IPSec

User Guide

2120028
Rev 2.2

SIERRA WIRELESS
HEART OF THE WIRELESS MACHINE®

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www.sierrawireless.com

Revision History

Revision number	Release date	Changes
1.x	Q2: 2008	IPSec User Guide documentation created.
2.x	Q2:2008	IPSec User Guide documentation revised and updated.

Contents

1: Introducing IPSec

IP protocol that drives the Internet is inherently insecure. Internet Protocol Security (IPSec), which is a standards-based protocol, secures communications of IP packets over public networks.

Organizations are striving to protect their communication channels from unauthorized viewing and enforcing authentication of the entities at the other side of the channel.

Unauthorized access to the sensitive data can be avoided by using IPSec. By applying security at the IP layer in the OSI model, communications can be protected. In this manner the upper layers in the OSI model can leverage the security services provided at the IP layer.

Sierra Wireless AirLink™ has added IPSec, as a latest addition to the list of features, in all the ALEOS-powered AirLink X and XT platforms of devices.

Overview

IPSec is a common network layer security control and is used to create a virtual private network (VPN).

The advantages of the IPSec feature includes:

- Data Protection: Data Content Confidentiality allows users to protect their data from any unauthorized view, because the data is encrypted (encryption algorithms are used).
- Access Control: Access Control implies a security service that prevents unauthorized use of a Security Gateway, a network behind a gateway or bandwidth on that network.
- Data Origin Authentication: Data Origin Authentication verifies the actual sender, thus eliminating the possibility of forging the actual sender's identification by a third-party.
- Data Integrity: Data Integrity Authentication allows both ends of the communication channel to confirm that the original data sent has been received as transmitted, without being tampered with in transit. This is achieved by using authentication algorithms and their outputs.

The IPSec architecture model includes the Sierra Wireless AirLink modem as a remote gateway at one end communicating, through a VPN tunnel, with a VPN gateway at the other end. The remote gateway is connected to a Remote network and the VPN is connected to the Local network. The communication of data is secure through the IPSec protocols.

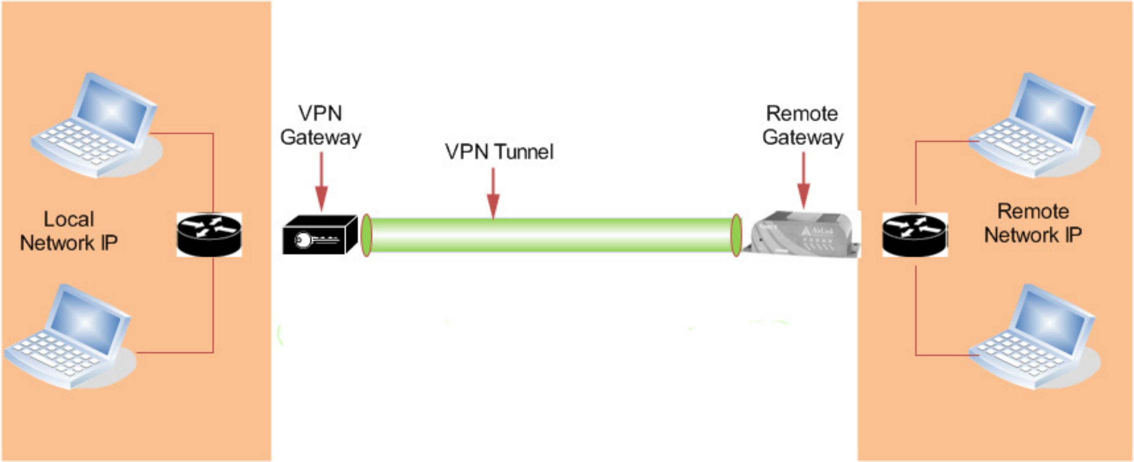


Figure 1-1: IPSec Architecture

Key Features of IPSec VPN

IPsec is compatible with a wide range of applications:

- Provides enhanced data security for all applications connected through a compatible Airlink gateway
- No additional installation required
- Simple wizard-based setup
- Remote management, control and configuration via AceWare tools and utilities
- Secure two-way communication channel with data encryption
- Can be downloaded, configured and installed over-the-air for currently deployed AirLink Raven X, PinPoint X and Raven XT device

Sections in this document, that provide further information about IPSec, are:

1. User scenarios with graphic illustration of the IPSec feature.
2. VPN configuration settings and VPN parameters.
3. IPsec configuration settings. It is assumed that audience has knowledge of AceManager.
4. Testing and basic troubleshooting.

Scenarios

Sierra Wireless AirLink modems with IPSec are designed to support the gateway-to-gateway security model.

IPsec is the most general security model, in that it allows either side to initiate a VPN session. Some user scenario's are discussed in this section.

In these examples, the term "VPN tunnel" is used to indicate a secure IPSec connection.

Remote Access Scenarios

1. This scenario shows three remote access activities:
   a. AVL Application Server (one way transmission of secure data): AirLink modem has GPS capability (PinPoint model). The modem has set up a VPN tunnel with a corporate VPN box and is configured to send GPS location data to the corporate network.

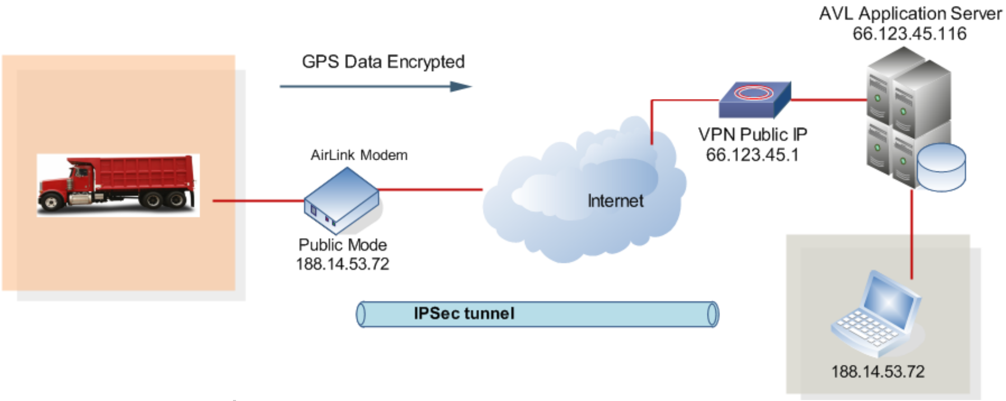


Figure 1-2: AVL Application Server scenario

   b. Corporate Email Server (two way transmission of secure data): AirLink modem is connected to a laptop. The modem setup has a VPN tunnel with the corporate VPN box. Through the modem, the laptop can securely access the corporate email server.

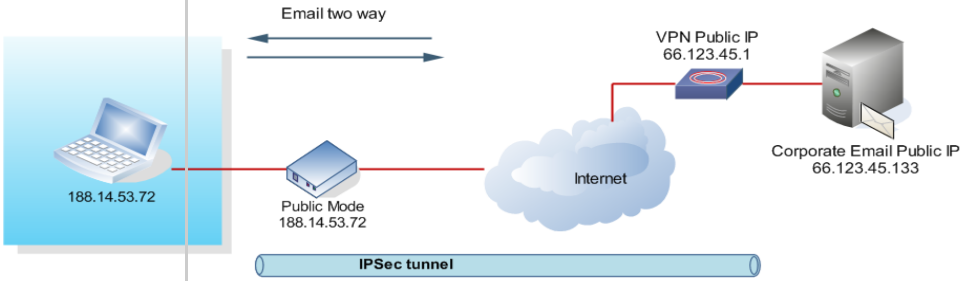


Figure 1-3: Corporate Email Server scenario

c. Google (two way transmission of insecure data): The laptop user wants to access Google. The Google access can be performed while the corporate VPN tunnel is active.

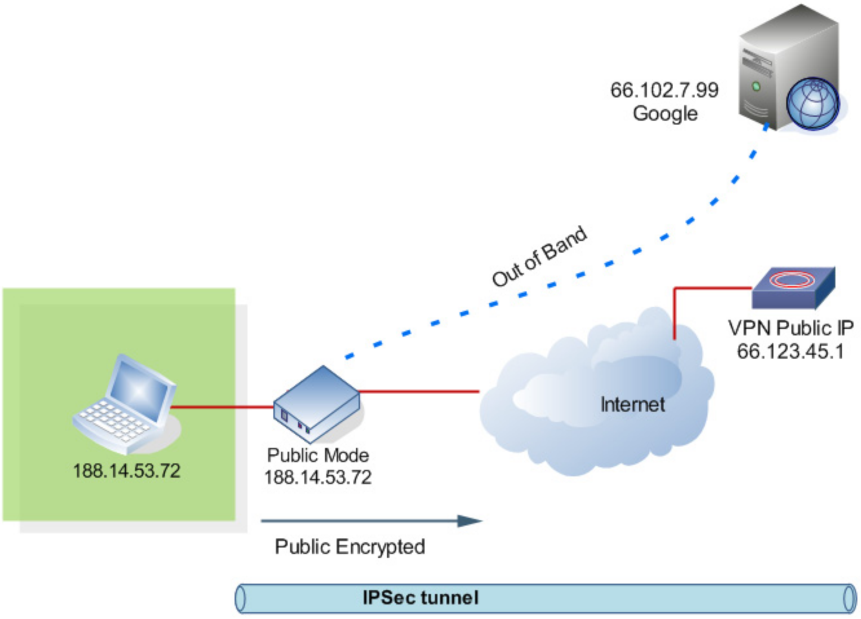


Figure 1-4: Web Server scenario

d. Pass-through (two way transmission of secure data): The AirLink modem has regular data connection with the laptop (VPN Client) and the VPN gateway.

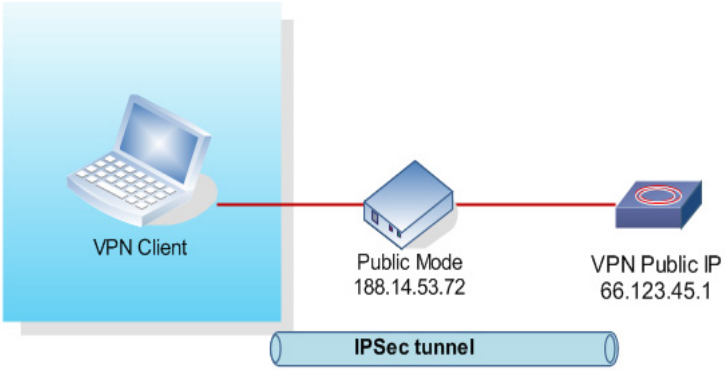


Figure 1-5: Pass through mode

The next chapter walks you through the installation and configuration steps of establishing an IPSec set-up on your modem to connect to the test servers at Sierra Wireless. You can follow the same process for connecting to your own VPN gateway.

2: Installation and Configuration

Note: Factory default settings allow you to connect to Sierra Wireless test equipment.

This chapter covers installation and configuration steps (Sierra Wireless test set-up), to use the IPSec feature.

The illustration below shows the user being connected to the Sierra Wireless test environment set up. The user laptop connected to an AirLink modem, communicates with the web server over the internet and through the Sierra Wireless VPN Gateway (Cisco and Netgear).

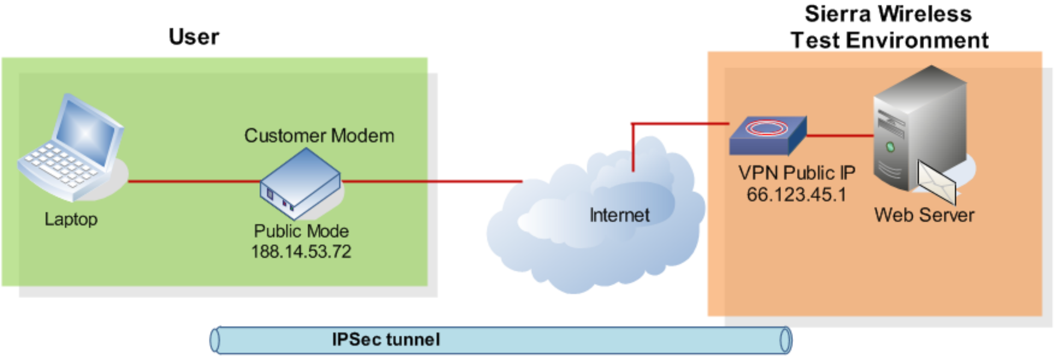
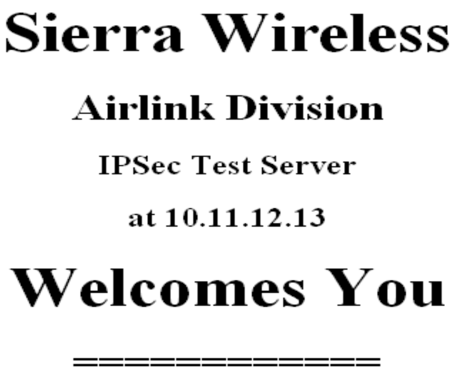


Figure 2-1: User set up

Once the tunnel is established and you are connected to the web server, the web browser displays connectivity to the Sierra Wireless IPSec test server.



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IPSec Test Server

at 10.11.12.13

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Figure 2-2: Connection to the web browser

Set-Up

IPSec has a wide variety of user configuration options. When IPSec is enabled, it must be done for the purpose of creating a VPN tunnel with a corporate VPN box. In order for the Sierra Wireless AirLink modem to communicate with the VPN box, the modem must be configured to support at least one of the security policies of the VPN box. Hence, the VPN box security configuration must be available as a reference before configuring the AirLink modem for IPSec.

The installation steps are as follows:

1. For Static IP: Using your modem's static IP, configure your Cisco VPN to allow a tunnel to be established with your modem's IP address.
2. For Dynamic IP: Configure your Cisco VPN to allow a tunnel to be established dynamically with your modem's current IP address
3. Connect your PC to the modem, and launch AceManager. Navigate to the IPSec configuration screen. Select the parameters that correspond to your Cisco configuration, and press the Write button on the top. Close AceManager.
4. Open a browser or other application and attempt to communicate with your enterprise network.

Modem Configuration Requirements

The modem should be provisioned and capable of passing traffic over the carrier network. If the modem is not provisioned, you will need to activate it in order to configure the account parameters. The Quick Start Guide for your modem will lead you through the steps to activate or configure your modem. You can access the Quick Start Guides on the support page for your modem. For 1x or EV-DO modems, you will also need a Setup Wizard, which is available on the support page as well.

The modem can have a static or dynamic IP address, which can be obtained from AceManager. The IP address is listed as the first displayed entry on the Status page.

The modem firmware version should be 3.3 or higher. If the modem firmware is 3.2 or lower, you will need to upgrade the modem firmware. Please contact your Sierra Wireless sales engineer for the appropriate firmware update utility.

Installation

Please uninstall any previous versions of AceManager that had been installed on your PC, prior to installing the latest version of AceManager.

AceManager is available for free from Sierra Wireless AirLink and can be downloaded from http://www.sierrawireless.com/support/AirLink/Wireless_Ace.aspx.

Once this new version of AceManager and the new firmware is installed on your PC, please perform a factory default reset of the modem using a AT command:

AT*RESETCFG

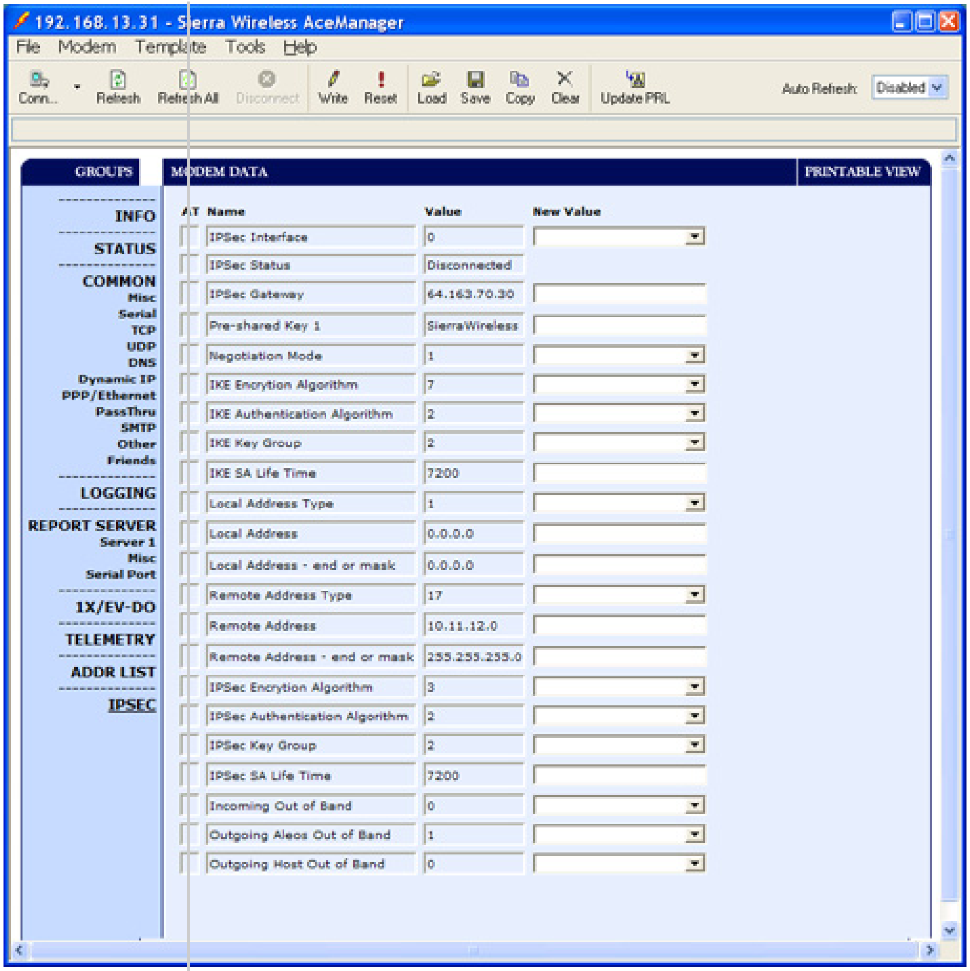
This command will reset the modem with factory defaults and once the modem comes back up, please connect the modem with AceManager.

Configuration Settings

Once the AceManager application is installed, you can run it from your Start menu or from the icon on the desktop.

1. Start AceManager

Start > All Programs >AirLink Communications > AceManager



AT	Name	Value	New Value
	IPSec Interface	0	
	IPSec Status	Disconnected	
	IPSec Gateway	64.163.70.30	
	Pre-shared Key 1	SierraWireless	
	Negotiation Mode	1	
	IKE Encrytion Algorithm	7	
	IKE Authentication Algorithm	2	
	IKE Key Group	2	
	IKE SA Life Time	7200	
	Local Address Type	1	
	Local Address	0.0.0.0	
	Local Address - end or mask	0.0.0.0	
	Remote Address Type	17	
	Remote Address	10.11.12.0	
	Remote Address - end or mask	255.255.255.0	
	IPSec Encrytion Algorithm	3	
	IPSec Authentication Algorithm	2	
	IPSec Key Group	2	
	IPSec SA Life Time	7200	
	Incoming Out of Band	0	
	Outgoing Aleos Out of Band	1	
	Outgoing Host Out of Band	0	

Figure 2-3: IPSec Pane in AceManager

2. Click on IPSec

The desired group tab will show respective parameters and details on the right side of the pane. Clicking on IPSec will display list of parameters with default values and user configurable input fields (New Value).

Table 2-1: Configuration Parameters in AceManager

Name	Default Value	Description
IPSec Interface	0	Select 1-Modem-OTA. Choose "0" fir disabling IPSec. Choose "1" for enabling IPSec. Choose "4" when you use ethernet for testing IPSec.
IPSec Status	Disconnected	Shows the status of IPSec.

Table 2-1: Configuration Parameters in AceManager

Name	Default Value	Description
IPSec Gateway	64.163.70.30	Fill in the IPSec of the VPN concentrator.
Pre-shared Key 1	SierraWireless	8 to 31 case sensitive ASCII characters
Negotiation Mode	1	The choices in drop down options are main or aggressive.
IKE Encryption Algorithm	7	You can choose other options like, Blowfish, 3 DES, Cast 128 and AES. 3DES or AES can be used for stronger encryption.
IKE Authentication Algorithm	2	Three different authentication algorithms are among the drop-down choices. 1-MD5 is for minimal security and 2-SH-1 is higher security. 5-SHA-256 is also an option.
IKE Key Group	2	Different Key Groups are, 1-DH1, 2-DH2 and 3-DH3.
IKE SA Life Time	7200 (seconds)	Enter the lifetime of VPN of how long it is valid. “0” reflects no expiry.
Local Address Type	1	Choose from drop-down menu. • “1” indicates Modem Public IP. It is the IP of the device behind the modem, when the modem is in public mode. • “2” indicates Host Private Subnet of the device behind the modem on the same subnet, when the modem is in private mode. • “5” indicates Single Address. • “17” indicates Subnet Address.
Local Address	0.0.0.0	Local Address of the device connected to the modem.
Local Address - end or mask	0.0.0.0	Subnet address with the Subnet Mask
Remote Address Type	17	Network behind the Concentrator.

Table 2-1: Configuration Parameters in AceManager

Name	Default Value	Description
Remote Address	10.11.12.0	Address of the remote device. Choose from two options: 5-Single Address and 17-Subnet Address.
Remote Address - end or mask	255.255.255.0	Subnet address with the Subnet Mask.
IPSec Encryption Algorithm	3	You can choose other options like, Blowfish, 3 DES, Cast 128 and AES. The option “0” indicates that IPSec encryption may not be used. 3DES or AES can be used for stronger encryption.
IPSec Authentication Algorithm	2	Three different authentication algorithms are among the drop-down choices. 1-MD5 is for minimal security and 2-SH-1 is higher security. 5-SHA-256 is also an option. “0” is also an option for not applying IPSec aunthentication algorithm.
IPSec Key Group	2	Different Key Groups are, 1-DH1, 2-DH2 and 5-DH5. DH5 denotes highest security
IPSec SA Life Time	7200 (seconds)	This indicates how often the modem renegotiates the IKE SA. While the renegotiation happens the VPN tunnel gets disconnected temporarily.
Incoming Out of Band	0	Enable (1) or Disable (0) access to modem remotely from machines that are not part of the IPSec network.
Outgoing Aleos Out of Band	1	Enable (1) or Disable (0) sending of ALEOS traffic over the IPSec tunnel to a remote location. This option allows ALEOS generated data (E.g. RAP) to be sent outside the IPSec tunnel.
Outgoing Host Out of Band	0	Enable (1) or Disable (0) access to resources outside the IPSec network. (e.g. Enable access to sites like www.google.com over non IPSec channel).

To confirm a successful connection, the following tests can be run:

- Connect a PC to the modem and attempt to ping the IP address 10.11.12.13. The tunnel might take some time to be established. However once the tunnel is established you will receive responses to your ping.
- Once the ability to ping the private address has been established, please try opening a browser and pointing it to http://10.11.12.13.

Once these two tests pass, a baseline for the IPSec configuration in the modem has been established.

You can now begin to make the IPSec configuration changes to get the modem connecting to your own IPSec gateway.

Different scenario use cases and their configuration steps in Ace Manager, to establish the IPSec tunnel, are addressed in the following sections.

HTTP Server

A PC connected to a Sierra Wireless AirLink Modem uses web browser to view an HTTP server behind the IPsec Gateway.

The Configuration steps are:

1. In AceManager, click on the IPSec tab. Please refer to Figure 2-3.
2. Configure the IPSec Interface parameter as "1", to enable IPSec. Once IPSec is enabled, the factory default settings should be restored. Table 2-1 lists all the IPSec parameter default values. The required fields for IPSec to be established are:

   a. IPSec Gateway

   b. Pre-shared Key 1

   c. IKE Encryption Algorithm

   d. IKE Authorization Algorithm

   e. IKE Key Group

   f. IKE SA Life Time

   g. Remote Address

   h. IPSec Encryption Algorithm

   i. IPSec Authentication Algorithm

   j. IPSec Key Group

   k. IPSec SA Life Time

   l. Incoming Out of Band: If you want mobile termination

m. Outgoing Host Out of Band: To access internet by bypassing the IPSec tunnel, you can set this parameter as “1”.

Note: In Chapter 1, Remote Access Scenarios section includes the Google web server scenario, where the outgoing Host Out of Band can be set to 1 to access internet outside the IPSec tunnel.

3. Click on **Write**, in the top bar.
4. Click on **Reset**, to reset the modem.
5. IPSec status displays as “Connected”.

Once the tunnel comes up, ping the web browser. The web browser should be able to reach the server. An example of a web browser screenshot, after the tunnel establishes, is provided.

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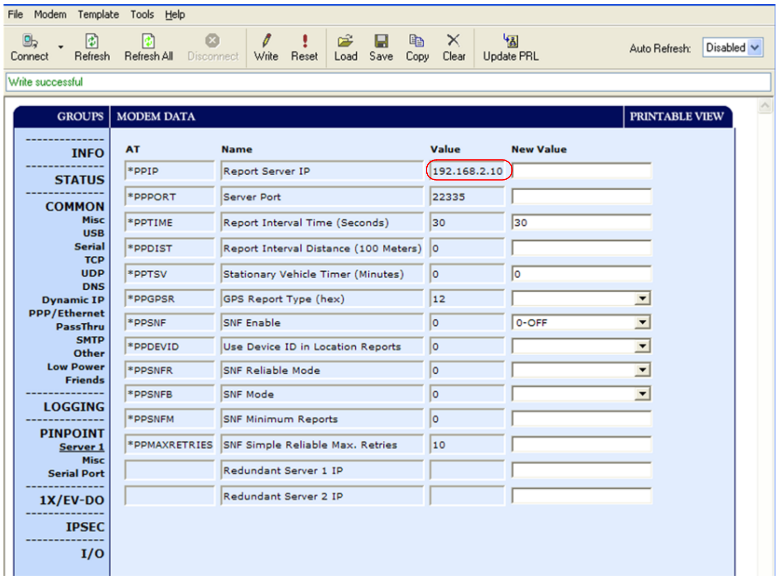
Figure 2-4: Web Browser

Application Server

A Sierra Wireless AirLink Modem sends AVL Application Server data through the tunnel for the Report Server that is behind the IPsec Gateway.

The Configuration steps are:

1. In AceManager, click on the PinPoint tab and ensure values that correspond to Figure 2-5.



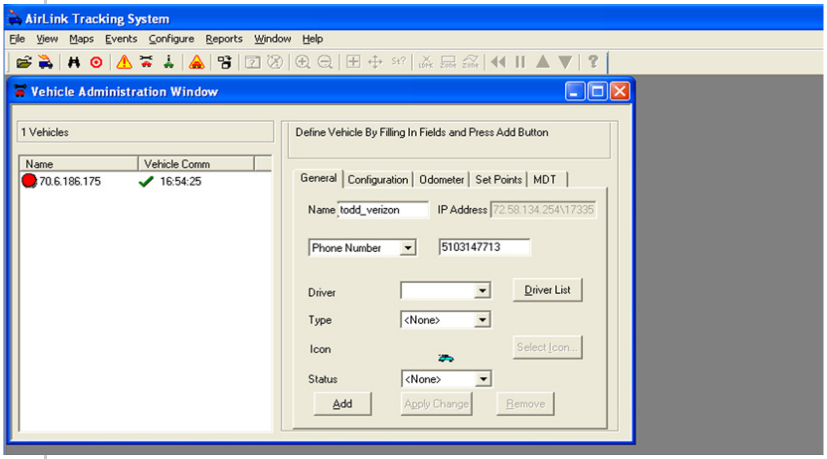
Write successful

AT	Name	Value	New Value
*PPIP	Report Server IP	192.168.2.10	
*PPPORT	Server Port	22335	
*PPTIME	Report Interval Time (Seconds)	30	30
*PPDIST	Report Interval Distance (100 Meters)	0	
*PPTSV	Stationary Vehicle Timer (Minutes)	0	0
*PPGPSR	GPS Report Type (hex)	12	
*PPSNF	SNF Enable	0	0-OFF
*PPDEVID	Use Device ID in Location Reports	0	
*PPSNFR	SNF Reliable Mode	0	
*PPSNFB	SNF Mode	0	
*PPSNFM	SNF Minimum Reports	0	
*PPMAXRETRIES	SNF Simple Reliable Max. Retries	10	
	Redundant Server 1 IP		
	Redundant Server 2 IP		

Figure 2-5: PinPoint Configuration

2. Provide the **Server IP Address** on the right-hand side pane.
3. Enter the **Report Interval** time.
4. Configure the **IPSec Interface** parameter as “1”, to enable IPSec. Once IPSec is enabled, the factory default settings should be restored. Table 2-1 lists all the IPSec parameter default values. The required fields for IPSec to be established are:
    a. IPSec Gateway
    b. Pre-shared Key 1
    c. IKE Encryption Algorithm
    d. IKE Authorization Algorithm
    e. IKE Key Group
    f. IKE SA Life Time
    g. Remote Address
    h. IPSec Encryption Algorithm
    i. IPSec Authentication Algorithm
    j. IPSec Key Group
    k. IPSec SA Life Time
    l. Incoming Out of Band: If you want mobile termination
    m. Outgoing Host Out of Band: To access internet outside the tunnel, from the modem.
5. Click on **Write**.
6. Click on **Reset**, to reset the modem.

An AVL Application server modem report notification image is provided as an example.


AirLink Tracking System
File View Maps Events Configure Reports Window Help
Vehicle Administration Window
General | Configuration | Odometer | Set Points | MDT
Driver List
Select Icon...
Add
Apply Change
Remove

1 Vehicles

Name	Vehicle Comm
70.6.186.175	✓ 16:54:25

Define Vehicle By Filling In Fields and Press Add Button

Name todd_verizon

IP Address 72.58.134.254\17335

Phone Number 5103147713

Driver

Type <None>

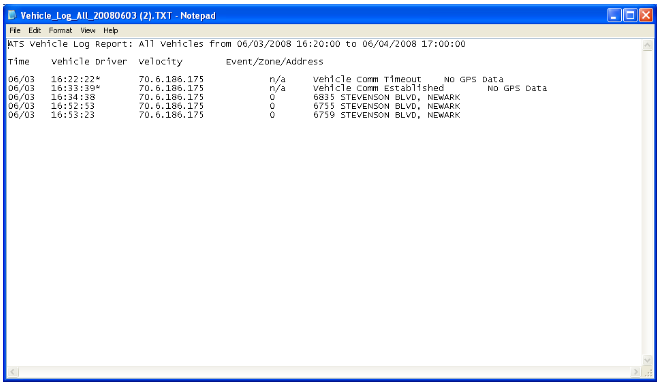
Icon

Status <None>

Figure 2-6: Application Server Tunnel

7. Once the tunnel comes up, check AVL Application server for the update.

An example of a log of the modem, sending data through the tunnel is provided.


Vehicle_Log_All_20080603 (2).TXT - Notepad
File Edit Format View Help

```
ATS Vehicle Log Report: All Vehicles from 06/03/2008 16:20:00 to 06/04/2008 17:00:00

Time    Vehicle Driver  Velocity        Event/Zone/Address

06/03   16:22:22*       70.6.186.175            n/a     Vehicle Comm Timeout    No GPS Data
06/03   16:33:39*       70.6.186.175            n/a     Vehicle Comm Established        No GPS Data
06/03   16:34:38        70.6.186.175            0       6835 STEVENSON BLVD, NEWARK
06/03   16:52:53        70.6.186.175            0       6755 STEVENSON BLVD, NEWARK
06/03   16:53:23        70.6.186.175            0       6759 STEVENSON BLVD, NEWARK
```

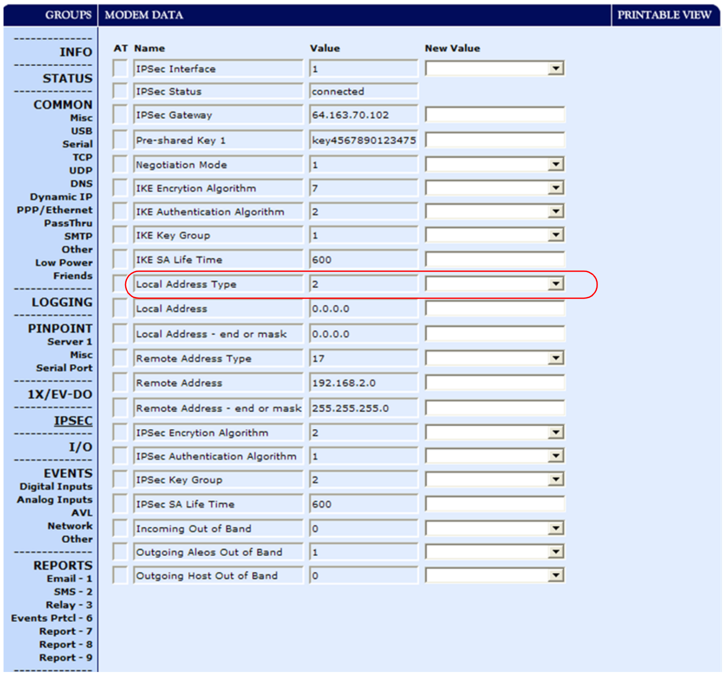
Figure 2-7: Log sending data

Network behind the modem

You can have multiple machines (For example., PC1 and PC2) behind the modem on the same LAN.

The Configuration steps are:

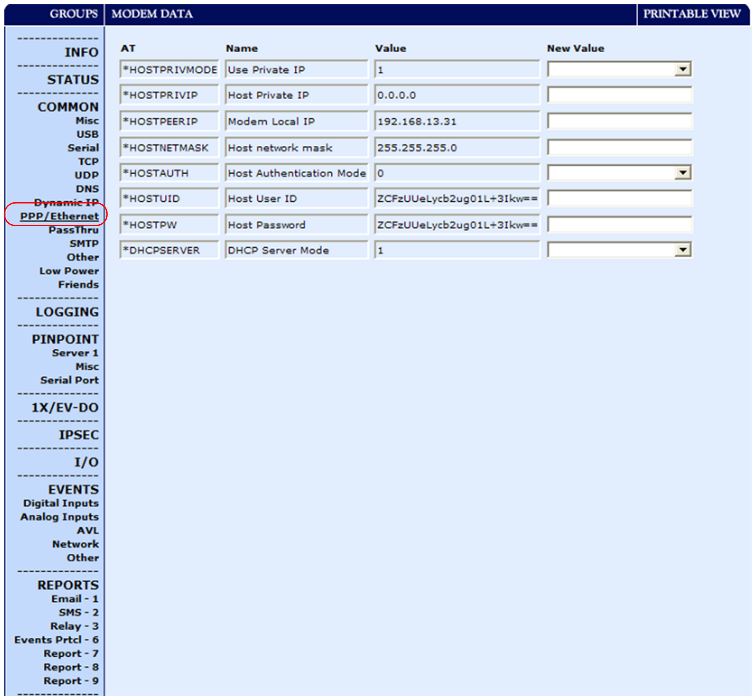
1. In AceManager, click on IPSec option.
2. Go to Local address type and set it to “2” (Host Private Subnet).



AT	Name	Value	New Value
□	IPSec Interface	1	
□	IPSec Status	connected	
□	IPSec Gateway	64.163.70.102	
□	Pre-shared Key 1	key4567890123475	
□	Negotiation Mode	1	
□	IKE Encrytion Algorithm	7	
□	IKE Authentication Algorithm	2	
□	IKE Key Group	1	
□	IKE SA Life Time	600	
□	Local Address Type	2	
□	Local Address	0.0.0.0	
□	Local Address - end or mask	0.0.0.0	
□	Remote Address Type	17	
□	Remote Address	192.168.2.0	
□	Remote Address - end or mask	255.255.255.0	
□	IPSec Encrytion Algorithm	2	
□	IPSec Authentication Algorithm	1	
□	IPSec Key Group	2	
□	IPSec SA Life Time	600	
□	Incoming Out of Band	0	
□	Outgoing Aleos Out of Band	1	
□	Outgoing Host Out of Band	0	

Figure 2-8: Host Private Subnet

3. Click on PPP ethernet. Set the modem to private mode.



AT	Name	Value	New Value
*HOSTPRIVMODE	Use Private IP	1	
*HOSTPRIVIP	Host Private IP	0.0.0.0	
*HOSTPEERIP	Modem Local IP	192.168.13.31	
*HOSTNETMASK	Host network mask	255.255.255.0	
*HOSTAUTH	Host Authentication Mode	0	
*HOSTUID	Host User ID	ZCFzUUeLycb2ug01L+3Ikw==	
*HOSTPW	Host Password	ZCFzUUeLycb2ug01L+3Ikw==	
*DHCPSERVER	DHCP Server Mode	1	

Figure 2-9: PPP Ethernet configuration

4. Configure the IPSec Interface parameter as “1”, to enable IPSec. Once IPSec is enabled, the factory default settings should be restored. Table 2-1 lists all the IPSec parameter default values. The required fields for IPSec to be established are:
   a. IPSec Gateway
   b. Pre-shared Key 1
   c. IKE Encryption Algorithm
   d. IKE Authorization Algorithm
   e. IKE Key Group
   f. IKE SA Life Time
   g. Remote Address
   h. IPSec Encryption Algorithm
   i. IPSec Authentication Algorithm
   j. IPSec Key Group
   k. IPSec SA Life Time
   l. Incoming Out of Band: If you want mobile termination
   m. Outgoing Host Out of Band: To access internet outside the tunnel, from the modem.
5. Make sure the static IP address of PC2 is on the same subnet as the modem’s host private IP. PC1 picks up the dynamic IP address and PC2 should be set to a static IP address.
6. Click on **Reset**, to reset the modem.

The IPSec tunnel is set up.

Now, you should be able to reach the other side of the server from PC1 an/or PC2. Both the machines (PC1 and PC2)can be communicated with, from the server through the IPSec tunnel. The modem is reachable from the remote server as well.

A: Sample Configuration File

VPN Configuration file

Two examples of Static IP and Dynamic IP are provided in the following sections, respectively.

Static IP

Example IPSec Configuration for Cisco 1841 Router

```
1841_ppx2#show run
Building configuration...

Current configuration : 2202 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname 1841_ppx2
!
boot-start-marker
boot-end-marker
!
!
no aaa new-model
!
resource policy
!
mmi polling-interval 60
no mmi auto-configure
no mmi pvc
mmi snmp-timeout 180
ip subnet-zero
ip cef
!
!
```

```
username progent privilege 15 password 0 progent
!
crypto isakmp policy 2
 encr 3des
 authentication pre-share
 group 2
 lifetime 28000
crypto isakmp key 6 key4567890123477 address 166.213.198.10
crypto isakmp key test address 70.2.190.17
!
!
crypto ipsec transform-set AES-SHA esp-aes esp-sha-hmac
crypto ipsec transform-set 3DES-SHA esp-3des esp-sha-hmac
!
crypto map IPSEC 30 ipsec-isakmp
 set peer 166.213.198.10
 set security-association lifetime seconds 28000
 set transform-set 3DES-SHA
 set pfs group2
 match address 101
crypto map IPSEC 40 ipsec-isakmp
 set peer 70.2.190.17
 set security-association lifetime seconds 28000
 set transform-set 3DES-SHA
 set pfs group2
 match address 102
!
!
!
interface FastEthernet0/0
 ip address 64.163.70.102 255.255.255.0
 ip nat outside
 ip virtual-reassembly
 duplex auto
 speed 10
 crypto map IPSEC
!
```

```
interface FastEthernet0/1
 ip address 192.168.2.1 255.255.255.0
 ip nat inside
 ip virtual-reassembly
 duplex auto
 speed auto
!
ip classless
ip route 0.0.0.0 0.0.0.0 64.163.70.1
ip route 192.168.3.0 255.255.255.0 70.2.190.17
ip route 192.168.13.0 255.255.255.0 166.213.198.10
!
no ip http server
no ip http secure-server
ip nat pool nat 64.163.70.102 64.163.70.102 netmask
255.255.255.252
ip nat inside source list 110 pool nat overload
!
access-list 101 permit ip 192.168.2.0 0.0.0.255 host 166.213.198.10
access-list 101 permit ip 192.168.2.0 0.0.0.255 host 192.168.13.100
access-list 102 permit ip 192.168.2.0 0.0.0.255 192.168.3.0 0.0.0.255
access-list 110 deny   ip 192.168.2.0 0.0.0.255 192.168.3.0 0.0.0.255
access-list 110 deny   ip 192.168.2.0 0.0.0.255 192.168.13.0
0.0.0.255
access-list 110 deny   ip 192.168.2.0 0.0.0.255 host 166.213.198.10
access-list 110 permit ip 192.168.2.0 0.0.0.255 any
!
!
control-plane
!
!
line con 0
line aux 0
line vty 0 4
 login local
 transport input all
!
end
```

Dynamic IP

```
1841b_dynamic#
1841b_dynamic#sh run
Building configuration...

Current configuration : 1479 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname 1841b_dynamic
!
boot-start-marker
boot-end-marker
!
no logging console
!
no aaa new-model
!
resource policy
!
mmi polling-interval 60
no mmi auto-configure
no mmi pvc
mmi snmp-timeout 180
ip subnet-zero
ip cef
!
!
!
!
!
username sw privilege 15 password 0 sw
!
!
```

```
!
crypto isakmp policy 100
 encr 3des
 authentication pre-share
 group 2
 lifetime 28000
crypto isakmp key 6 key4567890123477 address 0.0.0.0 0.0.0.0 no-
xauth
!
!
crypto ipsec transform-set 3DES-SHA esp-3des esp-sha-hmac
!
crypto dynamic-map MODEM-DYN-MAP 1000
 set security-association lifetime seconds 28000
 set transform-set 3DES-SHA
 set pfs group2
 match address 101
!
!
crypto map IPSEC 65535 ipsec-isakmp dynamic MODEM-DYN-MAP
!
!
!
interface FastEthernet0/0
 ip address 64.163.70.104 255.255.255.0
 ip virtual-reassembly
 speed 100
 full-duplex
 crypto map IPSEC
!
interface FastEthernet0/1
 ip address 192.168.4.1 255.255.255.0
 ip virtual-reassembly
 duplex auto
speed auto
!
ip classless
ip route 0.0.0.0 0.0.0.0 64.163.70.1
!
ip http server
no ip http secure-server
ip nat pool nat 64.163.70.104 64.163.70.104 netmask
255.255.255.252
ip nat inside source list 110 pool nat overload
!
access-list 101 permit ip 192.168.4.0 0.0.0.255 any
access-list 101 permit ip any 192.168.4.0 0.0.0.255
!
!
control-plane
!
!
line con 0
line aux 0
line vty 0 4
 login
!
end
```

B: IPsec Architecture

Standards of the M2M IPSec Support

Sierra Wireless M2M IPSec supports the following standards:

- RFC 1829 – “The ESP DES-CBC Transform”
- RFC 2401 – “Security Architecture for the Internet Protocol”
- RFC 2403 – “The Use of HMAC-MD5-96 within ESP and AH”
- RFC 2404 – “The Use of HMAC-SHA-1-96 within ESP and AH”
- RFC 2405 – “The ESP DES-CBC Cipher Algorithm With Explicit IV”
- RFC 2406 – “IP Encapsulating Security Payload (ESP)”
- RFC 2410 – “The NULL Encryption Algorithm and Its Use With IPSec”
- RFC 2451 – “The ESP CBC-Mode Cipher Algorithms”
- RFC 3602 – “The AES-CBC Cipher Algorithm and Its Use with IPSec” (future enhancement)

Security Algorithms:

1. Internet Key Exchange (IKE)
   a. Authentication for IKE Messages (Hashing Algorithms)
   - MD5
   - SHA1

   b. Exchange Modes Supported in Phase 1 and Phase 2 of IKE
   - Main Mode
   - Aggressive Mode
   - Quick Mode
   - Informational Mode

   c. Authentication Methods (used in Phase 1)
   - Authentication using pre-shared keys
   - Authentication using RSA signatures

   d. Oakley Groups: used during Phase 1 to calculate keys for the IKE Security Association
   - First Oakley Group (MODP 768)
   - Second Oakley Group (MODP 1024)
   - Fifth Oakley Group (MODP 1536)
   - MODP 2048 (available, but not currently supported)
   - MODP 3072 (available, but not currently supported)

- MODP 4096 (available, but not currently supported)
- MODP 6144 (available, but not currently supported)
- MODP 8192 (available, but not currently supported)

2. IP Security (IPSec)

a. IPSec Protocols

- Encapsulating Security Protocol (ESP)

b. Operational Modes

- Tunnel Mode

c. Cipher or Encryption Algorithms

- DES
- CAST128
- Blowfish
- AES (future)
- NULL encryption algorithm

d. Usage Options – Modem can support unencrypted traffic, and one option below for encryption:

- No authentication or encryption
- Authentication only
- Encryption only
- Authentication and Encryption

Reference Material

National Institute of Standards and Technology. Guide to IPsec VPNs. Retrieved January 7, 2008, from http://csrc.nist.gov/publications/nistpubs/800-77/sp800-77.pdf for IPsec White Paper resource.

5 Articles on IPsec by Cisco: http://www.ciscopress.com/authors/bio.asp?a=523e2313-3b15-4e8e-b051-c71d7fd6528d&rl=1

IPsec setup on Linux (includes useful examples): http://lartc.org/howto/lartc.ipsec.html

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