

INSTRUCTION MANUAL



RavenXT-Telus Airlink™ Cellular Modem

June 2014



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Raven XT-Telus CDMA Sierra Wireless Cellular Modem

1. General Description

This manual provides information for interfacing the Sierra Wireless Raven XT-Telus cellular modem to Campbell Scientific dataloggers. A Sierra Wireless CD ships with the modem that includes Sierra Wireless manuals and software utilities. Sierra Wireless manuals referenced in this manual include:

AceManagerGuide.pdf
Raven_XT_UserGuide.pdf
Raven_XT_QuickStart.pdf

The Raven XT-Telus digital cellular modems are manufactured by Sierra Wireless for use on the Telus Wireless Code Division Multiple Access (CDMA)/1xRTT networks. The modem is accessed through the Internet using TCP/IP communications protocol using a Dynamic or Static IP address.

- A Dynamic IP address is assigned on a “need to have” basis. A dynamic IP address is used with a service such as IP Manager (Section 5.4) to translate domain name to a dynamic IP address, so that the Raven can be contacted by name as if it had a static IP.
- A Static IP address is permanently assigned to a particular account and will always be used whenever the Raven connects to the Internet.

A Telus account can be setup for a Dynamic or Static IP address; a Dynamic IP is preferred. Generally, there is an associated monthly customer charge to use a Static IP account. Please ask your service provider for details on the monthly charge for static IP.

2. Establish Cellular Service

2.1 Raven XT-Telus Cellular Coverage/Service Requirements

What you need:

Determine coverage at the datalogger site for your chosen service provider. Coverage maps are available on each providers website. It is also possible to search for “Canadian cellular tower maps” for information on tower locations and possible coverage.

CDMA/1xRTT Dynamic IP or Static IP account established with Telus Wireless. Telus’s Broadband Access Plan is recommended.

To setup an account you will need the ESN number of the modem. The ESN number is listed on a label on the modem, and also on the box.

What you receive from Telus:

Activation Code (MSL)

10-digit Mobile Directory Number (MDN or MIN/MSID)

IP address (for a Static IP account only)

Recommended Dealers:

1. Communications Group, Red Deer, AB (403) 347-0777

3. Specifications

3.1 Raven XT-Telus Specifications

Sierra Wireless Raven XT, model V2227

Technology:	CDMA: EV-DO Rev. A, EV-DO Rev. 0, 1xRTT, IS-95
Bands:	800 MHz Cellular, 1900 MHz PCS
Transmit Frequency:	1850 to 1910 MHz and 824 to 849 MHz
Transmit Power:	1.0 W for 1900 MHz; 0.8 W for 850 MHz
Receiver Frequency:	1930 to 1990 MHz and 869 to 894 MHz
CDMA Throughput:	up to 80 kbps
RS-232 Data Rates:	300 bps to 115.2 kbps
Serial Interface:	RS-232, DB9-F
Serial Protocols:	AT Commands, PPP, UDP/IP, TCP/IP, SMTP, HTTP, DHCP, SMS, SLIP
RF Antenna Connector:	50 Ohm SMA (female)
Input Current Range:	50 to 250 mA
Typical Current Drain (at 12 Vdc):	50 mA dormant (idle for 10 to 20 seconds), 120 mA transmit/receive
Input Voltage Range:	9 to 28 VDC
Operating Temperature Range:	-30° to +70°C
Operating Humidity Range:	5% to 95% RH non-condensing
Status LEDs:	Power, Network, Signal, Activity
Dimensions:	7.6 x 2.7 x 10 cm (3"W x 1"D x 4"L)
Weight:	160g (5.6 oz)

4. Configuration

4.1 Base Station Requirements for Raven XT-Telus

PC running Campbell Scientifics' LoggerNet or PC400 software, with access to the internet.

4.2 Datalogger Site Equipment

- Raven modem with power cable (included with modem).
- Datalogger—21X, CR510, CR10(X), CR23X, CR7, CR1000, CR5000, CR3000, CR800.
- SC105 or SC932A Interface—connects the modem to the 21X, CR510, CR10(X), CR7, or other dataloggers' CS I/O port.
- The SC105 must be configured for use with the modem using the Device Configuration Utility. Settings should be:

CS I/O Mode: SDC Address 7

RS-232 Mode: Modem

Baud Rate: 115.2K or 9600 baud depending on datalogger model
8 data bits, 1 stop bit, no parity

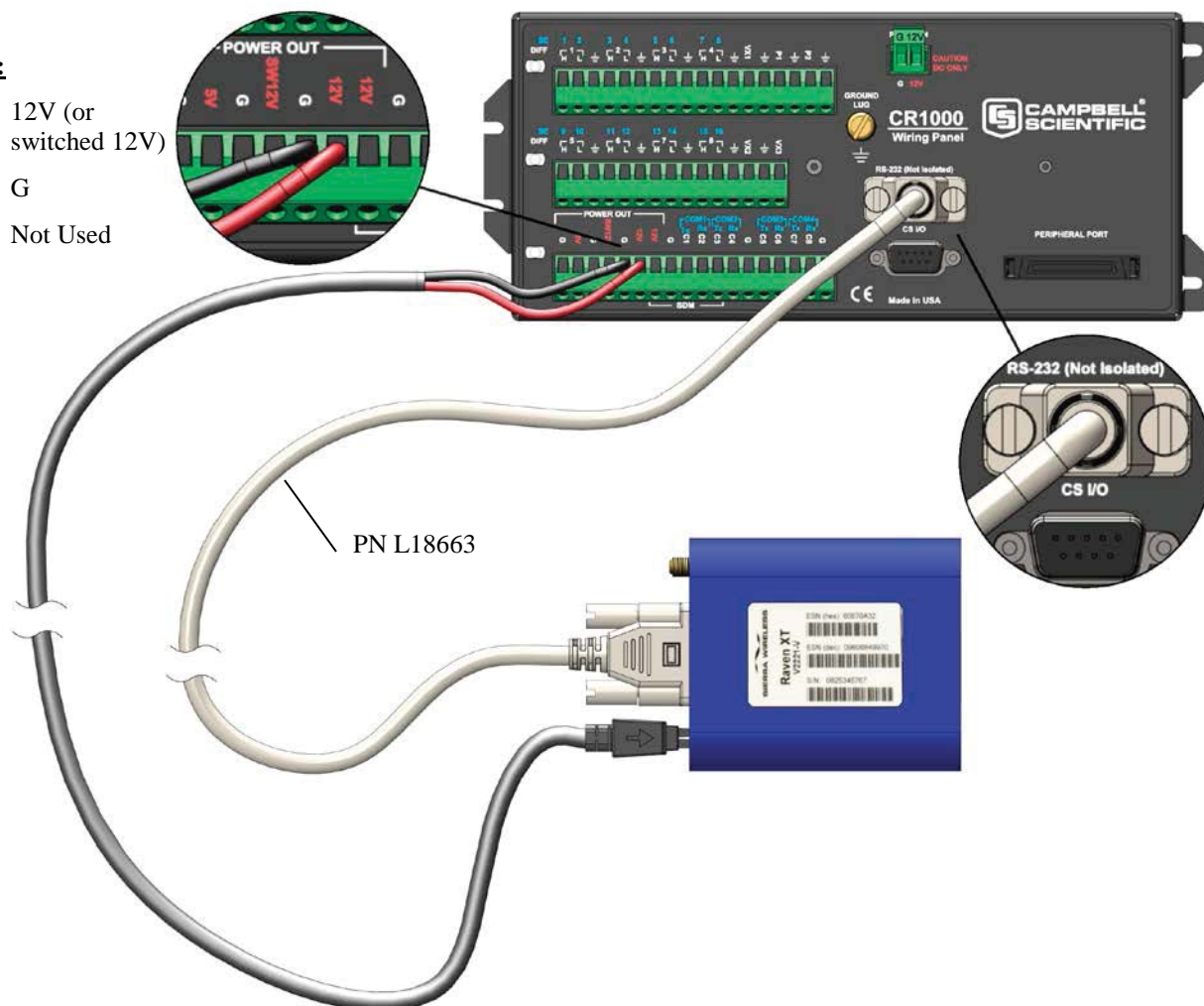
- PN L18663 Null Modem Cable—connects the modem to the CR23X, CR3000, CR800, CR2XX, CR1000 or CR5000 RS-232 port.

NOTE

If you have a black SC12 cable that is not Rev 1 or newer (as indicated on cable), it is a CS I/O cable only and will not work for RS-232. Connect the black SC12 cable between the datalogger and the SC932A. Use a 9-pin serial cable or a blue ribbon cable between the phone and the SC932A.

Wiring:

Red 12V (or
switched 12V)
Black G
White Not Used



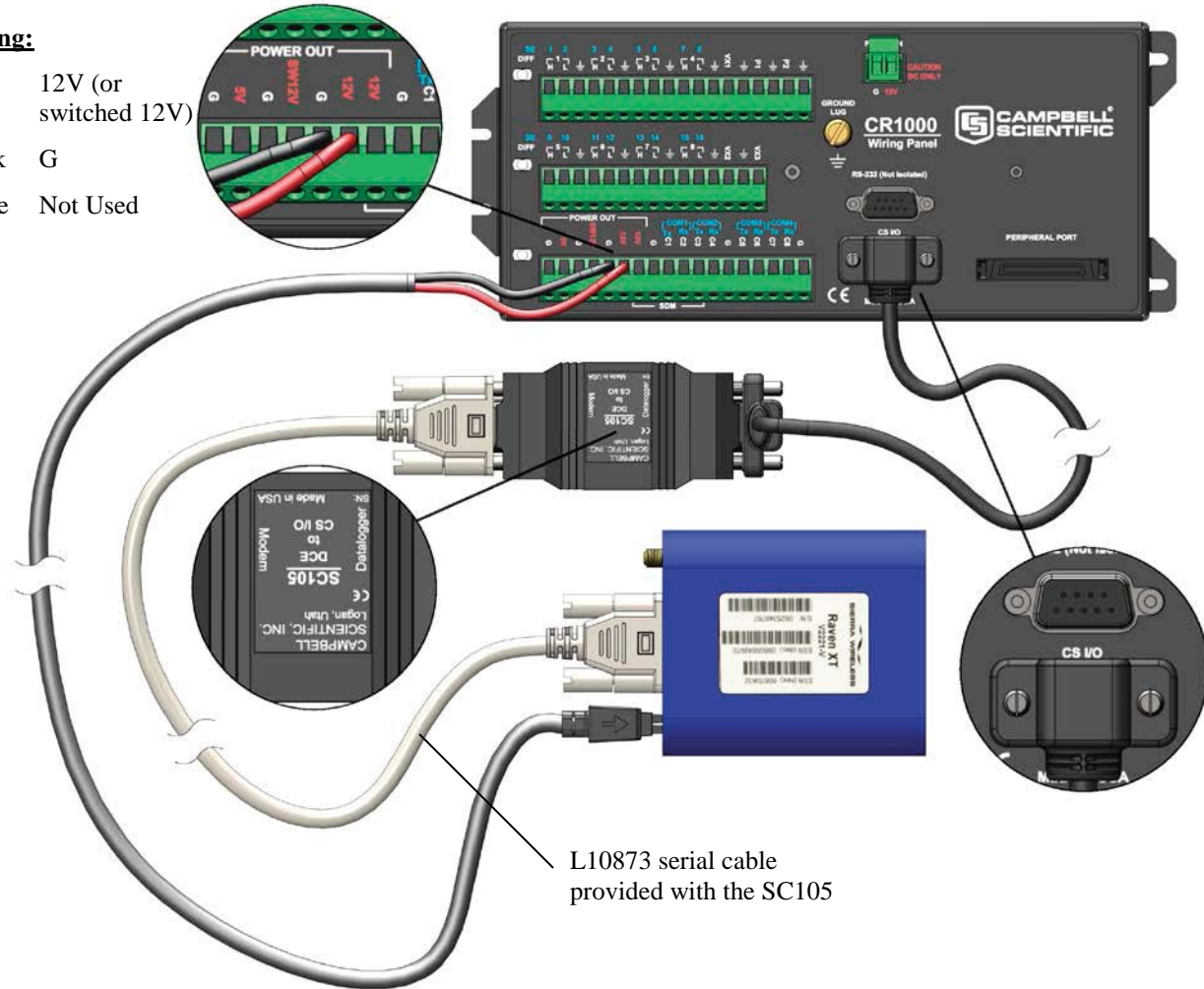
PN L18663 Null Modem Cable—connects the modem to the CR23X, CR3000, CR800, CR2XX, CR1000 or CR5000 RS-232 port (not compatible with the 21X, CR510, CR10X, or CR7 dataloggers).

Wiring:

Red 12V (or
switched 12V)

Black G

White Not Used



L10873 serial cable
provided with the SC105

SC105 Settings:

CS I/O Mode: SDC Address 7

RS-232 Mode: Modem

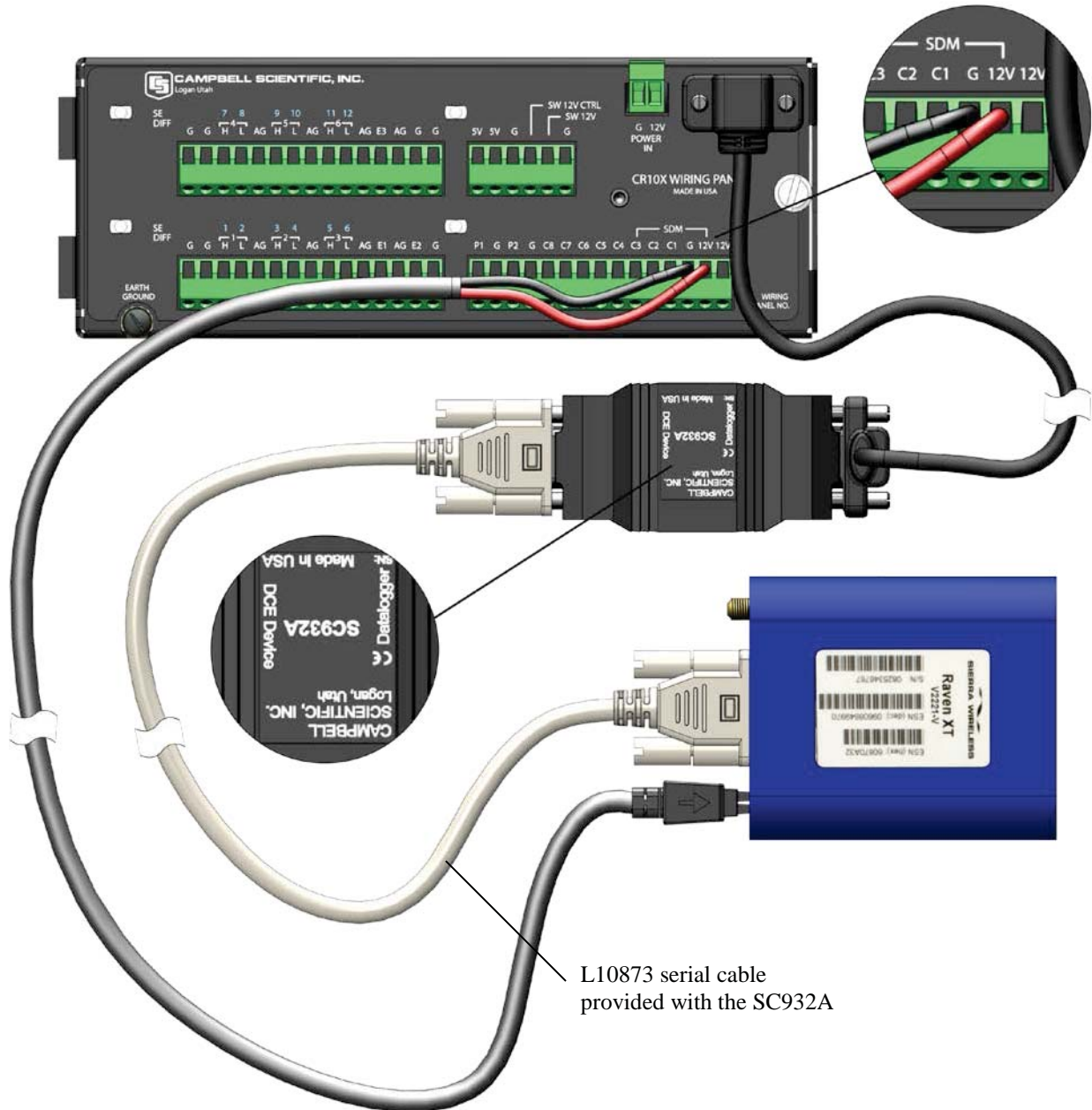
Baud Rate: 115.2K or 9600 baud depending on datalogger model

8 data bits, 1 stop bit, no parity

*SC105 interface connects the modem to a datalogger's CS I/O port;
recommended for dataloggers with the Pakbus Operating System.*

Wiring:

Red 12V (or
switched 12V)
Black G
White Not Used



SC932A interface connects the modem to the CS I/O port;
recommended for dataloggers with the Mixed-Array Operating System.

FIGURE 4.2-1. Modem Interface Options.

- PN L14394 Raven Mounting Kit—includes mounting hardware for securing the modem to below referenced environmental enclosure and a 9-pin male to 9-pin female cable.
- Antenna—the following antennas are available from Campbell Scientific. Contact a Campbell Scientific Applications Technician for help in determining the best antenna for your application.

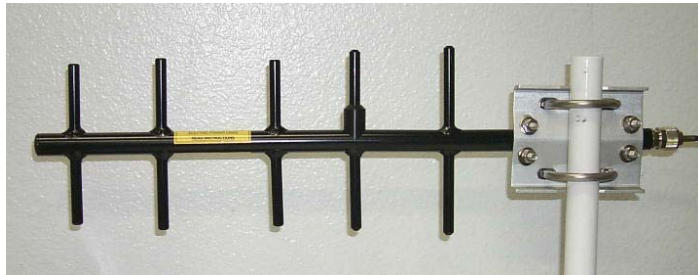
- The C2446 is a dual-band, omnidirectional antenna for our CDMA and GPRS digital-cellular modems. This antenna is recommended for locations where cellular coverage is strong.

The C2446 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 1.5" (3.8 cm)).

- The **L18285** 1 dBd omnidirectional antenna. This antenna is dual band, covering both the 800 MHz and 1.9 GHz bands, and is strongly recommended where cellular coverage is strong. The L18285 includes a mount/u-bolt assembly for attaching the antenna to a mast, post, or crossarm up to 1.5" (3.8 cm) in diameter.
- The **C2445** 9dBd Yagi Antenna is a higher gain antenna that should be "aimed" at the service provider's antenna. The C2445 is a 800 MHz antenna and bracket/u-bolt assembly for attaching the antenna to a mast or post. The antenna comes with 10' of cable. This antenna is recommended for fringe areas that require a higher gain antenna.
- The **L21831** Half-Wave Dipole Whip Antenna is a lower gain antenna used in transmitting short distances. It is an 800 MHz cellular antenna that terminates in a SMA Male connector for attachment to the modem. 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.



PN L18285 1 dBd Omni Directional Antenna



PN C2445 9dBd Directional Yagi Antenna



PN L21831 Half-Wave Dipole Whip Antenna

FIGURE 4.2-2. Antennas for Use with the Raven Modems

- Power Supply (see power considerations).
- Environmental Enclosure— ENC 10/12, ENC 12/14, or ENC 16/18.

4.3 Power Considerations

- A power cable included with the modem connects to the datalogger's 12 V or switched 12 V terminal. Connection to the switched 12 V terminal allows the datalogger to switch power to the modem during scheduled transmission intervals if desired. Connect the red lead wire to 12 V, and the black lead to G (ground). The white wire lead has no function and can be ignored.

- When using the switched 12 V terminal, the modem can typically be powered with a BP12 battery, CH100 charger/regulator, and MSX10 solar panel.

5. Program the Raven XT-Telus Modem

The following software is used to program the modem:

If an account is setup for the modem, it should automatically provision and activate on the Telus network once the antenna is connected and power is applied to the modem. The use of the Setup Wizard utility is no longer required. It is recommended that the modem be provisioned and tested in the office (assuming there is cellular coverage) rather than in the field.

AceManager is used to configure settings in the modem and load Campbell Scientific's Raven XT template file. The AceManager utility is also available from Sierra Wireless's website (www.sierrawireless.com/support). The CD that ships with the modem includes the utilities and manuals.

Campbell Scientific's "Raven XT Template 115200" file is for dataloggers that support 115200 baud (e.g. CR1000), the "Raven XT Template 9600" file is for dataloggers that support a maximum baud rate of 9600 (e.g. CR10X). The template file configures the modem to be compatible with CSI dataloggers. Template files are available from Campbell Scientific's Website: www.campbellsci.ca/download.

5.1 Indicator Lights

When your Raven XT is connected to power and an antenna, there is a specific pattern to the lights to indicate its operation mode.



- **Network**—Indicates a successful connection to the cellular network with an IP address given and a channel acquired.
- **Signal**—Light shows the strength of the signal and may be nearly solid (strong signal) or flashing (weaker signal). A slow flash indicates a very weak signal.
- **Activity**—Lights will flash as data is transferred to and from the modem on the network.
- **Power**—Indicates the power adapter is connected and there is power getting to the Raven XT.

- The **Reset button** (on the left side of the Raven XT) has two functions. If it is quickly depressed and released, the modem will simply power cycle the internal hardware. If, however, the reset is depressed and held for several seconds (count 10 slowly, and wait for the power light to go off after the light pattern stops), the ALEOS configuration settings will return to the factory defaults.

Light Patterns

The LEDs on the front of the modem will respond in different patterns to indicate modem states.

- **Normal**—Each LED, mentioned above, lit as applicable.
- **Start up**—The LEDs will cycle from left to right.
- **PassThru mode**—Network and Signal LEDs will blink in tandem. The Activity LED will blink when transmitting or receiving data.
- **SOS**—The Network LED blinks.
- **Configuration Reset**—The LEDs will cycle left to right and then right to left 4 times.
- **Authentication Failure**—The Network, Signal, and Activity LEDs blink every 2 seconds.
- **Data Retry**—The Network, Signal, and Activity LEDs blink every 3 seconds.

5.2 Using AceManager to Configure the Modem

After the Raven XT has been provisioned, certain settings have to be changed for the modem to be compatible with CSI dataloggers. The recommended way to change the settings is to send a template file to the modem using the AceManager utility.

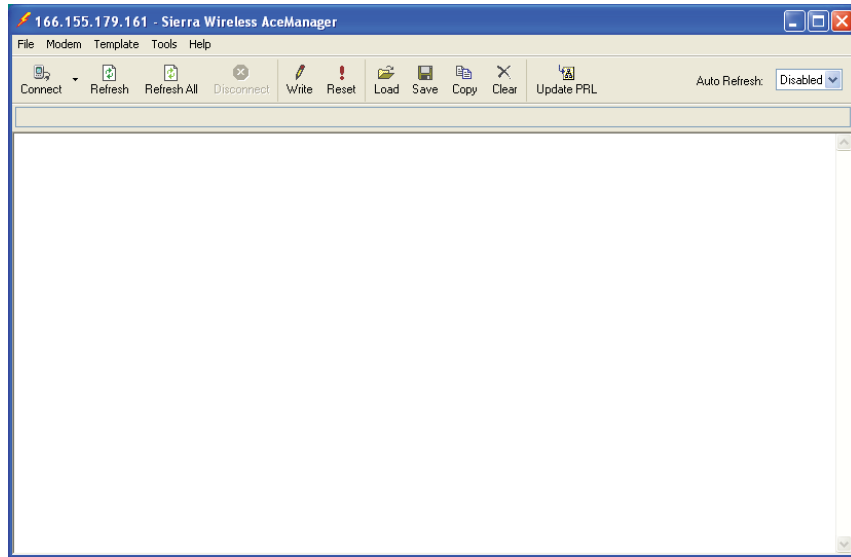
The AceManager utility is on the CD that ships with the Raven XT modem, and is available from Sierra Wireless (<http://www.sierrawireless.com/support>).

To install AceManager from the Sierra Wireless CD, click on the “AceManager” link under Modem Utilities and follow the prompts. Once the application has been installed, it can be run from the Windows Start menu, or from the icon on the desktop.

Campbell Scientific’s “Raven XT Template 115200” file is for dataloggers that support 115200 baud (e.g. CR1000), the “Raven XT Template 9600” file is for dataloggers that support a maximum baud rate of 9600 (e.g. CR10X). The template file configures the modem to be compatible with CSI dataloggers. Template files are available from Campbell Scientific’s Website: www.campbellsci.com/downloads.

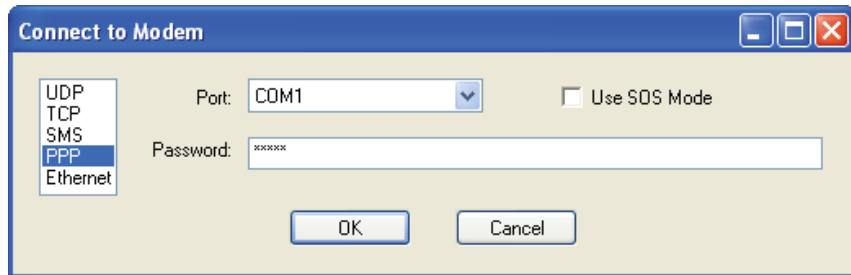
Connect the Raven XT to a com port on the PC with a direct RS-232 serial cable. Also connect the antenna, and 12V power.

Run AceManager to get the following screen:



Click the **Connect** icon in the Configuration Panel to open the connection options dialogue box. Select PPP, and the COM port the modem is connected to. Do not change the Password (the default password is 12345). Click OK to continue.

If the modem has been configured for "PPP" (see appendix B), then you may have to check the "Use SOS Mode" box.



Click the **Load** icon in the Configuration Panel. When prompted for a template file name, select the appropriate .xml file (downloaded from the CSC website). The following screens show the settings for the Miscellaneous and Serial settings after the template file has been loaded.

GROUPS	MODEM DATA			PRINTABLE VIEW
	AT	Name	Value	New Value
COMMON	DATE	Date and Time	10/21/2008 10:17:11	
	OPRG	Enable Over-the-Air Programming	1	1-ON
	*NETPHONE	Phone Number	14357571662	
		Force Static IP	0.0.0.0	
	*DPORT	Device Port	12345	6785
	*NETUID	Network User ID	ispda@cingulargprs.com	
	*NETPW	Network Password	CINGULAR1	
	*NETALLOWZEROIP	Allow Last Byte of net IP = Zero	1	1
	*HOSTPAP	Request PAP	0	0-NO
	TELEMETRY	S53	Destination Address	
S53		Destination Port	0	0
S53		Default Dial Code	T	T-TCP

GROUPS	MODEM DATA			PRINTABLE VIEW
	AT	Name	Value	New Value
COMMON	S23	Configure Serial Port	115200,8N1	115200,8N1
	\Q	Serial Port Flow Control	0	0-None
	S50	Data Forwarding Timeout	1	1
	S51	Data Forwarding Character	0	0
	E	DB9 Serial Echo	0	
	E	USB Serial Echo	1	
	E	Telnet Echo	1	
	V	AT Verbose Mode	1	1-Verbose
	&D	DTR Mode	0	0-Ignore DTR
	S211	DTR Mode	1	1-Ignore DTR
TELEMETRY	&S	Assert DSR	1	1-In Data Mode
	&C	Assert DCD	1	1-In Data Mode
	*CTSE	Enable CTS to Indicate Network Coverage	0	0-Disabled

Change “AT Verbose Mode” to “Numeric” for use with CR10(X), CR510, and CR23X dataloggers.

Click the **Write** icon to save the changes made by the template file.

Click the **Reset** icon to restart the modem. The other ways to reset the modem are by pressing the reset button on the front of the modem or removing the power from the modem.

Click the **Disconnect** icon to terminate communications with the modem.

WARNING

Unless you Write the commands, the changes made in New Value will not be sent to the modem. For some commands unless you Reset the modem, the newly written values will not take effect.

5.3 Configuring the Raven for Dynamic IP

Dynamic IP addresses are granted only when a modem or other device is connected and can change each time the modem or device reconnects to the network.

IP Manager is a free service provided by Sierra Wireless for the Raven XT 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 Raven XT by name as if it had a static IP.

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

AceManager is used to configure the Dynamic IP settings in your Raven XT 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 needs to have four elements configured.

Enter names in the New Value fields for **MODEMNAME**, **DOMAIN**, **IPMANAGER1**, **IPMANAGER2**, and **IPMGRUPDATE1**.

The screenshot shows the Sierra Wireless AceManager application window. The title bar indicates the connection to 173.181.138.49. The interface includes a menu bar (File, Modem, Template, Tools, Help) and a toolbar with various icons for connection management. A status bar at the bottom shows the loaded template: "C:\Documents and Settings\JAN CAMPBELL\Desktop\RAVEN X & XT Templates\CSC_RAVENXT_Telus_2011_CR1000.xml".

The main window is divided into two panes. The left pane, titled "GROUPS", contains a tree view with categories: INFO, STATUS, COMMON, Dynamic IP (selected), PPP/Ethernet, PassThru, SMTP, Other, Firewall, Port Forwarding, LOGGING, REPORT, Server 1, and 1X/EV-DO. The right pane, titled "MODEM DATA", displays a table of configuration parameters for the selected "Dynamic IP" group.

AT	Name	Value	New Value
*MODEMNAME	Modem Name	4388624280	
*DOMAIN	Domain	eaalink.com	eaalink.com
*IPMANAGER1	IP Manager Server 1 (IP Adrs)	eaalink.com	eaalink.com
*IPMGRUPDATE1	IPMServer1 Update (Minutes)	0	0
*IPMGRKEY1	IPMServer1 Key	*****	
*IPMANAGER2	IP Manager Server 2 (IP Adrs)	edns2.eaalink.com	edns2.eaalink.com
*IPMGRUPDATE2	IPMServer2 Update (Minutes)	0	0
*IPMGRKEY2	IPMServer2 Key	*****	

1. Modem name: A unique name for the modem (the 10-digit MDN number is recommended).
2. Domain: The domain name to be used by the modem (eairlink.com).
3. IP Manager IP Address: The IP or domain name of the dynamic DNS server which is running IP Manager.

IPMANAGER1: eairlink.com

IPMANAGER2: edns2.eairlink.com

4. IP Manager update interval refers to how often you want the address sent to the IP Manager. If this is set to zero, the modem will only send an update if the IP changes (i.e. if the modem is reset or is assigned a different IP). The value can be set from 0 - 255 minutes, and should be set to a value appropriate for your application.

Restrictions for Modem Name

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

Click the **Write** icon to save the changes.

Click the **Reset** icon to restart the modem.

Click the **Disconnect** icon to terminate communications with the modem.

6. LoggerNet/PC400W Software Setup

The Device Map is configured from the “Setup” button on the LoggerNet/PC400W Toolbar. Configure the Device Map as described below.

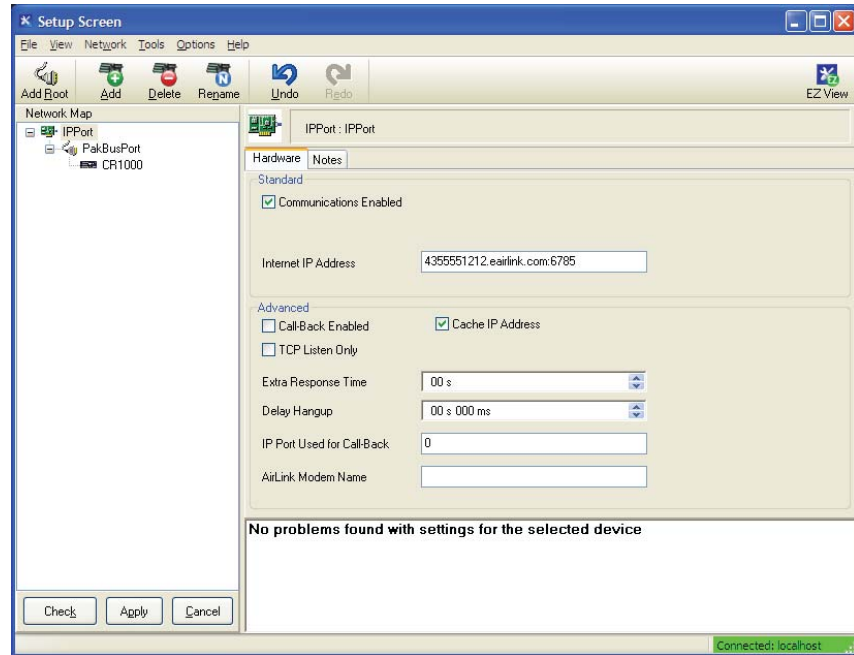
1. Select Add Root | IPPort.
2. Add a datalogger to the IPPort (Pakbus dataloggers, e.g. the CR1000, require a PakBusPort).
3. On the IPPort page, add the IP address/domain name and the Port number (the Raven template file configures the port to be 6785). Add four seconds of extra response time.
4. For PakBus dataloggers, leave the default settings on the PakBusPort page.
5. For PakBus dataloggers, set the PakBus address to match that of the datalogger (default address in the datalogger is 1). Make sure that “PakBus Always Open” is unchecked.

LoggerNet Device Map

Preceding zeros are not entered in the Internet IP Address (e.g. 070.218.074.247 is entered as 70.218.74.247).

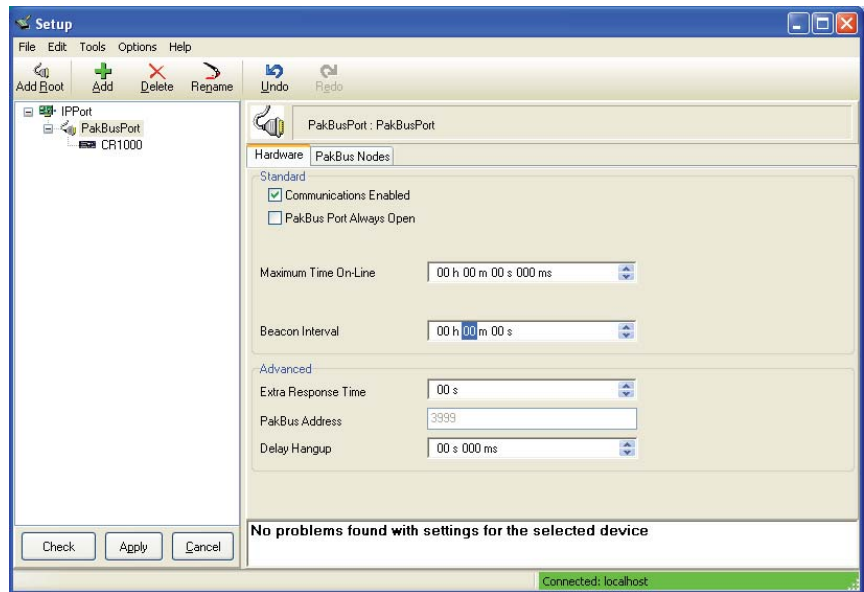
For a Dynamic IP using Sierra Wireless's IP Manager, enter the internet IP address as:

xxxx.yyyy:6785, where xxxx is the modem name, yyyy is the Domain name, and 6785 is the port number.

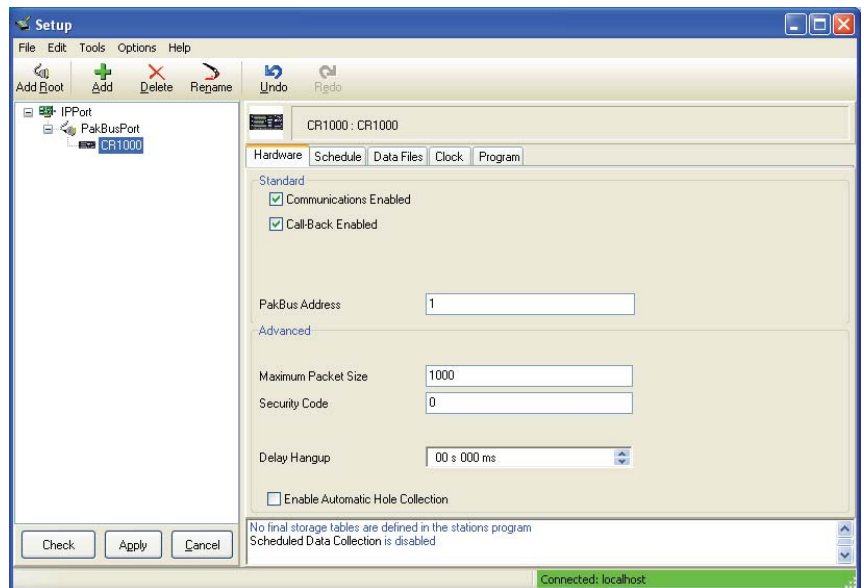


If using this option, please ensure that “Cache IP Address” is unchecked.

Uncheck “PakBus Port Always Open”.



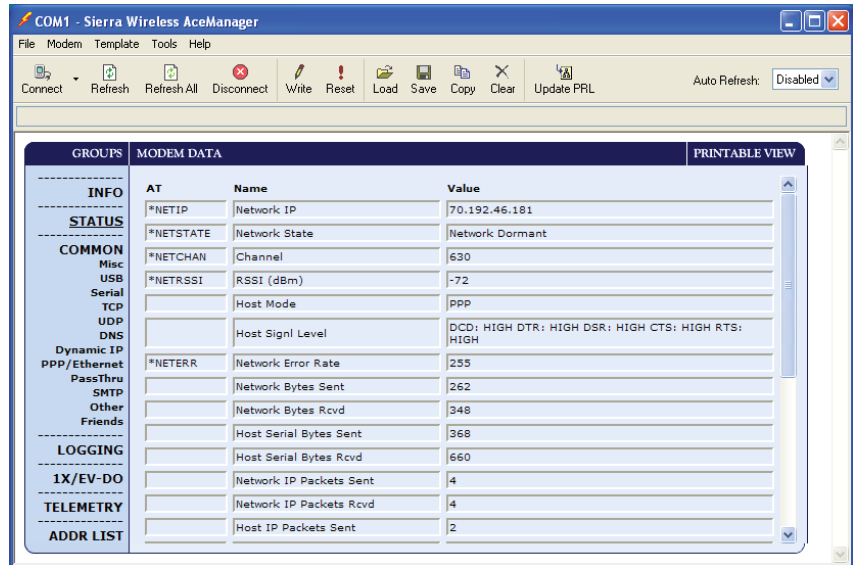
Enter PakBus address that has been set in the datalogger (default is 1, change the address using DevConfig).



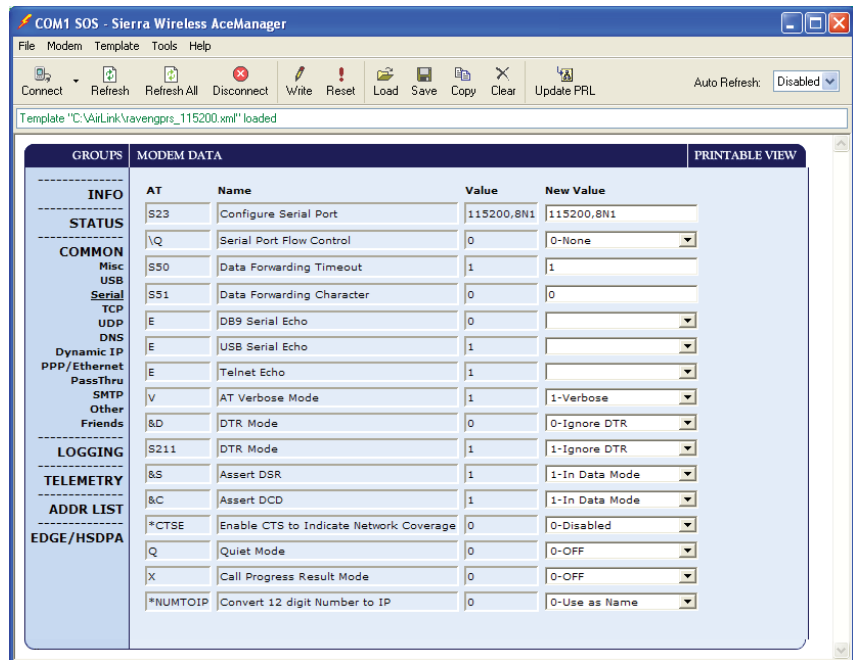
7. Troubleshooting

If LoggerNet/PC400W software is unable to establish a connection with the modem:

1. Check your account information (you may have to call your provider for this or look at your agreement).
 - a. Verify there is coverage at your location.
 - b. Check the Network light. Network – indicates a successful connection to the cellular network with an IP Address given and a channel acquired.
 - c. Make sure the modem has sufficient power.
 - d. Check the signal strength using AceManager (make sure your antenna is properly connected and oriented). Signal strength should be in the -51 to -90 range (-51 is a strong signal, -90 is a weak signal).
 - e. Make sure you have digital (not analog) coverage. For the Raven XT-Telus this should be a CDMA/1xRTT/EVDO account.
 - f. If you have a Static IP account, verify the Static IP Address. Preceding zeros in the IP address are not entered in LoggerNet/PC400W.
 - g. If you have a Dynamic IP account, you will need to have a DDNS (dynamic domain name server) name that LoggerNet can reference to make the connection (Section 5.3).
 - h. Connect with the modem through the serial port using AceManager. If the modem has been configured for “PPP” (see appendix B), then you may have to check the “Use SOS Mode” box.
 - i. From the “Status” group, make sure the “Network State” is “Network Ready”, and note the “Network IP” address. This is the current IP address for the modem (a dynamic IP address will change each time the modem is reset). Try connecting to this IP address using LoggerNet. If LoggerNet connects with the IP address, but not with the modem name.domain name, then there may be a problem with the Dynamic IP setup in the modem (Section 5.4).



Select the “Serial” Group, and make sure the “AT Verbose Mode” is set to “Numeric” for use with the CR10(X), CR510, and CR23X dataloggers, or “Verbose” for other dataloggers (e.g. CR1000).



If the modem answers but you do not get a connection to the datalogger:

1. Check your connection to the datalogger.
 - a. An SC932A or SC105 interface is required to connect the modem to a datalogger’s CSI/O port (Section 4). The default settings for SC105 (OS > 4) can be used with the RavenXT when the modem is configured for 115200 baud (baud rate is set by the template file).

Baud rate of the SC105 must match the baud rate in the modem (which has to be supported by the datalogger). SC105 settings for use with the RavenXT are listed below, which are configured using the DevConfig utility.

SC105 settings for the RavenXT:

CS I/O Mode: SDC Address 7

RS-232 Mode: Modem

Baud Rate: 115.2K or 9600 baud depending on datalogger model

8 data bits, 1 stop bit, no parity

- b. Make sure the modem is connected to the “DCE Device” connector on the SC932A, or the “Modem” connector on the SC105.

A null modem cable is required to connect the modem to a datalogger’s RS-232 port. No other interface is required.

2. Check your LoggerNet setup.

- a. Make sure the port number at the end of the IP address matches the port number of the Raven (e.g. 6785, see Figure 7-1).

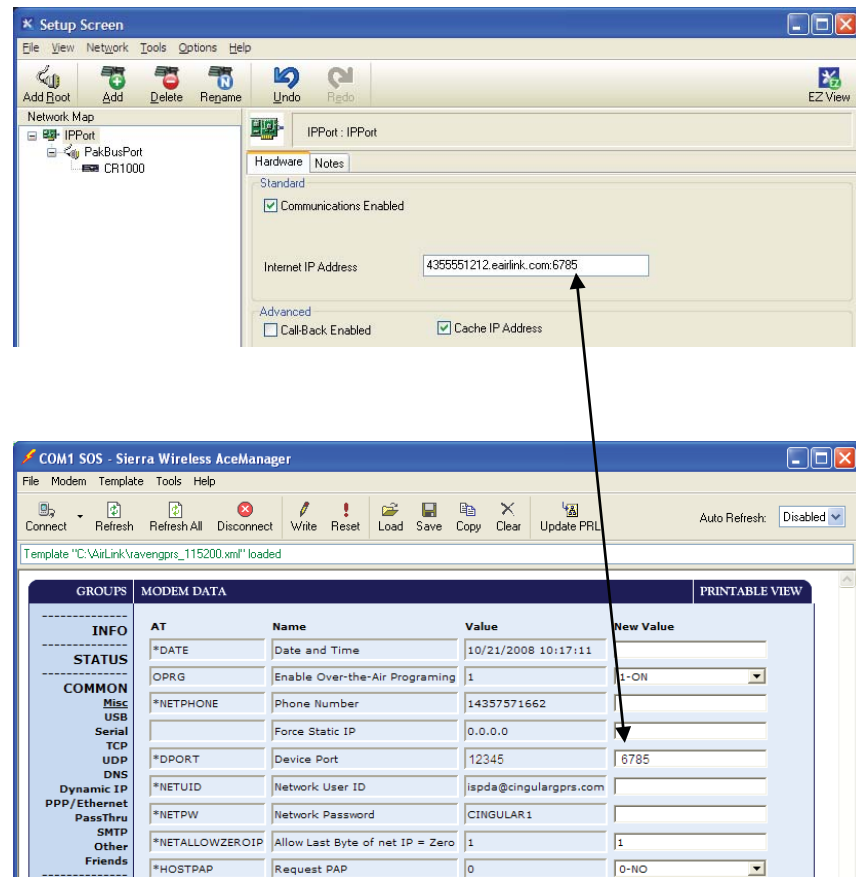


FIGURE 7-1. Device Port Configuration

- b. Try adding a few seconds to the extra response time on the IP Port in LoggerNet (you should not need more than 5 seconds).
 - c. If you are trying to communicate to a PakBus datalogger:
 - i. Verify the PakBus address in the setup screen matches that of the datalogger.
 - ii. If you have multiple PakBus networks/ports setup in LoggerNet, uncheck the 'PakBus Port Always Open' options on all PakBus ports.
3. Use AceManager to check modem communications with datalogger.

The modem's "Host Serial Bytes Sent" and "Host Serial Bytes Received" windows can indicate whether or not the modem is communicating with the datalogger.

Establish a connection with the modem through the cellular network using AceManager (click on the Modem menu item, Connect, UDP. Enter the IP address, and click OK). Go to the Status group and note the "Host Serial Bytes Sent" and "Host Serial Bytes Received" values (Figure 7-2). Try connecting with the datalogger using LoggerNet/PC400W. If a connection cannot be established, close LoggerNet and reconnect with AceManager and compare the current values with the previous values.

If the values are the same, the modem is not attempting to make a connection with the datalogger. Check that the .xml template file has been loaded (Section 5.3).

If the "Host Serial Bytes Sent" increased, the modem attempted to connect to the datalogger, but the response from the datalogger did not make it back to the modem. Check the interface between the modem and the datalogger (Section 4.2).

If both values incremented, the modem and the datalogger are communicating. Try adding some extra response time in LoggerNet.

NOTE

Baud rate changes require the modem to be reset before the change takes affect. Click the Reset icon in AceManager to the reset the modem and implement the change.

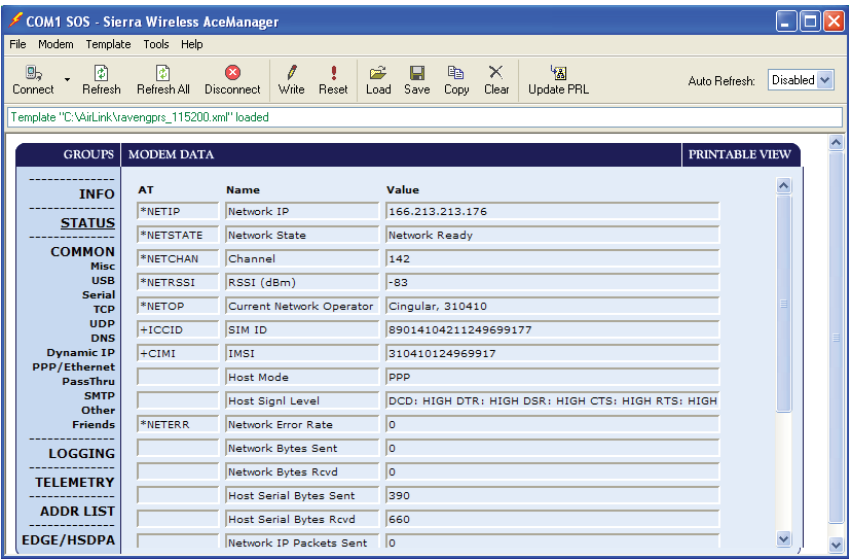


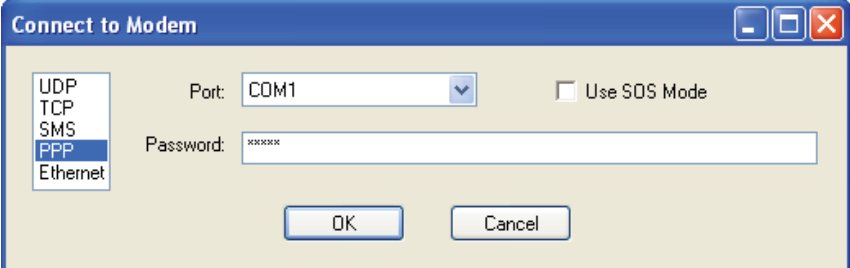
FIGURE 7-2. AceManager status page showing communications with modem.

Appendix A. AceManager Setup without Template File

AceManager is used to program settings in the Raven XT modems to make the modems compatible with CSI dataloggers. Sierra Wireless CDMA and GPRS template files to send the modems are available on the CSC website (<http://www.campbellsci.ca/download>). The procedure for sending the template files is described in Section 5.2.

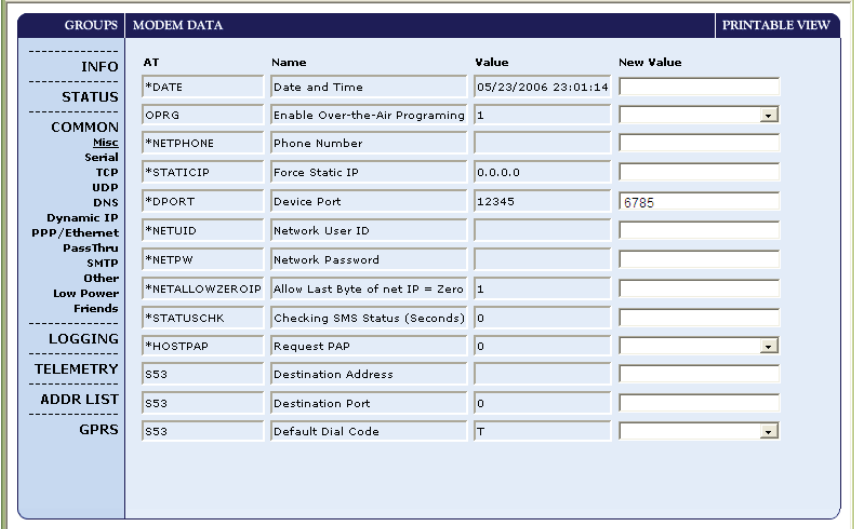
When the template files are not available, AceManager can be used to change the settings described below.

For a direct connection on a COM port use PPP and appropriate Com Port.



The "Connect to Modem" dialog box features a protocol selection list on the left with "PPP" highlighted. To the right, the "Port" is set to "COM1" and the "Use SOS Mode" checkbox is unchecked. A "Password" field contains "xxxxxx". "OK" and "Cancel" buttons are at the bottom.

Make a note of the Device port (*DPORT). The default is 12345 and we use 6785 in our templates. Any valid port can be used. This is the port number used in LoggerNet to get to the datalogger.



The "Modem Data" configuration window shows a table of settings. The left sidebar lists categories like INFO, STATUS, COMMON, LOGGING, and TELEMETRY. The main table lists AT commands and their values.

AT	Name	Value	New Value
*DATE	Date and Time	05/23/2006 23:01:14	
OPRG	Enable Over-the-Air Programing	1	
*NETPHONE	Phone Number		
*STATICIP	Force Static IP	0.0.0.0	
*DPORT	Device Port	12345	6785
*NETUID	Network User ID		
*NETPW	Network Password		
*NETALLOWZEROIP	Allow Last Byte of net IP = Zero	1	
*STATUSCHK	Checking SMS Status (Seconds)	0	
*HOSTPAP	Request PAP	0	
S53	Destination Address		
S53	Destination Port	0	
S53	Default Dial Code	T	

- S23 – Configure Serial Port – The baud rate needs to be configured to match a valid datalogger baud rate. For a CR10X: 9600,8N1 and for a CR1000: 115200,8N1.
- \Q – Serial Port Flow Control – This should be set to None.
- V – AT Verbose Mode – Set this to Verbose for CR800, CR1000, CR3000; Numeric for CR10(X), CR510, CR23X.
- &D – DTR Mode – Set to Ignore DTR
- S211 – DTR Mode – Set to Ignore DTR
- &S – Assert DSR – Set to In Data Mode
- &C – Assert DCD – Set to In Data Mode
- Q – Quiet Mode – Set to ON

The screenshot shows the Sierra Wireless AceManager interface for COM1. The 'MODEM DATA' section is active, displaying a table of configuration parameters. The table has columns for AT commands, Names, current Values, and New Values. A 'PRINTABLE VIEW' button is located at the top right of the table area. A status bar at the top indicates 'Reset successful'.

GROUPS	AT	Name	Value	New Value
INFO	S23	Configure Serial Port	115200,8N1	115200,8N1
	\Q	Serial Port Flow Control	0	0-None
	S50	Data Forwarding Timeout	1	1
	S51	Data Forwarding Character	0	0
	E	DB9 Serial Echo	0	
	E	USB Serial Echo	1	
	E	Telnet Echo	1	
	V	AT Verbose Mode	1	1-Verbose
	&D	DTR Mode	0	0-Ignore DTR
	S211	DTR Mode	1	1-Ignore DTR
TELEMETRY	&S	Assert DSR	1	1-In Data Mode
	&C	Assert DCD	1	1-In Data Mode
ADDR LIST	*CTSE	Enable CTS to Indicate Network Coverage	0	0-Disabled

- S0 – TCP Auto Answer – Set to ON
- TCPT – TCP Idle Timeout -- Set to a reasonable value like 2 min.

The screenshot shows the Sierra Wireless AceManager interface for COM1. The window has a menu bar (File, Modem, Template, Tools, Help) and a toolbar with buttons: Connect, Refresh, Refresh All, Disconnect, Write, Reset, Load, Save, Copy, Clear, and Update PRL. An 'Auto Refresh' dropdown is set to 'Disabled'. The main area is divided into 'GROUPS' and 'MODEM DATA'.

GROUPS:

- INFO
- STATUS
- COMMON
 - Misc
 - USB
 - Serial
 - TCB
 - UDP
 - DNS
 - Dynamic IP
 - PPP/Ethernet
 - PassThru
 - SMTP
 - Other
 - Friends
- LOGGING
- 1X/EV-DO
- TELEMETRY
- ADDR LIST

MODEM DATA:

AT	Name	Value	New Value
S0	TCP Auto Answer	1	1-ON
S7	TCP Connect Timeout	30	30
TCPT	TCP Idle Timeout	2	2
TCPS	TCP Idle Timeout Secs	0	0-Minutes
S221	TCP Connect Response Delay	0	0
S60	Telnet Echo Mode	1	1-Local Echo
*ENQ	Enable ENQ on TCP Connect	0	0-Disable

A 'PRINTABLE VIEW' button is located at the top right of the MODEM DATA section.

See Section 5.3 for information on configuring the modem for use with a Dynamic IP.

Appendix B. Configuring the Raven XT Modem for PPP

The Raven XT's template file configures the Raven XT to function as a serial server. As a serial server, the modem has an IP address, and port number 3001 for the Raven XT's RS232 port.

LoggerNet sends data via TCP/IP over the internet to the datalogger. The modem removes the data from the TCP packet and sends the data out the RS232 port to the datalogger. Returning data is put into a TCP packet by the modem and sent back to LoggerNet.

Settings in the Raven XT and datalogger (CR800, CR1000, and CR3000), can be changed to configure the RS232 serial ports for Point-to-Point (PPP) protocol. When configured as PPP, the Raven XT functions as a router, routing TCP/IP communications to the IP stack of the datalogger. PPP enables the datalogger to send/receive messages via email, HTTP, FTP to and from the datalogger, and allows concurrent communications between networked dataloggers and LoggerNet.

The default datalogger port number for PakBus/TCP communications is 6785. The datalogger will also respond to port 80 for HTTP, 23 for Telnet, and 21 for FTP. These ports can be disabled in the dataloggers configuration.

NOTE

After the RS232 port on the modem has been configured as PPP, use AceManager with a TCP or UDP connection to establish communications with the modem. It may also be possible to connect with the modem through its RS232 port using the "SOS" mode.

Raven XT Settings for PPP Mode:

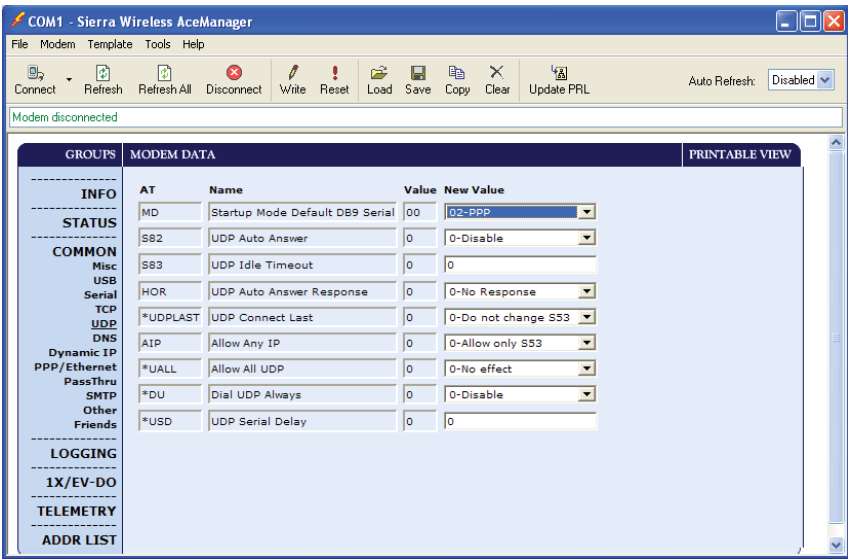
Download the current Raven XT AceManager template file from <http://www.campbellsci.ca/download> Load the template into AceManager and make the following changes in steps 1 and 2 before writing them to the Raven XT modem.

Use AceManager to configure the following UDP setting:

- MD = 02-PPP

Use AceManager to configure the following Misc. setting:

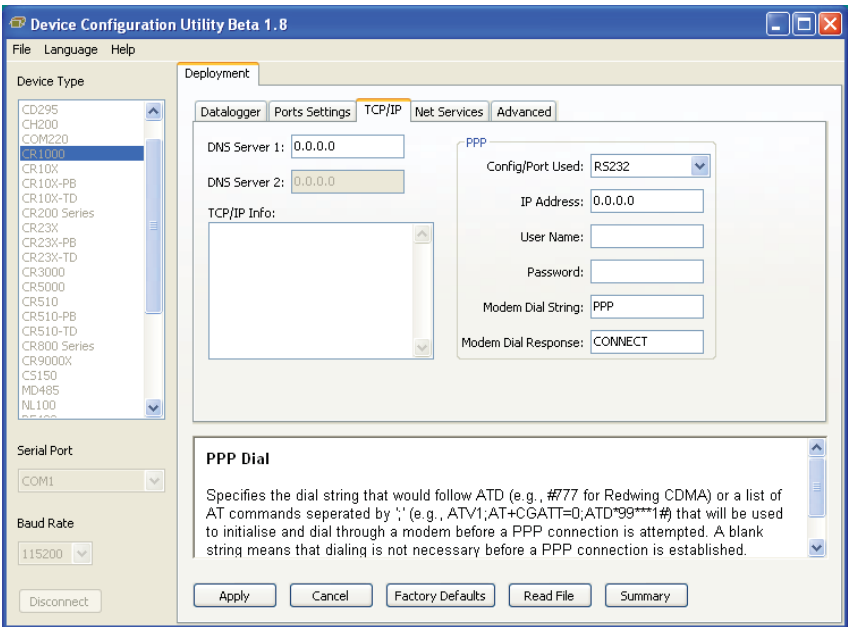
- *DPORT (Device Port) = 3001



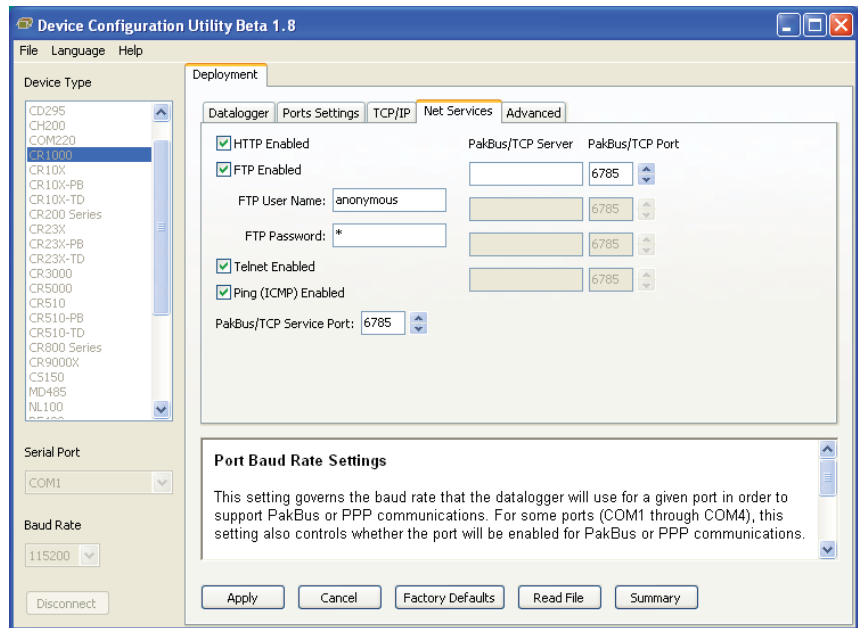
Datalogger Settings:

Using the Device Configuration Utility, configure the following setting on the TCP/IP tab:

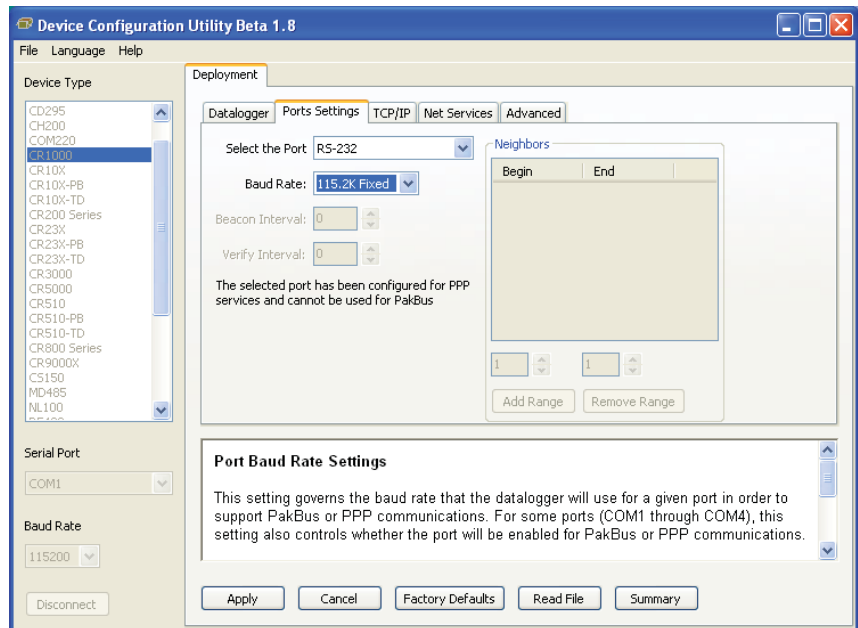
- Config Port Used = RS232
- IP Address = 0.0.0.0
- Modem Dial String = PPP
- Modem Dial Response = CONNECT
- User Name and Password are blank



Using the Device Configuration Utility, select the “Net Services” tab. The “Pakbus/TCP Service Port” default is 6785. This is the “Port” number that will follow the “IP address” for Loggernet to communicate with the datalogger.

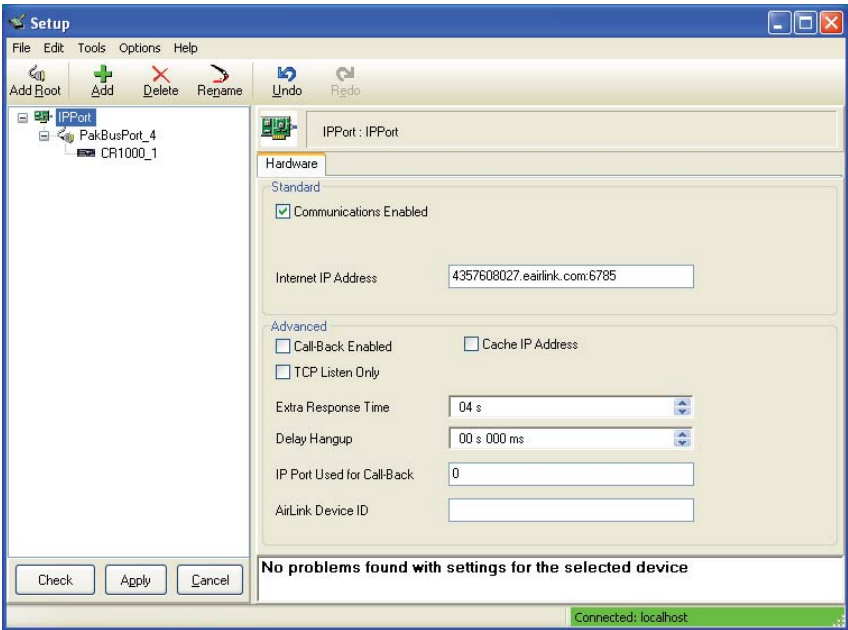


Using the Device Configuration Utility, fix the RS232 Baud Rate to “115200 Fixed” from the “Port Settings” tab.



Loggernet Settings:

Enter the IP address of the Raven XT, and the PakBus/TCP Service Port number of the datalogger (e.g. 6785 as explained above).



Appendix C. EmailSend Using the Gmail Outgoing SMTP Server

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 an SMTP server to send through like any other mail client. The Telus Wireless SMTP server can be used for sending outgoing email from the datalogger. Contact your service provider for more information.

NOTE

In order for the datalogger to send email, a PPP connection between the datalogger and modem is required. Please refer to Appendix B for details on this configuration.

C.1 Setting up a Gmail Account

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

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

In the following example program you will see:

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

C.2 Sending to Multiple Addresses

Sending to multiple email address can be done by using a comma to separate the email addresses (dataloggers@campbellsci.ca , customer@emailaddress.com).

C.3 Sending a Text Message to a Phone

The datalogger can only send email messages. 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.

Telus's max text message size is 132 characters, any email messages greater than 132 characters will be sent as a second message. Contact your service provider for information about their email to text message gateway server address.

EmailSend Program Example

The following example sends an email message when an alarm condition is True. Both the CR1000 and Raven modem must be configured as PPP as described above.

```
'Main program variables
Public Batt, RefTemp, Temp
Public Socket AS Long

'declare Email parameter strings (as constants), Message String & Result Variable
Const ServerAddr="smtp.gmail.com"
Const UserName="gmail account name"
Const Password="datalogger"
Const ToAddr="dataloggers@campbellsci.ca, customer@emailaddress.com"
Const FromAddr="gmailaccount@gmail.com"
Const Subject="Email Message Test"
Const Attach=""
Const CRLF = CHR(13)+CHR(10)

Public Result as String * 100
Public AlarmTrigger As Boolean
Public Message As String * 250
Public EmailSuccess As Boolean

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

BeginProg
  Scan (1,Sec,3,0)
    Battery (Batt)
    PanelTemp (RefTemp,250)
    TCDiff (Temp,1,mV2_5C,1,TypeT,RefTemp,True ,0,250,1.0,0)
    CallTable TenSecData
  NextScan

SlowSequence
  Scan(1,sec,1,0)
    If AlarmTrigger = False Then

      If Temp > 27 Then AlarmTrigger = True

      If AlarmTrigger Then
        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

        EmailSuccess=EmailSend (ServerAddr,ToAddr,FromAddr,Subject,Message,Attach,UserName>Password,Result)

      EndIf
    EndIf

    If Temp < 27 Then AlarmTrigger=False

  NextScan

EndProg
```

