

Application Note 18

Troll 9000 telemetry connection using AirLink Raven CDMA modem and 1xRTT wireless data service

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Introduction

Win-Situ software for the Troll 9000 series dataloggers has built-in capabilities for telemetry connections. The modem options in the software are designed around direct dialing of a remote modem telephone number via a modem connected to the office computer. It is also possible, however, to make connections across 1xRTT CDMA wireless data networks, which utilize IP addressing.

This paper describes the method used to connect to Troll 9000 series dataloggers via Win-Situ 4 software and AirLink Raven CDMA wireless modems serviced by the Verizon Wireless 1xRTT data network and static IP addressing.

It is the responsibility of the user to ensure that 1xRTT CDMA wireless service is available in the desired area. It is also the responsibility of the user to purchase an AirLink Raven CDMA modem, establish an account and 1xRTT data service for that modem through Verizon Wireless or other service provider, and to obtain a static IP address for the modem from the service provider. All of this must be done before equipment and software setup can proceed, or a telemetry connection can be attempted.

COM port redirection

The key to successfully making Win-Situ 4 connections through a network that uses IP addressing is the incorporation of "COM port redirector" software. Such third party software utilities act as a bridge between serial data applications and devices and IP networks. For the current application, COM/IP port redirector software from Tactical Software, LLC was utilized. Evaluation and licensed copies of the software can be downloaded from www.tacticalsoftware.com. The redirector creates a virtual serial COM port that can be accessed by Win-Situ 4. A modem connection is defined in Win-Situ, but instead of a

phone number, the redirector's "virtual modem" is given an IP address and IP port number to dial.

Modem settings

The modem settings required to make a given modem work for a particular application will vary by modem type, brand, and model. The following settings are specific to the AirLink Raven CDMA modem for use on the Verizon Wireless 1xRTT network. It is recommended that a person making these setting changes have experience using HyperTerminal or other terminal emulation software. It is also possible to change these settings via modem configuration software from the manufacturer. Consult AirLink for further details.

The following changes assume that one is starting with a new Raven CDMA modem having factory default settings. AirLink provides a utility that will restore default settings to a modem. The initial HyperTerminal port settings must be 115200 bits per second, 8 data bits, no parity, 1 stop bit, no flow control to match the default modem serial port settings.

HyperTerminal AT commands and purpose:

ATE1Q0 – local echo on and AT quiet mode off. Allows user to see commands as they are typed in HyperTerminal and the modem responses.

AS23=19200,8N1&W – sets the modems serial port to Win-Situ and Troll default of 19200 bits per second. For simplicity, it is recommended that this baud rate be used. Communication with the modem will be lost after this command is issued. Disconnect the HyperTerminal connection, reset the connection baud rate to 19200, then call the modem again in HyperTerminal. Proceed after the connection is reestablished.

AT*PTINIT=AT&D0S0=1 – defines the initialization string that is loaded when the modem is reset or power cycled. Ignore DTR and auto answer incoming calls.

AT*PTREFRESH=60 – reload the PTINIT string every 60 minutes. Keeps modem in a ready state in event of abnormal condition.

AT*RESETPERIOD=24 – resets the modem after 24 hours of inactivity. Guards against lockout due to modem getting into abnormal state.

AT\Q0 - no flow control.

AT&S0 – always assert DSR.

At&C0 – always assert DCD.

ATS211=1 – ignore DTR, used in conjunction with the &D0 command.

ATS50=1 – data forwarding idle timeout in tenths of a second.

AT+CTA=60 – CDMA signal inactivity timeout in seconds.

ATTCPS=0 – TCP timeout units set to seconds.

ATTCPT=5 – Number of minutes (see TCPS above) of TCP inactivity after which the connection will be dropped. The connection will be dropped if Win-Situ does not exchange information with the Troll for this period of time. This can be set to whatever the user thinks is prudent, but it is recommended that this be set relatively short to guard against unintended airtime usage.

ATDAE=0 – enables +++ AT escape sequence (later diagnostic purposes).

ATE0Q1MD04&WZ – enter all of these commands together! Turns local echo off (E0), turns AT quiet mode on (Q1), puts modem in TCP PAD mode (MD04), writes all changes to memory (&W) and resets the modem (Z).

The modem should start back up in TCP PAD mode after it resets. It should also always do this after a power cycle or reset. Should further HyperTerminal communications with the modem be necessary, power cycle the modem and send the command ATMD0 within five seconds to put it back into AT mode. After communications are completed, enter the last command line from above (ATE0Q1MD04&WZ).

Software configuration

Install the COM/IP port redirector software and create a virtual COM port (COM4, for example) following the provider's instructions. Be sure to install their "virtual modem" on that COM port. To do this, add a modem when selecting the virtual port number, select "Don't detect my modem, I will pick from a list." in the Windows Add Hardware

Wizard, then choose Tactical Software from the manufacturer list, select their Virtual Modem, and install it.

In Win-Situ, go to the Home level of the navigation tree and click the "Add" button to create a new connection. In the Win-Situ Connection Wizard, do the following:

- On the first screen select a Modem connection and one device.
- On the second screen:
 - select the virtual COM port that you created through COM/IP
 - for a phone number, enter the IP address and port for the Raven modem in the format d.d.d.d[ppppp] where d represents the IP address numbers and p represents the port numbers. Your wireless provider will supply a static IP address for your modem. The default port number for the Raven modem is 12345. If your modem is assigned a static IP address of 111.222.333.444, then you would enter "111.222.333.444[12345]" (do not include the quotation marks). Should your ISP or IT department require that the port number be something different, this must be changed on the modem through HyperTerminal using the AT*DPORT command or by changing the S53 register. Consult the modem documentation to do this.
 - Shorten the modem initialization string to "AT&F" (again do not include the quotes).
- On the third screen, set the baud rate to 19200.
- On the last screen, you can give the connection a name if you wish. Uncheck the box on this screen before completing the wizard.

Once the Connection Wizard is completed, save the settings by going to the File menu and selecting "Save Site". This ensures that the connection configuration will be remembered when Win-Situ is closed and re-opened.

You are now ready to make all of the physical connections and start using telemetry with your Troll. The Troll must be connected to the modem using a male-male 9-pin "null modem" adapter (In-Situ part number 0030910). The null modem swaps pin connections to the serial port and is required for successful communications. The Troll

will not be able to communicate with the modem if only a gender changer is used. Also, make sure that your PC has an active connection to the Internet.

Now, just highlight your new connection in the Win-Situ 4 navigation tree, then click the "Find" button on the right side of the screen. When the remote Troll is located, you can use Win-Situ as normal. The only noticeable difference between using the 1xRTT CDMA modem and a direct PC connection to a Troll is that the initial exchange of parameter and sensor information takes a little longer through the modem (about a minute as compared to 30 seconds with a direct PC connection). Other than that, there are no differences in performance.

If you suspect any problems with the modem or wireless network service, then there are a few things that can be checked. When making a connection or exchanging information between Win-Situ and the Troll, the Tx/Rx LED on the modem's front panel will blink if there is a successful connection. The Chan, Link, Reg, RSSI, and Power LEDs should all be lit if the modem is in the proper mode and 1xRTT network service is available. AirLink also provides a utility, called AceView that allows you to monitor the detection and registration of the modem on the 1xRTT network.

Be aware that Win-Situ and a Troll cannot synchronize baud rates across a telemetry connection. A Troll remembers the last baud rate at which it connected with Win-Situ, so it is important that any Troll being used for telemetry

first be connected directly to a PC and Win-Situ at the desired telemetry baud rate. The default baud rate for Trolls and Win-Situ is 19200, the same as the modem serial port settings in this example. If a very long cable is being used (greater than 2,000 feet), then it may be necessary to communicate with the Troll at 9600 baud. If this is the case, then the modem's serial port (ATS23 command) and the Win-Situ connection must be configured for the lower rate. It is also critical that the Troll first be directly connected to a PC and Win-Situ at that lower baud rate before connecting it to the remote modem.

Conclusions

By following the steps outlined here, robust and cost effective data telemetry can be achieved using existing or new Troll 9000 series data loggers deployed in most areas of North America.

*In-Situ, Win-Situ, Troll, AirLink, Raven, Tactical Software, COM/IP, AceView, and Verizon Wireless are all registered trademarks.

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