AirLink
COMMUNICATIONS

Raven GPRS

User Guide

cingular WIRELESS

AirLink Communications, Inc.

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- **WARNING**

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

- **Important Notice**

Because of the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the AirLink Communications modem are used in a normal manner with a well-constructed network, the AirLink modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. AirLink Communications, Inc., accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the AirLink Communications modem, or for failure of the AirLink Communications modem to transmit or receive such data.

- **Safety and Hazards**

Do not operate the AirLink Communications modem in areas where blasting is in progress, where explosive atmospheres may be present, near medical equipment, near life support equipment, or any equipment which may be susceptible to any form of radio interference. In such areas, the AirLink Communications modem MUST BE POWERED OFF. The AirLink Communications modem can transmit signals that could interfere with this equipment. Do not operate the AirLink Communications modem in any aircraft, whether the aircraft is on the ground or in flight. In aircraft, the AirLink Communications modem MUST BE POWERED OFF. When operating, the AirLink Communications modem can transmit signals that could interfere with various on board systems. The driver or operator of any vehicle should not operate the AirLink Communications modem while in control of a vehicle. Doing so will detract from the driver or operator's control and operation of that vehicle. In some states and provinces, operating such communications devices while in control of a vehicle is an offence.

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Introduction to Raven GPRS

The AirLink Raven uses serial to connect to a computer or other device and GPRS to connect to Cingular's cellular network to allow cellular communication to the Internet or other network.

Raven Overview

The Raven's rugged form factor is ideal for industrial and commercial applications that require real-time communications. The Raven provides cellular data communications for a variety of applications, such as telemetry, public safety, SCADA, traffic control, traffic metering, transit arrival systems and more.

FIGURE 1. Raven face and back

The Raven has several built in features to make it more effective in a variety of settings. In addition, Airlink provides several modem tools to further enhance the capabilities of the Raven. These features and tools are introduced in this User Guide.

- Wireless ACE, Wireless ACE Web, and AceNet
- IPManager
- Modem Doctor
- Keepalive

GPRS Overview

General Packet Radio Service (GPRS) is packet-switched with many users sharing the same transmission channel, only transmitting when they have data to send. This means that the total available bandwidth can be immediately dedicated to those users who are actually sending at any given moment, providing higher utilization where users only send or receive data intermittently. GPRS provides speeds of 30–70 kbps with bursts possibly up to 170 kbps.

Connecting to Cingular using Serial

Your Raven is equipped with a serial port which you can use to connect directly to your computer or device.

If you are using a computer with your Raven you can use Dial-Up Networking (DUN) to access the Internet or other network applications.

Establishing a Connection with GPRS

Cingular is the Internet Service Provider (ISP) from you to the Internet with the Raven as the connection to Cingular.

When your Raven is powered on, it automatically searches for cellular service using GPRS and establishes a PPP (Point to Point Protocol or "dial" up connection) link to Cingular's network. As soon as the Raven receives its IP, it's ready to create a TCP/IP network between your computer or device and Cingular's network so you can use Cingular to communicate on the Internet.

Using the Raven with a computer or network of computers behind a router using NAT (Network Address Translation which allows several computers or devices use a single IP address), you can access the Internet for web browsing, email, FTP, etc.

FIGURE 2. **Using the Raven to connect to the Internet**
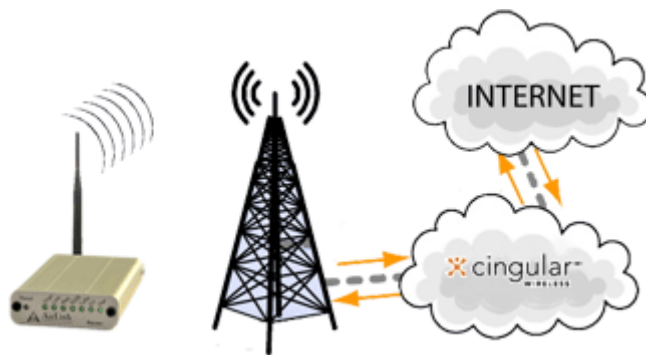
Note: Corporate network connections are unique for each configuration and not covered as part of the standard installation.

Using GPRS to Communicate directly to your Device

There are two types of addresses in TCP/IP, dynamic and static.

- Dynamic addresses are assigned on a "need to have" basis. Your Raven might not always receive the same address each time it connects with Cingular.
- Static addresses are permanently assigned to a particular account and will always be used whenever your Raven connects to Cingular. The address will not be given to anyone else.

If you need to contact the Raven, a device connected to the modem, or a host system using the modem, you need to have a known IP (such as one which is static) or domain name (an IP address which is converted by a DNS server into a word based name).

Most ISPs (cellular included) use dynamic IP addresses rather than static IP addresses. A dynamic IP address is suitable for many common Internet uses, such as web browsing, looking up data on another computer system, or other client function (such as data only being sent out or only being received after an initial request).

If you have a dynamic IP address for your Raven, you can use a service (such as IP Manager, covered later in this User Guide) to translate a dynamic IP address to a fully qualified domain name so you can contact the Raven as if it had a static IP.

Common Uses for the Raven

The Raven's rugged construction and cellular connection make it ideal for use in remote and/or industrial locations. The Raven can be used for telemetry and for more advanced communication to the device or devices behind it.

FIGURE 3. Financial POS and Kiosk

FIGURE 4. **Automation and Telemetry**
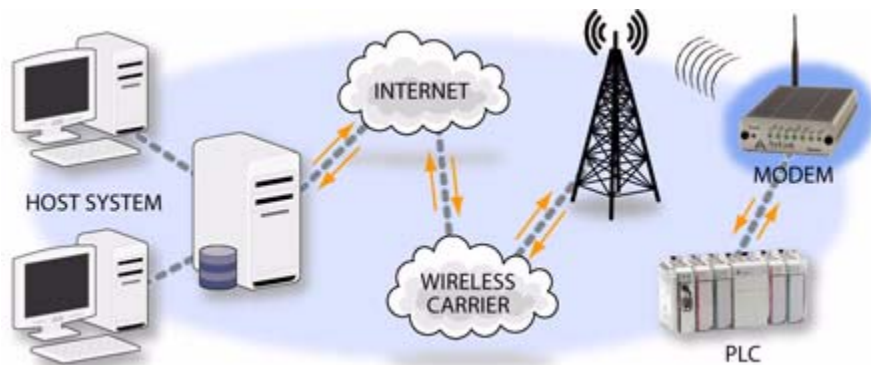
FIGURE 5. **Backup connection to the Internet**
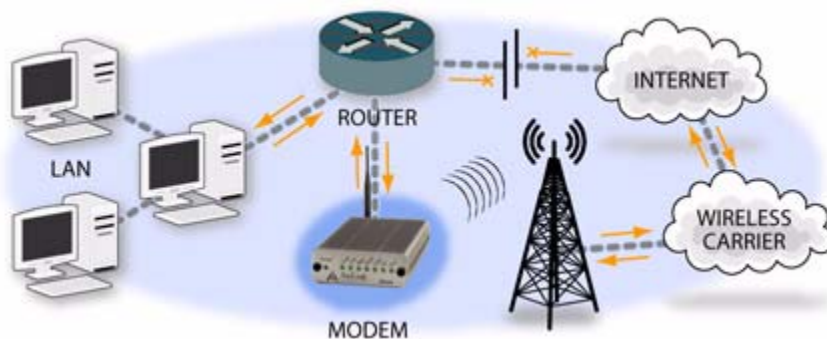
Subscriber Identity Module (SIM)

The Subscriber Identity Module (SIM) in the Raven is a smartcard securely storing the key identifying a mobile subscriber. Generally, you will only need to install the SIM once in the life of the modem and it may be pre-installed by Cingular or Air-Link.

Installing the SIM

To install the SIM, you will only need a small phillips head screw driver.

Opening the Case

1. Unplug the modem power and all cables.
2. Using a small phillips head screw driver, remove the two screws on the back of the modem.

FIGURE 1. Modem back

3. Slide the casing off of the modem and set it aside.

FIGURE 2. Modem partially slid from case

Ejecting the SIM tray

4. Using the tip of a closed pen, a paper clip, or PDA stylus, press the yellow button between the two cards.

FIGURE 3. Tray button

5. Slide the tray out of the slot.

FIGURE 4. Empty SIM Tray

Inserting the SIM

6. Place the SIM into the tray and gently press to click it into place.

FIGURE 5. SIM Tray with a SIM

7. Slide the tray back into the modem and gently press to click it into place.

FIGURE 6. Inserting the SIM

8. Slide the modem back into the case.

9. Secure the back of the modem with the screws.

Raven Activation

Your Raven needs specific parameters before it can operate on the Cingular GPRS network. Cingular will provide you with the necessary parameters to get the Raven configured.

Connecting the Raven to your computer

Your Raven's serial port can be connected directly to most computers or devices using a standard straight through serial cable.

Quick Start Guide and Setup Wizard

The preferred way to configure and activate your Raven is via the AirLink Setup Wizard for Cingular GPRS. The Quick Start Guide will lead you through the using the Setup Wizard.

- The Cingular GPRS Raven Setup Wizard is available from the AirLink web site, http://www.airlink.com/support.

- The Cingular GPRS Raven Quick Start Guide is also available at the AirLink web site.

Note: The web site may have a more recent Setup Wizard and Quick Start Guide than those included with your Raven. It is recommended that you check with the web site for the latest version before installing your Raven.

To run the Setup Wizard, you will need Microsoft Windows 98, Windows 2000, Windows XP, or later and .Net enabled.

1. Select **Start**
2. Select **All Programs**
3. Select **AirLink Communications**
4. Select **Setup Wizard**
5. Select **Setup Wizard**

FIGURE 1. Setup Wizard Menu

The Cingular GPRS Raven Quick Start Guide specifies the information you need and will lead you through the steps.

Configuring the Raven using AT Commands

An alternate method to configure and activate your Raven is by AT commands (full listing beginning on page 61) sent directly to the modem via a terminal application (page 58). This method is recommended only in situations where the Setup Wizard is not available and/or the configuration for the Raven is unusual.You can also configure your modem using Wireless ACE (page 15) or AceNet (page 16) using a template built in Wireless ACE. It is not recommended to activate a modem using either Wireless ACE or AceNet.

Raven Indicator Lights

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

FIGURE 2. Raven indicator lights

Tx (transmit) and **Rx** (receive) - Lights will flash as data is transferred to and from the modem on the network.

RSSI - Light shows the strength of the signal and may be solid (strong) or flashing (weaker).

Reg - Indicates the modem is registered (activated) on the cellular network.

Chan and **Link** - Indicate a connection to the cellular network.

Pwr - Indicates the power adapter is connected and there is power getting to the modem.

CHAPTER 4   *Raven Utilities*

AirLink offers a suite of utilities to optimize your Raven's performance, allowing you to remotely view status and make changes to the configuration as needed.

- AceView
- Wireless ACE and Wireless ACE Web
- AceNet
- Modem Doctor

This section of the Raven User Guide covers basic information about these utilities. For additional information on a specific utility, please refer to the user guide for that utility.

These utilities, except AceNet, are free of charge to those who own AirLink modems. You can download them and their user guides from the AirLink web site: http://www.airlink.com/support. Contact your dealer or AirLink for information on AceNet.

Note: AceView, Wireless ACE, and AceNet require with .Net and Microsoft Windows 98, Windows 2000, Windows XP, or later. Wireless ACE Web requires Internet Explorer 6.0 or later with ActiveX enabled.

AceView

AceView is a low-profile monitoring tool to view the status of your AirLink Raven and display network status, IP address, RSSI strength, firmware version, and other basic information.

FIGURE 1. AceView
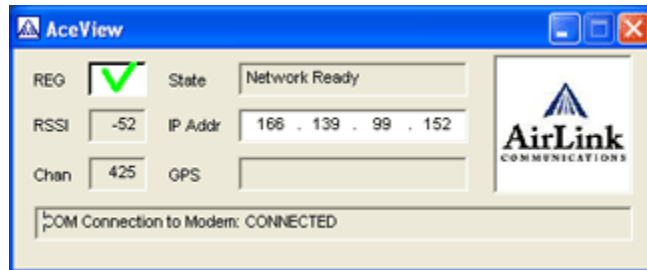
You can connect to your Raven locally or remotely using a known IP address or a fully qualified domain name. The display is updated periodically as AceView polls the Raven at a specified interval. *GPS is available only for PinPoint modems.*

FIGURE 2. AceView: About Raven

Wireless ACE and Wireless ACE Web

Wireless AirLink Configuration Executive (ACE) and Wireless Ace Web allow you to monitor your Raven remotely. Wireless ACE Web has a web-based interface and covers nearly the same range of features a Wireless ACE. Features discussed in this section apply to both versions unless otherwise noted.

FIGURE 3. Wireless ACE

Wireless ACE can be used to monitor your Raven, view modem status, or change the configuration of your Raven. You can even save a profile and, using Wireless ACE or AceNet, apply it to another AirLink modem.

Wireless ACE provides a graphical interface for entering AT commands. See "AT Commands" on page 61 for a full listing of the AT commands for your Raven.

Wireless ACE can be used with a Raven connected directly to your computer or remotely through your cellular service.

⚡ *AceNet*

With AceNet you can monitor several AirLink modems at the same time. The modems can be connected locally or remote. Several features can be displayed and logged. AceNet is a seperate product which can be purchased from AirLink.

FIGURE 4. AceNet
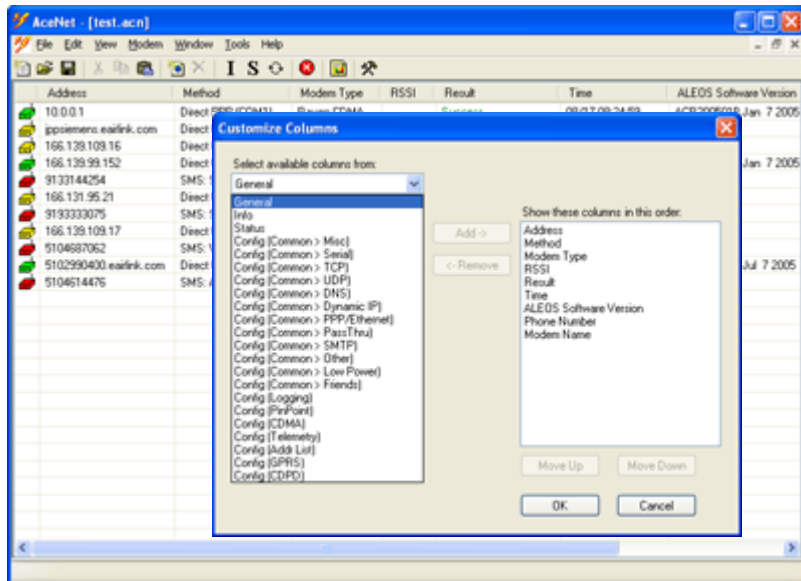
Using a template from Wireless ACE, you can change the configuration in several modems at the same time and can check and update their firmware as well. AceNet also features logging to a database and charting for the monitored modems.

With AceNet, you can connect to modems locally via serial or Ethernet or remotely via TCP/IP or SMS.

Modem Doctor

Modem Doctor is a troubleshooting utility. This utility will allow you to get a log file of the Raven activity which you can then send to AirLink support, erase the current configuration completely, and set the Raven to only respond to a serial connection.

FIGURE 5. Modem Doctor
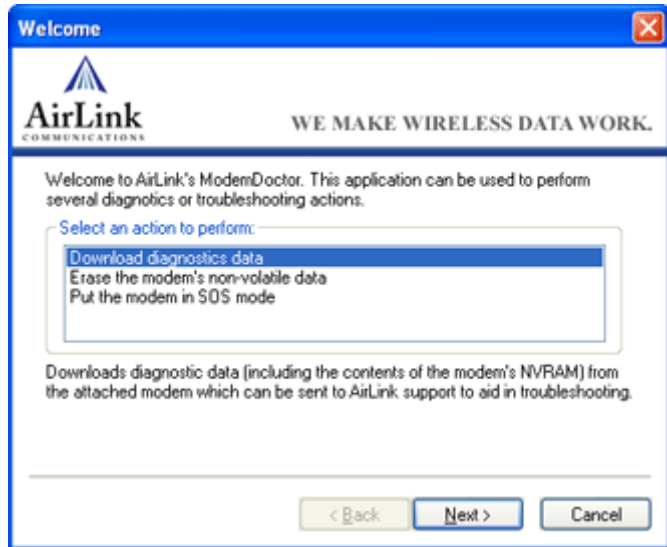
DNS: Using Names Instead of IPs

A domain name is a name of a server or device on the Internet which is associated, generally, with an IP address. In a way, a domain name is like the street address of your house with the phone number being like the IP. You can contact the house either by going to the address (name) or by calling the phone number (IP).

Domain Name Service (DNS) is a network service which translates, or redirects, the IP, allowing someone to contact that address via the name. A DNS server is registered to handle all addresses of a particular domain (much like the post office for a particular town or city is known to the post offices of all other towns and cities and is authorized to give the addresses of locations in its own location).

Configuring DNS

The Raven has an internal DNS resolver with which it can query DNS servers in order to translate names into IPs which it can then use internally. Generally, when your Raven receives its IP from Cingular, it will also be configured to use Cingular's DNS servers to use for resolving (or translating) names to IP addresses. In that case, the only one which is not overwritten is the alternate DNS.

You can use AT commands (page 61), Wireless ACE (page 15), and ACE Net (page 16) using a template built from Wireless ACE to configure DNS in your Raven.

*DNS1	Modem DNS Server 1	0.0.0.0	66.174.6.7
*DNS2	Modem DNS Server 2	0.0.0.0	66.174.3.7
*DNSUSER	Use Alternate DNS	0.0.0.0	0.0.0.0
*DNSUPDATE	DNS Updates	0	0-Disable

*DNS1 and *DNS2 - Set these to your primary and secondary DNS servers. These maybe be overwritten by Cingular when your Raven gets it's IP.

*DNSUSER - Set this, if desired, to an additional DNS server to query when the domain name is not found in the primary or secondary. If *DNSUSER is set to 0.0.0.0, it will be ignored.

Note: If you will be using your Raven to communicate with another Air-Link modem and both are using IP Manager (page 20) to translate dynamic IPs to domain names, it is recommended that you set ***DNSUSER** to the IP for IP Manager. IPManager's updates occur more frequently than Cingular's DNS servers decreasing the time between IP change and address resolution.

*DNSUPDATE - This command sets how often you want DNS Updates to be forced.

PPP-Peer

The Raven uses the unqualified domain name of "ppp-peer" when it is PPP or SLIP mode to resolve the address of the device or computer connected via PPP or SLIP. If the Raven is not in PPP or SLIP mode, "ppp-peer" will resolve to 0.0.0.0.

IP Manager

IP Manager translates a dynamic IP address to a fully qualified domain name so you can contact the Raven by name as if it had a static IP.

Since Cingular frequently does not offer static IP addresses, IP Manager is a free service provided by AirLink for your Raven to translate a dynamic IP address into a fully qualified domain name so it can be contacted directly on the Internet.

• 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.

• Static IP addresses are granted the same address every time the modem or device is connected.

A dynamic IP address is suitable for many Internet activities such as web browsing, looking up data on another computer system, data only being sent out, or data only being received after an initial request. However, if you need to contact the Raven directly, a device connected to the modem, or a host system using the Raven, a dynamic IP won't give you a reliable address to contact (since it may have changed since the last time it was assigned).

Fully Qualified Domain Name

A fully qualified domain name (FQDN) generally has several parts.

- **Top Level Domain (TDL):** The TDL is the ending suffix for a domain name (.com, .net, .org, etc.)
- **Country Code Top Level Domain (ccTDL):** This suffix is often used after the TDL for most countries *except the US* (.ca, .uk, .au, etc.)
- **Domain name:** This is the name registered with ICANN (Internet Corporation for Assigned Names and Numbers) or the registry for a the country of the ccTDL (i.e. if a domain is part of the .ca TDL, it would be registered with the Canadian domain registry.) It is necessary to have a name registered before it can be used.
- **Sub-domain or server name:** A domain name can have many sub-domain or server names associated with it. Sub-domains need to be registered with the domain, but do not need to be registered with ICANN or any other registry. It is the responsibility of a domain to keep track of its own subs.

A URL (Universal Resource Locator) is different from a domain name in that it also indicates information on the protocol used by a web browser to contact that address, such as http://www.airlink.com.

- .com is the TDL
- airlink is the domain (usually noted as airlink.com since the domain is specific to the TDL)
- www is the server registered with AirLink.com
- http:// is the protocol (html or web) used to access the webpage for AirLink

Dynamic Name Resolution

When an IP address is not expected to change, the DNS server can indicate to all queries that the address can be cached and not looked up for a long period of time. Dynamic DNS servers, conversely, have a short caching period for the domain information to prevent other Internet sites or queries from using the old information.

If the Raven is configured for Dynamic IP, when the Raven first connects to the Internet, it sends a IP change notification to IP Manager. IP Manger 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 name. If the IP address is needed, you can use the domain name to determine the IP address.

The fully qualified domain name of the Raven will be a subdomain of eairlink.com.

> **Note:** Earlink.com is a domain name owned and registered by AirLink for IP Manager.

Configuring the Raven for Dynamic IP

To configure the Dynamic IP settings in your Raven so that it will use IP Manager, you can use AT commands (page 61), using direct serial communication or Telnet (page 58), Wireless ACE (page 15), and ACE Net (page 16) using a template built from Wireless ACE.

To configure your AirLink modem to be addressed by name, the modem needs to have 4 elements configured.

FIGURE 1. Wireless ACE: Dynamic IP (IP Manager configuration)

*MODEMNAME	Modem Name	dogwatcher1	dogwatcher1
*DOMAIN	Domain	eairlink.com	eairlink.com
*IPMANAGER1	IP Manager Server 1 (IP Adrs)	eairlink.com	eairlink.com
*IPMGRUPDATE1	IPMServer1 Update (Minutes)	0	0
*IPMANAGER2	IP Manager Server 2 (IP Adrs)		
*IPMGRUPDATE2	IPMServer2 Update (Minutes)	0	

1. **Modem name:** The name you want for the modem.
2. **Domain:** Eairlink.com is the IP Manager domain provided by AirLink.

3. **IP Manager IP Address:** The IP or domain name of the dynamic DNS server. Earlink.com is the IP Manger server provided by AirLink. *Note: To use the name here instead of the IP, you need to have DNS set up in your* Raven*. See "DNS: Using Names Instead of IPs" on page 18.*

4. **IP Manager update interval:** How long you want the address to be cached.

In Wireless ACE, select **Dynamic IP** to configure your modem to use IP Manager.

You can configure a second dynamic server as a backup, secondary, or alternate server.

Note: For the Modem Name, you should use something which is unique but also easy to remember. Your company name or the intended function of the modem are recommended. If you have more than one modem, append a number for each.

Restrictions for Modem Name

- Must begin with a letter or number
- Can include a hyphen (-)
- Cannot contain spaces
- Must be no longer than 63 characters total

Keepalive

It is not uncommon for your Raven to be disconnected from Cingular after an extended period of inactivity. This is generally a feature intended to reduce your charges for inactive use.

Keepalive is used to test and maintain the Raven's connection to Cingular by pinging an IP address after a specified period of inactivity. Keepalive is recommended for users who have a remote terminated modem that infrequently communicates to the network. Keepalive is also recommended if you have experienced issues where the modem can no longer be reached remotely.

When Keepalive pings the IP address, an acknowledgement indicates there is an active connection to the network. If the modem does not receive a response from the IP address, it will retry 5 times in 5 second intervals. The Raven will then reset the radio module after 5 failed attempts and reconnect to Cingular.

Configuring Keepalive

As with all other aspects of the Raven's configuration, you can use Wireless Ace or Wireless Ace Web (page 15), AceNet (page 16), or direct serial communication or Telnet (page 58) to configure Keepalive.

To set the Keepalive using Wireless ACE, select **Other** from the menu on the left.

FIGURE 1. Keepalive Configuration in Wireless ACE

AT	Name	Value	New Value
*IPPING	Keepalive Ping Time	0	60
*IPPINGADDR	Keepalive Ping Address		192.168.0.222
*IPPINGFORCE	Force Keepalive Ping	0	1-YES

*IPPING sets the interval, in minutes, you want Keepalive to test the network connection. To disable Keepalive, set *IPPING to 0 (default setting).

*IPPINGADDR sets the IP address you want to use for the test. If *PPINGADDR is left blank or is set to an invalid IP address (i.e. an IP which is unreachable or one which is not a valid IP address), the modem will reset itself on a regular interval.

*IPPINGFORCE sets whether you wish the network connection test to occur only if there is no activity. Set to 1, IPPINGFORCE will force the ping to occur at the IPPING interval regardless of any other network activity. When *IPPINGFORCE is set to 1, the modem does a complete modem reset, in addition to resetting the connection. When the modem is reset, it could take a few minutes to reconnect to the network.

Data usage using Keepalive.

When using Keepalive, be aware that a ping moves approximately 66 bytes of data over the network and is billable by the carrier. The following *IPPING settings will incur approximate monthly data usage in addition to any other data usage:

- 5 min. will use 1.2mb / month
- 15 min. will use 400k / month
- 30 min. will use 200k / month
- 60 min. will use 100k / month
- 120 min. will use 50k / month

CHAPTER 8   *Host Modes*

The Raven can be in one of six communication modes as the Host to the computer or other device attached to the serial port of the Raven.

AT: The Raven accepts and responds to standard, Hayes-style AT commands. This is enabled by default.

PassThru: Direct connection to internal hardware (OEM Module) of the Raven.

PPP: The Raven is using PPP to communicate with the Host.

SLIP: The Raven is using SLIP to communicate with the Host.

UDP PAD: Any data received on the serial port is assembled into UDP packets and send to the session's associated IP and Port (described later). Any responses received from the associated IP and port destined for the modem's Device Port are unwrapped and sent out the serial port.

TCP PAD: Any data received on the serial port is packaged into TCP messages and sent to the associated connection's IP and Port (described later). Any data received from the TCP peer is unwrapped and sent out the serial port.

The Raven can be programmed to enter any of the modes, except PassThru, automatically on power up. This is done setting the Startup Mode Default (refer to **MD**

in the AT Command listing, page 69) to the desired mode. If this setting is non-zero, the modem will enter the specified mode after 5 seconds. If you want to cancel this behavior, the **ATMD0** command can be used before the 5-second time-out expires.

If the modem is in any mode other than AT or PassThru, the AT command mode can be re-entered by:

● Deactivating DTR (if &D2 or Ignore DTR, S211, is not set).

● Issuing the +++ escape sequence (if Disable AT Escape, DAE, is not set).

● Resetting or Power cycling the modem.

PassThru Mode can only be exited by resetting the modem.

> **Note:** DTR needs to be asserted (S211=1 or &D0) by the host before PPP Mode, SLIP Mode, UDP PAD Mode, or TCP PAD Mode can be entered.

AT Mode

AT commands are used to configure the modem, command it to do something, or query a setting. For a full listing of the AT commands, refer to page 61.

AT commands must always be terminated by <CR> (ASCII character 0x0D).

If **E=1** (Echo On), the AT command (including the terminating <CR>) will be displayed (output) before any responses.

Two settings affect the format of AT command output: V (Verbose) and Q (Quiet).

If **Q=1** (Quiet On), no result codes are output whatsoever, so there is no response generated by a (non query) command.

If **Q=0** (Quiet Off), result codes are output. The format of this output is then affected by the Verbose setting.

If Quiet mode is off, the result code is affected as follows:

For **V=1** (Verbose mode), the textual result code is surrounded by <CR><LF> and any AT query response is also surrounded by <CR><LF>.

For **V=0**, (Terse mode), a numeric result code is output with a single trailing <CR> (no <LF> is output), while any AT query response is followed by <CR><LF> (there is no preceding output).

For example, possible output to the AT command "AT<CR>" (assuming quiet mode is not on) is:

<CR> - if V=0
<CR><LF>OK<CR><LF> - if V=1

PassThru Mode

In PassThru mode, the Raven does not behave normally, all serial communication is passed directly between the internal hardware and the computer connected directly to the modem. This mode can be used to configure hardware-specific settings (e.g., for provisioning, etc.)

Issuing the "AT\APASSTHRU" enters this mode. The modem responds with OK, at which point a direct connection to the internal hardware is established.

PassThru Mode can only be exited by resetting the modem.

Some internal hardware requires upwards of 20 seconds before AT commands can be entered, so be patient if there seems to be no response to AT commands.

Warning: PassThru can only be exited by resetting or power-cycling the modem. This mode cannot be entered via a Telnet session.

PassThru Mode allows only specific AT commands. Those commands which are used with ALEOS only will be unavailable. For the many of the commands available in PassThru mode, refer to page 91. Most of these commands are not available except when the modem is in PassThru Mode. The commands usable also depend heavily on the modem model number (found on the label on the top of the modem).

Note: ALEOS is disabled in PassThru Mode. You cannot use ALEOS specific commands while the modem is in PassThru Mode.

PPP Mode

In PPP mode, the Raven acts as a PPP server, providing an IP address, and DNS servers (if available) to the Host.

PPP mode is entered from the AT mode by using any of the following commands:

AT\APPP<CR>
ATDT10.0.0.1<CR>
ATDT10001<CR>
ATD#19788<CR>
CLIENT<CR>

In response to any of the preceding commands, the modem will respond with **CONNECT**<CR><lf> and is ready for the host to begin PPP negotiations.

The IP received by the host in the resulting negotiation will either be a private (non-routable) IP or a public (network-routable) IP provided by the network, depending on the settings of *HOSTPRIVMODE [S300]. If *HOSTPRIVMODE=1, the value of the private IP an be determined beforehand by querying S110. The private IP to be used can be defined with the command AT*HOSTPRIVIP=192.168.100.33 substituting the desired IP address.

Using a private IP insulates the PPP client from changes in IP addresses of the underlying network. The Raven will perform basic NAT-like address translation on all packets.

If a public IP address is being used, any changes in the IP (as determined by the wireless network) will result in the PPP link to the host being disconnected, requiring the host to reinitiate it. The public IP is passed to the host in the PPP negotiations, so when the network forces a change, the modem has to force the host to renegotiate the PPP link to make this happen.

Slip Mode

SLIP mode is entered be using the "AT\ASLIP" command. As in PPP Mode, the IP address that the host assumes is affected by the setting of S300. SLIP does not negotiate the IP with the host, so before making a SLIP connection, the host SLIP driver must be configured to use the IP specified by querying S110.

UDP Pad Mode

When the modem is in UDP PAD (Packet Assembly and Disassembly) Mode, all characters received on the serial port are assembled into UDP packets and sent to the Raven's remote IP address/port, and any packets received from the same IP/port-destined for the Raven's Device Port (see *DPORT)--are disassembled and dumped onto the serial line.

A UDP session is initiated by one of the following events:

- Using the Dial UDP (DP) AT command (ex. **ATDP192.168.3.23/3456**)
- Setting the Startup Mode Default (**MD**) to 3 (UDP) so that a UDP session is entered automatically when the modem powers up. Serial data will be sent to the IP/port specified in **S53**.
- An incoming UDP packet is received and
  - • UDP auto answer is enabled (S82=2)
  - • The destination IP address matches that in S53
  - • Or allow any IP is set (AIP=1)
  - • The modem is in AT mode [not in a current UDP or TCP session]

UDP packet assembly is affected by the values of **S50** (PAD Forwarding Time-out) and **S51** (PAD Forwarding Character). Data received in the serial buffer will be transmitted when the idle inter-character time-out specified in S50 (in tenths of sec-onds) occurs or when a character is received that matches S51 (if non-zero).

UDP Auto Answer

UDP auto answer (previously called UDP half-open) is set with **S82=2**. When set, the Raven will automatically establish a UDP session to the source IP address and port of the UDP packet received. The Raven will remain "locked" to this one remote IP/port until no data is sent or received for the time interval defined in the UDP auto answer time-out (**S83**). During this session, packets from other IP/port addresses will be rejected, unless ***UALL** is set. Whether or not an incoming packet will cause the modem to enter a UDP session is always dependent on the **S53** and **AIP** settings.

When idle, after the time-out has occurred, the Raven is in AT command mode on the serial port, and any valid AT command may be entered during this time.

The Normal UDP Mode (**MD3**) can be combined with UDP auto answer to cause the incoming serial data to be sent in UDP packets (instead of being treated as AT

commands), while allowing sessions to be established from different UDP sources. A UDP session will be initiated either by incoming serial data or by an incoming UDP packet. The session, started by either method, will be terminated when no data has been sent or received for the **S82** period. Once the session terminates, another may be initiated by either means.

When the session is initiated by serial data, the new session will be established using the destination address specified in **S53**. The **S53** setting can be changed if the connect to last UDP setting (***UDPLAST=1**) is set. The address in **S53** will be updated to reflect the address of the last session initiated by an incoming UDP packet. So that when new data is received over the host serial port while in the idle state, a session will be re-established with the last address. (This behavior is the same as the previous Hybrid2 (**MD6**) mode).

> **Note:** TCP auto answer (**S0**) may also be set simultaneously with UDP auto answer. Then, when in the idle state, the modem will accept either a TCP or UDP incoming packet, and enter a TCP or UDP session as appropriate.

Reliable UDP

Reliable UDP adds a simple protocol on top of UDP to provide reliable delivery of data. When data is received from the host serial port, a 2 byte header is added to the data, containing a message type and a sequence number. The Raven will continue to send this data (buffering any received data in the meantime) until it receives an acknowledgement with this sequence number. If an acknowledgement is not received within the time-out period (specified in **S7**), the data will be retransmitted. This will continue until an acknowledgement is received or the modem is reset. Likewise any UDP packets received by the Raven are expected to have this simple header. The Raven will issue an acknowledgement for any valid packets which are received.

Configure the Raven as for a normal UDP session. Set the Startup Mode Default to 3, and the UDP Mode Default to 7 (**ATMD73**). If using two modems, configure the Destination IP and Port in each to point to each other. Serial data will then be sent reliably between the two

> **Note:** Although it adds reliability, the simple implementation of the Reliable UDP mode in the Raven does not check for duplicate packets.

Multicast UDP

Multicast UDP results in any data received from the host serial port being sent to all the clients in the Modbus list. The remote port number is taken from **S53**. To avoid flooding the network, the packets are sent to each client with a 20ms pause in between. The receipt of UDP packets works as in normal UDP mode (i.e. bound by the value **S53** and/or **AIP**). Since it may take a while to transmit the data to all hosts (especially if all 20 Modbus entries are used and name resolutions are required), new data received from the host port is buffered until current transmissions to all hosts are finished.

Enter the list of target IPs in the Modbus IP list. The index numbers in the IP list aren't used. Configure the Raven as for a normal UDP session. Set the Startup Mode Default to 3, and the UDP Mode Default to 8 (**ATMD83**). Configure the Destination port to match the device port of the remote modems.

TCP PAD Mode

When the Raven is in a TCP session, all characters received on the serial port are assembled into TCP packets and sent to the mode's remote IP address/port, and any packets received from the remote end of the TCP connection are disassembled and dumped onto the serial line.

- A TCP connection is established by one of the following methods:
- Using the Dial TCP (DT) AT command (ex. **ATDT192.168.3.23/3456**)
- TCP auto answer is enabled (**S0**), a TCP connection request is received, and the modem is not in a data session.
- Data is received on the serial port and
  - The Startup Mode Default (**MD**) is 4 (auto TCP)
  - The remote TCP destination, as defined in **S53**, successfully responds to the TCP connection request.

The value of **S7** (TCP Connection Time-out) specifies the number of seconds to wait, after initiating a TCP connection attempt, for a successful connection to be established. If the connection has not been successfully established before the time-out occurs, **ERROR/BUSY** is returned.

TCP packet assembly is affected by the values of **S50** (PAD Forwarding Time-out) and **S51** (PAD Forwarding Character). Data received in the serial buffer will be transmitted when the idle inter-character time-out specified in **S50** (in tenths of seconds) occurs or when a character is received that matches **S51** (if non-zero).

The TCP session will be terminated if no data is transmitted or received for the time interval specified in **TCPT** and **TCPS**. **TCPT** is the number of minutes (**TCPS=0**) or seconds (**TCPS=1**) used for this idle time-out.

> **Warning:** TCPT should never be 0 when using the TCP mode. A broken TCP session can result in the modem being left with a TCP half-open connection that can only be terminated with a reset.

TCP Auto Answer

TCP auto answer (**S0**=1|2) also allows a TCP connection request to be "answered" when the modem is idle, not in a data session. The TCP connection request's destination port has to match the modem's device port.

> **Note:** UDP auto answer may also be set simultaneously with TCP auto answer. Then, when in the idle state, the modem will accept either a TCP connection request or UDP incoming packet, and enter a TCP or UDP session as appropriate.

Hybrid Modes

Some previous hybrid modes (**MD=5, 6**) are no longer implemented as special, unique modes. Now that UDP auto answer (UDP Half-open, **S82=2**) can be enabled in conjunction with UDP PAD mode (**MD3**), effectively this is the same as MD5 and MD6 previously accomplished. Setting MD5 and MD6 are still supported, but not recommended.

TABLE 1. **Hybrid Mode Settings**

AT Setting	**Hybrid** (MD5)	**Hybrid2** (MD6)
MD	3	3
S82	2	2
S0	1	1
*UDPLAST	0	1

Modbus/BSAP Configuration

The Raven supports Modbus ASCII, Modbus RTU, BSAP, and can also emulate other protocols like DF1 or others using its Modbus Variable feature.

Modbus Overview

The Modbus Protocol, developed by Modicon in 1979, provides for client-server (also referred to as master-slave) communications between intelligent devices. As a de facto standard, it is the most widely used network protocol in the industrial manufacturing environment to transfer discrete/analog I/O and register data between control devices.

Modbus, BSAP, and other Modbus variations are often used in conjunction with telemetry devices.

> This section is just a brief overview of Modbus. For more information, refer to your Modbus equipment distributor or manufacturer or http://www.modbus.org.

Telemetry

Telemetry is an automated communications process by which data is collected from instruments located at remote or inaccessible points and transmitted to receiving equipment for measurement, monitoring, display, and recording. Transmission of the information may be over physical pairs of wires, telecommunication circuits, radios or satellite.

Remote Terminal Unit (RTU)

Modbus was originally designed to be used in a radio environment where packets are broadcast from a central station (also called master or host) to a group of remote units. Each remote unit, Remote Terminal Unit (RTU) , has a hexidecimal identification number (ID). The first part of the broadcast packet contains an RTU ID which corosponds to the ID of one of the remote units. The Modbus host looks for the ID and sends to only the unit with the matching ID. The RTU would then reply back to the central station.

The RTU connects to physical equipment such as switches, pumps, and other devices and monitors and controls these devices. The RTU can be part of a network set up for Supervisory Control and Data Acquisition.

Supervisory Control and Data Acquisition (SCADA)

Supervisory Control and Data Acquisition (SCADA) describes solutions across a large variety of industries and is used in industrial and engineering applications to monitor and control distributed systems from a master location. SCADA encompasses multiple RTUs, a central control room with a host computer (or network), and some sort of communication infrastructure.

SCADA allows for "supervisory" control of remote devices as well as acquiring data from the remote locations. Programmable Logic Controllers allow for a higher degree of automated SCADA.

Programmable Logic Controller (PLC)

A Programmable Logic Controller (PLC) is a small industrial computer which generally monitors several connected sensor inputs and controls attached devices (motor starters, solenoids, pilot lights/displays, speed drives, valves, etc.) according

to a user-created program stored in its memory. Containing inputs and outputs similar to an RTU, PLCs are frequently used for typical relay control, sophisticated motion control, process control, Distributed Control System and complex networking.

Modbus TCP/IP

Modbus TCP/IP simply takes the Modbus instruction set and wraps TCP/IP around it. Since TCP/IP is the communications standard for the Internet and most networked computers, this provides a simpler installation. Modbus TCP/IP uses standard Ethernet equipment.

Raven Modbus on UDP

When Ravens are used in place of radios, a Raven is connected to the central station (host) and a Raven is connected to each remote unit. When the Raven is configured for Modbus with UDP, the Raven connected to the host can store a list of IP addresses or names with matching IDs. When the host at the central station sends serial data as a poll request, the Raven at the host matches the RTU ID to a corresponding IP of a Raven at a remote unit. A UDP packet is assembled encapsulating the RTU ID and serial data transmitted from the host. The UDP packet is then transmited to the specific Raven at the remote unit matching the RTU ID. The remote Raven then disassembles the packet before transmiting the RTU ID and serial data to the remote unit. The remote units operate in normal UDP mode and their data is sent to the host via the remote Raven and host Raven.

FIGURE 1. Automation and Telemetry
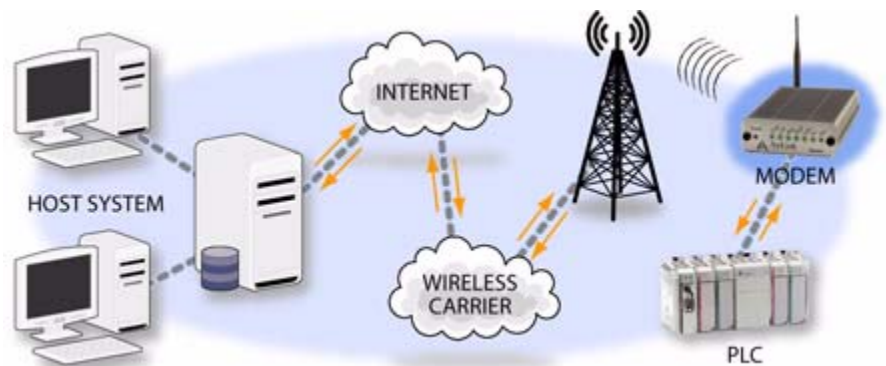
Configuring the Raven at the Polling Host for Modbus on UDP

You can use either Wireless ACE (page 15 and page 57), direct serial communication or Telnet (page 58) to configure the modem using AT commands (page 61). This section covers standard Modbus, variations may need additional commands (AT Commands: page 87).

Port

The destination port for the Raven at the host needs to match the device port in use on all the Ravens at the remote sites. For example, if the remote Raven's device port (*see below*) is "12345", then the Modbus host Raven's **S53** (AT commands: page 103) destination port should be set to "12345".

In Wireless ACE, select **Misc** in the side menu.

FIGURE 2. Wireless ACE: Destination Port

S53	Destination Port	0	12345
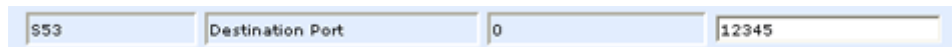
Take note of (or set) the Device Port setting in ***DPORT** (AT commands: page 103) to configure the remote Ravens.

FIGURE 3. Wireless ACE: Device Port

*DPORT	Device Port	12345	12345

Default Power-up Mode

The default power-up mode will need to be set. In Wireless ACE, select **UDP** in the side menu. Select the appropriate **MD** (AT commands: page 69) mode from the drop down menu.

FIGURE 4. Wireless ACE: MD Configuration

MD	Startup Mode Default	00	13-Modbus ASCII
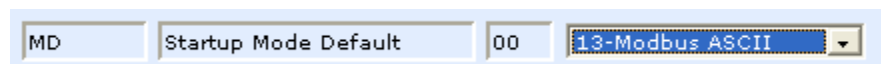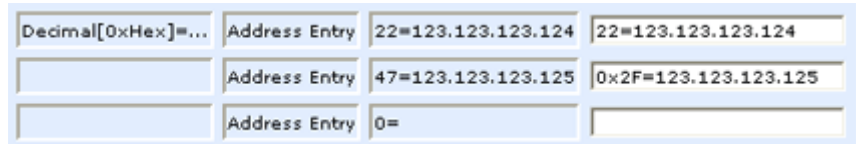
- **ATMD13**: Modbus ASCII
- **ATMD23**: Modbus RTU (Binary)
- **ATMD33**: BSAP
- **ATMD63**: Variable Modbus (individual parameters are set up manually)

IDs to IPs

The last step of configuring the Raven at the host is setting the IDs to their specific IPs. In Wireless ACE, select the menu option **Addr List**.

FIGURE 5. **Wireless ACE: Addr List**

Addresses can be entered in decimal or hex. Wireless ACE will translate hex entries into decimal. The number before the "=" is ID, the number after is the IP address. There can be a total of 100 remote ID/Local addresses entered into the Raven.

When using AT commands via telnet or direct serial connection, use **ATMLIST** for decimal IDs and **ATMLISTX** for hexidecimal, ex. if the ID is 27 and the IP is 123.123.123.124, you would enter it as **ATMLIST27=123.123.123.124** or **ATMLISTX1B=123.123.123.124**.

Dynamic IP

If you do not have a static IP, the host Raven should be configured to report its current IP to a Dynamic DNS (DDNS) server (page 20).

In the Host Raven's configuration, instead of IP address for the Addr List (ATMLIST or ATMLISTX), substitute a single unique name for each modem, i.e. remote1, remote2, etc.

When you configure IPManager for the host Raven, make note of your modem name and domain setting in Wireless ACE in the menu selection **Dynamic IP** to be used with the remote modems.

FIGURE 6. Wireless ACE: Modem Name and Domain

With names instead of IPs for the Address List, the host Raven will query the DNS server for the current IP assigned to the specific name of a remote Raven to send a message coroponding to the ID.

Configuring the Remote Ravens for Modbus with UDP

You can use either Wireless ACE (page 15 and page 57), direct serial communication or Telnet (page 58) to configure the modem using AT commands (page 61). This section covers standard Modbus, variations may need additional commands (AT Commands: page 87).

Port

The communications port on the remote Ravens needs to match the host Raven's port. If the host Raven's port is '12345' the remote Raven's port also needs to be '12345'.

In Wireless ACE, select **Misc** in the side menu. Set the destination port (**S53**) to match the device port of the host Raven (***DPORT**, *above*). Make sure the device port of the remote Raven (***DPORT**) matches the destination port of the host Raven (**S53**, *above*).

Default Power-up Mode

Each Raven at the remote locations will need to be configured to communicate with the Raven at the host. In Wireless ACE, select **UDP** in the side menu. Select 03-UDP (normal UDP operation) as the value for MD.

FIGURE 7. Wireless ACE: UDP Power-up Mode

MD	Startup Mode Default	00	03-UDP
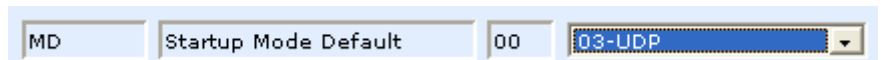
Host Raven IP

If the Host Raven has a static IP, enter it in the Destination Address for **S53**. In Wireless ACE, select **Misc** in the side menu.

FIGURE 8. Wireless ACE: Destination IP

S53	Destination Address	0.0.0.0	192.168.23.32
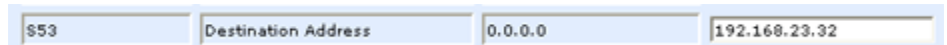
Dynamic IPs

If you do not have static IPs, the remote Ravens need to be configured to report their current IPs to a Dynamic DNS (DDNS) server (page 20). You will need to match the name of the Raven to the names specified in the host Raven's MLIST or MLISTX for the connected RTU.

Instead of an IP, for **S53**, specify the name of the host Raven (*MODEMNAME). If the remote Ravens are using a different DDNS than the host Raven, you will need to specify the fully qualified domain name (*MODEMNAME+*DOMAIN).

With a name instead of IPs for the host Raven, the remote Ravens will query the DNS server for the current IP assigned to the host Raven before sending data back to the host.

RTU settings

Other parameters may need to be changed, but this is dependent on the RTU type being used. As a minimum, this typically involves setting the proper serial settings to match your RTU.

FIGURE 9. Raven mounted in an enclosure with an RTU
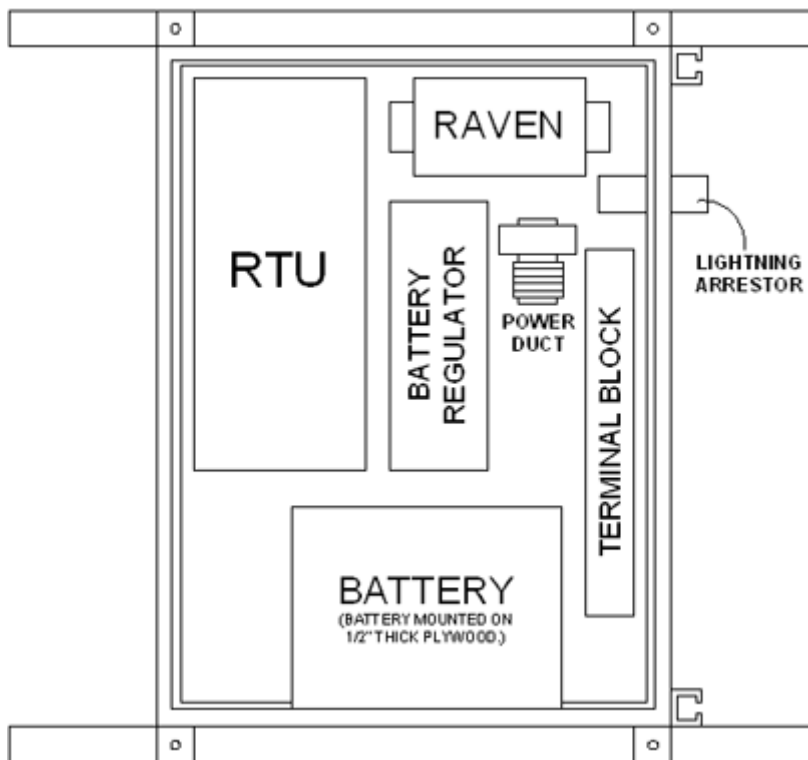
FIGURE 10. RTU to Raven setup
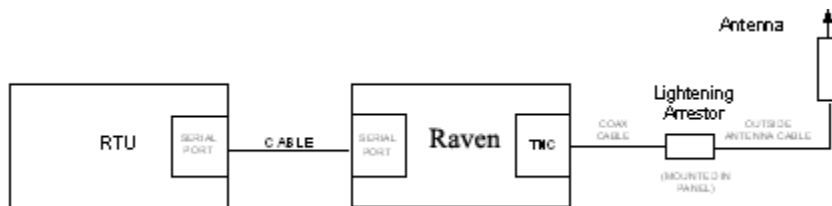
FIGURE 11. Power Connections
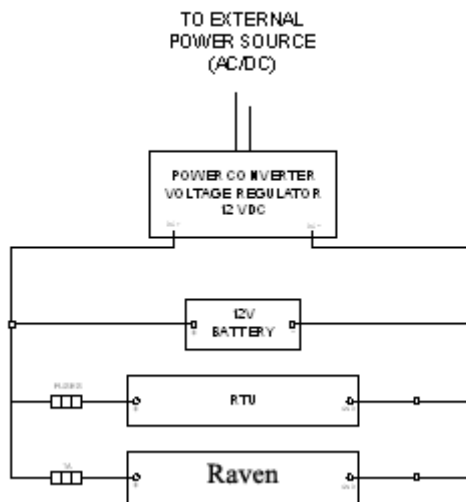
Simple Network Management Protocol (SNMP)

The Raven is can be configured as an SNMP agent and supports SNMPv2c and SNMPv3.

SNMP Overview

The Simple Network Management Protocol (SNMP) was designed to allow remote management and monitoring of a variety of devices from a central location. The SNMP management system is generally composed of agents (such as your Raven, a router, a UPS, a web server, a file server, or other computer equipment) and a Network Management Station (NMS) which monitors all the agents on a specific network. Using the management information base (MIB), an NMS can include reporting, network topology mapping, tools to allow traffic monitoring and trend analysis, and device monitoring.

Authentication ensures SNMP messages coming from the agent, such as the Raven have not been modified and the agent may not be queried by unauthorized users. SNMPv3 uses a User-Based Security Model (USM) to authenticate and, if desired, message encryption. USM uses a user name and password specific to each device.

Management Information Base (MIB)

The management information base (MIB) is a type of database used to compile the information from the various SNMP agents. Reports from various agents, such as the Raven, are sent as data in form designed to be parsed by the NMS into its MIB. The data is hierarchical with entries addressed through object identifiers.

SNMP Traps

The trap is a "snap-shot" of the settings and status of the Agent's device which is sent as a report to the NMS in a form that can be parsed and stored in the MIB. See below (page 48) for an example of the trap from an AirLink modem.

Raven SNMP Configuration

To configure your Raven to work as an SNMP agent, you can use either Wireless ACE (page 15), direct serial communication or Telnet (page 76page 58) to configure the modem using AT commands (page 79page 61). In Wireless ACE, the SNMP commands are all on the **Other** menu option.

There are only three commands to set for SNMP in the Raven: the listening port, the security level, and the trap destination.

Listening Port

*SNMPPORT sets the port for the SNMP agent to listen on. If set to zero, default, SNMP is disabled.

FIGURE 1. Wireless ACE: *SNMPPORT

SNMP generally uses port 161, however most Internet providers (including cellular) block all ports below 1024 as a security measure. You should be able to use higher numbered port such as 10161.

Security Level

*SNMPSECLVL sets the security level and which version of SNMP communications are used.

FIGURE 2. Wireless ACE: *SNMPPORT

*SNMPSECLVL	SNMP Security Level	0	
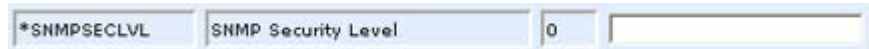
0 - No security required. SNMPv2c and SMNPv3 communications are allowed.

1 - Authentication required. SNMPv3 is required to do authentication and SNMPv2c transmissions will be silently discarded. Authentication is equivalent to the authNoPriv setting in SNMPv3.

2 - Authentication required and messages are encrypted. SNMPv3 is required to do authentication. SNMPv2c and SNMPv3 authNoPriv transmissions will be silently discarded. Authentication and encryption is equivalent to the authPriv setting in SNMPv3.

User Name and Password

The user name is '*user*'. The user name cannot be changed.

The Raven's password is used as the SNMP password (default is '*12345*').

> **Note:** The eight-character password requirement for SMNPv3 is not enforced by the Raven's Agent to allow the default password to function. Your SNMP administrator or MIS may require you to change to a more secure and/or longer password.

To change the password in the Raven, select **Modem** from the top menu line in Wireless ACE.

FIGURE 3. Wireless ACE: Changing the Raven Password - Menu Option
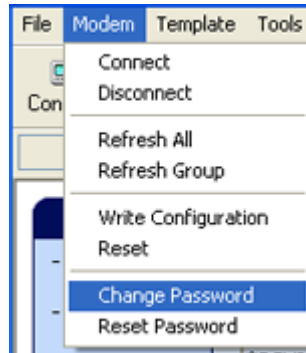
The current password will be pre-entered. As you type the new password and confirm it, the characters you type will be obscured by "x".

FIGURE 4. Wireless ACE: Changing the Raven Password

For the password, you can use numbers, letters, and/or punctuation.
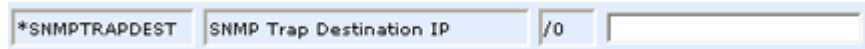
Caution: The password is case sensitive. "drowssaP" is not the same as "drowssap".

Trap Destination

*SNMPTRAPDEST needs to be set with the destination IP and port. If either are set to zero or empty, SNMP traps are disabled.

FIGURE 5. Wireless ACE: *SNMPPORT

| *SNMPTRAPDEST | SNMP Trap Destination IP | /0 | |

Note: Traps are sent out according to the SNMP security level (i.e. if the security level is 2, traps will be authenticated and encrypted). Currently, the only trap supported is *LinkUp*.

Example of the MIB trap

```
AIRLINK-MIB DEFINITIONS ::= BEGIN

IMPORTS
     ObjectName                    FROM SNMPv2-SMI
     MODULE-COMPLIANCE      FROM SNMPv2-CONF;

org          OBJECT IDENTIFIER ::= { iso 3 }
dod          OBJECT IDENTIFIER ::= { org 6 }
internet     OBJECT IDENTIFIER ::= { dod 1 }
private      OBJECT IDENTIFIER ::= { internet 4 }
enterprises  OBJECT IDENTIFIER ::= { private 1 }

airlink OBJECT IDENTIFIER ::= { enterprises 20542 }
general OBJECT IDENTIFIER ::= { airlink 1 }
common OBJECT IDENTIFIER ::= { airlink 2 }
status OBJECT IDENTIFIER ::= { airlink 3 }
gps OBJECT IDENTIFIER ::= { airlink 4 }

-- GENERAL --
phoneNumber OBJECT-TYPE
     SYNTAX            DisplayString (SIZE (10))
     MAX-ACCESS     read-only
     STATUS            current
     ::= { general 1 }

deviceID OBJECT-TYPE
```

```
        SYNTAX          DisplayString
        MAX-ACCESS      read-only
        STATUS          current
        ::= { general 2 }

electronicID OBJECT-TYPE
        SYNTAX          DisplayString
        MAX-ACCESS      read-only
        STATUS          current
        ::= { general 3 }

modemType OBJECT-TYPE
        SYNTAX          DisplayString
        MAX-ACCESS      read-only
        STATUS          current
        ::= { general 4 }

aleosSWVer OBJECT-TYPE
        SYNTAX          DisplayString
        MAX-ACCESS      read-only
        STATUS          current
        ::= { general 5 }

aleosHWVer OBJECT-TYPE
        SYNTAX          DisplayString
        MAX-ACCESS      read-only
        STATUS          current
        ::= { general 6 }

modemSWVer OBJECT-TYPE
        SYNTAX          DisplayString
        MAX-ACCESS      read-only
        STATUS          current
        ::= { general 7 }

modemHWVer OBJECT-TYPE
        SYNTAX          DisplayString
        MAX-ACCESS      read-only
        STATUS          current
        ::= { general 8 }

-- COMMON --
date OBJECT-TYPE
        SYNTAX          DisplayString
        MAX-ACCESS      read-only
        STATUS          current
        ::= { common 1 }
```

```
otaProgrammingEnable OBJECT-TYPE
    SYNTAX          INTEGER {
                    disabled(0),
                    enabled(1) }
    MAX-ACCESS      read-only
    STATUS          current
    ::= { common 2 }

devicePort OBJECT-TYPE
    SYNTAX          INTEGER(0..65535)
    MAX-ACCESS      read-only
    STATUS          current
    ::= { common 3 }

netUID OBJECT-TYPE
    SYNTAX          DisplayString
    MAX-ACCESS      read-only
    STATUS          current
    ::= { common 4 }

netPW OBJECT-TYPE
    SYNTAX          DisplayString
    MAX-ACCESS      read-only
    STATUS          current
    ::= { common 5 }

requestPAP OBJECT-TYPE
    SYNTAX          INTEGER {
                    no(0),
                    yes(1) }
    MAX-ACCESS      read-only
    STATUS          current
    ::= { common 6 }

destinationAddress OBJECT-TYPE
    SYNTAX          DisplayString
    MAX-ACCESS      read-only
    STATUS          current
    ::= { common 7 }

destinationPort OBJECT-TYPE
    SYNTAX          INTEGER(0..65535)
    MAX-ACCESS      read-only
    STATUS          current
    ::= { common 8 }
```

```
serialPortSettings OBJECT-TYPE
    SYNTAX          DisplayString
    MAX-ACCESS      read-only
    STATUS          current
    ::= { common 9 }

serialPortFlowControl OBJECT-TYPE
    SYNTAX          INTEGER {
                    none(0),
                    hardware(2),
                    software(4) }
    MAX-ACCESS      read-only
    STATUS          current
    ::= { common 10 }


-- STATUS --
ipAddress OBJECT-TYPE
    SYNTAX          IpAddress
    MAX-ACCESS      read-only
    STATUS          current
    ::= { status 1 }

netState OBJECT-TYPE
    SYNTAX          DisplayString
    MAX-ACCESS      read-only
    STATUS          current
    ::= { status 2 }

netChannel OBJECT-TYPE
    SYNTAX          INTEGER
    MAX-ACCESS      read-only
    STATUS          current
    ::= { status 3 }

rssi OBJECT-TYPE
    SYNTAX          INTEGER(-125..-50)
    MAX-ACCESS      read-only
    STATUS          current
    ::= { status 4 }

serialSent OBJECT-TYPE
    SYNTAX          INTEGER
    MAX-ACCESS      read-only
    STATUS          current
    ::= { status 5 }
```

```
serialReceived OBJECT-TYPE
     SYNTAX            INTEGER
     MAX-ACCESS        read-only
     STATUS            current
     ::= { status 6 }

hostMode OBJECT-TYPE
     SYNTAX            DisplayString
     MAX-ACCESS        read-only
     STATUS            current
     ::= { status 7 }

powerMode OBJECT-TYPE
     SYNTAX            DisplayString
     MAX-ACCESS        read-only
     STATUS            current
     ::= { status 8 }

fixObtained OBJECT-TYPE
     SYNTAX            INTEGER {
                       no(0),
                       yes(1) }
     MAX-ACCESS        read-only
     STATUS            current
     ::= { gps 1 }

satelliteCount OBJECT-TYPE
     SYNTAX            INTEGER
     MAX-ACCESS        read-only
     STATUS            current
     ::= { gps 2 }

latitude OBJECT-TYPE
     SYNTAX            DisplayString
     MAX-ACCESS        read-only
     STATUS            current
     ::= { gps 3 }

longitude OBJECT-TYPE
     SYNTAX            DisplayString
     MAX-ACCESS        read-only
     STATUS            current
     ::= { gps 4 }

END
```

Hardware Installation

Your AirLink Raven should be mounted in a position that allows easy access for the cables so they are not bent or constricted. The LEDs on the front panel should be visible for ease of operational verification. You should ensure that there is adequate airflow around the modem but that it is kept free from direct exposure to the elements (sun, rain, etc.). The exterior of the case should also be grounded.

Raven Mounting Kit

An optional accessory for your modem is a mounting kit. The bracket is designed to snugly cradle the modem and hold it in place where you need it.

The Raven "snaps" into place in the bracket locking into the grooves on the Raven case. The bracket can be further secured with a twist-tie set into the grooves on the top for situations where the modem may be subjected to violent movement, such as in the back of an automobile. In most stationary installations, such as in a field or pipe, the Raven and bracket shouldn't require a twist-tie.

The bracket can be attached to the location using #6 screws (mounting hole diameter approximately 0.150").

FIGURE 1. Raven Mounting Bracket, part number 100-170-1009 A
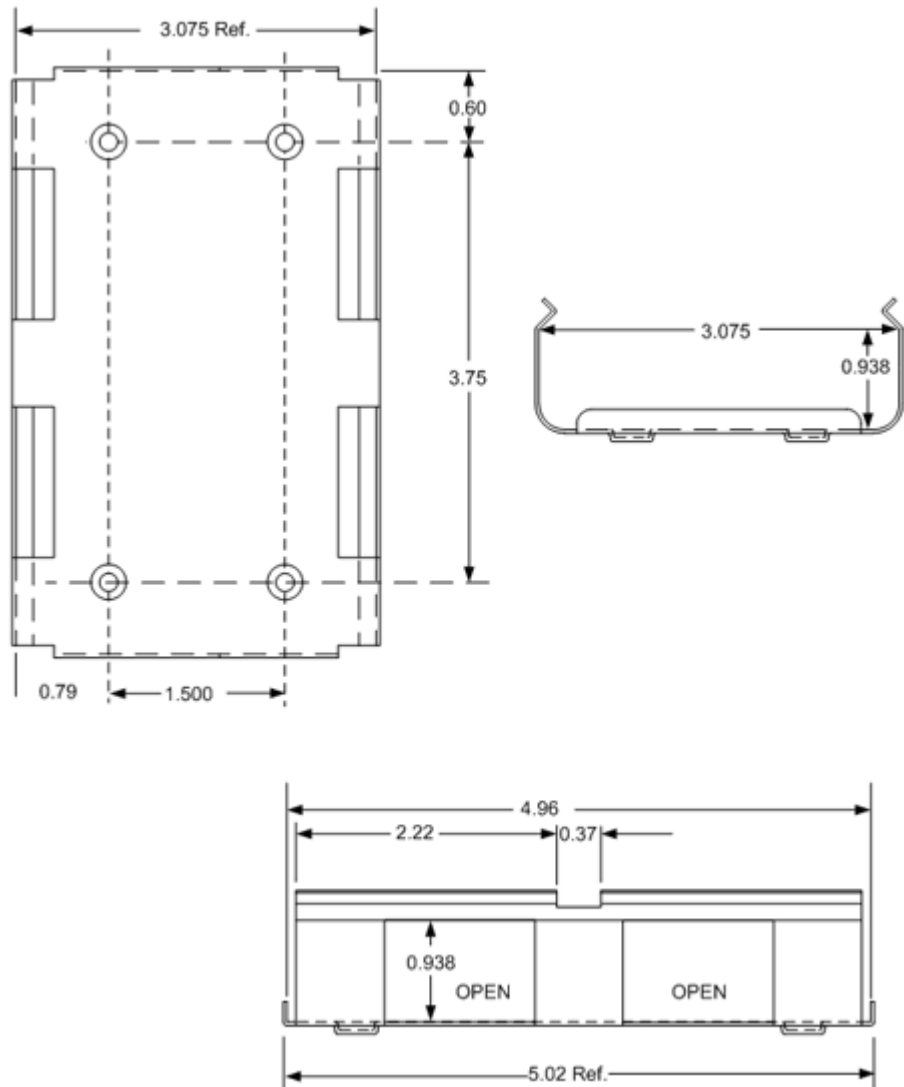
Connecting the Antenna

Your Raven will work with most standard cellular antennas with a TNC connector and rated to work with GPRS technology. Connect the antenna or RF cable directly to the TNC connector on the back of the Raven.

FIGURE 2. Raven connectors

Connecting power

Your Raven can be used with either DC (available in most automobiles) or 110 AC (standard US wall power) with the appropriate power adapter (available from Air-Link).

The power cable positive lead should be connected to the battery or power source positive terminal. The power cable negative lead should be connected to the battery or power source negative terminal. The Raven has an internal polysilicon circuit breaker that opens at 0.5 to 1.0 amps of current.

Connecting the Raven to a computer or other device

Your Raven's serial port can be connected directly to most computers or other devices using a standard straight through cable. If you have a DTE device, you will need a null modem or null modem cable.

Your Raven can also be connected to a serial cable that is connected to a USB to serial device connected to a computer or other device which does not have an available serial port but does have USB.

AT Commands

Just as with a Hayes compatible analog modem, the Raven parameters can all be configured with AT commands. Wireless ACE and Wireless ACE Web (See "Wireless ACE and Wireless ACE Web" on page 15. and below) are a graphical interface for the AT commands and it is highly recommended that you use one of them to modify any parameters, however a terminal emulation application, such as Telnet, can be used instead.

Using Wireless Ace

With Wireless ACE and Wireless ACE Web, you only need to find the command listed and then enter the new value in the space provided. For those commands which have specific parameters, the choices will be in a drop down menu.

FIGURE 1. Wireless ACE: Using AT Commands

AT	Name	Value	New Value
*HOSTPRIVMODE	Use Private IP	0	
*HOSTPRIVIP	Host Private IP	0.0.0.0	

To set or commit the changes in the modem, use the **Write** button at the top of Wireless ACE interface.

FIGURE 2. Wireless ACE: toolbar
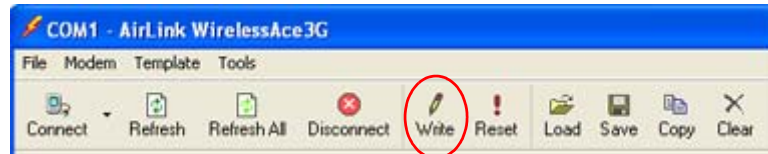
For more information on using Wireless ACE or Wireless ACE Web, please refer to the **Wireless ACE User Guide**.

Note: Some of the AT Commands are not able to be configured in Wireless ACE.

Using Telnet Terminal Emulation

Most installations of Microsoft Windows come with a version of HyperTerminal.

Start>All Programs>Accessories>Communications>HyperTerminal

1. Choose a name for your connection, such as **Raven**. The name and icon are only for your own reference so you can find the connection at a later date.

FIGURE 3. HyperTerminal: Connection Name
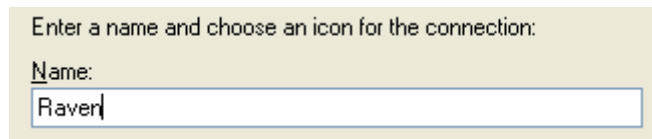
2. Select TCP/IP (Winsock) for **Connect Using**. The **host address** will be the current Internet IP of the Raven. Change the **port number** to **2332** (default telnet port for the Raven).

FIGURE 4. **HyperTerminal: TCP/IP Settings**
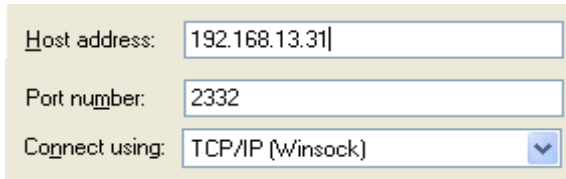
3. When HyperTerminal connects to the Raven, you may be prompted for a password. The default password is **12345**. When you press *Enter*, you should get back a reply of "OK".

FIGURE 5. **HyperTerminal: AT mode via Telnet**
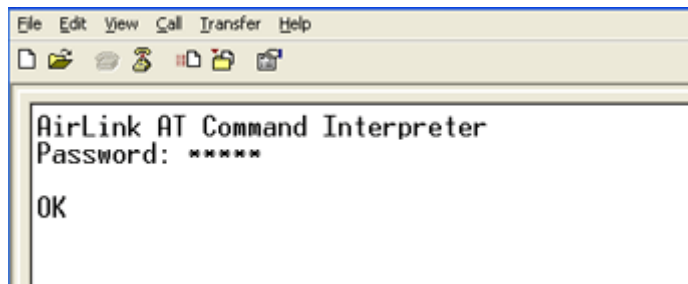
4. Type **AT** and press *Enter*. You should get a reply of "OK" or "0".
5. To see what you are typing as you type it, you will need to turn on the echo and verbose mode. Type **ATE1V1** and press *Enter*.
6. If you get a reply of "OK", then you entered the command successfully. If you get a reply of "0" or "ERROR", try entering the command again.

Direct Serial Connection

Using HyperTerminal included with most installations of Microsoft Windows:

Start>All Programs>Accessories>Communications>HyperTerminal

1. Choose a name for your connection, such as **Raven**. The name and icon are only for your own reference so you can find the connection at a later date.

    FIGURE 6. HyperTerminal: Connection Name

    Enter a name and choose an icon for the connection:

    Name:

    Raven
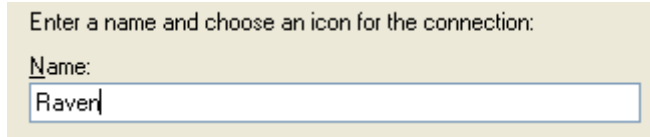
2. Select COM1 for the **Connect Using**.

    FIGURE 7. HyperTerminal: Comport Setting

    Connect using: COM1
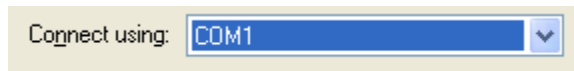
3. Change the **Bits per Second** to 115200 (default), **Data Bits** to 8, **Parity** to None, **Stop Bits** to 1, and **Flow Control** to Hardware.

    FIGURE 8. HyperTerminal: Comport Settings
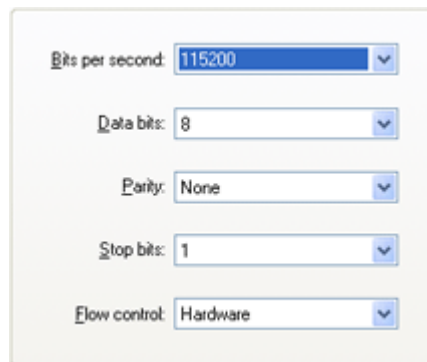
    Bits per second: 115200

    Data bits: 8

    Parity: None

    Stop bits: 1

    Flow control: Hardware

4. Type **AT** and press *Enter*. You should get a reply of "OK" or "0".
5. To see what you are typing as you type it, you will need to turn on the echo and verbose mode. Type **ATE1V1** and press *Enter*.

6. If you get a reply of "OK", then you entered the command successfully. If you get a reply of "0" or "ERROR", try entering the command again.

AT Commands

The tables below list the AT commands, their parameters, and explain what they do.

- For most commands, you need to preface the command with **AT** (exceptions are noted), i.e. **AT*IPPING** which listed as ***IPPING**.
- Some commands have specific parameters while other commands will take whatever your type.
- Acceptable parameters and/or specific formats are in the parameters column.
- Required variable parameters are denoted with italicized text, ex. D*n*. The *n* is variable and noted in the parameters column.
- Optional parameters are denoted with square brackets [ ].
- Most commands with parameters can be entered with ? to read the current value, i.e. AT&D? will respond with "2" if the default has not been changed.
- AT Commands are not case sensitive. A capital "E" is the same as a lower-case "e".
- If you enter a command which is recognized by the Raven, it will respond with "OK". If the command is not recognized, the response will be "ERROR".
- Those commands applicable only to certain model numbers of the Raven will be noted in the command column.

> **Caution:** Symbols listed with commands, such as *****, **/**, **&**, or **?**, are part of the command and must be included.

TABLE 1. Information and Status

Command	Details
I[*n*]	*n*=0 Product name (i.e. Raven).
	n=1 The Raven's firmware (ALEOS) version, hardware ID, and copyright.
	n=2 The OEM module's firmware version and relevant hardware ID.
	n=3 The OEM module's unique ID (ESN).
&V	View active profile (the contents of the active registers).
*HOSTMODE?	The current host mode (AT, PPP, UDP, etc.). If the Raven is not in AT mode, telnet into the modem to execute this command.
*NETCHAN?	The current active GPRS channel number .
*NETERR?	The network bit error rate.
*NETIP?	The current IP address of the modem reported by the embedded OEM module (generally obtained from Carrier). This is the address to which packets can be sent in order to contact the Raven from the Internet. **Note:** If there is no current network IP, 0.0.0.0 may be displayed.
	Use ***NETALLOWZEROIP** if you need to allow the display of an IP ending in a zero. See "*NETALLOWZEROIP=n" on page 79.
*NETOK	Checks the GPRS network connection.
	OK if connected.
	ERROR if not connected.
*NETOP?	The current network operator (cellular carrier, i.e. Cingular) from the modem's firmware version.
*NETPHONE?	The modem's phone number (if applicable or obtainable).
*NETRSSI?	The current RSSI (Receive Signal Strength Indicator) of the Raven as a negative dBm value. The same information is displayed with the command **S202?**.

TABLE 1. Information and Status

Command	Details
*NETSTATE?	The current network state:
	Connecting To Network = The Raven is in the process of trying to connect to the GPRS network.
	Network Authentication Fail = Authentication to the GPRS network has failed. Verify settings to activate the Raven.
	Network Negotiation Fail = Network connection negotiation failed. This is usually temporary and often clears up during a subsequent attempt.
	Network Ready = Raven is connected to the network and ready to send data.
	Network Dormant = Raven is connected to the network, but the link is dormant. It will be woken up when data is sent or received.
	No Service = There is no GPRS network detected.
	Hardware Reset = The OEM module is being reset. This is a temporary state.
*SMTPSTATUS?	The status of the last issued SMTP message (*SMTPSEND). If no status is available 0 is returned. Once read, the status is cleared.
	The status codes are received from the SMTP server the modem attempted to send the request. Ex. 354 = send in progress, 250 = sent ok.
*SNTPQUERY?	The current SNTP (Simple Network Time Protocol) time and date.

For most of the commands in the rest of the tables, you can query the current status of the associated register by substituting a "**?**" for any parameters, omitting the "=" if there is one, i.e. for the command *DPORT=*n*, you would enter **AT*DPORT?**.

TABLE 2. Basic Commands

Command	Parameters	Details
+++ The "+" is ASCII 0x2B.	*none*	AT Escape sequence Not proceeded by AT.
A/	*none*	Re-execute last command. Not proceeded by AT.
H*n*		Hang-Up Command
	n=1	Hang-up
&W	*none*	Writes all changed modem settings. If this command is not issued, any modified values will revert back to their previous values at modem reset.
A	*none*	Answer - manual
DAE=*n*		Disable AT Escape Sequence detection
	n=0	Enable +++ AT escape sequence detection.
	n=1	Disable +++ AT escape sequence detection.
E*n*		Toggle AT command echo mode.
	n=0	Echo Off
	n=1	Echo On.
H*n*		Hang-Up Command
	n=1	Hang-up
O	*none*	Online (Remote)
		Causes the modem to go from Command State to data state.
Q*n*		The AT quiet-mode setting. If quiet mode is set, there will be no responses to AT commands except for data queried.
	n=0	Off (Default)
	n=1	Quiet-mode on.
V*n*		Command Response Mode.
	n=0	Terse (numeric) command responses
	n=1	Verbose command responses (Default).

TABLE 2. Basic Commands

Command	Parameters	Details
X*n*		Extended Call Progress Result mode.
	n=0	Turn off extended result codes (Default)
	n=1	Turn on result codes. This adds the text 19200 to the CONNECT response.
Z	*none*	Reset the Raven.
		Note: This command does nothing if *DATZ=1.
*DATZ=*n*		Enables or disables reset on ATZ
	n=0	Normal Reset (Default).
	n=1	Disable Reset on ATZ.

The preferred method of activating (provisioning) the modem is using the Setup Wizard. However, there are special circumstances when commands may be used instead.

Note: You may need go into PassThru mode to activate the Raven. In that case, you will need to refer to the PassThru Mode table (page 76) and the Commands Usable with PassThru table (page 91).

TABLE 3. Activating (Provisioning)

Command	Parameters	Details
*DEVICEID=*n*	*n*=number string	Sets or queries the 64-bit Device ID that is used by the modem to identify itself to the server. The default is a value that depends on the underlying communications technology being used.
*NETAPN=*apn*	*apn*=access point name	Easy entry of the APN
		If left blank, the modem will attempt to use the default subscriber value as defined by the account.
*NETPHONE?	none	The modem's phone number, if applicable or obtainable.
*NETPW=*pw*	*pw*=password	The password that is used to login to Cingular's cellular network, when required.

<div align="center">

TABLE 3. Activating (Provisioning)

</div>

NETUID=uid	*uid*=user id (up to 64 bytes.)	The login that is used to login to the Cingular's cellular network, when required.
OPRG=*n*		Enables/disables over-the-air firmware upgrading of the Raven.
	n=0	Disables over-the-air programming.
	n=1	Enables over-the-air programming.

The Raven's cellular network is the connection to Cingular GPRS and remote devices or computers.

TABLE 4. Cellular Network (Cingular GPRS)

Command	Parameters	Details
*NETALLOWZEROIP=*n*		Allows the displayed IP address in *NETIP to end in zero (ex. 192.168.1.0).
	n=0	Allow
	n=1	Do not allow
*NETCHAN?	none	The current active GPRS channel number.
*NETERR?	none	The network bit error rate.
*NETIP?	none	The current IP address of the modem reported by the embedded OEM module (generally obtained from Carrier). This is the address to which packets can be sent in order to contact the Raven from the Internet. **Note:** If there is no current network IP, 0.0.0.0 may be displayed. Refer to ***NETALLOWZEROIP** if you need to allow the display of an IP ending in a zero.
*NETOK?	none	Checks the GPRS connection. **OK** if connected. **ERROR** if not connected.
*NETOP?	none	The current network operator (cellular carrier) from the modem's firmware version.
*NETRSSI?	none	The current RSSI (Receive Signal Strength Indicator) of the Raven as a negative dBm value. The same information is displayed with the command **S202?**.
*NETSTATE?	none	See "*NETSTATE?" on page 16..
*NETWDOG=*n*	*n*=minutes	Network connection watchdog: The number of minutes to wait for a network connection. If no connection is established within the set number of minutes, the Raven resets. Default = 20 min. 0 = Disable.

TABLE 4. Cellular Network (Cingular GPRS)

Command	Parameters	Details
+COPS=*mode*,[*format*] [,*oper*]		Manually specify an operator.
	mode=0	automatic - any affiliated carrier [default]
	mode=1	manual - use only the operator <oper> specified
	mode=4	manual/automatic - if manual selection fails, goes to automatic mode
	format=0	alphanumeric ("name")(G3210 must use this format)
	format=2	numeric
	oper="name"	*oper* uses the format specified in the *format* parameter.
		Refer also to *NETOP

The Local network for the Raven is the one to which it is connected physically via the serial port to your computer, device, hub, or switch. The Raven has the ability to provide some NAT (network address translation) to pass communication from the GPRS network and the Internet to the local device(s) and network. On the local network, the Raven acts as a Host.

TABLE 5. Local Network and Host Modes

Command	Parameters	Details
+++ The "+" is ASCII 0x2B.	*none*	AT Escape sequence Not proceeded by AT. If the Raven is in a data mode (any mode other than PassThru), this command causes the modem to re-enter AT command mode. There must be an idle time (set by **S50**) on the serial port before and after this command. **Note:** The detection of +++ is disabled if **DAE=1**. See "DAE=n" on page 76.
AIP=*n*	*n*=0 *n*=1	Allow only the IP specified in **S53** to connect when UDP auto answer is enabled (**S82=2**). Allow any incoming IP to connect when UDP auto answer is enabled (**S82=2**). Always subject to any Friends filters that may be defined
HOR=*n*	 *n*=0 *n*=1	Half-Open Response - In UDP auto answer (half-open) mode: No response codes when UDP session is initiated RING CONNECT response codes sent out serial link before the data from the first UDP packet. **Note:** Quiet Mode must be Off.
MD*hh*	*hh* (hex byte) = 00 - normal 01 - SLIP mode 02 - PPP mode 03 - UDP mode 04 - TCP mode 07 - PassThru	Default power-up mode When the Raven is power-cycled, it may enter the mode specified by this command after 5 seconds. On startup, typing ATMD0 within 5 seconds changes the mode to normal (AT command) mode. See also **S53** to set the port for UDP or TCP.

<p align="center">**TABLE 5. Local Network and Host Modes**</p>

Command	Parameters	Details
S0=*n*		This register determines how the Raven responds to an incoming TCP connection request. The Raven remains in AT Command mode until a connection request is received. DTR must be asserted (**S211=1** or **&D0**) and the Raven must be set for a successful TCP connection. The modem will send a "RING" string to the host. A "CONNECT" sent to the host indicates acknowledgement of the connection request and the TCP session is established.
	n=0	Off (Default)
	n=1	On
	n=2	Use Telnet server mode on TCP connections
	n=3	With a Telnet connection, overrides the client's default echo, allowing the server on the host port to perform the echo. CRLF sequences from the telnet client will also be edited to simply pass CRs to the server on the host port.
S7=*n*	*n* = seconds	Specifies the number of seconds to wait for a TCP connection to be established when dialing out.

S23=[*speed*],[*databits*] [*parity*][*stop bits*]	*speed*=
	
	 300 | 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200 | 230400
	
	 databits = 7 or 8
	 parity =
	    O=Odd
	    E=Even
	    N=None
	    M=Mark
	 stopbits =
	 1 | 1.5 | 2
		Serial line parameters.
		
		 Ex. **ATS23=19200,8N1** (sets modem to 19200, etc.)
		
		 The settings take affect after reset.
		
		 Note: MUST be 8 data bits for PPP mode.
		
		 Can also be set using **&L**=[*speed*],[*databits*] [*parity*][*stop bits*]

S50=*n*	*n* = tenths of seconds	Data forwarding idle time-out. If set to 0, a forwarding time-out of 10ms is used. (Used in UDP or TCP PAD mode)

TABLE 5. Local Network and Host Modes

Command	Parameters	Details
S51=*n*		PAD data forwarding character.
	n=0	no forwarding character
	n=ASCII code	ASCII code of character that will cause data to be forwarded.
		(Used in UDP or TCP PAD mode.)
S82=*n*		Enables UDP auto answer (half-open) mode.
	n=0	Normal mode
	n=2	Enable UDP auto answer mode.
S83=*n*		Set or query UDP auto answer idle time-out. If no data is sent or received before the time-out occurs, the current UDP session will be terminated. While a session is active, packets from other IPs will be discarded (unless *UALL is set).
	n=0	No idle time-out (Default).
	n=1-255	Time-out in seconds.
S211=*n*		For applications or situations where hardware control of the DTR signal is not possible, the modem can be configured to ignore DTR. When Ignore DTR is enabled, the modem operates as if the DTR signal is always asserted.
	n=0	Use hardware DTR. (default)
	n=1	Ignore DTR.
	n=3	Ignore DTR and assert DSR. This value is deprecated, and it is recommended to use &S to control the DSR instead. When this value is set to 3, &S will automatically be set to 0. **See also:** &D and &S
S221=*n*	*n* = 0 - 255	Connect Delay
		n = number of seconds to delay the "CONNECT" response upon establishing a TCP connection
		OR
		n = number of tenths of seconds to delay before outputting ENQ on the serial port after the CONNECT when the ENQ feature is enabled [see *ENQ]

TABLE 5. Local Network and Host Modes

Command	Parameters	Details
TCPS=*n*		TCP connection time-out (TCPT) units.
	n=0	TCPT specifies minutes.
	n=1	TCPT specifies seconds.
TCPT=*n*	*n* = minutes (TCPS=0) or seconds (TCPS=1)	TCP connection time-out. Specifies a time interval upon which if there is no in or outbound traffic through a TCP connection, the connection will be terminated. This value only affects the TCP connection in TCP PAD mode.
&C*n*		Set DCD mode.
	n=0	Always assert DCD
	n=1	Assert DCD when in a data mode (UDP, TCP, PPP, or SLIP) (Default).
	n=2	Assert DCD when the modem has network coverage.
&D*n*		Set DTR mode.
	n=0	Ignore DTR, same effect as HW DTR always asserted (same as S211=1)
	n=2	Use hardware DTR (same as S211=0)
&S*n*		Set DSR mode.
	n=0	Always assert DSR
	n=1	Assert DSR when in a data mode (UDP, TCP, PPP, or SLIP) (Default).
	n=2	Assert DSR when the modem has network coverage.
		Note: S211 can also be used to request that DSR is always asserted. If S211 is set to 3 and &S is changed to a non-zero value, S211 will be changed to 1.

TABLE 5. **Local Network and Host Modes**

Command	Parameters	Details
*CTSE=*n*		Clear To Send Enable
		This feature asserts CTS when there is a network connection.
	n=0	Disabled (Default).
	n=1	Enable assertion of CTS when there is network coverage.
		Note: Flow control (**AT\Q**) will override this indication, so if you want to use CTS to indicate network coverage, flow control has to be off (**AT\Q0**).
		RS232 voltage levels:
		Positive = Network coverage, Negative = no coverage.
*DU=*n*		The dial command always uses UDP, even when using ATDT
	n=0	Dial using the means specified. (default)
	n=1	Dial UDP always, even when using ATDT
		Note: When this parameter is set you cannot establish a TCP PAD connection.
*ENQ=*n*		Outputs an ENQ [0x05] after the TCP CONNECT delayed by the Delay Connect Response time [S221].
	n=0	Disabled (Default).
	n=1	Enables ENQ on CONNECT.
*HOSTMODE?	*none*	The current host mode (AT, PPP, UDP, etc.) which the modem is in. If the modem is not in AT mode, telnet into the modem to execute this command.
*HOSTNETMASK=*n.n.n.n*	*n.n.n.n* = subnet mask, i.e. 255.255.255.0	Netmask for the host interface. Allows communication with a subnet behind the host interface.
*HOSTPAP=*n*		Use PAP to request the user login and password during PPP negotiation on the host connection.
	n=0	Disable PAP request. (Default)
	n=1	Takes user login and password from Windows DUN connection and copies to *NETUID and *NETPW.

TABLE 5. Local Network and Host Modes

Command	Parameters	Details
*HOSTPEERIP =*d.d.d.d*	*d.d.d.d*=local or peer IP of modem	Set or query the IP address that can be used to directly contact the Raven once a PPP connection is established. If this value is not specified, 192.168.13.31 will be used. **Note:** This is not normally used nor needed by user applications.
*HOSTPRIVIP =*d.d.d.d*	*d.d.d.d*=IP	Set or query the private IP address that is to be negotiated by the PPP connection if *HOSTPRIVMODE =1
*HOSTPRIVMODE =*n*		Set or query whether a private or public (network) IP is to be used when the Host initiates a PPP connection to the modem.
	n=0	Public (network) IP Mode: When the Host initiates a PPP connection, the host will be given the public IP that was obtained from the OEM module. If the network issues a new IP, the PPP connection will be closed (since the IP has changed) and has to be re-initiated. (default)
	n=1	Private IP Mode: When the Host initiates a PPP connection, the host will be given the IP address specified in *HOSTPRIVIP. The modem will then perform NAT-like address translation, which shields the Host from network IP changes.
*MODEMHISPEED=*n*		Set the internal serial link speed to the radio (modem) module.
	n=0	115200 (default)
	n=1	230400
*UALL=*n*		Accepts UDP packets from any IP address when a UDP session is active. If there is no UDP session active, an incoming UDP packet will be treated according to the UDP auto answer and AIP settings.
	n=0	No effect (Default).
	n=1	Accept UDP data from all IP addresses when in a UDP session.

TABLE 5. Local Network and Host Modes

Command	Parameters	Details
*UDPLAST=*n*		If enabled, sets **S53** to the last accepted IP address through UDP auto answer. This can be used in conjunction with **MD3** so that when there is no UDP session, new ethernet host data will cause a connection to be restored to the last IP accepted through UDP auto answer.
	n=0	Does not change **S53** setting. (Default).
	n=1	Set **S53** to the last accepted IP.
		Note: This does not change the **S53** setting in NVRAM. If the modem is reset, the original **S53** setting will be restored from NVRAM.
*USD=*n*		Waits the specified delay before sending the first UDP packet and the subsequent UDP packets out to the Ethernet port.
	n=0	No UDP packet delay (Default).
	n=1-255	Delay in 100ms units, from 100 ms to 25.5 sec.
\Q*n*		Set or query the serial port flow control setting.
	n=0	No flow control is being used
	n=2	RTS/CTS hardware flow control is being used
	n=4	Transparent software flow control. Uses escaped XON and XOFF for flow control. XON and XOFF characters in data stream are escaped with the @ character (0x40). @ in data is sent as @@.
\APPP	*none*	Set modem operation to PPP mode.
\ASLIP	*none*	Set modem operation to SLIP mode. DTR must be asserted (**&D0** or **S211=1**)

PassThru Mode is used to communicate directly to the Raven's internal hardware (OEM module).

TABLE 6. PassThru Mode

Command	Parameters	Details
\APASSTHRU **Note:** This mode is not available through the remote AT telnet server.	none	Set modem operation to pass through mode. This will pass any characters received on the serial port directly to the internal OEM module and output any characters from the internal OEM module out the serial port. This allows direct access/configuration of the OEM module. Once this mode is entered, the unit must be physically reset to return to normal operation. **Note:** It may take up to 30 seconds for the OEM module to respond after CONNECT is output.
*CSX1=*n*	n=0 *n*=1	Data will be passed to the host. PASSTHRU mode will echo all host received data and will not pass the data to the modem while the modem is not asserting DCD. **Note:** If the modem is asserting DCD, data will be passed from the host to the modem as it normally is when ***CSX1=0**.
*PTINIT=*n*	*n*=AT command	Any AT Command string to be passed to the OEM module before entering PASSTHRU mode, e.g. AT&S1V1, etc.
*PTREFRESH=*n*	*n*=0-255 minutes	Number of minutes of inactivity in PASSTHRU mode to resend the *PTINIT string to OEM module. 0 = Disabled.
*RESETPERIOD=*n*	*n*=0-255 hours	In PASSTHRU mode, modem will be reset after this period if no data has been sent or received. . Value is in hours. 0 = Disabled.

It is possible to communicate with the Raven across a TCP/IP network (using Cingular's network and the Internet). Telnet provides a terminal style connection to the Raven. **Note:** Telnet is not a secure communications protocol.

TABLE 7. Telnet

Command	Parameters	Details
S60=*n*		Telnet Client Echo Mode
	n=0	No Echo
	n=1	Local Echo (Default)
	n=2	Remote Echo
*TELNETTIMEOUT=*n*	*n*=minutes	Telnet port inactivity time out.
		By default, this value is set to close the AT telnet connection if no data is received for 2 minutes.
*TPORT=*p*	*p*=0-65535	Sets or queries the port used for the AT Telnet server. If 0 is specified, the AT Telnet server will be disabled. The default value is 2332.

Friends Mode can limit access to the Raven from the Carrier network and the Internet. Friends Mode is a limited form of security.

TABLE 8. Friends Mode

Command	Parameters	Details
FM=[*n*]		Friends Mode - Only allow specified IPs to access the Raven.
	n=0	Disable Friends mode
	n=1	Enable Friends mode - Only packets from friends will be accepted (see below); packets from other IP addresses are ignored.
Fn=[*d.d.d.d*]	*n* = Friends list index [0 - 9]	Friends mode IP address
		255 = allow any number 0-255
	d.d.d.d = IP address	Example: 166.129.2.255 allows access by all IPs in the range 166.129.2.0-166.129.2.255.

Time and Date in the Raven is set to UTC (Coordinated Universal Time) and then adjusted for local time (i.e. California is UTC-8 and New York is UTC-5). Time is expressed in 24-hour format, i.e. 13:23:57 would be 1:23pm. You can set time and date manually or you can have it set automatically with a regular query to an Internet time server (such as time.nist.gov) using SNTP (Simple Network Time Protocol).

TABLE 9. Time and Date

Command	Parameters	Details
*DATE=[*mm/dd/ yyyy*],[*hh:mm:ss*]	*mm/dd/yyyy* = month, day, year *hh:mm:ss* = time in 24-hour notation	Sets and queries the clock in the unit. Either the date and time can be specified, or simply one of the two can be specified in which case the unspecified value will remain unchanged. The date and time are always specified 24-hour notation. **Note:** The GPS will be used to set the time, in which case any date/time specified will be ignored.
*SNTP=*n*	 *n*=0 *n*=1	Enables daily SNTP update of the system time. Off On.
*SNTPADDR= [*d.d.d.d*][*name*]	*d.d.d.d*=IP *name*=domain name	SNTP Server IP address, or fully-qualified domain name, to use if *SNTP=1. **Note:** If blank, **time.nist.gov** is used.
*SNTPQUERY?	none	The current SNTP time and date.

The Raven allows several different levels of logging.

TABLE 10. Logging

Command	Parameters	Details
*DBGCOM1000=*n*	 *n*=0 *n*=1	Turn on debugging for COM1000. No logging Logging

TABLE 10. Logging

Command	Parameters	Details
*DBGCOMLVL=*n*		Set the logging level for the host or module COM port.
	n=0	No logging
	n=1	Host COM.
	n=2	Module COM.
*DBGEVTLOGCLEAR	none	Clears the content of the logs in the modem.
*DBGIPLVL=*n*		Sets the logging level for the IP subsystem.
	n=0	No logging
	n=1	Log errors (i.e. invalid/corrupt packets, etc.).
	n=2	Log the header of all received packets. Note that this can quickly exhaust the event log.
*DBGPPPLVL=*n*		Sets the logging level for the PPP stack.
	n=0	No logging
	n=1-3	Enables logging at different levels of detail. (default = 1)

DNS settings in the Raven allow the modem to use domain names instead of IPs to contact other Internet hosts.

TABLE 11. DNS

Command	Parameters	Details
*DNS*n*=*d.d.d.d*	*n*=1 or 2 *d.d.d.d* = IP of domain server	Sets the DNS addresses to be returned during PPP negotiation. If the underlying communications network provides DNS addresses, they replace those specified by this command.
		*DNS1 and *DNS2 are valid.
*DNSUPDATE=*n*		Indicates whether the modem should send DNS updates to the DNS server specified by *DNSUSER. These updates are as per RFC2136. They are not secure and are recommended only for a private network. In a public network, the IP Logger services should be used instead.
	n=0	DNS updates disabled (Default).
	n=1	DNS updates enabled.

<div align="center">**TABLE 11. DNS**</div>

Command	Parameters	Details
*DNSUSER=*d.d.d.d*	*d.d.d.d* = IP of domain server	Sets a user-provided DNS to query first when performing name resolutions in the modem.

IPManager (See "IP Manager translates a dynamic IP address to a fully qualified domain name so you can contact the Raven by name as if it had a static IP." on page 20.) is a service from AirLink which allows a Raven with a dynamic IP to be contacted as if it had a static IP by using a Fully Qualified Domain Name.

<div align="center">**TABLE 12. IPManager**</div>

Command	Parameters	Details
*DOMAIN=[*name*]	*name* = domain name (i.e. eairlink.com) **Note:** Only letters, numbers, hyphens, and periods can be used.	Domain (or domain zone) of which the Raven is a part. This value is used during name resolutions if a fully qualified name is not provided and also for DNS updates. This value can be up to 20 characters long. If ***DOMAIN=eairlink.com**, then when ATDT@remote1 is entered, the fully qualified name remote1.eairlink.com will be used to perform a DNS query to resolve the name to an IP address.
*IPMANAGER*n*=[*name*]	*n*= 1 or 2 *name* = domain name	Sets a domain name or IP address to send IP change notifications to. Up to two independent IP Manager servers can be set, using either AT*IPMANAGER1 or AT*IPMANAGER2. Updates to a server can be disabled by setting that entry to nothing (i.e. "AT*IPMANAGER1=").
*IPMGRKEY*n*=[*key*]	*n*= 1 or 2 *key* = 128-bit key in hexadecimal [32 hex characters]	Sets the 128-bit key to use to authenticate the IP update notifications. If the key's value is all zeros, a default key will be used. If all the bytes in the key are set to FF, then no key will be used (i.e. the IP change notifications will not be authenticated). AT*IPMGRKEY1 is used to set the key to use with AT*IPMANAGER1, while AT*IPMGRKEY2 is used to the key with AT*IPMANAGER2.

TABLE 12. IPManager

Command	Parameters	Details
*IPMGRUPDATE*n*=*m*	*n*= 1 or 2 *m*=5-255	Sets the number of minutes to periodically send an IP update notification to the corresponding server. This will occur even if the IP address of the Raven doesn't change. *IPMGRUPDATE1 is used to set the refresh rate to *IPMANAGER1, while *IPMGRUPDATE2 is used with *IPMANAGER2. If the value is set to 0, then periodic updates will not be issued (i.e. IP change notifications will only be sent when the IP actually changes).
*MODEMNAME=[*name*]	*name* = domain name (i.e. eair-link.com) **Caution:** Only letters, num-bers, and hyphens can be used.	Name of the Raven (up to 20 characters long) to use when performing IP change notifications to IPManager. The value in *DOMAIN provides the domain zone to add to this name. Example: if ***MODEMNAME=mymodem** and ***DOMAIN=eairlink.com**, then the modem's fully qual-ified domain name is **mymodem.eairlink.com**. **Note:** Each modem using IPManager needs a unique name. Two modems cannot be called "mymodem". One could be "mymodem1" with the other as "mymodem". Automatically Generated Names: **#I3** - The ESN/IMEI will be used as the name **#CCID** - The CCID will be used as the name **#NETPHONE** - The phone number be used as the name

Keepalive (See "Keepalive" on page 24.) allows the Raven to stay connected to the cellular network even when there are periods of inactivity.

TABLE 13. Keepalive

Command	Parameters	Details
*IPPING=*n*	*n*=0-255	Set the period to ping (if no valid packets have been received) a specified address (*IPPINGADDR) to keep the modem alive (online). 0 = Disable pinging (default) See also *MINXMIT which can override this value.

TABLE 13. Keepalive

Command	Parameters	Details
*IPPINGADDR= [*d.d.d.d*][*name*]	*d.d.d.d* = IP *name*=domain name	Set the IP address or valid internet domain name for the Raven to ping to keep itself alive (online). *IPPING must to be set to a value other than 0 to enable pinging.
*IPINGFORCE=*n*		Have IP pings be always sent when their specified period expires.
	n=0	IP pings are sent only when the Raven has not received any IP packets for the specified IP ping interval.
	n=1	IP pings are issued when the IP ping interval expires regardless of received IP packets.
*MINXMIT=*n*	*n*=seconds	Minimum transmit period enforcement. When set to *n* seconds, will not let the *IPPING, *PPMINTIME, and the *MSCIUPDPERIOD timers to be set less than *n* seconds. Note that the *PPTIME can still be set to less than *MINXMIT, but the packets will still be transmitted no more often than the *PPMINTIME. **Warning:** The *MINXMIT value is can only be set one time and AirLink must be contacted to reset it.

Direct Communication can be used with the Raven to contact other Internet devices to pass information or other tasks.

TABLE 14. Direct Communication

Command	Parameters	Details

D[*method*][*d.d.d.d*][/*ppppp*]
or
D[*method*][@*name*][/*ppppp*]
	method =
	
	  P - Establish a UDP connection
	
	  T - Establish a TCP connection
	
	  N - Establish a Telnet connection
	
	d.d.d.d = IP address to contact
	
	name = domain name to contact
	
	ppppp = IP port to contact
		Dial a connection to a remote IP and Port using either UDP, TCP, or Telnet.
		
		Examples:
		
		ATD - Dial (establish) default connection per **S53**
		
		ATDP192.168.13.31/2332 - Dial (establish) UDP session to the specified IP address, 192.168.13.31, at port 2332.
		
		If the method, IP address, or port is omitted, the values from **S53** are used. If a telnet connection is requested (N) and the port is not supplied, port 23 will be used instead of the value from **S53**.
		
		Several special dialing numbers exist to make it easy to establish a PPP or SLIP connection with the modem. **ATD#19788** or **ATDT#19788** will establish a PPP connection (see \APPP) and **ATDT#7547** will establish a SLIP connection (see \ASLIP).
		
		If a domain name is specified, the '@' symbol can be used to explicitly indicate the start of the name. For example, if **ATDPHONY** is issued, this will be interpreted as dial a UDP connection to "HONY". To dial using the default method to host "PHONY", one would issue **ATD@PHONY**.
		
		To end the connection, issue the +++ escape sequence or drop the DTR line (if Ignore DTR **S211=0** or **&D2**)
		
		NOTE: The source port of the session is the Device Port (set by **S110** or ***DPORT**)

PING*d.d.d.d*[,*n*] or PING *domain_name*[,*n*]	*d.d.d.d* = IP address to contact *n* = amount of data to send	Ping the specified IP address. Sends a single ping, returns either OK or ERROR depending on result. Times out in 10 seconds. If *n* is provided, it specifies the amount of data to send with the ping. If n is not provided, the default, 50 bytes is used.

TABLE 14. **Direct Communication**

Command	Parameters	Details

S53=[*method*][*d.d.d.d*][/ *ppppp*]	*method* =
	
	  P - UDP
	
	  T - TCP
	
	  N - Telnet
	
	d.d.d.d = IP address or name
	
	ppppp = the port address
		Destination IP address, port, and method. These are used as defaults for the D (Dial) AT command.
		
		Examples:
		
		ATS53=T192.168.100.23/12345
		
		ATS53=foo.earlink.com
		
		Telnet to the specified IP at port 12345
		
		ATS53=192.168.100.23/12345
		
		Query the specified IP at port 12345
		
		ATS53=/12345
		
		Query port 12345

*DPORT=*n*	*n*=1-65535	The modem's Device Port. Can also be set with the command **S110**
*MSCIUPDADDR=*name* [/*port*]	*name*=domain name *port*=port	Modem Status Update Address - where Name/Port is the domain name and port of the machine where the modem status updates will be sent. The Raven's status parameters are sent in an XML format.
*MSCIUPDPERIOD=*n*	*n*=0-255	Modem Status Update Period - where n defines the update period in seconds. 0 = Disabled.

SMTP (Simple Mail Transfer Protocol) is the de facto standard for email transmission across the Internet. The Raven can send messages using SMTP if it has been configured to use a mail server. SMS (Simple Message Service) is another way to send messages via Cingular's cellular network.

TABLE 15. SMTP (email)

Command	Parameters	Details
*NETSMS2EMAIL= [*number*]	*number*=SMS/ E-mail server number	Specify the SMS/E-mail server number. This is necessary to send an SMS message to an email address (+CMGS).
*SMTPADDR= [*d.d.d.d*][*name*]	*d.d.d.d*=IP *name*=domain name	Specify the IP address or FQDN of the SMTP server to use.
*SMTPFROM=[*email*]	*email*=email address	Sets the email address from which the SMTP message is being sent.
*SMTPPW=[*pass*]	*pass*=password	Sets the password to use when authenticating the email account (*SMTPFROM) with the server (*SMTPADDR). **Note:** not required to use SMTP settings but may be required by carrier.
*SMTPSEND=[*email*] [*body*]	*email*=email address *body*=message body	Sends an email to the address specified, followed by the body of the email message. The email message is terminated and sent by entering a **.** or **Ctrl-Z** on an empty line. See also *SMTPSUBJ, *SMYPFROM, and *SMTPADDR
*SMTPSTATUS?	*none*	Returns the status of the last issued SMTP message (*SMTPSEND). If no status is available 0 is returned. Once read, the status is cleared out. The status codes are received from the SMTP server the modem attempted to send the request. Ex. 354 = send in progress, 250 = sent ok.

<div align="center">

TABLE 15. SMTP (email)

</div>

Command	Parameters	Details
*SMTPSUBJ=[*subject*]	*subject*=SMTP message subject	Allows configuration of the default Subject to use if one isn't specified in the message by providing a "Subject: xxx" line as the initial message line.
*SMTPUSER=[*user*]	*user*=username	The email account username to authenticate with the SMTP server (*SMTPADDR) for sending email. **Note:** not required to use SMTP settings but may be required by carrier.

Modbus, commonly used with telemetry devices, allows a connection via serial port to the modem. See "Modbus/BSAP Configuration" on page 35.

<div align="center">

TABLE 16. Modbus Settings

</div>

Command	Parameters	Details
IPL=*n*		IP List Dial
		This allows access the Modbus IP list using the first two digits of the dial string. Example: ATDT1234567 would go to ID "12" on the Modbus list and use the associated IP as the destination.
	n=0	Disabled
	n=1	Enabled
		Cannot be configured in Wireless ACE.
MD*hh*	*hh* (hex byte) = 00 - normal 01 - SLIP mode 02 - PPP mode 03 - UDP mode 04 - TCP mode	Set or query the modem's default power-up mode
		When the Raven is power-cycled, it may enter the mode specified by this command after 5 seconds. On startup, typing ATMD0 within 5 seconds changes the mode to normal (AT command) mode.
		See also **S53** to set the port for UDP or TCP.
MLIST*id=d.d.d.d*	*id*=ID *d.d.d.d*=IP or name	Enters an ID and IP address into the Modbus List. ID is a decimal value (1 to 100).
		Note: In Wireless ACE, this command (and MLISTX) is the **Addr List** menu option.
MLISTX*hexid=d.d.d.d*	*hexid*=ID *d.d.d.d*=IP or name	Enters an ID and IP address into the Modbus List. ID is a hexadecimal value (0 to 64). **Note:** This value is entered via Wireless ACE as 0xHex.
MVLEN=*n*	*n*= 1 or 2	Modbus Variant ID Length
		Length of the RTU ID in a modbus-variant protocol, in bytes. This parameter is used to define the length of the RTU ID in Modbus-like protocol data packets. This parameter is used when the when the **MD** is set to hex 63.
		Cannot be configured in Wireless ACE.

TABLE 16. Modbus Settings

Command	Parameters	Details
MVMSK=*hh*	*hh*=hex value (00 [default] no mask, all 8 bits 0F only the low order 4 bits)	Modbus Variant ID Mask Byte hex mask to use when extracting the ID. Specify which bits in the ID field to use. This parameter is used when the when the Mode Default (MD) is set to hex 63. *Cannot be configured in Wireless ACE.*
MVOFF=*n*	*n* = 0 - 255	Modbus (variable mode) Offset. Indicates the offset in the data of where the Modbus ID starts. *Cannot be configured in Wireless ACE.*
MVOPT=*n*		Modbus Variant Option Sets various behavioral options when dealing with a Modbus-variant protocol. This parameter is used when the when the Mode Default (MD) is set to hex 63
	n=0	No special action (Default)
	n=1	Skip leading zeroes in Modbus packets. *Cannot be configured in Wireless ACE.*
MVTYP=*n*		Modbus Variant Type The data-type of the RTU ID in a modbus-variant protocol. This parameter is used to define the data-type of the RTU ID in Modbus-like protocol data packets. This parameter is used when **MD** is set to 63.
	n=0	Binary (Default)
	n=1	ASCII Hex
	n=2	ASCII Decimal *Cannot be configured in Wireless ACE.*

<p align="center">**TABLE 16. Modbus Settings**</p>

Command	Parameters	Details
RKEY=*n*		Radio Transceiver Keying -
	n=0	Off (Default)
	n=1	On
		Enable/disable MDS Radio transceiver keying. Radio keying is designed to assert CTS when a packet is received, delay the time as specified, send the data out the serial port, wait the same amount time, drop CTS. This way, the CTS signal can be used to key a transmitter on and give it time to reach its power level before data is sent to it. Delay interval is specified in **S221**.\
		Cannot be configured in Wireless ACE.
S53=[*method*][*d.d.d.d*][/*ppppp*]	*method* = P - UDP T - TCP N - Telnet *d.d.d.d* = IP address or name *ppppp* = the port address	Destination IP address, port, and method. These are used as defaults for the D (Dial) AT command. Examples: ATS53=T192.168.100.23/12345 ATS53=foo.earlink.com Telnet to the specified IP at port 12345 ATS53=192.168.100.23/12345 Query the specified IP at port 12345 ATS53=/12345 Query port 12345
*DPORT=*n*	*n*=1-65535	The modem's Device Port. Can also be set with the command **S110**

Simple Network Management Protocol (SNMP) can be used to monitor devices connected to a network for any conditions which warrant administration attention. By default, SNMP uses port 161, however most Internet providers (including cellular) block all ports below 1024 as a security measure.

TABLE 17. SNMP

Command	Parameters	Details
\ACEPW=*pw*	pw=password	Change the ACE password to a new value. Password is case-sensitive. Default password is 12345.
		Ex. **AT\ACEPAW=new123**
*SNMPPORT=*n*		This controls which port the SNMP Agent listens on.
	n=0	SNMP is disabled.
	n=1-65535	Port for SNMP agent to listen on
*SNMPSECLVL=*n*		Selects the security level requirements for SNMP communications as follows:
	n=0	No security required. SNMPv2c and SNMPv3 communications are allowed.
	n=1	Authentication equivalent to 'authNoPriv' setting in SNMPv3. SNMPv3 is required to do authentication, SNMPv2c transmissions will be silently discarded.
	n=2	Authentication and encryption, equivalent to 'authPriv' setting in SNMPv3. SNMPv3 is required to do authentication and encryption, SNMPv2c and SNMPv3 authNoPriv transmissions will be silently discarded. Messages are both authenticated and encrypted to prevent a hacker from viewing its contents.
*SNMPTRAPDEST=[*host*]/ [*port*]	host=IP address port=TCP port	Controls destination for SNMP Trap messages.
		If port is 0 or host is empty, traps are disabled.
		Traps are sent out according to the SNMP security level (i.e. if the security level is 2, traps will be authenticated and encrypted). Currently, the only trap that can be generated is linkup.

TABLE 18. Other Settings

Command	Parameters	Details
*NUMTOIP=*n*		Convert 12 digit number to IP.
	n=0	Use as name.
	n=1	Use as IP.
\ACEPW=*pw*	pw=password	Change the ACE password to a new value. Password is case-sensitive. Default password is 12345.
		Ex. **AT\ACEPAW=new123**

When the RAVEN is in PassThru mode, the features of ALEOS, except serial commu-nications, are disabled. When the modem is in PassThru mode, you are communi-cating directly to the OEM module. Only this subset of AT commands will work while in PassThru mode. It is also necessary to note the model number of your modem, since the model number corresponds to the internal module.

Note: Many of these commands will not work (or will give different results) unless the modem is in PassThru Mode.

TABLE 19. Commands Usable with PassThru

Command	Parameters	Details
+++	*none*	AT Escape sequence Not proceeded by AT.
A/	none	Re-execute last command. Not proceeded by AT.
A	*none*	Answer - manual
E*n*		Toggle AT command echo mode.
	n=0	Echo Off
	n=1	Echo On.
H*n*		Hang-Up Command
	n=1	Hang-up
I[*n*]	*n*=0	The modem's module type.
	n=3	The OEM module's unique ID (ESN).
O	*none*	Online (Remote)
		Causes the modem to go from Command State to data state.
Q*n*		The AT quiet-mode setting. If quiet mode is set, there will be no responses to AT commands except for data queried.
	n=0	Off (Default)
	n=1	Quiet-mode on.
S0=*n*		Auto Answer
	n=0	Disable
	n=1-255	Enable after *n* number x 6 of seconds

TABLE 19. Commands Usable with PassThru

Command	Parameters	Details
S3=*n*	*n*=0-127 (ASCII character number)	Carriage Return Character The standard end of line character used to indicate the end of an AT command. This character is also used as the carriage return character for framing responses and result codes in command state.
S4=*n*	*n*=0-127 (ASCII character number)	Line Feed Character The standard line feed character sent by the modem to the host at the end of a response or return code in command state.
S5=*n*	*n*=0-127 (ASCII character number)	Backspace Character This register sets the character recognized as a backspace during command entry
S6=*n*	*n*=2-10	Wait for Blind Dial This register denotes the wait time, in seconds, before a blind dial (no dial tone detection).
S7=*n*	*n*=1-255	Wait For Carrier If no carrier from the remote modem is detected within the specified time, the modem goes on-hook.
S8=*n*	*n*=0-255	Comma Pause Time (Dial Modifier) Whenever a dial command contains the comma character, the contents of this register specify the pause time for each comma.
S9=*n*	*n*=0-255	Carrier Detect Response Time Specifies the time that the received carrier must be present for the modem to recognize it and turn on Data Carrier Detect (DCD) if applicable. The implementation is entirely at the IWF modem.
S10=*n*	*n*=1-2545	Lost Carrier Hang-up Delay (Remote) Specifies the amount of time that the carrier from the remote modem can be lost before the modem goes on-hook. This allows temporary disruptions to carrier without disconnecting. A setting of 255 causes the modem to disable Carrier Detect and presume carrier is always present.

TABLE 19. Commands Usable with PassThru

Command	Parameters	Details
S11=*n*	*n*=50-255	DTMF Dialing Speed (Remote)
		This specifies the duration of tones in DTMF dialing.
V*n*		Command Response Mode.
	n=0	Terse (numeric) command responses
	n=1	Verbose command responses (Default).
X*n*		Extended Call Progress Result mode.
	n=0	Turn off extended result codes (Default)
	n=1	Turn on result codes. This adds the text 19200 to the CONNECT response.
Z	*none*	Reset the Raven.
		Note: This command does nothing if *DATZ=1.
&F	*none*	Restore Factory Setting
&V	*none*	View active profile (the contents of the active registers).
&W	none	Writes all changed modem settings. If this command is not issued, any modified values will revert back to their previous values at modem reset.
!STATUS	*none*	Displays the current modem status. Format of response:
		Current band: <band>
C3210		Current channel: <chan>
		SID:<sid> NID:<nid> Roaming:<n>
		Temp:<temp>
		Pilot [NOT] acquired
		Modem has [NOT] registered
!RSSI *C3210*	*none*	Received Signal Strength
+CBIP?	*none*	Base Station IP Address
+CGSN	*none*	ESN (Electronic Serial Number)
+CICB		The mode for answering data/fax calls with A (Answer) or autoanswer via S0=1.
	n=0	Answer as voice (Default)
C3211	*n*=2	Voice
	n=3	Async data for next call, then revert to Voice

TABLE 19. Commands Usable with PassThru

Command	Parameters	Details
+CIMI	*none*	Mobile Station IP Address
+CMIP?	*none*	Received Signal Strength and Channel Frame Error Rate
+CSQ	*none*	Serving System
+CSS?	*none*	Capabilities
+GCAP	*none*	Model identification with supported frequency bands.
+WGMM	*none*	Serial number of the module.
+WHWV	*none*	PRL version
+WIMI=[*num*] *C3211*	*num*=IMSI	Set the IMSI. A valid IMSI is 15 digits in length; MCC (3), MNC (2), MIN2 (3), MIN1 (7). For support of Wireless Number Portability, changes to the IMSI will NOT update the MDN. Changes to the IMSI will automatically update the Access Overload Class values unless specifically modified using +WAOC command. Cingular will provide the IMSI.
+WMDN=[*num*] *C3211*	*num*=phone number	Set the Mobile Directory Number (MDN). Valid numbers are between 10 and 15 digits in length. For support of Wireless Number Portability in all non-RUIM software versions, changes to the MDN will update the IMSI_M portion (least significant 10 digits) of the IMSI. Changes to the MDN will also automatically update the Access Overload Class values unless specifically modified using the +WAOC command. The new IMSI_M and Access Overload Class values will not be visible in the WIMI and WAOC commands until after the changes are committed with the WCMT command. Cingular will provide the MDN.
+WSID=[*idx*], [*SID*],[*NID*] *C3211*	*idx*=The location in the SID/NID list to store the values. *sid*= system ID *nid*=network ID	Set SID and NID. The new SID/NID values are committed to NV with the +WCMT command. Cingular will provide the SID and NID. **Note:** A maximum of 20 index locations (0-19) are supported. Error 22 is returned if the specified index value is not in the valid range.

TABLE 19. Commands Usable with PassThru

Command	Parameters	Details
+WSPC=[*lock*],[*nnnnnn*] *C3211*	*lock*=	Service Programming Code
	0 - OTKSL(One Time Key Sub-sidy Lock)	Upon successful entry of this code, all other service pro-visioning AT commands may be used. Cingular will provide the unlock code and type.
	1 - MSL (Master Subsidy Lock)	If an OTKSL is used to enter provisioning mode, only the +WIMI, +WMDN, and +WCMT commands will be allowed. All other commands will return ERROR.
	nnnnnn=6 digit unlock code	**Caution:** This command supports five attempts to enter the correct service programming code. If five incorrect attempts are performed, the ME will power down.
		Note: Once the correct SPC code is entered, the module transitions to the Service Programming state. This state is not exited until a commit is done (+WCMT). While in the Service Programming state, subsequent validations of the SPC code are ignored until the Service Program-ming state is reset.
+WSSW	*none*	Software version of the module
+WVSS=[*n*] *C3211*	*n*=roam type	Preferred Roaming List
	0 - Home Only	**Note:** The values depend on the currently loaded PRL.
	1 - Automatic	Home only - Service on home systems
	2- Automatic A	For preferred systems:
	3- Automatic B	Automatic - Roaming allowed on affiliated systems
		For non preferred systems:
		Automatic-A - Roaming allowed on affiliated systems and any A band system
		Automatic-B - Roaming allowed on affiliated systems and any B band system
$QCVAD		The mode for answering data/fax calls with A (Answer) or autoanswer via S0=1.
	n=0	Answer as voice (Default)
C3210	*n*=3	Data for one call
	n=4	Data for all calls

TABLE 19. Commands Usable with PassThru

Command	Parameters	Details
~NAMLCK=*nnnnnn* *C3210*	*nnnnnn*=6 digit unlock code	The NAMLCK is the modem's 6-digit OTSL (One Time Subsidy Lock), MSL (Master Subsidy Lock), or SPC (Service Provisioning Code). Cingular will provide the unlock code. If the number is accepted by the modem, the OK result code is returned. If the number is rejected, the ERROR result is returned. If three successive Errors are returned, the modem must be reset to allow any further attempts. **Caution:** The modem permits 99 failures of this command during its lifetime. After that, the modem becomes permanently disabled.
~NAMVAL= *nam*[,*num,sid,nid*] *C3210*	*nam*=0 or 1; active account *num*=phone number *sid*= system ID *nid*=network ID	Write account activation data Cingular will provide the SID and NID. Following writing the values, the modem must be reset. **Note:** If ~NAMLCK has not been successfully executed, the modem returns ERROR.

Raven Specifications

Physical Characteristics:

- Weight: < 1 lb.
- Size: 3" wide x 1.1" high x 5.1" long
- Status LEDs
- RF Antenna Connector: 50 Ohm TNC
- Receive Diversity RF Antenna Connector: 50 Ohm SMA
- Serial Interface: RS232 DB-9F with

Data Services & RF Features:

- Network: 1900/850 MHz GPRS
- Transmit frequency: 1850-1910 MHz and 824-849 MHz
- Transmit power range at antenna port: 1.0 W for 1900 MHz and 0.8W for 850 MHz
- Transmitter can reduce output power when near a base station as per GSM specifications
- Receiver frequency: 1930-1990 MHz and 869-894 MHz
- Receiver sensitivity: typical -107 dBm (2.439% bit error rate)

- Multislot Class 8
- Circuit Switched Data Capable (14,400 Transparent and Non-Transparent Modes)

Environmental:

- Operating ranges: -30°C to +°C
- 10% duty cycle limit above 60°C
- Humidity: 5%-95% Non-condensing

Power Management:

- Low power consumption
- Input Voltage: 10 VDC to 28 VDC
- Input Current: 20 mA to 350 mA

Troubleshooting

Support web site

The Airlink web site is updated frequently with Setup Wizards, Utilities, FAQs, and other documentation.

http://www.airlink.com/support

Contacting Technical Support

For support assistance please email **support@airlink.com** or call **510-781-9760** Monday through Friday 6 AM to 5 PM Pacific Standard Time. Support is not available weekends or holidays.

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