INSTRUCTION MANUAL

RV50 Sierra Wireless AirLink®
4G LTE Cellular Modem

Revision: 5/17

WARRANTY AND ASSISTANCE

This equipment is warranted by CAMPBELL SCIENTIFIC (CANADA) CORP. ("CSC") to be free from defects in materials and workmanship under normal use and service for **twelve (12) months** from date of shipment unless specified otherwise. ******* Batteries are not warranted. ******* CSC's obligation under this warranty is limited to repairing or replacing (at CSC's option) defective products. The customer shall assume all costs of removing, reinstalling, and shipping defective products to CSC. CSC will return such products by surface carrier prepaid. This warranty shall not apply to any CSC products which have been subjected to modification, misuse, neglect, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose. CSC is not liable for special, indirect, incidental, or consequential damages.

Products may not be returned without prior authorization. To obtain a Return Merchandise Authorization (RMA), contact CAMPBELL SCIENTIFIC (CANADA) CORP., at (780) 454-2505. An RMA number will be issued in order to facilitate Repair Personnel in identifying an instrument upon arrival. Please write this number clearly on the outside of the shipping container. Include description of symptoms and all pertinent details.

CAMPBELL SCIENTIFIC (CANADA) CORP. does not accept collect calls.

Non-warranty products returned for repair should be accompanied by a purchase order to cover repair costs.

Campbell Scientific (Canada) Corp.
14532 131 Avenue NW | Edmonton AB T5L 4X4
780.454.2505 | fax 780.454.2655 | campbellsci.ca

Assistance

Products may not be returned without prior authorization. The following contact information is for Canadian and international clients residing in countries served by Campbell Scientific (Canada) Corp. directly. Affiliate companies handle repairs for clients within their territories. Please visit *www.campbellsci.ca* to determine which Campbell Scientific company serves your country.

To obtain a Returned Materials Authorization (RMA), contact CAMPBELL SCIENTIFIC (CANADA) CORP., phone (780) 454-2505. After a measurement consultant determines the nature of the problem, an RMA number will be issued. Please write this number clearly on the outside of the shipping container. Campbell Scientific's shipping address is:

CAMPBELL SCIENTIFIC (CANADA) CORP.
RMA#_____
14532 131 Avenue NW
Edmonton, Alberta T5L 4X4
Canada

For all returns, the client must fill out a "Statement of Product Cleanliness and Decontamination" form and comply with the requirements specified in it. The form is available from our web site at *www.campbellsci.ca/repair*. A completed form must be either emailed to *repair@campbellsci.ca* or faxed to (780) 454-2655. Campbell Scientific (Canada) Corp. is unable to process any returns until we receive this form. If the form is not received within three days of product receipt or is incomplete, the product will be returned to the client at the client's expense. Campbell Scientific (Canada) Corp.f reserves the right to refuse service on products that were exposed to contaminants that may cause health or safety concerns for our employees.

Precautions

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND **TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC**. FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.ca or by telephoning (780) 454-2505 (Canada). You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified personnel (e.g. engineer). If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General
- Prior to performing site or installation work, obtain required approvals and permits.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical
- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, 6 meters (20 feet), or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.

Elevated Work and Weather
- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance
- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CLIENT ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.

PLEASE READ FIRST

About this manual

Please note that this manual was originally produced by Campbell Scientific Inc. (CSI) primarily for the US market. Some spellings, weights and measures may reflect this origin.

Some useful conversion factors:

Area:	1 in^2 (square inch) = 645 mm^2
Length:	1 in. (inch) = 25.4 mm
	1 ft (foot) = 304.8 mm
	1 yard = 0.914 m
	1 mile = 1.609 km
Mass:	1 oz. (ounce) = 28.35 g
	1 lb (pound weight) = 0.454 kg
Pressure:	1 psi (lb/in2) = 68.95 mb
Volume:	1 US gallon = 3.785 litres

In addition, part ordering numbers may vary. For example, the CABLE5CBL is a CSI part number and known as a FIN5COND at Campbell Scientific Canada (CSC). CSC Technical Support will be pleased to assist with any questions.

About sensor wiring

Please note that certain sensor configurations may require a user supplied jumper wire. It is recommended to review the sensor configuration requirements for your application and supply the jumper wire is necessary.

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RV50 Sierra Wireless AirLink® 4G LTE Cellular Modem

1. Introduction

This manual provides information for interfacing the RV50 Sierra Wireless AirLink® 4G LTE Cellular Modem to Campbell Scientific dataloggers.

The RV50 digital cellular modem is manufactured by Sierra Wireless® and supports network operator switching based on the SIM for use on GSM (Global System for Mobile Communications) and CDMA (Code Division Multiple Access) networks. The modem is accessed through the Internet using TCP/IP communications protocol.

Use of the RV50 requires a Verizon® CDMA/1xRTT/EVDO/LTE or AT&T® GSM/GPRS/EDGE/HSPA+/LTE business account or an equivalent account from another service provider. See Section 4.1, *Establish Cellular Service (p. 2)*, for more information.

For additional information on the RV50 modem, see the Support section of the Sierra Wireless website.

Before using the RV50, please study:

- Section 2, *Precautions (p. 2)*
- Section 3, *Initial Inspection (p. 1)*
- Section 4, *QuickStart (p. 2)*

2. Precautions

- READ AND UNDERSTAND the *Safety* section at the front of this manual.

- CAUTION: This device uses considerably more power than the datalogger (see Section 6, *Specifications (p. 9)*) and may require a larger power supply, switching power with the datalogger, or a combination of these to ensure the battery is not drained. See Appendix A, *Controlling Power to the RV50 (p. A-1)*, for program examples of using switched 12V to control power to the RV50.

- We strongly recommend changing the default RV50 *ACEmanager* password to prevent unauthorized access and the potential of malware infection. The password can be changed from the *ACEmanager* **Admin** tab.

3. Initial Inspection

- The RV50 ships with the following items:
  - (1) grey power cable (from original manufacturer)
  - (4) screws and washers (from original manufacturer)

- o (1) 2 ft Ethernet cable

- o (1) Quick Deploy Guide

- o (1) *ResourceDVD*

- Upon receipt of the RV50, inspect the package and contents for damage. File any damage claims with the shipping company.

- Immediately check package contents against the shipping documentation. Contact Campbell Scientific about any discrepancies.

4. QuickStart

4.1 Establish Cellular Service

The RV50 supports network operator switching based on the inserted SIM (subscriber identity module). This means that the same modem can be configured for either Verizon Wireless® (CDMA), AT&T® (GSM) or other supported CDMA and GSM networks.

4.1.1 Verizon Wireless

What you need:

- Verizon Wireless CDMA/1xRTT/EVDO/LTE coverage at the datalogger site. For a coverage map, refer to: *www.verizonwireless.com/landingpages/better-matters/#maps*

- CDMA/1xRTT/EVDO/LTE static unrestricted IP account established with Verizon Wireless.

NOTE   Generally, there is a $500 one-time-per-customer charge to activate static IP on the account. Additional static IP lines of service may be added at no additional charge from that time on.

To set up an account, you will need the IMEI number of the modem. The IMEI number is listed on a label on the modem and also on the box. To set up an account with Verizon Wireless, call:

    800-526-3178 for Business Sales
    800-256-4646 for Personal Sales

Verizon Wireless will provide a SIM card for each modem. The mini-SIM (2FF) card must be installed inside of the modem as described in Section 4.2, *Install the SIM Card (p. 3)*. In addition to the SIM card, you should receive:

- 10-digit MSISDN number (telephone number associated with the SIM, used for billing)

- IP Address for a static IP account and an APN (Access Point Name) for CDMA/1xRTT/EVDO/LTE service. A common APN used for this application is: we01.VZWSTATIC. The user must program the APN name into the modem as described in Section 4.3, *Configure RV50 (p. 4)*.

4.1.2 AT&T

What you need:

- AT&T GSM/GPRS/EDGE/HSPA+/LTE coverage at the datalogger site. For a coverage map refer to: *www.att.com/maps/wireless-coverage.html*.

- GSM/GPRS/EDGE/HSPA+/LTE business account established with AT&T

To set up a GSM/GPRS/EDGE/HSPA+/LTE business account, contact your AT&T Business Account Representative or Blu-Telecommunications.

Blu-Telecommunications is part of the Alliance Channel with AT&T and can assist any customer nationwide. Blu-Telecommunications will contact AT&T and work with an AT&T account manager to set up an account.

Contact information for Blu-Telecommunication:
Website: *www.blu-tel.com*
Phone number: (877) 422-2616, or Email box: *i2gold@blu-tel.com*
What to ask for: M2M Setup
Who to ask for: Carlos Morales or Andy Tran

An APN must be added onto the account to make the modem accessible through the Internet. For networks with fewer than 30 modems, the standard 'I2Gold APN' can be used; networks with more than 30 modems will require a 'Custom APN'. A Custom APN has a setup fee starting at $500 and takes a minimum of 7 to 14 business days to complete. The user must program the APN name into the modem as described in Section 4.3, *Configure RV50 (p. 4)*.

AT&T will provide a Subscriber Identity Module (SIM) card for each modem. The mini-SIM (2FF) card must be installed inside of the modem as described in Section 4.2, *Install the SIM Card (p. 3)*. In addition to the SIM card, you should receive:

- 10-digit MSISDN number (telephone number associated with the SIM, used for billing)

- IP Address and APN for GSM/GPRS/EDGE/HSPA+/LTE service

4.2 Install the SIM Card

The SIM in the RV50 is a smartcard that securely stores the key identifying a mobile subscriber. You will only need to install the SIM once in the life of the modem.

To install the mini-SIM (2FF) card:

1. Remove the SIM card cover.

2. By default, the upper slot is the primary SIM. Note the location of the notched corner for correct alignment. The gold contact points of the SIM face down when inserting into the upper slot as shown in FIGURE 4-1. (They face up when inserting into the lower slot.) **Gently** slide the card

into the upper slot until it stops and locks into place. To eject the SIM card, press it in slightly and release.
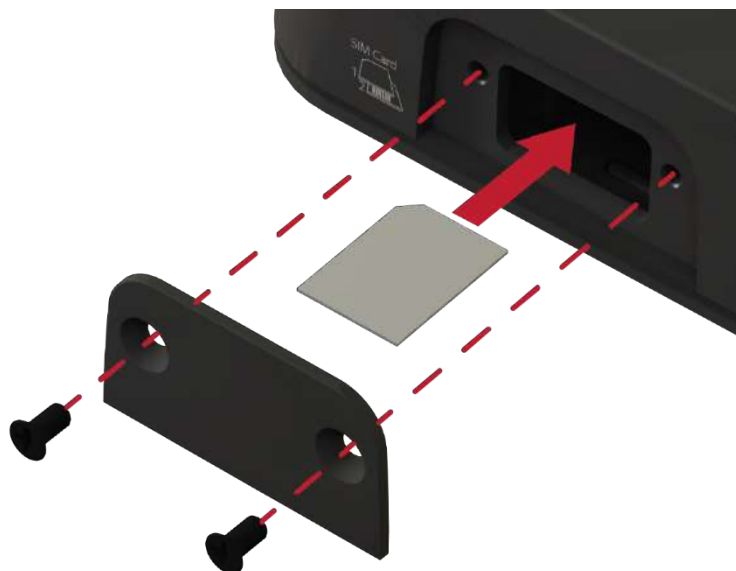
3. Replace the SIM card cover.

FIGURE 4-1. SIM Card Installation

4.3   Configure RV50

NOTE   QuickStart describes configuring the RV50 in serial server mode. It may also be configured in Point-to-Point Protocol (PPP) mode. For a description of the modes, see Section 5, *Overview (p. 9)*. For instructions on setting up the RV50 in PPP mode, see Section 7.5, *ACEmanager and Template Files (p. 18)*, and Section 7.6, *Enabling PPP Mode (p. 20)*.

The RV50 is configured using *ACEmanager*, a web based configuration tool hosted by the RV50. *ACEmanager* can be accessed using Internet Explorer® or Firefox® remotely over the cellular WAN or locally over Ethernet. A number of templates will be provided for download to make most configurations very simple once connected to *ACEmanager*.

1. Download Campbell Scientific's collection of RV50 configuration templates from *www.campbellsci.com/downloads* and run the executable downloaded. The templates can also be found on the Campbell Scientific *ResourceDVD*.

2. Connect the **Cellular** antenna.

3. Connect the **Diversity** antenna, if used. Recommended but not required. Note: If a **Diversity** antenna is not used, use *ACEmanager* to disable **WAN/Celluar | Network Credentials | RX Diversity**.

4. Connect the power cable leads to a power supply.

Lead Color	Function	Connect To
Black	Ground	**G**
White	Enable (On/Off)	**12V** or **SW12V** or control port
Red	Power (7 to 36 V)	**12V**

5. Connect the power cable to the RV50 **DC Power** input. When the RV50 is properly set up and powered, the status LEDs will turn on. The RV50 will begin the activation/provisioning process and attempt to connect to the mobile network. This process typically takes 5 to 10 minutes. A successful connection is indicated by a solid green or solid amber **Network** LED. If the RV50 does not automatically connect to the network, you may need to proceed to Step 6 to confirm or enter your **WAN/Cellular | SIM Slot 1 Configuration | Network Credentials | User Entered APN** information.

6. Connect your Windows® computer to the RV50 using the supplied Ethernet cable.

7. Launch an Internet Explorer or Firefox web browser, and enter http://192.168.13.31:9191 into the address bar. The *ACEmanager* login screen should appear in your browser.

8. Log in using **User Name** = user and **Password** = 12345. (We strongly recommend changing the default password to prevent unauthorized access and the potential of malware infection. The password can be changed from the **Admin** tab.)
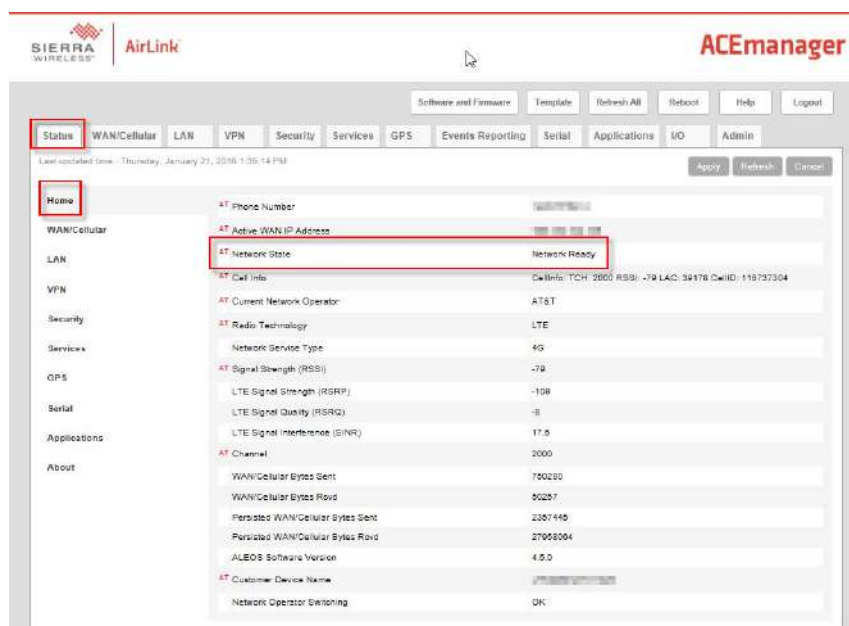
9. Once logged in, check the **Status | Home | Network State** field. It should read **Network Ready**, indicating the RV50 is connected to the cellular network. You can easily test the RV50 connection to the Internet by

selecting the **Admin | Advanced** tab and using the **PING** tool to ping an Internet server, such as *www.campbellsci.com*.

10. Click the **Template** button in the *ACEmanager* toolbar. A template application window will appear. Browse to and upload one of the configuration templates downloaded from Campbell Scientific. See TABLE 4-1.

<table>
<tr><td colspan="2" align="center">**TABLE 4-1. Template Files**</td></tr>
<tr><td align="center">**Template File Name**</td><td align="center">**Description**</td></tr>
<tr><td align="center">RV50_115200.xml</td><td align="center">Default configuration with RS-232 at 115200 baud and Ethernet communication enabled.[1]</td></tr>
<tr><td align="center">RV50_9600.xml</td><td align="center">Default configuration with RS-232 at 9600 baud and Ethernet communication enabled.[2]</td></tr>
<tr><td colspan="2">[1]CR1000, CR800 series, CR3000, CR6 series, CR300 series, CR5000
[2]CR200(X)</td></tr>
</table>

11. Reboot the RV50 after successfully applying the configuration template. You can do this by clicking the **Reboot** button on the *ACEmanager* toolbar, by momentarily pressing the **Reset** button (2 sec), or by temporarily removing power from the RV50.

4.4 Set up *LoggerNet*

The *LoggerNet* Network Map is configured from the *LoggerNet Setup* screen.

NOTE *Setup* has two options, EZ (simplified) and Standard. Click on the **View** menu at the top of the *Setup* screen, and select **Standard** view.

From the *LoggerNet* toolbar, click **Main | Setup** and configure the Network Map as described below.

1. Select **Add Root | IPPort**.

2. Add a datalogger to the **IPPort** (PakBus® dataloggers, for example the CR1000, require a PakBusPort).

3. Select the **IPPort** in the Network Map. Enter the RV50 IP address (or domain name) and port number. The IP address and port number are input in the **Internet IP Address** field separated by a colon. Preceding zeros are not entered in the **Internet IP Address** (for example, 070.218.074.247 is entered as 70.218.74.247). *Device Configuration Utility* (*DevConfig*) and the RV50 template file configure the port number to 3001 for serial server mode. Set the **Extra Response Time** to **4** seconds.
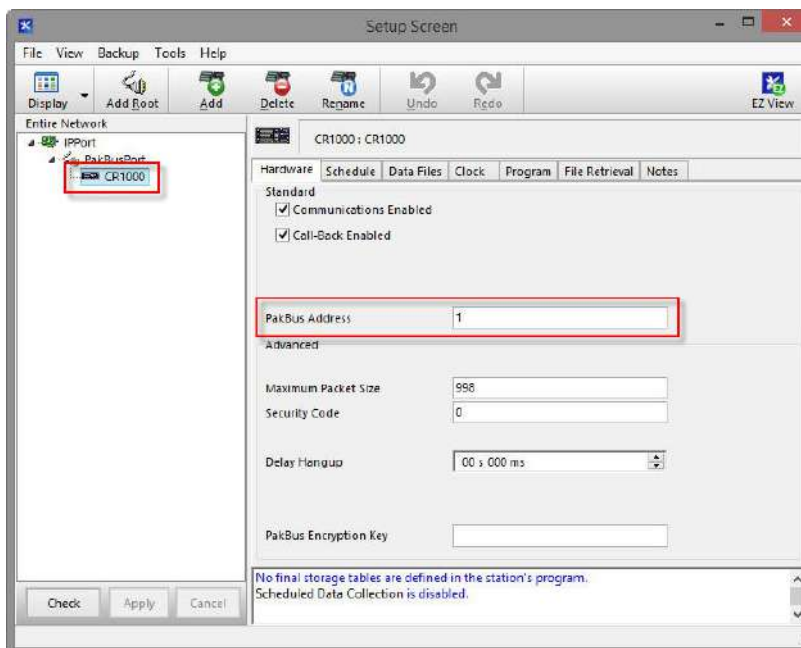
Example settings for a static IP address:
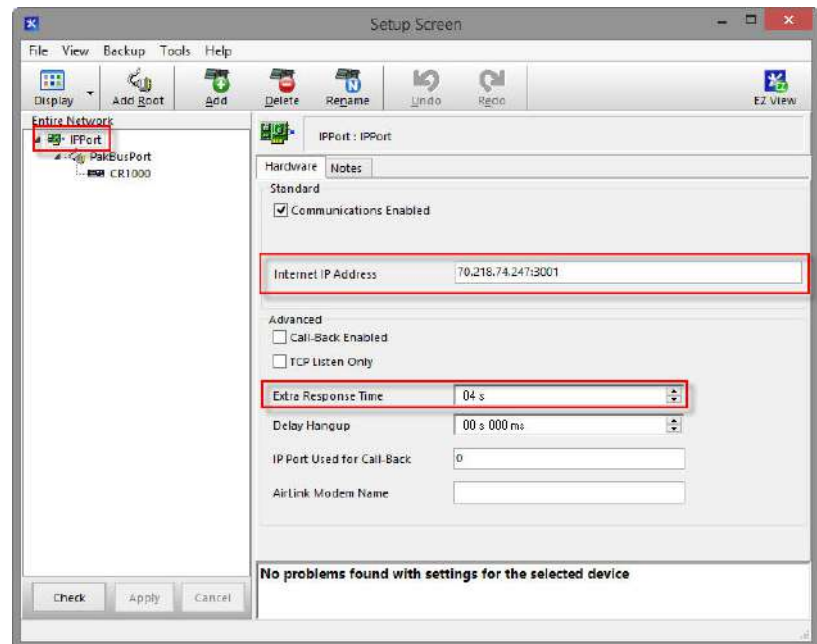
4. For PakBus dataloggers, leave the default settings for the **PakBusPort**. **PakBus Port Always Open** should not be checked.
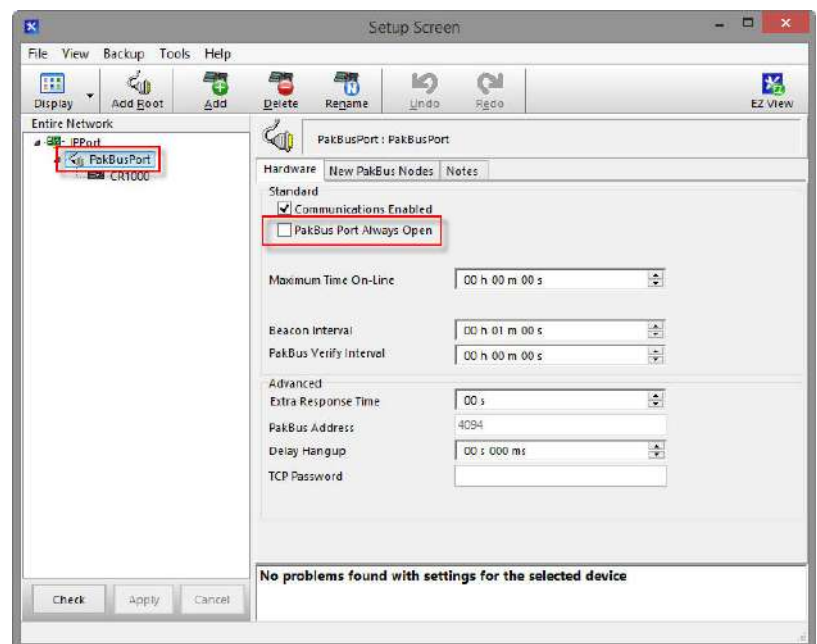
5. For PakBus dataloggers, select the datalogger in the Network Map and set the **PakBus Address** to match that of the datalogger (default address in the datalogger is 1). Click **Apply** to save the changes.


4.5   Set Up Hardware

The simplest hardware setup for modern dataloggers is to connect a null modem cable (pn 18663) between the RS-232 ports of the datalogger and the RV50. See Section 7.4, *Wiring and Connections (p. 15)*.

4.6   Test the Connection

After the Network Map has been configured, test the cellular connection using the *Connect* screen as shown below. Click on the appropriate station and click **Connect** to initiate a call to the datalogger. If the call is successful, the connectors at the bottom of the screen will come together and clock information from the datalogger will be displayed in the **Station Date/Time** field. If the connection fails, a **Communications Failure** message will be displayed.
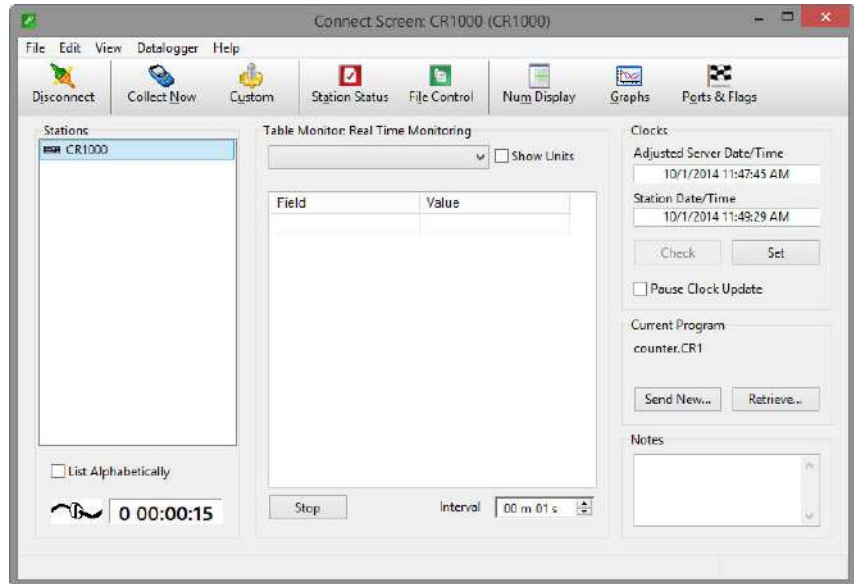
5.   Overview

The RV50 modem may be configured in one of two ways, depending on the communications type and needs of the user. For many applications that just need a connection for data collection and datalogger maintenance or monitoring, setup as a serial server is sufficient. In this mode, the modem receives IP communications over the cellular network and converts those to serial (RS-232) communications to pass on to the datalogger. From the datalogger's perspective, this is no different than a serial cable connecting it to a PC. Section 4, *QuickStart (p. 2)*, describes setting up the RV50 in serial server mode.

Alternatively, if IP communications are needed on the datalogger, the modem may be set up in Point-to-Point Protocol (PPP) mode. In this mode, the modem simply passes IP communications directly to the datalogger. This enables features such as FTP, HTTP, and emailing. For information on configuring the RV50 in PPP mode, see Section 7.5, *ACEmanager and Template Files (p. 18)*, and Section 7.6, *Enabling PPP Mode (p. 20)*. See Appendix B, *EmailSend Using the Gmail™ Outgoing SMTP* Server *(p. B-1)*, for more information on emailing.

6.   Specifications

Sierra Wireless® AirLink® RV50 cellular modem (MC7354 radio module)

Cellular WAN

- Network Technology: 4G with automatic fallback to 3G and 2G
- Cellular WAN: North American Model
  - o Carrier Approvals: Verizon®, AT&T®, Sprint®, T-Mobile® USA, Rogers™, Bell®, Telus®
  - o LTE: 1900(B2), AWS(B4), 850(B5), 700(B13), 700(B17), 1900(B25)
  - o WCDMA: 2100(B1), 1900(B2), AWS(B4), 850(B5), 900(B8)
  - o EV-DO/CDMA: 800(BC0), 1900(BC1), 1700(BC10)
  - o GSM/GPRS/EDGE: Quad-band

- o Industry Approvals: FCC, IC, PTCRB
- o Radio Type: Software-defined (with automatic network operator switching)
- o Interfaces: Dual SIM interfaces
- • Cellular WAN: International Model
  - o LTE: 2100(B1), 1800(B3), 2600(B7), 900(B8), 800(B20)
  - o WCDMA: 2100(B1), 1900(B2), 850(B5), 900(B8)
  - o GSM/GPRS/EDGE: Quad-band
  - o Industry Approvals: CE, RCM, GCF, R&TTE
  - o Radio Type: Software-defined (with automatic network operator switching)
  - o Interfaces: Dual SIM Interfaces (2FF)

Host Interfaces

- • 10/100/1000 Ethernet RJ45
- • RS-232 serial port, DB9 female
- • USB version 2.0 with micro-B connector

RF Connectors

- • 3 SMA antenna connectors (primary, diversity & GPS)
- • Active antenna support

Power

- • Operating Voltage: 7 to 36 Vdc
- • Typical Enable/Ignition Sense Line Low: 1 mA @ 12V
- • Typical Idle: 65 to 95 mA @ 12V, depending on configuration
- • Typical Active: 250 to 300 mA @ 12V, depending on configuration

Size

- • Dimensions: 119 x 34 x 94 mm (4.69 x 1.34 x 3.7 in)
- • Weight: 320 g (11.3 oz)

Environmental

- • Operating Temperature Range: –30 to 70 °C (–22 to 158 °F)
- • Storage Temperature: –40 to 85 °C (–40 to 185 °F)
- • Humidity: 90% @ 60 °C
- • Military Specification: MIL-STD-810G conformance to shock, vibration, thermal shock, and humidity
- • IP64 rated ingress protection

Industry Certifications

- • Safety: IECEE Certification Bodies Scheme (CB Scheme), UL60950
- • Vehicle Usage: E-Mark (UN ECE Regulation 10.04), ISO7637-2, SAE J1455 (Shock & Vibration)
- • Hazardous Environments: Class 1 Div 2
- • Environmental: RoHS, REACH, WEEE

7. Installation

7.1   Base Station Requirements for RV50

PC running Campbell Scientific's *LoggerNet* or *PC400* software with access to the Internet.

7.2   Datalogger Site Equipment

- RV50 modem with power cable (included with modem)

- Datalogger — CR2XX, CR300 series, CR1000, CR5000, CR3000, CR800 series, CR6 series

- Modem Interface

  If connecting to RS-232 port:

  Null Modem Cable (pn 18663, 1 ft., 9 pin, male-to-male) — connects the modem to the CR3000, CR800 series, CR2XX, CR300 series, CR1000, or CR5000 **RS-232** port. (See FIGURE 7-5.)

  CPI/RS-232 RJ45 to DB9 Cable (pn 31055) — connects the modem to the CR6 **CPI/RS-232** port. (See FIGURE 7-6.)

  If connecting to CS I/O port:

  SC105 Interface — connects the modem to any current datalogger with a **CS I/O** port. (See FIGURE 7-8.)

  The SC105 must be configured for use with the modem using *DevConfig*. Settings should be:

  CS I/O Mode: SDC Address 7, 8, 10, or 11
  RS-232 Mode: Modem
  Baud Rate: 115.2K or 9600 baud depending on datalogger model
  8 data bits, 1 stop bit, no parity

  If connecting to Ethernet port:

  Ethernet Cable (pn 28899) — connects the modem to the CR6 or NLxxx. (See FIGURE 7-7.)

- RV50 Mounting Kit (pn 32252) — includes mounting hardware for securing the modem to below-referenced environmental enclosure.

- Antenna — the following antennas are available from Campbell Scientific (see FIGURE 7-1). Contact Campbell Scientific for help in determining the best antenna for your application.

  o The **20679** is a dual-band, omnidirectional antenna for our CDMA and GPRS/EDGE digital-cellular modems. It covers both the 800-MHz band and the 1.9-GHz band. For the 800-MHz band, the 20679 provides a 0-dBd gain. For the 1.9-GHz band, the 20679 provides a 3-

dBd gain. This antenna is recommended for locations where cellular coverage is strong.

The 20679 includes a mount/U-bolt assembly that allows the antenna to be mounted to a mast, crossarm, or user-supplied pole (outer diameter of up to 3.8 cm (1.5 in)).

o The **32262** is an omnidirectional antenna with mounting bracket that is ideally suited for use with 4G and 3G cellular gateways. The mounting bracket attaches to a mast or crossarm, and it serves as the antenna ground plane. The antenna has an N type (female) threaded permanent stud for easy mounting to the included bracket or through an enclosure wall. A coaxial cable, sold separately, is required to connect this antenna to the inline surge suppression or radio antenna jack. The 32262 includes a mount/U-bolt assembly for attaching the antenna to a mast, post, or crossarm up to 3.8 cm (1.5 in) in diameter.

o The **31128** 8 dBd Yagi Antenna is a higher gain antenna that should be "aimed" at the service provider's antenna. It covers both the 800-MHz band and the 1.9-GHz band. The 31128 comes with bracket/U-bolt assembly for attaching the antenna to a mast or post. This antenna is recommended for fringe areas that require a higher gain antenna.

o The **32256** is a wideband termination antenna with SMA connector and articulating base. It has a high-efficiency response on nearly all 4G, 3G, and 2G frequency bands and is, therefore, primarily used with cellular gateways and routers. This antenna is intended for use inside the enclosure. Please note that the backplate of the enclosure is a grounded plane. If it is interposed between the antenna and the cell tower, it may attenuate the strength of the transmission signal. Simply turning the enclosure 90 to 180 degrees on its mounting mast may solve weak transmission issues.

Part number 20679 Omnidirectional Antenna

Part number 32262 2 dBd Omnidirectional Antenna

Part number 31128 8dBd Wideband Yagi Antenna

Part number 32256 4G/3G Cellular Whip Antenna

FIGURE 7-1. Antennas for Use with the RV50 Modem

- Power Supply — see Section 7.4.2, *Modem Power Connections (p. 17)*.

- Environmental Enclosure — ENC10/12, ENC12/14, or ENC16/18
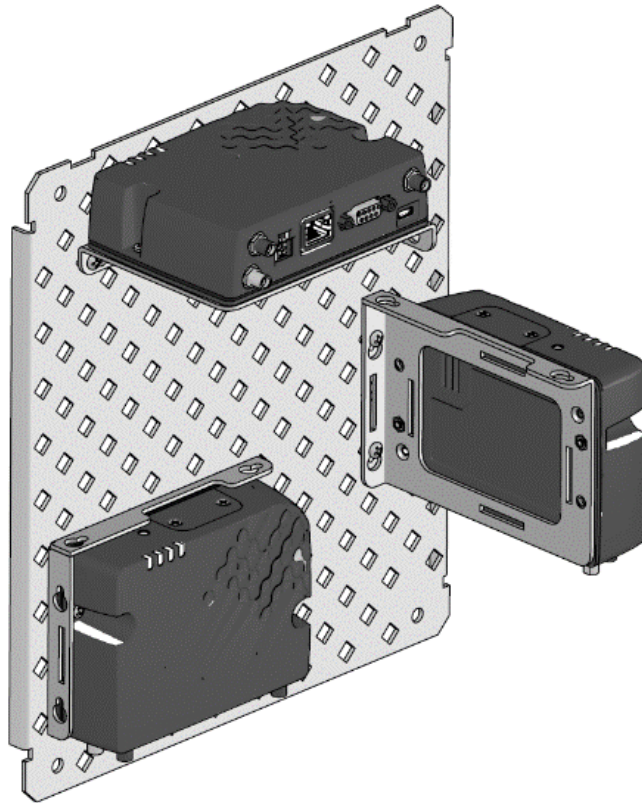
7.3   RV50 Mounting Kit (pn 32252)

FIGURE 7-2. RV50 Mounting Options

7.3.1 Mounting the RV50 Flat on the Backplate

Use the two included flat-head Phillips screws to mount the bracket to the backplate first. Then use two of the included pan-head Phillips screws to mount the RV50 to the bracket. See FIGURE 7-3.
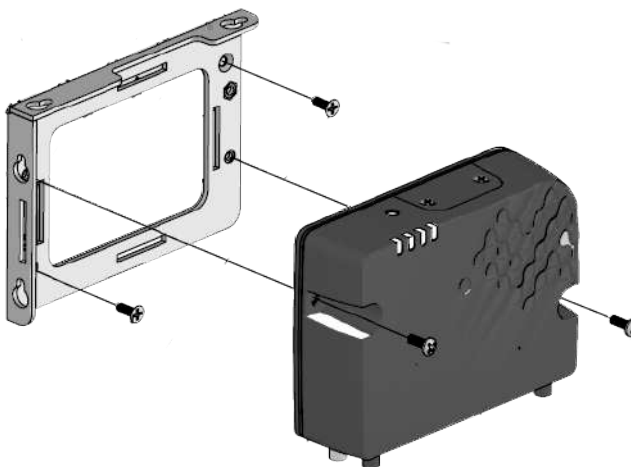
FIGURE 7-3. Flat Mount

7.3.2 Mounting the RV50 on Edge to the Backplate

Use two of the included pan-head Phillips screws to mount the RV50 to the bracket. Then use two of the included pan-head Phillips screws to mount the bracket to the backplate. See FIGURE 7-4.

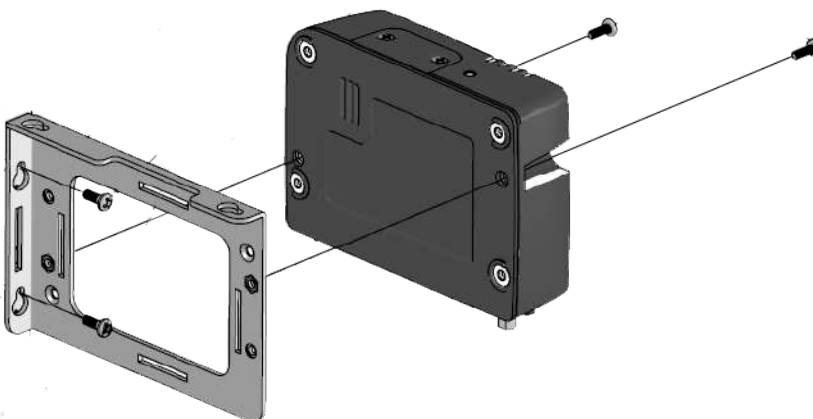*FIGURE 7-4. Edge Mount*

7.4   Wiring and Connections

This section explains how to connect the modem for different communication methods. It also describes how to power the modem and connect an antenna.

7.4.1 Modem Communication Connections

RS-232 connection using a null modem cable (pn 18663)

Part number 18663, Null Modem Cable, is used to connect the modem to the
CR3000, CR800, CR2XX, CR300 series, CR1000 or CR5000 **RS-232** port.

FIGURE 7-5. RS-232 Connection

CR6 RS-232 connection using a CPI/RS-232 cable (pn 31055)

Part number 31055, RS-232/CPI RJ45 to DB9 Male DTE, is used to connect
the modem to the CR6.

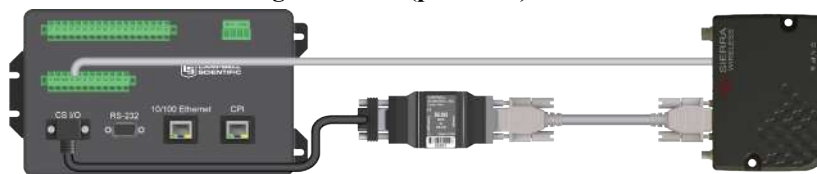*FIGURE 7-6. CR6 RS-232 Connection*

Ethernet connection

An Ethernet cable (pn 28899) is used to connect the modem to the **Ethernet**
port of the datalogger, NL1XX, or NL2XX.

FIGURE 7-7. Ethernet Connection

CS I/O connection using an SC105 (pn 16686)

The SC105 interface is used to connect the modem to a datalogger **CS I/O**
port. The SC105 can be connected directly to the modem **RS-232** port.
Alternatively, it can be connected to the modem using the serial cable
supplied with the SC105 (pn 10873). The SC105 is attached to the
datalogger **CS I/O** port using the SC12 cable supplied with the SC105.

FIGURE 7-8. CS I/O Connection

7.4.2 Modem Power Connections

A power cable is included with the modem and is used to connect the RV50 to the datalogger **12V** terminal. Connection to the switched 12V (**SW12V**) terminal or a control port terminal allows the datalogger to switch power to the modem during scheduled transmission intervals. See Appendix A, *Controlling Power to the* RV50 *(p. A-1)*, for **SW12V** program examples. Connect the red **and** white lead wires to **12V** for constant power, the red to **12V** and white to **SW12V** or a control port for program-controlled power, and the black lead to **G** (ground). The green wire lead is not necessary and can be removed or insulated. See TABLE 7-1.

When using the **SW12V** terminal, the modem can typically be powered with a BP12 battery, a CH150 charger/regulator, and a SP10 solar panel.

TABLE 7-1. Power Connections			
RV50 Wiring	**Lead Color**	**Function**	**Connect To**
	Red	Power (10 to 36V)	12V
	Black	Ground	G
	White	Enable (On/Off)	12V, SW12V, or Control Port for Control
	Green	None	No Connection

7.4.3 Antenna Connection

Connect the antenna to the **Cellular** SMA antenna connector as indicated in FIGURE 7-9.

FIGURE 7-9. Antenna Connection

Use of the **Diversity** antenna can improve performance but is not required. If a **Diversity** antenna is not used, use *ACEmanager* to disable **WAN/Celluar | Network Credentials | RX Diversity**.

Antenna diversity, also called space diversity, is a scheme that uses two or more antennas to improve the quality and reliability of a wireless link. Often, especially in urban and indoor environments, there is no clear line of sight between transmitter and receiver. Instead the signal is reflected along multiple paths before finally being received. Each bounce can introduce phase shifts, time delays, attenuations, and distortions that can destructively interfere with one another at the aperture of the receiving antenna.

7.5 *ACEmanager* and Template Files

Section 4, *QuickStart (p. 2)*, describes how to set up the RV50 in serial server mode using *ACEmanager*. *ACEmanager* along with template files can be used to set up the RV50 in serial server mode or PPP.

ACEmanager is accessed via a web browser. For initial setup or troubleshooting with a direct (cabled) connection, connect a standard Ethernet (RJ45) cable between the Ethernet port on the PC and that on the modem. Type **http://192.168.13.31:9191** into a web browser.

Once the modem is provisioned on the network, it may be accessed over the air by typing **http://** followed by the IP address (dynamic or static) of the modem, followed by the port **:9191**.

The first screen is a login (shown below). The default password is 12345. We strongly recommend changing the default password to prevent unauthorized access and the potential of malware infection. The password can be changed from the **Admin** tab.

After entering the password and pressing enter (or clicking **Log In**), the following status screen is displayed:

RV50 template files from Campbell Scientific's website (*www.campbellsci.com/downloads*) are used to configure the RV50 modem using *ACEmanager*. See TABLE 7-2.

TABLE 7-2. *AceManager* Template Files	
Template Files for the RV50	**Description**
RV50_115200.xml	Serial server mode or PPP mode, for newer dataloggers[1]
RV50_9600.xml	Serial server mode, for older dataloggers[2] that support 9600 baud
[1]CR1000, CR800 series, CR3000, CR6 series, CR300 series, CR5000 [2]CR200(X)	

Click the **Template** menu in the top right of the screen. When prompted for a template file name, select **RV50_115200.xml** or **RV50_9600.xml**. The following screen shows the settings under the **Serial** tab after the 115200 baud template file has been loaded.

Click on **WAN/Cellular** for the following screen:

Enter the APN as shown in the screen above. The example is for an **APN** = **I2GOLD**.

After the template file has been loaded, and the APN entered, click **Apply** to save the changes in the modem.

Click **Reboot** to restart the modem. Alternately, reset the modem by pressing **Reset** on the front of the modem or by removing power from the modem.

Click **Logout** to terminate communications with the modem.

WARNING   **Unless you Apply the commands, the changes made will not be saved in the modem. For most commands, you must reboot the modem for the newly written values to take effect.**

The modem is now set up in serial server mode. To enable PPP mode, see Section 7.6, *Enabling PPP Mode (p. 20)*.

7.6 Enabling PPP Mode

The first step in enabling PPP mode is using the template file to configure the RV50 as described in Section 7.5, *ACEmanager and Template Files (p. 18)*.

After configuring the modem, you must use *DevConfig* to configure the datalogger for PPP mode.

Connect to your datalogger in *DevConfig* and select **Deployment | PPP**.
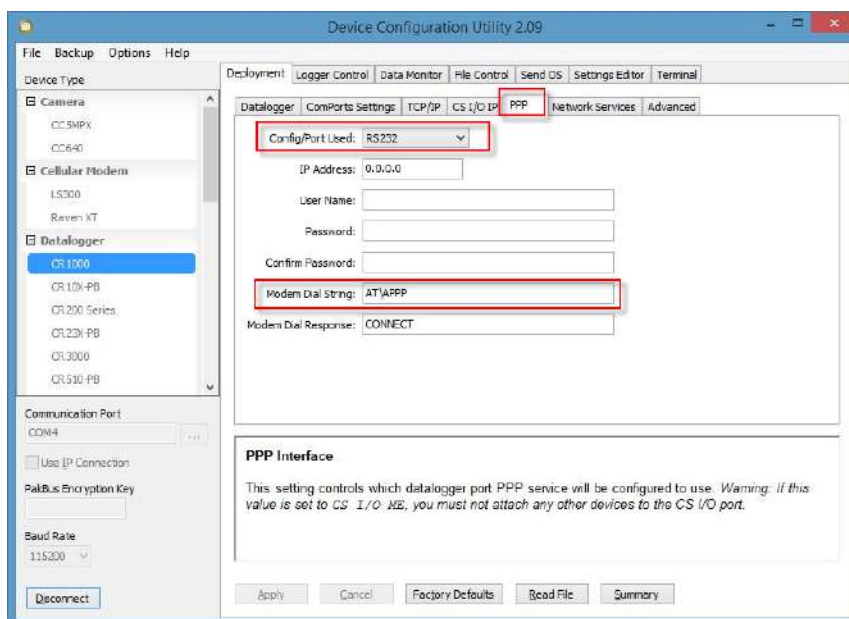
For the **Config/Port Used**, use the drop-down list to select the datalogger port you wish to use for PPP. **RS-232** is the standard choice, but any port in the drop-down list can be used.

Set the **Modem Dial String** to **AT\APPP**.

Press **Apply** to apply the changes.

With PPP enabled, PakBus®/TCP communications use port 6785. Therefore, in *LoggerNet* use **:6785** after the IP address or domain name as shown below.

8. Operation

8.1 Ports
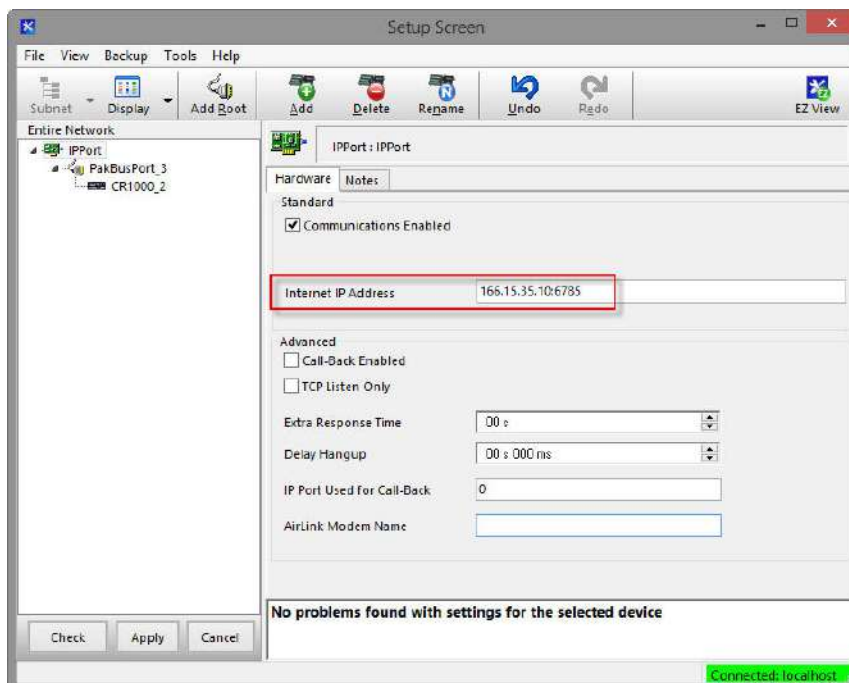
RS-232

The **RS-232** port is the main port used with Campbell Scientific dataloggers. Its function is described throughout this manual.

USB

The **USB** port is not used in Campbell Scientific applications.

Ethernet

The **Ethernet** port may be used in place of PPP Mode to get to the IP stack of the datalogger. However, this method comes with higher current drain for both the modem and the datalogger. See Appendix D, *Using the RV50 Ethernet Port (p. D-1)*, for more information.

8.2 LED Indicator Lights

When your RV50 is connected to power and an antenna, there is a specific pattern to the lights to indicate its operation mode as described in TABLE 8-1.

		TABLE 8-1. LED Indicator Lights	
LED	**Color / Pattern**	**Description**	**LED Power Saving Mode**
Power	Off	No power or input voltage $\geq$ 36 Vdc or $\leq$ 7 Vdc	
	Solid Green	Power is present.	
	Green with Amber Flash	Power is present and the gateway has a GPS fix.	
	Solid Red	Standby mode	
	Flashing Green	When you press the reset button, flashing green indicates when to release the reset button to reboot the gateway.	
	Flashing Red	When you press the reset button, flashing red indicates when to release the reset button to reset the gateway to the factory default settings.	
Signal	Solid Green	Good signal (equivalent to 4–5 bars)	Off
	Solid Amber	Fair signal (equivalent to 2–3 bars)	Off
	Flashing Amber	Poor signal (equivalent to 1 bar) If possible, Sierra Wireless® recommends moving the gateway to a location with a better signal.	
	Flashing Red	Inadequate (equivalent to 0 bars) Sierra Wireless recommends moving the gateway to a location with a better signal.	
NOTE	The quality of the signal strength is measured using the appropriate parameters for the radio technology in use.		

TABLE 8-1. LED Indicator Lights

LED	Color / Pattern	Description	LED Power Saving Mode
Network	Solid Green	Connected to an LTE network	Off
	Solid Amber	Connected to a 3G or 2G network	Off
	Flashing Green	Connecting to the network	
	Flashing Red	No network available	
	Flashing Red / Amber	Network Operator Switching is enabled, but the gateway is unable to locate the required firmware. For more information, refer to the ALEOS Software Configuration User Guide (Admin chapter) from the Sierra Wireless website.	
Activity	Flashing Green	Traffic is being transmitted or received over the WAN interface.	
	Flashing Red	Traffic is being transmitted or received over the serial port. This behavior only appears if the RV50 is configured to display it. For more information, refer to the ALEOS Software Configuration Guide (Serial chapter) from the Sierra Wireless website.	
	Flashing Amber	Traffic is being transmitted or received over both the WAN interface and the serial port. This behavior only appears if the RV50 is configured to display it. Refer to the ALEOS Software Configuration Guide (Serial chapter) from the Sierra Wireless website.	
ALL	Green LED chase	Radio module reconfiguration/firmware update or Network Operator Switching is in progress.	
	Amber LED chase	ALEOS software update is in progress.	

8.3   Rebooting the RV50

To reboot the RV50:

- On the RV50, press the **Reset** button for 1–5 seconds. (Release the button when the **Power** LED flashes green.)

- In *ACEmanager*, click the **Reboot** button on the toolbar.

8.4   Reset the RV50 to Factory Default Settings

To reset the RV50 to the factory default settings:

- On the RV50, press the **Reset** button for more than 5 seconds. (Release the button when the **Power** LED flashes red.) Once the LEDs resume their normal operating behavior, the reset is complete.

- In *ACEmanager*, go to **Admin | Advanced** and click the **Reset to Factory Default** button.

9.   Attributions

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Appendix A. Controlling Power to the RV50

The RV50 uses considerably more power than the datalogger. Therefore, it may be necessary to use the datalogger to control power to the RV50. The following program examples show how to control power to the RV50 using the switched 12V (**SW12V**) terminal on the datalogger.

CRBasic Example A-1, created by *Short Cut*, uses the **TimeIsBetween** instruction to turn on **SW12** for 15 minutes every 60 minutes between 9:00 a.m. and 5:00 p.m. (Note that the **TimeIsBetween** instruction requires operating system version 28 or later in the CR1000, CR3000, or CR800. It is supported in all CR6 and CR300 operating systems.)

CRBasic Example A-1. Using TimeIsBetween to Turn On and Off SW12

```
'CR6 Series
'Created by Short Cut (3.1)

'Declare Variables and Units
Public BattV
Public PTemp_C
Public SW12State As Boolean

Units BattV=Volts
Units PTemp_C=Deg C

'Define Data Tables
DataTable(Table2,True,-1)
  DataInterval(0,1440,Min,10)
  Minimum(1,BattV,FP2,False,False)
EndTable

'Main Program
BeginProg
  'Main Scan
  Scan(5,Sec,1,0)
    'Default Datalogger Battery Voltage measurement 'BattV'
    Battery(BattV)
    'Default Wiring Panel Temperature measurement 'PTemp_C'
    PanelTemp(PTemp_C,60)
    'SW12 Timed Control
    'Turn ON SW12 between 0900 hours and 1700 hours
    'for 15 minutes every 60 minutes
    If TimeIsBetween(540,1020,1440,Min) And TimeIsBetween(0,15,60,Min) Then
      SW12State=True
    Else
      SW12State=False
    EndIf
    'Always turn OFF SW12 if battery drops below 11.5 volts
    If BattV<11.5 Then SW12State=False
    'Set SW12-1 to the state of 'SW12State' variable
    SW12(1,SW12State,0)
    'Call Data Tables and Store Data
    CallTable Table2
  NextScan
```

CRBasic Example A-2, also created by *Short Cut*, performs the same function as the first program (turn on **SW12** for 15 minutes every 60 minutes between 9:00 a.m. and 5:00 p.m.) without using the **TimeIsBetween** instruction. This method should be used for CR1000, CR300 and CR800 operating systems prior to version 28.

CRBasic Example A-2. Using If Statements to Turn On and Off SW12

```
'CR1000
'Created by Short Cut (3.1)

'Declare Variables and Units
Dim MinIntoDay
Public BattV
Public PTemp_C
Public SW12State As Boolean

Units BattV=Volts
Units PTemp_C=Deg C

'Define Data Tables
DataTable(Table2,True,-1)
  DataInterval(0,1440,Min,10)
  Minimum(1,BattV,FP2,False,False)
EndTable

'Main Program
BeginProg
  'Main Scan
  Scan(5,Sec,1,0)
    'Default Datalogger Battery Voltage measurement 'BattV'
    Battery(BattV)
    'Default Wiring Panel Temperature measurement 'PTemp_C'
    PanelTemp(PTemp_C,_60Hz)
    'SW12 Timed Control
    'Get minutes into current day
    MinIntoDay=Public.TimeStamp(4,1)/60
    'Turn ON SW12 between 0900 hours and 1700 hours
    'for 15 minutes every 60 minutes
    If (MinIntoDay>=540 And MinIntoDay<1020) And ((MinIntoDay-540) Mod 60 < 15) Then
      SW12State=True
    Else
      SW12State=False
    EndIf
    'Always turn OFF SW12 if battery drops below 11.5 volts
    If BattV<11.5 Then SW12State=False
    'Set SW12 to the state of 'SW12State' variable
    SW12(SW12State)
    'Call Data Tables and Store Data
    CallTable Table2
  NextScan
```

Appendix B. EmailSend Using the Gmail™ Outgoing SMTP Server

NOTE	The functionality described in this Appendix is not available for CR5000 or CR200-series dataloggers.

NOTE	Due to changes by Gmail, the EmailSend program in this appendix will only work with our faster dataloggers, the CR6 and the CR300. For other dataloggers, we suggest another compatible mail service such as Yahoo®.

The datalogger has a mail client in it similar to a mail client on a computer. For the datalogger to send an email, it needs a Simple Mail Transfer Protocol (SMTP) server to send through like any other mail client. The Gmail SMTP server can be used for sending outgoing email from the datalogger. Both the modem and the datalogger must be configured for PPP as described in Section 7.5, *ACEmanager and Template Files (p. 18)*, and Section 7.6, *Enabling PPP Mode (p. 20)*.

B.1 Setting up a Gmail Account

First you need to create a Gmail account, if you do not already have one. To create a Gmail account, go to *www.gmail.com* from your PC. Gmail accounts are free of charge.

The credentials to access the mail server will be the username and the password used when creating the Gmail account.

In the following example program you will see:

- ServerAddr set to smtp.gmail.com:587
- UserName set to (the Gmail account user name).
- Password (the one you established at Gmail)

NOTE	Gmail requires Transport Layer Security (TLS) to connect to their mail server. You must go into the Settings Editor in *DevConfig* to enable TLS in the datalogger.

In 2013, Gmail changed the way they receive email. The changes require a port number of 587 to be added to the IP address or server name you are sending to (for example, 174.194.68.108:587, smtp.gmail.com:587). This will allow for the datalogger to establish a TLS connection with the correct SMTP port on Gmail's SMTP servers.

Also, a new security feature has been added to Gmail that will prompt if the device/PC sending the email is authorized to do so. You will see a message in the *Result* variable (of the **EmailSend** instruction) that refers to opening your email account in your web browser. If you see this message, open your web

browser and point it to *http://email.google.com*. Enter the username and password that your datalogger is using to send email. You should then see a red bar at the top of the browser screen. Follow the listed instructions to allow the datalogger to send email.

B.2 Sending to Multiple Addresses

Sending to multiple email address can be done by using a comma to separate the email addresses (4355551212@hotmail.com, 4355551234@vtext.com).

B.3 Sending a Text Message to a Phone

To send a text message to a phone, the email needs to be converted to a text message via an email-to-text message gateway. Most cellular providers have an email-to-text message service for their phone subscribers. To send a text message to Verizon Wireless phone subscribers, send an email to the (10 digit phone number of the person's phone)@vtext.com (4355551234@vtext.com).

Most text messages are limited to 160 characters, so any email messages greater than 160 characters will be truncated.

Email-to-Text Message Gateways

T-Mobile: *phonenumber@tmomail.net*
Virgin Mobile: *phonenumber@vmobl.com*
AT&T: *phonenumber@txt.att.net*
Sprint: *phonenumber@messaging.sprintpcs.com*
Verizon: *phonenumber@vtext.com*

B.4 EmailSend Program Example

CRBasic Example B-1 sends an email message when an alarm condition is **True**. Both the CR6 and the RV50 modem must be configured as PPP as described in Section 7.5, *ACEmanager and Template Files (p. 18)*, and Section 7.6, *Enabling PPP Mode (p. 20)*. Transport Layer Security (TLS) must be enabled in the datalogger to use the Gmail mail server. (TLS is automatically enabled in the CR6 and CR300 and in the CR1000/CR3000/CR800 with OS revision 24 or later.)

CRBasic Example B-1. Using EmailSend to Send a Text Message

```
'Main program variables

Public Batt, RefTemp, Temp

'declare Email parameter strings (as constants), Message String & Result Variable
Const ServerAddr="smtp.gmail.com:587"
Const UserName="username@gmail.com"
Const Password="password"
Const ToAddr="datalogger@hotmail.com, 4355551234@vtext.com"
Const FromAddr=UserName
Const Subject="Email Message Test"
Const Attach=""
Const CRLF = CHR(13) & CHR(10)

Public AlarmTrigger As Boolean
Dim Message As String * 250
Public EmailServerResp As String * 50
```

```
Public EmailResult

DataTable (TenSecData,True,-1)
  DataInterval (0,10,Sec,10)
  Sample (1,Batt,FP2)
  Sample (1,Temp,FP2)
EndTable

DataTable(EmailLog,True,10)
  Sample (1,EmailResult,FP2)
  Sample (1,EmailServerResp,String)
  Sample (1,Message,String)
EndTable

BeginProg
  Scan (1,Sec,3,0)
    Battery (Batt)
    PanelTemp (RefTemp,250)
    TCDiff (Temp,1,mV200C,U1,TypeT,RefTemp,True ,0,250,1.0,0)
    CallTable TenSecData
  NextScan

  SlowSequence
  Do
    Delay (1,1,Sec)
    'Approximately every 1 second, check for an email alarm condition
    'If the temperature has transitioned from below 27 degC to
    'to above 28 degC, send an email alarm message
    If AlarmTrigger = False Then
      If Temp > 28 Then AlarmTrigger = True
      If AlarmTrigger Then
        'Create email message body
        Message = "Warning!" & CRLF & CRLF
        Message = Message & "An alarm condition has been identified. "
        Message = Message & "The temperature is " & Temp & " degrees C." & CRLF & CRLF
        Message = Message & "Datalogger time is " & Status.Timestamp
        'Attempt to send the email message
        EmailResult=EmailSend
(ServerAddr,ToAddr,FromAddr,Subject,Message,Attach,UserName,Password,EmailServerResp)
        CallTable EmailLog
      EndIf
    EndIf
    If Temp < 27 Then AlarmTrigger=False
  Loop
EndProg
```

Appendix C. Configuring the RV50 for Dynamic IP

Verizon® and AT&T® accounts are provided with a static IP address and do not require the settings described in this section. Accounts with a dynamic IP address, will require the IP Manager settings described below.

- A static IP address is permanently assigned to a particular account and will always be used whenever the RV50 connects to the Internet.

- A dynamic IP address is assigned on a "need to have" basis. The address can change each time the modem or device reconnects to the network. A dynamic IP address is used with a service such as IP Manager (described below) to translate a domain name to a dynamic IP address, so that the RV50 can be contacted by name as if it had a static IP.

IP Manager is a free service provided by Sierra Wireless® for the RV50 to translate a dynamic IP address into a fully-qualified domain name, so it can be contacted directly on the Internet. IP Manager translates a dynamic IP address to a fully qualified-domain name so you can contact your RV50 by name as if it had a static IP address.

If the RV50 is configured for dynamic IP, when the RV50 first connects to the Internet, it sends an IP change notification to IP Manager. IP Manager will acknowledge the change and update the dynamic DNS record. The changed IP address will then be the address for the RV50 configured name. Once the RV50 IP has been updated in IP Manager, it can be contacted via name.

ACEmanager is used to configure the dynamic IP settings in your RV50 so that it will use IP Manager as described below.

Connect with modem using *ACEmanager*. Select the dynamic IP group to configure your modem to use IP Manager.

To configure your Sierra Wireless modem to be addressed by name, the modem simply needs to have two elements configured: Enable **Dynamic DNS** and enter a meaningful name for the **Device Name**.

- Under the **Services** tab, select the **Dynamic DNS** group and use the drop-down list to select **IP Manager**. This will reveal the settings specific to this DNS service.

- Enter a **Device Name**; this is a unique name for the modem (the 10-digit MDN number is recommended).

Restrictions for **Device Name**:

- Must begin with a letter or number
- Can include a hyphen (-)
- Cannot contain spaces
- Must be no longer than 20 characters total

Verify that the **Domain**, **IP Manager Server 1**, and **IP Manager Server 2** are the same as above.

Click **Apply** to save the changes.

Click **Reboot** to restart the modem.

Click **Logout** to terminate communications with the modem.

In *LoggerNet/PC400*, the IP address for PPP is:

modemname.eairlink.com:6785

The IP address for serial server is:
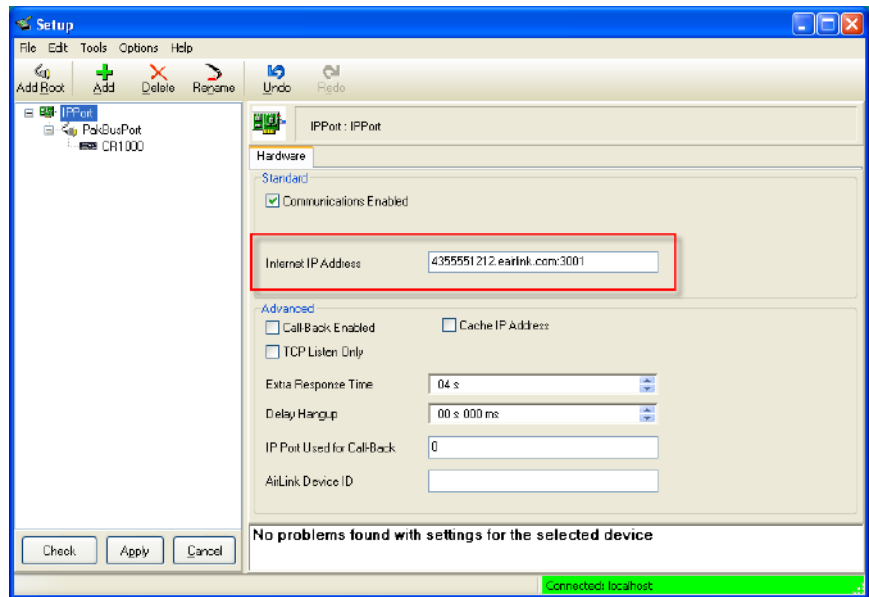
modemname.eairlink.com:3001

FIGURE C-1. Serial Server Mode with Dynamic IP

# Appendix D. Using the RV50 Ethernet Port

The RV50 **Ethernet** port can be used to communicate with IP-enabled devices such as dataloggers and IP cameras. However, the use of Ethernet communication increases the total system current demand (the modem and the device you are connecting to) by several milliamps as compared to the use of serial communication.

The following example can be used to communicate with a CR1000 / NL121 via the RV50 **Ethernet** port. Port forwarding in the RV50 must be enabled and specific ports need to be forwarded to the CR1000 (in this case ports 80 and 6785). Additional ports can be configured as needed. The host IP address 192.168.13.50 specified in the figure below is the IP address of the CR1000.

For this example, a static **IP Address**, **Subnet Mask**, **IP Gateway**, and **DNS Server** is configured in the CR1000 as shown in the figure below. The example CR1000 IP address of 192.168.13.50 is the same address used in the RV50 port forwarding configured previously.
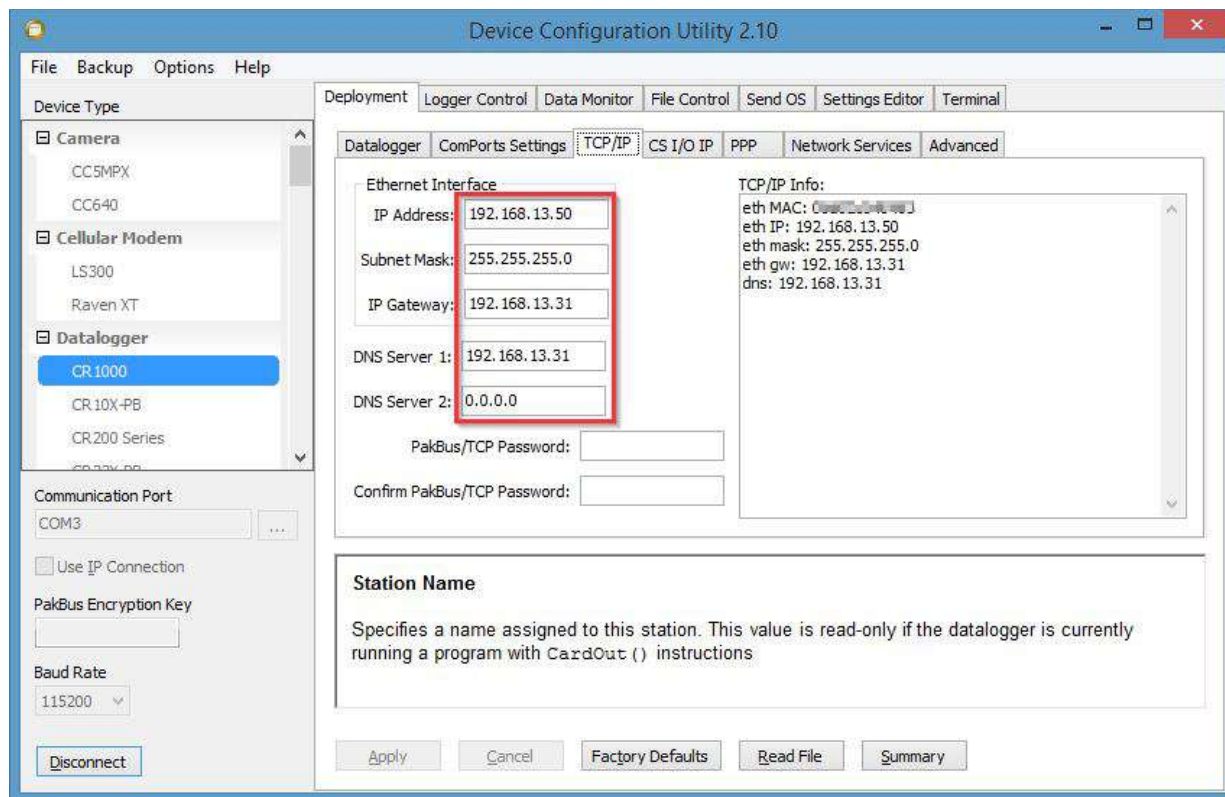
Once the RV50 and the CR1000 have been configured and the RV50 has been rebooted, you can communicate with the CR1000 via *LoggerNet* using the public IP address of the RV50 and port 6785. You can also open a web browser and enter the public IP address of the RV50 to see the default web page of the CR1000.

Appendix E. Regulatory Information

This information provided by Sierra Wireless®.

E.1 Important Information for North American Users

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

WARNNG

Changes or modifications to this device not expressly approved by Sierra Wireless could void the user's authority to operate this equipment.

E.2 RF Exposure

In accordance with FCC/IC requirements of human exposure to radio frequency fields, the radiating element shall be installed such that a minimum separation distance of 20 cm should be maintained from the antenna and the user's body.

WARNING

This product is only to be installed by qualified personnel.

To comply with FCC/IC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain must not exceed the specifications listed below for the device used.

Device	Frequency Band	FCC ID/IC Number N7NMC7355 2417C-MC7355
AirLink RV50	Cellular Band	6.5 dBi
	PCS Band	3.0 dBi
	Band 4	6.0 dBi
	Band 13	9.0 dBi
	Band 17	9.0 dBi
	Band 25	3.0 dBi

E.3 EU

Sierra Wireless hereby declares the AirLink RV50 devices is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

The RV50 displays the CE mark.

$\mathsf{C}\,\mathsf{E}$

WARNING	**Changes or modifications to this device not expressly approved by Sierra Wireless could void the user's authority to operate this equipment.**

WARNING	**This product is only to be installed by qualified personnel.**

E.4 Declaration of Conformity

The Declaration of Conformity made under Directive 1999/5/EC is available for viewing at: *http://source.sierrawireless.com/resources/airlink/-certification_and_type_approval/rv50_ce_declaration_of_conformity/*.

E.5 RoHS Compliance

SIERRA WIRELESS

Sierra Wireless SA
3 esplanade du Foncet
92442 Issy les moulineaux Cedex
France
Phone +33(0) 1 46 29 08 00
www.sierrawireless.com

DECLARATION OF EUROPEAN UNION RoHS COMPLIANT PRODUCT

Sierra Wireless S.A. for itself and its subsidiaries (collectively, "Sierra Wireless") certifies that to the best of its knowledge the products identified below to be "RoHS Compliant":

Item	Product Description
1	RV50

RoHS compliant defines that the product conforms to the requirements of the European Union's restriction on use of hazardous substances in electrical and electronics equipments directive, 2011/65/EC (RoHS directive") which limits the content of certain hazardous substances.
The RoHS directive is with respect to any homogenous components used in the product as shipped by Sierra Wireless, in its entirety.

RoHS - Exemptions according to annex III
☐ No exemption
☒ Exemption 6(b): Lead as an allying element in aluminum containing up to 0.4 % lead by weight
☒ Exemption 6(c): Copper alloy containing up to 4 % lead by weight
☐ Exemption 7(a): Lead in high melting temperature type solder (ie lead-based alloys containing 85% by weight or more lead)
☐ Exemption 7(c)-I: Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, eg piezoelectronic devices, or in a glass or ceramic matrix compound
☐ Exemption 7(c)-II: Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher
☐ Exemption 15: Lead in solders to complete a viable electrical connection between semiconductor die and carrier with integrated circuit flip chip packages.
☐ Other exemption than above.

Sierra Wireless has reach its conclusion that the products listed above are RoHS compliant based on its knowledge and belief via internal design controls, analytical test data and information provided by its component suppliers. However, Sierra Wireless makes no representation or warranty as to the accuracy of such third party information.

Sierra Wireless, S.A.

Name: Rafet Lakhdar
Title: Operations Director EMEA
Date: August 31th, 2015

Campbell Scientific Companies

Campbell Scientific, Inc.
815 West 1800 North
Logan, Utah 84321
UNITED STATES
www.campbellsci.com • info@campbellsci.com

Campbell Scientific Africa Pty. Ltd.
PO Box 2450
Somerset West 7129
SOUTH AFRICA
www.campbellsci.co.za • cleroux@csafrica.co.za

Campbell Scientific Southeast Asia Co., Ltd.
877/22 Nirvana@Work, Rama 9 Road
Suan Luang Subdistrict, Suan Luang District
Bangkok 10250
THAILAND
www.campbellsci.asia • info@campbellsci.asia

Campbell Scientific Australia Pty. Ltd.
PO Box 8108
Garbutt Post Shop QLD 4814
AUSTRALIA
www.campbellsci.com.au • info@campbellsci.com.au

Campbell Scientific (Beijing) Co., Ltd.
8B16, Floor 8 Tower B, Hanwei Plaza
7 Guanghua Road
Chaoyang, Beijing 100004
P.R. CHINA
www.campbellsci.com • info@campbellsci.com.cn

Campbell Scientific do Brasil Ltda.
Rua Apinagés, nbr. 2018 ─ Perdizes
CEP: 01258-00 ─ São Paulo ─ SP
BRASIL
www.campbellsci.com.br • vendas@campbellsci.com.br

Campbell Scientific Canada Corp.
14532 – 131 Avenue NW
Edmonton AB T5L 4X4
CANADA
www.campbellsci.ca • dataloggers@campbellsci.ca

Campbell Scientific Centro Caribe S.A.
300 N Cementerio, Edificio Breller
Santo Domingo, Heredia 40305
COSTA RICA
www.campbellsci.cc • info@campbellsci.cc

Campbell Scientific Ltd.
Campbell Park
80 Hathern Road
Shepshed, Loughborough LE12 9GX
UNITED KINGDOM
www.campbellsci.co.uk • sales@campbellsci.co.uk

Campbell Scientific Ltd.
3 Avenue de la Division Leclerc
92160 ANTONY
FRANCE
www.campbellsci.fr • info@campbellsci.fr

Campbell Scientific Ltd.
Fahrenheitstraße 13
28359 Bremen
GERMANY
www.campbellsci.de • info@campbellsci.de

Campbell Scientific Spain, S. L.
Avda. Pompeu Fabra 7-9, local 1
08024 Barcelona
SPAIN
www.campbellsci.es • info@campbellsci.es

Please visit www.campbellsci.com to obtain contact information for your local US or international representative.