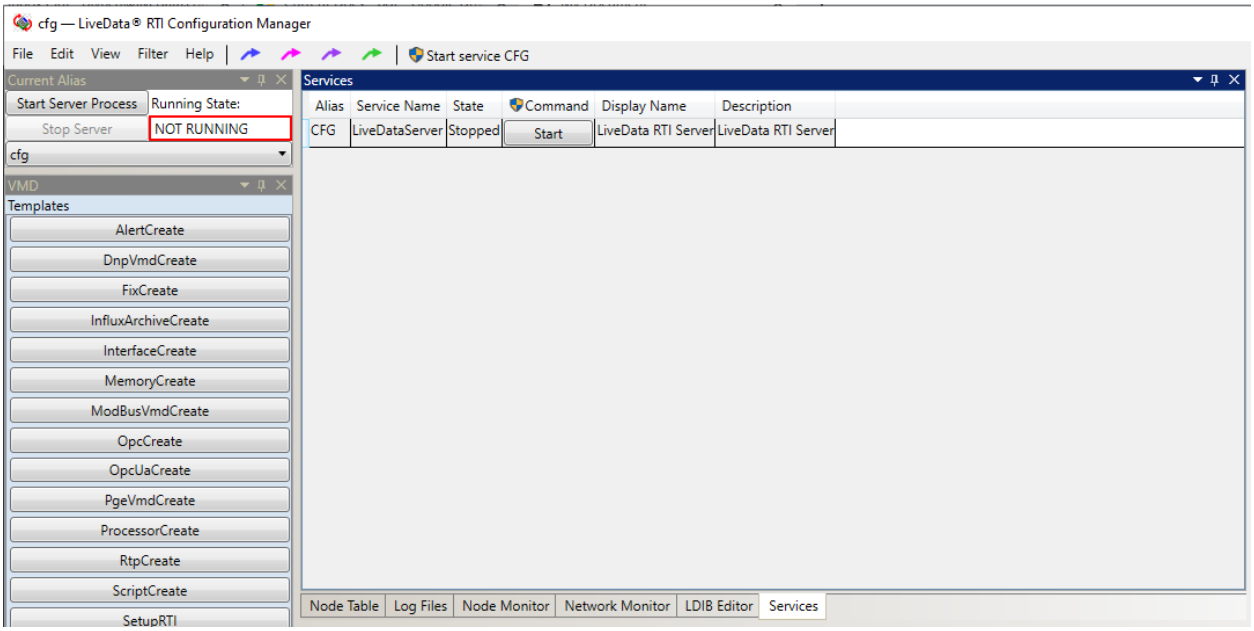
Note: It is recommended to save a copy of the configuration before proceeding in a known location with a descriptive name. That way, any problems created later can be revoked by reloading the stored copy.

Starting and Stopping the Oracle Utilities Live Energy Connect Server

After loading the batch files necessary to create all the nodes in the example configuration, you can start the Oracle Utilities Live Energy Connect server. Usually, the server is run as a Windows service. By default, the "cfg" configuration alias will already have a Windows service registered after installing Oracle Utilities Live Energy Connect.

To Start the Oracle Utilities Live Energy Server as a Windows Service:

1. Click the **Start Service CFG** command in the **Menu Bar**. Alternatively, click **Start** from the **Service** tab of the **Central** panel.



2. If you are not running the Configuration Manager with Administrative privileges, a pop-up message is displayed asking if you want to allow the "servxnt.exe" program (the server executable) to make changes to the computer. Select **Yes**.

Now we can stop the server and work on setting up the SCADA system simulator configuration.

To Stop the Oracle Utilities Live Energy Server

1. To stop a running Oracle Utilities Live Energy Connect server, click the **Stop Service** command on the **Menu Bar** at the top of the Configuration Manager window. Alternatively, click **Stop** in the **Services** tab of the Configuration Manager.

Creating a New Configuration Alias

Now you are ready to set up the server configuration that will simulate a remote SCADA system.

To do this we will create a new configuration alias in Oracle Utilities Live Energy Connect Configuration Manager to work with new configuration.

To Create a New Configuration Alias in the Configuration Manager:

1. Select **New alias…** from the **File** menu.
2. In the **Create new alias** tool, enter a name for the new configuration alias. Enter “ScadaSim”.
3. Select **OK**. The Configuration Manager will switch to the new configuration alias and show an present an empty configuration.

Loading the Simulated SCADA System Configuration

To Import the Provided SCADA Server Configuration:

1. Select **Import configuration…** from the **File** menu.
2. Navigate to the “C:\ProgramData\LiveEnergyConnect” directory in the file browser.
3. Select the “IccpServerSim.db” file and select **Open**.

Loading Batch File for Simulated SCADA Server Configuration

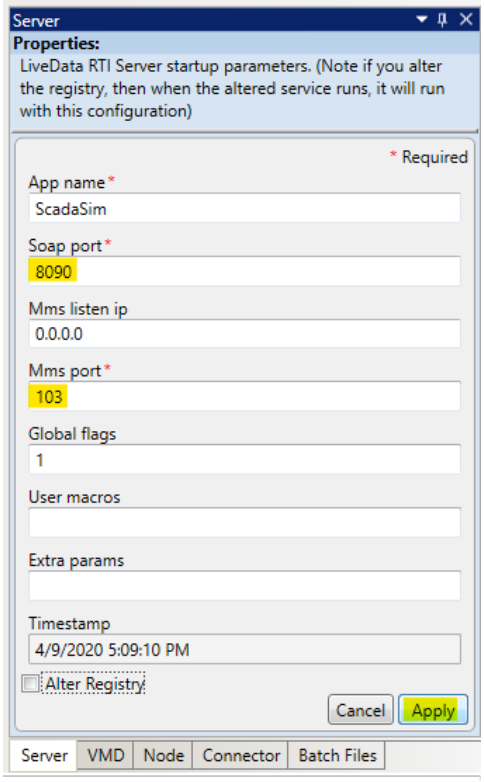
To Load the Provided SCADA Server Configuration's Batch File:

1. Select **Load batch (share)…** from the **File** menu.
2. Navigate to the "C:\ProgramData\LiveEnergyConnect\Config" directory in the file browser that opens.
3. Select the "IccpSimPoints.csv" file and select **Open**.

Adjusting the Server Parameters for the Simulated SCADA Server Configuration

The Oracle Utilities Live Energy Connect server needs to have two ports specified at startup to run successfully: a port for communication between the Configuration Manager and the server (using the SOAP protocol) and a port for communication between VMD's inside and outside of the server (using MMS). The default SOAP port is 8089 and the default MMS port is 102.

Most customers will not need to adjust these ports because they will only run one of Oracle Utilities Live Energy Connect instance on a single machine. However, in this example tutorial, we will need to change the ports used by the instance simulating the SCADA server configuration because the *two instances can't use the same port on the same machine at the same time*.



To Adjust the Server Parameters for the SCADA Server Simulator Configuration:

1. Select the **Server** tab in the **Properties** panel.
2. Change the **Soap port** from "8089" to "8090".
3. Change the **Mms port** from "102" to "103".
4. Click **Apply**.

Creating a Service for the Simulated SCADA Server Configuration

The Windows service for the simulated SCADA server configuration has not been created yet. The **Services** tab in the **Central** panel only shows one service “cfg” listed for the configuration alias.

To Create a Windows Service for the SCADA Server Simulator Configuration:

1. Select **Create Service for Alias…** from the **File** menu.
2. In the **Service Name** field, enter the service name. This name will be used to register the service. Windows service names cannot include spaces.
3. In the **Display Name** field, enter a display name for the service. This can contain spaces.
4. Select which type of startup behavior the service should have in the **Startup Type** field. Let’s select **Manual** since this is just an example tutorial.
5. Add a description of the service in the **Description** field. This description will appear in the **Services** tab of the Configuration Manager and the Windows Services Manager tool.
6. Click **OK**.

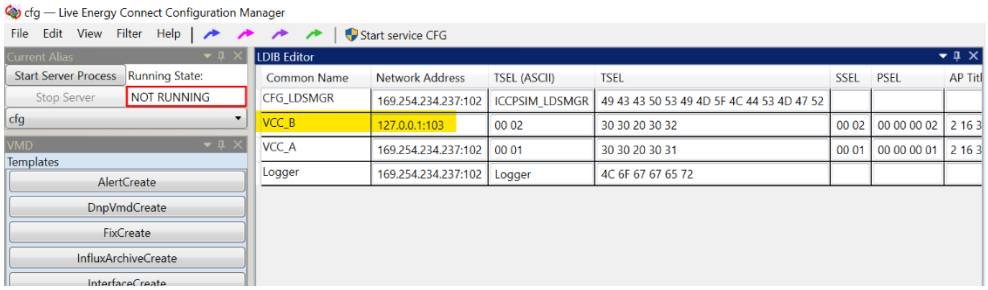
Adjusting the Networking Information for Both Configurations with the LDIB Editor

Now we will use the LDIB Editor in the Central panel to specify the address of the "remote" VCC for each server configuration. In this case for both server configurations, the remote ICCP peer's IP address will be the LOCALHOST address, 127.0.0.1, because we are running both configurations on the same machine.

Note: If we were using a prototype VMD to create "VCC_A" and "VCC_B" then we could specify this information in a batch file.

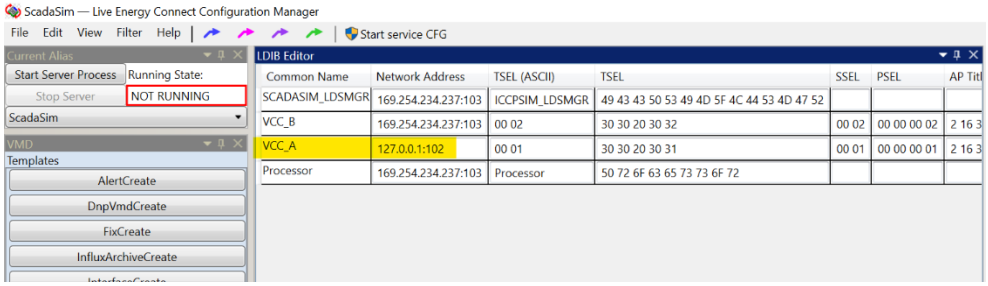
To Update the Cfg Configuration's Remote Peer's IP Address in the LDIB Editor

1. Select the "cfg" alias from the **Configuration Alias** drop-down menu.
2. Open the **LDIB Edior** tab in the **Central** panel.
3. For the row associated with "VCC_B" in the Common Name column, change the value for Network Address to "127.0.0.1:103".



To Update the ScadaSim's Configuration's Remote Peer's IP Address in the LDIB Editor

1. Select the "ScadaSim" alias from the **Configuration Alias** drop-down menu.
2. Open the **LDIB Edior** tab in the **Central** panel.
3. For the row associated with "VCC_A" in the Common Name column, change the value for Network Address to "127.0.0.1:102".



Starting Both Oracle Utilities Live Energy Connect Server Instances

To Start the Service for the ICCP Client Configuration:

1. Select the “cfg” alias from the **Configuration Alias** drop-down menu.
2. Open the **Services** tab in the **Central** panel.
3. For the row associated with the “cgf” alias, select **Start Service**.

To Start the Service for the SCADA Simulator Configuration:

1. Select the “ScadaSim” alias from the **Configuration Alias** drop-down menu.
2. Open the **Services** tab in the **Central** panel.
3. For the row associated with the “ScadaSim” alias, select **Start Service**.

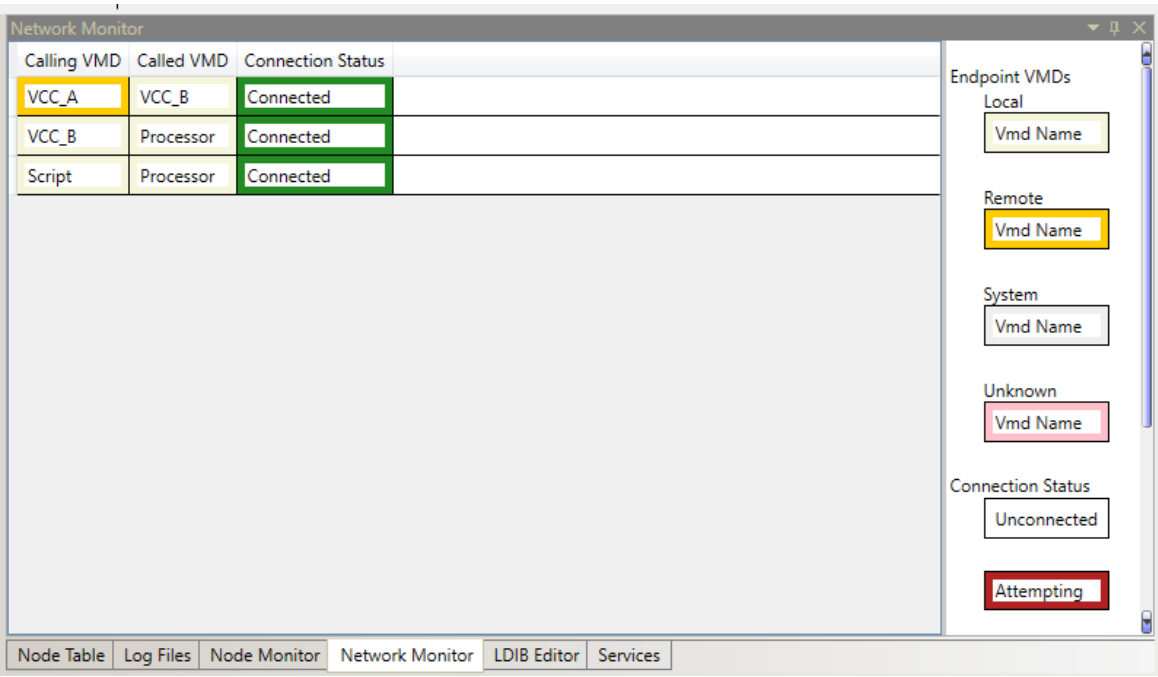
Confirming Data is Flowing Through the Oracle Utilities Live Energy Connect Server

Once both server instances are running, confirm that:

- There is an established MMS association (used for the ICCP association) between “VCC_A” and “VCC_B”.
- The SCADA Simulator (“ScadaSim”) configuration is generating random values for its configured points.
- The ICCP Client (“Cfg”) configuration is receiving information reports with the values of those points.

To Check the Status of the MMS Association:

1. Select **Configuration Alias** and navigate to the **Network Monitor** tab in the **Central** panel.
2. Click the **Services** tab in the **Central** panel.
   Note: The **Network Monitor** tab shows the status of every MMS association in the current server configuration. An MMS association occurs between two VMD’s. There are multiple associations between VMD’s within a single server configuration because of the architecture of Oracle Utilities Live Energy Connect server, which is essentially a container of connected VMD’s.
3. Check the status of the association between “VCC_A” and “VCC_B”.

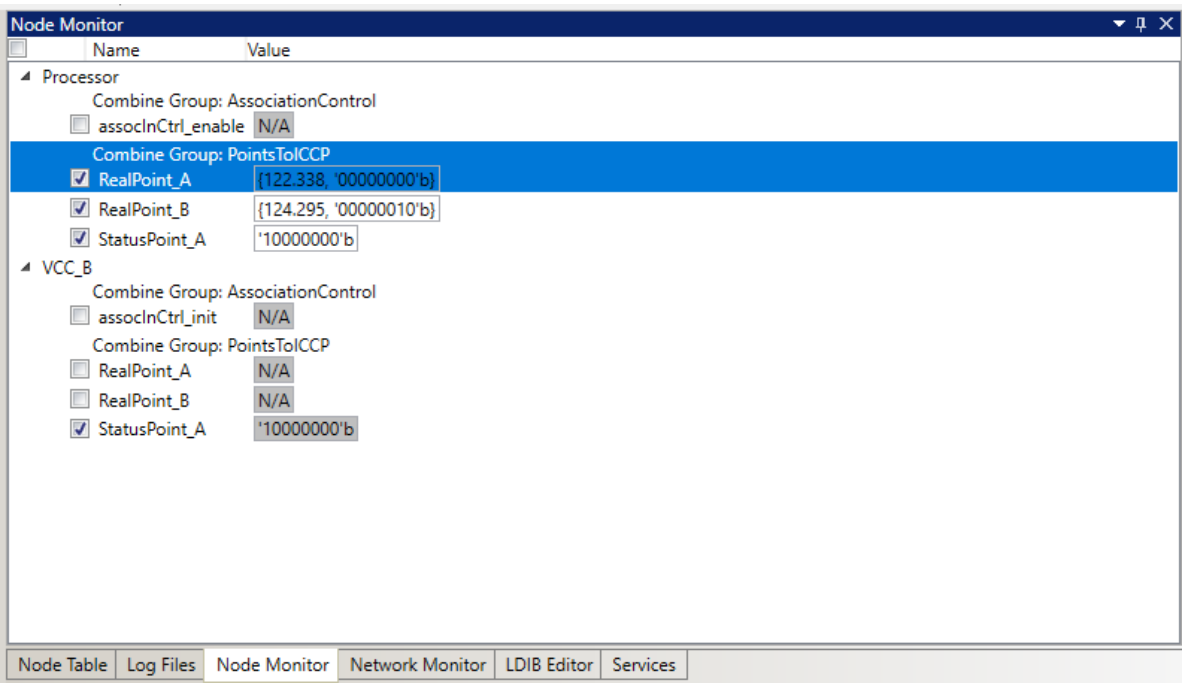


The above figure shows the “ScadaSim” configuration’s **Network Monitor** tab. For this configuration, the local VCC is “VCC_B” and the remote VCC is “VCC_A”. The Network Monitor shows that the association between “VCC_B” and “VCC_A” is in a **Connected** state.

To Confirm That the “ScadaSim” Configuration Is Generating Values for Its Points:

1. Select the “ScadaSim” configuration alias and navigate to the **Node Monitor** tab in the **Central** panel.

2. View the current values for some of the nodes in the “Processor” VMD like “RealPoint_A”, “RealPoint_B”, and “StatusPoint_A”. To do this select the checkbox next to the appropriate labels in the **Node Monitor**.
3. Confirm that the values for these points are random values that update periodically every few seconds.



The figure above shows **Node Monitor** displaying the current value of certain nodes in the Oracle Utilities Live Energy Connect server. Like the **Node Table**, the **Node Monitor** will only show a limited number of nodes in order to avoid cluttering the screen. To change the number of nodes displayed or to specify that particular nodes be displayed, select **Filter Nodes** from the **Filter** menu in the **Menu** bar.

To Confirm the “cfg” Configuration Is Receiving Values for Its Configured ICCP Points:

1. Select the “cfg” configuration alias and navigate to the **Node Monitor** tab in the **Central** panel.
2. View the current values for some of the nodes in the “Processor” VMD like “RealPoint_A”, “RealPoint_B”, and “StatusPoint_A”. Again, to do this, select the checkbox next to the appropriate labels in the **Node Monitor**.
3. Confirm that the values for these points are non-zero values that update periodically as points on the remote ICCP server are updated.

If so, the “cfg” server configuration is working as desired.

To Confirm the “Logger” Script VMD Is Writing Values of ICCP Points to a Separate File:

1. In Windows File Explorer, navigate to the directory where the Script VMD is writing a file of the points. In the provided example, this directory is "C:\ProgramData\LiveEnergyConnect\Logs.”
2. Find the Script VMD’s output file, which will end in “_Received_Point_Values.csv” and contain the date at beginning of the filename.
3. Confirm that the historical values of the points are being written to this file.

Additional Tools and Features in the Oracle Utilities Live Energy Connect Configuration Manager

This section focuses on the additional tools and features in the Oracle Utilities Live Energy Connect Configuration Manager that can be used to monitor and edit server configuration.

- Oracle Utilities Live Energy Connect Logging
- Specifying the Visible Nodes in the Configuration Manager
- Variable Access Tool
- LDIB Editor
- Gathering Diagnostic Information for Support
- Running Live Energy Connect as a Windows Process
- Reloading Macros

Oracle Utilities Live Energy Connect Logging

The Oracle Utilities Live Energy Connect server write to a log file called “LIVEDATA.LOG”. You can view the log and configure the information included in the log in the **Log File** tab in the **Central** panel of the Configuration Manager.

Viewing Oracle Utilities Live Energy Connect Log Files

View the current log file from the **Log File** tab in the **Central** panel. Alternatively, use a text editor to view the log. To view in any text-editor navigate to "C:\ProgramData\LiveEnergyConnect\Logs” and open the “LIVEDATA.LOG” file. Also, if you double-click on the bar in the **Log File** tab that contains the file path, then Windows will open the current log in your default text editor.

Specifying the Logging Levels

Log messages can be divided into two major categories: **Manager** and **Transport**. Each category has five **Logging Levels**, which can be adjusted while the server is running to customize what information is written to the log.

Transport log messages contain information about the network connections the Oracle Utilities Live Energy Connect server configuration uses (TCP sockets, network addresses, routing, etc.). Unless you are troubleshooting a network connectivity issue, the Transport Level log messages are not particularly useful.

Manager log messages contain information about the Oracle Utilities Live Energy Connect server and its configuration (ICCP associations, protocol messages, etc.). The various sources of information for Manager log messages are divided into **Logging Modules**. Logging Modules represent functional components of the Oracle Utilities Live Energy Connect server. Adjust which logging modules are associated with which logging level by editing the server’s “srvxnt.ini” file. The default logging level used by each logging module is printed to the log file at start-up.

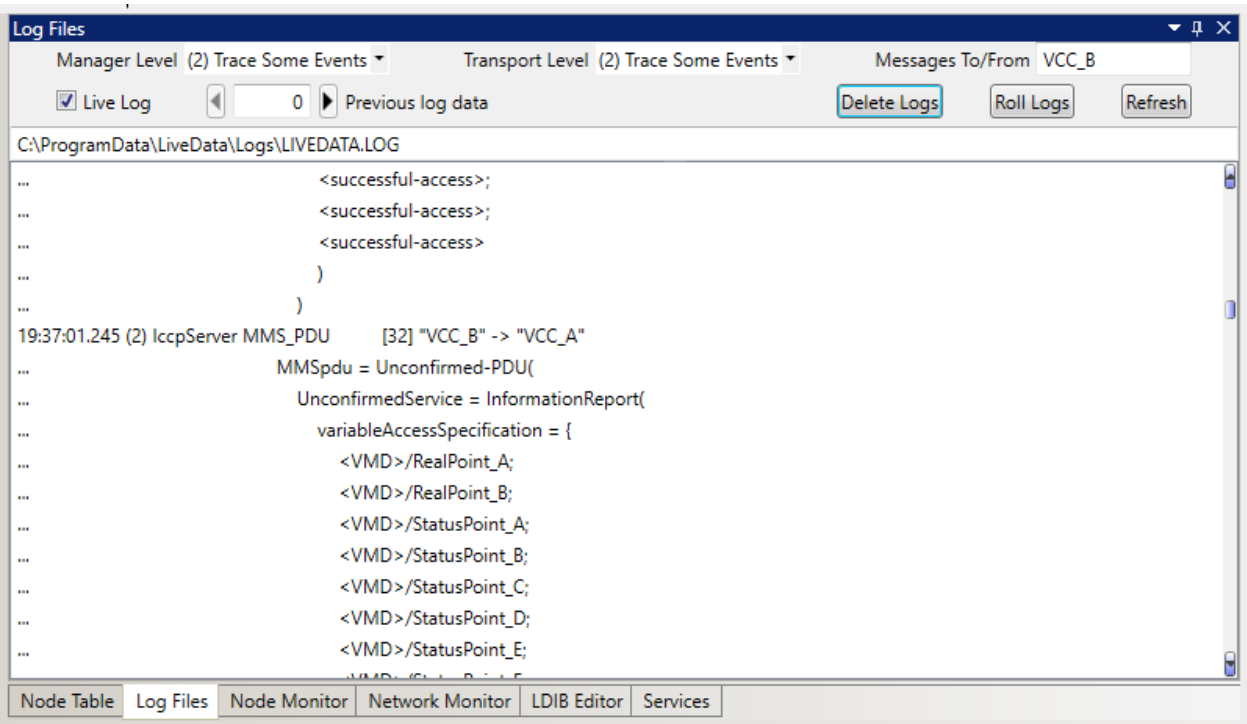
The five logging levels are:

- (0) Errors
- (1) Diagnostics
- (2) TraceSomeEvents
- (3) TraceAllEvents
- (4) TraceAllData

Use the **Messages To/From** field to specify to view detailed MMS/ICCP information about a particular VMD.

For example: If the **Manager** level is set to “2” and a remote VMD is specified in the **Messages To/From** field, then you can view the decoded MMS packets sent by the remote VMD.

The screenshot below shows the log file produced when running the example Oracle Utilities Live Energy Connect server configuration used in the previous tutorial. There are decoded MMS packets (MMS PDU’s) appearing in the log because the Manager Level is set to “2” and the remote VCC called “VCC_B” is specified in the **Messages To/From** field.



Rolling the Log Files

The higher the log level, the more verbose the logging,- that is a log level of 0 will only send error messages to the log but a log level of 4 will send all available information to the log.

The more verbose a log file is, the faster it will grow. Log files automatically roll over based on the “NumOldLogs” and “MaxLogFileSize” parameters specified in the Oracle Utilities Live Energy Connect server “srvxnt.ini” file. Select **Roll Logs** to roll over the logs manually from the Configuration Manager.

Managing the Log Files

Unselect **Live Log** to “freeze” the viewing panel of the log file in the **Log File** tab of the Configuration Manager. This is helpful if the log file is logging a lot of information but you want to review a small section of the log.

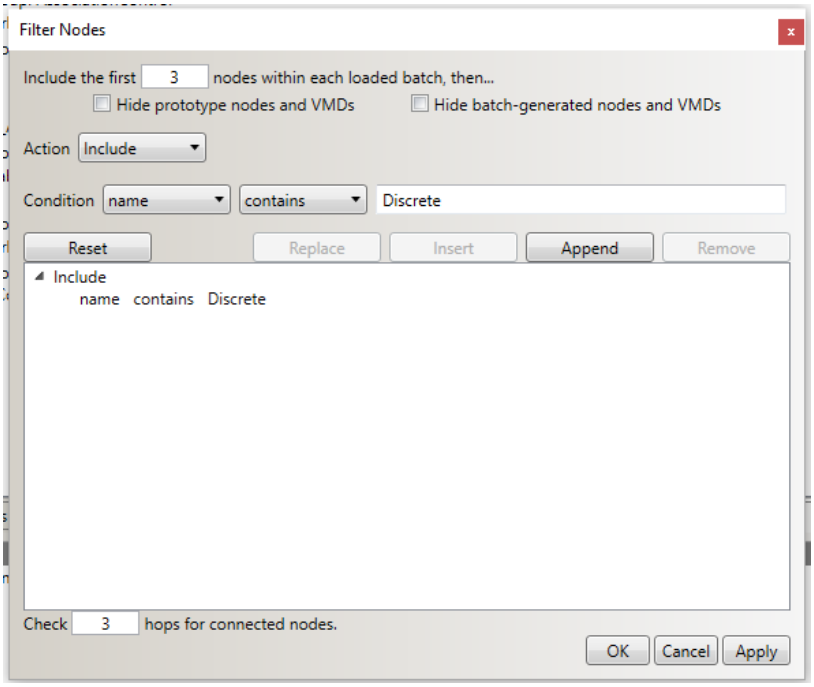
Select **Delete Logs** to delete all automatically rolled-over log files and the current log file. If the live logging feature is disabled or if the log files have been deleted, refresh the Configuration Manager’s view of the current “LIVEDATA.LOG”. Select **Refresh** in the **Log File** tab to refresh the file.

Specifying the Visible Nodes in the Configuration Manager

Let's say you want to monitor a specific node in the Oracle Utilities Live Energy Connect server configuration. By default, the node you are interested in may not show up in the **Node Table** or **Node Monitor** because the Configuration Manager limits the number of nodes displayed to keep the screen from getting cluttered. The Configuration Manager also limits the number of connections displayed in the **Connections** panel to keep the graph of connections that it displays readable. You can change what nodes and connections are visible with the **Filter Nodes** tool.

To Create a New Filter Rule with the Filter Nodes Tool:

1. Navigate to the **Filter** menu and select **Filter Nodes**.
2. Add a rule with the **Condition** of **Name** and specifier of **Contains**.
3. In the **Condition** specifier field's text box type either the whole node label of the node that you're interested in or just a part of it and select **Append**. Now nodes that contain that string in the node label will be visible in the **Node Table** and **Node Monitor**.



The screenshot above shows **Filter Nodes Tool** containing a filter rule that makes nodes whose node labels contain the string "Discrete" visible in the **Node Table** and **Node Monitor**. Also notice that the number of hops (connections) from a selected node in the **Connections** panel is set to 3, which is the default.

Note: VMD names and node labels are case-sensitive and so any strings specified in the **Filter Nodes Tool** are also case-sensitive.

To Adjust the Connection Hops Displayed in the Connections Panel:

1. Navigate to the **Filter** menu and adjust the value of the field called **Check [ ] hops for connected nodes**.
2. Select **Append**. Now the graphic in the **Connections** panel shows nodes that are within the desired number of connections from the selected node.

Variable Access Tool

In addition to using the **Node Monitor** tab in the **Central** panel, you can monitor nodes in the Configuration Manager using the **Variable Access Tool**. The **Variable Access Tool** will also let you read and write values to certain points even if they are currently filtered out of the views in the **Node Monitor** and **Node Table** tab.

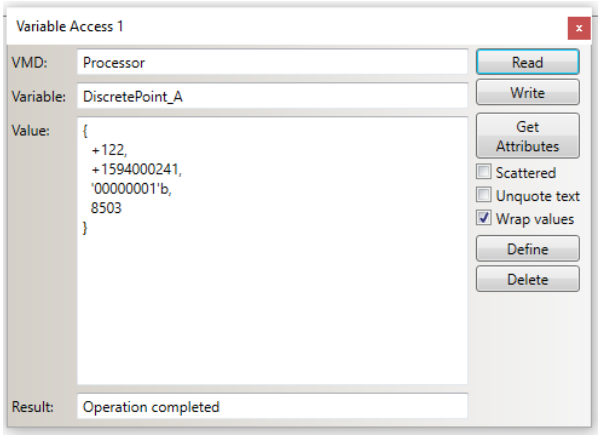
Certain types of nodes are viewable and writeable. Typically, you will only be using the **Variable Access Tool** to read or write *IntermediatePointMonitor* nodes.

To open the tool, select the **Variable Access** option from the **View** menu in the **Menu Bar**.

To Read a Value from and Write a Value to a Node with the Variable Access Tool:

1. In the **VMD** field, select the name of the VMD that contains the node of interest like, for example, "Processor".
2. Enter the name of the node to view in the **Variable** field. For example, if you were using the example configurations from the Getting Started: A Quick Configuration Manager Tutorial section, start entering "DiscretePoint_A" and the **Variable** field will automatically populate the drop-down with possible nodes in the VMD that contain the string "DiscretePoint_A".
3. Select the node you'd like to read. For example, select "DiscretePoint_A" from the drop-down of the **Variable** field.
4. Select **Read**. If it exists, the current value for that point will be displayed as a structure in Oracle Utilities Live Energy server's MMS-DL syntax format. If it does not exist, an error message is displayed in the **Result** field.
5. To change the value of the node, edit the **Value** section of the Variable Access Tool and select **Write**. If the write is successful, an "Operation completed" message will be displayed in the **Result** field. If it not, an error message will appear in the **Result** field.

The figure below shows the Variable Access Tool after reading the *IntermediatePointMonitor* node in the "Processor" VMD called "DiscretePoint_A" using the example ICCP client server configuration. This point happens to be of type "Data_DiscreteExtended" and so its value includes four components: a discrete value ("+122"), a timestamp ("+1594000241 "), a bit string of ICCP quality flags ("'00000001'b"), and a change-of-value counter ("8503").



Note: Since the value of a node needs to be in a specific format, it is best to read the value of a node and use the result as a template to write to the node. This will avoid formatting errors.

Writing a value to a node with the **Variable Access Tool** changes the value of that node in the server. This will affect the rest of the configuration. Writing values with the **Variable Access Tool** is useful when developing or debugging server configurations,- but it should be done with caution in production environments. In production environments, the side-effects of a “write” to a particular node in an Oracle Utilities Live Energy Connect server instance should be well understood by the Configuration Manager user.

LDIB Editor

The **LDIB Editor** tab in the **Central** panel contains networking information and some MMS/ICCP information that the Oracle Utilities Live Energy Connect server uses to establish MMS/ICCP associations between VMD's. The information in the **LDIB Editor** is generated automatically based on the information in the configuration and batch files and can be edited.

Note: Editing information in the **LDIB Editor** will not write that information to a batch file. So, if a VMD's networking information is specified in a batch file, any changes to that information made from the **LDIB Editor** will not persist if the batch file is unloaded and reloaded into the configuration.

There are 13 fields included in the **LDIB Editor** table for each VMD (local and remote).

Each VMD in your configuration may have a value for some or all of these fields:

LDIB Editor Field	Description
Common Name	Name for the VMD. Only used by Oracle Utilities Live Energy Connect
Network Address	IP address and TCP port of the MMS/ICCP interface (MMS port defaults to 102)
TSEL (ASCII)	2-byte or 4-byte number used to select the correct instance of the transport layer in ASCII format.
TSEL	2-byte or 4-byte number used to select the correct instance of the Transport layer as hexadecimal number.
PSEL	2-byte or 4-byte number used to select the correct instance of the Presentation layer.
SSEL	2-byte or 4-byte number used to select the correct instance of the Session layer.
AP Title	Optional object identifier representing the Application Process Title given to this application.
AE Qualifier	A long integer (32-bit, signed int) is used to qualify the application entity.
IS	Select/Deselect International Standard (Defaults to selected and is mutually exclusive with DIS field).
DIS	Select/Deselect Draft International Standard (Defaults to unselected and is mutually exclusive with IS field)
Secure ICCP	Enable/Disable Secure ICCP (Defaults to disabled).

Monitoring	Enable/Disable monitoring of node value in the Configuration Manager (Defaults to enabled).
UCA	Enable/Disable Utility Communications Architecture (Defaults to disabled).

Viewing Network Connection and ICCP Association Configuration Information in the LDIB Editor

If you have changed your configuration or loaded a batch file since last viewing the LDIB editor, click **Refresh** to view the current values.

Use the **LIDB Editor** to check and verify your configuration's ICCP associations by looking at the TSEL, SSEL, PSEL, AP Title, and AE Qualifier columns.

Changing Network Connection Information

To change the IP address of a VMD or an ICCP Association parameter, it is recommended to change it in the VMD tab of **Properties** panel in the Configuration Manager or the batch file if one was used to define the VMD and not the **LDIB Editor**.

However, it can be changed in the Network Address column of the **LDIB Editor**. After making any changes, click **Apply**. Any changes applied to the **LDIB Editor** table will override values specified elsewhere in the configuration or batch files. To restore these values if you can re-specify the VMD parameters in the Properties panel for the given VMD or reload the batch files containing the relevant information.

Writing an "LDIB.INI" File

If the configuration needs to communicate with an external application using Microsoft's ActiveX (OCX) controls, the server configuration will need an "LDIB.ini" file that contains the remote application's VMD's association information.

Clicking **Write LDIB.ini** exports the information shown in the LDIB Editor table as the "LDIB.ini" file. However, most customer's Oracle Utilities Live Energy Connect server configurations do not require an "LDIB.ini" file.

Gathering Diagnostic Information for Support

If there are issues in configuring or running Oracle Utilities Live Energy Connect, contact My Oracle Support (MOS) by creating a Service Request (SR) from the MOS portal. You can gather information that will be helpful to MOS engineers using the Configuration Manager's **Gather Diagnostic Data** tool.

To Gather Diagnostic Data from the Configuration Manager:

1. Select **Gather Diagnostic Data...** from the **Help** menu in the **Menu Bar**.
2. The Configuration Manager will prompt you with a form in which you can select to collect some or all of the configuration, initialization, log, and dump files. The files will be organized into a directory and compressed as a ".zip" file. You can share these files individually with MOS.

Note: Some information in your Oracle Utilities Live Energy Connect server configuration may be considered confidential or restricted by your organization. Consult your organization's procedures for sharing sensitive information with vendors before sharing your diagnostic data with MOS. If your organization will not allow you to share the information that the Configuration Manager gathered, let MOS know and MOS can work with you to sanitize any sensitive information.

Running Oracle Utilities Live Energy Connect as a Windows Process

Sometimes while developing, troubleshooting, or testing with an Oracle Utilities Live Energy Connect server configuration, you may not want to run the server as a Windows service you might need to frequently start and stop it. In situations like this, you can run the server as a Windows process.

To Run Oracle Utilities Live Energy Connect Server as a Windows Process:

1. With the desired configuration alias chosen, select **Start Server Process** from the **Configuration Alias** panel. The Oracle Utilities Live Energy Connect server will start as a process and a console window will be displayed (for ease of monitoring multiple Oracle Utilities Live Energy Connect server processes on one machine). If the console window is closed, the server process stops. The **Running State** indicator updates to **Running** or **Standby** once the server finishes its start-up (depending on the server configuration).
2. To stop an Oracle Utilities Live Energy Connect server that is running as a server process, select **Stop Server** from the **Configuration Alias** panel when the appropriate configuration alias is selected. Alternatively, you can close the console window that was opened when the server process was started.

Note: To run multiple Oracle Utilities Live Energy Connect server instances on the same machine (as Windows services or processes), each server instance needs a unique “App Name”, “Soap port”, and “Mms port”. These server parameters are specified in the **Server** tab of the **Properties** panel.

Reloading Macros

As mentioned in the Live Energy Concepts and Terminology section, at start-up the Oracle Utilities Live Energy Connect server uses the configuration defined in the Configuration Manager and the PDI macros defined in the "DataflowMacros.pdi" file to instantiate a server configuration.

Sometimes, customers may need to update which macros will be loaded into a server configuration if they are upgrading from an older version of the Oracle Utilities Live Energy Connect or if they have been provided custom PDI macros to use in their configuration.

To Reload Macros:

1. Stop any running Oracle Utilities Live Energy Connect server instances on the machine. To do this, select **Stop** from the **Services** tab in the **Central** panel (for running services). Alternatively, select **Stop Server** from the **Configuration Alias** panel (for any running server processes).
2. Unload any batch files. To do this, select the batch files in the **Batch Files** tab of the **Properties** panel and click **Unload**.
3. Select **Reload macros** from the **File** menu in the **Menu Bar**. The Configuration Manager will automatically start the Oracle Utilities Live Energy Connect server as a process, reload the macro definitions in the "DataflowMacros.pdi" file or any custom macros specified in the **User macros** field and then stop itself.

Appendix A: Creating an ICCP Client with Oracle Utilities Live Energy Connect

In the Getting Started: A Quick Configuration Manager Tutorial section, you worked with two Oracle Utilities Live Energy Connect server configurations. One of these configurations was an example of using Oracle Utilities Live Energy Connect as an ICCP client. This tutorial focuses on how to create that ICCP client configuration from scratch.

Making an ICCP Client Configuration with the Oracle Utilities Live Energy Connect Configuration Manager

Step 1: Open an Empty Configuration

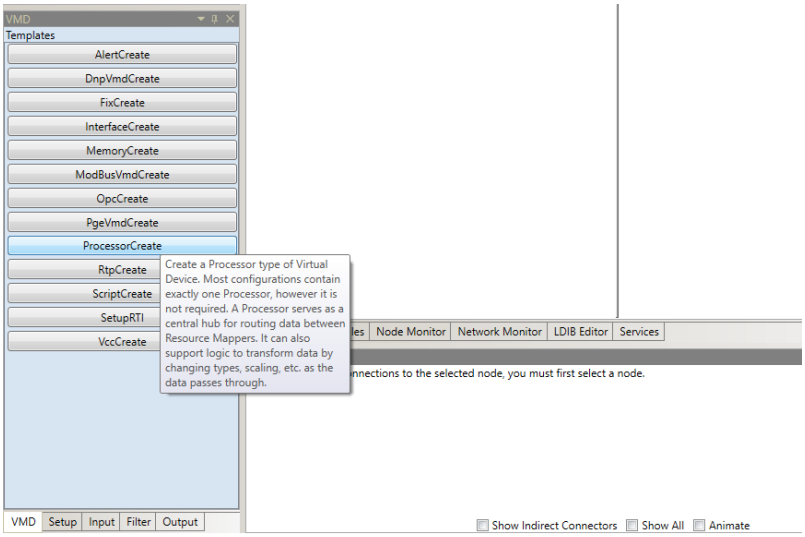
1. Start the Oracle Utilities Live Energy Connect Configuration Manager as an Administrator.
2. Select **Import Configuration…** from the **File** menu. Select the "EmptyTemplate.db" file from the "C:\ProgramData\LiveEnergyConnect" directory and click **Open**.
3. If the Configuration Manager prompts you with a warning that any unsaved changes to the current configuration will be lost, you can select **Cancel** to save the current configuration in your desired location with an appropriate filename. If you do not need to save any changes to the last open configuration, then select **OK**.
4. The Configuration Manager may prompt you with a warning message that the "EmptyTemplate.db" configuration file contains PDI macros that are out of date. To update the macros, select **Reload Macros** from the **File** menu. A warning will appear saying the Configuration Manager needs to start the Oracle Utilities Live Energy Connect server. Click **OK**. The server will start up, reload any macros that need to be updated, and stop.
5. Once the "EmptyTemplate.db" file has been imported, you will be able to see an empty Oracle Utilities Live Energy Connect server configuration in the Configuration Manager. It will have a single VMD - a *Configuration Manager* VMD.

Note: Every new configuration has a *Configuration Manager* VMD.

Step 2: Create a Processor VMD

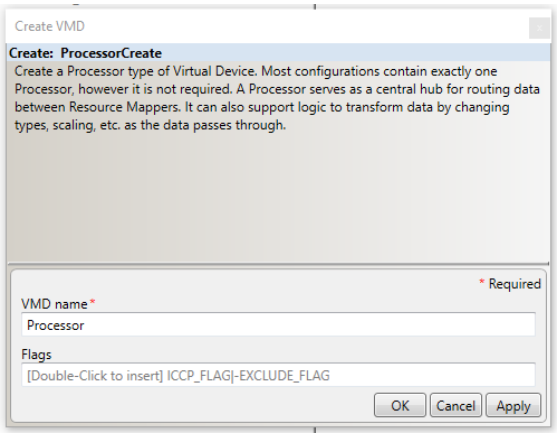
The first VMD that you need to create is a *Processor* VMD. Any local VMD in a configuration can communicate with any other local VMD using a *Processor* VMD as a proxy. The *Processor* VMD acts as the hub of your dataflow.

1. Select **ProcessorCreate** in the **VMD** tab of the **Templates** panel.

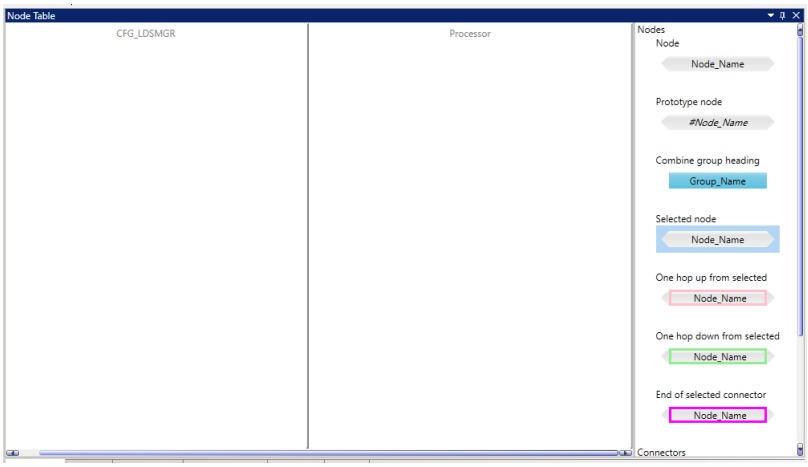


2. In the **Create VMD** tool, specify "Processor" for the ***VMD name*** field.
3. There is no need to enable any flags in the ***Flags*** field.

Note: The "Flags" field allows you to enable or disable certain functions in a VMD. The EXCLUDE_FLAG, ICCP_FLAG, PUSHALL_FLAG, and NOREAD_FLAG flags are set by default. To remove a flag, click **Unset**. To set a flag, click **Set**.



4. Select **OK** to create the *Processor* VMD called "Processor". Now there are two VMD's in the configuration: a *Configuration Manager* VMD and a *Processor* VMD.



Step 3: Create a VCC

In Oracle Utilities Live Energy Connect a VCC is a type of VMD. The term "VCC" is originates from the ICCP protocol.

Note: The term "VMD" is specific to the MMS protocol. All VCC's are VMD's but not all VMD's are VCC's. The *VCC* VMD created here will serve as the ICCP client that makes an ICCP association with the remote SCADA system.

To make an ICCP association, both parties need to know certain parameters and information about their own VCC the other party's VCC. To learn more about setting up ICCP associations, refer to Appendix B: ICCP Reference.

Typically, when two parties are setting up an ICCP association they share the necessary ICCP association information with each other using an *Association Information Exchange Form* (AIEF). Since we are setting up both sides of our example scenario, we can just use the example values that are listed in the table below. For information about each parameter refer to Appendix B: ICCP Reference.

ICCP Association and Network Connection Info	Company A (our RTI Server)	Company B (SCADA Server)
VCC Name	VCC_A	VCC_B
VCC Role	Client	Server
Association Role	Listener (makes inbound assoc.)	Associator (makes outbound assoc.)
Domain	domA	domB
Bilateral Table ID	1_0	2_0
ICCP Version	1996, 8	1996, 8

Supported Features	111010000000	111010000000
Network Address	127.0.0.1:102	127.0.0.1:103
TSEL	00 01	00 02
SSEL	00 01	00 02
PSEL	00 00 00 01	00 00 00 02
AP Title	2 16 3826 86 67 67 65 49 73	2 16 3826 86 67 67 66 49 73
AE Qualifier	101	202

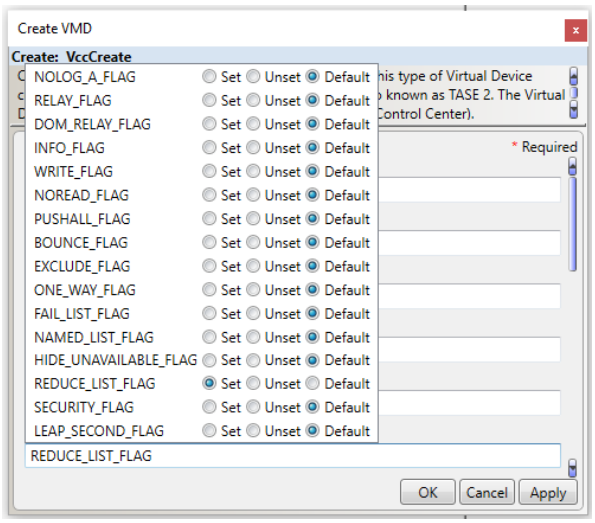
The table above provides ICCP association and network connection information for our example tutorial. This information will be used when creating *VCC* VMD's in the Configuration Manager.

To Create the Local *VCC*:

1. In the **VMD** tab of the **Templates** panel, select the **VccCreate** template.
2. Specify the name of the *VCC* in the **My VMD** field as "VCC_A".
3. Set **Assoc in** to "0" and **Assoc out** to "1". This means the local VCC ("VCC_A") will attempts to make an outbound ICCP association with its remote peer (as opposed to listening for an inbound association).
4. Set **Client role** to "1".
5. Set **Server role** to "0". In this example, the local VCC is just an ICCP client.

Note: A VCC can serve as an ICCP client and an ICCP Server (a.k.a. "a dual-role VCC") simultaneously. A single VCC can also make associations with more than one other VCC. But for every role a VCC plays, it needs a dedicated association.

6. In the **Flags** field, set the **REDUCE_LIST_FLAG**. This flag lets the Oracle Utilities Live Energy Connect server adjust which points it includes in its transfer set requests if one or more of those points do not exist on the remote ICCP server.

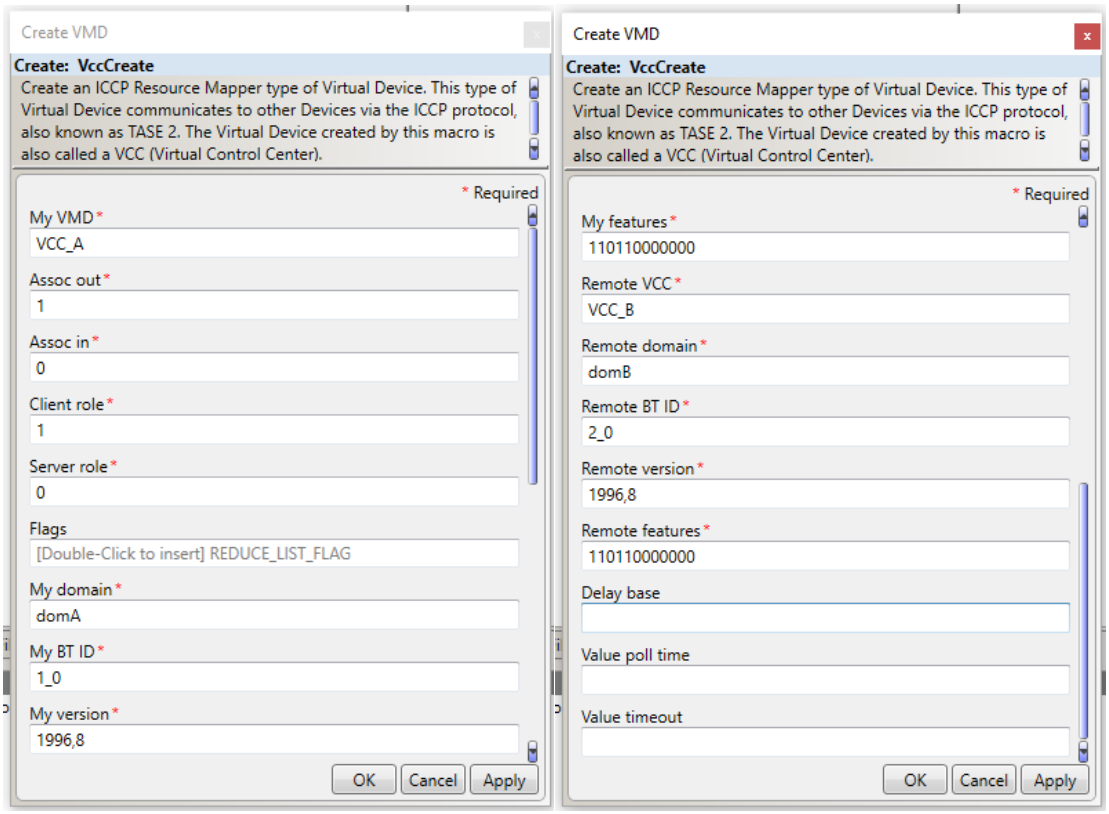


Note: The string that populates the **Flags** field is determined by which flags are **Set** or **Unset**. A blank field uses the default setting for all flags. A flag that is explicitly set appears in this field as its name. A flag that is explicitly unset appears as its name with a minus sign ('-'), in front of it. Explicitly set or unset flag instructions are concatenated together with the pipe character ('|'). In this tutorial, this field appears as "REDUCE_LIST_FLAG" but another entry for this field might look something like "RELAY_FLAG|INFO_FLAG|-EXCLUDE_FLAG".

7. Specify the domain of the server in the **My domain** as "domA".
8. Enter "1_0" in the **My BT ID** field. This field specifies the local VCC's bilateral table ID.
9. Specify the **My version** field by entering "1996,8".
10. Specify the **My features** fiels as a 12-bit bi-tstring by entering "110110000000" here. In this example, the local VCC supports ICCP Blocks 1, 2, 4, and 5.

Note: While establishing an ICCP association, the client accesses a standard ICCP object called "Supported_Features". This object is represented as a bit-string that specifies the ICCP Conformance Blocks supported in the server. To learn more about ICCP conformance blocks refer to Appendix B: ICCP Reference.

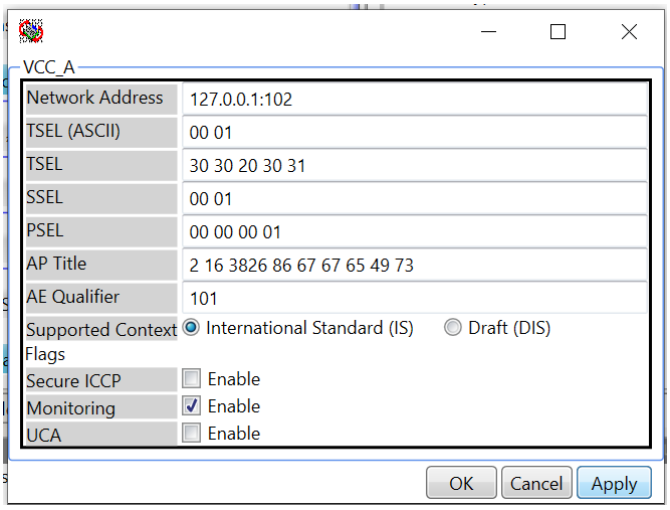
11. Specify **Remote Vcc** as "VCC_B".
12. Specify the **Remote domain** as "domB".
13. Specify the **Remote BT ID** field as "2_0".
14. Specify the **Remote version** field as "1996,8".
15. Specify **Remote features** as "110110000000".
16. Leave the **Delay base**, **Value poll time**, and **Value timeout** fields blank.
17. Refer to the figure below for a summary of what the fields in **VccCreate** tool should look like.



18. Click **OK** to create this VMD.

To Specify the ICCP Association Parameters for the Local *VCC*:

1. In the Configuration Manager, select the local VCC in the Node Table by clicking where it says "VCC_A".
2. Then open the **VMD** tab of the **Pr**operties panel.
3. In the **VMD** tab of the **Properties** panel, click the button labeled **My VMD**. A window that lets you specify the network connection and ICCP association parameters for "VCC_A" will appear (see the figure below).

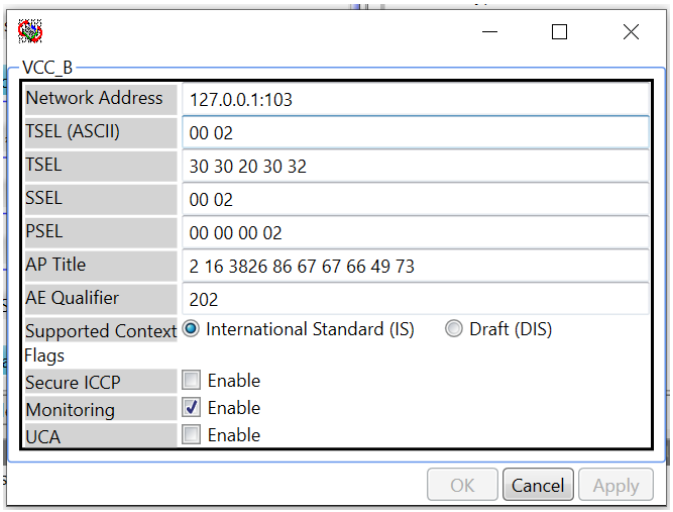


Note: To fill in the information in this window, we will refer to the table of ICCP Association information that was included at the beginning of this section. To find out more about the meaning of each of these parameters, refer to the section of section of Appendix B: ICCP Reference called *VccCreate (VMD Resource Mapper Template)*.

4. Set the **Network Address** field to "127.0.0.1:102".
5. Set the **TSEL (ASCII)** field to "00 01". This will cause the **TSEL** field to update to "30 30 20 30 31".
6. Set the **SSEL** field to "00 01".
7. Set the **PSEL** field to "00 00 00 01".
8. Set the **AP Title** field to "2 16 3826 86 67 67 65 49 73".
9. Set the **AE Qualifier** field to "101".
10. Leave the **Supported Context**, **Secure ICCP**, **Monitoring**, and **UCA** fields as their default values.
11. Click **Apply**.

To Specify the ICCP Association Parameters for the Remote *VCC*:

1. In the Configuration Manager, select the local VCC in the Node Table by clicking where it says "VCC_A".
2. Then open the **VMD** tab of the **Pr**operties panel.
3. In the **VMD** tab of the **Properties** panel, click the button labeled **Remote VCC**. A window that lets you specify the network connection and ICCP association parameters for "VCC_B" will appear (see the figure below).



4. Set the **Network Address** field to "127.0.0.1:103".
5. Set the **TSEL (ASCII)** field to "00 02". This will cause the **TSEL** field to update to "30 30 20 30 32".
6. Set the **SSEL** field to "00 02".
7. Set the **PSEL** field to "00 00 00 02".
8. Set the **AP Title** field to "2 16 3826 86 67 67 66 49 73".
9. Set the **AE Qualifier** field to "202".
10. Leave the **Supported Context**, **Secure ICCP**, **Monitoring**, and **UCA** fields as their default values.
11. Click **Apply**.

Step 4: Create a Script VMD

A *Script* VMD represents an interface to a Python script running in Oracle Utilities Live Energy Connect's embedded real-time Python interpreter. You can create your own scripts or use one of the many scripts that ship with the Oracle Utilities Live Energy Connect installer.

In this tutorial, your *Script* VMD will be an interface to a Python script called "PointLogger.py". This script is part of your Oracle Utilities Live Energy Connect installation and is located in the "C:\ProgramData\LiveEnergyConnect\Scripts" directory. This *Script* VMD will get point values from the *Processor* write the values of the points to a specified log file as they come in.

Note: Although, this particular script's functionality is quite simple, *Script* VMD's provide the ability to perform complex filtering. They can be used to quickly create interfaces to non-standard, external applications.

To Create This configurations *Script* VMD:

1. Navigate to the **Templates** panel and select the **VMD** tab.
2. Select the **ScriptCreate** template which will launch the **ScriptCreate** tool.
3. Enter "Logger" in the **My VMD** field.
4. In the **Flags** field, specify "ICCP_FLAG". This allows the Script VMD to "know about" the standard ICCP datatypes.
5. Leave the **Script file** field blank.

Note: The **Script file** field is not where you specify the script associated with a *Script* VMD. This field instead allows you to specify another script that controls (i.e. enables/disables) this *Script* VMD. The script that *Script* VMD uses is specified later with a *SetupScript* node within the *Script* VMD.

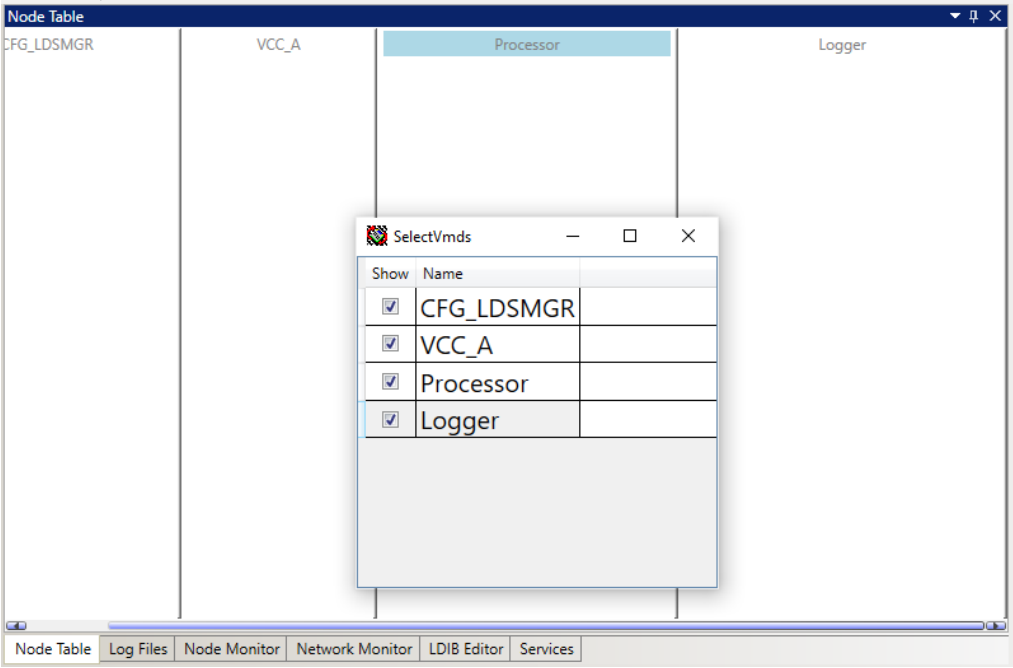
6. Leave the **UseCommonThread**, **Python instance**, and **Computer ID** fields blank.
7. Click **OK**.

Step 5: Arrange the VMD's in the Node Monitor

Before creating the nodes within each VMD and connectors between those nodes, it is helpful to arrange the VMD's in the Configuration Manager so that arrangement is representative of the dataflow we are creating. Typically, in engineering diagrams, data flows from left (input) to right (output).

To Arrange the VMD's:

1. Right-click the "Processor" VMD right where it says "Processor"
2. Select "VCC_A" VMD and drag it to place between "CFG_LDSMGR" and "Processor" VMD's.



3. This updates the order in which the VMD's are displayed in the **Node Table**.

Note: To hide a VMD, select the checkbox next to the name of the VMD to hide. The order of the VMD's only affects the order in which they are displayed in RCM's **Node Table**. It does not affect the dataflow at all.

4. Save the configuration. Select **File** then select **Save Configuration.**
5. After creating all the required VMD's, the next step is to create the nodes inside those VMD's.

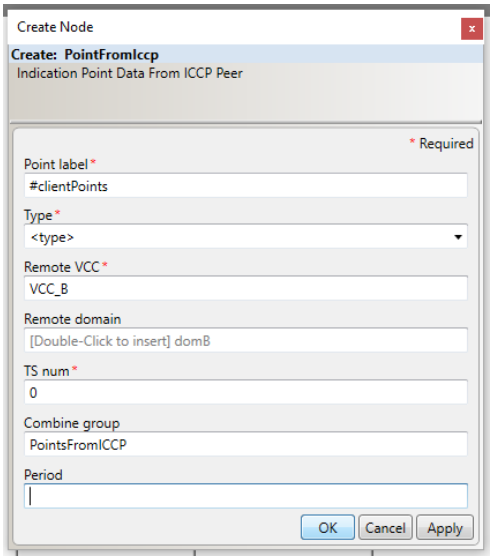
Step 6: Create Nodes in the VCC

Points coming from the remote ICCP server enter the local VCC ("VCC_A") as input nodes with the type *PointFromIccp*. This sample configuration uses a batch file to specify these input nodes. You will need to create one prototype node that is used (along with the batch file) to generate all of the *PointFromIccp* nodes in the local VCC.

There are also a couple of setup nodes that are needed in the "VCC_A" VMD: two nodes to control the ICCP association and two nodes to control and define a Data Set Transfer Set.

To Create the *PointFromIccp* Prototype Node:

1. Select the VMD called"VCC_A".
2. Navigate to the **Input** tab of the **Templates** panel. The list of possible input node templates used with the type of selected VMD is displayed.
3. Select **PointFromIccp** from the list of node templates.
4. In the **Point label** field, enter "#clientPoints".
   Note: A point label that contains a string starting with the pound character ('#') signifies that the node is a prototype node. In one of the configuration's batch files there will be a table that contains a column (called the "driven" column) which matches the string starting with the pound character ('#').
5. In the **Type** field, enter "<type>".
6. In the **Remote VCC** field, enter "VCC_B".
7. Leave the **Remote domain** field blank.
8. In the **TS num** field, enter "0". This will make the ICCP client ("VCC_A") ask the remote ICCP server to organize the points it cares about into the Data Set Transfer Set called "TransferSet_0".
9. In the **Combine group** field, enter "PointsFromICCP".
10. Select **OK**.



“VCC_A” acts as an ICCP client so it makes an outbound ICCP association. A “VccAssocOutControl” setup node and a related “Constant” input node is used to specify this outbound association. The “Constant” node is used to specify an initial value for the “VccAssocOutControl” node at start-up.

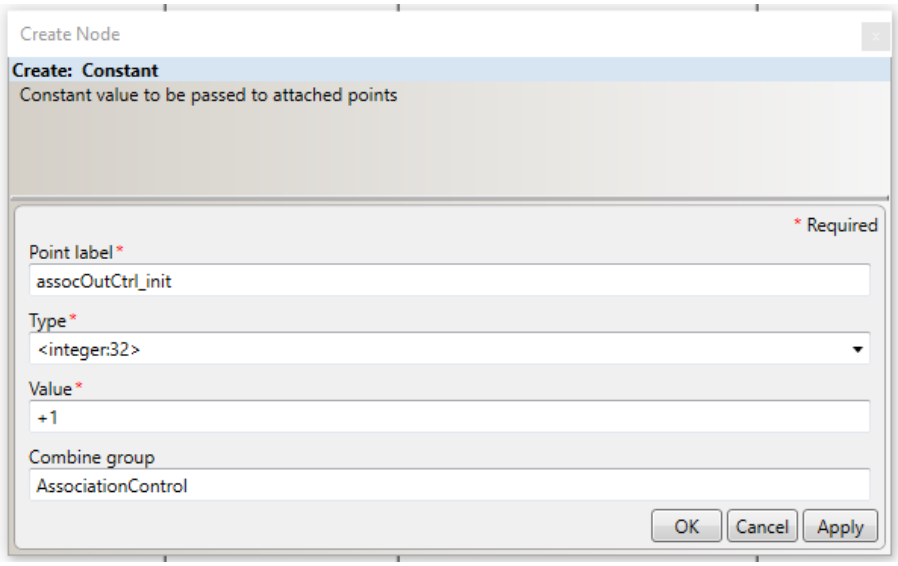
To Create the *VccAssocOutControl* Node:

1. With “VCC_A” still selected, navigate to the **Setup** tab of the **Templates** panel.
2. In the **Point label** field, enter the node name “assocOutCtrl”.
3. In the **Remote Vcc** field, enter “VCC_B”.
4. In the **Init state var** field, type “assocOutCtrl_init”. This is the node label that will be used for the *Constant* node that defines the initial state of this *VccAssocOutControl* node. This field needs to of the match the node label of the *Constant* node exactly.
5. Leave the **Association flags** and **Stale time** fields blank.
6. In the **Combine group** field, enter “AssociationControl”.
7. Click **OK**.

Note: The **Combine group** field is used to organize different nodes into groups. Nodes with the same value for the “Combine group” field will be displayed together underneath a combine group label in the **Node Table** and **Node Monitor** tabs.

To Create the *Constant* Node That Will Initialize the Value of the *VccAssocOutControl* Node:

1. With the “VCC_A” still selected, navigate to **Input** tab of the **Templates** panel. This will list all possible types of input nodes that can be used with the type of the selected VMD.
2. Select the **Constant** option from the list of node templates in the **Input** tab.
3. In the **Point label** field, enter the node name “assocOutCtrl_init”.
4. **Note**: Two (non-prototype) nodes that live in the same VMD and the same point domain within that VMD cannot have the same point label. However, one of these (non-prototype) nodes point labels can contain a substring that is another node’s entire point label.
5. In the **Type** field enter “<integer:32>” which in the Oracle Utilities Live Energy Connect server’s syntax for MMS defines a 32-bit integer.
6. In the **Value** field enter “+1”. This will be the initial value that the node “assocOutCtrl” uses at start-up.
   Note: In the Oracle Utilities Live Energy Connect server, an ICCP association variable can be in one of 3 states represented by an integer value: disabled (+0), enabled (+1), or associated (+2).
7. In the **Combine group** field enter “AssociationControl”.
8. Click **OK**.



Note: The Configuration Manager automatically creates an Implicit Edge connector from the *Constant* node created in the last step to the node called "assocOutCtrl" which references this *Constant* node.

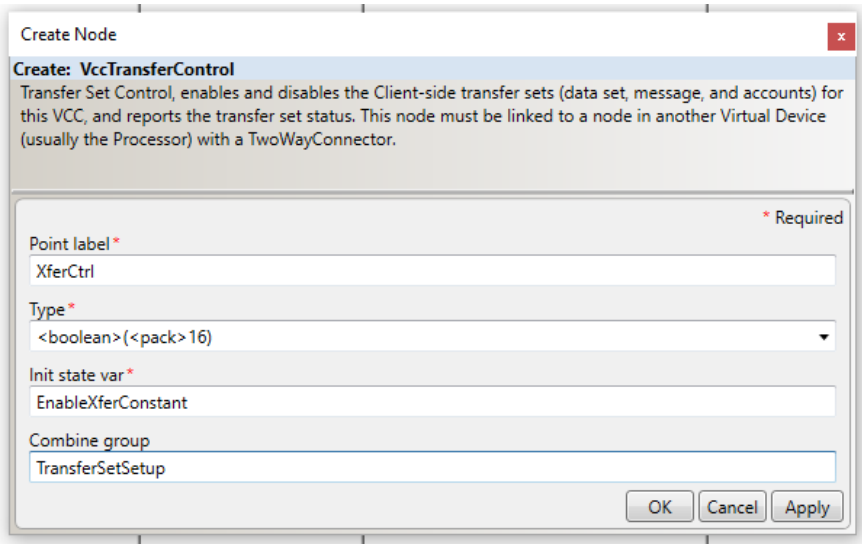
"VCC_A" will be acting as an ICCP client. When ICCP Block 2 is supported by both ICCP peers, an ICCP client can define Data Set Transfer Sets. These Data Set Transfer Sets tell the server which points the client wants to get information about and how it wants that information delivered.

Note: Data Set Transfer Sets are a type of ICCP object.

To configure a Data Set Transfer Set in the Oracle Utilities Live Energy Connect Configuration Manager, we will use a *VccTransferControl* setup node, a related *Constant* input node, and a *DsTansferSet* setup node.

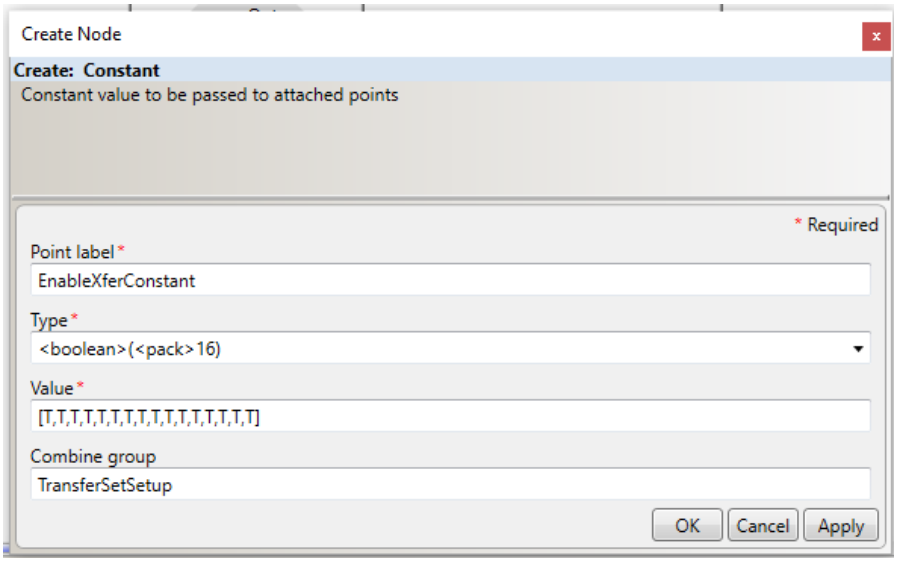
To Create the *VccTransferControl* Node:

1. With the "VCC_A" still selected, open the **Setup** tab in the **Templates** Panel.
2. Select **VccTransferControl** from the list of node templates in the **Setup** tab.
3. In the **Point label** field, enter the node name "XferCtrl".
4. In the **Type** field, enter "<boolean>(<pack>16)", which in the Oracle Utilities Live Energy Connect server's syntax for MMS defines a structure made up of 16 bits.
5. In the **Init state var** field, enter "EnableXferConstant". This will be the node label used for the *Constant* node that defines the initial state of this *VccTransferControl* node. Again, this field needs to match the node label of the related *Constant* node exactly.
6. In the **Combine group** field "TransferSetSetup".
7. Click **OK**.



To Create the Constant Node That Will Initialize the Value of the *VccTransferControl* Node:

1. With the "VCC_A" still selected, open the **Input** tab in the **Templates** Panel.
2. Select the **Constant** option from the list of node templates in the **Input** tab.
3. In the **Point label** field enter the node name "EnableXferConstant".
4. In the **Type** field, enter "<boolean>(<pack>16)".
5. In the **Value** field, enter "[T,T,T,T,T,T,T,T,T,T,T,T,T,T,T,T]". This value will be the initial value that the node called "XferCtrl" uses at start-up.
   Note: By making all 16 bits of the *VccTransferControl* node have a value of "True", you are enabling "VCC_A" to define up to 16 Data Set Transfer Sets.
   Note: After a node with the type "boolean>(<pack>n)" has been created, you can enable or disable a particular bit by clicking the text entry area for **Value** field. A pop-up with radio buttons for each bit will appear and allow to select which bits in the object should be set to "True" and "False".
6. In the **Combine group** field, enter "TransferSetSetup".
7. Click **OK**.



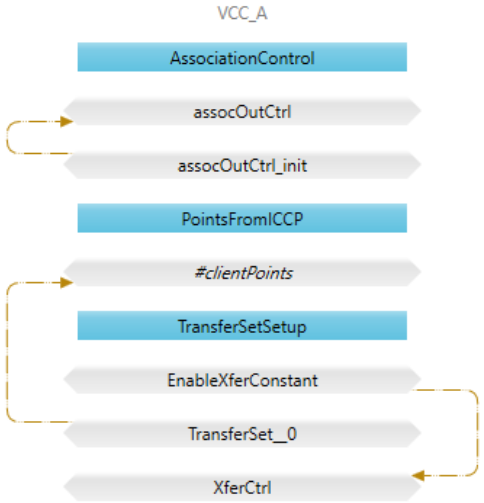
To Create the *DsTransferSet* Node:

1. With the "VCC_A" still selected, open the **Setup** tab in the **Templates** Panel.
2. Select **DsTransferSet** from the list of node templates in the **Setup** tab.
3. In the **TS num** field, enter the node name "0" so that the whole node label will be "TransferSet_0" .
4. In the **Remote domain** field, enter "domB".
5. In the **Remote VCC** field, enter "VCC_B".
6. Leave the **Start time** and **Start delay** fields blank.
7. In the **IntervalCheck** field, enter "3".
8. Leave the **Start time** and **Start delay** fields blank.
9. In the **IntegrityCheck** field, enter "1200".
10. In the **IntervalTimeOut** field, enter "0".
11. In the **IntegrityTimeOut** field, enter "1".
12. In the **ObjectChange** field, enter "1".
13. In the **OperatorRequest** field, enter "1".
14. In the **RBE** field, enter "1".
15. Leave the **IntervalDelay**, **AllChangesReported**, **Critical**, **CircumventSiemansBug**, and **Do read** fields blank.

Note: For more information about each field in the "DsTransferSet" node template, refer to Appendix B: ICCP Reference.

16. In the **Combine group** field, enter "TransferSetSetup".
17. Click **OK**.

At this point in the tutorial, there should be five different nodes in VCC_A.



Notice that the nodes are organized into three different combine groups each with its own label: "AssociationControl", "PointsFromICCP", and "TransferSetSetup". Also, notice that the Configuration Manager has automatically built 3 implicit edge connectors (brown arrows) because of the relationships that were defined between some of the nodes.

Step 7: Create Nodes in the Processor VMD

Any VMD in an Oracle Utilities Live Energy Connect server configuration can communicate with any other VMD in the configuration using a *Processor* VMD as a proxy. A *Processor* VMD will also typically contain nodes used for filtering data or for monitoring and controlling associations.

The *IntermediatePointMonitor* node is one of the most used types of nodes in a *Processor* VMD. Although it is a filter node, the *IntermediatePointMonitor* node is used to read (and write) the value of a point at a particular step in its dataflow through the Oracle Utilities Live Energy Connect server.

In this example ICCP client configuration, you will create *IntermediatePointMonitor* nodes and use them to get the data received by the "VCC_A" VMD into the "Processor" VMD.

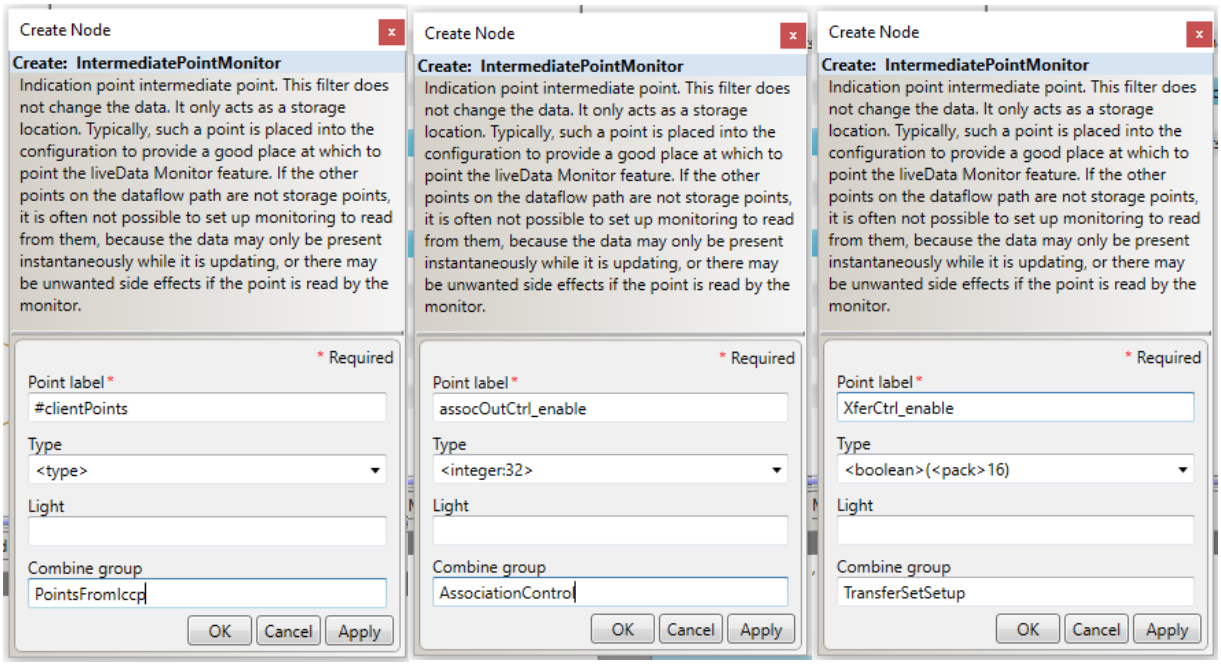
You will also create IntermediatePointMonitor nodes to allow the Configuration Manager and the Oracle Utilities Live Energy Connect server to read and write to the nodes in the "VCC_A" that are control the outbound association and Data Set Transfer Set control.

To Create the Three *IntermediatePointMonitor* Nodes in the "Processor "VMD:

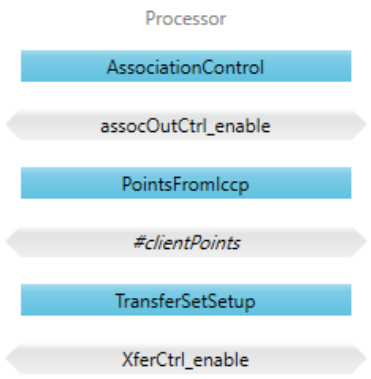
1. Select the VMD "Processor".
2. Open the **Filter** tab in the **Templates** panel.
3. Select **IntermediatePointMonitor** from the list of node templates in the **Filter** tab.
4. In the **Point label** field, enter the node name "#clientPoints".
5. In the **Type** field, specify "<type>".
6. Leave the **Light** field blank.
7. In the **Combine group** field, enter "PointsFromIccp".
8. Select **OK**.
9. Repeat steps 1 -8 to create two more *IntermediatPointMonitor* nodes in the "Processor" VMD: one called "assocOutCtrl_enable" and one called "XferCtrl_enable". The values for all three *IntermediatePointMonitor* nodes int the VMD are specified in the table below.

Template Node Field	#clientPoints	assocOutCtrl_enable	XferCtrl_enable
Point label	#clientPoints	assocOutCtrl_enable	#clientPoints
Type	<type>	<integer:32>	<Boolean>(<pack>16)
Combine group	PointsFromIccp	AssociationControl	TransferSetSetup

10. While creating each node, check that each matches the relevant template node in the figure below to ensure that there are no typos.



These *IntermediatePointMonitor* nodes are the only nodes that need to be created in the "Processor" VMD. At this point in the tutorial, there should be three different nodes in the Processor VMD as is shown in the figure below.

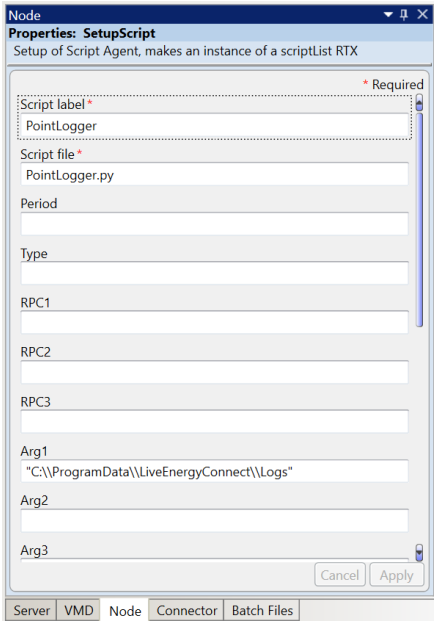


Step 8: Create Nodes in the Script VMD

The *Script* VMD called “Logger” will need a setup node and an output node. The setup node, a *SetupScript* node, will specify information about which Python script to use in the VMD. The output node, a *PointToScript* node will define the output behavior of the *Script* VMD based on the methods in the Python script. In this example, the output behavior of the “Logger” *Script* VMD will be to write changes in value to a CSV file.

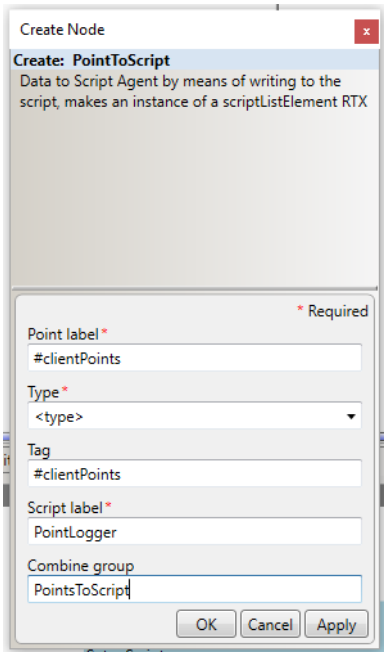
Create a *SetupScript* Node in the *“*Logger*” Script* VMD:

1. Navigate to **Setup** tab of the **Templates** panel.
2. Select the **SetupScript** template to display the **Create Node** form.
3. Enter “PointLogger” in the **Script label** field.
4. Enter “PointLogger.py” in the **Script file** field.
5. Enter “C:\\ProgramData\\LiveEnergyConnect\\Logs” in the **Arg1** field. Make sure the file path is in double quotes and contains double backslashes.
6. Leave all the other fields blank.
7. Click **OK**.

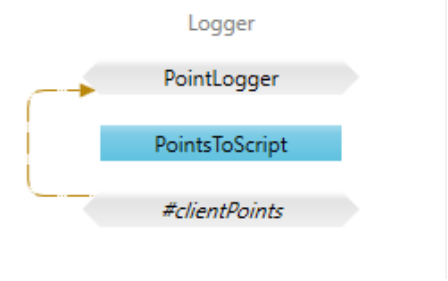


Create a *PointToScript* node in the “Logger” Script VMD:

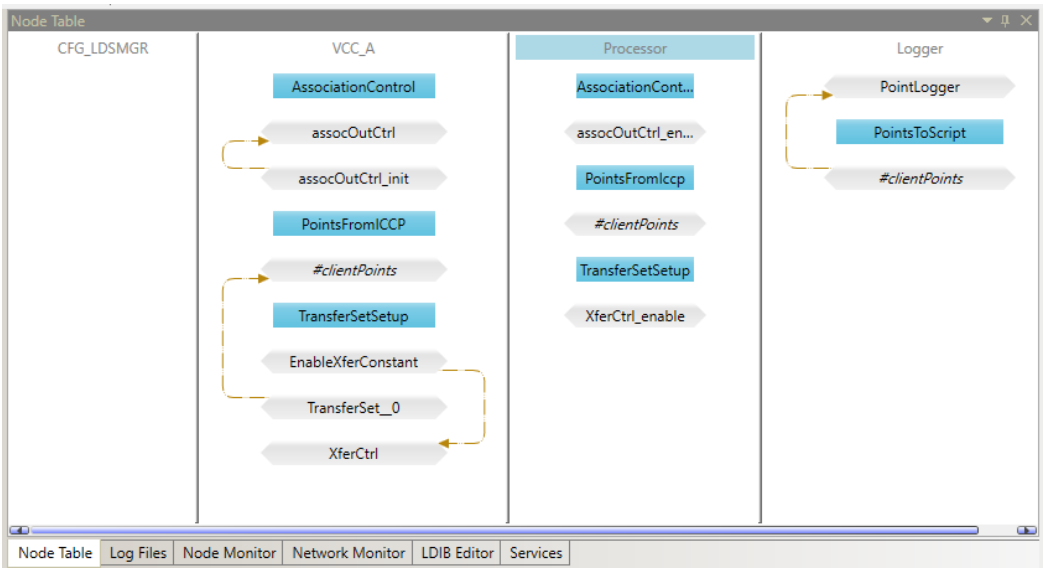
1. Navigate to **Output** tab of the **Templates** panel.
2. Select the **PointToScript** template to display the **Create Node** form.
3. Enter “#clientPoints” in the **Point label** field.
4. Enter “<type>” in the **Type** field.
5. Enter “#clientPoints” in the **Tag** field.
6. Leave the **Python instance** field blank.
7. Enter “PointsToScript” in the **Combine group** field.
8. Click **OK**.



These two nodes are the only nodes you need to create in the *Script* VMD. At this point in the tutorial, there should be two different nodes in the Script VMD called “Logger” as shown below.



All nodes for our example Oracle Utilities Live Energy Connect server configuration have been created. If everything was specified correctly, the view of the configuration from the **Node Table** tab of the **Central** panel should look like the one shown in the figure below.



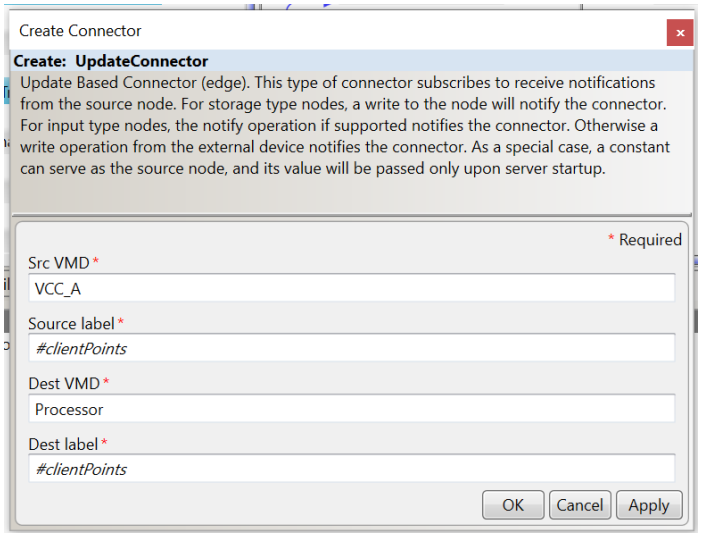
The last step in building the configuration is to connect the nodes.

Step 9: Connect the Nodes

This Oracle Utilities Live Energy Connect server configuration requires Update connectors and Two Way connectors between some of the nodes.

Create Connectors between Nodes in the Configuration

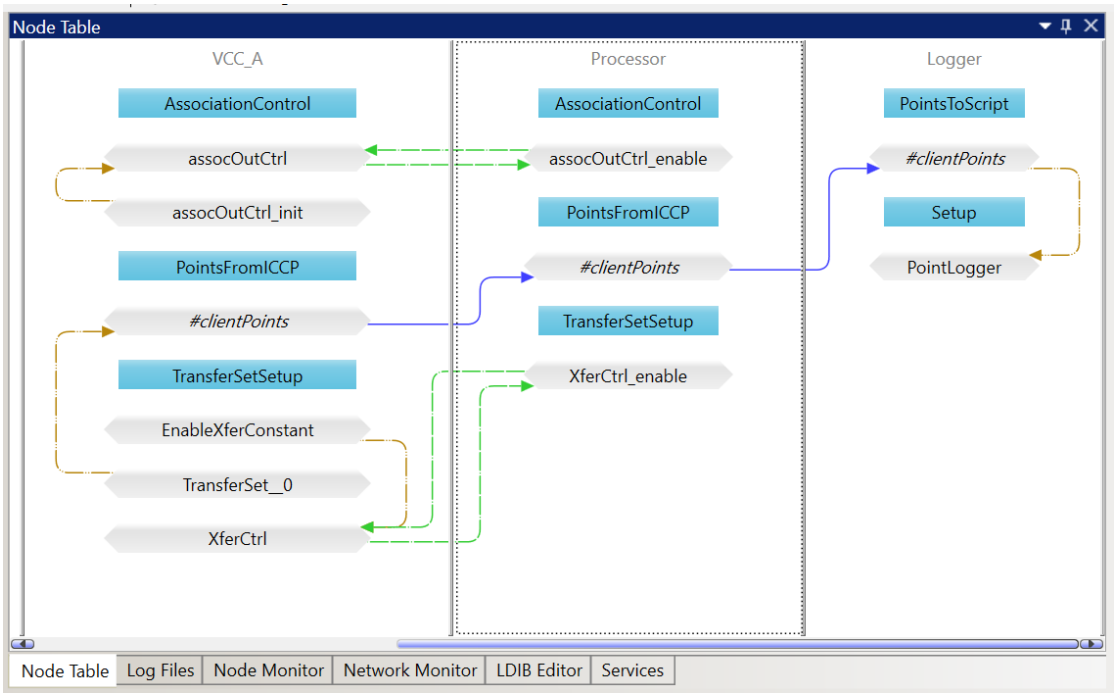
1. Click on the **Create Update Connector** icon in the **Menu Bar**. The **Create Update Connector** icon is depicted as a blue arrow.
2. The **Create Connector** tool window will open.
3. Enter "VCC_A" in the **Src VMD** field.
4. Enter "#clientPoints" in the **Source label** field.
5. Enter "Processor" in the **Dest VMD** field.
6. Enter "#clientPoints" in the **Dest label** field.



7. Click **OK**.
8. Use the **Create Connector** tool and the values in the table below to create the remaining three connectors in this example server configuration.
   The table below shows the values used to create each Update Connector and Two Way Connector in this example server configuration.

Connector Type	Source VMD	Source Node	Destination VMD	Destination Node
Update Connector	VCC_A	#clientPoints	Processor	#clientPoints
Update Connector	Processor	#clientPoints	Logger	#clientPoints
Two Way Connector	VCC_A	XferCtrl	Processor	XferCtrl_enable
Two Way Connector	VCC_A	assocOutCtrl	Processor	assocOutCtrl_enable

Once all four of these connectors have been created, the view of your Oracle Utilities Live Energy Connect server configuration from the **Node Table** tab should look like the one shown in the figure below.


Node Table
VCC_A
AssociationControl
assocOutCtrl
assocOutCtrl_init
PointsFromICCP
#clientPoints
TransferSetSetup
EnableXferConstant
TransferSet__0
XferCtrl
Processor
AssociationControl
assocOutCtrl_enable
PointsFromICCP
#clientPoints
TransferSetSetup
XferCtrl_enable
Logger
PointsToScript
#clientPoints
Setup
PointLogger
Node Table
Log Files
Node Monitor
Network Monitor
LDIB Editor
Services

Step 10: Validate the Configuration

Now that the example configuration is completed, let's validate that it works just like the provided example configuration.

Load the Batch File:

1. Navigate to the **Batch Files** tab of the **Properties** panel and select **Load Share**.
2. When prompted select the example batch file called "IccpPoints.csv" from the "C:\ProgramData\LiveEnergyConnect\Config" directory.
3. Confirm that the prototype nodes in the configuration generate the nodes defined in the batch file as expected.

Note: If loading the batch file doesn't generate any nodes or if you receive an error message from the Configuration Manager, one or more field values in the relevant prototype node does not match the column values in the batch file.

Start the Oracle Utilities Live Energy Connect Server as a Server Process:

1. Confirm that the **Soap port** and **Mms port** are specified as "8089" and "103" respectively in the **Server** tab of the **Properties** panel. If not, specify the field values and click **Apply**.
2. Click **Start Server Process** button in the **Configuration Alias** panel.
3. Confirm that the server starts by looking at the **Running Status** in the **Configuration Alias** panel.
4. Confirm that the server is attempting to make an outbound ICCP association with the remote ICCP server by looking at the **Network Monitor** tab of the **Central** pane. The association between "VCC_A" and "VCC_B" should have a status that reads "Attempting".

If you are working through this tutorial you should have already created the configuration alias called "ScadaSim" from the earlier tutorial section of the guide called Getting Started: A Quick Configuration Manager Tutorial.
If you skipped that section or if you just no longer have the example server configuration loaded for the "ScadaSim" configuration alias, then refer to that tutorial to prepare the SCADA server simulator configuration.

Test Against the Simulated SCADA Server Example Configuration:

1. Switch to the Configuration Aliases "ScadaSim" using the drop-down selector in the **Configuration Alias** panel.
2. Confirm that the "IccpSimPoints.csv" batch file is loaded by looking at the **Batch Files** tab in the **Properties** panel. If it is not loaded, then load it is using **Load Share**.
3. Click **Start Server Process** in the **Configuration Alias** panel.
4. Confirm that the server starts by looking at the **Running Status** in the **Configuration Alias** panel.
5. Confirm that the two running server instances establish an ICCP association using the **Network Monitor** tab of the **Central** pane. The association between "VCC_A" and "VCC_B" should have a status that reads "Connected".
6. Switch back to the configuration alias "cfg".
7. Confirm that point values are being updated in the "Processor" VMD of this server instance. You can verify this using the **Node Monitor** tab in the **Central** pane.
8. Finally, confirm that the embedded Python script used in the "Logger" VMD is logging point values in CSV file in the specified directory (specified in the **Arg1** field of the VMD's *SetupScript* node).
9. Save the configuration. Click **Save As** from the **File** menu.

You have now successfully created your first Oracle Utilities Live Energy Connect server configuration from scratch.
If you are having trouble validating this Oracle Utilities Live Energy Connect server configuration, try the following:

- Confirm that there are no missing nodes or connectors.
- Confirm that there are no typos in the values used for the various parameters of the VMD's, nodes, and connectors.
- Confirm that there are not two running instances of the server configured to use the same ports for SOAP and MMS communication.
- Confirm that you are not running two instances of Oracle Utilities Live Energy Connect Configuration Manager simultaneously.

For any further issues, contact My Oracle Support (MOS).

Appendix B: ICCP Reference

ICCP Indication Point Types in Oracle Utilities Live Energy Connect

The following is a list of the possible Oracle Utilities Live Energy server types that ICCP points can have and the each type's structure in the Oracle Utilities Live Energy server.
The bold typeface in the list below is the syntax used to specify each type in the Oracle Utilities Live Energy Connect server (e.g. the **Type** field of a *PointFromIccp* node might be specified as "Data_RealQ").

Data_Real
floating-point: {format-width 24, exponent-width 8}

Data_State
bit-string:
{
State_hi[0],
State_lo[1],
Validity_hi[2],
Validity_lo[3],
CurrentSource_hi[4],
CurrentSource_lo[5],
NormalValue[6],
TimeStampQuality[7]
}

Data_Discrete
integer: {width 32}

Data_Flags
bit-string:
{
unused[0],
unused[1],
Validity_hi[2],
Validity_lo[3],
CurrentSource_hi[4],
CurrentSource_lo[5],
NormalValue[6],
TimeStampQuality[7]
}

Data_TimeStamp
integer: {width 32}
Note: The integer value represents seconds since Unix epoch.

COV_Counter
Unsigned: {width 16}
The following complex types are used in transferring IndicationPoint object values:

Data_RealQ STRUCTURE
{
COMPONENT Value Data_Real,
COMPONENT Flags Data_Flags
}

Data_StateQ
Data_State

Data_DiscreteQ STRUCTURE
{
COMPONENT Value Data_Discrete,
COMPONENT Flags Data_Flags
}

Data_RealQTimeTag STRUCTURE
{
COMPONENT Value Data_Real,
COMPONENT TimeStamp Data_TimeStamp,
COMPONENT Flags Data_Flags
}

Data_StateQTimeTag STRUCTURE
{
COMPONENT TimeStamp Data_TimeStamp,
COMPONENT Flags Data_State
}

Data_DiscreteQTimeTag STRUCTURE
{
COMPONENT Value Data_Discrete,
COMPONENT TimeStamp Data_TimeStamp,
COMPONENT Flags Data_Flags
}

Data_RealExtended STRUCTURE
{
COMPONENT Value Data_Real,
COMPONENT TimeStamp Data_TimeStamp,
COMPONENT Flags Data_Flags,
COMPONENT COV COVCounter
}

Data_StateExtended STRUCTURE
{
COMPONENT TimeStamp Data_TimeStamp,
COMPONENT Flags Data_State,

COMPONENT COV COVCounter
}

Data_DiscreteExtended STRUCTURE
{
COMPONENT Value Data_Discrete,
COMPONENT TimeStamp Data_TimeStamp,
COMPONENT Flags Data_Flags,
COMPONENT COV COVCounter
}

Note: Data_RealQTimeTagExtended uses TIMESTAMP_EXTENDED instead of Data_TimeStamp.

Note: The TimeTagExtended types have a millisecond time field in addition to the timestamp (and no COV field). TimeTagExtended types were added in the 2000,8 version of ICCP.

IndicationPointConfig STRUCTURE
{
COMPONENT PointType integer { width 8, range 0 .. 2 },
COMPONENT QualityClass integer { width 8, range 0 .. 1 },
COMPONENT NormalSource integer { width 8, range 0 .. 3 },
COMPONENT TimeStampClass integer { width 8, range 0 .. 1 },
COMPONENT COVClass integer { width 8, range 0 .. 1 },
}

ICCP Quality Codes

The ICCP protocol provides quality codes to represent data quality for a point. If used, these are transferred with each data item.
The quality codes for a data item are derived from the SCADA system's reliability information.
The mapping of a SCADA system's data reliability information into the ICCP quality codes is a local implementation issue and can vary across organizations.

The categories of data item quality information are:

Data Item Status or Validity
Valid (Good)
Invalid (Bad)
Held
Suspect

Data Item Source:
Telemetered
Calculated
Estimated
Manual

Data Item State:
Normal
Abnormal (off-normal).

Oracle Utilities Live Energy Connect Configuration Manager Node Templates for ICCP

One ICCP VMD and 20 ICCP node templates are provided for you in the Oracle Utilities Live Energy Configuration Manager. This section provides an alphabetized reference of these templates. Oracle Utilities Live Energy Connect provides support for many of the conformance blocks in the ICCP protocol.

ICCP Setup Node Templates

Four of the node templates are designed to establish incoming and outgoing associations with other VMD's:

- VccAssocInControl
- VccAssocOutControl
- VccTransferControl
- VerifyAssociation

These node templates are common to all ICCP communication and have no specific block designation.

ICCP Conformance Blocks

The following table describes the supported conformance blocks and references the templates associated with each block.

Block	Definition	Related Templates
Block 1 **Periodic System Data**	Includes status points, analogue points, quality flags, time stamp, change of value counter, protection events, and association objects to control ICCP sessions.	DsTransferSet (Setup Node for Blocks 1 and 2) PointFromIccp (Input Node for Blocks 1 and 2) PointToIccp (Output Node for Blocks 1 and 2)
Block 2 **Extended Data Set Condition Monitoring**	Provides report by exception capability for the data types that block 1 is able to transfer periodically.	
Block 4 **Information Messages**	Provides support for simple text and binary files.	ImTransferSet (Setup Node for Block 4) MessageFromIccp (Input Node for Block 4) MessageToIccp (Output Node for Block 4)
Block 5 **Device Control**	Provides device control requests: on/off, trip/close, raise/lower and digital set points. Includes mechanisms for interlocked controls and select-beforeoperate.	ControlFromIccp (Input Node for Block 5) ControlToIccp (Output Node for Block 5)

Block 8	Provides scheduling, accounting, and outage and plant information.	GetOutageFromIccp (Input Node for Block 8) GetTAQueryFromIccp (Input Node for Block 8) SendOutageToIccp (Output Node for Block 8) SendTAQueryToIccp (Output Node for Block 8) TANoSegPeriodicFromIccp (Input Node for Block 8) TANoSegPeriodicToIccp (Output Node for Block 8) TAServerTransferSetFromIccp (Input Node for Block 8) TaTransferSet (Setup Node for Block 8)
Additional User Objects	The term "scheduling" refers to scheduling an amount of electrical power to be transferred from one system to another on a periodic basis for a certain interval of time under the restrictions of a formal agreement. From a data exchange standpoint, "scheduling" is expanded to include the retrieval of any periodic or profile data for control center energy scheduling, accounting, or application monitoring.	

ICCP Node Templates in LCM

VccCreate (VMD Resource Mapper Template)

Creates an ICCP Resource Mapper type of Virtual Manufacturing Device (VMD). This type of Virtual Device communicates to other Devices via the ICCP protocol, also known as TASE.2. The VMD created by this macro is also called a VCC (Virtual Control Center).

Parameter	Definition	Default
My VMD	Required. Specifies the common name to be assigned to this VCC.	No default
Assoc out	Required. Specifies whether this VCC is to have an outbound association. 1 enables an outbound association; 0 does not.	No default
Assoc in	Required. Specifies whether this VCC is to have an inbound association. 1 enables an inbound association; 0 does not. Note: A VCC can have both and inbound and outbound association.	No default
Client role	Required. Specifies whether the VCC has the ICCP client role or not. 1 specifies the client role; 0 disables it.	No default
Server role	Required. Specifies whether the VCC has the ICCP server role or not. 1 specifies the server role; 0 disables it.	No default
Flags	Optional. This parameter is a set of boolean (on/off) options that enable or disable certain functions in the ICCP VMD (VCC) that you are creating. The flags argument is expressed as a series of flag keywords separated by the vertical bar (' | ') character in the Flags field. If you prefer to use a form, then click in the Flags field to view the form that allows you to set and unset flags using radio buttons. To remove a flag, unset it in the form or precede it with a minus sign in the Flags field.	The PUSHALL_FLAG, EXCLUDE_FLAG, FAIL_LIST_FLAG, and NAMED_LIST_FLAG flags are set by default. All other flags are not set by default unless both the Assoc out and Assoc in parameters are set to ' 1 ', then the ONE_WAY_FLAG is set by default. The EXCLUDE_FLAG is set by default.
	NOLOG_A_FLAG: If set, directs RTI Server not to generate log messages for variable access failures.	Not Set
	RELAY_FLAG: If set, directs RTI Server to treat incoming Information Reports and Read Event Notifications as though they were MMS Writes to a local variable by the same name as specified in the report.	Not Set

	DOM_RELAY_FLAG: If set, directs RTI Server to treat incoming Information Reports and Read Event Notifications as though they are Writes, creating a domain-scoped variable where the domain is the remote VMD name.	Not Set
	INFO_FLAG: If set, directs RTI Server to send out Information Reports instead of Event Notifications for pushed and polled variables and for enrolled MMS Read Events.	Not Set
	WRITE_FLAG: If set, directs RTI Server to send out MMS Writes instead of Event Notifications for pushed and polled variables and for enrolled MMS Read Events.	Not Set
	NOREAD_FLAG - If set, directs RTI Server not to perform an initial read of all push-list variables, directing RTI Server to refresh the variable's internal state only as writes come in.	Not Set
	PUSHALL_FLAG: If set, directs RTI Server not to check push-list variables for changes in value, directing RTI Server to push a variable whenever a write comes in regardless of the value.	Not Set
	BOUNCE_FLAG: If set, directs RTI Server to allow a write to a variable on a given association to trigger a notification (push list or push agent) on the same association.	Not Set
Parameter	**Definition**	**Default**
	EXCLUDE_FLAG - If set, directs RTI Server not to allow incoming connections to this VMD except for those whose names appear in an 'AllowMmsInbound' node.	Set
	ONE_WAY_FLAG: If set, directs RTI Server to force outbound requests to use an outbound association.	Not Set
	FAIL_LIST_FLAG: If set, directs RTI Server to prevent the creation of a variable list if any of its variables are non-existent.	Not Set
	NAMED_LIST_FLAG: If set, directs RTI Server to perform an integrity scan with RBE to send a named variable list instead of an enumerated list.	Not Set
	HIDE_UNAVAILABLE_FLAG: If set, directs RTI Server to treat any variable whose value cannot be read as though the variable does not exist.	Not Set
	REDUCE_LIST_FLAG - If set and the remote ICCP server refuses to define a data set, causes the ICCP Client to attempt to read the data values and then retry the data set definition with any inaccessible data values omitted.	Not Set
	SECURITY_FLAG - If set, directs RTI Server to perform the secure ICCP procedures (certificate checking) at the ACSE level.	Not Set
	LEAP_SECOND_FLAG: If set, directs RTI Server to adjust timestamps according to the official schedule of leap seconds (as found in the srvxnt.ini file).	Not Set

My domain	Required. Specifies the local domain name for server-side data.	No default
My BT ID	Required. Specifies the local bilateral table ID.	No default
My version	Required. Specifies the local ICCP version, such as 1996,8.	No default
My features	Required. Specifies locally supported features, as twelve ones or zeros or a combination of ones and zeroes.	No default
Remote VCC	Required. Specifies the common name of the remote VCC. Use the name of the server VCC if the client and server are different.	No default
Remote domain	Required. Specifies the remote domain name for server-side data.	No default
Remote BT ID	Required. Specifies the remote bilateral table ID.	No default
Remote version	Required. Specifies the remote ICCP version, such as 1996,8.	No default
Remote features	Required. Specifies the features which must be supported by remote VCC, as twelve ones or zeros, or a combination of ones and zeros.	No default
Delay base	Optional. Specifies the reference time in seconds relative to the present time for StartDelay (in the DsTransferSet macro).	No default
Value poll time	Optional. Specifies the period in seconds for polling ICCP server variables to test for the availability of their values.	5 seconds
Value timeout	Optional. Specifies the seconds that RTI Server is to wait for all variables to have a value before allowing an association. A value of 0 disables the feature.	0 seconds

ControlFromIccp (Input Node Template)

Takes device control from the ICCP peer.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
My domain	Specifies the local domain name for server-side data. Leave this parameter blank if the scope is VCC-wide.	Yes, unless the scope is VCC-wide.

Flags	This parameter is a set of boolean (on/off) options that enable or disable certain functions in the OPC UA VMD that you are creating. The flags argument is expressed as a series of flag keywords separated by the vertical bar (' | ') character in the Flags field. If you prefer to use a form, then click in the Flags field to view the form that allows you to set and unset flags using radio buttons. To remove a flag, unset it in the form or precede it with a minus sign in the Flags field.	No, if the data type is COMMAND.
	REAL: Sets the control point to type REAL. Default: If not set, the default is type COMMAND.	
	DISCRETE: Sets the control point to type DISCRETE. Default: If not set, the default is type COMMAND.	
	SBO: Indicates whether the control point supports the select-before-operate sequence.	Yes, if you are using SBO.
	TAGABLE: Indicates whether the control point supports tagging.	No
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

ControlToIccp (Output Node Template)

Transfers device control to the ICCP peer.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Remote VCC	Specifies the common name of the remote VCC. Use the name of the server VCC if the client and server are different.	Yes
Remote domain	Specifies the remote domain name for server-side data. Leave this parameter blank if the scope is VCC-wide.	Yes, unless the scope is VCC-wide.

Flags	This parameter is a set of boolean (on/off) options that allows you to select a data type and specify additional options. The flags argument is expressed as a series of flag keywords separated by the vertical bar (' | ') character in the Flags field. If you prefer to use a form, then click in the Flags field to view the form that allows you to set and unset flags using radio buttons. To remove a flag, unset it in the form or precede it with a minus sign in the Flags field.	No, if the data type is COMMAND.
	REAL: Sets the control point to type REAL. Default: If not set, the default is type COMMAND.	
	DISCRETE: Sets the control point to type DISCRETE. Default: If not set, the default is type COMMAND.	
	SBO: Indicates whether the control point supports the select-before-operate sequence.	Yes, if you are using SBO.
	TAGABLE: Indicates whether the control point supports tagging.	No
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

DsTransferSet (Setup Node Template)

Defines a client-side DS transfer set.

Parameter	Definition	Required
TS num	Assigns a transfer set number that is unique to this VCC.	Yes
Remote domain	Specifies the remote domain for data.	Yes
Remote VCC	Specifies the common name of the remote server's VCC.	Yes
StartTime	Specifies the absolute start time as GMTBasedS.	No
StartDelay	Specifies the start time in seconds relative to the #delay_base in the VccCreate VMD.	No
IntervalCheck	Specifies the period in seconds between interval-based transmissions.	Yes
TLE	Specifies the time limit for execution in seconds.	No
BufferTime	Specifies the buffer time in seconds.	No
IntegrityCheck	Specifies the period in seconds between integrity-based transmissions.	Yes

IntervalTimeOut	Indicates whether interval based transmissions are enabled. 1 indicates that interval-based transmissions are enabled; 0 indicates that they are not.	Yes
IntegrityTimeOut	Indicates whether integrity-based transmissions are enabled. 1 indicates that integrity-based transmissions are enabled; 0 indicates that they are not.	Yes
ObjectChange	Indicates whether change-based transmissions are enabled. 1 indicates that change-based transmissions are enabled; 0 indicates that they are not.	Yes
OperatorRequest	Indicates whether operator-requested transmissions are enabled. 1 indicates that operator-requested transmissions are enabled; 0 indicates that they are not.	Yes
RBE	Indicates whether report-by-exception is enabled. 1 indicates that report-by-exception is enabled; 0 indicates that report-by-exception is not.	Yes
IntervalDelay	Specifies the start time delay after the next time, which is a multiple of the **IntervalCheck** period (e.g., if IntervalCheck is 3600 seconds, and IntervalDelay is 60 seconds, poll 1 minute after each hour). Defining this parameter (even with a 0 value) enables this feature.	No
AllChangesReported	Indicates whether or not all changes are to be reported. 1 indicates that the all-changes-reported function is enabled; 0 indicates that this function is not enabled.	No
Critical	Indicates whether critical acknowledgment is required or not. 1 indicates that critical acknowledgment is required; 0 or no value indicates that it is not.	No
CircumventSiemensBug	Indicates whether or not to circumvent the Siemens Transfer Set domain name bug. Specifying any value directs RTI Server is to circumvent the Siemens bug. No value indicates not to circumvent this bug.	No
Do read	Indicates whether or not RTI Server is to perform an initial read. 1 indicates to do an initial read of data values; 0 or no value indicates that RTI Server is not to perform an initial read.	No
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

GetOutageFromIccp (Input Node Template)

Retrieves outage data from the ICCP peer. Specifically, this outage data provides the time period when the outage occurred.

Parameter	Definition	Required

Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager. This specific label indicates the information requested about the outage. Specify one of the following: •DONewRevSched returns the date that the outage started and when it ended. •DOActual gets the date that the outage occurred. •DOCancel gets the cancellation date. The cancellation date is the time when the outage was cancelled if it was cancelled.	Yes
Type	Specifies the data type for this outage object. Use the data type with the same name as the Point label: •DONewRevSched •DOActual •DOCancel	Yes
Remote VCC	Specifies the common name of the remote VCC. Use the server VCC name if the client and server are different.	Yes
Remote domain	Specifies the remote domain for data. Leave this parameter blank if the scope of the data is VCC-wide.	Yes, unless the scope is VCC-wide.
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

GetTAQueryFromIccp (Input Node Template)

Retrieves the Transfer Account Query from the ICCP peer.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Remote VCC	Specifies the common name of the remote server VCC.	Yes

ImTransferSet (Setup Node Template)

Defines a client-side information message (IM) transfer set.

Parameter	Definition	Required
TS num	Assigns a transfer set number that is unique to this VCC.	Yes
Remote VCC	Specifies the common name of the remote server's VCC.	Yes
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	Yes

MessageFromIccp (Input Node Template)

Receives an information message from the ICCP peer as an IM_struct type. It is recommended that you set the RELAY_FLAG for the ICCP association. Use an update connector for this point.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Remote VCC	Specifies the common name of the remote VCC. Use the server VCC if the client and server are different.	Yes
TS num	Specifies the number of the IM transfer set. The default is 0.	No
Size	Specifies the information buffer size in bytes. The default is 1024	No
Remote domain	Specifies the domain name used in incoming Block 4 information reports. Leave this parameter blank if the scope of the information reports is VCC-wide.	Yes, unless the scope is VCC-wide.

MessageToIccp (Output Node Template)

Sends an information message to the ICCP Peer by writing an IM_struct type to this node. Use either an update or time-based connector.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Remote VCC	Specifies the common name of the remote client VCC.	Yes

My domain	Specifies the domain name that is used in outgoing Block 4 information reports. Leave this parameter blank if the scope of the information reports is VCC-wide.	Yes, unless the scope is VCC-wide.

PointFromIccp (Input Node Template)

Retrieves indication point data from the ICCP peer.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Type	The supported ICCP types are: •Data_Discrete •Data_Real •Data_RealQ •Data_RealQTimeTag •Data_RealExtended •Data_RealQTimeTagExtended •Data_State • Data_StateQ •Data_StateQTimeTag • Data_StateExtended • Data_StateQTimeTagExtended • Data_Discrete •Data_DiscreteQ • Data_DiscreteQTimeTag • Data_DiscreteExtended • Data_DiscreteQTimeTagExtended	Yes
Remote VCC	Specifies the common name of the remote VCC. Use the server VCC if the client and server are different.	Yes
Remote domain	Specifies the remote domain for this point if the point is of domain scope. Leave blank for a VCC-wide point.	No
TS num	Specifies the number of the transfer set to which this point is assigned	No
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

Period	Places a limit (in seconds) on the time RTI Server will wait between receiving reports before dis-establishing the association and then re-establishing it. Specify this limit on only one node associated with this VCC because specifying it on more than on requires more memory and will slow down performance. Note: The node must receive data at a specified time interval, not when the data changes; otherwise, the function that re-establishes the association will not work in the event that the data never changes. If this parameter is undefined or set to 0, RTI Server will wait indefinitely.	No
Variation	Indicates whether or not the RELAY_FLAG is for this ICCP association. Enter 1 if the RELAY_FLAG is set for the ICCP association; otherwise, enter 0 or leave blank.	No

PointToIccp (Output Node Template)

Sends indication point data to the ICCP peer.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Type	The supported ICCP types are: •Data_Discrete •Data_Real •Data_RealQ •Data_RealQTimeTag •Data_RealExtended •Data_RealQTimeTagExtended •Data_State • Data_StateQ •Data_StateQTimeTag • Data_StateExtended • Data_StateQTimeTagExtended • Data_Discrete •Data_DiscreteQ • Data_DiscreteQTimeTag • Data_DiscreteExtended • Data_DiscreteQTimeTagExtended	Yes
My domain	Specifies the local domain for this point if the point has domain scope. Leave this parameter blank if the point's scope is VCC-wide.	Yes, unless the scope is VCC-wide.
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

SendOutageToIccp (Output Node Template)

Provides device outage data to the ICCP peer in order to execute a planned outage.

Parameter	Definition	Required

Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager. This specific label indicates information about the planned outage that RTI Server is to send to the ICCP peer. Specify one of the following: •DONewRevSched sends the dates when the outage is to start and end. •DOActual sends the date when the outage is to occur. •DOCancel sends the cancellation date if you or your organization decides to cancel the outage.	Yes
Type	Specifies the data type for this outage object. Use the data type with the same name as the Point label: • DONewRevSched •DOActual •DOCancel	Yes
Remote VCC	Specifies the X.500 common name of the remote client VCC.	Yes
My domain	Specifies the local VCC domain issuing this report. Leave this parameter blank if this node's scope is VCC-wide.	Yes, unless the scope is VCC-wide.
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

SendTAQueryToIccp (Output Node Template)

Sends a query to the ICCP peer.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Remote VCC	Specifies the common name of the remote server VCC.	Yes

TANoSegPeriodicFromIccp (Input Node Template)

Retrieves "scheduling" and "accounting" information from the ICCP peer periodically. In particular, this type of node retrieves the information without segmentation.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Row type	Provides the MMS-DL (Manufacturing Messaging Service-Descriptive Language) specification of the type of data in a single matrix row.	Yes
Num floats	Specifies the number of floats in a matrix row.	Yes
Num ints	Specifies the number of integers in a matrix row.	Yes
Num matrix ids	Specifies the sum of the number of floats and integers in a matrix row.	Yes
Max loc refs	Specifies the maximum number of local refs that are allowed in the header structure	Yes
Max rows	Specifies the maximum number of matrix rows which may be passed using this point	Yes
Ts num	Specifies the number of the transfer set to which this point is assigned.	Yes
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

TANoSegPeriodicToIccp (Output Node Template)

Sends "scheduling" and "accounting" information to the ICCP peer periodically. In particular this type of node sends the information without segmentation.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Row type	Provides the MMS-DL specification of the type of a single matrix row.	Yes
Num matrix ids	Indicates how many numbers are in a matrix row. These numbers can be either integers or floats, or some combination of integers and floats.	Yes
Max loc refs	Specifies the maximum number of local refs that are allowed in the header structure.	Yes

Max rows	Specifies the maximum number of matrix rows which may be passed using this point.	Yes
My domain	Specifies the domain in the local VCC of this report. Leave this parameter blank if the scope is VCC-wide.	Yes, unless the scope is VCC-wide.
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

TAServerTransferSetFromIccp (Input Node Template)

Defines a server-side transfer account (TA) transfer set.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Remote VCC	Specifies the common name of the remote server VCC.	Yes

TaTransferSet (Setup Node Template)

Defines a client-side transfer account (TA) transfer set.

Parameter	Definition	Default
Ts num	Assigns a transfer set number that is unique to this VCC.	Yes
Remote domain	Assigns a transfer set number that is unique to this VCC.	Yes
Remote VCC	Specifies the common name of the remote server VCC.	Yes
BeforeTheHour	Indicates whether or not the ICCP server is to send a report before the hour. Specify 1 to direct the ICCP server to send this information before the hour; otherwise, specify 0. Often, this is referred to as “"pre-schedules”."	Yes
DispatchUpdate	Indicates whether or not the ICCP server is to send a report for a dispatch update. Specify 1 to direct the ICCP server to send a report for a dispatch update; otherwise, specify 0. Often, this is referred to as “"next hour schedules”.“"	Yes

DuringTheHour	Indicates whether or not the ICCP server is to send a report during the hour. Specify 0.1 to direct the server to send these reports during the hour; otherwise, specify 0. Often, this is referred to as “"mid hour schedule changes.“"	Yes
AfterTheHour	Indicates whether or not the ICCP server is to send a report after the hour. Specify 1 to direct the server to send these a report after the hour; otherwise, specify 0. Often, this is referred to as “"after the hour actuals."	Yes
ActualDataUpdate	Indicates whether or not the ICCP server is to send a report for an actual data update. Specify 1 to direct the server to send a report for an update; otherwise, specify 0. Often, this is referred to as "corrections to previous schedules."	Yes
PastHours	Indicates whether or not the ICCP server is to send a report for data in the past. Specify 1 to direct the server to send a report for this past data; otherwise, specify 0.	Yes
ObjectChange	Indicates whether or not the server is to send a report when any object in the transfer account changes. Specify 1 to direct the server to send a report when a change occurs; otherwise, specify 0.	Yes
OperatorRequest	Indicates whether or not the ICCP server is to send a report when an operator at the ICCP server control requests it. Specify 1 to direct the server to send a report upon operator request; otherwise, specify 0.	Yes

Note: A Transfer Account object represents what, where, when, and how much is transferred between two utilities in a particular account. It may also represent generation schedules and other energy delivery schedules within a utility. It is a container for a number of different attributes and objects, which together define the entire transfer account definition, i.e. which account, when is the effective time frame, and what are the periodic or profile values of the data.

VccAssocInControl (Setup Node Template)

Establishes inbound association control, enabling and disabling the inbound ICCP association to this VCC, and reporting the association status. This node must be linked to a node in another virtual device, usually the processor, with a TwoWayConnector. The data type is <integer:32>. Control values are -1 to abort and disable, +0 to disable, and +1 to listen for an association. Status values are +0 for disabled, +1 for listening for association, and +2 for associated.

Parameter	Definition	Required

Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Remote VCC	Specifies the common name of the remote VCC.	Yes
Init state var	Indicates whether or not RTI Server is to establish an association initially. Specify +1 if RTI Server is to enable the association initially; specify +0 if RTI Server is not to enable the association initially.	Yes
Association flags	Each of these flags disables or enables an option for handling data and associations. By default, none of these flags are set. The flags argument is expressed as a series of flag keywords separated by the vertical bar (' | ') character in the Flags field. If you prefer to use a form, then click in the Flags field to view the form that allows you to set and unset flags using radio buttons. To remove a flag, unset it in the form or precede it with a minus sign in the Flags field.	No
	RELAY_FLAG: If set, directs RTI Configuration Manager to treat incoming Information Reports and Read Event Notifications as though they were MMS Writes to a local variable by the same name as in the report.	
	DOM_RELAY_FLAG: If set, directs RTI Configuration Manager to treat incoming Information Reports and Read Event Notifications as though they are Writes, creating a domain-scoped variable where the domain is the remote VMD name.	
	INFO_FLAG: If set, directs RTI Configuration Manager to send out Information Reports instead of Event Notifications for pushed and polled variables and for enrolled MMS Read Events.	
	BOUNCE_FLAG - If set, directs RTI Configuration Manager not to allow a write to a variable on a given association to trigger a notification (push list or push agent) on the same association.	
	EN_OUT_FLAG - If set, directs RTI Configuration Manager to attempt to make an outbound association.	
	SUPERCEDE_FLAG - If set and an associate request comes in while there is already an association, directs RTI Configuration Manager to abort the old association and accept the new one. If not set, RTI Configuration Manager refuses the new association.	
	ALLOW_MULTI_FLAG - If set and an associate request comes in while there is already an association, directs RTI Configuration Manager to keep the old association and also accept the new one. If not set, refuse the new association and keep the old one.	

Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

VccAssocOutControl (Setup Node Template)

Provides outbound association control, enabling and disabling the outbound ICCP association from this VCC, and reporting the association status. This node must be linked to a node in another VMD (usually the processor) with a TwoWayConnector. The data type is <integer:32>. Control values are -1 to abort and disable, +0 to disable, and +1 to try to associate. Status values are +0 for disabled, +1 for trying to associate, and +2 for associated.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Remote VCC	Specifies the name of the remote VCC.	Yes
Init state var	Indicates whether or not RTI Server is to establish an association initially. Specify +1 if RTI Server is to enable the association initially; specify +0 if RTI Server is not to enable the association initially.	Yes
Association flags	Each of these flags disables or enables an option for handling associations controlled by this node. By default, none of these flags are set. The flags argument is expressed as a series of flag keywords separated by the vertical bar (' | ') character in the Flags field. If you prefer to use a form, then click in the Flags field to view the form that allows you to set and unset flags using radio buttons. To remove a flag, unset it in the form or precede it with a minus sign in the Flags field.	No
	RELAY_FLAG: If set, directs RTI Server to treat incoming Information Reports and Read Event Notifications as though they are MMS Writes to a local variable by the same name as in the report.	
	DOM_RELAY_FLAG: If set, directs RTI Server to treat incoming Information Reports and Read Event Notifications as though they are Writes, creating a domain-scoped variable where the domain is the remote VMD name.	
	INFO_FLAG: If set, directs RTI Server to send out Information Reports instead of Event Notifications for pushed and polled variables and for enrolled MMS Read Events.	
	WRITE_FLAG: If set, directs RTI Server to send out MMS Writes instead of Event Notifications for pushed and polled variables and for enrolled MMS Read Events.	

	NOREAD_FLAG: If set, directs RTI Server to make all AA-specific PGE variables candidates for pushing (without the need for inclusion in a PUSH list).	
	REPORT_FLAG: If set, directs RTI Server not to perform an initial read of all push-list variables, directing RTI Server to refresh the variable's internal state only as writes come in.	
	BOUNCE_FLAG: If set, directs RTI Server not to allow a write to a variable on a given association to trigger a notification (push list or push agent) on the same association.	
	EN_OUT_FLAG: If set, directs RTI Server to attempt to make an outbound association.	
	SUPERCEDE_FLAG: If set and an associate request comes in while there is already an association, directs RTI Configuration Manager to abort the old association and accept the new one. If not set, RTI Configuration Manager refuses the new association.	
	ALLOW_MULTI_FLAG: If set and an associate request comes in while there is already an association, directs RTI Server to keep the old association and also accept the new one. If not set, refuse the new association and keep the old one.	
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

VccTransferControl (Setup Node Template)

Establishes transfer set control, enabling and disabling the client-side transfer sets (data set, message, and accounts) for this VCC, and reporting the transfer set status. This node must be linked to a node in another virtual device, usually the processor, with a TwoWayConnector.

Parameter	Definition	Required
Point label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Type	Specifies the data type of the transfer set, which must be a packed boolean array type, such as <boolean>(<pack>16).	Yes
Init state var	Specifies the name of a packed boolean array type variable, where the true (1) array elements initially enable the corresponding transfer sets, and the false (0) elements disable them.	Yes
Combine group	This is the name used for grouping nodes in this VMD when they are displayed in the Node Table. Specify a combine group name if you would like to group nodes together when they serve a similar function.	No

VerifyAssociation (Setup Node Template)

Periodically requests an ICCP Identify from the ICCP peer. If the request is not acknowledged by the time specified in the timeout parameter (default is 1 minute), then the association will be aborted. A new association can then be established.

Parameter	Definition	Required
Label	Assigns a name that is for routing the data within RTI Server. This name will be displayed throughout RTI Configuration Manager, for example, in the Node Table, and can be used in batch files in order to create more instances of this node. Use this label whenever you refer to the node within RTI Configuration Manager, for example, when connecting this node to another node.	Yes
Remote VCC	Specifies the common name of the remote VCC.	Yes
Pclass	Specifies the LiveData poll class controlling the frequency of issuing the identify request. 1 - specifies 10 seconds. 2 - specifies 1 seconds. 3 - specifies .1 seconds. Do not use poll class 0 because it is the PUSH class, which makes no sense in this case.	Yes
Timeout	Specifies the time-out in milliseconds on all confirmed requests for the entire server. The default is 60000 (one minute). This timeout will govern how soon the identify request (and all other requests) time out. **Note:** Because this parameter is global, specify this parameter only once.	No