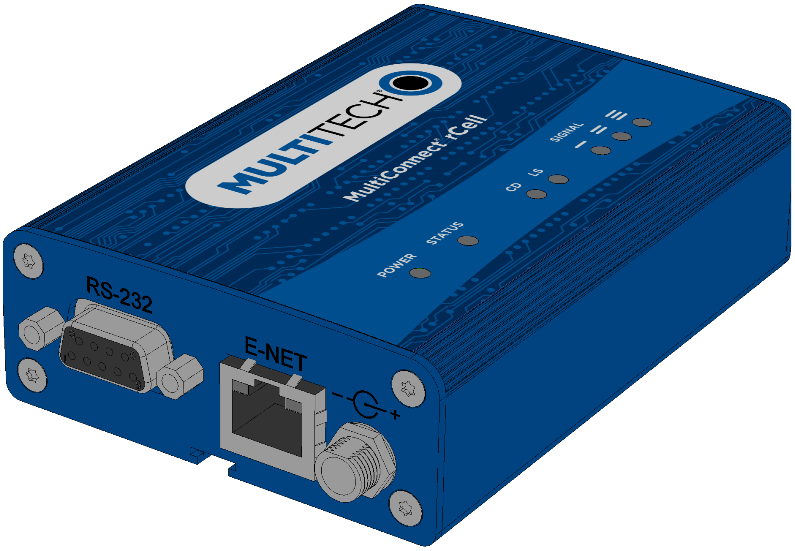

MultiConnect® rCell 100

MTR-C2 User Guide

MultiConnect® rCell 100 Series Router User Guide

Model: MTR-C2

Part Number: S000567 Version: 2.8

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The Knowledge Base provides immediate access to support information and resolutions for all MultiTech products. Visit http://www.multitech.com/kb.go.

Support Portal

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Support

Business Hours: M-F, 8am to 5pm CT

Country	By Email	By Phone
Europe, Middle East, Africa:	support@multitech.co.uk	+(44) 118 959 7774
U.S., Canada, all others:	support@multitech.com	(800) 972-2439 or (763) 717-5863

Warranty

To read the warranty statement for your product, visit www.multitech.com/warranty.go. For other warranty options, visit www.multitech.com/es.go.

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Fax (763) 785-9874

Contents

Chapter 1 – Chapter 1 Product Overview

About MultiConnect rCell 100 Series Router

This guide describes the MultiConnect rCell 100 Series Router. Use the rCell family of routers to provide secure data communication between many types of devices that use legacy and the latest communication technologies.

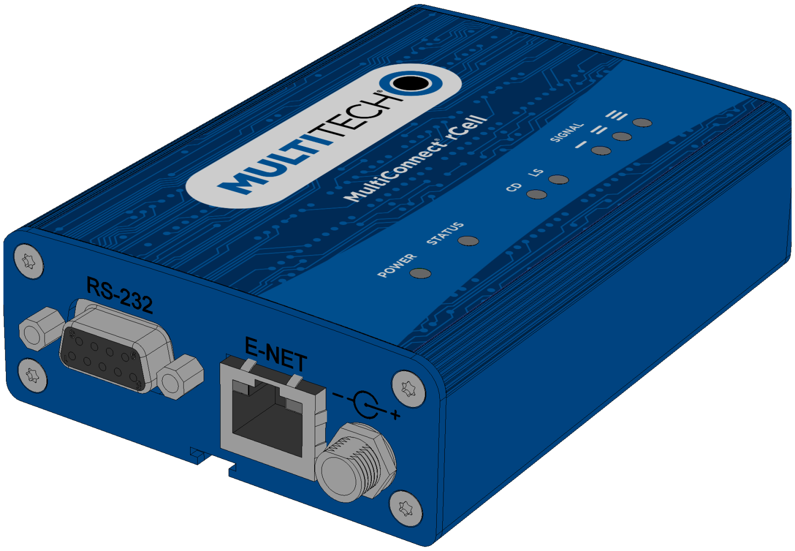
Some device models support:

- GPS capability

What's New in This Release

Manual version	Update description
2.4	Software update: Additional SMS commands, SNMP and Open VPN tunnels
2.6	RED compliance (H5-B07, H6-B16, and LEU1-B07 only)
2.8	Modbus Slave, Cellular Radio Firmware Upgrade (H5 and H6 only)

The router has an integrated cellular modem and includes 10/100 BaseT Ethernet and RS-232 serial connectivity. An image of the device follows:



Documentation

The following table describes additional documentation for your device. The documentation is available on the Multi-Tech Installation Resources website at http://www.multitech.com/brands/multiconnect-rcell-100-series.

Document	Description
User Guide	This document provides an overview, safety and regulatory information, schematics and general device information.

Document	Description
API Developer Guide	You can use the rCell API to manage configurations, poll statistics, and issue commands. Documentation is available on the MultiTech Developer Resources website at http://www.multitech.net/developer/software/mtr-api-reference/.
AT Commands	This document describes AT commands that are available for your device. These commands are documented in the Reference Guide part number S000546.

Descriptions of LEDs

The top panel contains the following LEDs:

- Power and Status LEDs—The Power LED indicates that DC power is present and the Status LED blinks when the unit is functioning normally.
- Modem LEDs—Two modem LEDs indicate carrier detection and link status.
- Signal LEDs—Three signal LEDs display the signal strength level of the wireless connection.
- Ethernet LEDs—These LEDs are not on the top panel. See the section Ethernet LED Descriptions for descriptions of these LEDs.

LED Indicators	
POWER	Indicates presence of DC power when lit.
STATUS	The LED is a solid light when the device is booting up, saving the configuration, restarting, or updating the firmware. When the Status LED begins to blink, the router is ready for use.
CD	Carrier Detect. When lit, indicates data connection has been established.
LS	Link Status OFF —No power to the cellular radio Continuously Lit — Transmitting or receiving Slow Blink (-0.2Hz) — Registered or connected LED Fast Blink (-3Hz) — Not registered or searching for connection
SIGNAL	Signal strength for cellular (RSSI range: 0 - 31) ALL OFF — Unit is off, not registered on network, or extremely weak signal (0 <= RSSI < 6). 1 Bar “ON” — Very weak signal (7 <= RSSI <14). 1 Bar and 2 Bar “ON” — Weak signal (15 <= RSSI <23). 1 Bar, 2 Bar, and 3 Bar “ON” — Good signal (24 <= RSSI >= 31).

Ethernet LED Descriptions

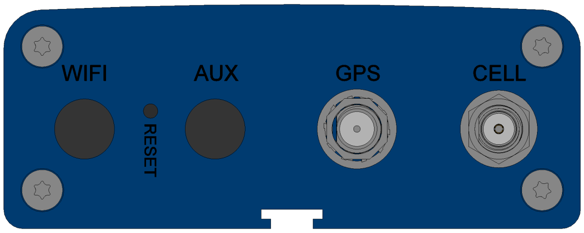
Two Ethernet LEDs are physically on the RJ-45 connector(s). The table that follows describes these LEDs.

Ethernet Link	Right LED on Ethernet connector. Blinks when there is transmit and receive activity on the Ethernet link. It shows a steady light when there is a valid Ethernet connection.
Ethernet Speed	Left LED on Ethernet connector. Lit when the Ethernet is linked at 100 Mbps. If it is not lit, the Ethernet is linked at 10 Mbps.

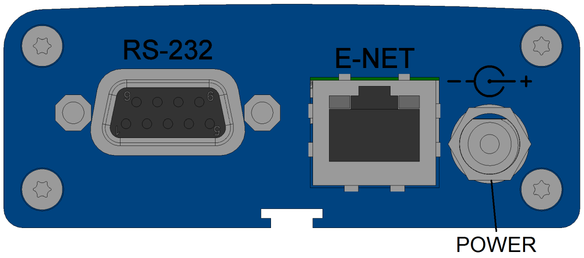
Side Panel Connectors

The device has connectors on both sides of the housing. The right side of the device contains a SIM card holder, a reset button, a GPS antenna connector, and a cellular-auxiliary antenna connector pair. Depending on the model of your device, the GPS and WiFi antenna connector may or may not appear.

The following shows the right side panel of the device:



The following shows the left side panel of the device containing an RS-232 connector, an Ethernet connector, and the power receptacle.



The following table describes the items on the two side panels:

Label	Description
CELL	Cellular antenna inputs. Use with the Exceltek Electronics C0081-ANG0002 antenna supplied with the device if ordered as a bundle. - CELL - Primary.
GPS	GPS antenna input. Use with the Trimble GPS antenna 66800-52 supplied with the device when ordered as a bundle. Used only on the B17 model.
RESET	Resets the device. Refer to Resetting the Device or Resetting User Defined Settings to the Device.
RS-232	DE 9-pin, female-D Sub through-hole connector.
E-NET	RJ-45 receptacle for standard Ethernet 10/100 Base-T.
	Caution: Ethernet ports and command ports are not designed to be connected to a public telecommunication network or used outside the building or campus.
Power	9-32 VDC power receptacle for provided power cord. The device uses a Globtek GT-41052-1509 9V 1.7A power supply.

Specifications

MTR-C2

Category	Description
General	
Performance	CDMA2000 1xRTT
Frequency Bands	Dual-Band 800/1900 MHz
Radio	
Cellular	Telit CE910-DUAL
Speed	
Packet Data	Up to 153 Kbps downlink and uplink
SMS	
SMS	Point-to-Point Messaging
	Mobile-Terminated SMS
	Mobile-Originated SMS
Connectors	
Cellular	Female SMA connectors for cellular
GPS	Female SMA connector
Power Requirements[1]	
Voltage	7 V to 32 V DC
Physical Description	
Dimensions	Refer to the *Dimensions* topic that follows.
Weight	8.2 ounces or 230 grams
Environment	
Operating Temperature[2]	-40° C to +85° C
Humidity	Relative humidity 15% to 93% non-condensing
Certifications, Compliance, Warranty	
EMC Compliance	EN55022 Class B EN55024
Safety Compliance	UL/cUL 60950-1
	UL201
	ANSI/ISA 12.12.01 2013 & CSA C22.2 No. 213
	EN 60079-0:2012+A11:2013
	EN 60079-15:2010
Network Compliance	Verizon, Aeris
Warranty	Two years

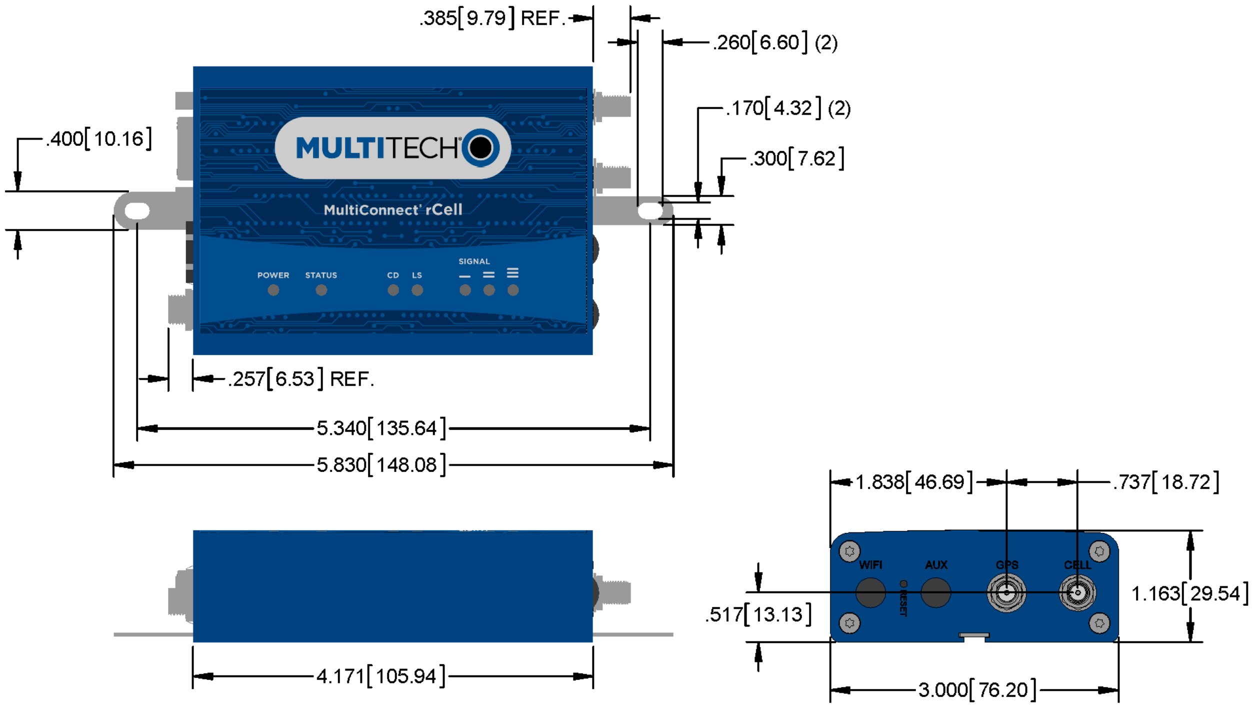
[1] Optional power supply must be a Listed ITE power supply marked LPS or Class 2 rated 1.0 A minimum. Certification does not apply or extend to voltages outside certified range, and has not been evaluated by UL for operating voltages beyond tested range.

[2] UL Recognized @ 40° C, Limited by AC power supply. UL Recognized @ 60° C when used with the fused DC power cable, part number FPC-532-DC.

Installation in outdoor locations has not been evaluated by UL. UL Certification does not apply or extend to outdoor applications.

> **Note:** Radio performance may be affected at the temperature extremes. This is considered normal. There is no single cause for this function. Rather, it is the result of an interaction of several factors, such as the ambient temperature, the operating mode, and the transmit power.

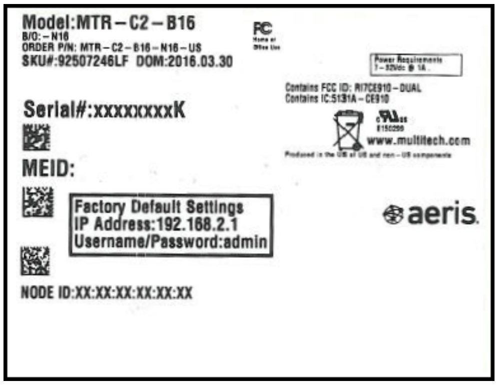
Dimensions



DIMENSIONS IN In [mm]

Labels

The images that follow show regulatory information for your device.



Model:MTR–C2–B16
B/O:–N16
ORDER P/N: MTR–C2–B16–N16–US
SKU#:92507246LF DOM:2016.03.30

Serial#:xxxxxxxxK

MEID:

Factory Default Settings
IP Address:192.168.2.1
Username/Password:admin

NODE ID:XX:XX:XX:XX:XX:XX

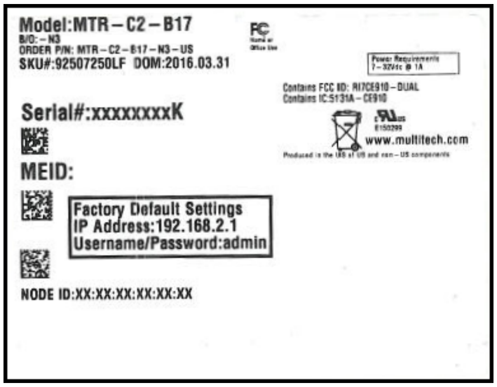
Home or Office Use

Power Requirements
7–32Vdc @ 1A

Contains FCC ID: RI7CE910–DUAL
Contains IC:5131A–CE910

E150299
www.multitech.com
Produced in the USA of US and non–US components

aeris



Model:MTR–C2–B17
B/O:–N3
ORDER P/N: MTR–C2–B17–N3–US
SKU#:92507250LF DOM:2016.03.31

Serial#:xxxxxxxxK

MEID:

Factory Default Settings
IP Address:192.168.2.1
Username/Password:admin

NODE ID:XX:XX:XX:XX:XX:XX

Home or Office Use

Power Requirements
7–32Vdc @ 1A

Contains FCC ID: RI7CE910–DUAL
Contains IC:5131A–CE910

E150299
www.multitech.com
Produced in the USA of US and non–US components

Power Draw MTR-C2

	Cellular call box connection no data (amps)	Average measured current (amps) at maximum power	Peak TX amplitude current (amps)	Total inrush charge measured in MilliCoulombs (mC)
7 volts				
US Cellular 800 MHz	0.209	0.548	0.640	9.1
US PCS 1900 MHz	0.245	0.618	0.716	
9 volts				
US Cellular 800 MHz	0.185	0.430	0.504	31
US PCS 1900 MHz	0.216	0.510	0.600	
32 volts				
US Cellular 800 MHz	0.056	0.133	0.188	15.4
US PCS 1900 MHz	0.065	0.148	0.208	

Note: Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load. The above power draw numbers are measurements from an MTR-C2-B17.

Peak Tx: The peak current during a CDMA connection transmitting data at max power.

Maximum Power: The continuous current during maximum data rate with the radio transmitter at maximum power

Inrush Charge: The total inrush charge at power on.

Chapter 2 – Chapter 2 Safety Warnings

Lithium Battery

- A lithium battery (3V, coin cell, CR1632) located within the product provides backup power for the timekeeping. This battery has an estimated life expectancy of ten years.
- When this battery starts to weaken, the date and time may be incorrect.
- Battery is not user replaceable. If the battery fails, the device must be sent back to MultiTech Systems for battery replacement.
- Lithium cells and batteries are subject to the Provisions for International Transportation. Multi-Tech Systems, Inc. confirms that the Lithium batteries used in the MultiTech product(s) referenced in this manual comply with Special Provision 188 of the UN Model Regulations, Special Provision A45 of the ICAO-TI/IATA-DGR (Air), Special Provision 310 of the IMDG Code, and Special Provision 188 of the ADR and RID (Road and Rail Europe).

CAUTION: Risk of explosion if this battery is replaced by an incorrect type. Dispose of batteries according to instructions.
Attention: Risque d'explosion si vous remplacez la batterie par un modèle incompatible. Jetez les piles usagées selon les instructions.

Ethernet Ports

CAUTION: Ethernet ports and command ports are not designed to be connected to a public telecommunication network.

Radio Frequency (RF) Safety

Due to the possibility of radio frequency (RF) interference, it is important that you follow any special regulations regarding the use of radio equipment. Follow the safety advice given below.

- Operating your device close to other electronic equipment may cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.
- Different industries and businesses restrict the use of cellular devices. Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or where blasting operations are in process. Follow restrictions for any environment where you operate the device.
- Do not place the antenna outdoors.
- Switch OFF your wireless device when in an aircraft. Using portable electronic devices in an aircraft may endanger aircraft operation, disrupt the cellular network, and is illegal. Failing to observe this restriction may lead to suspension or denial of cellular services to the offender, legal action, or both.
- Switch OFF your wireless device when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.
- Switch OFF your wireless device in hospitals and any other place where medical equipment may be in use.

Interference with Pacemakers and Other Medical Devices

Potential interference

Radio frequency energy (RF) from cellular devices can interact with some electronic devices. This is electromagnetic interference (EMI). The FDA helped develop a detailed test method to measure EMI of implanted cardiac pacemakers and defibrillators from cellular devices. This test method is part of the Association for the Advancement of Medical Instrumentation (AAMI) standard. This standard allows manufacturers to ensure that cardiac pacemakers and defibrillators are safe from cellular device EMI.

The FDA continues to monitor cellular devices for interactions with other medical devices. If harmful interference occurs, the FDA will assess the interference and work to resolve the problem.

Precautions for pacemaker wearers

If EMI occurs, it could affect a pacemaker in one of three ways:

- Stop the pacemaker from delivering the stimulating pulses that regulate the heart's rhythm.
- Cause the pacemaker to deliver the pulses irregularly.
- Cause the pacemaker to ignore the heart's own rhythm and deliver pulses at a fixed rate.

Based on current research, cellular devices do not pose a significant health problem for most pacemaker wearers. However, people with pacemakers may want to take simple precautions to be sure that their device doesn't cause a problem.

- Keep the device on the opposite side of the body from the pacemaker to add extra distance between the pacemaker and the device.
- Avoid placing a turned-on device next to the pacemaker (for example, don’t carry the device in a shirt or jacket pocket directly over the pacemaker).

Antenna

The antenna intended for use with this unit meets the requirements for mobile operating configurations and for fixed mounted operations, as defined in 2.1091 and 1.1307 of the FCC rules for satisfying RF exposure compliance. If an alternate antenna is used, consult user documentation for required antenna specifications.

Chapter 3 – Chapter 3 Cellular Information

Antenna System Cellular Devices

The cellular/wireless performance depends on the implementation and antenna design. The integration of the antenna system into the product is a critical part of the design process; therefore, it is essential to consider it early so the performance is not compromised. If changes are made to the device's certified antenna system, then recertification will be required by specific network carriers.

Requirements for Cellular Antennas with regard to FCC/IC Compliance

There cannot be any alteration to the authorized antenna system. The antenna system must maintain the same specifications. The antenna must be the same type, with similar in-band and out-of-band radiation patterns.

This device has been designed to operate with the antennas listed below and having a maximum gain for 850 MHz of <= 6.4 dBi , for 1700 MHz of <= 6.5 dBi, and for 1900 MHz of <= 3 dBi. Antennas not included in this list or that have a gain greater than specified are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

EV-DO and CDMA Antenna Information

EV-DO and CDMA Authorized Antennas

These devices were approved with the following antenna:

Manufacturer:	Exceltek Electronics Ltd.
Manufacturer's Model Number:	C0081-ANG0002
MultiTech Part Number	45009713L

Multi-Tech ordering information:

Model	Quantity
ANQB-1HRA	1
ANQB-10HRA	10
ANQB-50HRA	50

EV-DO and CDMA Antenna Requirements

Category	Description
Frequency Range	824 - 894 MHz / 1850 - 1990 MHz
Impedance	50 Ohms
VSWR	VSWR should not exceed 2.0:1 at any point across the bands of operation
Typical Radiated Gain	2 dBi on azimuth plane
Radiation	Omni-directional
Polarization	Linear vertical

Chapter 4 – Chapter 4 Carrier Specific Information

Notice for Devices that Use Aeris Radios

One component of your device is a radio. A radio algorithm prevents your device from repeatedly attempting to connect to the network when the radio:

- Cannot establish a packet data connection or
- Fails to access the application server.

When writing applications for your devices, ensure that your applications do not interfere with the radio's connection retry algorithm. If you fail to do so, Aeris might block network access for your devices.

After your devices reach the end of their commercial lifespan, you must remove them from the Aeris network. To do so, remove power from the devices and remove their antennas. If your devices continue to attempt to register with the network after you cancel device subscriptions, Aeris can bill you for any traffic generated by those devices.

Chapter 5 – Chapter 5 Installing the Router

Installing the Router

1. To use the router's cellular features, connect a suitable antenna to the antenna connector.
2. Using an Ethernet cable, connect one end of the cable to the E-NET connector on the back of the router and the other end to your computer, either directly or through a switch or hub.
3. If you are connecting to a serial interface, connect the DE-9 connector (9-pin) of the RS-232 cable to the RS-232 connector on the router. Then connect the other end to the serial port on the desired device.
4. Some routers support the use of a GPS receiver. If you are using a GPS receiver with the router, attach the GPS cable to the GPS connector on the router.
5. Attach a power cable to your power supply module.
6. Screw-on the power lead from the power supply module into the power connection on the router.
7. Plug the power supply into your power source.

   The POWER LED lights after the device powers up.

   When the Status LED begins to blink, the device is ready for use.
8. You can configure your router by using your router's web management interface. You might need to change the IP address of your computer to be in the same IP and subnet mask range as the device.

   a. Open a web browser. In the browser's address field, type the default address for the router: http://192.168.2.1. (If the browser displays a message that there is a problem with the website's security certificate, ignore this and click **Continue to the webpage**).

   b. A login page opens. In the **username** field, type the default user name: admin (all lower-case).

   c. In the **password** field, type the default password: admin (all lower-case).

   d. Click **Login**. The Web Management Home page opens. Online documentation included with the web management interface describes how to configure your router.

Mounting the Device

1. Locate the groove on the bottom of the modem.
2. Slide the mounting rod through the groove.
3. To secure the rod to the desired surface, place and tighten two screws in the holes on either end of the mounting rod. The dimensions illustration in this guide shows the mounting rod, as well as the dimensions for placement of the screws.

Setting up GPS

If your model can support a GPS, see the online help file for information on working with a GPS.

Resetting the Device

You need:

- A pin, paperclip, or similar thin object that can fit into the reset hole

The following is the default condition for the RESET button on the device. You can program a change to the behavior of the button if needed.

To reset the device:

1. Find the hole labeled RESET. The reset button is recessed into the case.
2. Use the pin to press and release the RESET button as follows:

   Reset options:

   - To reboot, press RESET for less than 3 seconds.
   - To reboot and restore user-defined defaults (if previously set), press RESET for 3 to 29 seconds.
   - To reboot, restore factory settings, and erase user-defined defaults, press RESET for 30 seconds or longer.

Note: The device reboots when restoring settings.

Restoring User Defined Settings to the Device

You can restore user defined settings to your device.

You need:

- A pin, paperclip, or similar thin object that can fit into the reset hole

1. Locate the hole in the panel labeled RESET. The reset button is recessed into the housing.
2. Use the pin to press in the button for about 3 seconds and then release the RESET button.
   - If you do not press in the button long enough, the device will reset, but the user defined settings will not be restored.
   - If you hold it too long, factory default settings will be restored.

The device reboots with user-defined configuration settings restored.

The location of the RESET button is the same on the faceplate of the Conduit Application model.

Restoring User Defined Settings to the Device

You can restore user defined settings to your device.

You need:

- A pin, paperclip, or similar thin object that can fit into the reset hole

1. Locate the hole in the panel labeled RESET. The reset button is recessed into the housing.
2. Use the pin to press in the button for about 3 seconds and then release the reset button.
   a. If you do not press in the button long enough, the device will reset, but the user defined settings will not be restored.
   b. If you hold it too long, factory default settings will be restored.

Chapter 6 – Chapter 6 Using the Wizard to Configure Your Device

First-Time Setup

If you need to change the mode of your device, this is the only way to do so. This section is not available through the device management software.

Other than when you first power up the device, you must configure the device to factory default settings, reset it and then, access it through the default 192.168.2.1 IP address to see the first-time setup. This wizard helps you configure the main features of your rCell.

Depending on the mode, your proceeding options and fields differ (see the description for each step for details below). Here are the steps for first-time setup:

1. On the first page, the mode option lets you set up the rCell as a **Network Router**, **PPP-IP Passthrough**, or **Serial Modem** device. If you switch modes, we recommend that you reset the device and configure to factory default settings.
   a. The **Network Router** mode is the default and establishes the device as a cellular network router.
   b. In the **PPP-IP Passthrough** mode, the rCell assigns the IP address it receives from the cellular provider to the Ethernet-attached device. In this mode, the rCell only allows one DHCP lease.

      Note: In this mode, many of the rCell services described in this document are non-configurable and do not appear in the device configuration menu. All IP traffic is passed between the Ethernet-attached device and the cellular provider with no firewall functionality.
   c. The **Serial Modem** mode creates a serial connection to the device which can be configured for speed and flow control. The serial port talks to the cellular radio in order to send and receive messages via the cellular radio.
   d. Click **Next**.
2. In the **Choose Password** page, enter the following:
   a. In the **Current Password** field, type the current password. The default password is **admin**.
   b. In the **New Password** field, type the password you want to use to replace the current one.
   c. To confirm the accuracy of the password, re-type it in the **Confirm Password** field.
   d. Click **Next**. Or if you are done making changes, click **Finish**.

      Note: If you do not want to change your password, click **Skip**.
3. In the **Time Configuration** page, set the date, time, and time zone.
   a. In the **Date** field, type in the date you desire, or select the date from the pop-up calendar that opens.
   b. In the **Time** field, type the desired time.
   c. From the **Time Zone** drop-down list, select the time zone in which the router operates.
   d. Click **Next**. Or if you are done making changes, click **Finish**.
4. In the **IP Setup** page, give the router its address and network information (the fields shown vary based on the selected mode):

If you select **PPP-IP Passthrough** mode, the following options are displayed:

a. In the **Protocol Support** field, choose **IPv4** only as the cell radios for C2 and EV3 do not support **IPv6**.
b. In the **IPv4/IPv6 Address** field, type the router's IP address.
c. For **IPv6**, in the **Prefix Length** field, the length of the prefix displays. Users cannot change this field. For **IPv4**, in the **Mask** field, type the mask for the network. The default is 255.255.255.0.
d. In the **IPv6/IPv4 Primary DNS** field, type the address of the primary DNS (optional).

   Note: This is an optional value that can be used if you use a DNS server other than the servers received from your carrier.

e. Click **Next**. Or if you are done making changes, click **Finish**.

If you select **Network Router** or **Serial Modem** mode, the following options are displayed:

a. In the **IP Address** field, type the router's IP address.
b. In the **Mask** field, type the mask for the network. The default is 255.255.255.0.
c. This field is only available in **Network Router** mode. If you select **Serial Modem** mode, skip this step. In the **IPv4 Primary DNS** field, type the address of the primary DNS (optional).

   Note: This is an optional value that can be used if you use a DNS server other than the servers received from your carrier.

d. Click **Next**. Or if you are done making changes, click **Finish**.

5. This section is only available if you select **Network Router** or **PPP-IP Passthrough** mode. If you select **Serial Modem** mode, skip this step. In the **PPP Configuration** page, configure PPP for your router.

   a. To use PPP, check **Enabled**. When enabled, your device functions as a router.
   b. For devices without an AUX connector (no diversity), leave **Diversity** unchecked. Diversity enables the use of two cellular antennas for better performance.
   c. To enable the dial-on-demand feature, check **Dial-on-Demand**. This indicates to the router to bring up the PPP connection when there is outgoing IP traffic, and take down the PPP connection after a given idle timeout.
   d. In the **APN** field, type the APN (Access Point Name). The APN is assigned by your wireless service provider.

      Note: This configuration does not apply for rCell units with embedded CDMA/EVDO radios. For these devices, you will not be able to modify this field.

   e. Click **Next**. Or if you are done making changes, click **Finish**.

6. This section is only available if you select **Network Router** or **PPP-IP Passthrough** mode. If you select **Serial Modem** mode, skip this step. In the PPP Authentication page:

   a. From **Type**, select the authentication protocol type used to negotiate with the remote peer: **PAP, CHAP, or PAP-CHAP**. The default value is **NONE**.
   b. In the **Username** field, type the username with which the remote peer authenticates. You can leave this field blank, if desired. Username is limited to 60 characters.
   c. In the **Password** field, type the password with which the remote peer authenticates. You can leave this field blank, if desired. Password is limited to 60 characters.

7. This section is only available if you select **Serial Modem** mode. For any other mode, skip this step. In the **Serial Port Configuration** page:

   a. From **Baud Rate**, select baud rate in BPS for the serial port from the drop down list. Default setting is **115200**.
   b. In the **Flow Control** field, select the flow control option from the drop down list provided. Choose from **NONE** or **RTS-CTS**.
   c. In the **Parity** field, select the parity option from the drop down list. Choose from **NONE**, **ODD**, or **EVEN**.
   d. In the **Data Bits** field, select the data bits option from the drop down list. Choose from **7** or **8**.
   e. In the **Stop Bits** field, select the stop bit option from the drop down list. Choose from **1** or **2**.

8. Click **Finish**.
9. To save your settings, click **Save and Restart**.

Chapter 7 – Chapter 7 Configuring Your Device

Home Page (Dashboard)

The Home page (dashboard) displays a summary of the configuration settings for the MultiConnect rCell device. The following settings, where applicable, include the area of the Web Management interface where they can be accessed and changed.

Click **Home** to display the following information:

- **Router**:

  Model Number: The MultiConnect rCell model ID.

  Serial Number: The MultiTech device ID.

  Firmware: MultiConnect rCell MTR firmware version.

  Current Time: Current date and time of the router. For information on setting the date and time, go to **Setup > Time Configuration**.

  Up Time: Amount of time the device has been continuously operating.

  WAN Transport: Current transport for IP traffic leaving the LAN. If two WAN interfaces are configured for use (Wi-Fi and cellular), the current WAN will be set based on the WAN configurations at *Setup > WAN Configuration.*

- **LAN**:

  MAC Address: Media Access Control Address used to uniquely identify the devices LAN Ethernet interface.

  IP Address: LAN IP address of this device. To configure the IP address, go to **Setup > IP Configuration**.

  Netmask: Network mask of the LAN. To configure the network mask, go to **Setup > IP Configuration**.

  Gateway: Default gateway IP address of the LAN. To configure the default gateway, go to **Setup > IP Configuration**.

  DNS: Current Domain Name System IP addresses known by this device. To configure the DNS, go to **Setup > IP Configuration**.

  DHCP State: Current state of this device's DHCP server. To configure, go to **Setup > DHCP Configuration**.

  Lease Range: Current DHCP lease range of this device's DHCP server. To configure, go to **Setup > DHCP Configuration**.

- **Cellular**:

  Protocol Support (only available when you choose **PPP-IP Passthrough**): Choose only **IPv4** for C2 and EV3 as their cell radios do not support **IPv6**.

  State: Current state of the cellular PPP link. For more information, go to **Cellular > Cellular Configuration**.

  Signal: Current signal strength of the cellular link. Mouse hover provides dBm value.

  Connected: Total time connected for the current PPP session.

  IP Address: Current cellular WAN IP address issued to this device by the cellular carrier.

  Roaming: Indicates whether or not this device's cellular link is currently connected to its home network.

  Phone number: Device's cellular phone number also known as Mobile Directory Number (MDN).

  Tower: Tower ID of the cellular tower currently providing cellular service to this device.

Unavailable Services in PPP-IP Passthrough and Serial Modem Modes

In both **PPP-IP Passthrough** and **Serial Modem** modes, many rCell services described in this document are non-configurable and therefore do not appear in the device configuration menu. If you choose one of these modes, all sections between this and the next note on this subject are not available.

Configuring IP Address and DNS Information for LAN

Your router manages traffic for your local area network (LAN). To change the IP address and DNS configuration:

1. From **Setup**, select **IP Configuration**.
2. To configure the address LAN information:

   In the **IP Address** field, type the router's IP address. The default is 192.168.2.1.

   In the **Mask** field, type the mask for the network. The default is 255.255.255.0.

   In the **Gateway** field, type the IP address of the network's gateway (router). If this device is the gateway, leave this field blank.
3. To resolve domain names, configure domain name server information (DNS).

   To allow the router to behave as a local DNS forwarder, check **Enable Forwarding Server**.

   > **Note:** When a DNS request is received, the router forwards the request to a remote DNS server if there is no record in the router’s cache. New requests are cached in the router for future requests.

   In the **Primary Server** field, type the address of the primary DNS.

   In the **Secondary Server** field, type the address of the secondary DNS.

   The **WAN DNS Servers** field displays information about DNS servers, if any, that have been detected on the WAN link of the router.
4. Click **Submit**.
5. To save your changes, click **Save and Restart**.

Configuring Dynamic Domain Naming System (DDNS)

This feature allows your router to use a DDNS service to associate a hosted server's domain name with a dynamically changing internet address. To configure your router to use DDNS:

1. From **Setup**, select **DDNS Configuration**.
2. In the **Configuration** group, check **Enabled**.
3. In the **Service** drop-down list, select a DDNS service. To define a service that isn't listed choose **Custom**.

   a. For custom DDNS service, in the **Service** field, type the DDNS server's URL.

   b. For custom DDNS service, in the **Port** field, type the DDNS server's port.
4. In the **Domain** field, type the registered Domain name.
5. In the **Update Interval** field, type the days that can pass with no IP Address change. At the end of this interval, the existing IP Address is updated on the server so that the address does not expire. The range of the interval you can enter is between 1 and 99 days. The default is 28 days.
6. Check **Use Check IP**, if you want to query the server to determine the IP address before the DDNS update. The IP address is still assigned by the wireless provider and the DDNS is updated based on the address

returned by Check IP Server. If disabled, the DDNS update uses the IP address from the PPP link. The default is **Use Check IP**.

7. In the **Check IP Server** field, type the name to which the IP Address change is registered. Example: checkip.dyndns.org
8. In the **Check IP Port** field, type the port number of the Check IP Server. The default is 80.
9. From the **System** drop-down list, select the desired system registration type, either Dynamic or Custom. The default is Dynamic.
10. Enter **Username** of the server.
11. Enter **Password** of the server.
12. To force update of DDNS, click **Update**.
13. Click **Submit**.
14. To save your changes, click **Save and Restart**.

Entering authentication information

Your DDNS server requires you to identify yourself before you can make changes.

1. In the **Username** field, type the name that can access the DDNS Server. The default is NULL. You receive your name when you register with the DDNS service.
2. In the **Password** field, type the password that can access the DDNS Server. The default is NULL. You receive your password when you register with the DDNS service.
3. Click **Submit**. If you are finished making changes click **Save and Restart**.

Forcing a DDNS server update

To update the DDNS server with your IP address, click **Update**.

Configuring Dynamic Host Configuration Protocol (DHCP) Server

You can configure your device to function as a DHCP server that supplies network configuration information, such as IP address, subnet mask, and broadcast address, to devices on the network. To configure the DHCP server:

1. From **Setup**, select **DHCP Configuration**.
2. To use the DHCP feature, check **Enabled**.
3. The **Subnet** field displays the subnet address.
4. The **Mask** field displays the network's subnet mask.
5. In the **Gateway** field, type the gateway address. The default Gateway address is the LAN IP address of the device.
6. In the **Domain** field, type your network domain, if any.
7. In the **Lease Range Start** field and in the **Lease Range End** field, type the range of IP addresses to be assigned by DHCP.
8. In the **Lease Time** field, type the DHCP lease time. Lease time is set in days, hours, and minutes.
9. Click **Submit**. If you are finished making changes, click **Save and Restart**.

Assigning Fixed Addresses

To add fixed addresses for the DCHP server:

1. In the **Fixed Address** group, click **Add**. A dialog box opens, where you define the address.

2. In the **MAC Address** field, type the MAC address to which the specified IP address binds.
3. In the **IP Address** field, type the fixed IP address to be assigned.
4. Click **Finish**.
5. To save your changes, click **Save and Restart**.

Configuring the Global Positioning System (GPS)

This GPS information applies only to the MTR models that support GPS including:

Model B17

Some routers have a built-in GPS receiver. If your router has a GPS receiver, the router can forward NMEA (National Marine Electronics Association) sentences from the GPS receiver to a device connected to the router's serial port. You can also send the GPS data over the network to a remote computer.

There are four areas of GPS configuration including: **Server Configuration**, **Local Configuration**, **Client Configuration** and **NMEA Configuration** along with **Current Position** information.

Notes:

- All enabled sentences are forwarded periodically using the interval specified in the **NMEA Configuration** section. Before forwarding, the router adds an ID prefix and ID to each enabled NMEA sentence. If set, the NMEA sentences available are those provided by the built-in receiver which are: GPGGA, GPGSA, GPGSV, GPGLL, GPRMC, GPVTG.
- You can simultaneously enable the TCP Server, TCP/UDP client, and serial port dump.

Dumping NMEA Sentence Information to the Router's TCP Server Port

To configure the TCP server port where you can send the NMEA sentences:

1. Complete the steps under **GPS Server Configuration**.
2. To use the serial port for GPS, you must disable the serial port client/server. Go to **Setup > Serial IP Configuration > Serial Port Settings** and uncheck **Enabled**.
3. Then, under **Local Configuration**, check **Serial Port Dump**.
4. **Submit**.
5. To save your changes, click **Save and Restart**.

Sending GPS information to a remote server

The **Client Configuration** allows the device to connect to a remote server using the IP and port information for uploading GPS data.

1. To allow the device to connect, go to **Setup > GPS Configuration > Client Configuration**.
2. Check **TCP/UDP Client**.
3. From the **Protocol** drop-down list, select the protocol of the client (**TCP or UDP**).
4. In the **Remote Host** field, type the IP address of the remote host.
5. In the **Port**, field type the port number of the remote host.
6. If your remote host requests a password, type that password in the **Password** field. The password is sent to the server in response.
7. Click **Submit**.
8. To save your changes, click **Save and Restart**.

Configuring NMEA Sentences

To configure the time interval, additional prefix or ID information, and which NMEA sentences that can be sent:

1. Go to **Setup > GPS Configuration > NMEA Configuration** and in the **Interval** field, type the amount of time, in seconds, that passes before the NMEA information is sent. The default is **10** seconds. The range is **1** to **255** seconds.
2. You can further identify the router, also called a remote asset, that is collecting and sending the GPS information. To do so:

   Add ID: The ID is an unique remote asset identification string. The ID string can be any length up to 20 characters. The *&* and *$* are invalid characters. The ID must follow the standard NMEA sentence structure. Refer to the Universal IP AT Commands Reference Guide for sentence structure.

   To add more information to the beginning of the ID, in the Add ID Prefix field, type the information.
3. You can select which NMEA sentence types you want to send. Check any combination of the available options: **GGA, GSA, GSV, GLL, RMC,** and **VTG**.

Configuring the Serial Port

To configure the serial terminal connected to the RS-232 connector on the router:

1. Go to **Setup > Serial IP Configuration > Serial Port Settings**, check **Enabled**.
2. From the **Baud Rate** drop-down list, select the baud-rate at which the serial terminal communicates. The default is **115200**.
3. From the **Flow Control** drop-down list, select the flow control for the serial port. The options are **NONE** or **RTS-CTS**. The default is **NONE**.
4. From the **Parity** drop-down list, select the parity for the serial port. The options are **NONE, EVEN,** or **ODD**. The default is **NONE**.
5. To use the Modbus protocol as the protocol the serial devices use to communicate, check **Modbus Gateway**.
6. From the **Data Bits** drop-down list, select the data bits for the serial port. Data bit options are **7** or **8**. The default is **8**.
7. From the **Stop Bits** drop-down list, select the stop bits for the serial port. The options are **1** or **2**. The default is 1.
8. Click **Submit**.
9. To save your changes, click **Save and Restart**.

Configuring Device to Act as Client

You can set up the router to act as a client.

The TCP, UDP, SSL/TLS client feature enables the router to act as a proxy TCP, UDP, or SSL/TLS client to the serial terminal connected to the RS-232 port on the router. This helps the serial terminal access any TCP, UDP, or SSL/TLS server on the LAN/WAN allowing two-way traffic between the serial device and the remote server.

To use this function, you must first check **Enabled** under **Serial Port Settings**. To configure the IP Pipe in TCP, UDP, or SSL/TLS client mode:

1. Go to **Setup > Serial-IP Configuration > Serial Port Settings > IP Pipe** group.
2. From the **Mode** drop-down list, select **CLIENT**.
3. From the **Protocol** drop-down list, select the desired protocol: **TCP**, **UDP**, or **SSL/TLS**.

4. In the **Server IP Address** field, enter the address of the far-end TCP, UDP, or SSL/TLS server.
5. In the **Server Port** field, enter the port value used by the far-end TCP, UDP, or SSL/TLS server.
6. If the primary server is unavailable, in the **Secondary IP Address** field, enter the address of the alternate TCP, UDP, or SSL/TLS server.
7. If the primary server is unavailable, in the **Secondary Port** field, enter port number value of the alternate TCP, UDP, or SSL/TLS server.
8. From the **Connection Activation** drop-down list, select a connection method. Options are:

   ALWAYS-ON. If you select this option, you cannot change the **Connection Termination** option.

   DTR-ASSERT. When the DTR signal is asserted, the connection is established.

   CR. Three carriage returns must be received before the TCP, UDP, or SSL/TLS connection is established to the remote server.

   ON-DEMAND. Set the connection as available on-demand.
9. From the **Connection Termination** drop-down list, select a disconnect method for the IP pipe. Options are:

   ALWAYS-ON.

   TIMEOUT. The IP pipe connection disconnects if the configured timer expires with no data sent or received. In the **Timeout** field, enter the desired number of seconds for this timeout.

   SEQUENCE. A sequence of received characters disconnects the IP pipe.

   DTR-TOGGLE. When the DTR control signal is toggled, the IP pipe disconnects.
10. Click **Submit**.
11. To save your changes, click **Save and Restart**.

Configuring Device to Act as Server

You can set up the router to act as a server.

The TCP, UDP, SSL/TLS server feature enables a TCP, UDP, SSL/TLS client on the Ethernet network to connect to the remote serial terminal that is connected to the RS-232 port on the router. The router acts as a TCP, UDP, SSL/TLS server which allows two-way traffic between the TCP, UDP, SSL/TLS client and the remote terminal on the serial port.

To use this function, you must first check **Enabled** under **Serial Port Settings**. To configure the IP Pipe in TCP, UDP, SSL/TLS server mode:

1. Go to **Setup > Serial-IP Configuration > Serial Port Settings > IP Pipe** group.
2. In the **Mode** drop-down list, select **SERVER**.
3. From the **Protocol** drop-down list, select the desired protocol: **TCP**, **UDP**, or **SSL/TLS**.
4. In the **Server Port** field, type the desired port value in the range **1** to **65535**.
5. From the **Connection Termination** drop-down list, select a disconnect method for the IP pipe. Options are:

   ALWAYS-ON.

   TIMEOUT. The IP pipe connection disconnects if the configured timer expires with no data sent or received. In the **Timeout** field, enter the desired number of seconds for this timeout.

   SEQUENCE. A sequence of received characters disconnects the IP pipe.

   DTR-TOGGLE. When the DTR control signal is toggled, the IP pipe disconnects.
6. Click **Submit**.

7. To save your changes, click **Save and Restart**.

Time Configuration

You can configure how your device manages the setting of time on its domain of systems. The system date and time display in these formats: **MM/DD/YYYY / HH:MM**. You can set the date and time manually, or you can configure the device to get this information from a cellular RTC (real time clock) or an SNTP server.

Setting the Date and Time

To set the device's date and time:

1. From **Setup**, select **Time Configuration**.
2. In the **Date** field, type in the date you desire, or select the date from the pop-up calendar that opens.
3. In the **Time** field, type the time.
4. From the **Time Zone** drop-down list, select your time zone. The default selection is UTC (Universal Coordinated Time, Universal Time).

   Note: To learn more about time zones, visit the following website : http://wwp.greenwichmeantime.com/info/current-time.htm

5. Click **Submit**.
6. To save your changes, click **Save and Restart**.

Configuring SNTP to Update Date and Time

To configure the server from which the SNTP date and time information is taken, and how often:

1. To enable SNTP to update the date and time, check **Enabled**.
2. In the **Server** field, type the SNTP server name or IP address that is contacted to update the time.
3. In the **Polling Time** field, type the time that passes (in minutes), after which the SNTP client requests the server to update the time. Default is 120 minutes.
4. Click **Submit**.
5. To save your changes, click **Save and Restart**.

Adding Saved Networks

You can define, edit, and delete networks that your router supports. These networks can appear in your list of choices when configuring other items, such as tunnels. To setup networks:

1. Go to **Setup** > **Saved Networks**. A list of networks already saved appears.
2. Add, edit, or delete networks, as described in Adding Networks and Editing or Deleting an Existing Network.

Adding Networks

To add a network:

1. Click **Add Network**.
2. In the **Name** field, type the name of the network.
3. In the **IP Address** field, type the IP address of the network.
4. In the **Subnet Mask** field, type the network mask.

5. Click **Finish**.
6. To save your changes, click **Save and Restart**.

Editing or Deleting an Existing Network

1. To delete a network, click **red X**.
2. At the top of the pane, a message tells you the network is deleted. To undo the delete, click the **Undo** link found in the message.
3. To edit a network, click **pencil icon**. Change the IP address or subnet mask as desired.
4. Click **Finish**.
5. To save your changes, click **Save and Restart**.

Note: You cannot edit the network name and you cannot delete a network if it is used in another configuration.

Configuring SNMP

The device offers Simple Network Management Protocol (SNMP) which is used for collecting information from, and configuring network devices on an IP network.

You also have the option to configure SNMP traps which are alerts sent from SNMP-enabled devices to an SNMP agent or manager typically providing device status or condition information.

You can also access the **MIB** file which is a management information base. This file is a formal description of a set of network objects managed using the Simple Network Management Protocol (SNMP). The format of the **MIB** is defined as part of the SNMP. (All other **MIBs** are extensions of this basic management information base.)

Click **Download MIB**, to download the MIB file.

To configure SNMP:

1. Go to **Setup > SNMP Configuration**, check the **Enabled** box for each of the SNMP versions that apply (either **SNMP V1/V2C** and/or **SNMP V3**).
2. For **SNMP V1/V2C**, enter the Community Name.
3. Also, For **SNMP V1/V2C**, if needed, enter the **Allowed IP Addresses**.
4. For **SNMP V3**, enter **Username**, **Password**, and **Confirm Password**.
5. Click **Add** and enter **Network Address**.
6. Click **Finish**.
7. Click **Submit**.
8. Click **Save and Restart**.

To configure SNMP Traps:

1. Go to **Setup > SNMP Configuration > SNMP Trap Configuration**, check the **Enabled** box.
2. Select from the drop-down the **Version** of SNMP (**SNMP v1**, **SNMP v2c** or **SNMP v3**).
3. For **SNMP v1** or **SNMP v2c**:
    a. Enter the **Destination IP** address.
    b. Enter the **Community Name**.
    c. To test, click **Send Test Trap**.
    d. Click **Submit**.

e. Click **Save and Restart**.

4. For **SNMP v3**:

   a. Enter the **Destination IP** address.
   b. Enter **Username**.
   c. Enter **Password** and **Confirm Password**.
   d. Enter the **Community Name**.
   e. For **Engine ID**, click **Default** and the system generates an ID for you.
   f. To test, click **Send Test Trap**.
   g. Click **Submit**.
   h. Click **Save and Restart**.

Unavailable Services in PPP-IP Passthrough and Serial Modem Modes

In both **PPP-IP Passthrough** and **Serial Modem** modes, many rCell services described in this document are non-configurable and therefore do not appear in the device configuration menu. If you choose one of these modes, all sections between this and the previous note on this subject are not available.

Chapter 8 – Chapter 8 Setting Up the Firewall

Defining firewall rules

The router's firewall enforces a set of rules that determine how incoming and outgoing packets are handled. By default, all outbound traffic originating from the LAN is allowed to pass through the firewall, and all inbound traffic originating from external networks is dropped. This effectively creates a protective barrier between the LAN and all other networks. For additional information, see:

- Adding Port Forwarding Rules
- Adding Devices
- Advanced Settings

Adding Port Forwarding Rules

For a device within the LAN to be visible from the internet or from an outside network, create a forwarding rule to allow incoming packets to reach the device.

1. Go to **Firewall > Settings** to display the **Firewall** window.
2. In the **Port Forwarding** group, click **Add Rule**.
3. In the **Inbound Forwarding Rule** dialog box, enter a name for the rule and optionally, a description. Click **Next**.
4. In the second **Inbound Forwarding Rule** dialog box, in the **External WAN Port(s)** field, type the port(s) to be forwarded. Common ports are listed in the field's attached drop-down list and are exposed once you enter a character. Type **ANY** to forward all ports.
5. In the **Destination LAN IP** field, type the IP address of the device that packets will be forwarded to. The attached drop-down list contains DHCP leased and Saved Network addresses.
6. In the **Destination LAN Port(s)** field, type the port to which packets are translated. If there is a range of ports, the ending port is automatically set. The Destination LAN ending port is based on the Destination LAN starting port and the range provided in the **External WAN Port(s)** field.
7. From the **Protocol** drop-down list, select the protocol of the messages that can be forwarded.
8. A default filter allowing forwarded packets through the firewall is automatically created. If desired, you can use the **Advanced Settings** mode of the Port Forwarding wizard to further restrict packets based on source address and source ports using the **Inbound Filter Rule**. In most cases, this is not necessary.
9. Click **Finish**.
10. To save your changes, click **Save and Restart**.

Adding Outbound Traffic Rules

To prevent a device within the LAN from communicating with a device in an external network, you must establish a firewall rule to drop packets destined to the external device.

1. Click **Add Rule** in the **Outbound Traffic** section.
2. Enter a name for the rule and optionally, a description. Click **Next**.
3. In the second **Filter Rule** dialog box, in the **Destination IP** field, type the IP address of the device or network that packets are to be sent to. Type **ANY** if the destination address does not matter.
4. In the **Destination Mask** field, type the network mask of the destination network.

5. In the **Destination Port** field, type the port for which that the packets are destined. Common destination ports are listed in the Destination Port field's attached drop down list. Type **ANY** if the destination port does not matter.
6. In the **Source IP** field, type the IP address of the device or network that the traffic originates from. Type **ANY** if the source address does not matter.
7. In the **Source Mask** field, type a network mask for the origin of the traffic.
8. In the **Source Port** field, type the port that is the origin of the traffic. Type **ANY** if the source port does not matter.
9. From the **Action** drop-down list, select the action to perform on the traffic. You can allow the traffic to be **accept, reject, log** or **drop**. Accepted packets are allowed to continue through the firewall. Dropped packets are removed and no further processing is performed on them. Rejected packets are dropped, and an error message is sent to the source of the packet. Logged packets are logged to the system's main log file with the rule's name prepended as an identifier (viewable from the Statistics page). Log rules do not affect the packet's fate.
10. The **Direction** field is locked to **OUTGOING** while using the Outbound Traffic wizard.
11. From the **Protocol** drop-down list, select the protocol of the traffic that is being filtered. Choose from **TCP, UDP, TCP/UDP** or **ANY**. Type **ANY** if the protocol does not matter (to accept the default).
12. Click **Finish**.
13. To save your changes, click **Save and Restart**.

MAC Filtering

To setup a MAC Filtering rule:

1. Click **Add Rule** in the **MAC Filtering** section.
2. Enter a **Name** for the rule and, optionally, a **Description**. Click **Next**.
3. Enter the **MAC** Address of the destination or source of the packet.
4. Select the action from the drop down list. Choose either **ACCEPT, REJECT, DROP, or LOG**.
5. Choose the **Direction** from the drop down list including **INCOMING or OUTGOING**.
6. Select the **Protocol** from the drop down list. Choose from **TCP/UDP, TCP, UDP or ANY**.
7. Click **Finish**.
8. To save your changes, click **Save and Restart**.

Advanced Settings

The **Firewall's Advanced Settings** mode lets you manipulate **DNAT, SNAT**, and **Filter** rules directly. **DNAT** rules can manipulate the destination address and port of a packet; similarly **SNAT** rules can manipulate the source address and port of a packet.

Filter rules apply an **ACCEPT, REJECT, DROP**, or **LOG** action to a packet. **DNAT, SNAT**, and **Filter** rules can be associated if they are named the same. This association is recognized within the **Port Forwarding** and **Outbound Traffic** wizards accessed from the **Normal Settings** mode, and allows the associated rules to be viewed and edited as a series.

Setting up Static Routes

To set up a manually configured mapping of an IP address to a next-hop destination for data packets:

1. Go to **Firewall > Static Routes**.
2. In the **Static Routes** window, click **Add Route**.

3. In the **Name** field of the **Add Route** dialog box, type the name of the route.
4. In the **Address** field, type the remote network IP address of the remote location.
5. In the **Mask** field, type the network mask that is assigned on the remote location.
6. In the **Gateway** field, type the IP address of the routing device that supports the remote IP Network.
7. Click **Finish**.
8. To save your changes, click **Save and Restart**.

Chapter 9 – Chapter 9 Setting Up Cellular Features

Configuring Cellular

To configure how cellular is used on your device:

1. On the Web Management interface, go to **Cellular > Cellular Configuration** to display the **Cellular Configuration** window. If you choose IPv6 Passthrough mode, you must select **Administration > Initial Setup**.
2. Check **Enabled**.
3. Check and change the Cellular Configuration fields as desired. For field descriptions, see Cellular Configuration Fields.
4. Click **Submit**.
5. To save your changes, click **Save and Restart**.

Cellular Configuration Fields

Field	Description
General Configuration	
Enabled	Allows the device to establish a cellular connection (Cellular WAN).
Dial-on-Demand[1]	Enables the Dial-on-Demand feature. If enabled, the device brings up and maintains a cellular connection while network activity on the LAN requires WAN access. The device brings down the cellular connection when outgoing network traffic ceases for the given Idle Timeout duration. Enable this feature when Wakeup-on-Call is enabled to allow the device to "sleep" after it has been "woken up." See Configuring Wakeup-on-Call for more information.
Connect Timeout	The time (in seconds) that the device waits before it deems that the connection attempt has failed. The value used is the amount of time that elapses between each dialing retry.
Dialing Max Retries	Number of dialing retries allowed; the default is zero, which means an infinite number is allowed.
Modem Configuration	
Dial Number	The modem dial string is: ■ ***99***1#** for GSM/GPRS/LTE devices ■ **#777** for CDMA/EVDO devices
Connect String	The modem response to initiate a PPP connection, usually **CONNECT**.
Dial Prefix	The modem AT command that initiates a PPP connection, usually **ATDT** or **ATD**.
SIM Pin	The pin used to unlock the SIM for use (only required if the SIM is locked). This does not apply to CDMA radios.
APN	The Access Point Name assigned by the wireless service provider (carrier specific).

Field	Description
Init String#	Optional fields to apply additional AT commands that execute just before every PPP connection attempt. Use these fields to expand functionality and to troubleshoot.
Authentication	
Authentication Type	The type of authentication to use when establishing a PPP connection: **NONE, PAP, CHAP, or PAP-CHAP** (either). Authentication may not be required by the cellular service provider.
Username	Name of the user that the remote PPP peer uses to authenticate.
Password	Password that the remote PPP peer uses to authenticate.
Keep Alive[1] Used to periodically check if the cellular link is up; if not, the device tries to establish the link.	
ICMP/TCP Check[1] An active check that provides the most reliable and reactive diagnosis of the cellular link, but requires sending data through the cellular link.	
Enabled[1]	Enables the Active Keep Alive check. Depending on the plan type and data usage, this may result in additional data charges.
Keep Alive Type[1]	Protocol type for active keep alive, either **TCP** or **ICMP**. **ICMP** periodically pings the designated host at the specified interval. **TCP** tries to make a connection to the designated host at the interval specified.
Interval[1]	Time in seconds between active checking of the cellular link.
Hostname[1]	Host name or IP address for the keep alive check.
TCP Port[1]	TCP port number to connect with the TCP server (only visible when **Keep Alive Type TCP** is selected).
ICMP Count[1]	Number of sequential, unsuccessful ping attempts to the specified host to declare that the link needs to be re-established (only visible when **Keep Alive Type ICMP** is selected).
Data Receive Monitor A passive check that observes the absence of packets received over a given amount of time. This check cannot reliably determine if the link is down; no network traffic may cause the monitor to signal to shutdown and re-establish the cellular link even though the link was in a good state.	
Enabled	Enable or disable the passive monitoring of the cellular link.
Window	The amount of time that can pass without receiving network traffic before the cellular link is torn down and re-established.

[1] If you choose **PPP-IP Passthrough** and **Serial Modem** mode, this field is not available.

Activating CDMA

If your device is to operate on a CDMA network, you need to associate the radio in your device with you cellular service account so that the radio can connect to the service provider's cellular network.

Before activating your account, you need to contact your carrier to setup an account, check the signal strength LEDs on the device, as well as the signal strength meter on the web management interface. Ensure the device is receiving a strong cellular signal.

To activate your account on your CDMA device:

1. From **Cellular**, select **Activation**.
   Note: The device's current activation status is displayed, either **ACTIVATED** or **NOT ACTIVATED**. In addition, a message will appear below the status saying that this device's radio appears or does not appear to be activated.
2. If the device is not activated, follow the instruction for your specific carrier below. Each carrier activation is different.
    1. **Sprint:** Uses an Over-The-Air activation process that automatically attempts to activate the radio once you arrive at the Activation window. For details on activating using AT commands see the Sprint Activation Guide for EV3/C2.
    2. **Verizon:** Uses a one-click activation process. Click the **Activate** button. For details on activating using AT commands see the Verizon Activation Guide for EV3/C2.
    3. **Aeris:** Requires you to first enter the **MDN** and **MSID/MIN** and then click the **Activate** button. For details on activating using AT commands see the Aeris Activation Guide for EV3/C2.
        - After the activation starts, a message displays at the top of the screen that it is in progress.
        - Once the activation completes, a message appears at the top of the screen that it succeeded or failed.
4. To verify the radio is activated, go to **Verify Activation**, enter an **IP Address or URL**, and use the default **Network Interface** as **Radio**. Click the **PING** button.
    - The device uses the cellular radio connection to ping a server.
    - Once the ping completes, a message appears at the top of the screen that it succeeded or failed.

Unavailable Services in PPP-IP Passthrough and Serial Modem Modes

In both **PPP-IP Passthrough** and **Serial Modem** modes, many rCell services described in this document are non-configurable and therefore do not appear in the device configuration menu. If you choose one of these modes, all sections between this and the next note on this subject are not available.

Configuring Wake Up On Call

This feature allows the router to wake up and initiate a cellular connection when there is an incoming call, SMS, or LAN activity.

1. Go to **Cellular > Wake Up On Call** to display the configurations.
2. Check the **Wake Up On Call** box.
3. Select a Wake Up setting. For wakeup methods, see Wake Up On Call Method Settings.
4. Click **Submit**.
5. To save your changes, click **Save and Restart**.

Note: This feature only defines when the device brings up its cellular link, not when the device takes it down. See the **Dial on Demand** option on the **Cellular Configuration** page at **Cellular > Cellular Configuration** to configure the criteria for bringing the cellular link down.

Wake Up On Call Method Settings

The triggers that wake up the router to re-establish the cellular link are:

- On Ring:

  Any incoming call will bring up the cellular link.

  Enabled: Check to allow any incoming call to wake up the router.

  Message: The expected response from the integrated cellular modem to an incoming call.

- On Caller ID:

  Only incoming calls in the caller ID list will bring up the cellular link.

  Enabled: Check to allow a specific caller to wake up the router.

  Caller ID: Field to specify a caller ID. Enter the ID then click **Add** to add the caller to the approved caller ID trigger list.

- On SMS (not available if you enabled SMS through **SMS > General Configuration**):

  Only specific SMS messages will bring up the cellular link.

  Enabled: Check to allow specific SMS messages to wake up the router.

  Message: Field to specify the SMS message contents. Click **Add** to add the SMS message to the approved SMS trigger list.

For Wake-Up-On-Call field descriptions, see Wake Up On Call General Configurations.

Wake Up On Call General Configurations

Field	Description
Wake Up on Call check box	Enables the Wake Up On Call feature.
Dial On Demand LAN	When checked, the router allows network activity on the LAN that needs WAN access to trigger the Wake Up and establish the cellular link. If this configuration is not checked, the router will only establish a cellular connection when the selected Wake Up method is triggered via incoming call, caller ID, and/or short message service (SMS).
Time Delay	Time that passes between a receiving call and initiating the Wake Up On Call connection.
Acknowledgment String to Caller	String used to acknowledge to the delivering SMSC (short message service center) the receipt of an SMS.
Init String Number	Router initialization strings specific to the integrated cellular modem required for the Wake Up On Call feature.

Using Telnet to Communicate with the Cellular Radio

Your router comes with an integrated cellular radio. You can use this cellular radio directly without using any router functions. To do so, you must use re-director software on your computer. This software creates a virtual serial port that allows your computer to communicate with the integrated cellular radio over IP using telnet. To communicate directly with the cellular modem:

1. From the Web Management interface, go to **Cellular > Telnet Radio Access**.
2. Check **Enabled**.
3. To enable raw mode, check **Raw**. The program transfers data between the computer and cellular modem without any processing.
4. To enable the Auto Dialout Login feature, check **Login**. The Auto Dialout port is the Telnet port used by the re-director software on your computer to communicate to the cellular modem integrated on the router.
5. In the **Port** field, enter the serial Auto Dialout port number. The default is **5000**.
6. In the **Inactivity** field, enter the time in seconds that the auto dialout session remains active before becoming inactive.
7. To enable the EIA standard signal characteristics (time and duration) used between different electronic devices, check **Handle EIA Signal**.
8. In the **Telnet TCP Keep Alive** section of the window, in the **Time** field, enter the time in seconds that the device waits before it probes the Telnet connection for the first time. The default is **7200** (seconds).
9. In the **Interval** field, enter the time interval in seconds that the device waits between probes. The default is **75** (seconds).
10. In the **Probes** field, enter the number of probes that the device makes. The default is **9**.
11. Click **Submit**.
12. To save your changes, click **Save and Restart**.

Radio Status

Field	Description
Module Information	
MEID	Mobile Equipment Identifier (C2 or EV3 models only)
IMSI	International Mobile Subscriber Identifier
Manufacturer	Company that developed the cellular module
Model	Cellular module model number
Hardware Revision	Module's hardware revision
MDN (Phone Number)	Mobile Directory Number. In some SIM/carriers, the value may not be present and therefore not displayed.
MSID	Mobile Station ID. Some SIM/carriers do not contain this value and therefore the value is not displayed.
Firmware Version	Module's firmware version
Service Information	
Home Network	Cellular service provider associated with the module's data account
Current Network	Current cellular service operator (Not available for C2 or EV3 models)
RSSI	Received Signal Strength Indication
Service	Cellular service connection type
Roaming	Indicates whether or not the current service is provided by the Home Network carrier
Update Options	
MDN (Phone Number)	Update the cellular module's phone number. This number is updated only on the device. The MDN that the carrier has associated with this device does not change.

Chapter 10 – Chapter 10 Configuring SMS

Configuring SMS

This function is not available if you enable SMS through **Cellular > Wake Up On Call**. To enable short message service (SMS) via the Web Management interface or API:

1. From the Web Management interface, go to **SMS > SMS Configuration > General**.
2. Check **Enabled**.
3. In the **Sent SMS to Keep** field, enter the total number of sent SMS messages to keep in the device's history.
4. In the **Received SMS to Keep** field, enter the total number of received SMS messages to keep in the device's history.
5. In the **Resend Failed SMS** field, enter the total number of resend attempts for SMS messages that failed to send.
6. Set messages to keep and resend options.
7. Click **Submit.**
8. To save your changes, click **Save and Restart**.

For field descriptions see SMS Field Descriptions.

SMS Field Descriptions

Field	Description
Enabled	Enables the SMS utilities required to send SMS via API and the Web Management interface.
Sent SMS to Keep	The total number of sent SMS messages to keep in the device's history.
Received SMS to Keep	The total number of received SMS messages to keep in the device's history.
Resend Failed SMS	The total number of resend attempts for SMS messages that failed to send.

SMS Commands

SMS commands are disabled by default. To enable these available commands (for status and debugging purposes) and set security filters:

1. Go to **SMS > SMS Configuration > SMS Commands**, check the SMS commands you wish to enable. Refer to the table of **SMS Command Descriptions** for details on available commands.
2. Check the security filters, you wish to use (can be one or both):
   - **Password:** If enabled, SMS commands will require **p password** in the syntax. For example: **p 12345 #serial** where 12345 is your password.

     Use the **default password** (last six digits of the radio's IMEI or last six digits of the MEID).

     Or click on **Use custom password** and enter your own password.

     You can also toggle the eye icon to make the password visible or hidden.

- **Whitelist**: If enabled, SMS commands can only be received from a number in the whitelist (you must enter a phone number).

  Enter the phone number and click **Add Number**.

  Note: Due to differences between service providers, for every US number you add to the **Whitelist**, create two separate entries: 1) one using the **phone number** and 2) the other using **1 + phone number**.

3. Refer to the **Required SMS Command Format** field to see the format based on your chosen settings.
4. Click **Submit**.
5. To save your changes, click **Save and Restart**.

Here is an example SMS Command (#serial – Server mode):

```
Serial-IP Port Status:
Mode: Server
Protocol: SSL/TLS
Port: 3000
TX Bytes: 1234567
RX Bytes: 123456789
DCD Status: ON
2016-11-20 19:22
```

The response message to all SMS commands includes a time stamp. The time stamp format is **YYYY-MM-DD HH:MM**.

The system adds the time stamp to the existing commands at the end of the SMS message. In case the message exceeds the 160 character limit, the device information and the occurred event are not truncated. Only the time stamp is lost.

SMS Command Descriptions

The following table describes available SMS Commands under **SMS Configuration** > **SMS Commands** > **Enabled Commands**. All SMS Commands are disabled by default. Check to enable.

SMS Command	Description
#reboot	reboots the device
#checkin	checks in to DeviceHQ™
#rm <enable|disable> <AccountKey>	enable or disable remote management using DeviceHQ (You must specify AccountKey when enabling Remote Management if not previously configured.)
#setcellular <enable|disable> [<APN>]	enable or disable Cellular and allows setting of the APN
#ping [<interface>] [<count>] <address>	ping IP address <count> times (range: 1-20, default = 4) through <interface> (choose from cellular, wifi, and ethernet or if not specified, the default gateway interface is used)

SMS Command	Description
#apn	get APN string
#cellular	PPP status
#radio	radio status
#ethernet	Ethernet LAN configuration details
#wan	WAN transport type and WAN priority configuration
#serial	get serial details: Mode (Server or Client), RX bytes, TX bytes, DCD Status, Protocol, Port (Server mode only), Server IP Address (Client mode only), and Server Port (Client Mode only)
#wifi	get Wi-Fi details: Date and time in format YYYY-MM-DD HH:MM, mode (WAN or Access Point), MAC address, status (for WAN mode only), SSID, Security settings (for Access Point only, None, WEP, WPA, WPA2-PSK, and WPA/WPA2-PSK)

Note: Arguments in square brackets [ ] are optional. Those in angle brackets < > are values.

Sending an SMS Message

To send an SMS message from the router:

1. Go to **SMS > Send SMS** to display the **Send SMS** window.
2. In the **Recipient** field, enter a phone number and click **Add**. You can add up to 100 phone numbers.
3. In the **Message** field, enter a text message up to 160 characters long.
4. Click **Send**. The system displays a confirmation indicating whether the message has been successfully sent or not.

Viewing Received SMS Messages

To view received SMS messages from the router:

1. Go to **SMS > Received** to display the **Received SMS** window. The messages are sorted by date with the most recent messages on top. The table shows up to 30 characters for each message.
2. To view the full message, click the eye icon to the right of the message entry.
3. To delete an SMS message, click the **X** under **Options** to the right of the message. A dialog box asks you to confirm that you want to delete the SMS message. Click **OK**.
4. To delete all the received SMS messages, click **Delete All**. A dialog box asks you to confirm that you want to delete all SMS messages. Click **OK**.
5. To configure, the receive list to automatically update, check the **Auto Refresh** box in the upper right corner.

Viewing Sent SMS Messages

To view sent SMS messages from the router:

1. Go to **SMS > Sent** to display the **Sent SMS** window. The messages are sorted by date with the most recent messages on top. The table shows up to 30 characters for each message.
2. To view a full message, click the eye icon to the right of the message entry.
3. To delete a sent SMS message, click the **X** to the right of the message entry. A dialog box asks you to confirm that you want to delete the SMS message. Click **OK**.
4. To delete all the sent SMS messages, click **Delete All**. A dialog box asks you to confirm that you want to delete all the SMS messages. Click **OK**.
5. To configure, the receive list to automatically update, check the **Auto Refresh** box in the upper right corner.

Chapter 11 – Chapter 11 Defining Tunnels

Setting Up GRE Tunnels

Tunneling allows the use of a public network to convey data on behalf of two remote private networks. It is also a way to transform data frames to allow them to pass networks with incompatible address spaces or even incompatible protocols. Generic Routing Encapsulation (GRE) is a tunneling mechanism that uses IP as the transport protocol and can be used for carrying many different passenger protocols.

The tunnels behave as virtual point-to-point links that have two endpoints identified by the tunnel source and tunnel destination addresses at each endpoint. Configuring a GRE tunnel involves creating a tunnel interface, which is a logical interface, then configuring the tunnel endpoints for the tunnel interface. To set up GRE tunnels:

1. From the Web Management interface, go to **Tunnels > GRE Tunnels > GRE Tunnels Configuration**.
2. Click **Add Tunnel**. A series of wizard pages helps you configure the connection.
3. In the **Tunnel Name** field, enter a name for the new tunnel.
4. (Optional) In the **Description** field, you can enter a description that helps you further identify the tunnel. Click **Next**.
5. In the next wizard pane:
    a. In the **Remote WAN IP** field, type the IP address of the gateway to which you want to connect.
    b. (Optional) From the **Saved Network** drop-down list, select the network that is to be routed through the tunnel. To select a local interface: Select the local interface on which the tunnel is being created. Eventually, the packets destined for this tunnel will be routed through it.
    c. If you are not using a saved network, in the **Remote Network Route** field, type the IP address of the network that is routed through the tunnel.
    d. If you are not using a saved network, in the **Remote Network Mask** field, type the mask of the network.
    e. Click **Add Route**. The defined GRE tunnel configuration is added and appears in the **Network Routes** list.
6. Click **Finish**.
7. To save your changes, click **Save and Restart**.

Configuring Network-to-Network Virtual Private Networks (VPNs)

The device supports site-to-site VPNs via IPsec tunnels for secure network-to-network communication. Both tunnel endpoints should have static public IP addresses and must be able to agree on the encryption and authentication methods to use. Setting up an IPsec tunnel is a two-stage negotiation process. The first stage negotiates how the key exchange is protected. The second stage negotiates how the data passing through the tunnel is protected. For endpoints that do not have public static IP addresses, additional options may help such as **NAT Traversal** and **Aggressive Mode**.

By default, based on the encryption method chosen, the device negotiates ISAKMP hash and group policies from a default set of secure algorithms with no known vulnerabilities. This allows flexibility in establishing connections with remote endpoints. There is an **ADVANCED** mode that provides a way to specify a strict set of algorithms to use per phase, limiting the remote endpoint's negotiation options.

The default set of Hash Algorithms is: **SHA-1, SHA-2**, and **MD5**.

The default set of DH Group Algorithms is: **DH2(1024-bit), DH5(1536-bit), DH14(2048-bit), DH15(3072-bit), DH16(4096-bit), DH17(6144-bit), DH18(8192-bit), DH22(1024-bit), DH23(2048-bit)**, and **DH24(2048-bit)**.

To set up a Network-to-Network VPN tunnel on your router:

1. From the Web Management interface, go to **Tunnels > IPsec Tunnels**.
2. Click **Add Tunnel** in upper right.
3. Enter a name for the tunnel and an optional description.
4. Click **Next**. The **IPsec Remote Tunnel Endpoint** pane opens.
5. In the **Remote WAN IP** field, enter the external IP address of the remote endpoint.
6. In the **Remote Network Route** and **Mask** fields, enter the remote subnet.
7. Choose **Tunnel Type** from the drop-down menu. Values are **IKE** and **IKEv2**.
8. Click **Next**. The public IP address and LAN of this device do not need to be configured because they are already known by this device.
9. Enter the **Pre-Shared Key**. This key needs to be the same on both endpoints.
10. Select the **Encryption Method**. **AES** is the successor of **3DES** and is recommended, but **3DES** may be required to operate with legacy endpoints. The encryption method needs to be the same on both endpoints.
11. Click **Next**.
12. If the remote endpoint is set up with unique IDs, check the **Enable UID** box, and enter the **Local and Remote IDs**.
13. Click **Finish**.
14. To save your changes, click **Save and Restart**.

For field descriptions, see IPsec Tunnel Configuration Field Descriptions.

IPsec Tunnel Configuration Field Descriptions

Field	Description
IPSec Tunnel	
Name	Name used to identify the IPsec tunnel in configurations and logs.
Description	Optional text to describe the IPsec tunnel. This description shows up in the UI while hovering over the summary of an IPsec tunnel.
IPSec Remote Tunnel Endpoint	
Remote WAN IP	External IP address of the remote tunnel endpoint. The remote device is typically another router.
Saved Network	Select a saved network from the pre-defined list of user-defined networks on the **Setup > Saved Networks** page. This network describes the remote endpoint's subnet, and is used to identify packets that are routed over the tunnel to the remote network.
Remote Network Route	This field is used in conjunction with the **Remote Network Mask** field and describes the remote endpoint's subnet. This is used to identify packets that are routed over the tunnel to the remote network.

Field	Description
Remote Network Mask	This field is used in conjunction with the **Remote Network Route** field, to describe the remote endpoint's subnet. It identifies packets that are routed over the tunnel to the remote network.
Tunnel Type	Internet Key Exchange (IKE) for host-to-host, host-to-subnet, or subnet-to-subnet tunnels. Choose from **IKE** or **IKEv2**.
IPsec Tunnel: IKE	
Authentication Method	Authentication is performed using secret pre-shared keys and hashing algorithms (**SHA1 MD5**). This field cannot be modified.
Pre-Shared Key	Secret key that is known by both endpoints.
Encryption Method	IKE encryption algorithm used for the connection (phase 1 - ISAKMP SA). Based off of phase 1, a secure set of defaults are used for phase 2, unless the **Advanced** option is used, in which case, all components of both phases 1 and 2 are specified by the user.
IPSec Tunnel: Advanced	
IKE Lifetime	Duration for which the ISAKMP SA exists from successful negotiation to expiration.
Key Life	Duration for which the IPsec SA exists from successful negotiation to expiration.
Max Retries	Number of retry attempts for establishing the IPsec tunnel. Enter zero for unlimited retries.
Enable UID	Enable Unique Identifier String (UID) to enable the **Local ID** and **Remote ID** fields.
Local ID	String identifier for the local security gateway.
Remote ID	String identifier for the remote security gateway.
Compression	Enable IPComp. This protocol increases the overall communication performance by compressing the datagrams. Compression requires greater CPU processing.
Perfect Forward Secrecy	Newly generated keys are unrelated to older keys.
NAT Traversal	A technique that establishes and maintains the tunnel while traversing network address translation gateways. This may be necessary if this device or the remote endpoint is behind a NAT firewall.
Aggressive Mode	Whether to allow a less secure mode that exchanges identification in plain text. This may be used for establishing tunnels where one or more endpoints have a dynamic public IP address. Although this mode is faster to negotiate phase 1, the authentication hash is transmitted unencrypted. You can capture the hash and start a dictionary or use brute force attacks to recover the PSK.

OpenVPN Tunnels

OpenVPN is an open-source software application that implements virtual private network (VPN) techniques for creating secure point-to-point or site-to-site connections in routed or bridged configurations and remote access facilities. You can use and setup OpenVPN tunnels with this device.

To use OpenVPN, you must first install an OpenVPN application along with an easy-rsa tool and configure OpenVPN on your computer. Then you must also generate the certificates for the OpenVPN server and client before configuring the device.

To configure OpenVPN client and server on this device the following files are required:

- **The CA PEM file or CA certificate (.crt)**
- **The Diffie Hellman PEM file (.pem)**
- **The Server Certificate to be used by the device endpoint (.crt)**
- **The Server/Client Key to be used by the device endpoint (.key)**

Note: When you configure OpenVPN server and client make sure both sides use the same settings, and certificates.

Configuration 1: OpenVPN Tunnel with TLS Authorization Mode (Device only)

This first configuration establishes the OpenVPN Tunnel connection from a device client to a device server using TLS as Authorization Mode. This involves adding and configuring both OpenVPN Server and Client sides within the device UI.

To add an **OpenVPN Server using TLS**:

1. Go to **Tunnels > OpenVPN Tunnels > OpenVPN Tunnel Configuration**.
2. Click **Add Tunnel**.
3. Enter the **Name**.
4. Select the **Type** as **SERVER** from the drop-down.
5. You can also enter an optional **Description**.
6. Click **Next**.
7. Enter the following fields (using **TLS** as **Authorization Mode**):

    a. **Interface Type** as **TUN** from the drop-down.
    b. **Authorization Mode** as **TLS** from the drop-down.
    c. **Protocol** as **UDP**.
    d. **VPN Subnet**.
    e. **Port** number.
    f. **VPN Netmask**.
    g. **LZO Compression** as **ADAPTIVE** from the drop-down.
    h. Enter the contents of the following files generated from the easy-rsa tool. You can copy and paste this content from the certificate files after opening from a text editor like Notepad. (all required):

        i. **CA PEM (.crt)**
        ii. **Diffie Hellman PEM (.pem)**
        iii. **Server Certificate PEM (.crt)**
        iv. **Server Key PEM (.key)**

- i. Select the **Encryption Cipher**

8. Click **Next**.

   Note: Use the same **CA PEM** certificate and parameters as the server for the OpenVPN clients .
9. **Remote Network Routes** create a route from the server network to the client network. This allows the server to get an access to the client's network. In the **OpenVPN Tunnel** dialog box, under **Remote Network Routes**:

   a. Choose an available **Saved Network** as your remote network route from the drop-down if desired (optional).

   b. Or enter the **Remote Network Route** (should be the client subnet). For example, if the client IP address is 192.168.3.1, enter 192.168.3.0.

   c. Enter the **Remote Network Mask** (usually 255.255.255.0).

   d. You may enter **Gateway** (optional).

   e. Click **Add Route**.
10. The system displays your recently-added **Push Route** with the client subnet (remote network route + mask).
11. **Push Routes** create a route from client's network to the server's network. This allows clients to get access to the server's network. Under **Push Routes**:

    a. Click **Client To Client** box if you want this optional feature (this establishes a connection between multiple clients that are connected to the server).

    b. Choose an available **Saved Network** as your push route from the drop-down if desired (optional).

    c. Or enter the **Remote Network Route** (same address as the server subnet above).

    d. Or enter the **Remote Network Mask** (same as above).

    e. You may enter **Gateway** (optional).

    f. Click **Add Route**.

    Note: If you use **Static Key Authorization Mode**, the **Push Routes** do not work.
12. Click **Next**.
13. The system displays the **Configuration Preview** window (read-only).
14. Click **Finish**.
15. Click **Save and Restart** to save your changes

To add an **OpenVPN Client using TLS**:

1. Go to **Tunnels > OpenVPN Tunnels > OpenVPN Tunnel Configuration**.
2. Click **Add Tunnel**.
3. Enter the **Name** of the tunnel.
4. Select the **Type** as **CLIENT** from the drop-down.
5. You can also enter an optional **Description**.
6. Click **Next**.
7. Enter the following fields (using **TLS** as **Authorization Mode**):

   a. **Interface Type** as **TUN** from the drop-down.

   b. **Authorization Mode** as **TLS** from the drop-down.

   c. **Protocol** as **UDP**.

   d. **Remote Host** (server public IP address).
   e. **Remote Port** number.
   f. **LZO Compression** as **ADAPTIVE** from the drop-down.
   g. Enter the contents of the following files generated from the easy-rsa tool. You can copy and paste this content from the certificate files after opening from a text editor like Notepad. (all required):

      i. **CA PEM (.crt)**
      ii. **Client Certificate PEM (.crt)**
      iii. **Client Key PEM (.key)**

   h. Click Next.

8. If you use **TLS** as **Authorization Mode**, you do not need configure or add **Remote Network Routes**. The server adds the routes if the server's **Push Routes** are already configured. If you use **Static Key** as **Authorization Mode**, you must add and configure **Remote Network Routes**.
9. Click **Next**.
10. The system displays the **Configuration Preview** window (read-only).
11. Click **Finish**.
12. Click **Save and Restart** to save your changes.

Now the device client can access the device server subnet. You can ping the IP address of the device server subnet from the client console to test this.

Note: The PC connected to the device does not have access to the device server subnet.

Configuration 2: OpenVPN Tunnel with TLS Authorization Mode (Device and Connected PC)

This second configuration provides access between a device server and its subnet and device client and its subnet. An additional configuration is needed on the device server side. This also allows your PC to connect with the device server and ultimately to the device client through that server.

1. Configure the device server as shown under how to add an **OpenVPN Server using TLS** (steps 1-14).
2. Open device console, go to **/var/config/ovpnccd/openVPNServerName**. Create the folder if not present in the device.
3. Create a file that has the client certificate name with the following information:

   a. **iroute [Client_Subnet] [Mask*]***
   b. **example** -- echo “iroute 192.168.3.0 255.255.255.0” > mtrClient1

4. For each client, you must create a separate file in the folder **/var/config/ovpnccd/yourserverName**.

   Note: Make the file name the same as the Common Name value used to create the certificate.
5. Configure device client as shown under how to **add an OpenVPN Client** (steps 1-12).

Once properly configured, you should have a connection between the device server and device client and their subnets. Your PC can also connect with the device server and thus the device client through that server.

Configuration 3: OpenVPN Tunnel with Static Key Authorization Mode (device server and client)

This third configuration establishes the OpenVPN Tunnel connection from a device client to a device server using Static Key as Authorization Mode. This involves adding and configuring both OpenVPN Server and Client sides within the device UI.

When using Static Key, the OpenVPN tunnel is created between only two end-points, the client and server. You cannot connect more than one client to the server in this mode. Remote Network Route must be specified in both configurations, client and server, in order to establish the connection between subnets.

To add an **OpenVPN Server using Static Key**:

1. Go to **Tunnels > OpenVPN Tunnels > OpenVPN Tunnel Configuration**.
2. Click **Add Tunnel**.
3. Enter the **Name**.
4. Select the **Type** as **SERVER** from the drop-down.
5. You can also enter an optional **Description**.
6. Click **Next**.
7. Enter the following fields (using **STATIC KEY** as **Authorization Mode**):

   a. **Interface Type** as **TUN** from the drop-down.
   b. **Authorization Mode** as **STATIC KEY** from the drop-down.
   c. **Protocol** as **UDP**.
   d. **Local Address** as **DEFAULT**.
   e. **Port** number.
   f. **Remote Address** as **DEFAULT**.
   g. **LZO Compression** as **ADAPTIVE** from the drop-down.
   h. **Hash Algorithm** as **DEFAULT**.
   i. **Encryption Cipher** as **DEFAULT**.
   j. Generate and enter the **Static Key PEM** (required). Both server and client must use the same static key. See example below:

      ```
      -----BEGIN OpenVPN Static key V1-----
      3f4c9113b2ec15a421cfe21a5af015bb967059021c1fd6f66ecfd00533d967237875215e20e80a2d59efd
      79148d6acdea9358dcafe0efdbb54003ff376c71432dd9d16f55e7d8917a32bfe07d61591b7bbb43c7ba
      d214482b8547ec9dca8910f514d9f4270ccaeff1a79852ae27c1c307c9dc3c836d1c380bece3c70fd2104
      e1968ed29b6c3388719226f959f69f9be43688ed27bc3a4dbc83f640370524b47bb871816af79586d07
      08781fad384480d0609b11c31d27baa6e902d29277a474e3e2785a8410d595c0f9c75312375b4bd098
      76e1a47a598e114749a09c35f098e9123015c2795c702e4a346a8bccd00305c7cb30beef66ad33f43dac
      c2e662128
      -----END OpenVPN Static key V1-----
      ```

8. Click **Next**.
9. **Remote Network Routes** create a route from the server network to the client network. This allows the server to get access to the client's network. In the **OpenVPN Tunnel** dialog box, under **Remote Network Routes**:

   a. Choose an available **Saved Network** as your remote network route from the drop-down if desired (optional).
   b. Or enter the **Remote Network Route** (should be the client subnet). For example, if the client IP address is 192.168.3.1, enter 192.168.3.0.
   c. Enter the **Remote Network Mask** (usually 255.255.255.0).
   d. Click **Add Route**.

10. The system displays your recently-added **Remote Network Route** with the client subnet (remote network route + mask).

    Note: **Push Routes are not required with Static Key as Authorization Mode.**
11. Click **Next**.
12. The system displays the **Configuration Preview** window (read-only).
13. Click **Finish.**
14. Click **Save and Restart** to save your changes.

To add an **OpenVPN Client using Static Key**:

1. Go to **Tunnels > OpenVPN Tunnels > OpenVPN Tunnel Configuration**.
2. Click **Add Tunnel**.
3. Enter the **Name**.
4. Select the **Type** as **CLIENT** from the drop-down.
5. You can also enter an optional **Description**.
6. Click **Next**.
7. Enter the following fields (using **STATIC KEY** as **Authorization Mode**):

    a. **Interface Type** as **TUN** from the drop-down.

    b. **Authorization Mode** as **STATIC KEY** from the drop-down.

    c. **Protocol** as **UDP**.

    d. **Local Address** as **DEFAULT**.

    e. **Remote Host**.

    f. **Remote Address** as **DEFAULT**.

    g. **Remote Port** number.

    h. **Hash Algorithm** as **DEFAULT** from drop-down.

    i. **LZO Compression** as **ADAPTIVE** from the drop-down.

    j. Select the **Encryption Cipher** as **DEFAULT** from drop-down.

    k. Select the **Hash Algorithm** as **DEFAULT** from drop-down.

    l. Enter the **Static Key PEM** (required). Both server and client must use the same static key. See example below:

    ```
    -----BEGIN OpenVPN Static key V1-----
    3f4c9113b2ec15a421cfe21a5af015bb967059021c1fd6f66ecfd00533d967237875215e20e80a2d59efd
    79148d6acdea9358dcafe0efdbb54003ff376c71432dd9d16f55e7d8917a32bfe07d61591b7bbb43c7ba
    d214482b8547ec9dca8910f514d9f4270ccaeff1a79852ae27c1c307c9dc3c836d1c380bece3c70fd2104
    e1968ed29b6c3388719226f959f69f9be43688ed27bc3a4dbc83f640370524b47bb871816af79586d07
    08781fad384480d0609b11c31d27baa6e902d29277a474e3e2785a8410d595c0f9c75312375b4bd098
    76e1a47a598e114749a09c35f098e9123015c2795c702e4a346a8bccd00305c7cb30beef66ad33f43dac
    c2e662128
    -----END OpenVPN Static key V1-----.
    ```
8. Click **Next**.
9. **Remote Network Routes** create a route from the server network to the client network. This allows the client to get access to the server's network. In the **OpenVPN Tunnel** dialog box, under **Remote Network Routes**:

   a. Choose an available **Saved Network** as your remote network route from the drop-down if desired (optional).
   b. Or enter the **Remote Network Route** (should be the client subnet). For example, if the client IP address is 192.168.2.1, enter 192.168.2.0.
   c. Enter the **Remote Network Mask** (usually 255.255.255.0).
   d. Click **Add Route**.

10. The system displays your recently-added **Remote Network Route** with the client subnet (remote network route + mask).

    Note: **Push Routes** are not required with **Static Key** as **Authorization Mode.**
11. Click **Next**.
12. The system displays the **Configuration Preview** window (read-only).
13. Click **Finish**.
14. Click **Save and Restart** to save your changes.

Configuration 4: OpenVPN Tunnel with Static Key Authorization Mode and TCP

This fourth configuration establishes the OpenVPN Tunnel connection from a device client to a device server using Static Key as Authorization Mode and TCP protocol (instead of UDP for the third configuration). This involves adding and configuring both OpenVPN Server and Client sides within the device UI.

To add an **OpenVPN Server using Static Key and TCP**:

1. Go to **Tunnels > OpenVPN Tunnels > OpenVPN Tunnel Configuration**.
2. Click **Add Tunnel**.
3. Enter the **Name**.
4. Select the **Type** as **SERVER** from the drop-down.
5. You can also enter an optional **Description**.
6. Click **Next**.
7. Enter the following fields (using **STATIC KEY** as **Authorization Mode**):

   a. **Interface Type** as **TUN** from the drop-down.
   b. **Authorization Mode** as **STATIC KEY** from the drop-down.
   c. **Protocol** as **TCP**.
   d. **Local Address** as **DEFAULT**.
   e. **Port** number.
   f. **Remote Address** as **DEFAULT**.
   g. **Hash Algorithm** as **ECDSA-WITH-SHA1**.
   h. **LZO Compression** as **ADAPTIVE** from the drop-down.
   i. **Encryption Cipher** as **CAMELLIA-256-CBC**.
   j. Generate and enter the **Static Key PEM** (required). Both server and client must use the same static key. See example below:

```
-----BEGIN OpenVPN Static key V1-----
3f4c9113b2ec15a421cfe21a5af015bb967059021c1fd6f66ecfd00533d967237875215e20e80a2d59efd
79148d6acdea9358dcafe0efdbb54003ff376c71432dd9d16f55e7d8917a32bfe07d61591b7bbb43c7ba
d214482b8547ec9dca8910f514d9f4270ccaeff1a79852ae27c1c307c9dc3c836d1c380bece3c70fd2104
e1968ed29b6c3388719226f959f69f9be43688ed27bc3a4dbc83f640370524b47bb871816af79586d07
```

```
08781fad384480d0609b11c31d27baa6e902d29277a474e3e2785a8410d595c0f9c75312375b4bd098
76e1a47a598e114749a09c35f098e9123015c2795c702e4a346a8bccd00305c7cb30beef66ad33f43dac
c2e662128
-----END OpenVPN Static key V1-----
```

8. Click **Next**.
9. **Remote Network Routes** create a route from the server network to the client network. This allows the server to get access to the client's network. In the **OpenVPN Tunnel** dialog box, under **Remote Network Routes**:
   a. Choose an available **Saved Network** as your remote network route from the drop-down if desired (optional).
   b. Or enter the **Remote Network Route** (should be the client subnet). For example, if the client IP address is 192.168.3.1, enter 192.168.3.0.
   c. Enter the **Remote Network Mask** (usually 255.255.255.0).
   d. Or click **Add Route**.
10. The system displays your recently-added **Remote Network Route** with the client subnet (remote network route + mask).

    Note: **Push Routes are not required with Static Key as Authorization Mode.**
11. Click **Next.**
12. The system displays the **Configuration Preview** window (read-only).
13. Click **Finish**.
14. Click **Save and Restart** to save your changes.

To add an **OpenVPN Client using Static Key and TCP**:

1. Go to **Tunnels > OpenVPN Tunnels > OpenVPN Tunnel Configuration**.
2. Click **Add Tunnel**.
3. Enter the **Name**.
4. Select the **Type** as **CLIENT** from the drop-down.
5. You can also enter an optional **Description**.
6. Click **Next**.
7. Enter the following fields (using **STATIC KEY** as **Authorization Mode**):
   a. **Interface Type** as **TUN** from the drop-down.
   b. **Authorization Mode** as **STATIC KEY** from the drop-down.
   c. **Protocol** as **TCP**.
   d. **Local Address** as **DEFAULT**.
   e. **Remote Host**.
   f. **Remote Address** as **DEFAULT**.
   g. **Remote Port** number.
   h. **Hash Algorithm** as **ECDSA-WITH-SHA1**.
   i. **LZO Compression** as **ADAPTIVE** from the drop-down.
   j. **Encryption Cipher** as **CAMELLIA-256-CBC**.
   k. Generate and enter the **Static Key PEM** (required). Both server and client must use the same static key. See example below:

```
-----BEGIN OpenVPN Static key V1-----
3f4c9113b2ec15a421cfe21a5af015bb967059021c1fd6f66ecfd00533d967237875215e20e80a2d59efd
79148d6acdea9358dcafe0efdbb54003ff376c71432dd9d16f55e7d8917a32bfe07d61591b7bbb43c7ba
d214482b8547ec9dca8910f514d9f4270ccaeff1a79852ae27c1c307c9dc3c836d1c380bece3c70fd2104
e1968ed29b6c3388719226f959f69f9be43688ed27bc3a4dbc83f640370524b47bb871816af79586d07
08781fad384480d0609b11c31d27baa6e902d29277a474e3e2785a8410d595c0f9c75312375b4bd098
76e1a47a598e114749a09c35f098e9123015c2795c702e4a346a8bccd00305c7cb30beef66ad33f43dac
c2e662128
-----END OpenVPN Static key V1-----
```

8. Click **Next**.
9. Remote Network Routes create a route from the server network to the client network. This allows the client to get access to the server's network. In the **OpenVPN Tunnel** dialog box, under **Remote Network Routes**:

   a. Choose an available **Saved Network** as your remote network route from the drop-down if desired (optional).

   b. Or enter the **Remote Network Route** (should be the client subnet). For example, if the client IP address is 192.168.2.1, enter 192.168.2.0.

   c. Enter the **Remote Network Mask** (usually 255.255.255.0).

   d. Click **Add Route**.

10. The system displays your recently-added **Remote Network Route** with the client subnet (remote network route + mask).

    Note: **Push Routes are not required with Static Key as Authorization Mode.**
11. Click **Next**.
12. The system displays the **Configuration Preview** window (read-only).
13. Click **Finish**.
14. Click **Save and Restart** to save your changes.

Unavailable Services in PPP-IP Passthrough and Serial Modem Modes

In both **PPP-IP Passthrough** and **Serial Modem** modes, many rCell services described in this document are non-configurable and therefore do not appear in the device configuration menu. If you choose one of these modes, all sections between this and the previous note on this subject are not available.

Chapter 12 – Chapter 12 Device Administration

Configuring Device Access

This section contains configurations that determine how the device can be accessed as well as security features that decrease susceptibility to malicious activity.

To display the **Access Configuration** window containing the fields described below, go to **Administration > Access Configuration**.

HTTP Redirect to HTTPS

The device allows only secure access to its Web UI. This set of rules provides the optional convenience of automatically redirecting HTTP requests to the device's secure HTTPS port.

The device can be configured to allow HTTP access to its RESTFUL JSON API. Embedded devices that do not have SSL/TLS or HTTPS capabilities can then configure, monitor, and control the device.

See the MTR API Developer Guide for more information.

Field	Description
Enabled	Enables HTTP to HTTPS redirect which automatically redirects users trying to access the device via HTTP to HTTPS.
Port	The port on which the device listens for HTTP requests.
Via LAN/Ethernet	If checked, the device listens and responds to HTTP requests from the LAN.
Via WAN/Cellular	If checked, the device listens and responds to HTTP requests from the WAN.

HTTPS

The device provides secure Web UT access to modify its configurations and execute actions.

Field	Description
Port	The port on which the device will listen for HTTPS requests.
Via WAN/Cellular	If checked, the device will listen and respond to HTTPS requests from the WAN. This increases susceptibility to malicious activity.
Timeout Minutes	Amount of time a user's session can remain dormant before automatically being logged out.
Change Password	Utility to change the user's password.

SSH

The device's internal system can be accessed securely via SSH. This is intended for advanced troubleshooting and/or custom deployment solutions.

Field	Description
Enabled	Enables SSH redirect which automatically redirects users trying to access the device via SSH.
Port	The port on which the device listens for SSH requests.
Via LAN/Ethernet	If checked, the device listens and responds to SSH requests from the LAN.
Via WAN/Cellular	If checked, the device listens and respond to SSH requests from the WAN.

ICMP

Internet Control Message Protocol (IMCP) is used by devices to send error messages such as that a requested service is not available or a host or device could not be reached. ICMP can also relay query messages.

Field	Description
Enabled	Enables ICMP responses.
Respond to LAN/Via Ethernet	If checked, the device will respond to ICMP traffic from the LAN, such as ping requests.
Respond to WAN/Via Cellular	If checked, the device will respond to ICMP traffic from the WAN, such as ping requests. This increases susceptibility to malicious activity.

IP Defense

A set of rules that decreases susceptibility to malicious activity. If these settings are configured too strictly, they may interfere with non-malicious activity.

DoS Prevention

This area of the Access Configuration window engages a set of rules at the firewall that prevents Denial-of-Service attacks by limiting the amount of new connection requests to the device.

Field	Description
Enabled	Enables DoS prevention.
Per Minute	Allowed number of new connections per minute until burst points are consumed. For example, if 60 new connections are received in a minute, decrement one burst point. If no more burst points, drop the packet.
Burst	Number of allowed burst for traffic spikes. A burst occurs when the Per Minute limit is reached. On a period where the Per Minute limit is not reached, one burst point is regained, up to the maximum.

Ping Limit

This area of the Access Configuration window engages a set of rules at the firewall that aims to prevent ping flood attacks by limiting the number of ICMP requests to the device. These rules that mitigate the effects of a ping DoS on your device do not apply if ICMP is disabled.

Field	Description
Enabled	Enables the Ping Limit feature.
Per Second	Allowed number of pings per second before burst points are consumed. Once burst points run out, ICMP packets will be dropped.
Burst	Number of burst points. On a period where the Per Second limit is not reached, one burst point is regained, up to this maximum.

Brute Force Protection

This feature tracks login attempts at the RESTFUL API level. Its purpose is to prevent Dictionary attacks that attempt to brute force the user's password.

Field	Description
Enabled	Enables the Brute Force Prevention feature.
Attempts	The number of failed attempts allowed before the user's account is locked out.
Lockout Minutes	The number of minutes an account is locked out before a new login attempt will be accepted.

Modbus Slave

The Modbus feature allows the user to enable the Modbus query server. You can query this server over Modbus-TCP for status information.

Field	Description
Enabled	Enables the Modbus Query Server.
Via LAN	If checked, the device can query the Modbus server via LAN.
Port	Port number configured for Modbus.

For Modbus query information, refer to the MTR Modbus Information page on our Developer Resources website (on .net) for details: http://www.multitech.net/developer/software/mtr-software/mtr-modbus-information/

After making all your desired changes, click **Submit**, then click **Save and Restart**.

Configuring IP Defense

You can configure your router to slow malicious actions against it.

Denial of Service (DOS) Prevention

To mitigate the effects of a denial of service attack:

1. Go to **Administration** > **Access Configuration**.
2. Check **Enabled** to enable the DoS prevention.

3. In the **Per Minute** field, type the average number of pings per minute. This is the number of new connections per minute until burst points are consumed. For example, if 60 new connections are received in a minute, decrement one burst point. If no more burst points occur, drop the packet.
4. In the **Burst** field, type the allowed burst for traffic spikes. A burst occurs when the **Per Minute** limit is reached. On a period where the **Per Minute** limit is not reached, one burst point is regained, up to the maximum.
5. Select **Submit** to save changes.
6. To save your changes, click **Save & Restart**.

Ping limit

This engages a set of rules at the firewall that aims to prevent Ping Flood attacks by limiting the number of ICMP requests to the router. This does not apply if **ICMP** is disabled. To mitigate the effects of a ping DoS on your router:

1. Check **Enabled** to enable the Ping Limit feature.
2. In the **Per Second** field, type the average number of ICMP pings to the router, and the allowed number of pings per second before burst points are consumed. Once burst points run out, ICMP packets will be dropped.
3. To limit the burst of traffic from any source, in the **Burst** field, type the allowed burst for traffic spikes. On a period where the **Per Second** limit is not reached, one burst point is regained, up to this maximum.
4. Select **Submit**.
5. To save your changes, click **Save & Restart**.

Brute force

This feature tracks login attempts at the RESTFUL API level. Its purpose is to prevent Dictionary attacks that attempt to brute force the user's password. To foil brute force, password-guessing attacks:

1. Check **Enabled** to enable the Brute Force Prevention feature.
2. To define how many times someone can try to log in and fail, in the **Attempts** field, type the number of attempts made before the account is locked out. This is the number of failed attempts allowed before the user's account is locked out.
3. In the **Lockout Minutes** field, type the number of minutes that an account is locked out after login attempts fail. This is the number of minutes an account is locked out before a new login attempt will be accepted.
4. Click **Submit**.
5. To save your changes, click **Save & Restart**.

Unavailable Services in PPP-IP Passthrough and Serial Modem Modes

In both **PPP-IP Passthrough** and **Serial Modem** modes, many rCell services described in this document are non-configurable and therefore do not appear in the device configuration menu. If you choose one of these modes, all sections between this and the next note on this subject are not available.

Generating a New Certificate

Because the device uses a self-signed website certificate, your browser shows a certificate error or warning. Ignore the warning and add an exception or add your device IP address to the trusted sites.

To generate a new certificate:

1. Go to **Administration > Certificate Management**. The **Certificate** window displays the details of the certificate that is currently used.
2. Click **Create** to open the **Generate Certificate** window.
3. In the **Common Name** field, enter the name, hostname, or IP address, depending on what you use to connect to the device. The web browser uses this field to check for a valid certificate.
4. In the **Days** field, enter the amount of days before the certificate will expire.
5. In the **Country** field, enter the 2-letter code for the country name.
6. In the **State/Province** field, enter the state or province for which the certificate is valid.
7. In the **Locality/City** field, enter the locality or the city for which the certificate is valid.
8. In the **Organization** field, enter the organization name for which the certificate is valid.
9. In the **Email Address** field, enter the email address of the person responsible for the device. Typically this is the administrator. This field may be left blank.
10. Click **Generate**. Wait until the certificate is generated. You may have to reboot to complete the operation.
11. To save your changes, click **Save and Restart**.

Uploading a New Certificate

To upload a new certificate:

1. Go to **Administration > Certificate Management**. The Certificate window displays the details of the certificate that is currently used.
2. Click **Upload** to open **Upload Certificate** window.
3. Click **Choose File** to select a valid certificate to be uploaded.
4. Click **Save**. Wait until the file is uploaded.
5. To save your changes, click **Save and Restart**.

Setting up the Remote Management

To modify DeviceHQ™ automatic update settings, go to options under **Auto-Update Settings** and refer to Managing Your Device Remotely.

1. Go to **Administration > Remote Management > Remote Server**. To allow the device to connect to the Remote Management Server, check **Enabled**.
2. If you want the device to use a secure connection, check **SSL Enabled**. This feature might be supported in a future release.
3. The **Server Name** field is pre-populated with the address of the Remote Management Server.
4. The **Server Port** field is pre-populated with the port the Remote Management Server listens on. You likely do not need to change this.
5. In the **Account Key** field, type the account key received from the Remote Management administrator. The device is not allowed to connect to the Remote Management Server without a valid account key.
6. Click **Submit**.
7. To save your changes, click **Save and Restart**.

Managing Your Device Remotely

DeviceHQ™ can monitor devices, reboot devices, and perform remote software and configuration updates.

To configure your device to use DeviceHQ™:

1. Go to **Administration > Remote Management** and check **Enabled**. See other options under Setting up the Remote Server.
2. Go to options under **Auto-Update Settings**.
3. To define how often the device connects to DeviceHQ™ to check in and request any pending updates, set the **Check-In Interval** field to the desired number of minutes between 240-10080 (240 minutes to 1 week).

   Note:

   > Your device must connect to DeviceHQ™ every 4 hours at a minimum. If you set the check-in interval to less than 4 hours, your change is ignored.

4. To define how often the device connects to DeviceHQ™ to send GPS data, set the **GPS Data Interval** field to the desired number of minutes, between 240-10080 (240 minutes to 1 week). **Note:** Some MTR models do not have GPS. In this case, the system does not display this field.
5. If you want the device to connect to DeviceHQ™ only when the device's cellular link is up, check **Sync with Dial-On-Demand**.

If **Sync with Dial-On-Demand** is checked and cellular dial-on-demand is enabled, the connection is not dialed solely for the purpose of connecting to DeviceHQ™. The device will connect to the system only when other traffic brings up the link.

6. Check **Allow Firmware Upgrade** if you want DeviceHQ™ to make automatic updates of your firmware.
7. Check **Allow Configuration Upgrade** if you want DeviceHQ™ to make automatic updates of your configuration software.
8. Click **Submit**.
9. Click **Save and Restart** to save your changes.

Unavailable Services in PPP-IP Passthrough and Serial Modem Modes

In both **PPP-IP Passthrough** and **Serial Modem** modes, many rCell services described in this document are non-configurable and therefore do not appear in the device configuration menu. If you choose one of these modes, all sections between this and the previous note on this subject are not available.

Notifications

The device can send alerts via email, SMS, and/or SNMP. To use these options, enable SMTP (see SMTP Settings for details), SMS (see Configuring SMS for details), and SNMP Traps (see Configuring SNMP for details).

A time stamp is added to the actual notifications. The format is **YYYY-MM-DD HH:MM**.

To setup notifications:

1. Go to **Administration > Notifications > Configuration**.
2. Under **Recipient Group**, click **Add Group** (you must add a group before you can edit/save your alert).
3. In the **Create Recipient Group** window, enter your **Group Name**.

4. Click **Add Phone**. Enter the person's **Name** and **Phone Number**. Then click **Finish**.
5. Click **Add Email**. Enter the person's **Name** and **Email**. Then click **Finish**.
6. Add name, phone number and email for each person in your group. When done, click **Submit**.
7. See the list of available alerts:
   - **High Data Usage**
   - **Low Signal Strength**
   - **Device Reboots**
   - **Ethernet Interface Failure**
   - **Cellular Interface Failure**
   - **Ethernet Data Traffic**
   - **Cellular Data Traffic**
   - **WAN Interface Failover**
   - **Ping Failure**
   - **Wi-Fi Interface Failure**
   - **Wi-Fi Data Traffic**
8. Click on the pencil icon under the **Edit** column for the alert you want to use and configure. The **Edit** dialog box appears for your chosen alert.

For **High Data Usage**:

1. Check **Enabled**.
2. Under **Data Plan Details**, select the **Plan Type** from the drop down menu which includes **Monthly** or **Custom Interval**.
3. If you choose **Custom Interval**, enter the **Interval** length in days.
4. Select the **Start Date** from the calendar picker.
5. Enter the **Limit** in **MB** for data usage.
6. In **Notify At**, enter the percentage of the limit that triggers notification to be sent.
7. Select alert recipients from **Recipient Group**.
8. Select how you want to send alerts by clicking **Email**, **SMS**, or **SNMP**.
9. Click **Finish**.
10. To save your changes, click **Save and Restart**.

For **Low Signal Strength**:

1. Check **Enabled**.
2. Enter the **Signal Threshold** in **dBm**.
3. Enter the **Duration** in seconds.
4. Under **Alerts**, select the recipients under **Recipient Group**.
5. In **Notify**, enter the frequency of notification (in hours). Default is **24**.
6. Select how you want to send alerts by clicking **Email**, **SMS**, or **SNMP**.
7. Click **Finish**.
8. To save your changes, click **Save and Restart**.

For **Device Reboots**:

1. Check **Enabled**.
2. Under **Alerts**, select the recipients under **Recipient Group**.
3. In **Notify**, the field for frequency of notification is shown. The predefined value is **Always** and cannot be modified by the user.
4. Select how you want to send alerts by clicking **Email**, **SMS**, or **SNMP**.
5. Click **Finish**.
6. To save your changes, click **Save and Restart**.

For **Ethernet Interface Failure**:

1. Check **Enabled**.
2. Enter the **Duration** in seconds.
3. Under **Notification Options**, select the recipients from the drop-down in **Recipient Group**.
4. In **Notify**, enter the frequency of notification (in hours). Default is **24**.
5. Select how you want to send alerts by clicking **Email**, **SMS** or **SNMP**.
6. Click **Finish**.
7. To save your changes, click **Save and Restart**.

For **Cellular Interface Failure**:

1. Check **Enabled**.
2. Enter the **Duration** in seconds.
3. Under **Notification Options**, select the recipients from the drop-down in **Recipient Group**.
4. In **Notify**, enter the frequency of notification (in hours). Default is **24**.
5. Select how you want to send alerts by clicking **Email**, **SMS** or **SNMP**.
6. Click **Finish**.
7. To save your changes, click **Save and Restart**.

For **Ethernet Data Traffic**:

1. Check **Enabled**.
2. Enter **Interval** in hours when alert is sent.
3. Under **Notification Options**, select the recipients from the drop-down in **Recipient Group**.
4. In **Notify**, the constant value is **Always**.
5. Select how you want to send alerts by clicking **Email**, **SMS** or **both**.
6. Click **Finish**.
7. To save your changes, click **Save and Restart**.

For **Cellular Data Traffic**:

1. Check **Enabled**.
2. Enter **Interval** in hours when alert is sent.
3. Under **Notification Options**, select the recipients from the drop-down in **Recipient Group**.
4. In **Notify**, the constant value is **Always**.
5. Select how you want to send alerts by clicking **Email**, **SMS** or **both**.
6. Click **Finish**.
7. To save your changes, click **Save and Restart**.

For **WAN Interface Failover**:

1. Check **Enabled**.
2. Enter the **Timeout** in seconds.
3. Select what to **Notify On** from the drop-down.
4. Under **Notification Options**, select the recipients from the drop-down in **Recipient Group**.
5. In **Notify**, the constant value is **Always**.
6. Select how you want to send alerts by clicking **Email**, **SMS** or **SNMP**.
7. Click **Finish**.
8. To save your changes, click **Save and Restart**.

For **Ping Failure**:

1. Check **Enabled**.
2. Under **Ping Details**, select the **Network Interface** from the drop-down.
3. Enter the **IP Address** or **URL** that you want to ping.
4. Enter the **Count**.
5. Enter the **Failure Threshold**.
6. Enter the **Ping Interval**.
7. Under **Notification Options**, select the recipients from the drop-down in **Recipient Group**.
8. In **Notify**, the constant value is **Always**.
9. Select how you want to send alerts by clicking **Email**, **SMS** or **SNMP**.
10. Click **Finish**.
11. To save your changes, click **Save and Restart**.

For **Wi-Fi Interface Failure**:

1. Check **Enabled**.
2. Enter the **Duration** in seconds.
3. Under **Notification Options**, select the recipients from the drop-down in **Recipient Group**.
4. In **Notify**, enter the frequency of notification (in hours). Default is **24**.
5. Select how you want to send alerts by clicking **Email**, **SMS** or **SNMP**.
6. Click **Finish**.
7. To save your changes, click **Save and Restart**.

For **Wi-Fi Data Traffic**:

1. Check **Enabled**.
2. Enter **Interval** in hours when alert is sent.
3. Under **Notification Options**, select the recipients from the drop-down in **Recipient Group**.
4. In **Notify**, the constant value is **Always**.
5. Select how you want to send alerts by clicking **Email** or **SMS**.
6. Click **Finish**.
7. To save your changes, click **Save and Restart**.

Customizing the User Interface

You can change how the user interface on your device appears. To change the interface:

1. From the Navigation pane, select **Administration > Web UI Customization**.
2. To define what information appears on the **Administration: Support** page, use the Support group. See Customizing Support Information.
3. To define other settings, use the **Device Settings** group. See Specifying Device Settings.

Customizing Support Information

To customize the interface displaying information that can be used to support users:

1. To enable display of the custom support information, go to **Administration > Web UI Customization > Support Information** and check **Show Custom Info**.
2. Type the desired information into the optional fields including:
   - **Company Name**
   - **Country**
   - **Fax**
   - **Address 1**
   - **Address 2**
   - **City**
   - **State/ Prv**
   - **Zip Code**
   - **City**
3. To add a phone number:
   a. Click **Add Phone**.
   b. A label can appear next to the phone number, for example **Fax** or **Phone** or **International**. In the **Label** field, enter text that describes the phone number.
   c. In the **Number** field, type the phone number.
4. To add a link to a website, click **Add Link**.
   a. To label the website, type label text in **Label** field.
   b. In the **URL** field, type the website's link.
   c. To add further descriptive text about the site, type the information in the **Text** field.
5. To add an image, click **Upload Image:**
   a. Click **Browse**, go to the location of the image, and select the image.
   b. Click **OK.**
6. To delete an existing image, click **Remove Image**.
7. Click **Submit**.
8. To save your changes, click **Save and Restart**.

Specifying Device Settings

To define other custom settings for devices:

1. Go to **Administration > Web UI Customization > Device Settings**.
2. Enter desired information in the optional fields including:
   - **Device Name**
   - **Custom ID**
   - **Button Color**
   - **Button Font Color**
   - **Highlight Color**
   - **Highlight Font Color**

Note: To define color fields, use **#rrggbb** format.

3. To add a favorite icon, also known as a shortcut icon or bookmark icon, in the **Custom Favicon** field, click **Browse** to find where the Favicon file resides, select the desired file, and click **Upload Icon**.
4. To remove an existing favorite icon, click **Remove Icon**.
5. To add a custom logo, next to the **Custom Logo** field, click **Browse** to find where the logo file resides, select the desired file, and click **Upload Logo**.
6. To remove an existing logo, click **Remove Logo**.
7. Click **Submit**.
8. To save your changes, click **Save and Restart**.

Upgrading Firmware

Upgrade the device's firmware to the latest version.

You can download firmware upgrades from the MultiTech website or update your firmware automatically through MultiTech's DeviceHQ™ system.

First, check your firmware version. Refer to the upper right corner of your configuration software window. To upgrade the firmware on your device:

1. Before you upgrade your firmware, save your present configuration as a backup. See DeviceHQ™.
2. Go to the MultiTech website, locate the firmware upgrade file you want for your device, and download this file to a known location.
3. From **Administration**, select **Firmware Upgrade**. The Administration: Firmware Upgrade pane opens.
4. In the **Firmware Upgrade File** field, point to the area where the upgrade file resides, and select the firmware file. To do so:
   a. Click **Browse** to find where the firmware file resides that you want to apply.
   b. Select the file and click **Open**. The file appears in the **Firmware Upgrade File** field. Make sure you select the correct BIN file; otherwise, your device can become inoperable.
5. Click **Start Upgrade**.
6. A message about time needed to upgrade appears. Click **OK**. A progress bar appears indicating the status of the upgrade. When upgrade is completed, your device reboots.
7. After the firmware upgrade is complete, verify your configuration to make sure it is what you expected.

Note:

- The new firmware is written into flash memory.
- It may take up to five minutes to upgrade the firmware. Do not interfere with the devices's power or press the reset button during this time.
- The DeviceHQ™ is a cloud platform that provides the ability to remotely manage and upgrade rCell devices. Please see the **Remote Management** section or visit mdm.multitech.com for more information.

Saving and Restoring Settings

To restore previous configuration settings to your device, to restore settings to their factory defaults, or to save the current configuration:

1. Go to **Administration > Save/Restore > Upload Configuration**.
2. To restore a configuration from a previously saved file, go to **Restore Configuration From File**:
    a. Next to the **Restore Configuration** field, click **Browse**.
    b. Navigate to the location where the configuration file is stored and select the desired file.
    c. Click **Restore**. The device reboots.
3. To save your current configuration to a file, go to **Save Configuration To File**:
    a. Click **Save**.
    b. Navigate to the location where you wish to save the file and select location.
4. This option is only available if you had reset to user-defined configuration. (Also, holding the reset button on the device for 30 seconds overrides user-defined settings and resets to factory default.) To reset the device's configuration to the factory settings, go to **Reset to Factory Default Configuration**:
    a. Click **Reset**.
    b. A dialog box appears prompting you to confirm that you want to restore to factory default settings.
    c. Click **OK**.
5. This option is only available if you set user-defined settings first. (Also, holding the reset button on the device for 5 seconds sets user-defined defaults) To restore the device's configuration to the user-defined configuration settings, go to **Reset to User-Defined Configuration**:
    a. Click **Restore**.
    b. A dialog box appears prompting you to confirm that you want to restore to a set of user-defined settings.
    c. Click **OK**.
6. To set deployment-specific default settings, click **Set Current Configuration As User-Defined Default**.
    a. A dialog box appears prompting you to confirm that you want to restore to a set of user-defined settings.
    b. Click **OK**.
7. To save a current configuration:
    a. Click **Save**.
    b. A dialog box appears asking you if you want to open or save the configuration file. Click **Save**.

c. Navigate to the location where you want to store the configuration. Click **Save**.
d. A progress dialog box appears to indicate that the configuration is being saved. Click **Close**.

Using the Debugging Options

The device has utilities to help troubleshoot and solve technical problems. You can set up your device:

- To automatically reboot itself at a particular time of day or use a particular offset in hours from boot.
- To record and report Syslog messages that can help you resolve potential issues with your device.

You can also communicate directly with the device's cellular radio. To do this:

1. From **Administration**, select **Debug Options**.
2. Click the down arrow to the far right of the Radio Terminal screen to view the terminal window.
3. Enter AT commands to the radio.

See also: Statistics Configuration Fields

Automatically rebooting the device

To specify the amount of time that passes before the device automatically reboots itself:

1. Go **Administration > Debug Options > Auto Reboot Timer**, select **DISABLED**, **HOUR OF DAY**, and **TIMER** from the drop-down list under **Auto Reboot**.
2. In the **Auto Reboot Timer** field, select the **Hour of the Day** (0-23) and then enter **Hour of the Day to Restart** (0-23).
3. If you do NOT want the device to automatically reboot, set the time to **0**. The default setting is **0**.

Setting up Telnet

To enable and configure Telnet on your device:

1. Go to **Administration > Debug Options > Telnet**, check **Enabled**.
2. Enter the **Port** number for Telnet.
3. Enter the **Username**.
4. Enter the **Password**. Enter it again under **Confirm Password**.
5. Click **Submit**.
6. To save your settings, click **Save and Restart**.

Configuring Remote Syslog

To enable and configure Remote Syslog to capture and send log data from your device, you must have local syslog software installed.

To set up a log request in DeviceHQ™, under **Devices**, select your device. Then click on Tasks and select **Request Device Logs**. After the request has been completed, return to the device administration software.

1. To activate **Remote Syslog**, go to **Administration > Debug Options > Logging** under **Remote Syslog**, check **Enabled**.
2. To enable a remote server to receive and store the device's log data, in the **IP Address** field, type the IP address of the desired server.

3. To determine the amount of log information that is collected, in the **Debug Log Level**, select the type of information from the values in the dropdown menu which includes: **Minimum, Error, Warning, Info, Debug,** and **Maximum**. The system will collect the type of information you specify. For example, **Maximum** will collect all the log data available while **Warning** will collect anything that is a warning or above that level.
4. To download syslog information directly from the device, click **Download**.
5. Click **Submit**.
6. To save your changes, click **Save and Restart**.

Statistics Settings

To configure **Statistics**:

1. Go to **Administration > Debug Options > Statistics**.
2. Enter the **Save Timeout** in seconds.
3. Enter the **Save Data Limit** in megabytes.
4. To delete cell activity history, click **Delete Cellular History**.
5. To delete ethernet history, click **Delete Ethernet History**.
6. Click **Submit**.
7. To save your settings, click **Save and Restart**.

Ping and Reset Options

Perform a Ping Test

Ping allows you to test the IP address or URL to ensure it is operational.

To perform a ping test:

1. Go to **Administration > Debug Options > Ping**.
2. Enter the **IP address or URL** of the site you wish to ping.
3. Under **Network Interface**, choose from the available drop-down list options including: **ANY, CELLULAR, ETHERNET,** and **DIAL-UP.**
4. Click **Ping**.

Reset Options

To reset the modem, go to **Administration > Debug Options > Reset Options**, click **Reset Modem.** If successful, the system displays a message confirming a successful reset.

SMTP Settings

The following table lists the configuration fields in the SMTP window.

Field	Description
SMTP Configuration	
Enabled	Click to use the SMTP feature.
Server	Enter the SMTP server address.

Field	Description
Port	Enter the port number that the SMTP server uses.
Email	Enter the sender email address. This address will be added as the sender email address to the sent emails.
Username	Enter the name that can access the SMTP server.
Password	Enter the password that can access the SMTP server.
Mail Log Settings	
Entries to Keep	Enter the desired number of mail log entries that are to be stored in the router. The range of values is **10** to **1000**. If you click **Submit**, this setting is not applied to the emails that are in progress or deferred. Note that logs are not saved on the device. Also, logs do not persist through power cycles.
Send a Test Email	
Address	To make sure that the SMTP is configured properly, enter a destination email address, then click **Send Test Email**.

Chapter 13 – Chapter 13 Device Status

Viewing Device Statistics

The device collects sent/received traffic data for WAN, Cellular, and Ethernet networks. The daily statistical data is stored on the device for a 365-day period. All data that is older than 365 days is automatically deleted.

1. From **Status & Logs** on the left side of the Web Management interface, select **Statistics**. (If you select **PPP-IP Passthrough** mode, go to **Status** menu and then **Statistics**.)
2. The application categorizes statistics about your device. To see statistics that appear in a particular category, click the appropriate tab.

   System

   Ethernet

   Cellular

   Serial

   GRE

   IPSec

Definitions

A data usage bar chart and a cumulative usage line chart are available for Ethernet and Cellular. The Data Usage bar chart also shows statistics for data sent and data received. The following list includes some definitions to help you understand some of the data. Not all of the available statistics are listed here or shown in every tab.

- **Total**: Total number of sent/received bytes for a 365-day period.
- **Today**: Total number of sent/received bytes for today.
- **Sessions**: Bytes
- **Packets**: Number of successfully transmitted (TX) and received (RX) packets.
- **Errors**: Number of errors that occurred. Possibly due to connection issues or network congestion.
- **Dropped**: Number of dropped packets. Possibly due to memory constraints.
- **Overruns**: Number of overruns that occurred. Possibly due to processing constraints.
- **Frame**: Number of invalid packets.
- **Carrier**: Number of signal modulation errors that occurred (possibly due to physical connection).
- **Collisions**: Number of packet collisions that occurred due to network congestion.
- **Queue Length**: Length of the transmit queue.

Cumulative and Daily Usage

Click **Show Cumulative Usage** or **Show Daily Usage** to display the desired view. Default chart view is Daily Usage for 30-day period.

Timeframe of Chart

Change the time frame for the chart by clicking **Configure**. In the dialog that appears, set the **Start Date** and **End Date**, then click **Finish**.

Show Log

The associated run-time logs for this section.

Mail Log

Mail Log shows the recent email delivery attempts and the mail log details. Mail log entries are sorted by date with the most recent on top. (This function is not available if you use **PPP-IP Passthrough** or **Serial Modem** mode). You can select the number of emails to display in the queue. Possible values are **5, 10, 25, 50**, or **All emails**.

1. Go to **Status & Logs > Mail Log** to display the **Mail Log** window.
2. To see the delivery details, click the eye icon under **Options** for the desired email entry.
3. To delete all mail log entries, click **Purge Log**.
   Note: Logs do not persist through power cycles.

Mail Queue

Mail Queue shows the emails that are waiting to be sent. The most recent email delivery attempts are on top. You can select the number of emails to display in the queue. Possible values are **5, 10, 25, 50**, and **All emails**. (This function is not available if you use **PPP-IP Passthrough** or **Serial Modem** mode).

1. Go to **Status & Logs > Mail Queue** to display the **Mail Queue** window.
2. To view the delivery details for an individual email, click the eye icon under **Options** for the desired email entry.
3. To delete all mail log entries, click **Purge Log**.
   Note: Logs do not persist through power cycles.

Service Statistics

On the Web Management interface side menu, click **Status & Logs > Services** to display the **Service Statistics** window. (If you use **PPP-IP Passthrough** mode, go to **Status** menu and follow the remaining instructions.) This window shows the configuration (enabled or disabled) and the status of the following services:

- **DDNS**
- **SNTP**
- **Cellular RTC**
- **TCP/ICMP Keep Alive**
- **Dial-on-Demand**
- **SMTP**
- **SMS**
- **Failover**

Statistics Configuration Fields

The device saves the statistics periodically depending on the configured timeout and data limit. By default, the Save Timeout is set to 300 seconds and the Data Limit is set to 5 MB. For the default scenario, the device saves the data if more than 5 minutes has elapsed, or if more than 5 MB has been sent or received from the last check. The device checks these conditions every minute, but the data is saved only if one of the conditions is met.

Field	Description
Save Timeout	The device saves the statistical data when the desired timeout period has elapsed. Default is 300 seconds (5 minutes).
Save Data Limit	The device saves the statistical data if the data limit is reached. Default is 5 MB.
Delete Cellular History	Deletes all Cellular history on the device.
Delete Ethernet History	Deletes all Ethernet history on the device.

Chapter 14 – Chapter 14 Regulatory Information

47 CFR Part 15 Regulation Class B Devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. 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 one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

Industry Canada Class B Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Reglement Canadien sur le matériel brouilleur.

This device complies with Industry Canada license-exempt RSS standard(s). The operation is permitted for the following two conditions:

1. the device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

FCC Grant

FCC Grant Part 22, 24

FCC Identifier	RI7CE910-DUAL
Equipment Class	PCS Licensed Transmitter
Notes	Dual Band CDMA
Approval	Single Modular

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designators
22H	824.7 - 848.31	0.292	2.5 PM	1M28F9W
24E	1851.2 - 1908.75	0.278	2.5 PM	1M28F9W

Power listed is conducted. The maximum antenna gain including cable loss for compliance with radiated power limits. RF exposure requirements and the categorical exclusion requirements of 2.1091 is 5.12dBi for part 22H and 6.12dBi for part 24E. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not transmit simultaneously with any other antenna or transmitter. This device is allowed only for OEM integration into host products. Consumer or end-user installation is not allowed. End-users and OEM integrators must be provided with specific information required to satisfy RF exposure compliance.

Industry Canada Class B Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Reglement Canadien sur le matériel brouilleur.

This device complies with Industry Canada license-exempt RSS standard(s). The operation is permitted for the following two conditions:

1. the device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

FCC Interference Notice

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

FCC and IC Antenna Requirements Toward License Exempt Radio Transmitters (Bluetooth/WLAN)

The license-exempt Bluetooth/WLAN radio transmitter contained in this equipment may only be operated with an antenna of a type, a maximum gain and the required antenna impedance as approved and specified below. To reduce potential radio interference to other users, choose the antenna type and it's gain so that the equivalent isotropically radiated power (EIRP) is not more than that necessary for successful communication.

Requirements for Cellular Antennas with regard to FCC/IC Compliance

There cannot be any alteration to the authorized antenna system. The antenna system must maintain the same specifications. The antenna must be the same type, with similar in-band and out-of-band radiation patterns. This device has been designed to operate with the antennas listed below and having a maximum gain for 850 Mhz of <= 6.4 dBi , for 1700 Mhz of <= 6.5 dBi, and for 1900 Mhz of <= 3 dBi. Antennas not included in this list or that have a gain greater than specified are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

EMC, Safety, and R&TTE Directive Compliance

CE0682

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 2014/30/EU on the approximation of the laws of Member States relating to electromagnetic compatibility;
and
Council Directive 2014/35/EU on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;
and
Council Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment;
and
Council Directive 1999/5/EC on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

Restriction of the Use of Hazardous Substances (RoHS)

RoHS
2011/65/EU
COMPLIANT

Multi-Tech Systems, Inc.

Certificate of Compliance

2011/65/EU

Multi-Tech Systems, Inc. confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2011/65/EU of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS).

These MultiTech products do not contain the following banned chemicals[1]:

- Lead, [Pb] < 1000 PPM
- Mercury, [Hg] < 1000 PPM

- Hexavalent Chromium, [Cr+6] < 1000 PPM
- Cadmium, [Cd] < 100 PPM
- Polybrominated Biphenyl, [PBB] < 1000 PPM
- Polybrominated Diphenyl Ether, [PBDE] < 1000 PPM

Environmental considerations:

- Moisture Sensitivity Level (MSL) =1
- Maximum Soldering temperature = 260C (in SMT reflow oven)

[1] Lead usage in some components is exempted by the following RoHS annex, therefore higher lead concentration would be found in some modules (>1000 PPM);

- Resistors containing lead in a glass or ceramic matrix compound.

REACH Statement

Registration of Substances

After careful review of the legislation and specifically the definition of an “article” as defined in EC Regulation 1907/2006, Title II, Chapter 1, Article 7.1(a)(b), it is our current view that Multi-Tech Systems, Inc. products would be considered as “articles.” In light of the definition in § 7.1(b) which requires registration of an article only if it contains a regulated substance that “is intended to be released under normal or reasonably foreseeable conditions of use,” our analysis is that Multi-Tech Systems, Inc. products constitute nonregisterable articles for their intended and anticipated use.

Substances of Very High Concern (SVHC)

Per the candidate list of Substances of Very High Concern (SVHC) published October 28, 2008 we have reviewed these substances and certify the Multi-Tech Systems, Inc. products are compliant per the EU “REACH” requirements of less than 0.1% (w/w) for each substance. If new SVHC candidates are published by the European Chemicals Agency, and relevant substances have been confirmed to be greater than 0.1% (w/w), Multi-Tech Systems, Inc. will provide updated compliance status.

Multi-Tech Systems, Inc. also declares it has been duly diligent in ensuring that the products supplied are compliant through a formalized process which includes collection and validation of materials declarations and selective materials analysis where appropriate. This data is controlled as part of a formal quality system and will be made available upon request.

Waste Electrical and Electronic Equipment Statement

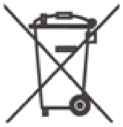
WEEE Directive

The WEEE Directive places an obligation on EU-based manufacturers, distributors, retailers, and importers to take-back electronics products at the end of their useful life. A sister directive, ROHS (Restriction of Hazardous Substances) complements the WEEE Directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE Directive covers all MultiTech products imported into the EU as of August 13, 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

July, 2005



Information on HS/TS Substances According to Chinese Standards

In accordance with China's Administrative Measures on the Control of Pollution Caused by Electronic Information Products (EIP) # 39, also known as China RoHS, the following information is provided regarding the names and concentration levels of Toxic Substances (TS) or Hazardous Substances (HS) which may be contained in Multi-Tech Systems Inc. products relative to the EIP standards set by China's Ministry of Information Industry (MII).

Hazardous/Toxic Substance/Elements

Name of the Component	Lead (PB)	Mercury (Hg)	Cadmium (CD)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Printed Circuit Boards	O	O	O	O	O	O
Resistors	X	O	O	O	O	O
Capacitors	X	O	O	O	O	O
Ferrite Beads	O	O	O	O	O	O
Relays/Opticals	O	O	O	O	O	O
ICs	O	O	O	O	O	O
Diodes/ Transistors	O	O	O	O	O	O
Oscillators and Crystals	X	O	O	O	O	O
Regulator	O	O	O	O	O	O
Voltage Sensor	O	O	O	O	O	O
Transformer	O	O	O	O	O	O
Speaker	O	O	O	O	O	O
Connectors	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
Screws, Nuts, and other Hardware	X	O	O	O	O	O
AC-DC Power Supplies	O	O	O	O	O	O
Software /Documentation CDs	O	O	O	O	O	O
Booklets and Paperwork	O	O	O	O	O	O
Chassis	O	O	O	O	O	O

X Represents that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/Txxx-2006 Requirements for Concentration Limits.
O Represents that no such substances are used or that the concentration is within the aforementioned limits.

Information on HS/TS Substances According to Chinese Standards (in Chinese)

依照中国标准的有毒有害物质信息

根据中华人民共和国信息产业部 (MII) 制定的电子信息产品 (EIP) 标准－中华人民共和国《电子信息产品污染控制管理办法》（第 39 号），也称作中国 RoHS, 下表列出了 Multi-Tech Systems, Inc. 产品中可能含有的有毒物质 (TS) 或有害物质 (HS) 的名称及含量水平方面的信息。

有害/有毒物质/元素

成分名称	铅 **(PB)**	汞 **(Hg)**	镉 **(CD)**	六价铬 **(CR6+)**	多溴联苯 **(PBB)**	多溴二苯醚 **(PBDE)**
印刷电路板	O	O	O	O	O	O
电阻器	X	O	O	O	O	O
电容器	X	O	O	O	O	O
铁氧体磁环	O	O	O	O	O	O
继电器/光学部件	O	O	O	O	O	O
ICs	O	O	O	O	O	O
二极管/晶体管	O	O	O	O	O	O
振荡器和晶振	X	O	O	O	O	O
调节器	O	O	O	O	O	O
电压传感器	O	O	O	O	O	O
变压器	O	O	O	O	O	O
扬声器	O	O	O	O	O	O
连接器	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
螺丝、螺母以及其它五金件	X	O	O	O	O	O
交流-直流电源	O	O	O	O	O	O
软件/文档 CD	O	O	O	O	O	O
手册和纸页	O	O	O	O	O	O
底盘	O	O	O	O	O	O

X 表示所有使用类似材料的设备中有害/有毒物质的含量水平高于 SJ/Txxx-2006 限量要求。
O 表示不含该物质或者该物质的含量水平在上述限量要求之内。