Mitsubishi

Q Series programmable logic controllers

eMES I/F Version 2.1

Installation and Configuration

eMES I/F Module

eMES I/F Workbench

DRAFT

MITSUBISHI ELECTRIC

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This book applies to Mitsubishi Electric Automation, Inc. and the eMES I/F product components and to all subsequent releases and modifications until otherwise indicated in new editions.

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Preface

Welcome to eMES I/F. Mitsubishi Electric Corporation's eMES I/F product combines an eMES I/F module (a QCPU) and a Workbench program to support their Mitsubishi Q Series® programmable logic controller. The system enables backplane communication between the plant floor and the business enterprise. This book is your first step to using this product.

Use this book as a guide when installing the eMES I/F module and the Workbench components.

How this book is organized

This book contains the following chapters:

"Chapter 1: Installing the eMES I/F module" provides the steps to install the **eMES I/F module** on the base unit of the Mitsubishi Q Series programmable logic controller and configure multiple CPU parameters using GX Developer.

"Chapter 2: Installing the Workbench" provides the steps to install the Workbench, and then explains how to start the Workbench the first time. This chapter also describes initial Workbench tasks such as scanning the network for eMES I/F modules and changing the module's default IP address.

"Chapter 3: Verifying the installation" tests the eMES I/F system that you installed and configured. This chapter describes how to create a trigger to execute a transaction whose payload is captured using the TCP Receiver Client program.

Terminology

This section is your starting point and as such provides the terminology associated with the eMES I/F environment. Use this terminology as a reference for the rest of this book. Some of the terms and descriptions were taken from the IBM Terminology and the Microsoft Computer Dictionary. The following terms are listed in alphabetic order.

Term	Description
access privileges	Permissions set by an administrator that allow or deny users access to certain features of the Workbench such as a tag write operation. By setting access privileges, the administrator controls user access to restricted data and functions.
backplane	A printed circuit board at the back of the chassis that provides electrical interconnection between the modules inserted into the chassis.
control program	This is the application that is running on the Mitsubishi Q Series™ family of controllers. The software supports ladder logic, sequential function chart, structured text, and function block programming languages.
controller	A programmable device with physical access to plant floor equipment such as motors, sensors, values, pumps, and so forth. An example is the Mitsubishi Q Series™ controller.
CPU	Provides the processing power that reads the inputs, solves the logic, and writes to the outputs for the controller. This pertains to the Mitsubishi Q Series controller.
eMES I/F module	A hardware and embedded software appliance that fits in a slot on the Mitsubishi Q Series logic controller's base unit.

Term	Description
enterprise system	Refers to large organizations that run multiple servers using high-end business applications such as ERP.
device variable	An identifier for the location of an address space in the controller's memory. This pertains to the Mitsubishi Q Series controller.
local variable	A holding variable. Pertains to triggers.
MAC address	Media Access Control (MAC) is a hardware address. The number is assigned to the eMES I/F module by the manufacturer. MAC addresses (which are physical addresses) uniquely identify a node on a network.
PLC	programmable logic controller
static variable	A variable that retains its value between invocations of triggers.

Related documentation

There is related documentation available that provides additional information on how to use eMES I/F.

- Quick Start available in PDF format from the Workbench Help menu.
- eMES I/F User's Guide available in PDF format from the Workbench Help menu.
- Online Help available from the Workbench Help menu. You must have a browser installed to use this feature.

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1 Installing the eMES I/F module

This chapter describes how to install the eMES I/F module on the Mitsubishi Q Series logic controller's base unit. This chapter also describes how to use the GX Developer to set parameters that enable the eMES I/F module to participate in a multiple CPU configuration.

Pre-requisite knowledge

It is assumed that you have some experience with the following:

- Mitsubishi Q Series architecture.
- MELSEC networks. This programmer knows how to configure the networks.
- GX Developer. This programmer knows how to use the GX Developer to configure and program the Mitsubishi Q Series logic controller.

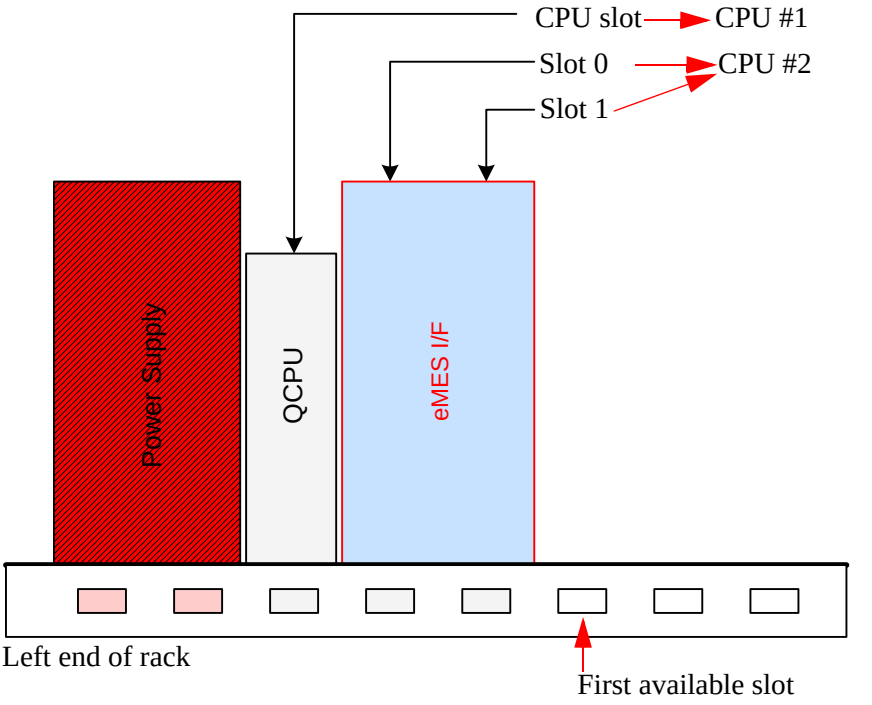
Minimum hardware components

- Mitsubishi Q Series base unit with a power supply and one QCPU.
- One eMES I/F module.

Reviewing the base unit

The Mitsubishi Q Series logic controller has a base unit which is the rack on which all modules are mounted. The base unit is available with 3, 5, 8, or 12 slots. The slots are numbered 0, 1, 2, and so forth. The power supply slot and the first CPU slot are not counted.

The following shows an example rack used for instructional purposes.



The example rack has five (5) slots (this number is used in GX Developer on the I/O assignment tab). Two slots are occupied by the eMES I/F module. There are three (3) empty slots. There can be up to four (4) CPUs in the rack. An eMES I/F module counts as a CPU. Also, there must be at least one QCPU in the rack. The eMES I/F module mounts in the slot to the right of the last (or only) QCPU.

Power supply location

The power supply module is installed in a dedicated slot at the left end of the rack. The power supply modules provide +5VDC power for all modules mounted on the base unit.

QCPU module location

The QCPU module mounts in the slot to the right of the power supply.

If multiple QCPUs are used, they occupy the first CPU slot and next slots. The slots are numbered 0, 1, 2, and so forth.

The QCPU provides the processing power that reads the inputs, solves the logic, and write to the outputs. The QCPU is where the ladder runs and where the customer deploys their control application. Currently, there must always be at least one QCPU in the rack.

eMES I/F module location

The QCPUs must be installed first, and the eMES I/F module mounted to the right of the last QCPU. If multiple eMES I/F modules are used, they must occupy consecutive slots and be the last modules in line.

The eMES I/F module deploys the configured transactions, triggers, and listeners. When the rack is powered on, the eMES I/F module scans the backplane and enumerates each of the QCPUs.

Warnings

Do not install or remove the eMES I/F module while the base unit power is on when the Mitsubishi Q Series logic controller is located in a volatile or hazardous environment. Be sure that power is off or the area is nonhazardous before proceeding.

The Mitsubishi Q Series logic controller’s base unit is sensitive to electrostatic discharge. Take the following precautions:

- Touch a grounded metal surface to discharge any static buildup in your body.
- Handle the power supply and QCPU modules by the edges.

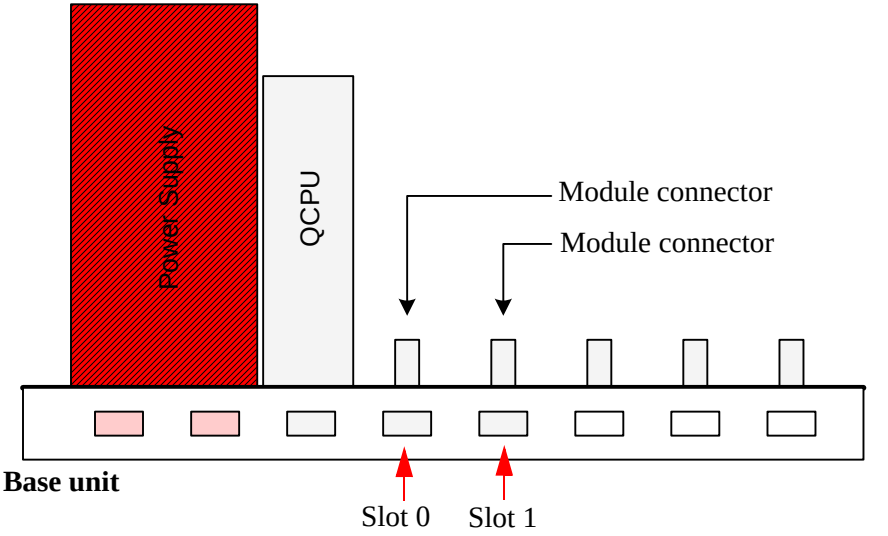
- Never touch any exposed circuitry.

Before you install the eMES I/F module on the base unit, you should ground the rack and power supply.

Step 1: Installing the eMES I/F module

This step describes how to install a single eMES I/F module in a rack where a power supply and QCPU module are already installed.

For this example, the eMES I/F module will occupy slot 0 and slot 1.



1. Turn everything off. Remove the base unit's power cord from the outlet.
2. Remove any plastic protectors that might be covering the module connectors.
3. Move any existing network modules or I/O modules to make 2 slots available next to the last QCPU in the rack. This might be necessary since rack configurations vary. (The example rack does not include any network or I/O modules.)

4. Install the eMES I/F module next to the last QCPU installed on the rack. Using the connector holes on the bottom of the eMES I/F module as a point of support, push on the module in the direction of the arrow to snap the module on the base unit.
5. Attach the Ethernet cable to the eMES I/F module.
6. Attach the power cord to the outlet.
7. Turn everything on.

The following LED conditions will occur:

Component	LED	Indicates
QCPU	**MODE** is steady green	There is power between the QCPU and the rack.
QCPU	**ERR** is blinking red.	There is an error condition caused by the modules not having the same configuration parameters. See *Step 2: Configuring multiple CPU settings* on page 6
eMES I/F module	**RDY** is steady green	There is power between the QCPU and the rack.
eMES I/F module	**ERR** is steady red	There is an error condition caused by the modules not having the same configuration parameters. See *Step 2: Configuring multiple CPU settings* on page 6.

The next step is to start GX Developer and connect to the QCPU. Once you have established communication between GX Developer and the QCPU, you must configure the QCPU's multiple CPU parameters.

Step 2: Configuring multiple CPU settings

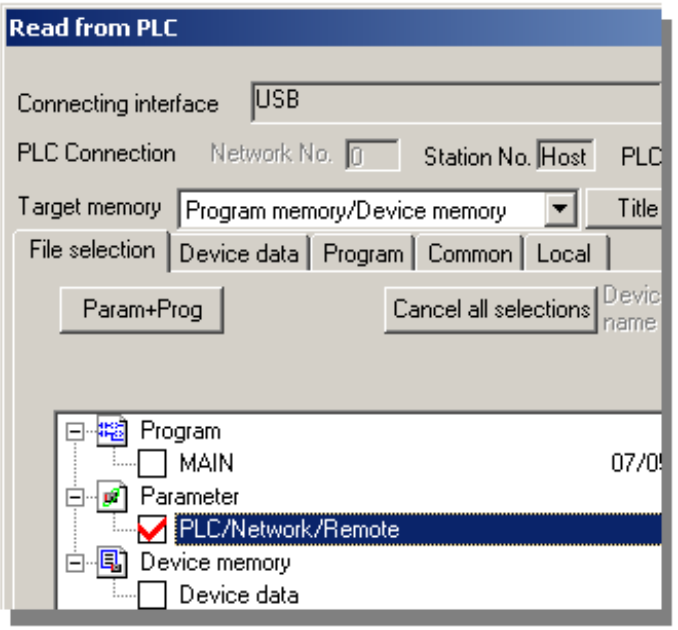
In order for communication to occur across the backplane, all CPU modules in the rack must have the same multiple CPU parameter settings. The purpose of this step is to describe how to use GX Developer to configure the eMES I/F module in a multiple CPU environment. The eMES I/F module will retrieve the multiple CPU parameter settings from the first QCPU in the rack. Consequently, you must configure the multiple CPU parameter settings on the first QCPU. For more information, see *Step 3: Retrieving the multiple CPU configuration* on page 12.

The following assumes that:

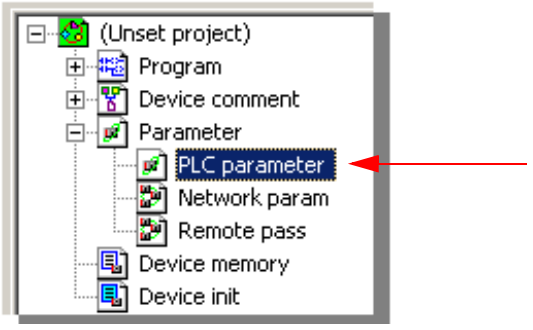
- You have installed the QCPU and eMES I/F module on the rack
- You have established a connection between the GX Developer and the rack.

1. From the GX Developer menu bar, click **Online**, and then click **Read from PLC**.

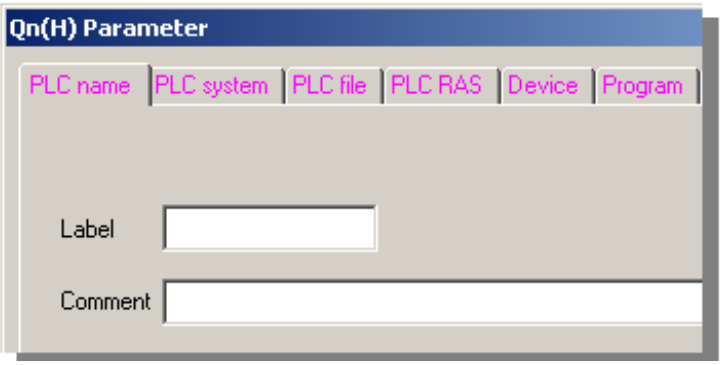
The Read from PLC window appears.



2. Under **Parameter**, select **PLC/Network/Remote**, and then click **Execute**. GX Developer reads the QCPU parameters.
3. Click **Close**.
4. From the left pane, expand **Parameter**, and then double-click **PLC Parameter**.



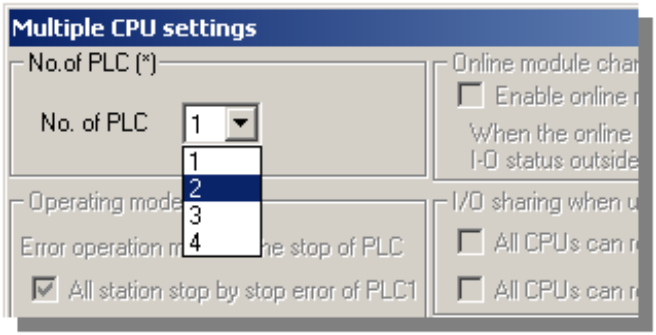
The Qn(H) Parameter window appears with a set of tabs at the top and buttons at the bottom of the window.



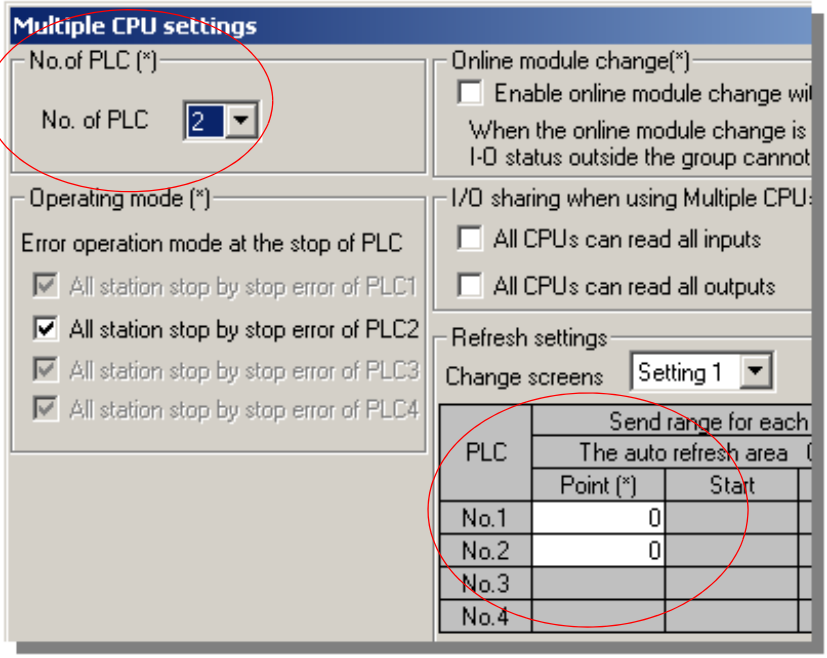
5. At the bottom of the Qn(H) Parameter window, click the **Multiple CPU settings** button.

   The Multiple CPU settings window appears.

6. Using the **No. of PLC** down-arrow, set the value to 2.



For this example, the number of CPUs in the rack is 2 (the QCPU and the eMES I/F module). The setting must correspond to the number of CPUs in the rack..



Notice the value next to **PLC No. 1** and **No. 2** defaults to zero. Leave as zero.

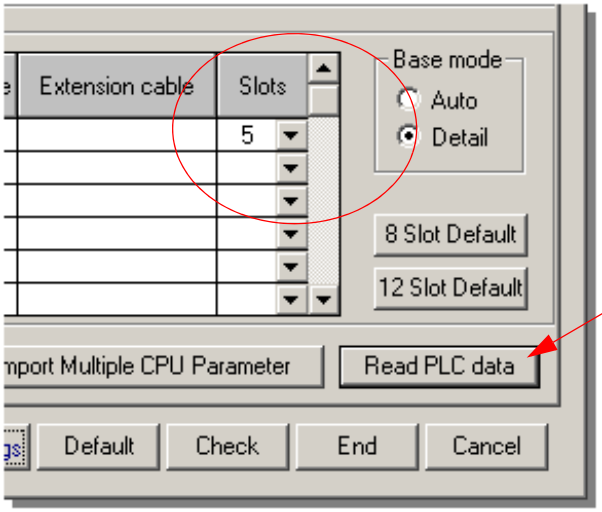
Typically, those values are set by the PLC programmer and reflect a specific configuration. Also, if more than one QCPU is in the rack, each QCPU must have the same multiple CPU parameter settings.

7. Click **End**.

   The Qn(H) Parameter window re-appears.

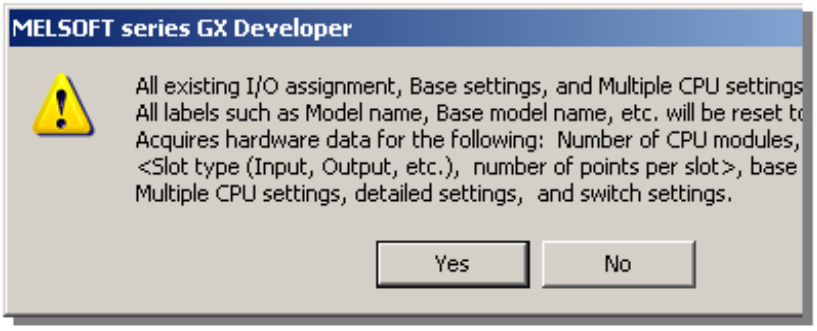
8. Select the **I/O assignment** tab.

Under the **Base setting (*)** section, make sure the slot number (in this case 5) reflects the number of slots on the rack.



9. From the bottom of the **I/O assignment** tab, click **Read PLC data**.

   A message similar to the following appears.

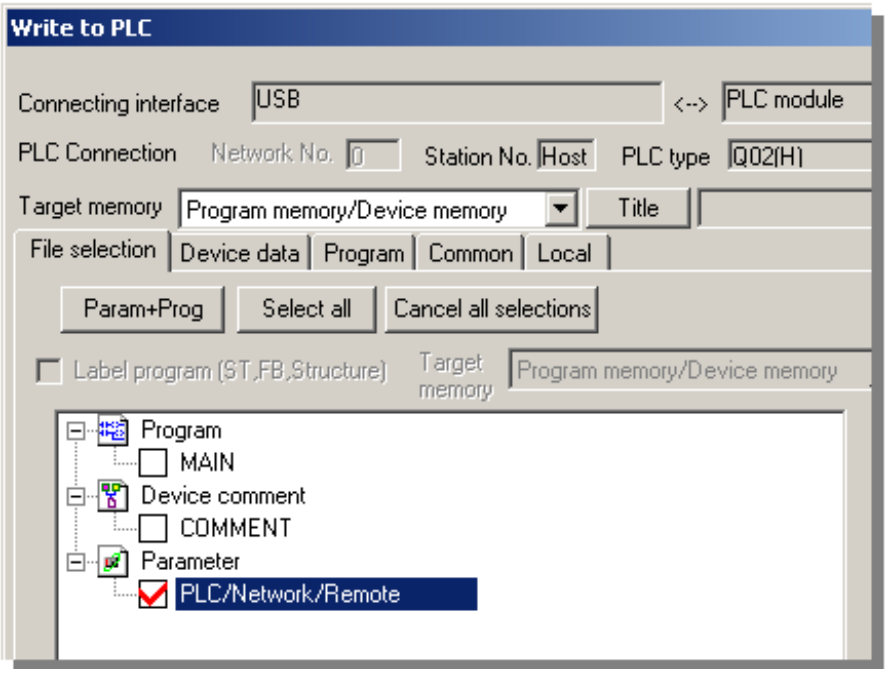


10. Click **Yes**.
11. From the bottom of the **I/O assignment** tab, click **Check** and then click **End**.

    The next step is to write the parameters to the QCPU.

12. From the menu bar, click **Online**, and then click **Write to PLC**.

The Write to PLC window appears.



13. Expand **Parameter**, select the **PLC/Network/Remote**, and then click **Execute**.
14. A message might appear saying the parameters already exist. Click **Yes all (A)**.

    A progress bar will appear briefly.
15. A completed message will appear. Click **OK**.
16. Click **Close**.

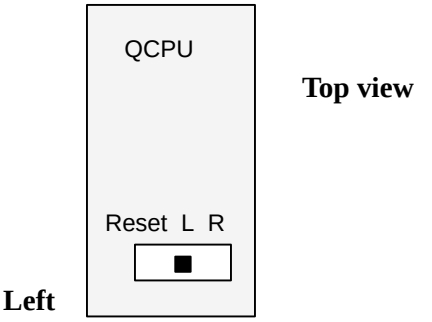
You are returned to the GX Developer main window.

The final step is to reset the PLC so that eMES I/F module retrieves the multiple CPU parameters from the QCPU.

Step 3: Retrieving the multiple CPU configuration

In order for the eMES I/F module to be able to retrieve the multiple QCPU data, you must reset the QCPU module as follows:

1. Open the cover at the top of the QCPU to expose the LED settings and controls for the module.
2. On the **Reset** panel, the reset button should be in the middle position:



3. Move the reset button from the middle position to the left position, and then hold 2 seconds.
4. Return the reset button to the middle position. Wait 5 seconds.
5. Move the reset button from the middle position to the left position, and then hold 10 seconds.
6. Return the reset button to the middle position.

The following LED conditions will occur:

Component	LED	Indicates
QCPU	**MODE** is steady green	There is power between the QCPU and the rack.
QCPU	**RUN** is steady green	QCPU and eMES I/F module have the same parameters.
eMES I/F module	**RDY** is steady green	QCPU and eMES I/F module have the same parameters.

You are ready to install the Workbench.

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2 Installing the Workbench

The Workbench is a tool used to configure transactions and triggers and manage all aspects of the eMES I/F environment.This chapter will walk you through the installation of the Workbench and then describe initial administration tasks such as adding license keys and changing the default name of the eMES I/F module.

Assumptions

Before you begin, the following is assumed:

- An eMES I/F module was installed on the rack of a Mitsubishi Q Series logic controller.
- You received a Workbench license key from Mitsubishi.
- You have the default user ID and password for the Workbench.

Installation process

You must install the Workbench on a computer that has TCP connectivity to the eMES I/F module. Follow these steps:

1. Insert the eMES I/F Workbench compact disc into the CD-ROM drive.

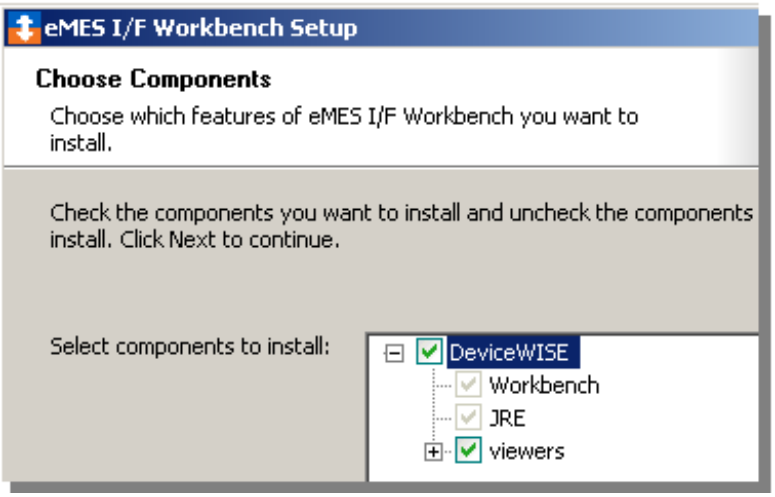
   The eMES I/F Workbench welcome screen appears.

2. Click **Next**.

   The License Agreement screen appears.

3. Read the terms of the license, and then click **I Agree**.

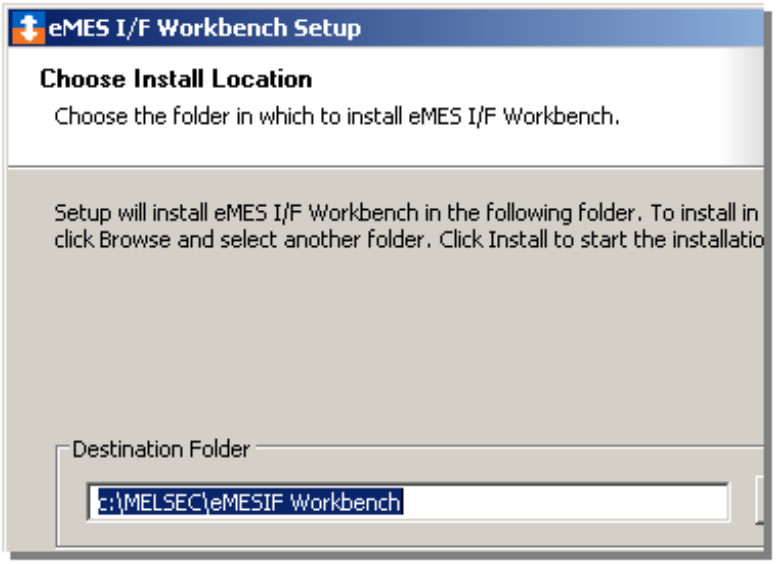
The **Choose Components** screen appears.



4. Accept the defaults, and then click **Next**.

   The **Choose Components** screen lets you install the latest Java Runtime Environment (JRE), the Workbench, and the optional TCP Receiver Client program. For more information, see *Using the TCP Receiver Client* on page 36.

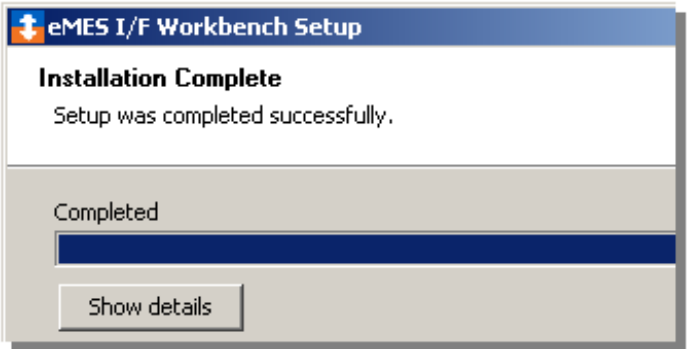
The **Choose Install Location s**creen appears.



5. Accept the default destination folder or click **Browse** to select a different folder, and then click **Install**.

   An **Installing** screen appears that shows you the progress of the eMES I/F installation.

   When installation is complete, a screen similar to the following appears.



6. Click **Next**.

7. A message will ask you if you want to create a desktop shortcut for all users. Click **Yes**.
8. Another screen appears that tells you the eMES I/F Workbench installation was successful. click **Finish**.

You are now able to start the Workbench. The first time you start the Workbench, you must have a license key.

Obtaining eMES I/F license keys

The eMES I/F product requires license keys. You must request four (4) license keys from Mitsubishi. For more information, see:

- *Requesting the Workbench license* (next).
- *Requesting runtime, enterprise, and device driver licenses* on page 16

Requesting the Workbench license

The Workbench license key is installed the first. All subsequent keys are installed using the Workbench's Administration feature.

When you request the license key for the Workbench from Mitsubishi, you must provide Mitsubishi with a physical address (sometimes referred to as the MAC address) of the configured Ethernet adapter in the computer running the Workbench. On Windows computers, the physical address can be found as follows:

1. At a Windows command prompt, type:

   ipconfig /all (and press Enter)

   The address is identified by the Physical Address line.
2. Send the information to your Mitsubishi representative.

Requesting runtime, enterprise, and device driver licenses

You must request these three (3) license keys from Mitsubishi:

- Runtime license key — this license is required in order to execute triggers, enable OPC XML servers, and more.

- Enterprise license key — this license identifies the enterprise systems that the eMES I/F module can access such as an IBM WebSphere MQ queue or an IBM DB2 database table.
- Device driver license — this key supports the MELCO drivers that are associated with Mitsubishi Q Series logic controllers.

You will not be able to request the runtime, enterprise, or device driver license keys until after you start the Workbench. For more information, see *Getting the MAC address of the eMES I/F module* on page 25.

For information about adding these license keys, see *Adding runtime, enterprise, and device driver license keys* on page 27.

Starting the Workbench the very first time

This section describes how to start the Workbench the first time. The Workbench requires a license key. If you do not have the license key, contact your Mitsubishi representative. The Workbench license key will be similar to the following:

```
################################################
NXABASOB-QV66DZLM-TG6LT3SW
################################################
```

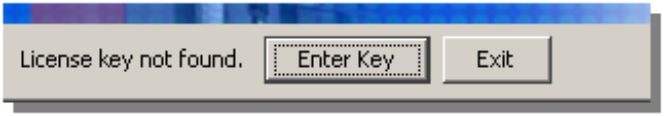
To start the Workbench:

1. From the Windows **Start** menu, click **All Programs** > **MELSOFT Application** > **eMES I/F Workbench**.

   There is another way to start the Workbench on Windows. During installation, an eMES I/F Workbench icon was placed on your desktop. You can double-click that icon to start the Workbench.

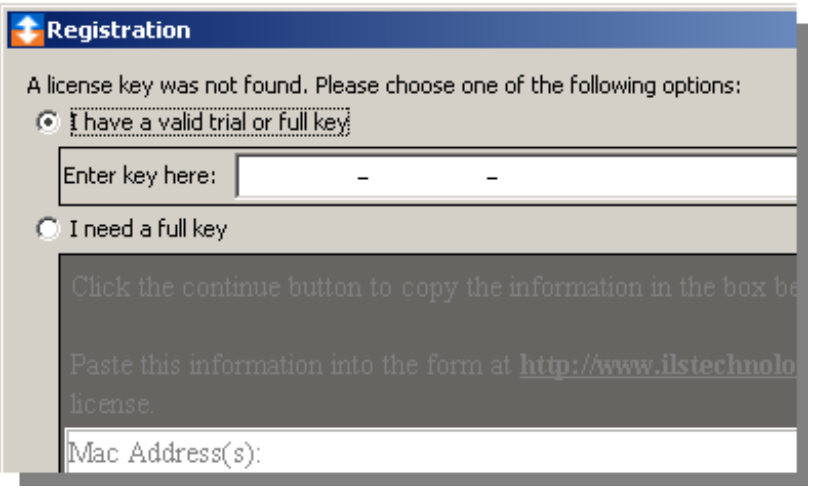
A window similar to the following appears.

A message at the bottom of the window will tell you that the license key was not found. You cannot use the Workbench unless you add this license key.

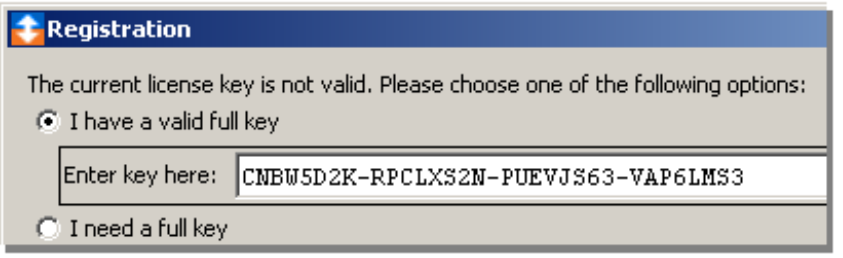


2. Click **Enter Key**.

A registration window appears.

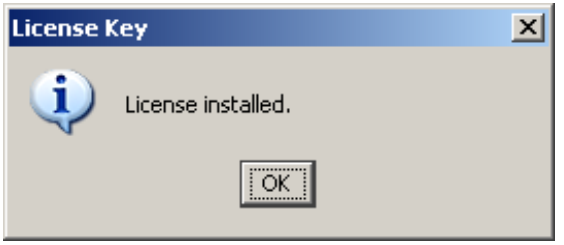


3. Copy the key information that was sent to you by Mitsubishi.
4. Make sure the **I have a valid trial or full key** option is selected, and then paste the key that you copied into the **Enter key here** box.



5. Click **Continue**.

   A message appears that tells you the license was installed.



6. Click **OK**.

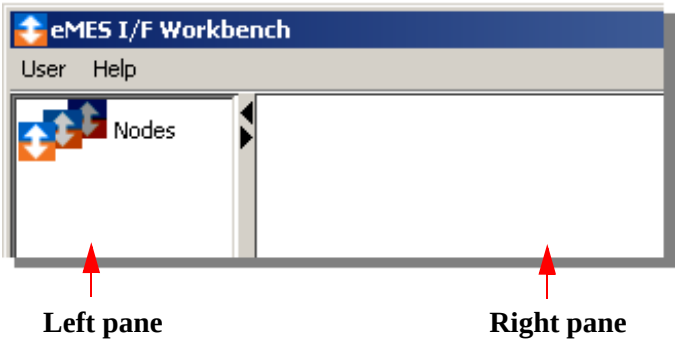
   The Workbench logon window appears.

7. At the bottom of the window, type your user name and password, and then click **Logon**.

The default user name is **admin**, and the default password is **admin**. For security purposes, you should change the default password. For more information, refer to the eMES I/F User's Guide.

User name and password are case-sensitive. For example, if your password is mypassword and you type MYPASSWORD, the Workbench will deny you access when connecting to the selected eMES I/F module.

The Workbench window appears.



The very first time you start the Workbench, the right pane might be blank. You will have to scan the network for eMES I/F modules.

Scanning the network for eMES I/F modules

The first time you log on to the Workbench, you might not see any eMES I/F modules in the **Nodes** list. You will have to scan the network.

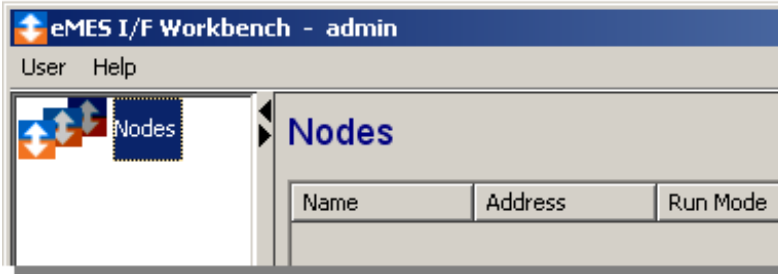
Information in this section is based on the following assumptions:

- One or more eMES I/F modules is installed on the rack and configured to run on the network. For more information, see *Installing the eMES I/F module* on page 1.
- Your system administrator gave you the subnet address for the network. (There might be more than one subnet address.)

To scan the local network for eMES I/F modules:

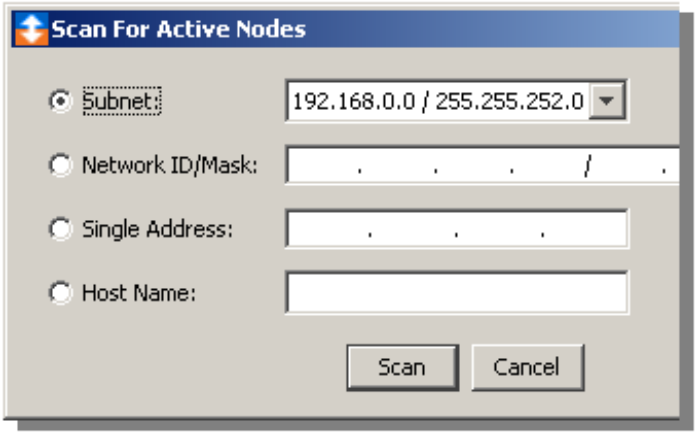
1. From the Workbench left pane, click the **Nodes**.

   The Nodes window appears as the right pane.



2. From the bottom of the Nodes window, click **Scan**.

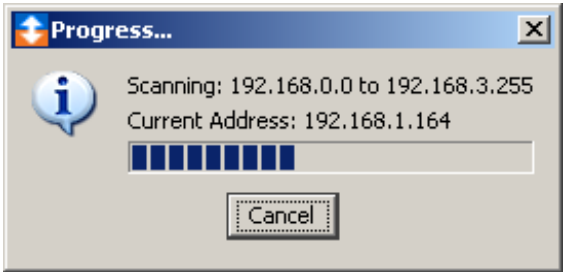
The Scan for Active Nodes window appears. The window defaults to the subnet addresses that you are connected to.



3. Accept the default subnet address, and then click **Scan**.

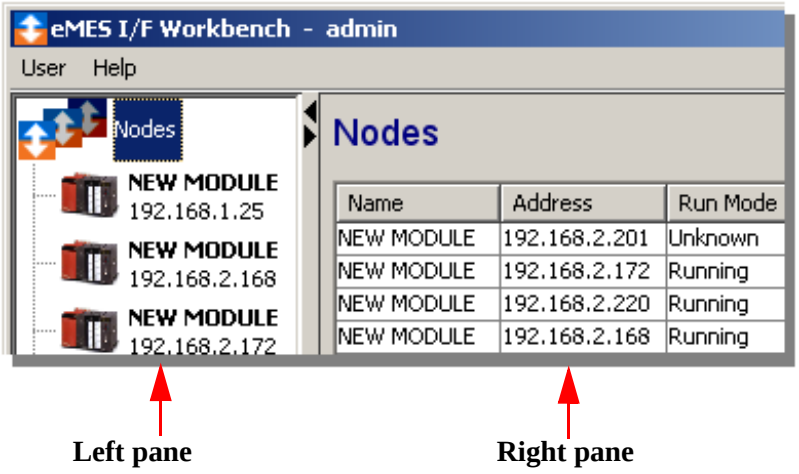
If you are connected to more than one network, click the down-arrow, select the subnet address, and then click **Scan**.

A progress indicator similar to the following appears.



eMES I/F will search for all of the IP addresses 1-255 within a subnet address.

When all modules are located, a window similar to the following appears. For this example, four eMES I/F modules were located.

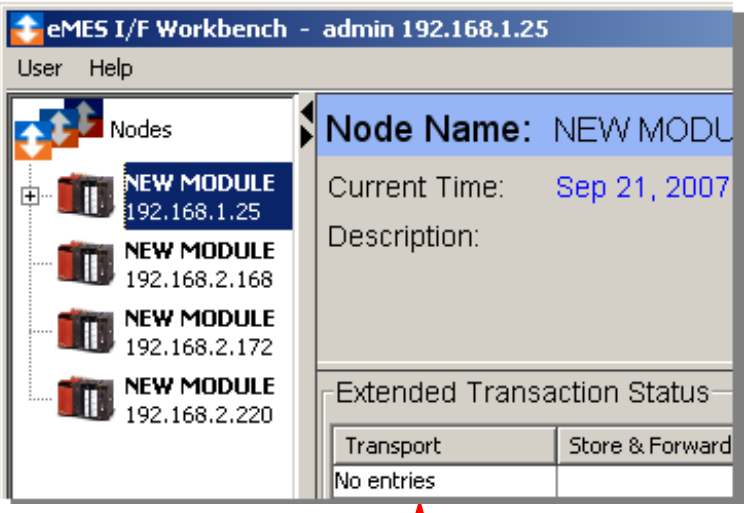


The **right pane** provides a summary and status of the module.

Graphics that represent eMES I/F modules that are configured with the subnet address on the local network appear in the **left pane.** Each module has a name and IP address. You can change the name of the module using the **Node Administration** tab. For more information, see *Changing the name of the module* on page 29. You can change the IP address of the module using the **Network Configuration** tab. For more information, see *Changing the factory settings* on page 31.

Now that you have located all the modules on the subnet, the next step is to connect to a specific eMES I/F module.

4. From the **left pane**, click the eMES I/F module.



eMES I/F checks to see if you are an authorized user for this module. When your credentials are authenticated, the status window for the module appears as the default **right** pane. At this point, you are connected to the specific eMES I/F module.

Your first set of tasks is to add required licenses and change the default eMES I/F module settings.

Initial eMES I/F module administration

When the eMES I/F module is first installed there are settings that you will want to change such as the name of the module, the time set on the module, and the factory configured IP address. You must also add the license keys in order to configure triggers and transactions and transmit data to an enterprise system.

Getting the MAC address of the eMES I/F module

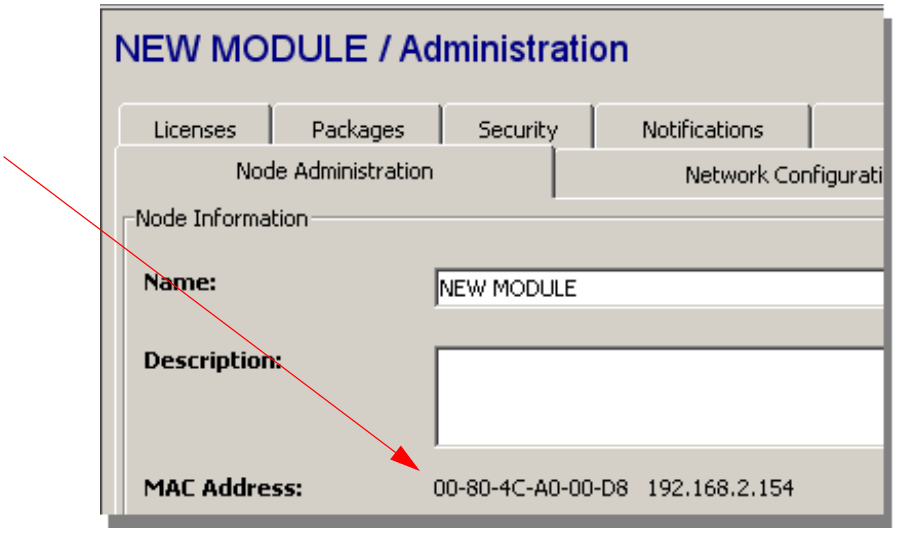
The physical address of the eMES I/F module is referred to as the MAC address. The following provides the process for obtaining the MAC address and ultimately receiving the activation key code.

1. From Workbench left pane, expand the eMES I/F module whose MAC address you want to obtain.

2. Click the **Administration** icon.

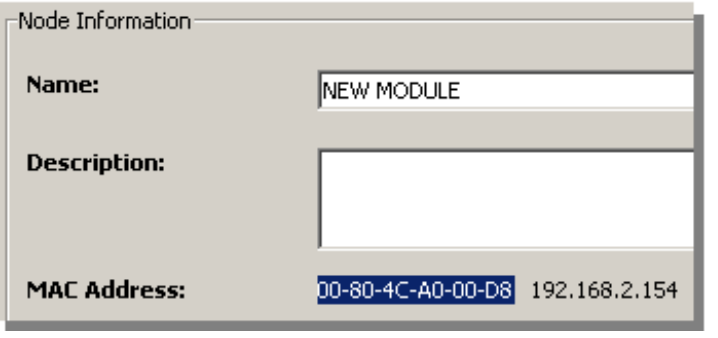
   The **Administration** window appears.

3. Click the **Node Administration** tab.



4. Record the 12-digit address that appears next to **MAC Address**.

   You can also select, copy, then and paste the numbers.



In order to acquire the license activation key codes for the runtime, (the appropriate) enterprise, and device driver licenses, requires that you send Mitsubishi Electric Corporation an e-mail along with the MAC address of the eMES I/F module.

When Mitsubishi receives the MAC address, you will receive back an activation key code for the licenses. The activation key code is used in conjunction with the **License Management** tab where you use the key

code to activate the specific software support. For more information, see *Adding runtime, enterprise, and device driver license keys* (next).

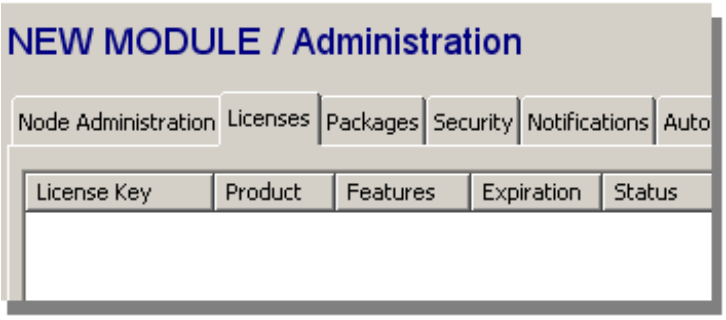
Adding runtime, enterprise, and device driver license keys

Prior to using the **License Management** tab, you must have completed the steps in *Getting the MAC address of the eMES I/F module* on page 25. In addition, you should have received or downloaded the license activation key codes from Mitsubishi.

Follow these steps to add the license keys for the runtime, enterprise, and device driver support.

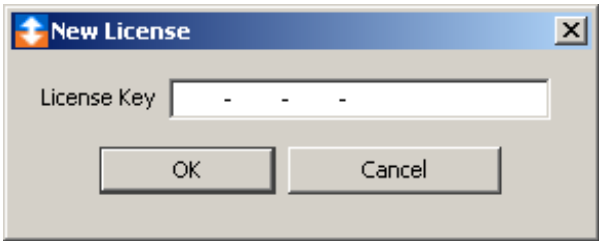
1. From Workbench left pane, expand the eMES I/F module that you want to add the licenses to.
2. Click the **Administration** icon.

   The Administration window appears as the right pane.
3. Click the **Licenses** tab.

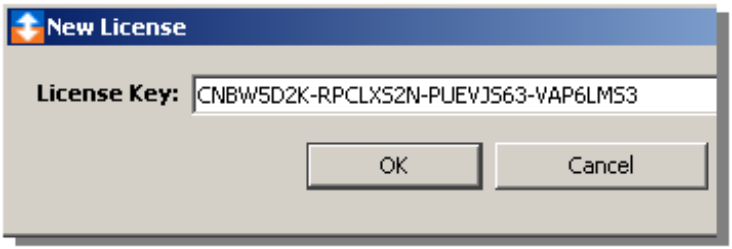


   The tab is empty because no license keys have been added.
4. From the bottom of the **Licenses** tab, click **New**.

The New License window appears.



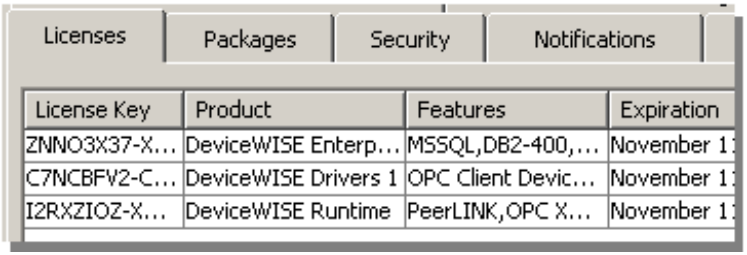
5. In the **License Key** box, type the license key code, and then click **OK**.



You can also copy and then paste the license key.

6. Repeat steps 4 and 5 for each additional license.

Appropriate information appears on the **Licenses** tab.



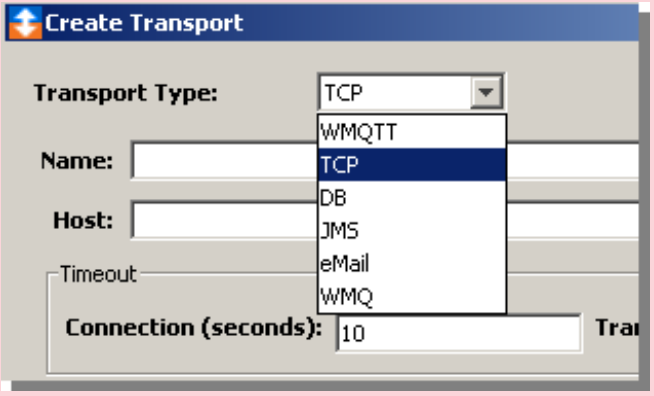
For this example, there are three licenses. The enterprise license supports multiple enterprise protocols including IBM DB2 and IBM WebSphere MQ.

To verify that the enterprise license was added:

1. From the Workbench left pane, select **Transports**, display its pop-up menu, and then click **New**.

   The Create Transports window appears.

2. From the **Transport Type** drop-down list. You should see the appropriate protocols.



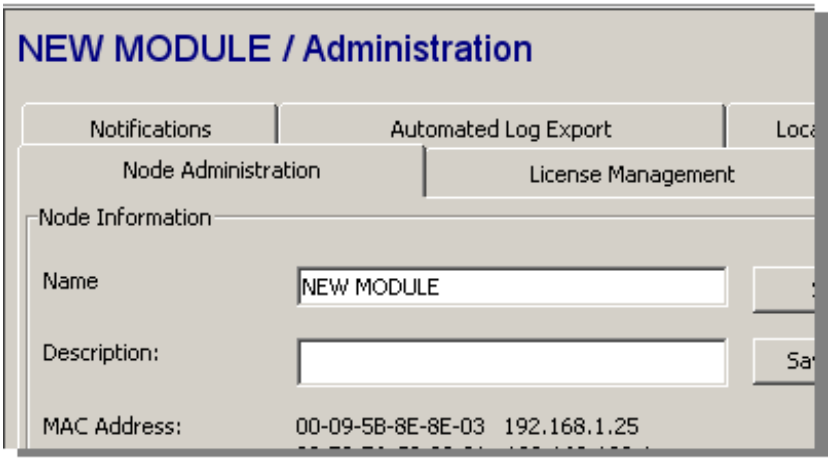
Changing the name of the module

The default name for every eMES I/F module is **NEW MODULE**. The first step when setting up an eMES I/F module might be to change the default name to a more meaningful name. Follow these steps:

1. From Workbench left pane, expand the eMES I/F module whose name you want to change.
2. Click the **Administration** icon.

   The Administration window appears as the right pane.

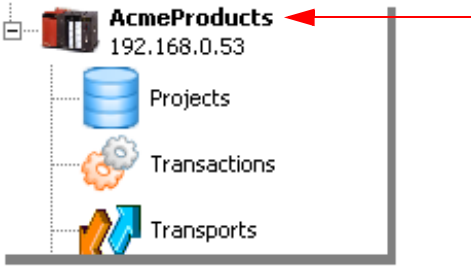
3. Click the **Node Administration** tab.



4. In the **Name** box, type a new name. For this example, *AcmeProducts*.The module name can have up to 32 characters and include letters, numbers, and the underscore character. Spaces are not allowed.

5. Click **Save Name**.

   The name is immediately changed on the left pane.



The next step is to change the general network settings for the new module.

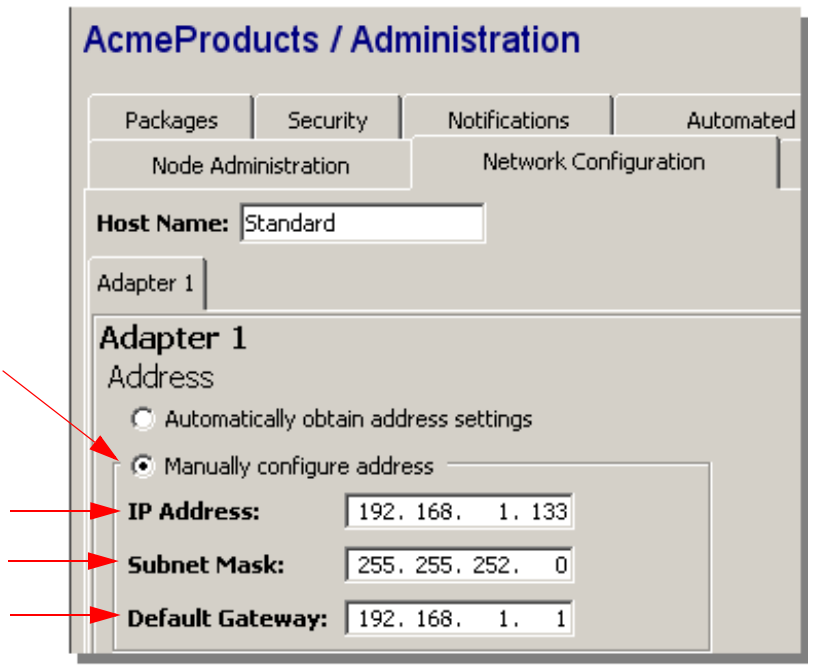
Changing the factory settings

The eMES I/F module ships with its DHCP option set to automatically obtain its network setting. You must change this default IP address to the appropriate value in your network.

1. From the **Administration** window, click the **Network Configuration** tab.

   By default, the **Automatically obtain address settings** option is selected. This means that the eMES I/F module is set to automatically obtain the network settings.

2. To set the network settings that the IT administrator has supplied you, select the **Manually configure address** option.



3. Type the IP address, subnet mask, and default gateway address, and then click **Save Configuration**.

   For information about other network settings such as host name and DNS server, see the eMES I/F User's Guide.

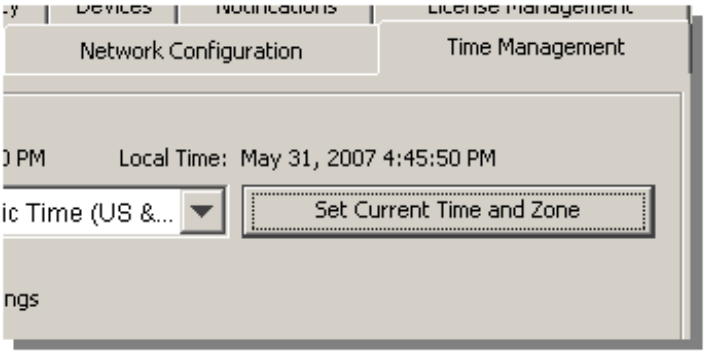
Now that you have established network communication for the module, the last step is to set the date and time.

Setting the time and date

To set the current date and time on the eMES I/F module:

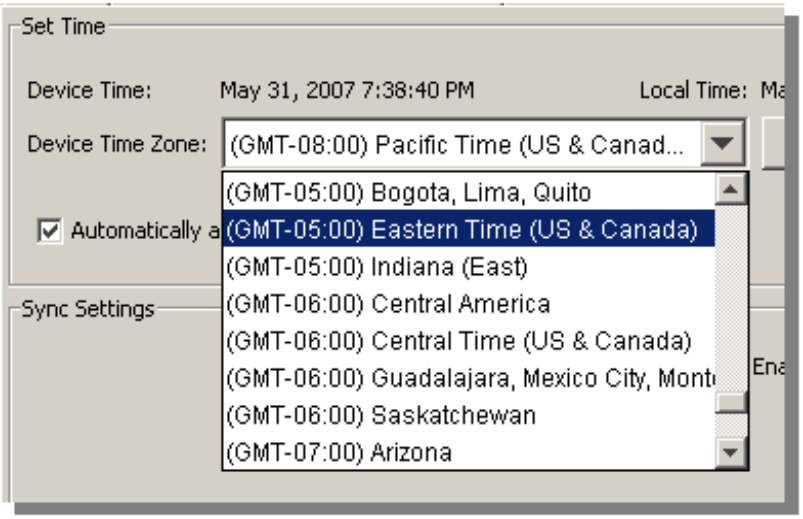
1. From the Administration window, click the **Time Management** tab.

   A tab similar to the following appears.



   You can set the current date and time on the eMES I/F module, and then synchronize the time with other eMES I/F modules on the network.

2. Next to **Device Time Zone**, click the down-arrow to select the time zone where the eMES I/F module is located.



3. To save the time zone in the eMES I/F module, click **Set Current Time and Zone**.

4. A message will tell you the current time zone that was set. Click **OK**.

   You will have reboot the eMES I/F module for changes to take effect.

   If you want to use additional parameters on the **Time Management** tab, see the eMES I/F User's Guide.

You are ready to start creating triggers. However, before you begin, it is recommended that you test the installation and configuration of your eMES I/F environment. Go to *Verifying the installation* on page 35.

❖❖❖

3 Verifying the installation

This chapter provides the process for creating a simple trigger to test the communication between the newly installed eMES I/F module and a simulated enterprise TCP application.

This chapter describes how to create and then start a trigger that uses your computer's built-in TCP protocol. You will be able to test the messages generated by the trigger using the TCP Receiver Client program that was installed when the Workbench was installed. No protocol licensing is required.

In order to test your eMES I/F setup, the following must occur:

- Step 1: Start the TCP Reviewer Client program. See *Using the TCP Receiver Client* on page 36.
- Step 2: Create a TCP transport using the IP address of the computer where the TCP Reviewer Client resides. See *Defining the TCP transport* on page 37.
- Step 3: Create a transaction using the TCP transport that you created in Step 2. See *Building the transaction* on page 40.
- Step 4: Create a trigger that uses the transaction that you created in Step 3. See *Creating a scheduled trigger* on page 49.

Assumptions

Before you begin, make sure the following has occurred:

- You installed an eMES I/F module on the rack of a Mitsubishi Q Series controller.
- You installed the Workbench on a computer that has TCP connectivity to the eMES I/F module.

- The Workbench was previously started and you have a user ID and password.

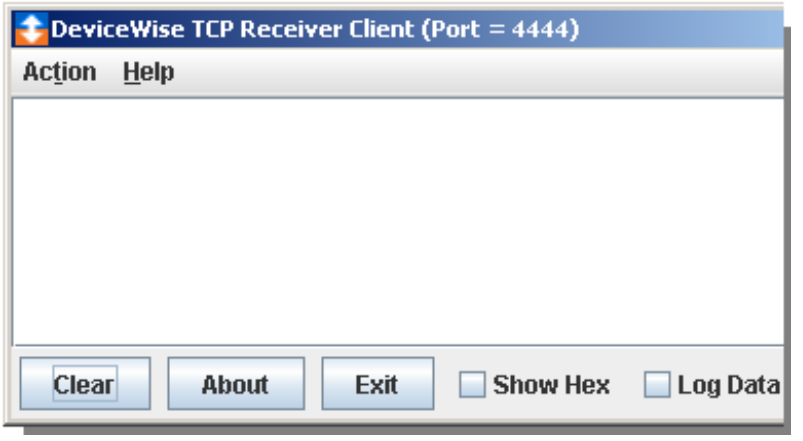
Using the TCP Receiver Client

When you install the Workbench, you also installed the TCP Receiver Client. The TCP Receiver Client is a program that lets you display output messages from a trigger event. The program uses standard TCP/IP network protocol as the transport. A trigger configured with a TCP transport must be started in order to use the program.

To start the TCP Receiver Client:

1. From the Windows **Start** menu, click **All Programs** > **MELSOFT Application** > **Viewers** > **TCP Receiver**.

   The TCP Receiver Client window appears.



   Notice **Port = 4444**. You will need this port number when creating the transport.

2. Minimize the program.

Defining the TCP transport

Transmission Control Protocol/Internet Protocol (TCP/IP) is the most popular protocol and the basis for the Internet. Its routing capabilities provide maximum flexibility in an enterprise-wide network.

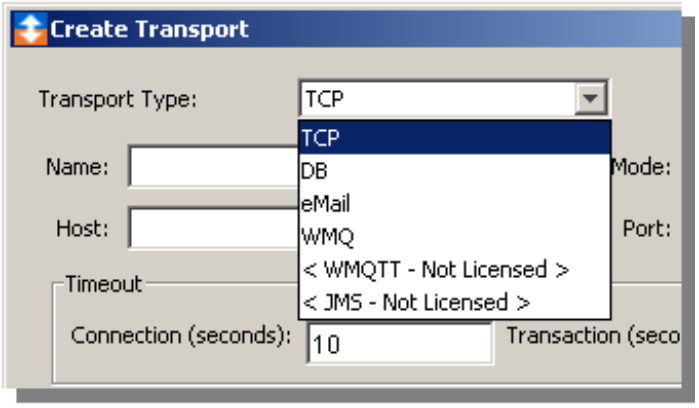
Before you begin to create a TCP transport, the following is assumed:

- The TCP Receiver Client program is running on your local computer.
- The Workbench is started and you have logged on.

You can create a transport that contains an IP address and port number that a message is sent to. For this example, the TCP Receiver Client program on your local computer is the enterprise application.

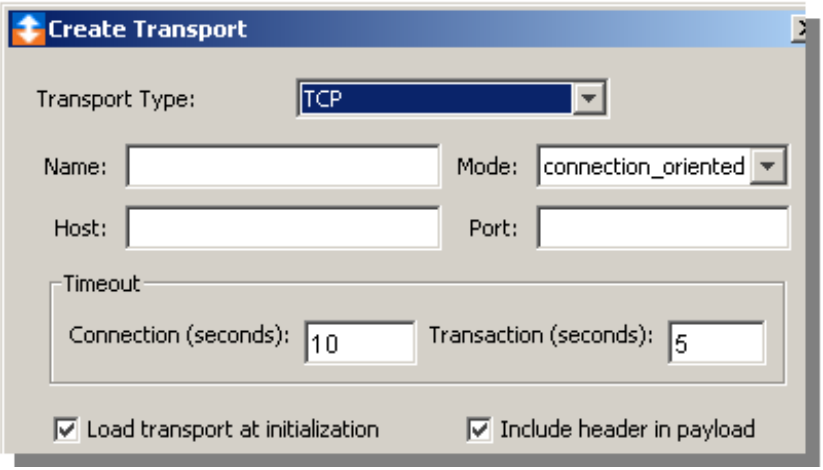
1. From the Workbench left pane, expand the eMES I/F module that you want to associate the new transport with.
2. On the **Transports** icon, right click to display its pop-up menu, and then click **New**.

   The Create Transport window appears.
3. Next to **Transport Type**, click the down-arrow, and then select TCP.



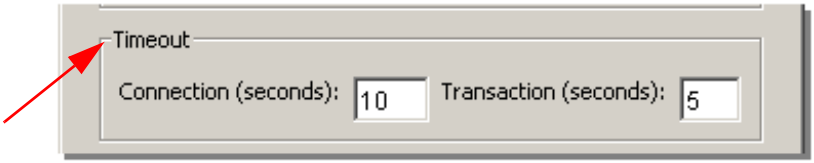
The TCP and e-mail protocols are included free with each eMES I/F module. Other protocols such as relational databases and message queuing systems are turned on using a licence activation key.

The Create Transport window changes to accommodate a TCP transport.



4. In the **Name** box, type *MyTCPTransport*. This will be the unique name for the transport. You will not be able to type invalid characters. For example, spaces are not allowed. You will not be able to insert a space in the name.
5. In **Mode** box, accept the default **connection-oriented**. For more information, refer to the eMES I/F User's Guide.
6. In the **Host** box, type the IP address or host name of the computer where you want the messages sent. For this example, this is the IP address where the TCP Receiver Client program is running.
7. In the **Port** box, type the port number of the computer where you want the messages sent. For this example, use the port number 4444.

   The **Timeout** section provides values that affect connection times.



8. Accept the default value for each **Timeout** parameter.

The **Connection** timeout parameter defaults to 10 seconds and specifies the length of time the system will try to connect to a target computer (where the associated TCP program is running). If the connection is not made in the specified time period, an error message is sent to the exception log. This connection is tested when you click **Validate**.

The **Transaction** timeout parameter defaults to 5 seconds and specifies the amount of time the eMES I/F module should wait (once the connection is made) for a TCP transaction to complete. The time value should be the outer limit for how long you expect a typical transaction to take using a transport.

9. Select the **Load transport at initialization** check box to have the transport connect to the host as soon as the eMES I/F module boots up.

By default, a transport is down until it processes a transaction.

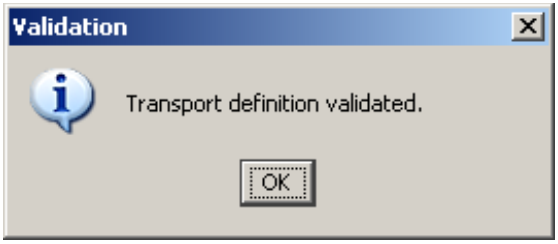
10. Make sure the **Include header in payload** check box is selected.

Now that you have filled in the appropriate value for each parameter, you must validate the connection, and then save your work.

11. Click **Validate**.

The Workbench tests the connection to the TCP Receiver Client.

12. A message will tell you whether or not the validation was successful. Click **OK**.



13. If no errors are received, click **Save**.

The new transport is saved to the eMES I/F module and added the Transports window.

The next step is to build the transaction.

Building the transaction

A transaction is specified as an action that is executed whenever a runtime event occurs. At that time, the trigger that is associated with the transaction performs several operations including the building of a runtime payload per the input map specification.

The transaction for this example is comprised of its name, a previously defined TCP transport, an input map and payload.The transaction will be specified within a trigger as an action to be executed whenever the scheduled event occurs.

Before you begin to build the transaction, the following is assumed:

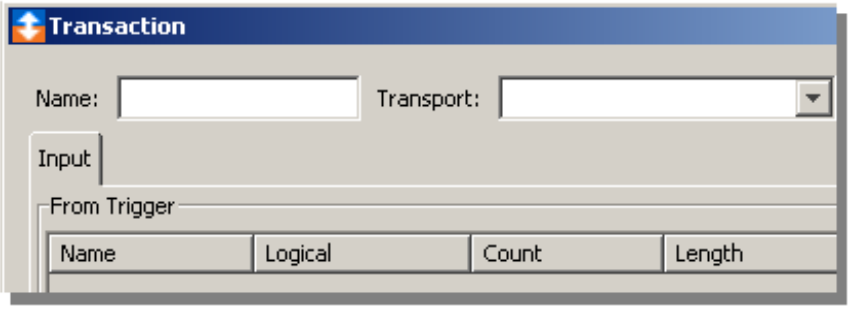
- The TCP transport was defined.
- The Workbench is started and you have logged on.

1. From the Workbench left pane, expand the eMES I/F module that you want to add the transaction to.

2. On the **Transactions** icon, right-click to display its pop-up menu.

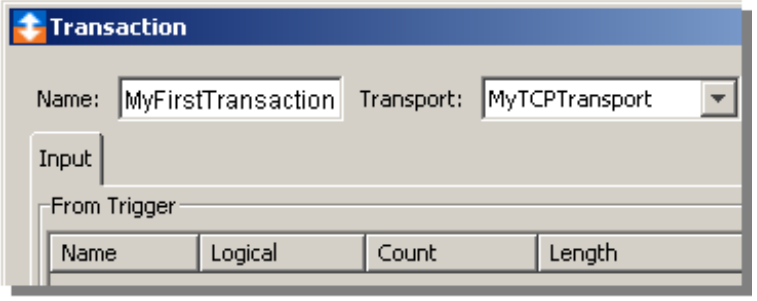
3. Click **New**.

   The Transaction window similar to the following appears.

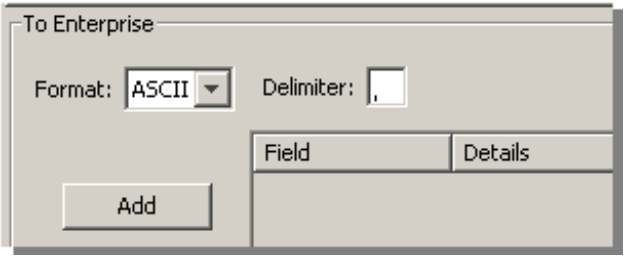


4. In the **Name** box, type *MyFirstTransaction* as the unique name for the transaction. A transaction name can be up to 32 characters and include letters, numbers, and the underscore character. Spaces are allowed. You will not be able to type invalid characters.

   From the **Transport** drop-down list, select the transport you created on page 37. For this example, MyTCPTransport.

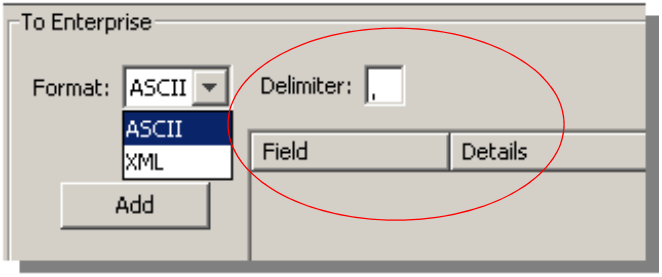


The following shows the **To Enterprise** section of the Transaction window when a TCP transport is selected.



Now that you have specified the transport, you can add the payload.The first step when adding a payload is to identify the format of the message.

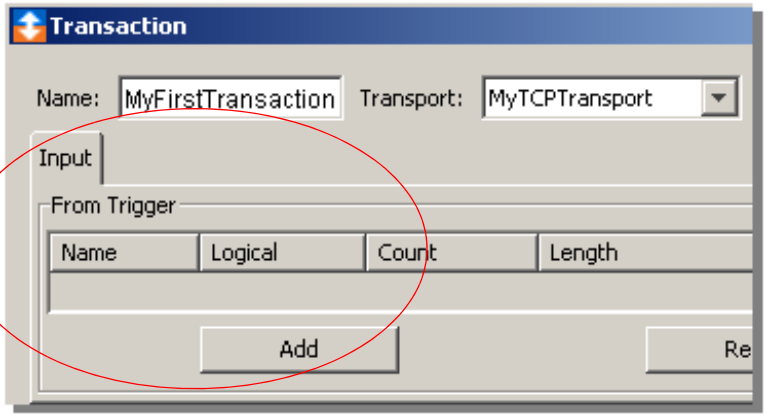
5. Under the **To Enterprise** section, click the **Format** down-arrow, and then select **ASCII**.



6. The **Delimiter** box becomes available. The **Delimiter** box defaults to a comma that is used to separate each ASCII element in a message. Accept the default comma.

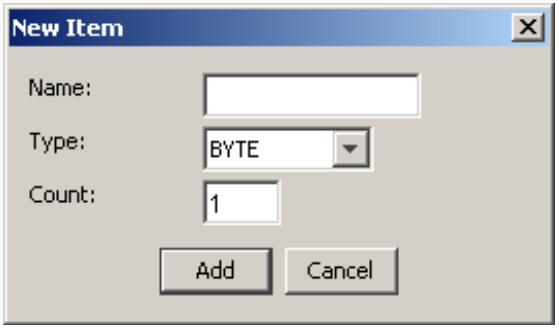
   After you specify ASCII as the format, you must create the map variables, and then specify the ASCII payload values.

7. Go to the **Input** tab at the top of the Transaction window.



8. Click **Add**.

   The New Item window appears.

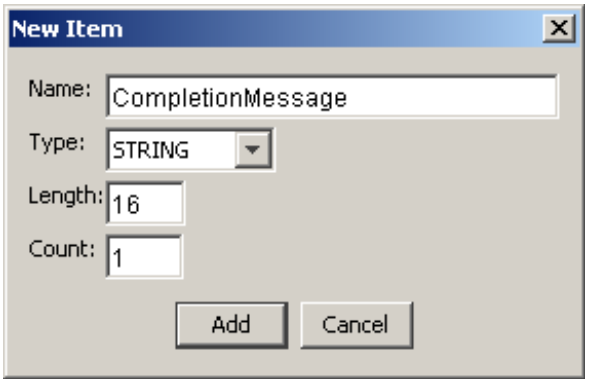


9. In the **Name** box, type *CompletionMessage* as the name for the map variable.

   The name can be up to 32 characters and include letters, numbers, underscore, dash characters, and spaces. Special characters such as < > ’ (single quotation) " (double quotation) are not allowed.

10. Click the **Type** down-arrow to display a list of supported data types, and select the data type that you want assigned to the name. For this example STRING.

The New Item window changes to accommodate the string data type.

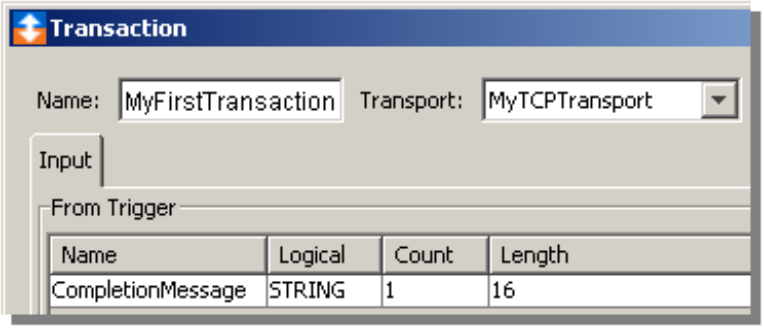


11. In the **Length** box, change the value for the string to 16.
12. In the **Count** box, accept the default 1. The value specifies the dimension of the map variable (for this example a scalar).

> **Arrays**: If the data type were an array, you would change the value in the **Count** box to the number of elements in the array.

13. Click **Add**.

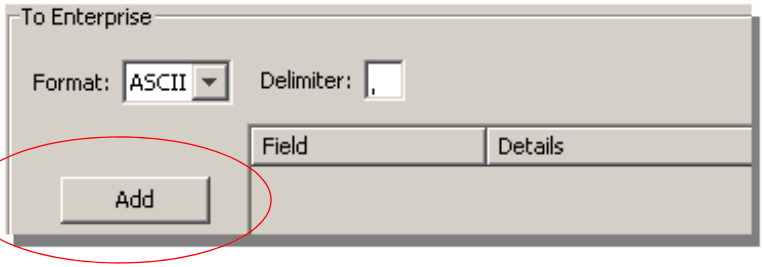
    A row appears on the **Input** tab with the information you added.



You can repeat the steps to add all required map variables appropriately. For this example, there is only one map variable.

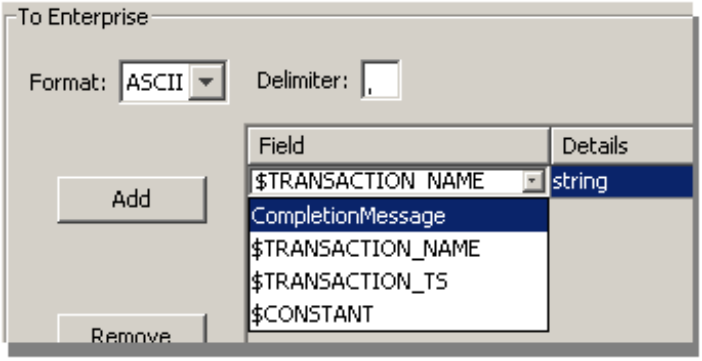
The next step is to create the payload.You must associate the map variable from the **Input** tab with a data item (or macro if appropriate) for the payload.

14. Go to the **To Enterprise** section of the Transaction window.



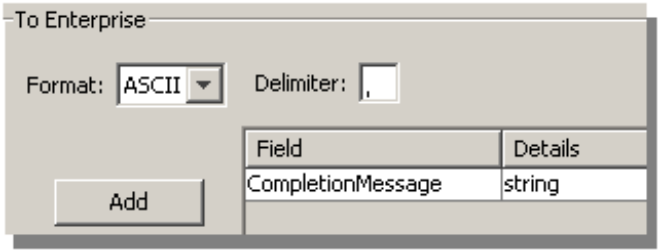
15. Click **Add**.

    The first row in the table becomes active.



16. Under **Field**, click the column to display a drop-down list, and then select the appropriate map variable (for this example, **CompletionMessage.**
17. Under **Details**, click the column to display a drop-down list, and then select the appropriate data type (for this example, **string**).

The completed **To Enterprise** section might look like this.



18. When you complete the transaction, click **Test**. If no errors are received, click **Create**.

    The new transaction is saved to the current eMES I/F module, and the name is added to the Transactions window.

The final step is to create a trigger and associate the map variable in the trigger action definition. However, before you can create a trigger, you must create a project.

Creating a project

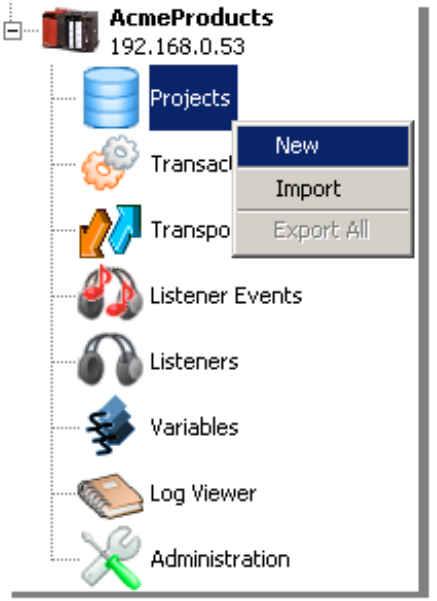
A project is simply a group of triggers. The grouping enables global operations that apply to all triggers in the project. For example, when the project is started, all triggers with a started status are also started; likewise, when the project is stopped, all started triggers are also stopped.

It is assumed that the Workbench is started and you have logged on.

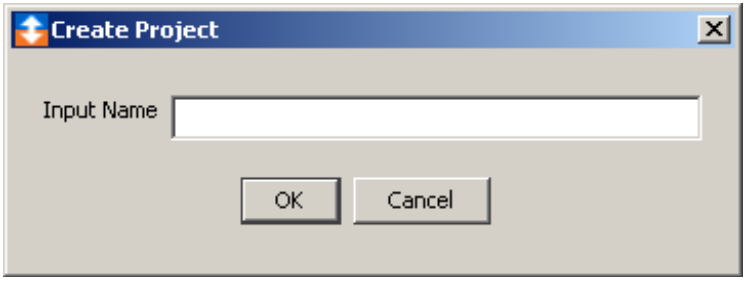
Follow these steps to create a project.

1. From the Workbench left pane, expand the eMES I/F module that you want to add a project to.

2. On the **Projects** icon, right-click to display its pop-up menu, and then click **New**.

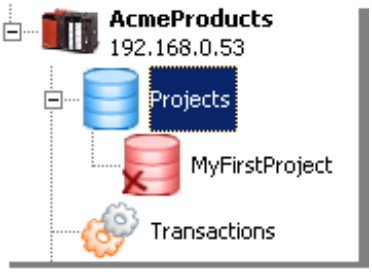


The Create Project window appears.



3. Type *MyFirstProject* as the name for the project, and then click **OK**. A project name can be up to 32 characters in length and can include letters, numbers, and the underscore character. Spaces are not allowed.

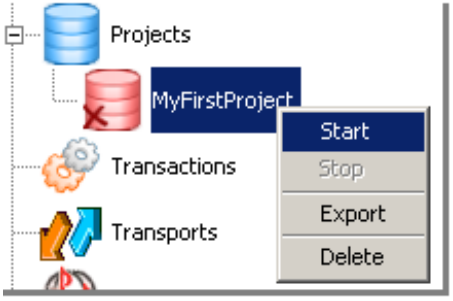
The name and new icon is added under the **Projects** icon (on the Workbench left pane.



The project name is also added to the Projects window.

The next step is to start the project.

4. Under the **Projects** icon, select the project, and then display its pop-up menu.



5. Click **Start**.

The project icon changes to a started state and a green check mark appears on the project.

You are ready to create the trigger.

Creating a scheduled trigger

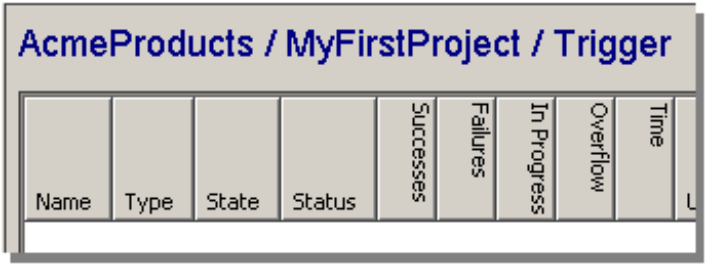
You can create a trigger to use for taking data samples at a known point in time. This type of trigger is referred to as a scheduled trigger. The trigger can be configured to automatically transfer data based on a time of day transaction type (such as hourly, first and last day of the month, on a specific day of the week, and a specific day of the month).

It is assumed that the Workbench is started and you have logged on.

To create a scheduled trigger, follow these steps:

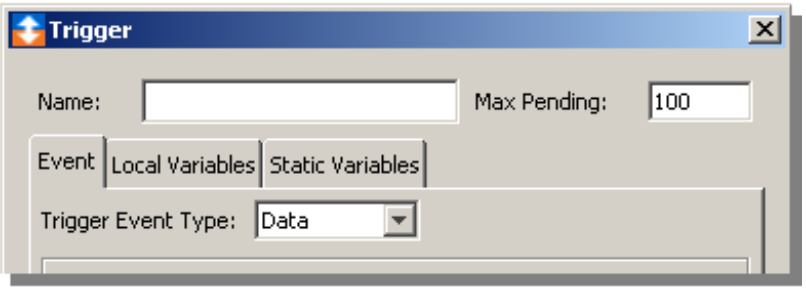
1. From the Workbench left pane, expand the eMES I/F module that contains your project.
2. Under the **Projects** icon, select **MyFirstProject**.

   The Trigger window appears.



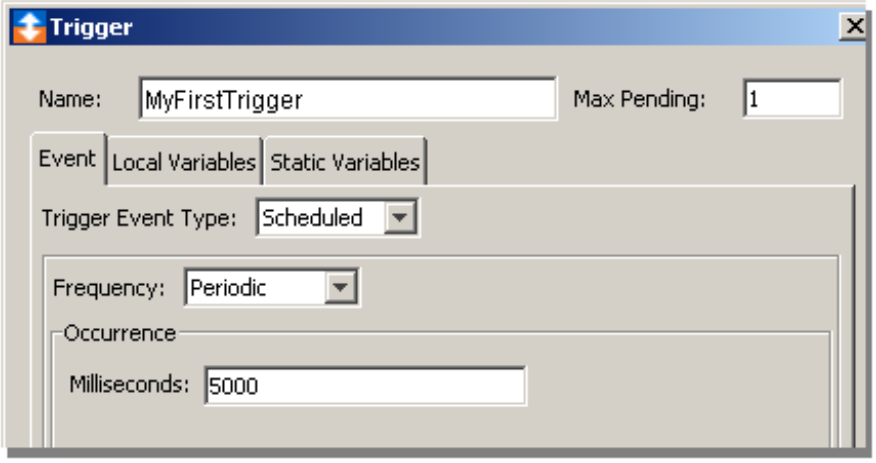
   For this example, the window is empty because no trigger has yet been created. However, typically the window contains a list of triggers that belong to the project.
3. From the bottom of the Trigger window, click the **New** button.

The Trigger window appears.



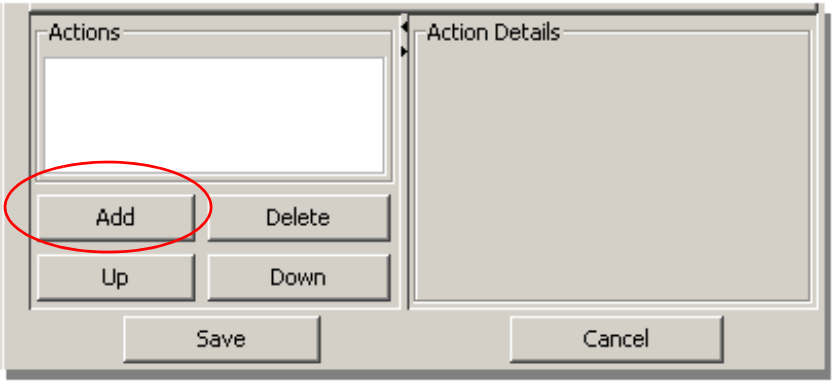
4. In the **Name** box, type *MyFirstTrigger* as the name for the trigger. A trigger name can be up to 32 characters and include letters, numbers, and the underscore character. Spaces are not allowed.
5. In the **Max Pending** box, accept the default value. The value indicates the number of triggers that can be instantiated before another trigger is allowed to start. For more information about the **Max Pending** parameter, refer to the eMES I/F User's Guide.
6. From the **Trigger Event Type** drop down-list, click **Scheduled**.

   The **Event** section becomes active with input parameters for the default **Periodic** time of day option.

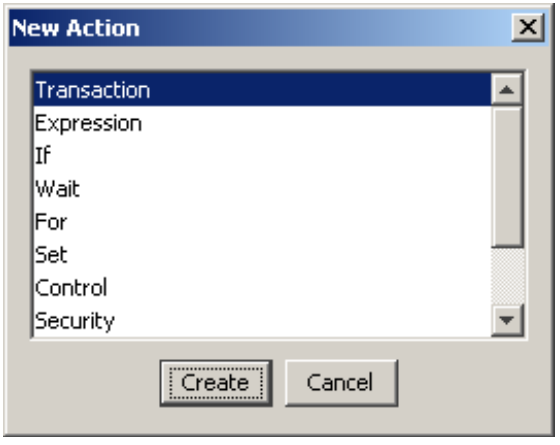


7. From the **Frequency** drop-down list, accept **Periodic** as the time of day option you want to use. The **Periodic** option sets a trigger to execute continuously at a specific millisecond interval.
8. Under **Occurrence**, in the **Milliseconds** box, type a value of 5000. This will set the trigger to execute every 5 seconds.

   The next step is to select an action for the trigger. This is the transaction that you created on page 40 (**MyFirstTransaction**).
9. From the bottom of the Trigger window under **Actions**, click **Add**.

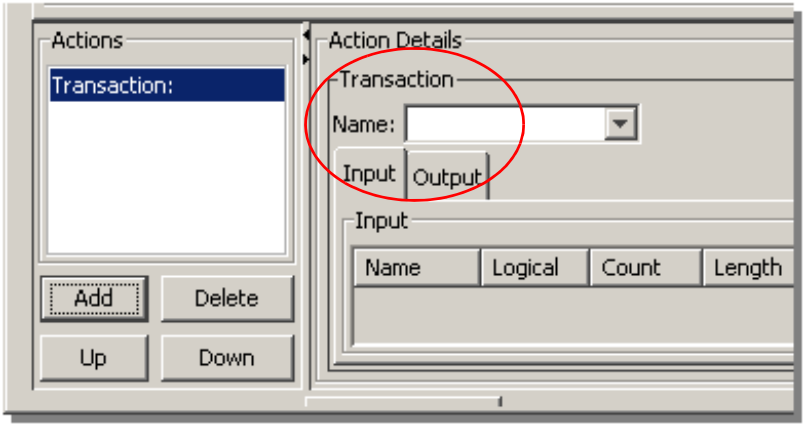


The New Action window appears.



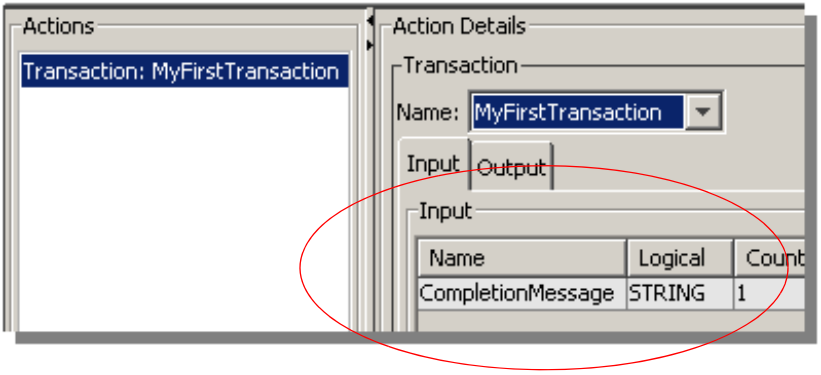
10. Select **Transaction**, and then click **Create**.

The window changes to accommodate your selection.



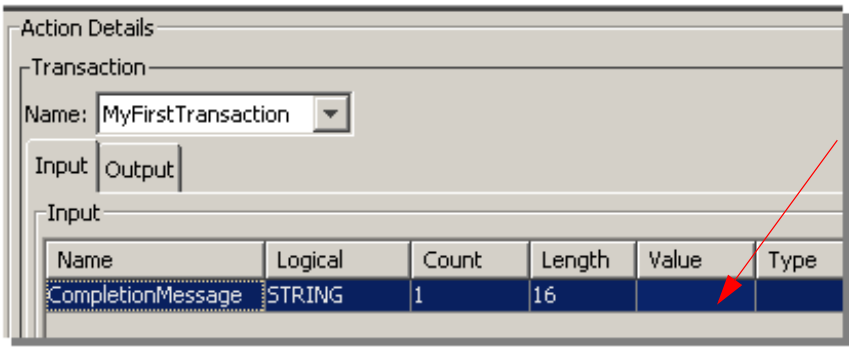
11. Under **Actions Details**, from the **Name** drop-down list, select **MyFirstTransaction**.

    The **Input** tab becomes populated with the name of the map variable from **MyFirstTransaction**.



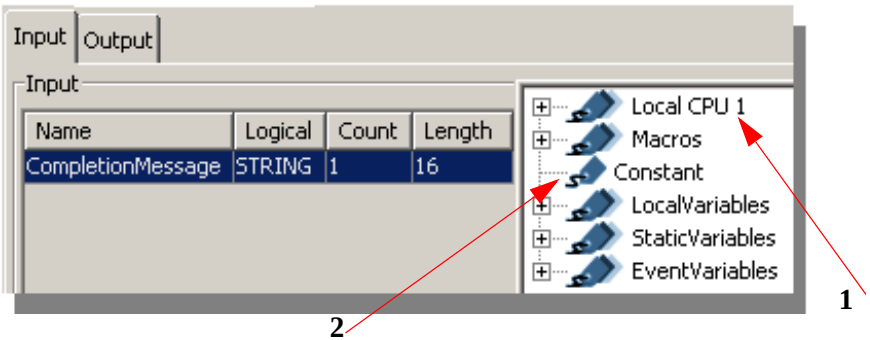
The next step is to associate the map variable with a predefined macro.

12. From the **Input** map, select the first row in the table.



13. Under the **Value** heading, click the right side of the **Value** column.

    A list of device variables, macros, and other system variables appear.

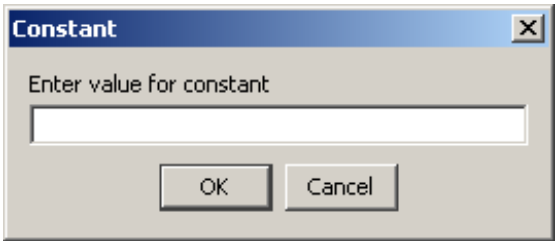


    1 Notice the **Local CPU 1**. This entry verifies that the runtime license was installed, and the eMES I/F module is started. Click the plus sign to see the device variables on the CPU.

    2 Notice the **Constant**. You will associate the map variable in the row with this Constant.

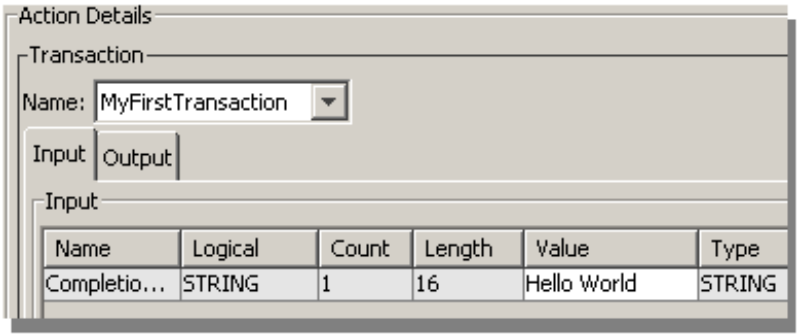
14. Select **Constant**.

The Constant window appears.



15. Type *Hello World*, and then click **OK**.

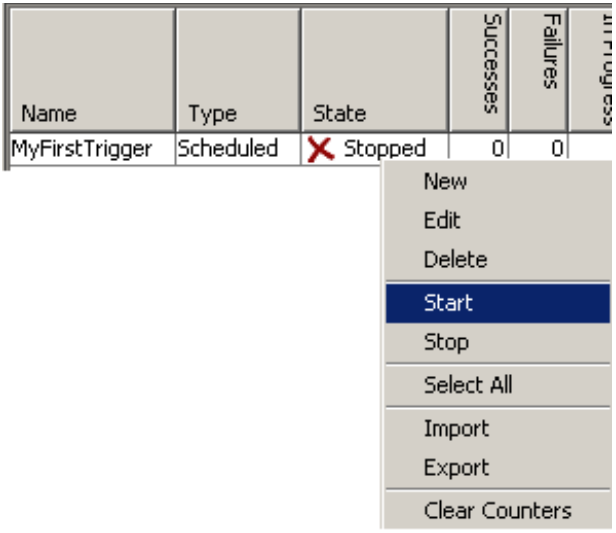
    The **Input** tab will be similar to the following:



16. The trigger is complete, click **Save**.

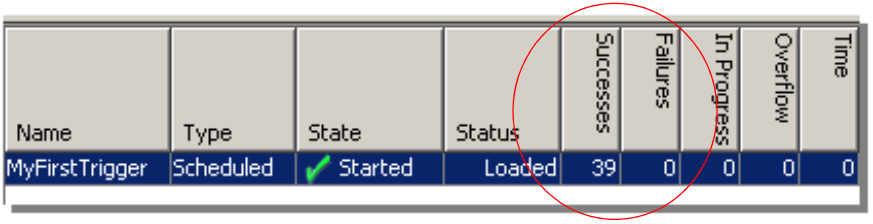
    When you save a trigger, the name of the trigger is added to the Trigger window. You are ready to start the trigger.

17. From the Trigger window, select the trigger you just created, display its pop-up menu, and then click **Start**.



The **State** column for the trigger changes to **Starting** and then to **Started** and a green check mark appears.

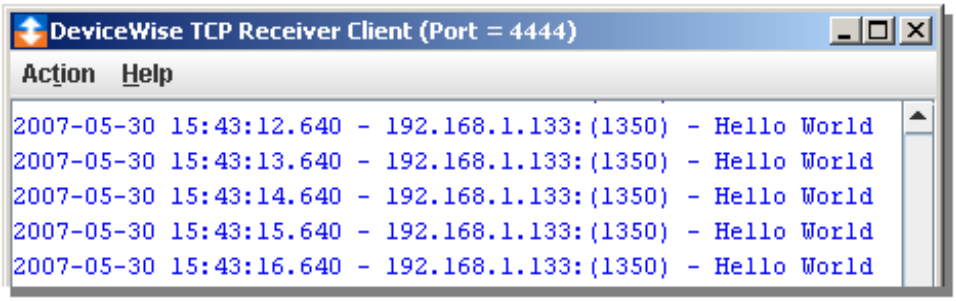
When the trigger is executing, the value of the **Successes** column is incremented.



If there is a problem, the value of the **Failures** column is incremented. For this example, the trigger is running, and you should be receiving messages on the TCP Receiver Client window.

Reviewing the payload

Maximize the TCP Receiver Client program. You should see the message Hello World.



Congratulations!

❖❖❖

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