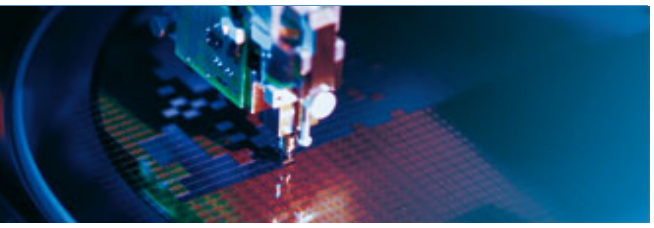
GETTING STARTED GUIDE



Everyware Device Cloud

Development Kit

Rev 2 – October 2012 – 110124-30182

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Trademarks

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Document Revision History

REVISION	DESCRIPTION	DATE
1	Initial Release	August 2012
2	Changed part number for ESF/Denali and Cloud Publish USB flash drive Removed USB Flash Drive section Added cellular option for development kit Added Dashboard section	October 2012

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Important User Information

In order to lower the risk of personal injury, electric shock, fire, or equipment damage, users must observe the following precautions as well as good technical judgment, whenever this product is installed or used.

All reasonable efforts have been made to ensure the accuracy of this document; however, Eurotech assumes no liability resulting from any error/omission in this document or from the use of the information contained herein.

Eurotech reserves the right to revise this document and to change its contents at any time without obligation to notify any person of such revision or changes.

Safety Notices and Warnings

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. Eurotech assumes no liability for the customer's failure to comply with these requirements.

The safety precautions listed below represent warnings of certain dangers of which Eurotech is aware. You, as the user of the product, should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

Installation in Enclosures

In the event that the product is placed within an enclosure, together with other heat generating equipment, ensure proper ventilation.

Do Not Operate in an Explosive Atmosphere

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Alerts that can be found throughout this manual

The following alerts are used within this manual and indicate potentially dangerous situations.

Danger, electrical shock hazard:
Information regarding potential electrical shock hazards:

- Personal injury or death could occur. Also damage to the system, connected peripheral devices, or software could occur if the warnings are not carefully followed.
- Appropriate safety precautions should always be used, these should meet the requirements set out for the environment that the equipment will be deployed in.

Warning:
Information regarding potential hazards:

- Personal injury or death could occur. Also damage to the system, connected peripheral devices, or software could occur if the warnings are not carefully followed.
- Appropriate safety precautions should always be used, these should meet the requirements set out for the environment that the equipment will be deployed in.

Information and/or Notes:
These will highlight important features or instructions that should be observed.

Use an Appropriate Power Supply

- Only start the product with a power supply supplied with the development kit. In case of uncertainty about the required power supply, please contact your local Eurotech Technical Support Team.
- Use power supplies that are compliant with SELV regulation.
- Avoid overcharging power-points.

Antistatic Precautions

To avoid damage caused by ESD (Electro Static Discharge), always use appropriate antistatic precautions when handing any electronic equipment.

Life Support Policy

Eurotech products are not authorized for use as critical components in life support devices or systems without the express written approval of Eurotech.

Warranty

For Warranty terms and conditions users should contact their local Eurotech Sales Office.
See Eurotech Worldwide Presence page 42 for full contact details.

WEEE

The information below is issued in compliance with the regulations as set out in the 2002/96/EC directive, subsequently superseded by 2003/108/EC. It refers to electrical and electronic equipment and the waste management of such products. When disposing of a device, including all of its components, subassemblies, and materials that are an integral part of the product, you should consider the WEEE directive.

This device is marketed after August 13, 2005 and you must separate all of its components when possible and dispose of them in accordance with local waste disposal legislations.

- Because of the substances present in the equipment, improper use or disposal of the refuse can cause damage to human health and to the environment.
- With reference to WEEE, it is compulsory not to dispose of the equipment with normal urban refuse and arrangements should be instigated for separate collection and disposal.
- Contact your local waste collection body for more detailed recycling information.
- In case of illicit disposal, sanctions will be levied on transgressors.

Technical Assistance

If you have any technical questions, cannot isolate a problem with your device, or have any enquiry about repair and returns policies, contact your local Eurotech Technical Support Team.

See Eurotech Worldwide Presence page 42 for full contact details.

Transportation

When transporting any module or system, for any reason, it should be packed using anti-static material and placed in a sturdy box with enough packing material to adequately cushion it.

Warning:
Any product returned to Eurotech that is damaged due to inappropriate packaging will not be covered by the warranty.

Product Overview

The Everyware™ Device Cloud (EDC) Development Kit provides a complete, cloud-ready development platform for Eurotech's Everyware Cloud. The development kit consists of the following components:

- Helios mobile gateway with
  - VGA and Wi-Fi
  - Cellular modem (EDCK4011)
  - Wind River Linux 4.2
  - Everyware™ Software Framework (ESF)/Denali routing application
  - Cloud Publish application
  - Hex key for Helios USB bay
- EDC Demonstration Board and Programmable Logic Controller (PLC) mounted on Plexiglas
- Antennas
  - Wi-Fi antenna (280000-00088E)
  - GPS antenna (7002-14400-000-000)
  - Cellular antenna (7002-14403-000-000) (EDCK4011)
- Cables
  - PLC serial cable (610000-00062E)
  - Interdevice power cable (red and black wire)
  - Ethernet crossover cable (2040-10070-000-000) for accessing Denali
  - Null modem serial cable (610000-00011)
- Power Supplies
  - 24 VDC power supply (ETSA240170UD) and AC power cord for the Helios, EDC Demonstration Board, and PLC
  - 12 VDC power supply (400124-30122E) and AC power cord for the Helios in standalone use only
- USB Flash Drives
  - Utiliboot for reloading Linux operating system (190124-3410)
  - ESF/Denali and Cloud Publish for reloading the applications (190124-3E10)
    (This drive also includes this guide: *EDC Development Kit Getting Started Guide, Eurotech document #110124-3018.*)
  - FreeDOS for recovering Helios (190122-2999)
- *EDC Development Kit Quick Start (Eurotech document #110124-3017)*

Please make sure you have received all the components before you begin your development.

This guide describes how to set up the development kit hardware, connect to the Everyware Cloud, and begin using your published data. It extends the information provided in the EDC Development Kit Quick Start and is intended for software application developers and system integrators. For more documentation on the EDC Development Kit, see
http://everywarecloud.eurotech.com/doc/EDCDevKit.

Related Documents

The following documents provide more information on the various components included in the development kit:

Document	Available at
Helios Platform Hardware Reference Manual	http://support.eurotech-inc.com/forums/topic.asp?topic_id=2877
Denali User Manual	http://support.eurotech-inc.com/forums/topic.asp?topic_id=3040
Everyware Cloud Developer's Guide	http://everywarecloud.eurotech.com/doc/ECDevGuide
Everyware Software Framework Developer's Guide	http://esf.eurotech.com/doc/ESFDevGuide

Table 1. Related Documents

Software Specification

The EDC Development Kit leverages Eurotech's Helios mobile gateway running the Denali routing application software, plus the power of ESF, to provide a complete, cloud-ready development platform. This section gives a brief description of the software available on the Helios.

BIOS

The Helios mobile gateway incorporates a custom system BIOS developed by Eurotech.

Operating System

The Helios mobile gateway runs the Wind River Linux 4.2 operating system. You can log into the administrative console from the display interface or remotely using SSH (Secure SHell). The default username is "`root`" and the default account password is "`IsiTech`". For additional information about remote log in, see Remote Log In, page 39.

Everyware™ Software Framework

Everyware Software Framework (ESF) is an inclusive software framework that puts a middleware layer between the operating system and the OEM application. It provides industry-standard interfaces that shorten development time, simplify coding, and allow software to be ported from one Eurotech hardware platform to another.

The *ESF Developer's Guide* provides detailed instructions and sample applications for developing device applications using ESF on Eurotech platforms. It is available at http://esf.eurotech.com/doc/ESFDevGuide.

Denali Routing Application

Denali is an application component of Eurotech's Everyware™ Software Framework (ESF), allowing configuration of a powerful network routing software platform. Eurotech's ESF and Denali software components run on different hardware platforms, providing a complete toolkit that is ready to use for a variety of communication and network applications.

Information about Denali is available at http://support.eurotech-inc.com/forums/topic.asp?topic_id=3040.

Hardware Specification

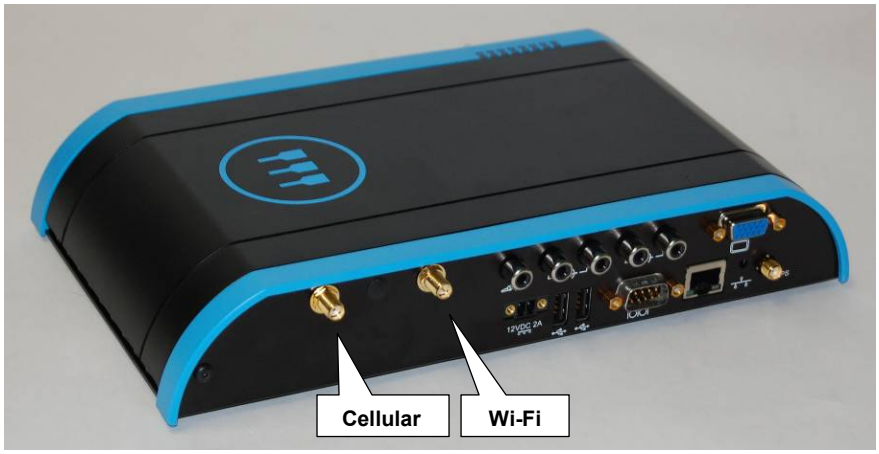
The EDC Development Kit is designed to provide you with a quick and easy start to publishing device data to the Everyware Cloud using a Helios mobile gateway and custom EDC Demonstration Board with Koyo DirectLogic 05 Programmable Logic Controller (PLC). This section gives a brief description of these hardware components.

Helios

Helios is a programmable mobile gateway that provides a flexible application-ready hardware platform with enhanced wireless capabilities. It is based on Eurotech's Catalyst XL which integrates with a carrier board and supporting peripheral devices. All electronics are housed in an enclosure. In addition to the input/output provided on the front panel, three USB host ports for wireless devices and additional storage are accessible in the USB Bay located under the removable cover. Using pre-certified wireless modules in this USB Bay, the Helios platform can be easily customized for any network.

With the Helios platform, you can quickly and easily create a gateway device, loaded with your application software that precisely meets your requirements. Several options are available allowing the hardware to be easily customized for specific applications. The Helios supplied in the development kit includes a VGA expansion board providing connection to a standard monitor and a Wi-Fi module expanding its network connectivity. As an option, the Helios can also include a cellular modem installed in the USB bay.

The following photograph shows a Helios that includes Wi-Fi and cellular. Your Helios may vary in appearance depending on the options you have selected.



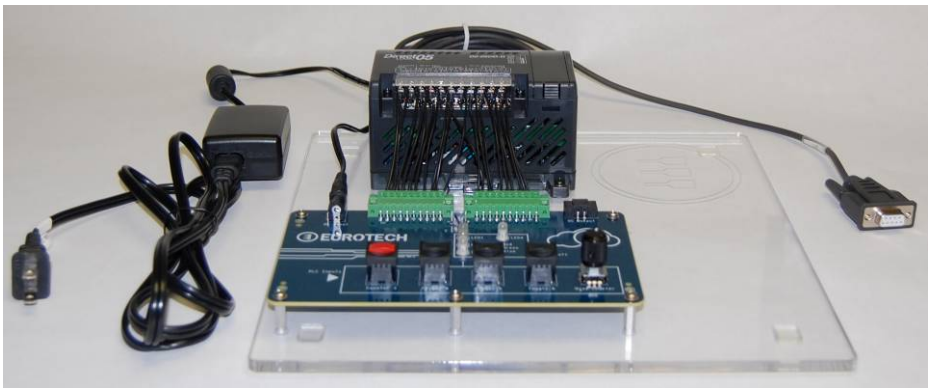
Disclaimer:
The arrangement of two antennas in close proximity on the Helios is used for demonstration purposes only and is not intended for a final application. It is recommended for application purposes to use antennas with 20 cm separation from all persons and from each other or to test a specific antenna configuration according to FCC or other regulatory requirements.

This equipment generates and can radiate radio frequency energy and may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by such measures as reorienting the receiving antenna, increasing separation between equipment and receiver, or connecting the equipment into an outlet on a different electrical circuit.

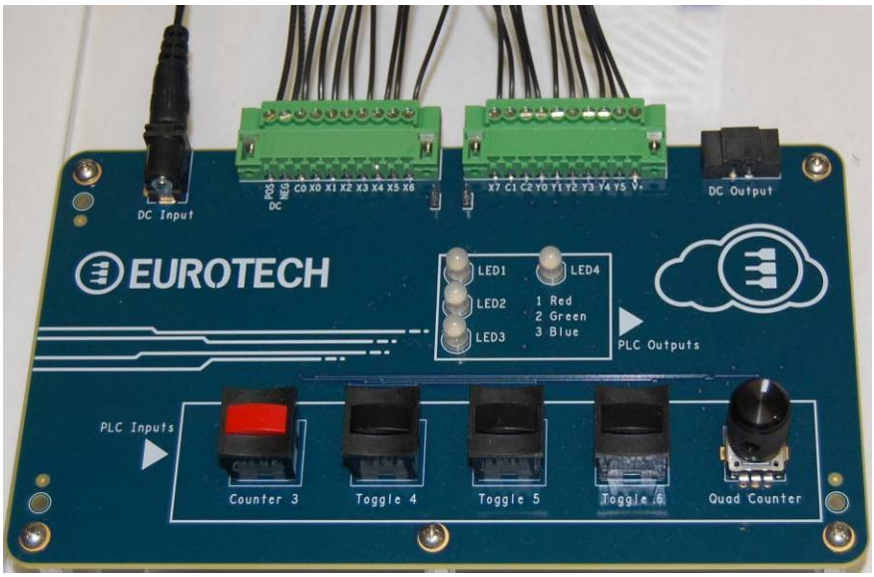
For additional details about the hardware, refer to the *Helios Hardware Reference Manual* at http://support.eurotech-inc.com/forums/topic.asp?topic_id=2877.

Everyware Device Cloud Demonstration Board

The Everyware Device Cloud (EDC) Demonstration Board provides switches/controls to change inputs to the Programmable Logic Controller (PLC) and LEDs to display outputs from the PLC. Helios reads from and writes to the PLC using a serial connection and publishes the PLC data to the Everyware Cloud periodically and when it changes. For details about the publish interval, see Configuring Cloud Publish Application, page 32. The following photo shows the board with PLC.



The following photograph shows the location of the connectors, switches/controls, and LEDs on the board.



The following table describes the connectors, switches/controls, and LEDs on the board.

EDC Demonstration Board	Description	Specifications
DC Input	DC input from AC power adapter	24 VDC
DC Output	DC output to Helios	12 VDC
10-position Terminal Blocks	Connections to PLC inputs and outputs	X0-X7 Input: 12-24 VDC, 3-15mA Y0-Y5 Sinking Output: 6-27VDC, 1A
LED1-4	Red/Green/Blue LEDs, PLC outputs D1-4	Uses high-side driver MOSFETs
Counter 3	Pushbutton switch, PLC input SW2	Switches to DC_IN when closed
Toggle 4-6	Toggle switches, PLC inputs SW3-5	Switch to DC_IN when closed
Quad Counter	Rotary Encoder, PLC input SW1	Drives an open-drain MOSFET with pull-up to DC_IN

Table 2. EDC Demonstration Board Components

The following table lists the wiring of the board.

PLC	shunt	CN1	CN2	EDC Demonstration Board Use
+		10		DC POS (12-24VDC)
G	x			
-		9		GND
LG	x			
C0		8		GND
X0		7		"Quad Counter" Rotary Encoder (SW1.A)
X1		6		"Quad Counter" Rotary Encoder (SW1.B)
X2		5		"Counter" (SW2)
X3		4		"Toggle 4" (SW3)
C1			9	GND
X4		3		"Toggle 5" (SW4)
X5		2		"Toggle 6" (SW5)
X6		1		JP1.2
X7			10	JP2.2
C2			8	GND
Y0			7	LED1 (D1)
Y1			6	LED2 (D2)
Y2			5	LED3 (D3)
Y3			4	LED4 (D4), Red
Y4			3	LED4 (D4), Green
Y5			2	LED4 (D4), Blue
+V			1	DC_IN

Table 3. Wiring to EDC Demonstration Board

Preparing Your Development Kit

To prepare the development kit for first-time use, you will connect the Helios to the EDC Demonstration Board and PLC, configure the Helios for Internet access on your network, connect to the Everyware Cloud, use Eurotech's Everyware Cloud Console to verify your data, and begin developing your applications. This section describes how to connect the Helios to the EDC Demonstration Board and PLC.

Hardware Connections

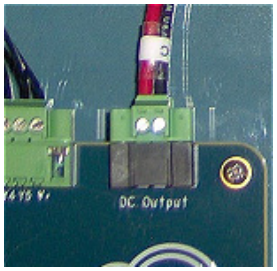
To prepare your development kit hardware for use, complete the following steps:

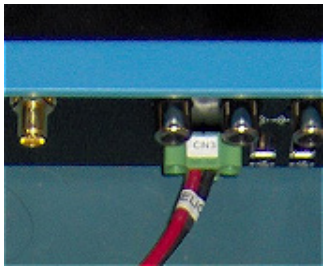
1. Connect a VGA display and USB keyboard to Helios.

2. Set the switch, located on the rear of the PLC, to RUN.

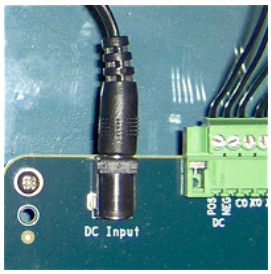
3. Connect PLC Port 2 to the Helios with the serial cable (610000-00062E).

4. Connect the red and black interdevice power cable between the Helios DC input and the EDC Demonstration Board DC output.

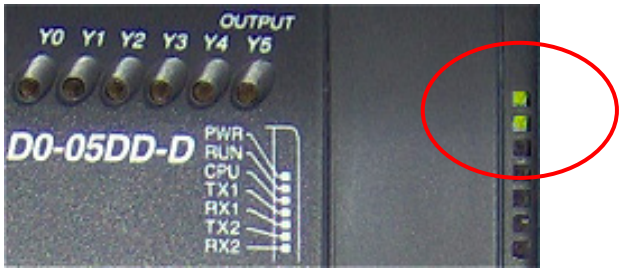




5. Connect the 24 VDC power supply to the DC Input on the EDC Demonstration Board. (You will not use the 12 VDC power supply).



6. Connect the 24 VDC power supply to an AC power source. The PWR and RUN LEDs on the PLC light green when the power supply is successfully connected.



7. After one minute, the LEDs on the EDC Demonstration Board will light in sequence once – LED1, LED2, LED3, and LED4 (red, green, then blue).

Configuring Your Network Connectivity

Your Helios runs the Denali routing application software allowing configuration of a variety of IP network connections. It is capable of connecting to the Internet using one of the following networks:

- Wi-Fi via fixed IP address or DHCP
- Ethernet via fixed IP address or DHCP
- Cellular via cellular modem installed in USB bay (EDCK4011 or your own modem)

Before your Helios can connect to the Everyware Cloud, its network settings must be configured for Internet access as described in the following sections.

For more details on configuring the Helios network connection, refer to the Denali User Manual at http://support.eurotech-inc.com/forums/topic.asp?topic_id=3040.

Denali Setup Web Page

To change the network settings of your Helios, you must access the Denali Setup Web page by connecting to your Helios via Wi-Fi or Ethernet. The following sections provide instructions for both methods.

Note:
If you change either the Ethernet or Wi-Fi configuration from the factory-default settings, you will subsequently need to use the new address rather than the default addresses given in the following sections.

Connecting via Ethernet

To access Denali using an Ethernet connection to Helios, complete the following steps:

1. Connect your development PC to the Helios using the Ethernet crossover cable supplied with your kit.
2. Open a Web browser and enter the following address into the address bar: **http://192.168.1.1.**
3. If the Web page loads successfully, you will see a security warning. Proceed to Accessing the Setup Web Page, page 16.
4. Otherwise, see Troubleshooting, page 39.

Connecting via Wi-Fi

To access Denali using a Wi-Fi connection to Helios, complete the following steps:

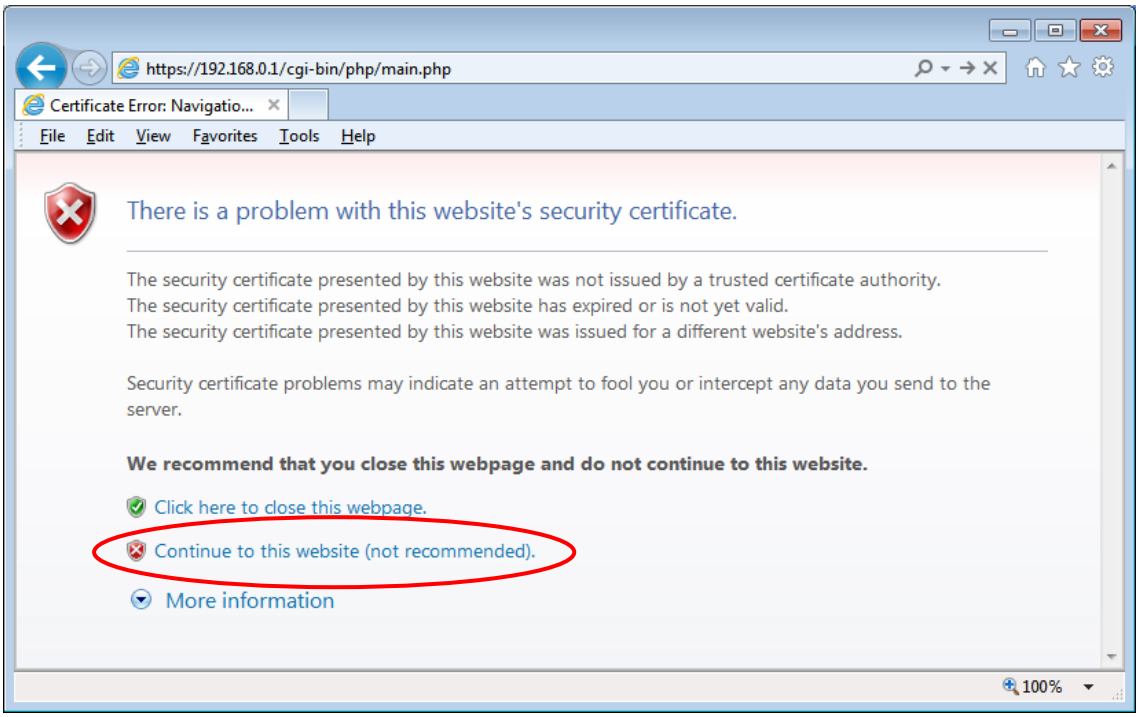
1. On your development PC, locate the list of available Wi-Fi access points (SSID) and find the access point named ‘denali_wifi’.
2. Disconnect your development PC from any existing Wi-Fi networks and connect to ‘denali_wifi’.
3. Open a Web browser and enter the following address into the address bar: **http://192.168.2.1.**
4. If the Web page loads successfully, you will see a security warning. Proceed to Accessing the Setup Web Page, page 16.
5. Otherwise, see Troubleshooting, page 39.

Accessing the Setup Web Page

After you have connected to your Helios, complete the following steps to log into the Denali Setup Web page:

1. Proceed past certificate warning.

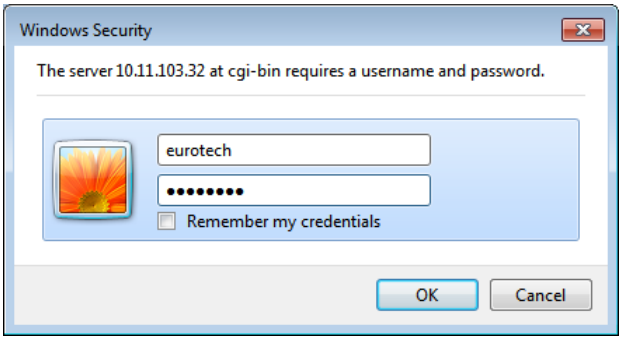
   The first Web page that you will see when accessing Denali using your Web browser is a security warning about a certificate. To continue past the security warning in Internet Explorer, click on the message Continue to this website.



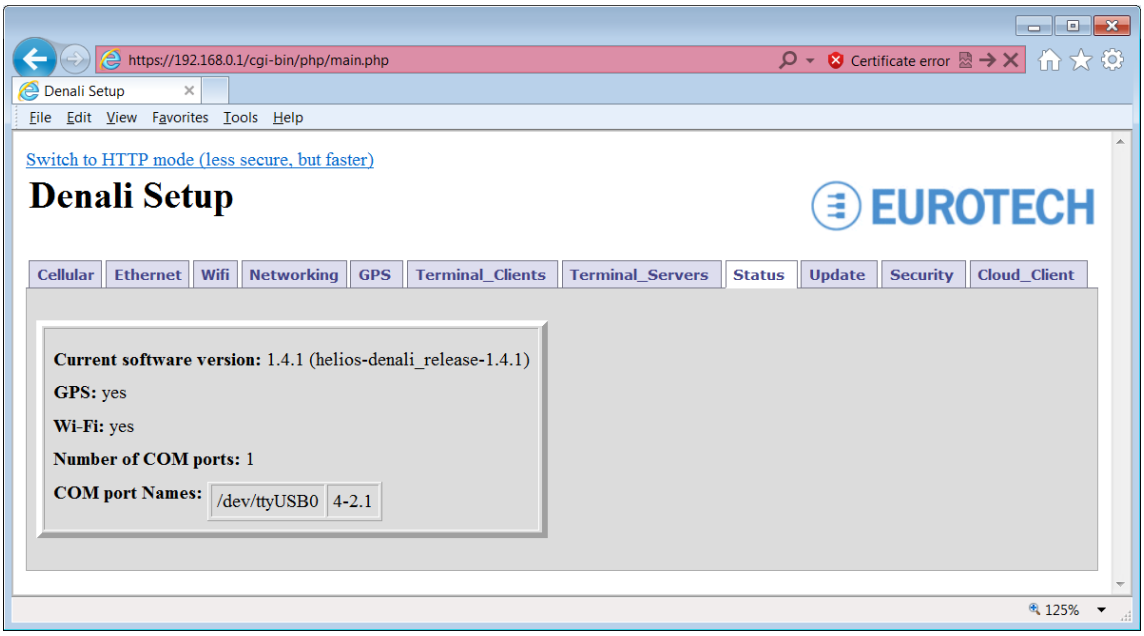
   If using Mozilla Firefox, click Add Exception. If using Google Chrome, click Proceed Anyway.

2. Log into Web page.

   Enter your login details when prompted. The default username is `eurotech` and default password is `eurotech`.



After logging in, the Denali Setup Web page is displayed. The following screen capture is given as an example. Your Setup Web page may display a different software version.

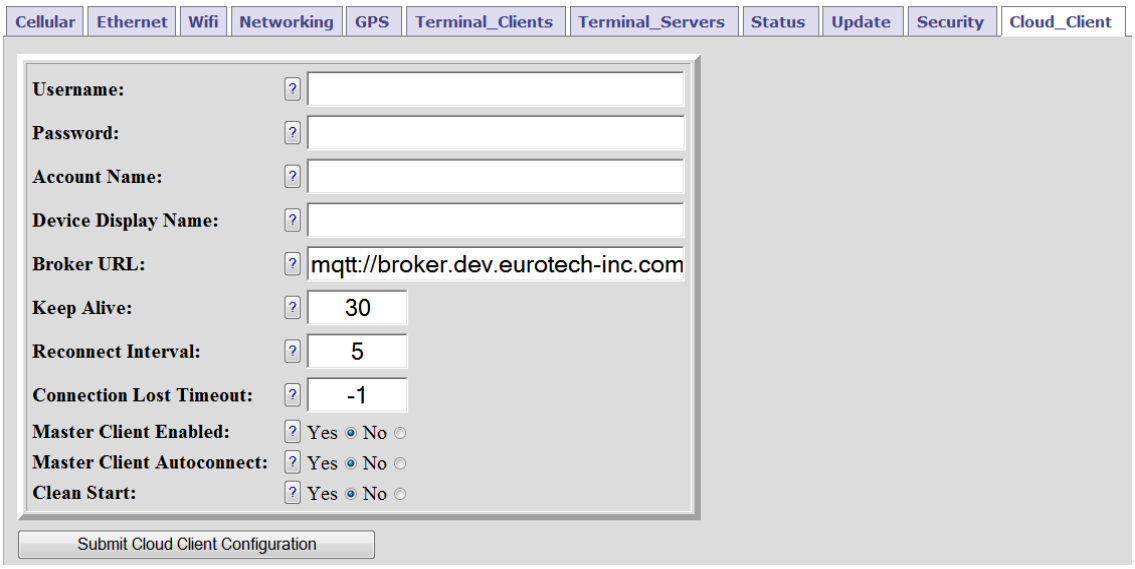


Everyware Cloud Configuration

The Everyware Cloud uses the MQTT publish/subscribe protocol to make connections from the end devices and other client systems to a cloud-based message broker. Your Helios supports this protocol and must be configured with your Everyware Cloud account credentials to connect to the Everyware Cloud. This configuration is performed by Eurotech prior to shipping your development kit. However, Eurotech recommends verifying the configuration prior to first-time use.

Verifying your Everyware Cloud Configuration

To verify your configuration, click on the Cloud_Client tab in the Denali Setup Web page. Verify that the fields are set according to the credentials (Username, Password, Account Name, Broker URL) that were provided with your Everyware Cloud account.



Network Settings

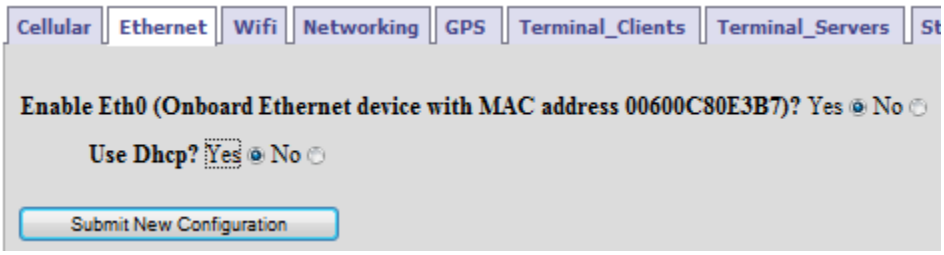
To connect to the Internet, you must configure your Helios network settings in the Denali Setup for Ethernet, Wi-Fi, or cellular, depending on your available network. The following sections provide instructions for all network connections.

Connecting via Ethernet

If your Helios is connecting to the Internet using Ethernet, click on the Ethernet tab in the Denali Setup Web page. Helios can be configured for DHCP client (address assigned by an existing network) or fixed IP (you will need to know the correct address settings to use on your network).

Ethernet – DHCP Client

To configure Ethernet for DHCP client, set the Use Dhcp? option to Yes, and then click Submit New Configuration.



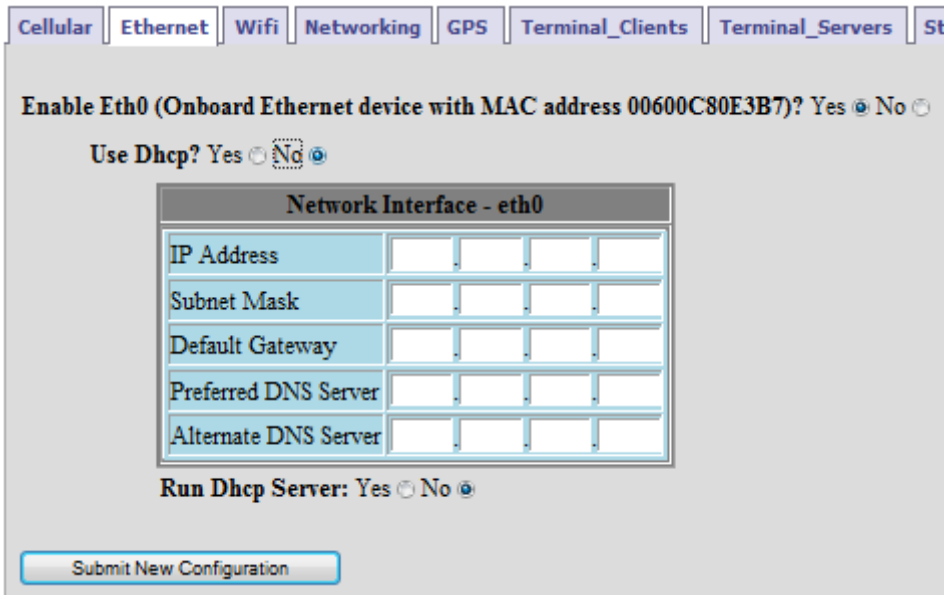
Note:
If you are currently configuring the Helios over Ethernet, this option will cause you to lose access to the Helios over the cross-over Ethernet cable. Before submitting this change to Ethernet settings, make sure you can determine the address that is dynamically assigned either using the VGA display and keyboard or the Wi-Fi access point on the Helios. For help finding the Ethernet address, see Helios IP Address and Route, page 40.

After submitting this configuration, connect the Helios to an existing Local Area Network (LAN) Ethernet port.

Ethernet – Fixed IP

If your Helios must use a fixed IP address, you will need to know the correct IP address, subnet mask, default gateway, and DNS server on your network. If you do not have this information, consult a network administrator.

To configure Ethernet for fixed IP, set the Use Dhcp? option to No and the Run Dhcp Server? option to No. Enter the IP address information in the appropriate fields, and click Submit New Configuration.



After submitting this configuration, connect the Helios to an existing Local Area Network (LAN) Ethernet port.

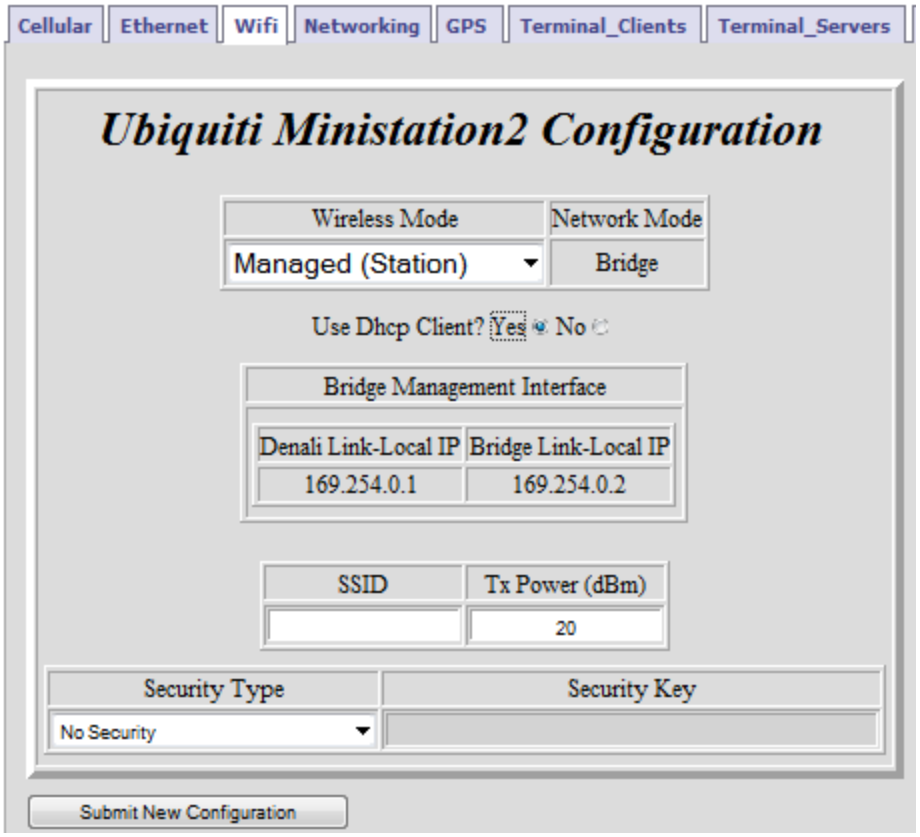
Connecting via Wi-Fi

If your Helios is connecting to the Internet using Wi-Fi (802.11), click on the Wi-Fi tab in the Denali Setup Web page. Helios can be configured for DHCP client (address assigned by an existing network) or fixed IP (you will need to know the correct address settings to use on your network). In either case, you need to know the access point name (SSID) of your existing network and its security settings (WEP, WPA, or none).

Note:
If the Helios has a Default Gateway on Ethernet (fixed or dynamic), it will use Ethernet as the default route to the Internet instead of Wi-Fi. If you are currently configuring the Helios to use both Ethernet and Wi-Fi and want Wi-Fi to be the default route, make sure the Ethernet is disconnected or configured with a fixed IP address and no default gateway.

Wi-Fi – DHCP Client

To configure Wi-Fi for DHCP client, set the Wireless Mode option to Managed (Station) and the Use Dhcp Client? option to Yes. Enter the SSID of your network's access point, choose the correct Security Type, and enter the Security Key (if any). Click Submit New Configuration.



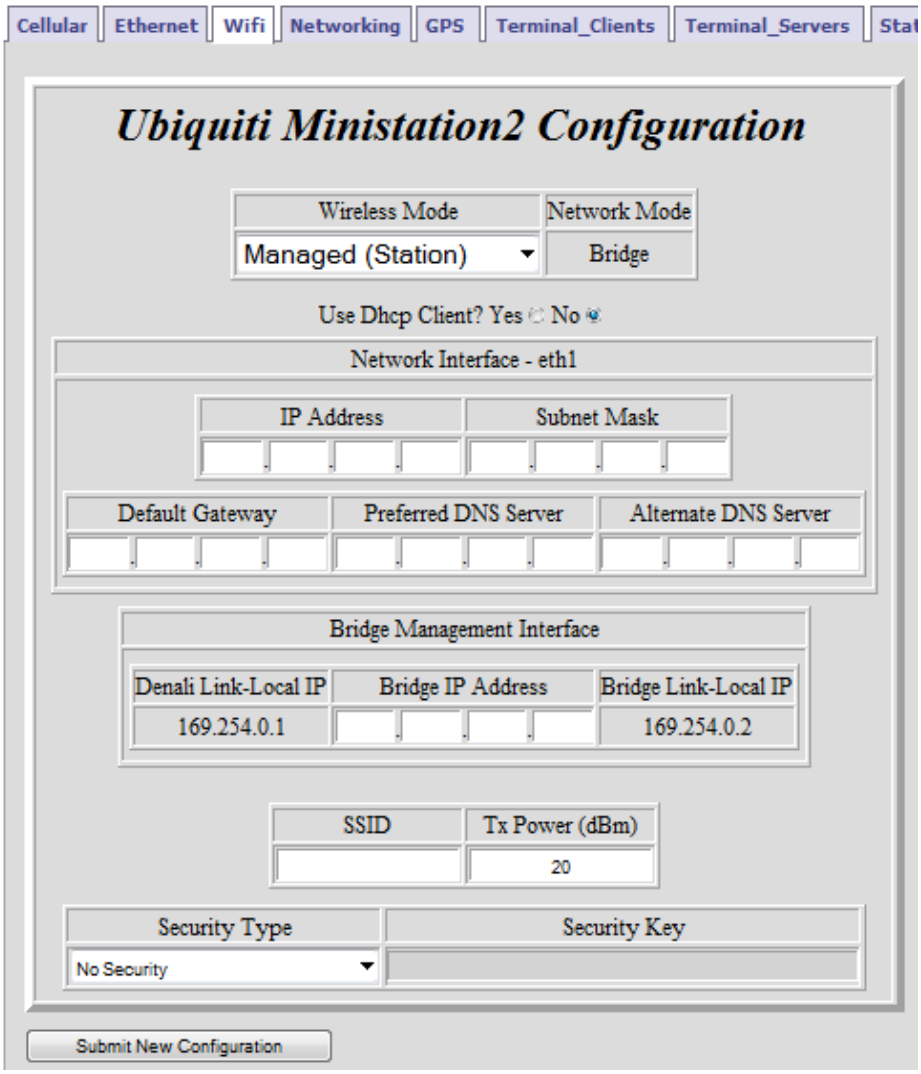
Note:
If you are currently configuring the Helios over Wi-Fi, this option will cause you to lose access to the Helios. Before submitting this change to Wi-Fi settings, make sure you can determine the address that is dynamically assigned using the VGA display and keyboard or the Ethernet connection on the Helios For help finding the Ethernet address, see Helios IP Address and Route, page 40..

After submitting this configuration, the Helios should automatically connect to the access point.

Wi-Fi – Fixed IP

If your Helios must use a fixed IP address, you will need to know the correct IP address, subnet mask, default gateway, and DNS server on your network. If you do not have this information, consult a network administrator. (The Helios needs two assigned addresses on the network.)

To configure Wi-Fi for fixed IP, set the Wireless Mode option to Managed (Station) and the Use Dhcp Client? option to No. Enter the IP address information in the appropriate fields, including both a primary IP address for the Helios and a second IP address for its internal Wi-Fi bridge. Enter the SSID of your access point, the Security Type, and the Security Key (if any). Click Submit New Configuration.



After submitting this configuration, the Helios should automatically connect to the access point.

Connecting via Cellular Modem

A third method of connecting your Helios to the Internet is to use a cellular modem installed in the USB bay. You can purchase a development kit with the cellular option or you can purchase your own cellular modem and activate it with a data account on the appropriate cellular carrier.

Eurotech offers a cellular option for the development kit that includes a cellular modem with a limited, one year data plan. Typically, your development kit ships with the modem activated. If your modem is not activated, contact your local Eurotech representative for activation instructions.

Note:
The EDCK4011 includes an EVDO (Sprint) cellular modem with a 75 MB per month data plan for one year. Excess usage will incur an additional fee or discontinued service.

The following table lists some modems that are currently supported on the Helios. For the latest list of supported modems, contact your local Eurotech sales representative.

USB Plug-in Modem	Cellular Technology	Manufacturer
Compass C885	HSDPA	Sierra Wireless
Compass C888	HSDPA	Sierra Wireless
Compass C889	HSDPA	Sierra Wireless
MC760	EVDO	Novatel
USB589 / T598	EVDO	Sierra Wireless
USBConnect Shockwave (USB308)	HSDPA	Sierra Wireless
U600	4G, EVDO	Sierra Wireless

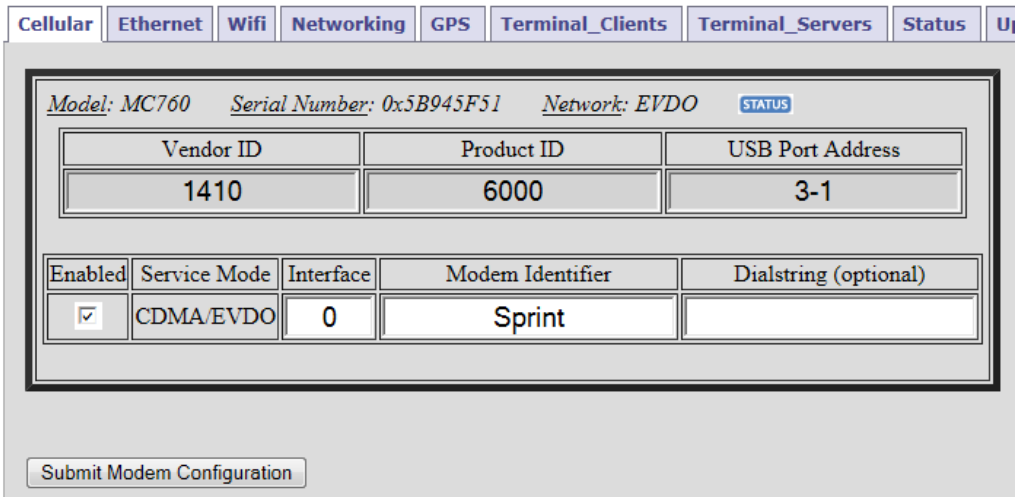
Table 4. Supported Cellular Modems

If you are using your own modem, first install the modem in one of the available USB ports in the USB bay of the Helios. These USB ports are designed to support higher-current USB modules. To access the USB bay, use the hex key supplied with the kit to remove the two screws located on each side of the enclosure.

Your cellular modem must be enabled in the Denali Setup. For development kits with the cellular modem installed, this configuration is performed by Eurotech prior to shipping. If you are using your own modem, perform the steps described in the following sections.

Enable Cellular Modem

Click on the Cellular tab in the Denali Setup Web page. Your cellular modem should appear in the list. Select the Enabled checkbox, enter a number for Interface, enter a text string for Modem Identifier, and then click Submit Modem Configuration. Depending on the modem, the configuration will be slightly different. The following screen capture shows one example.



Note:
If the Helios has a Default Gateway on Ethernet or Wi-Fi in Managed mode (fixed or dynamic), it will use that network as the default route to the Internet instead of cellular. If you are configuring cellular to be the default network, make sure that both Ethernet and Wi-Fi are either unconnected or do not have a default gateway.

After submitting the configuration, the Helios should connect to the Internet using the cellular modem.

Verify Cellular Modem

Using the Helios administrative console, you can verify that your cellular modem is configured correctly. At the system prompt, enter the following command:

```
ifconfig
```

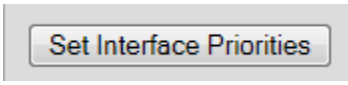
Your display output should have a 'ppp0' section, similar to the following:

```
ppp0      Link encap:Point-to-Point Protocol
          inet addr:75.226.234.14  P-t-P:66.174.193.64  Mask:255.255.255.255
          UP POINTOPOINT RUNNING NOARP MULTICAST  MTU:1500  Metric:1
          RX packets:4 errors:1 dropped:0 overruns:0 frame:0
          TX packets:5 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:3
          RX bytes:64 (64.0 b)  TX bytes:97 (97.0 b)
```

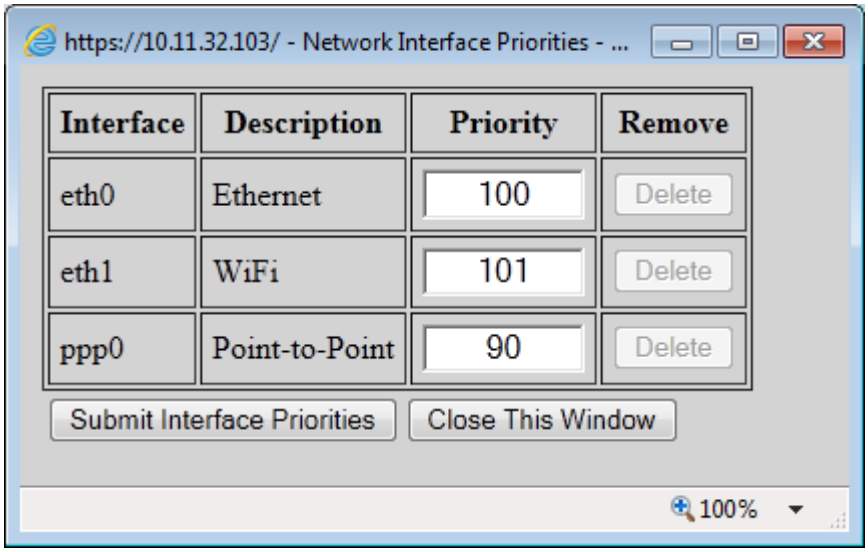
Setting Interface Priorities

Depending on your network configuration, you may need to configure the Interface Priorities in Denali. The Interface Priorities setting ensures that the correct network is the default route to the Internet if more than one of your network interfaces contains a default gateway.

Click on the Networking tab in the Denali Setup Web page and then click the Set Interface Priorities button located at the bottom of the page.



Determine the priorities for your network configuration and set the corresponding Priority for each network interface. When complete, click Submit Interface Priorities. The following screen capture is shown as an example.



Using the Helios administrative console, you can verify the default route of your Helios. At the system prompt, enter the following command:

```
route -n
```

In the following example output, the cellular interface 'ppp0' is the default route:

```
default         64.sub-66-174-1 0.0.0.0         UG    0      0        0 ppp0
```

Using Your Everyware Cloud Account

Eurotech's Everyware Cloud is a cloud-based architecture that quickly connects devices to build and maintain an end-to-end M2M application. With the Everyware Cloud, you can publish device and sensor data, enable automatic notifications and perform actions on real-time data using Rules, and use REST APIs to query the stored data into your back-end applications.

Everyware Cloud Console

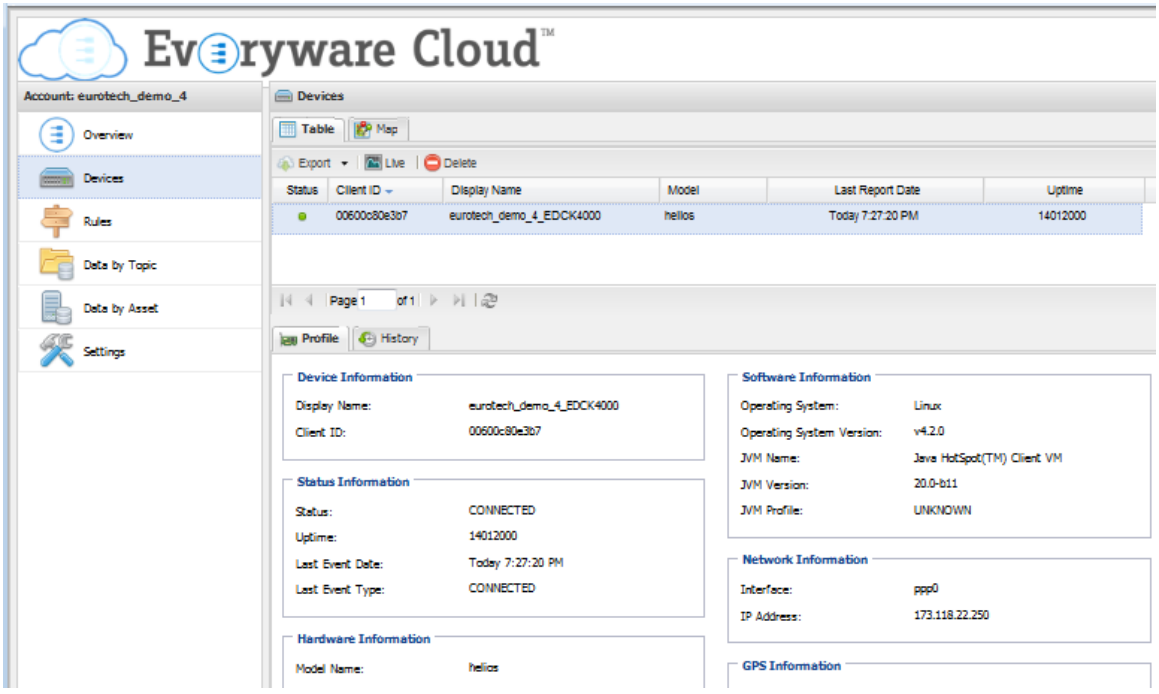
After you have configured the Helios to connect to the Internet, you can view data from the PLC and create rules to act on the data, such as generating REST API calls or sending e-mail, Twitter feed, or SMS messages, using the Web-based Everyware Cloud Console.

The *Everyware Cloud Developer's Guide* describes how to use the Everyware Cloud Console and provides sample applications to understand application development using the Everyware Cloud, including MQTT publish/subscribe and REST APIs. It is available at http://everywarecloud.eurotech.com/doc/ECDevGuide.

Connecting to the Console

To connect to the Everyware Cloud Console, complete the following steps:

1. On your development PC, log into the Everyware Cloud Console (https://console-sandbox.everyware-cloud.com) with the Username and Password you received in your registration email. Make sure to enter all upper/lowercase and symbols correctly.
2. In the left panel of the Console, click on Devices and verify that your Helios (generally "company name_project name_EDCK4000") appears with a green dot in the Status column indicating that it is connected. If your device is not listed, see Checking Cloud Connection, page 41.



Viewing your Data

To view your data in the Console, complete the following steps:

1. In the left panel of the Console, click on Data by Asset.
2. Select your device and then select the topmost checkbox to display all metrics from your device.
3. Click the Query button to display the current values of your EDC Demonstration Board switches/controls.
4. Change the switches/controls on the EDC Demonstration Board one at a time, click the Query button in the Console, and verify the changes in the Console's Results Table or Results Chart.

The following controls on the EDC Demonstration Board have the following effects in publishing to the Everyware Cloud.

Control	Action	Cloud Metric
Quad Counter	Turn clockwise to increment and turn counter-clockwise to decrement	qc
Counter 3	Press and release to enable momentary control and increment counter. This also clears the Quad Counter value to zero.	t3 (true/false) c3 (count)
Toggle 4	Press to enable, press again to disable	t4
Toggle 5	Press to enable, press again to disable	t5
Toggle 6	Press to enable, press again to disable	t6

Table 5. EDC Demonstration Board Controls

Creating Rules

The Everyware Cloud uses a SQL-based rules engine to process incoming published data, allowing immediate message processing and/or notifications to occur based on user-defined criteria. Statistical rules are applied to the data in real-time. The actions generated by a rule can include e-mail, SMS, or Twitter notification, an MQTT publish event, or a REST API call.

Once you have verified that the PLC data is publishing to your Everyware Cloud account, you can create Rules to demonstrate this powerful feature of the Everyware Cloud. In the following sections, you will be guided through creating Rules in the Console to demonstrate the Rules feature using your development kit. For more details on using Rules, refer to the *Everyware Cloud Developer's Guide* (http://everywarecloud.eurotech.com/doc/ECDevGuide).

Create a New Rule

To create a new Rule in the Console, complete the following steps:

1. In the left panel of the Console, click on Rules.
2. Click New to open the New Rule window.
3. In the Rule Information box, enter the Name, Description, and Statement.
4. Click the Add button in the Rules Actions box to add an action for your rule.
5. Select the action and enter the parameters associated with the selected action. Use the tooltips provided in the console when entering the parameters for each action.
6. When complete, click Submit.

Example 1: Rules to Control LED1

Example 1 describes how to create two Rules for controlling the LED1 on the EDC Demonstration Board, in response to pressing a toggle button on the board. The following steps describe the control sequence:

1. Press the Toggle 4 button on the EDC Demonstration Board.
2. The Helios will publish the button press event to the Everyware Cloud.
3. Upon receiving the published event, a Rule will publish a control back to the Helios to turn on LED1.
4. When the Toggle 4 button is deactivated on the board, the Helios will publish the event.
5. A second Rule in the Everyware Cloud will publish a control to the Helios to turn off LED1.

To create the Rule to turn on LED1, add a new rule in the Console using the following information:

Name	LED1 ON
Status	Enabled
Description	Turn on LED1 if Toggle 4 active
Statement	select * from EdcMessageEvent where semanticTopic.startsWith("eurotech/demo") and boolMetric('t4')=true

The “eurotech/demo” is based on the “location” variable in the Cloud Publish configuration. If you have changed the configuration (see Configuring Cloud Publish Application, page 32), use the correct semantic topic according to your Helios configuration. The metric named ‘t4’ is the name of the Boolean data point published by the Helios based on the status of the Toggle 4 button.

Under Rule Actions, add an MQTT action with the following parameters:

Topic	$EDC/$account/$asset/eurotech/demo/led/1
Metrics	(remove all default metrics, and add only a single metric)

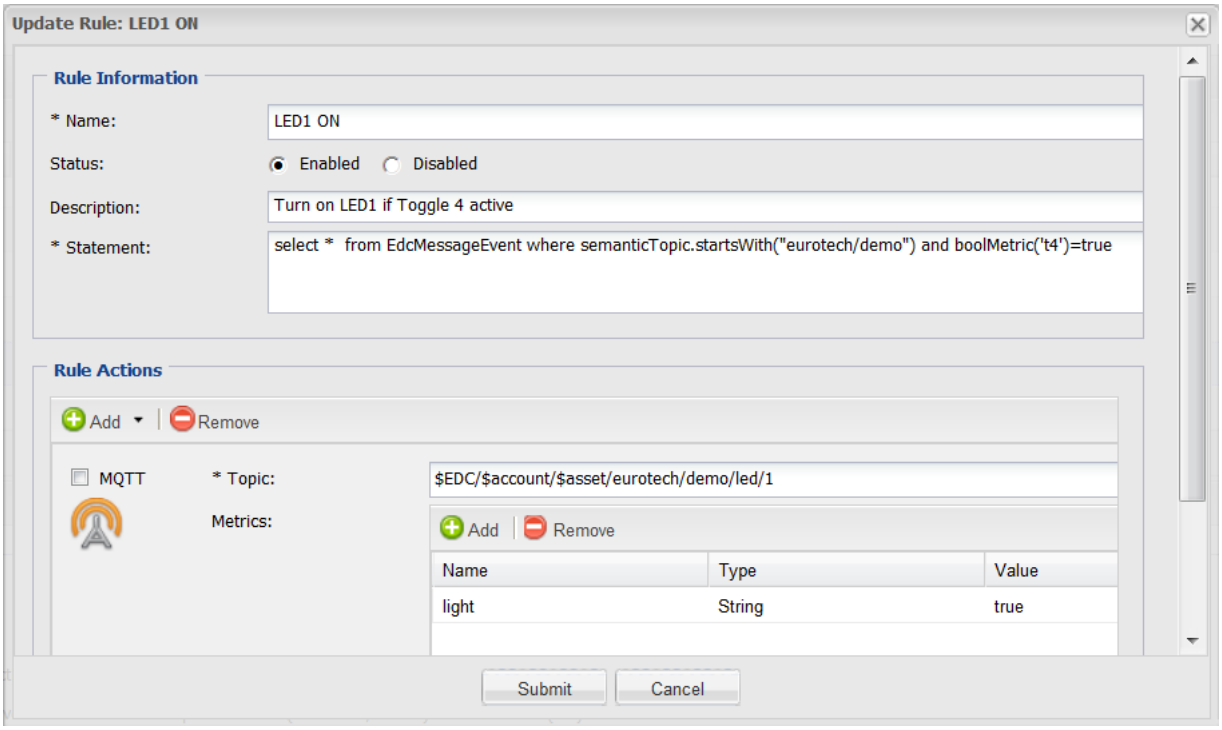
Name	Type	Value
light	String	true

The “eurotech/demo” is based on the “control.topic” variable in the Cloud Publish configuration. If you have changed the configuration (see Configuring Cloud Publish Application, page 32), use the correct control.topic according to your Helios configuration.

The initial part of the Topic string “$EDC/$account/” publishes a control to the Everyware Cloud. The next part of the Topic “$asset” uses the Helios asset ID to specify where the control should be delivered. The final part of the Topic string “led/1” specifies that this message relates to LED1 on the EDC Demonstration Board.

The MQTT message that triggers as a result of the action contains one Metric named “light” that contains a String value of “true”. The Helios subscribes to control messages, and once it receives a message with a control for one of the four LEDs, it turns them on or off depending on the value of the Metric named “light”.

The following screen capture shows this Rule.



To create the Rule to turn off LED1, add a second rule in the Console using the following information:

Name	LED1 OFF
Status	Enabled
Description	Turn off LED1 if Toggle 4 deactivated
Statement	select * from EdcMessageEvent where semanticTopic.startsWith("eurotech/demo") and boolMetric('t4')=false

Under Rule Actions, add an MQTT action with the following parameters:

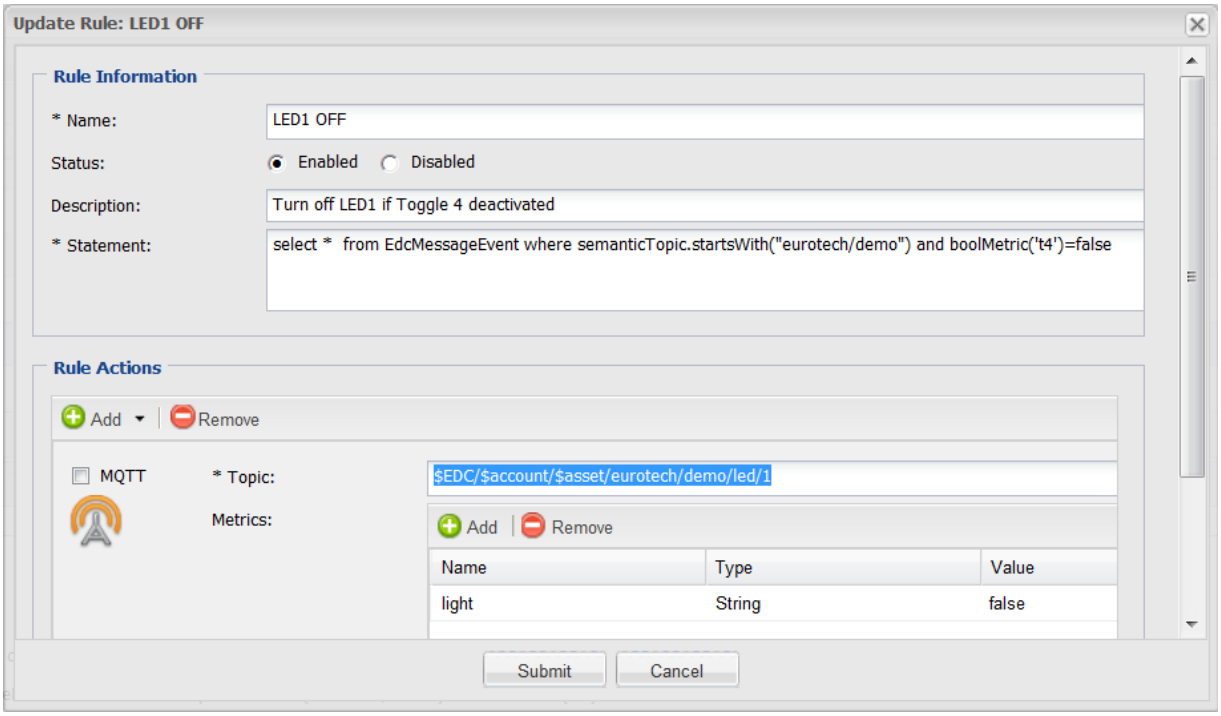
Topic	$EDC/$account/$asset/eurotech/demo/led/1
Metrics	(remove all default metrics, and add only a single metric)

Name	Type	Value
light	String	false

The “eurotech/demo” is based on the “control.topic” variable in the Cloud Publish configuration. If you have changed the configuration (see Configuring Cloud Publish Application, page 32), use the correct control.topic according to your Helios configuration.

Similar to the first rule, this rule looks for a published metric “t4” (from the Toggle 4 button) with a value of false and then publishes back to the Helios a control to turn off LED4.

The following screen capture shows this Rule.



To test this example, press the Toggle 4 button on the EDC Demonstration Board to enable it. The LED1 on the board should turn on. Press Toggle 4 again to disable it, and LED1 should go off.

Example 2: Rules for Quad Counter

Example 2 describes how to create two Rules that will generate an alarm when the Quad Counter on the EDC Demonstration Board is turned. The Rules publish controls back to the Helios whenever the Quad Counter reaches a certain threshold. It will also generate an alarm notification e-mail when the counter value is high. The following steps describe the control sequence:

1. Turn the Quad Counter clockwise, greater than a counter value of 10.
2. LED4 turns to red, and a “HIGH Alert” e-mail is sent from the Everyware Cloud.
3. Turn the Quad Counter further clockwise, greater than a counter value of 25.
4. LED4 stays red, and a “HIGH-HIGH Alert” e-mail is sent from the Everyware Cloud.
5. Turn the Quad Counter counter-clockwise, less than a counter value of 10.
6. LED4 turns to green. No e-mail is sent.

Note that the Rules described in this section use an average Quad Counter value, showing another feature of the Esper rules syntax, rather than an instantaneous value. Since the Helios publishes periodically, not only on change of state, an e-mail will be sent every time the Helios publishes a Quad Counter value greater than 10. For details about how often the Helios publishes data, see Configuring Cloud Publish Application, page 32. The Rule could be changed to alert only on change of state. Once you have finished testing this application, you should disable the Rules or turn the Quad Counter back to a counter value less than 10 to avoid continually receiving e-mails.

The following Rule definitions use the default “eurotech/demo” publish and subscribe topics, which you should adjust if you have changed the Cloud Publish configuration in the Helios.

To create the first Rule, add a new rule in the Console using the following information:

Name	Normal Avg Qc
Status	Enabled
Description	Normalize LED4 when Qc below threshold
Statement	select *, intMetric('qc') as qc, avg(intMetric('qc')) as avgQc from EdcMessageEvent.win:time_batch(10 sec) where semanticTopic.startsWith("eurotech/demo") having avg(intMetric('qc')) <= 10

The Rule statement includes an examination of the published metric 'qc', which is the Quad Counter value from the development kit. The Quad Counter increases by one every click clockwise and decreases by one every click counter-clockwise (minimum of 0).

The "time_batch(10 sec)" aggregates the values of the 'qc' variable over a 10 second window. If the development kit were publishing multiple times in 10 seconds, then the "having avg(intMetric('qc')) <= 10" is a conditional statement that tells this Rule to operate only when the average 'qc' value is less than or equal to an arbitrary threshold of 10.

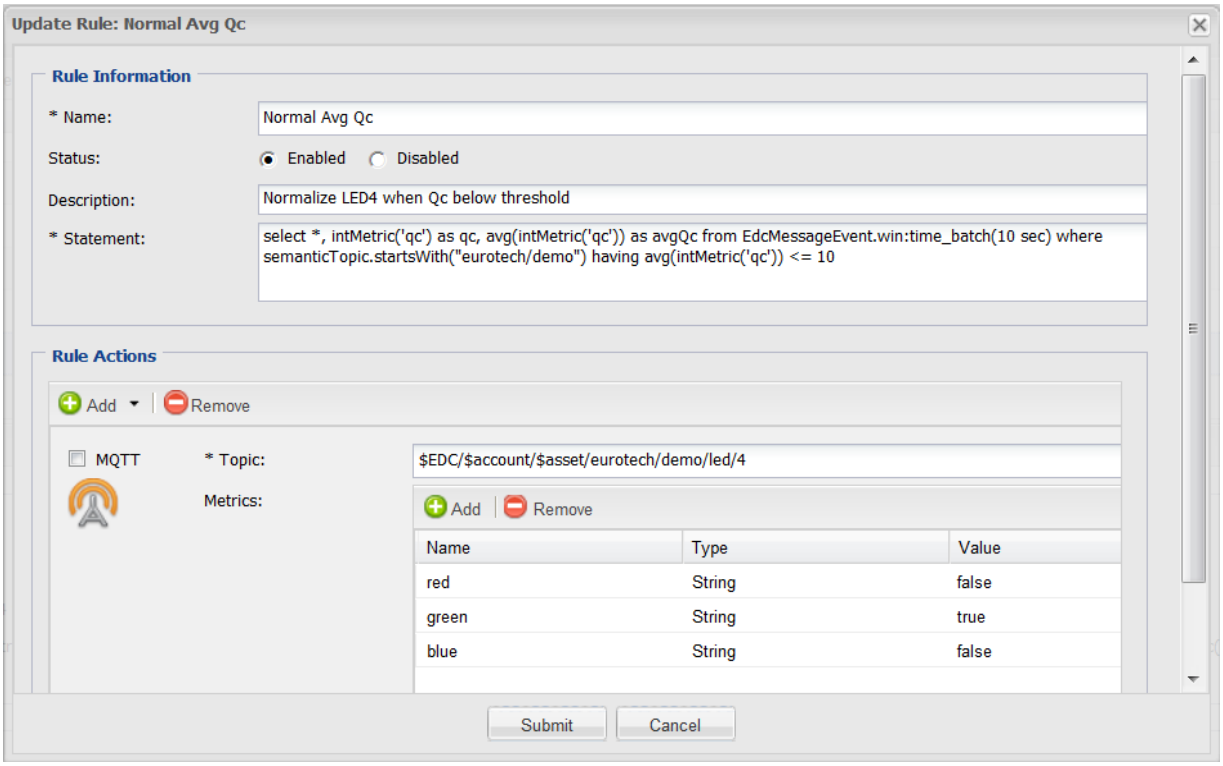
Under Rule Actions, add an MQTT action with the following parameters:

Topic	$EDC/$account/$asset/eurotech/demo/led/4
Metrics	(remove all default metrics, and add only a single metric)

Name	Type	Value
red	String	false
green	String	true
blue	String	false

The MQTT action publishes three metrics, named "red," "green," and "blue." Their values indicate which lights on the multi-colored LED4 to turn on ("true" is on). In the normal condition (qc <= 10), only the green LED is on.

The following screen capture shows this Rule.



To create the second Rule, add a new rule in the Console using the following information:

Name	High Avg Qc Alert
Status	Enabled
Description	Control LED4 based on thresholds of last 10 sec average Qc value
Statement	select *, intMetric('qc') as qc, avg(intMetric('qc')) as avgQc from EdcMessageEvent.win:time_batch(10 sec) where semanticTopic.startsWith("eurotech/demo") having avg(intMetric('qc')) > 10

The Rule statement again looks at the average value of ‘qc’ over 10 seconds and triggers only when average qc>10.

Under Rule Actions, add an email action with the following parameters:

To	*[enter a valid e-mail address]*
Subject	Code Alert: #if ($avgQc >= 25) HIGH-HIGH Alarm #else HIGH Alarm #end
Body	On date: $receivedOn asset: $asset published on topic: $semanticTopic a QC value of $qc resulting in an average QC value of $avgQc over the last 10 seconds.

The e-mail subject contains conditional logic that will result in a subject of “Code Alert: HIGH-HIGH Alarm” or “Code Alert: HIGH Alarm”, depending on whether the average ‘qc’ is greater than 25 or between 10 and 25.

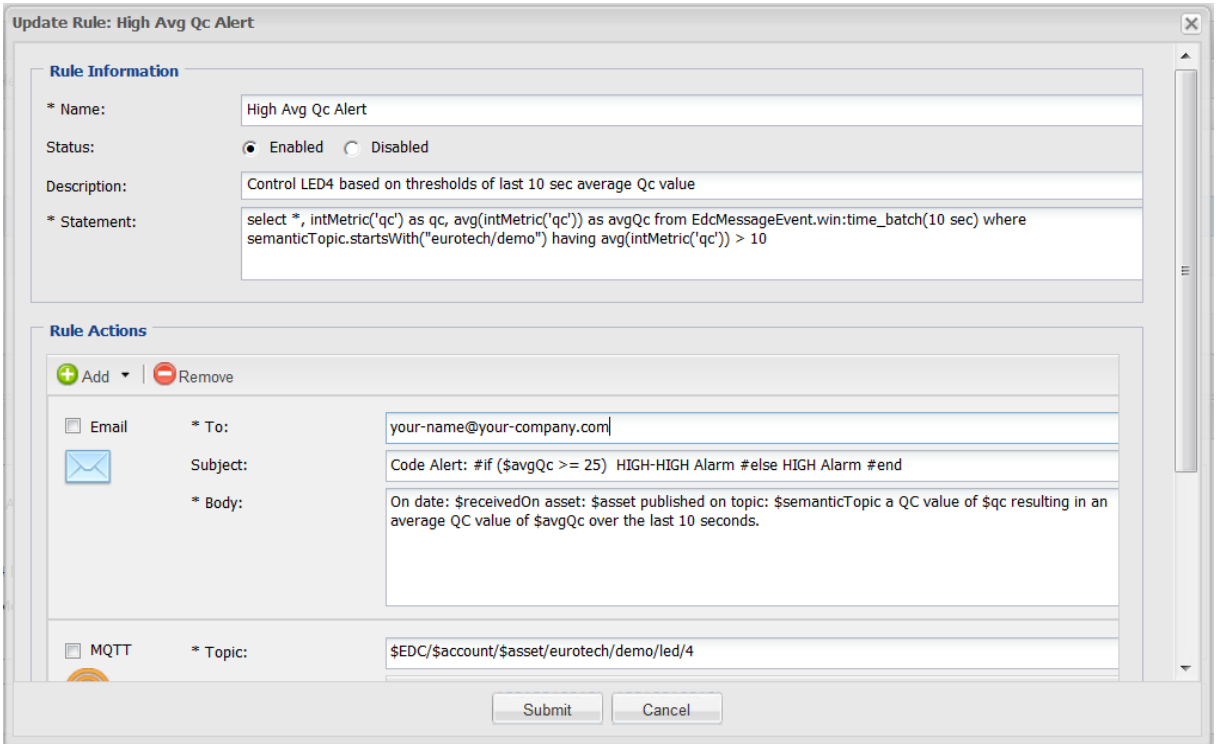
Under Rule Actions, add an MQTT action with the following parameters:

Topic	$EDC/$account/$asset/eurotech/demo/led/4
Metrics	(remove all default metrics, and add only a single metric)

Name	Type	Value
red	String	true
green	String	false
blue	String	false

The MQTT action in this Rule changes the state of the three metrics. So the red LED turns on, and the green LED turns off.

The following screen capture shows this Rule.



To test these two rules, first press the Counter 3 button on the EDC Demonstration Board clearing the Quad Counter value based on logic in the PLC. LED4 should turn to green as a result of the first rule in this example. Then turn the Quad Counter dial 10 clicks clockwise. LED4 should remain green.

Next, turn the Quad Counter dial one more click clockwise (qc = 11). This action should generate a published message to the Everyware Cloud within 10 seconds, and the second rule should publish a control back to the Helios causing LED4 to turn red. You should also receive a “HIGH alarm” e-mail message. Turn the Quad Counter dial at least one full revolution further clockwise. After 10 seconds, you should receive a “HIGH-HIGH alarm” e-mail message. Turn the dial counter-clockwise to reverse the stages until the LED4 returns to a green color and the e-mail notifications stop (or disable the “High Avg Qc Alert” rule).

If you leave the Rules active and the Quad Counter with a value greater than 10, you will continue to receive alarm notifications at intervals defined by the Cloud Publish configuration in the Helios.

Configuring Cloud Publish Application

The Helios comes with a Java application written as part of the ESF software framework. This application requests status from the PLC and publishes this data to the Everyware Cloud periodically or whenever it changes based on a user pushing a button or turning a dial on the EDC Demonstration Board. The application also subscribes to controls using the MQTT protocol. When the Helios receives control messages from the Everyware Cloud, the controls are sent to the PLC causing lights on the board to turn on or off.

You can configure a few settings of the Cloud Publish application on the Helios, such as how often it polls the PLC, how often it publishes, and the MQTT topics used to publish and subscribe to data.

To configure the Cloud Publish application, complete the following steps:

1. Log into the Helios administrative console. (See Operating System, page 9.)

2. Edit the application configuration file.
   To edit the file, enter the following commands:

```
cd /opt/jvm/esf/configuration/.esf/com.esf.core.configuration/
nano com.esf.app.demo.modbus.config
```

   The configurable variables of the application can be changed as follows:

```
poll.interval=1000
publish.interval=180
location=eurotech/demo
control.topic=eurotech/demo
```

   The variables are defined as follows:

poll.interval	How often (in milliseconds) to poll the PLC using the Modbus protocol
publish.interval	How often (in seconds) to publish data to the Everyware Cloud if there are no changes
location	MQTT “semantic topic” on which to publish PLC data The full MQTT publish topic will be: *account_name/Helios_MAC_address/semantic_topic* The *Helios_MAC_address* is the “Asset ID” in the Everyware Cloud and is automatically incorporated by the Cloud Publish application. The *semantic_topic* (indicated by the “location” variable) is the topic which will appear in the Everyware Cloud Console containing this device’s data.
control.topic	MQTT “semantic topic” on which the Helios will subscribe to control data Data published to the Everyware Cloud on the following topic will be automatically delivered to the Helios whenever it is subscribed: *$EDC/account_name/Helios_MAC_address/control.topic* The *Helios_MAC_address* is the “Asset ID” in the Everyware Cloud that is used by the Helios to publish PLC data. Control topics, beginning with “$EDC/*account_name*”, are only used for publish/subscribe but do not generate data storage events in the Everyware Cloud. The following publish topic can also be used, which will both publish the message to the Helios and generate an Everyware Cloud storage event with the control data: *account_name/RulesAssistant/control.topic*

3. Save the changes.
   After setting the variables in the application configuration file, press Control-X to exit then press y when prompted to save changes.

4. Restart the ESF framework.
   To use the new configuration file, power cycle the Helios or restart ESF with the following command:

```
ESF restart
```

Using the Dashboard

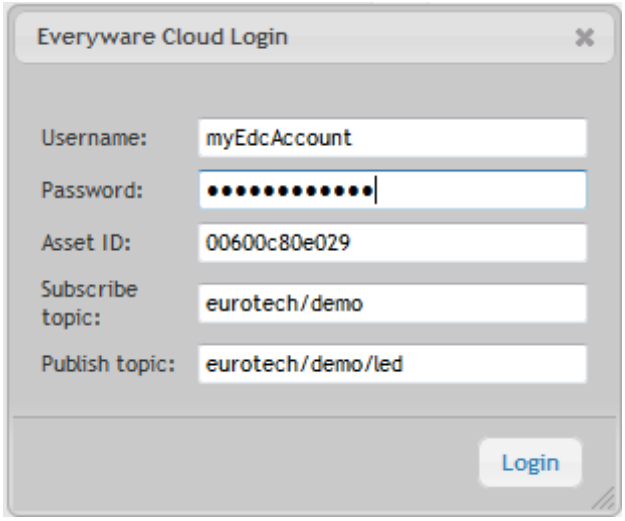
In addition to the Console, you can view PLC data and send controls back to the Helios using a Web-based Dashboard. An example Dashboard has been set up to demonstrate how a Web-based or infrastructure application can use the Everyware Cloud to acquire published data and send controls to Cloud-connected devices using REST APIs.

To connect to the EDC Development Kit Dashboard, you must use the Mozilla Firefox browser. In the browser, open the following Web address: http://devkit.everyware-cloud.com/.

Logging into the Dashboard

Log into the Dashboard with the following credentials:

Username	Username of your Everyware Cloud account
Password	Account password of the above Username
Asset ID	Identifier of the application or sensors from which the data has been gathered For the EDC Development Kit, the Asset ID is the MAC address of the Helios. In this case, the Asset ID and Client ID are the same. To obtain the Asset ID, view the list of Devices in the Everyware Cloud Console and use the MAC address listed under Client ID.
Subscribe Topic	Topic on which the Dashboard will subscribe This is the same topic that the Helios uses to publish data. By default, the development kit is configured with a topic of "eurotech/demo". If this configuration parameter ("location") has been changed, use the correct topic when logging into the Dashboard. See Configuring Cloud Publish Application, page 32, for details on configuring the Cloud Publish application topic.
Publish Topic	Topic on which the Dashboard will publish controls By default, the development kit is configured with a control.topic of "eurotech/demo". The Cloud Publish application appends the additional topic "/led" for the LED controls, so this must be included when logging into the Dashboard. If this configuration parameter has been changed, use the correct topic when logging into the Dashboard.



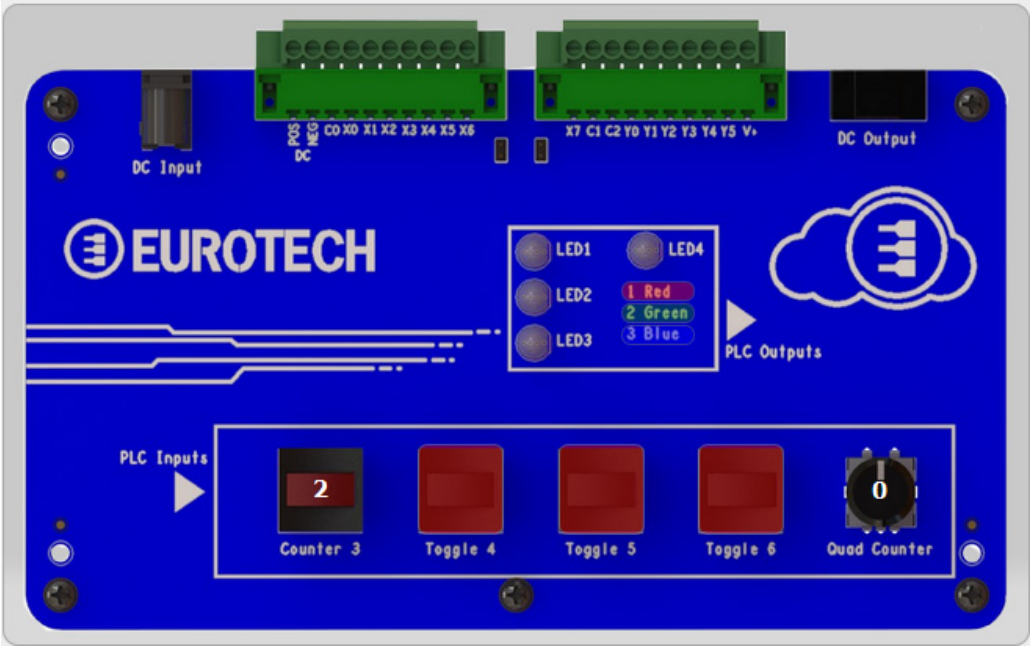
Note:
For the Cloud Publish application version 1.1, the default Subscribe Topic is "us/Kansas/stilwell" and the Publish Topic is "us/Kansas/led".

Dashboard Controls

After logging into the Dashboard, wait a minimum of 5 seconds for the Dashboard status to be updated.

Note:
The Dashboard updates itself approximately every five seconds after performing REST API queries to the Everyware Cloud.

The following figure shows a graphic of the EDC Demonstration Board that is included in the Dashboard.



Several areas of the graphic are connected with dynamic controls to view PLC data:

- Counter 3 displays a count of how many times the Counter 3 button on the EDC Demonstration Board has been pressed.
- Toggle 4, Toggle 5, and Toggle 6 buttons indicate the state of the buttons on the EDC Demonstration Board.
- Quad Counter displays the current count.
- LED1, LED2, and LED3 indicate the state of the LEDs on the EDC Demonstration Board.
- LED4 shows the color of LED4 on the EDC Demonstration Board.

In addition to the indicators, several areas on the graphic provide control of outputs published to the development kit:

- Click on LED1, LED2, or LED3 to toggle the state of the corresponding LEDs on the EDC Demonstration Board. The color of the LEDs on the board may differ from the graphical display of the Dashboard LEDs.
- Click on the color names below LED4 to change the color of the LED on the EDC Demonstration Board.

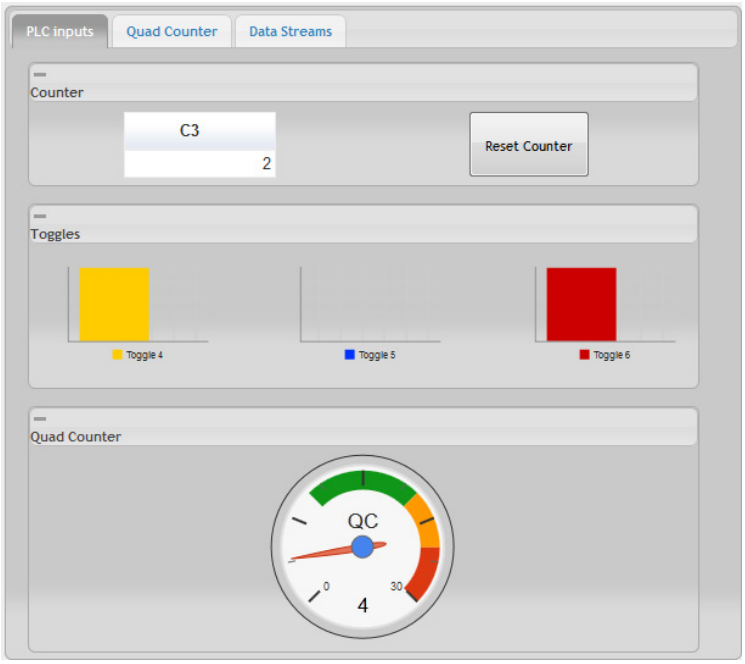
Note:
The color change of LED1, LED2, and LED3 in the Dashboard is an instantaneous graphical effect of the user's click. The LED colors are also updated after a query accordingly to the value of the corresponding metrics. If there is a mismatch between the color determined by the click and the color determined by the result arriving from a previously instanced query, the LED color in the Dashboard can vary. In this case, wait for the next query to update the color (approximately 5 seconds).

There will be a delay between the changes to LED4 on the board and to the representation of LED4 on the Dashboard. The change in the Dashboard is not a graphical effect of the user's click. It is a result of the query to the Everyware Cloud.

If you have implemented the Rules examples discussed in a previous section (see Creating Rules, page 25), the values of LED1 and LED4 that you change in the Dashboard will be overwritten by published messages from the Helios.

Additional Indicators and Data Stream

The tabs along the side of the Dashboard show additional indicators of the Metrics published by the Helios. These tabs are given as examples of the types of displays used in a human-machine interface.

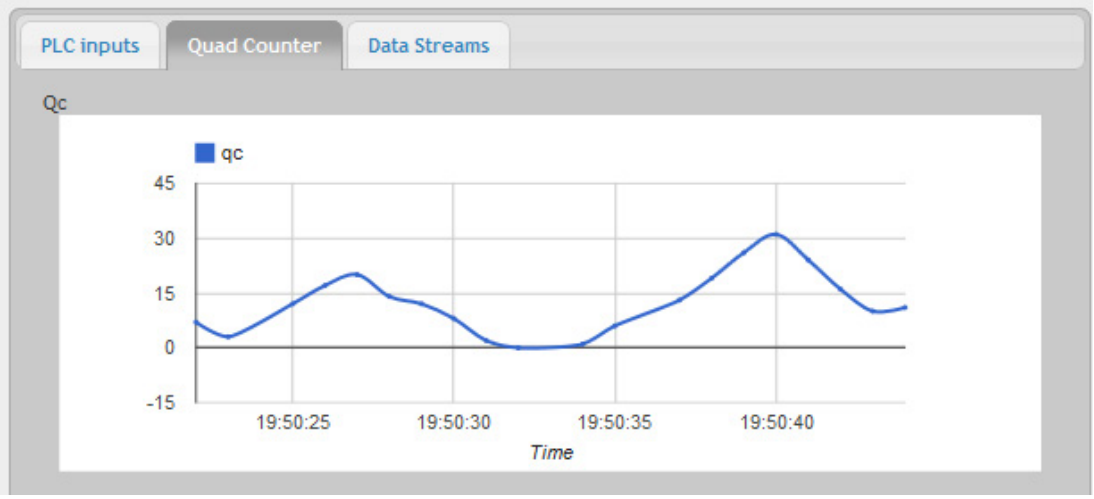


Click on the PLC Inputs tab to show examples that use the PLC Inputs on the EDC Demonstration Board.

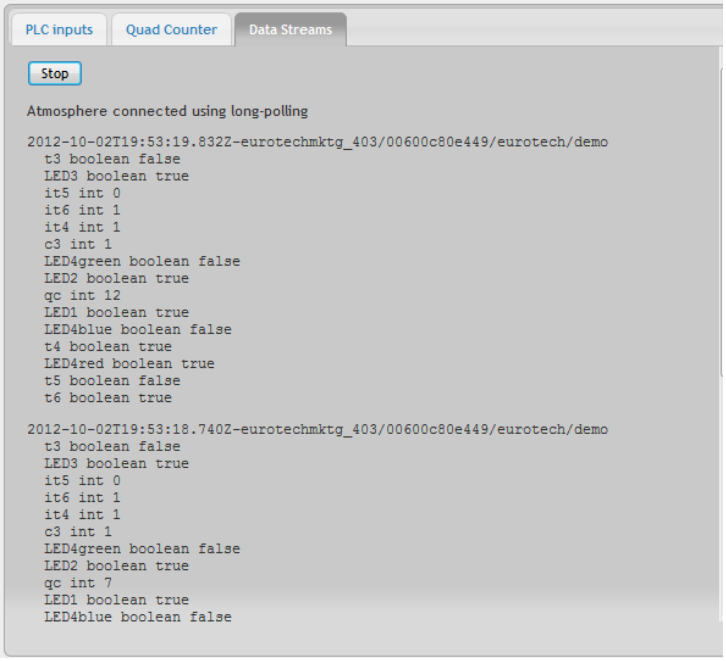
- In the Counter area, the C3 value shows a count of how many times the Counter 3 button has been pressed. Clicking the Reset Counter button resets the counter.
- In the Toggles area, the graphs Toggle 4, Toggle 5, and Toggle 6 show the state of the Toggle 4, 5, and 6 buttons.
- In the Quad Counter area, the QC dial graphically displays the value of the Quad Counter dial. Note that this is a generic graphic and that its red and green colors are not connected to the numeric thresholds specified in the Rules notification discussed in a previous section (Creating Rules, page 25).

Note:
The Cloud Publish application version 1.1 does not support the Reset Counter button.

Click on the Quad Counter tab to show a graph of published values of the 'qc' Metric. Turn the Quad Counter on the EDC Demonstration Board to change the count. The graph is dynamically updated as new messages are published from the Helios into the Everyware Cloud.



Click on the Data Streams tab to view a dynamic data stream to the Everyware Cloud using a REST API. Click on the Get Streams button. Next generate data from the development kit by turning the Quad Counter. As new messages are published from the Helios, they automatically appear in the Data Streams window.



Changing your Security Settings

Eurotech recommends that you change the passwords listed in this section after your initial setup.

Linux

To change your Linux password, complete the following steps:

1. Log in using the `root` account with the password `IsiTech`.
2. Change the 'root' password using the command `passwd`.
3. When prompted, enter a new 'root' account password.

Denali

To change the Denali password on your Helios, complete the following steps:

1. Log into the Denali Setup Web page.
2. Click on the Security tab.
3. Enter the current username and password. The default username and password are `eurotech`.
4. Enter the new username and password.
5. Click the Change Web Password button to change the password

For additional details, refer to the *Denali User Manual, Chapter 12 Security* available at http://support.eurotech-inc.com/forums/topic.asp?topic_id=3040.

Everyware Cloud Administrator

To change your Everyware Cloud Administrator password, complete the steps described in the *Everyware Cloud Developer's Guide, Managing Account Settings* available at http://everywarecloud.eurotech.com/doc/ECDevGuide.

Everyware Cloud Broker

To create a new Everyware Cloud broker password, change the broker user account in the Everyware Cloud account and the Cloud_Client password in Denali on your Helios.

To change your Everyware Cloud broker password, complete the steps described in the *Everyware Cloud Developer's Guide, Managing Account Settings* available at http://everywarecloud.eurotech.com/doc/ECDevGuide.

To change the Denali Cloud_Client password on your Helios, complete the following steps:

1. Log into the Denali Setup Web page.
2. Click on the Cloud_Client tab.
3. Enter the same username and password as the broker user account in the Everyware Cloud.
4. Click the Submit New Configuration button.

Troubleshooting

This section provides some helpful troubleshooting tips if you have problems getting started with your development kit.

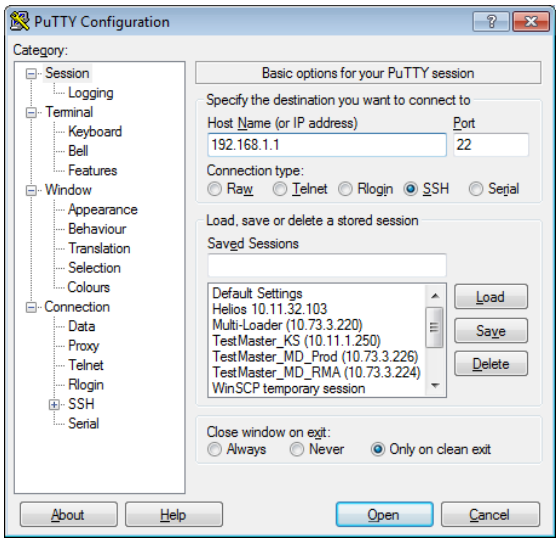
Remote Log In

If you have a VGA monitor and keyboard connected to your Helios, you can log into the administrative console from the display interface. If you are logging into the Helios over a network connection, you will need to use SSH (Secure SHell).

For Linux systems, the `ssh` command is available as an SSH client.

For Windows systems, the PuTTY program is available as a free SSH client. Download and install PuTTY (choose the Windows installer version) from http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html.

Once the PuTTY application is installed on the Windows computer, run the PuTTY application and enter the IP address of the Helios. Set the Connection type to SSH and the Port to 22. Click the Open button to connect.



The first time an SSH connection is made with PuTTY, a security warning is given as PuTTY tries to authenticate with the Denali routing application. Click Yes to continue. Then log into the Helios `root` account using the correct password.

Helios IP Address and Route

After you have logged into the Helios administrative console, enter one of the following commands to determine the current IP address of the system.

`ifconfig`	(to list all network interfaces)
`ifconfig eth0`	(for the Ethernet address)
`ifconfig eth1`	(for the Wi-Fi address)

To set a temporary network address on an interface, use the command:

`ifconfig` *`interface ip_address`* `netmask` *`subnet`*

where *`interface`* is the network name (eth0, eth1), *`ip_address`* is the address on the network, and *`subnet`* is the subnet mask in dotted notation (such as 255.255.0.0).

To check the route table of Denali, enter the following command. The entry listed as “default” is currently set as the default route to the Internet.

`route`

Helios Network Connection

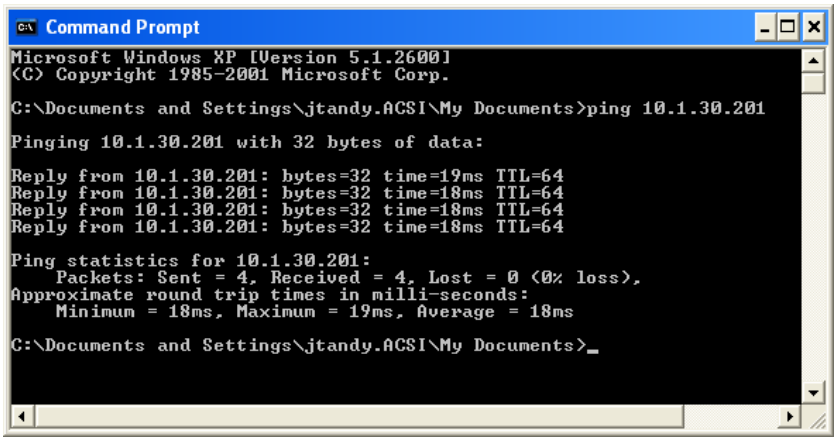
If you cannot connect to the Helios over your network, ping its IP address.

In the Microsoft Windows Start menu, select Accessories>Command Prompt. The Command Prompt window is displayed.

Type the command:

`ping` *`address`* where *`address`* is the numeric address of the Helios

A diagnostic message is sent to Denali to check communication. If successful, the Ping response will receive a reply, as shown in the following window.



If you are still unable to get Helios to connect to a network, check with the network administrator for additional support.

Denali Setup Web Page

The section describes common reasons why the Denali Setup Web page fails to load.

Due to network configuration, the computer making the connection may not be able to reach the Helios system. Check the connection by doing a ping command. See Helios Network Connection, page 40.

However if you are trying to connect over the Internet using a cellular connection, a ping may fail because it is blocked by the cellular network. In this case, try making an SSH connection with the PuTTY application. The SSH connection should work if a connection can be made to the Helios system. See Remote Log In, page 39.

If connecting over a cellular network, such as the Sprint network in the United States, the problem may be that port 80 is blocked. In the Web browser, try entering the full HTTPS address of the Helios https://*ip_address*/cgi-bin/php/main.php where *ip_address* is the address of the Helios.

Everyware Cloud Connection

If you have the Helios configured but do not see it listed in the Everyware Cloud Console, try the following steps:

1. Verify the Cloud_Client configuration of the Helios to ensure it matches the credentials and broker URL you have been given (see Verifying your Everyware Cloud Configuration, page 17).
2. Log into the Everyware Cloud Console and verify that the account name is correct and that the username configured in the Helios has either Administrator or “broker:connect” privileges. To check user accounts, click on Settings in the left panel of the Console and then click the Users tab.
3. Log into the Helios administrative console (see Remote Log In, page 39). From the command line, verify that the Helios can connect to the Internet by doing the following two ping commands:

```
ping 4.2.2.1 -c 4
ping google.com -c 4
```

4. Restart ESF with the following command:

```
ESF restart
```

.

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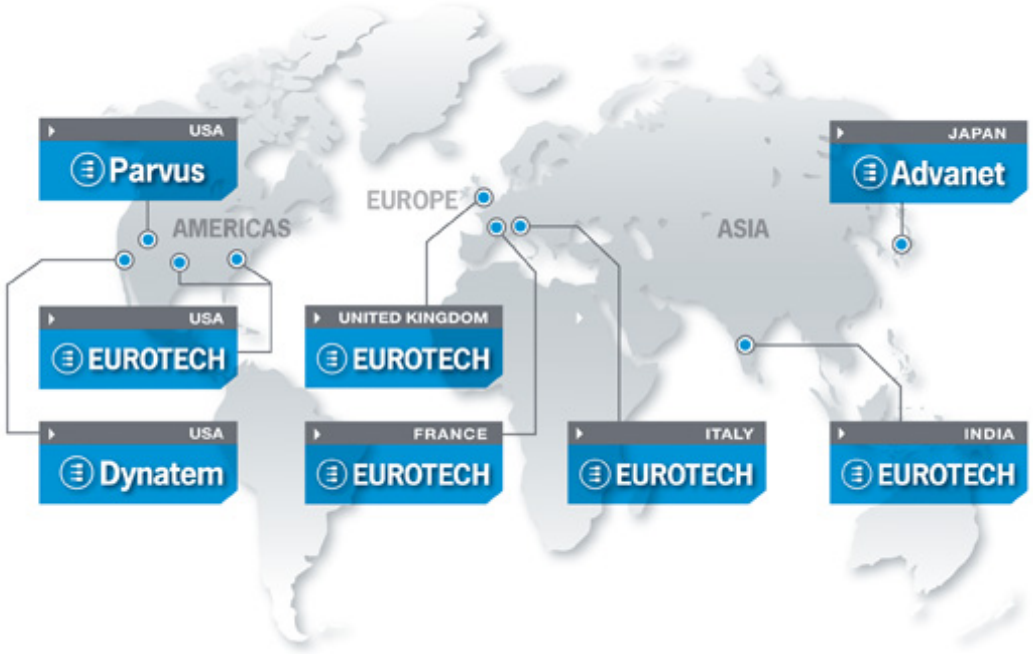

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