



**Cedar 880AG
Enterprise Dual-Radio
Access Point/Bridge
User Guide**

Release 1.3
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United States and Japan 802.11a 5250 Mhz ~ 5350 MHz Usage Note:

Due to US and Japan DFS requirement, the 802.11a radio frequency usage from 5250 Mhz to 5350 MHz is temporarily disabled for US and Japan models. This band will be enabled in the future through firmware upgrade after the product has finished and passed DFS test.

FCC Compliance

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

The users are prohibited from making any change or modification to this product, any modification to this product shall void the user's authority to operate under FCC Part 15 Subpart A Section 15.21 regulations.

“This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and, (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Reader should be positioned so that personnel in the area for prolonged periods may safely remain at least 20 cm in an uncontrolled environment from the reader's surface. Observe FCC OET Bulletin 56 “Hazards of radio frequency and electromagnetic fields” and Bulletin 65 “Human exposure to radio frequency electromagnetic fields.”

Frequency Stability Statement

A carefully chosen AT-cut crystal resonator that offers tight frequency tolerance and stability over operating temperature is used in this device so that frequency stability of

this device is ensured to be within +/- 15 ppm that an emission is maintained within the band of operation under all conditions of normal operation as specified in this users guide.

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1 Introduction

This manual contains information on configuring and managing the Intelicis Enterprise Dual-Radio Access Point – Cedar 880 product family. It is organized into the following chapters:

- **Introduction:** Overview of the wireless network and access point deployment
- **Installation:** Description of the Cedar 880 hardware
- **Initial Configuration:** Description of Cedar 880 initial configuration and the management interfaces
- **System:** Instructions for changing system parameters
- **Network:** Instructions for changing network parameters
- **Security:** Instructions for configuring RADIUS and authentication profiles
- **Wireless Network:** Instructions for configuring and monitoring wireless network
- **Management:** Instructions for changing management interface settings
- **Log:** Description of the log file
- **Monitor:** Description of how to monitor the system
- **Command Line Interface:** Description of Command Line Interface (CLI) syntax

1.1 *Wireless Network*

A wireless network is a flexible data communications system that extends the capability of the existing wired network to provide connectivity for wireless devices. Unlike the traditional wired network which relies on physical cables and wires to transmit and receive data, a wireless network relies on radio frequency (RF) technology to transmit and receive data.

A Wireless Access Point (AP) is a device that connects wireless communication devices. It is usually connected to a wired network on one end, and relays data to the wireless network on the other end.

The advent of the wireless network opens up the possibility of what a network infrastructure can be. Without the restriction of wires, the network can move with users and change as fast as the organization does. Figure 1.1 illustrates a sample wireless network.

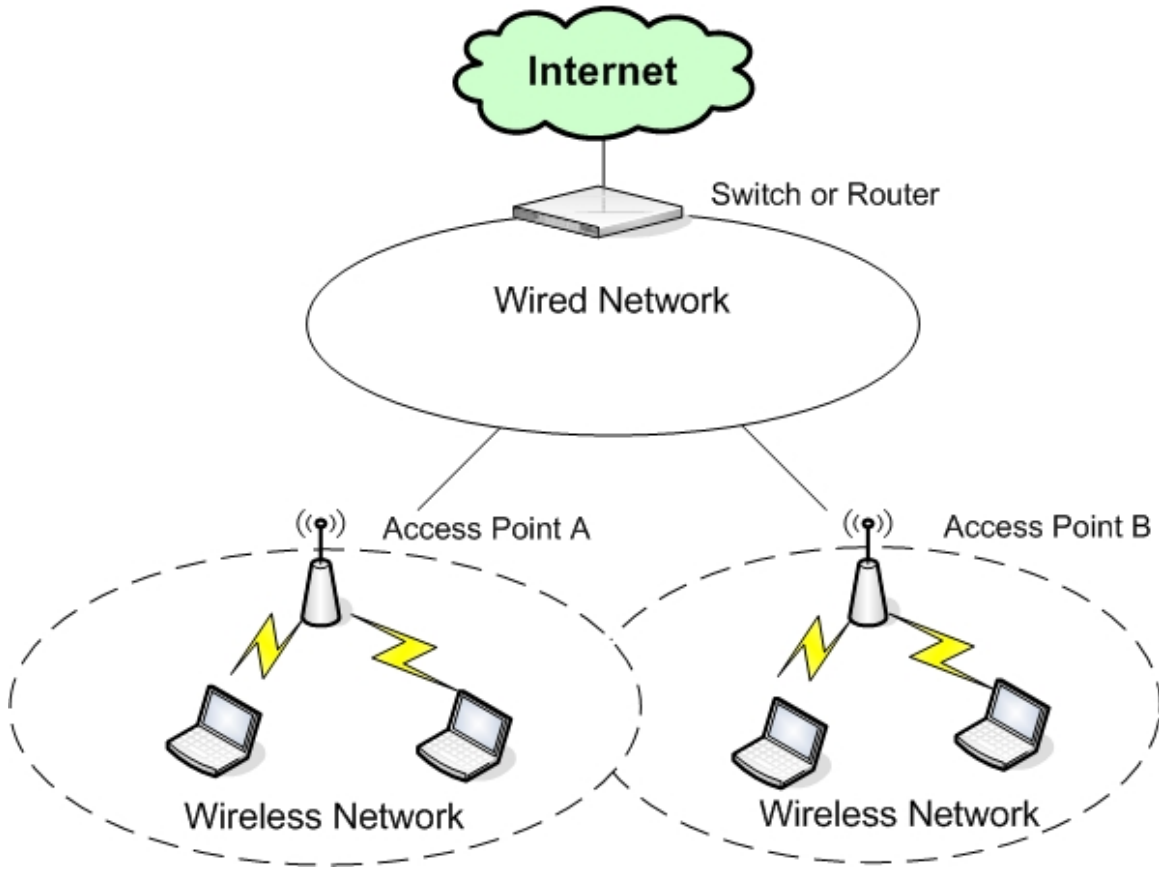


Figure 1.1 Wireless Networks

1.2 Wireless LAN Bridge

Cedar Wireless Access Point provides the capability of being configured as a regular Access Point, a Wireless LAN Bridge or both. A Wireless LAN Bridge wirelessly connects two or more Ethernet LANs together. It is a very practical, easy and in most cases inexpensive way to connect Ethernet LANs or extend the range of existing WLANs. As illustrated in Figure 1.2 and 1.3, the access point can operate in point-to-point or point-to-multipoint bridge topology.

Point-to-point

Point-to-point link allows you to use two access points to bridge two Local Area Networks from different locations. Access point A serves as a base bridge while Access point B serves as a non-base bridge. Both access points relay data between the two

networks. This is an ideal topology for connecting main office with warehouse, or between office buildings.

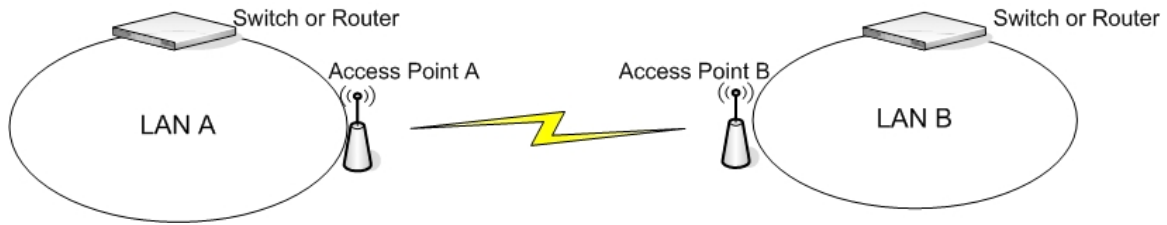


Figure 1.2 Point-to-Point Bridge

Point-to-Multipoint

Point-to-Multipoint Bridge allows you to use multiple access points to bridge Local Area Networks from different locations. Access point A serves as a base bridge while Access point B and C serve as non-base bridges. This is an ideal topology for central office to collect data from remote offices.

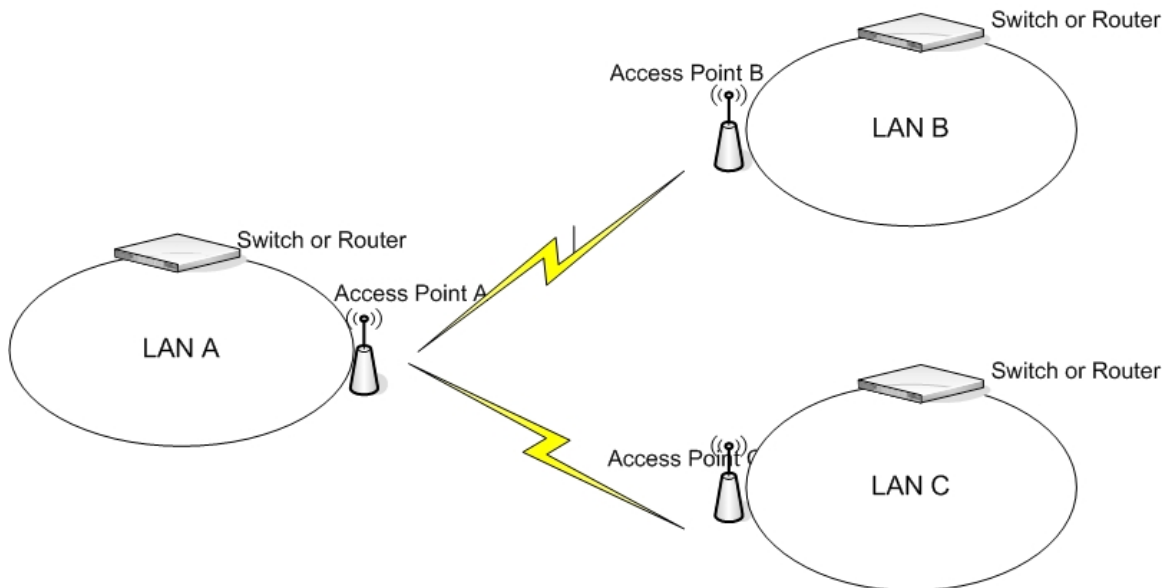


Figure 1.3 Point-to-Multipoint Bridge Mode

1.3 Access Point Deployment

The deployment of access point depends greatly on the building structure, the existing wiring and the type of service to be deployed. For example, RF signals transmit much easier through a wood-frame building than through a concrete one. For newly constructed

buildings where Ethernet cable CAT 5 is pre-installed, wiring is not a concern. For older construction, where re-cabling is cost prohibitive, a solution which is less dependent on wiring such as LAN Bridge may be more viable.

The access point coverage areas should overlap to ensure there are no gaps and roaming clients always have a connection available. In addition, the number of active wireless users and the type of service they are using (e.g. VoIP) are important factors to consider.

1.4 Application Deployment

Applications can be deployed easily after a network infrastructure is in place. Figure 1.3 illustrates a possible scenario:

- High Speed Internet Access is available for all wireless clients.
- Voice over IP applications can be used for calling over the Internet.
- Streaming media data can be offered over the IP network.
- Handheld devices for mobile staff can easily communicate with each other.
- All voice, video and data are transmitted seamlessly using QoS technology.

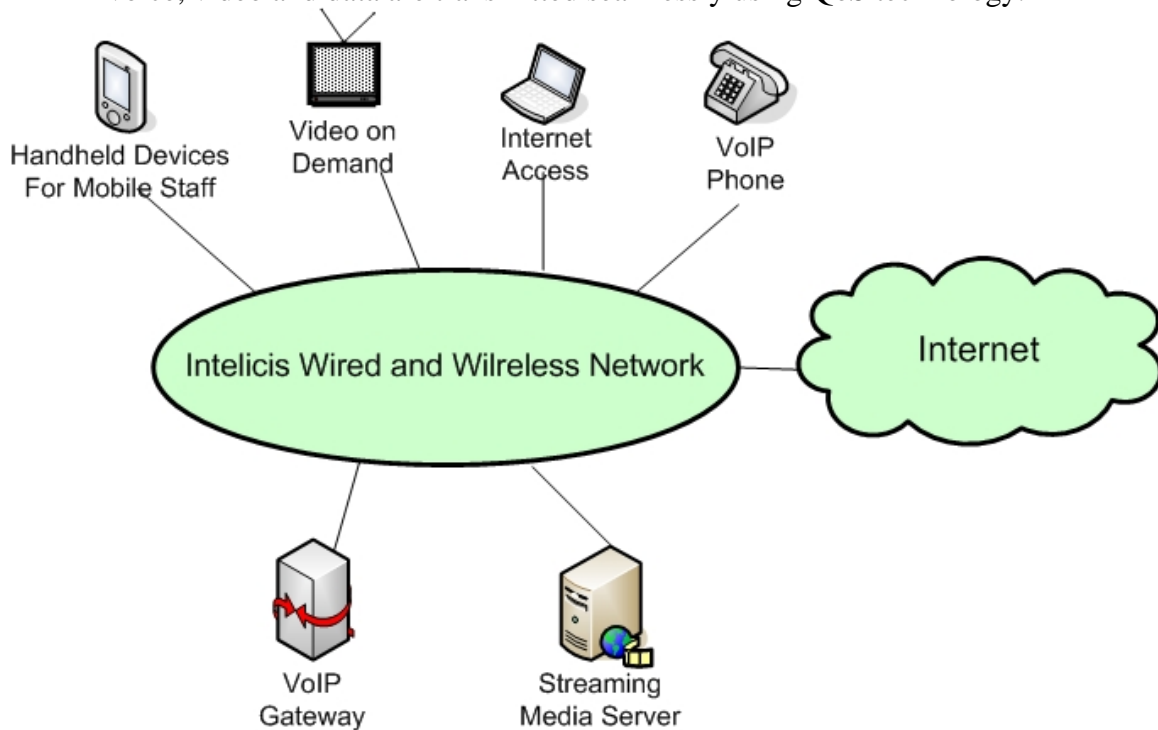


Figure 1.3 Application Deployments

2 Installation

This chapter provides instructions on how to install Cedar 880AG.

2.1 Package Contents

Before installation, please inspect the package contents first and report any missing or damaged items to your sales representative. This package should contain the following:

- Cedar 880AG Dual-Radio Access Point
-
- Mounting rubber foot (for desktop installation) (4)
- Power Adaptor
- CAT5 Ethernet cable (RJ45 to RJ45)
- Cedar 880AG Product Resource CD

2.2 Physical Description

2.2.1 Top Panel



Figure 2.1 Cedar 880AG Top Panel

- **Power LED**
This Power LED is constantly ON when power is applied.
- **Ethernet Link/Activity LED**
This LED is ON when Ethernet establishes link; flashing when there is Ethernet activity.
- **802.11a Wireless LED**
This LED is slow flashing when 802.11a wireless is ready for client to associate; fast flashing when there is traffic on 802.11a wireless.

-  **802.11g Wireless LED**

This LED is slow flashing when 802.11g wireless is ready for client to associate; fast flashing when there is traffic on 802.11g wireless.

2.2.2 Rear Panel

- **DC Power Jack**

The DC power jack provides the connection to the external 5V DC 2A power supply.

- **Reset Button**

The Cedar 880AG rear panel contains one reset button which will reset the unit to the manufacturer's default configuration. Press and hold the button down for at least 5 seconds and the unit will automatically reboot and reset to the manufacturer's default configuration.

- **RJ45 Connector**

The RJ45 connector provides the connection switch or gateway through a CAT 5 cable. This connector also provides the connection to PoE power source.





- **DB9 Connector**

This DB9 connector provides the connection to the PC serial port for local management. A straight RS232 cable is needed (not included in the package).

- **Antenna Connectors**

Two reverse polarity TNC jack connectors are provided for connecting to antennas. The antennas must have a reverse polarity TNC plug connector to be used with Cedar 880AG.

2.2.3 LED Description

LED	Color	Indication
	Green, solid	The unit power is on.
	Off	The unit power is off.
	Blue, solid	The Ethernet port has successful link.
	Flashing	The Ethernet port is linked and has activity
	Orange, slow flashing	The 802.11a wireless is ready for client to associate.
	Fast flashing	There is activity on 802.11a wireless
	Off	The 802.11a wireless is not ready.
	Orange, slow flashing	The 802.11g wireless is ready for client to associate.
	Fast flashing	There is activity on 802.11g wireless
	Off	The 802.11g wireless is not ready.

2.3 Install the Unit

2.3.1 Mounting Options

The Cedar 880AG is designed with two installation options:

- On desktop or shelf
- Wall mount

Mounting Cedar 880AG on desktop or shelf:

- Adhere the 4 mounting rubber feet to the bottom of the unit.
- Place the unit on a secure, flat surface.

Mounting Cedar 880AG on wall:

- At desired wall location, position nails to match the wall mount holes on the bottom of the unit.
- Secure unit firmly on the nails.

2.3.2 Supplying Power to the Unit

The Cedar 880AG is equipped with a universal 100-240 VAC, 50/60 Hz power supply. To power the unit, connect the included power adaptor to the wall outlet and plug the DC output connector into the power jack on the rear panel of Cedar 880AG.

Cedar 880AG also supports the 802.3af PoE standard. If your switch or gateway has the capability to supply PoE to remote devices, simply connect the Ethernet cable from your switch or gateway to the RJ45 connector on the rear panel of Cedar 880AG. This will automatically supply power to the unit.

2.4 Connecting Cedar 880AG

To establish a connection to Cedar's console interface, you will need to:

- Connect a regular straight serial cable to the console port located on the rear panel of the unit.
- Connect the other end of the serial cable to a terminal or PC.

After the unit is turned on, the LEDs on the top panel will follow the pattern described below:

- The Power LED goes on.
- The Ethernet LED will be ON if the Ethernet port is connected to a switch or gateway and a valid link is established.
- After 30 seconds, the 802.11a and 802.11g LEDs will be flashing.

3 Initial Configuration

This chapter contains the following information:

- Discover AP's IP address using Scan Tool
- Cedar's default settings
- Web Management Interface
- Command Line Interface

3.1 Scan Tool

Cedar 880AG by default acquires its IP address and subnet mask from the DHCP server. The administrator can use the Scan Tool to find out the AP's IP address.

Scan Tool is a utility that is included in the AP CD-ROM. It scans the network and displays all the available Cedar Access Points. Scan Tool provides the following functions:

- Discover Cedar AP's IP address, MAC address and firmware version.
- Change AP's IP address.
- Upgrade AP's firmware
- Switch on/off AP's telnet, SNMP and web interface.

Please follow the steps described below to use the Scan Tool:

1. Insert the installation CD into your CD-ROM drive to install the Scan Tool software. Follow the on-screen instructions to install Scan Tool on your computer.
2. Scan Tool requires Java 1.4 or newer version installed on your computer. You can choose to install Scan Tool along or with the Java software.
3. Double click the Scan Tool icon on the desktop to launch the Scan Tool software. Scan Tool scans the local area network and displays all the Cedar Access Points that it discovers (Figure 3.1).

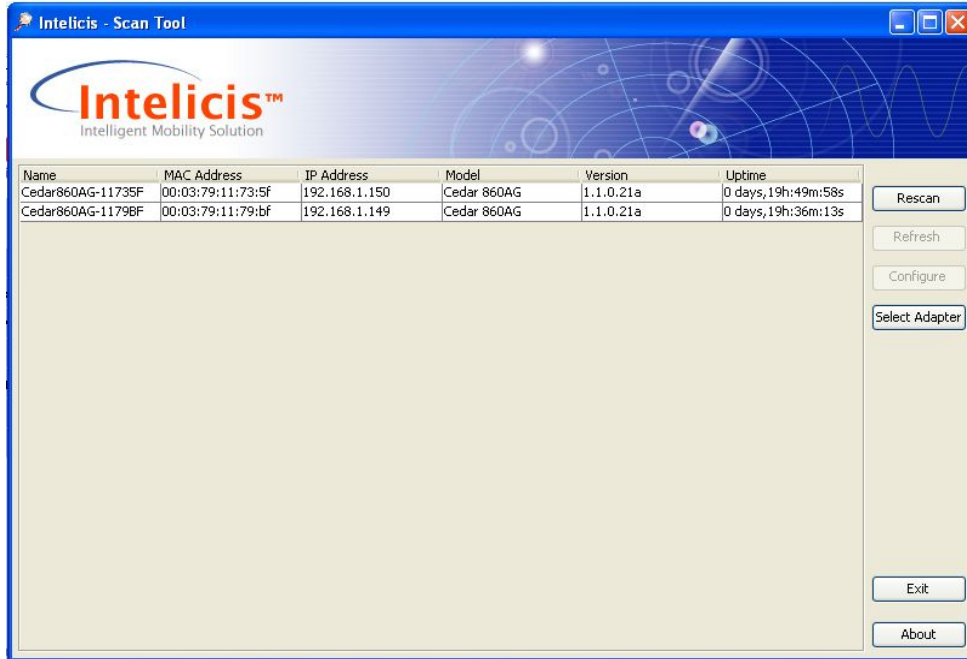


Figure 3.1 Scan Tool Main Screen



4. Locate the AP you want to manage by using the MAC address (AP's MAC address can be found at its back panel). If the AP has acquired an IP address from the DHCP server, use it to log in to AP's web interface (section 3.3).
5. If DHCP server is not available in the system, AP's IP address is displayed as 0.0.0.0. Click the AP entry and then the **Configure** button to enter the configure IP screen (Figure 3.2).



Figure 3.2 Scan Tool Configure IP Screen

6. The administrator can assign a static IP address to the AP by :
 - a) Change IP address mode to static
 - b) Enter IP address, subnet mask and gateway IP address.
 - c) Provide the SNMP read/write community name in order to make any configuration change. The Cedar initial SNMP read/write community name is *private*.

 7. You can also use Scan Tool to upgrade the AP firmware by clicking the **Upgrade** tab:
 - a) Select either FTP or TFTP protocol.
 - b) Enter server IP address, firmware name and optional FTP login name and password.
 - c) Provide the SNMP read/write community name. The Cedar initial SNMP read/write community name is *private*.

 8. In case SNMP, telnet or web interface are accidentally turned off, Scan Tool can be used to turn them back on again by clicking the **Advanced** tab.
-  Intelicis Scan Tool scans Intelicis access points only. It does not scan access points from other manufactures.
-  Please run one instance of Scan Tool on a network. Running multiple instances may receive incorrect scan result.

3.2 Default Setting

Table 3.1 lists Cedar's manufacturer default settings:

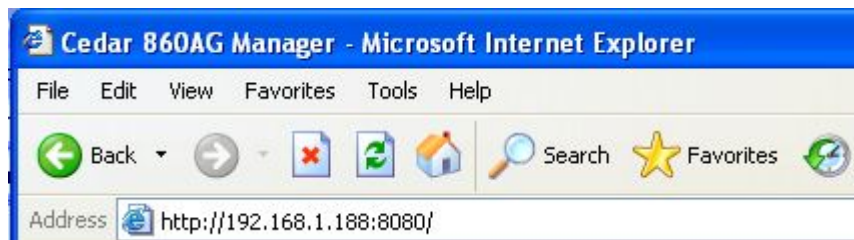
Default login name	admin
Default login password	changeitnow
Default enable password	changeitnow
Default IP address	Acquired from the DHCP server.
Default subnet mask	Acquired from the DHCP server.
Default gateway	Acquired from the DHCP server.
Default DNS IP address	Acquired from the DHCP server
Default management VLAN ID	Untagged

Default SSID for Radio 1	Intelicis-a
Default SSID for Radio 2	Intelicis-g

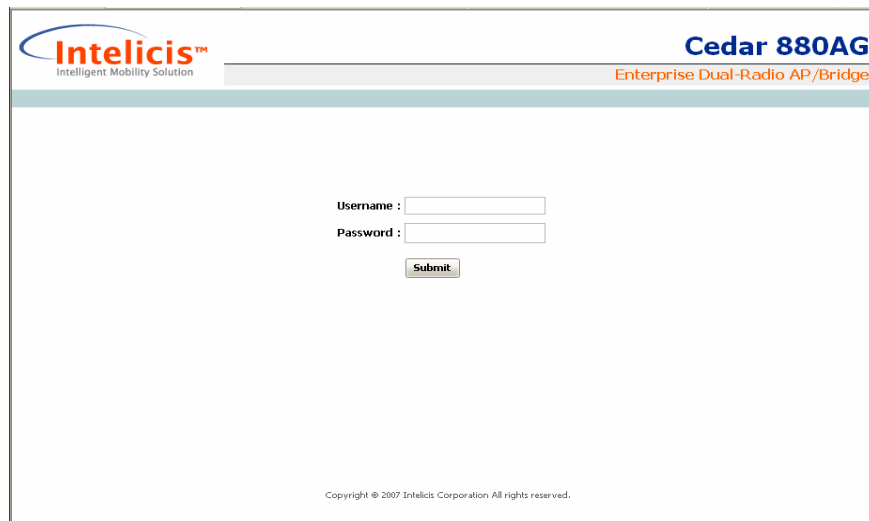
Table 3.1 Cedar Manufacturer Default Setting

3.3 Web Management Interface

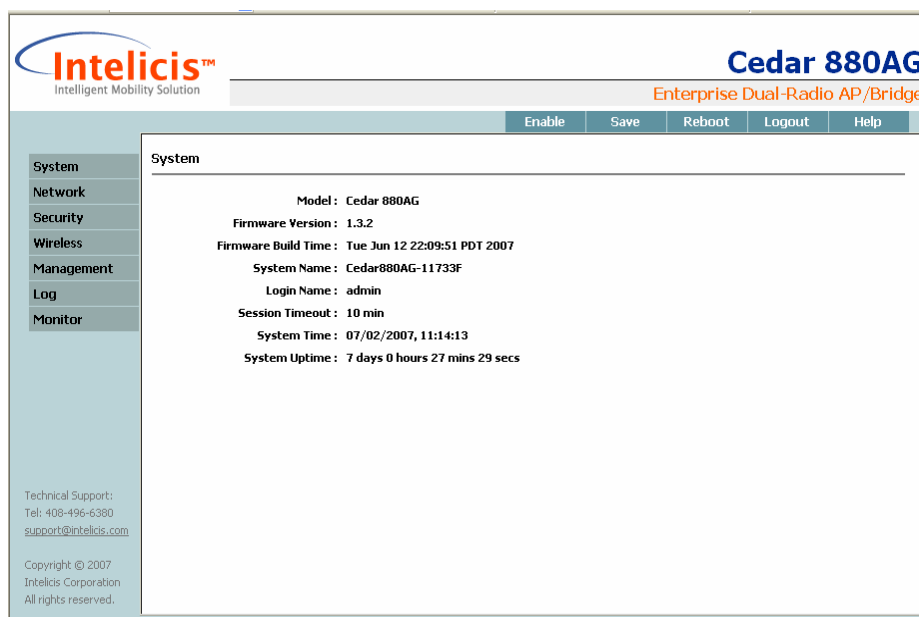
The Cedar Web Management Interface is accessible from any web browser on the network. Enter the Cedar IP address and port 8080 in the browser address line to activate the Cedar Web Interface.



You will be prompted for username and password. Enter the default username “admin” and password “changeitnow”.



After the initial login, the home page is displayed. The administrator now has easy access to configuring system parameters as well as managing any AP activities.



3.3.1 Menu

The menu displayed on the left side of the screen allows the administrator to perform the following configurations:

- **System:** Configure system parameters such as system name, password and upgrade
- **Network:** Configure network parameters such as IP address, default route and VLAN
- **Security:** Configure security parameters such as RADIUS and authentication profiles
- **Wireless:** Configure wireless parameters such as SSID, radios
- **Management:** Configure Telnet, SSH and SNMP parameters
- **Log:** Display system log file
- **Monitor:** Display statistics and usage of the system

3.3.2 Tool Bar

The tool bar located in the upper right-hand corner provides a shortcut to frequently used operations. Here is a summary of each of their functions.

Enable

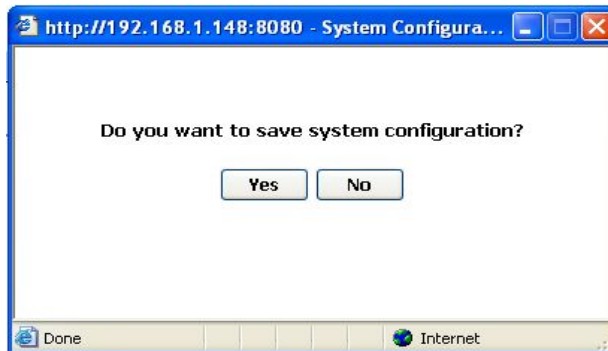
Cedar 880 has two operating modes: normal and privilege. The normal mode allows the administrator to view most, but not all of the system parameters. The privilege mode allows the administrator to view all of the system parameters as well as modify them.

In order to perform any configuration changes, you need to be in the privilege mode. To enter the privilege mode, click **Enable**, and enter your privilege password.



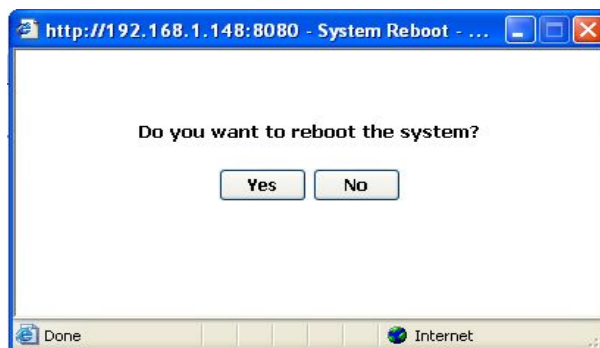
Save

All configuration changes must to be saved into the system. One efficient way of doing this is by clicking **Save**. The save operation is required; otherwise changes will be lost after reboot.



Reboot

Sometimes, you may need to reboot the system in order for any new changes to take effect. Click **Reboot** to reboot the system.



Logout

Click *Logout* to log out of the system.

Help

Click *Help* to receive on-line help information.

4 System

This chapter contains information on the following topics:

- Change system setting
- Change password and privilege password
- Upgrade
- Execute CLI command file

4.1 System Setting

Select *System* > *Setting* to change system parameters.

The screenshot shows the web interface for the Cedar 880AG Enterprise Dual-Radio AP/Bridge. The page title is "System > System Setting". The interface includes a navigation menu on the left with options: System, Network, Security, Wireless, Management, Log, and Monitor. The main content area displays the following settings:

- Model: Cedar 880AG
- Firmware Version: 1.3.2
- Firmware Build Time: Tue Jun 12 22:09:51 PDT 2007
- System Name: Cedar880AG-11733F
- Login Name: admin (This parameter won't take effect until you log in again.)
- Session Timeout: 10 min
- System Time: 07/02/2007, 11:17:19
- System Uptime: 7 days 0 hours 30 mins 34 secs
- SNTP Setting: On Off
- SNTP Server: time.nist.gov (IP or Hostname)
- SNTP Offset: +8

Buttons for "Apply" and "Cancel" are located at the bottom of the settings area. The top right of the page has buttons for "Enable", "Save", "Reboot", "Logout", and "Help".

System Name

The **System Name** is a descriptive string (maximum length of 20) that describes the system. The default value is <none>.

Login Name

The administrator uses the combination of **Login Name** and **Login Password** to log in to Cedar. After log in, the administrator can view most of the system parameters. In order to view all of the system parameters and perform any changes, the administrator needs to enter the privilege mode.

The **Login Name** may have a maximum length of 31. The default value is "admin".

Session Timeout

The Cedar Command Line Interface times out after the session is inactive for a period of time. This parameter specifies the time out period in minutes. The default is 10 minutes.

SNTP Setting

This Simple Network Time Protocol (SNTP) setting is used to synchronize computer clocks on the Internet. If the setting is on (default), Cedar automatically synchronizes its clock with the reference SNTP Server.

SNTP Server

Specify the IP address or the host name of the reference SNTP Server. The default value is “time.nist.gov”.

SNTP Offset

The SNTP Server uses the UTC (Universal Time, Coordinated) as the reference for the current time. The SNTP offset specifies the number of hours to be added to or subtracted from the UTC time for conversion to local time. Here are some examples:

- San Francisco, California, USA: UTC - 8
- Toronto, Ontario, Canada: UTC - 5
- Stockholm, Sweden: UTC + 1
- Beijing, China: UTC + 8
- Tokyo, Japan: UTC + 9



Changes to **System Name** and/or **Login Name** are saved automatically. You do not need to save the changes by clicking *Save* in the tool bar.

4.2 Change Password

Select *System > Change Password* to change the login password and/or privilege password. It is highly recommended that the administrator change the default values after initial installation.

Login Password

The administrator uses the combination of **Login Name** and **Login Password** to log in to Cedar. After log in, the administrator can view most of the system parameters. In order to view all of the system parameters and perform any changes, the administrator needs to enter the privilege mode.

The manufacture default value for **Login Password** is “changeitnow”.

Privilege Password

The **Privilege Password** is used by the administrator to enter the privilege mode. The manufacture default value is “changeitnow”.



Changes to **Login Password** and/or **Privilege Password** are saved automatically. You do not need to save the changes by clicking *Save* in the tool bar.

4.3 Upgrade

Intelicis offers free firmware upgrades for bug fixes and patches. Please visit the Intelicis web site at www.intelicis.com for the latest upgrade. Choose one of the following methods to download the upgrades.

- Copy the new firmware to a local FTP server root directory. Make sure the file can be retrieved via “anonymous” login with no password.
- Copy the new firmware to a user’s FTP home directory. Make sure the file can be retrieved by logging in with the user’s username/password.

Select *System > Upgrade* to upgrade the firmware.

The screenshot shows the Intelicis Cedar 880AG web interface. The top left features the Intelicis logo and tagline 'Intelligent Mobility Solution'. The top right displays 'Cedar 880AG Enterprise Dual-Radio AP/Bridge' and a navigation menu with 'Enable', 'Save', 'Reboot', 'Logout', and 'Help'. A left-hand navigation menu includes 'System', 'Network', 'Security', 'Wireless', 'Management', 'Log', and 'Monitor'. The main content area is titled 'System > Upgrade' and contains a form with the following fields: 'Protocol' (radio buttons for FTP and TFTP, with FTP selected), 'Username', 'Password', 'Server IP' (four input boxes), and 'File Name'. 'Upgrade' and 'Cancel' buttons are located below the form. At the bottom left of the interface, there is technical support information: 'Technical Support: Tel: 408-496-6380 support@intelicis.com' and a copyright notice: 'Copyright © 2007 Intelicis Corporation All rights reserved.'

Protocol

Choose either FTP (File Transfer Protocol) or TFTP (Trivial File Transfer Protocol).

Username/Password

Enter the username and password Cedar uses to log into the FTP server. If the username and password are not specified, Cedar logs in to the FTP server as “anonymous” with no password.

Server IP

The **Server IP** is the IP address of the local FTP or TFTP server where Cedar can retrieve the firmware. An example of the **Server IP** is 192.168.15.184.

File Name

Enter the Cedar 880AG firmware name. The firmware name is composed of three parts: model name-date-version number. For example, cedar880ag-09302005-1.1.0.88a.bin refers to Cedar model 880 version 1.1.0.88 created on 09/30/2005.

4.4 System Configuration

Select *System > Configuration* to reset the system or execute CLI command batch files.

The screenshot shows the Intelicis Cedar 880AG web interface. The top header includes the Intelicis logo and the product name 'Cedar 880AG Enterprise Dual-Radio AP/Bridge'. A navigation menu on the left lists 'System', 'Network', 'Security', 'Wireless', 'Management', 'Log', and 'Monitor'. The main content area is titled 'System > Configuration' and contains three sections: 'Configuration' with 'Save System Configuration' and 'Reset to Manufacturer Default' buttons; 'Execute CLI Command File' with fields for FTP Server IP, Username, Password, and File Name, and 'Execute' and 'Cancel' buttons; and 'Export Configuration' with fields for FTP Server IP and Username.

Save System Configuration

All configuration changes must be saved into the system. This step is required; otherwise changes will be lost after reboot.

Reset to Manufacture Default

This operation will reset Cedar to all of its manufacturer's default values.

Execute CLI Command File

The administrator can put all the CLI commands in a batch file and execute them together. Command batch files are especially useful when the administrator needs to make sizeable configuration changes. One of the following methods can be chosen:

- Copy the command file to a local FTP server root directory. Make sure the file can be retrieved via “anonymous” login with no password.
- Copy the command file to a user's FTP home directory. Make sure the file can be retrieved by logging in with the user's username/password.

Enter the FTP Server IP address and the username and password Cedar uses to log in to the FTP Server. If the username and password are not specified, Cedar logs into the FTP server as “anonymous” with no password. Cedar retrieves the specified CLI command file and executes it immediately.

Export Configuration

The administrator can export the existing configuration to a file for archiving purpose. If for any reasons, a recovery is required. The export file contains useful configuration information.

Enter the FTP Server IP address and the username and password Cedar uses to log in to the FTP Server. If the username and password are not specified, Cedar logs into the FTP server as “anonymous” with no password. Cedar copies the export file to the specified FTP area.

5 Network

This chapter contains information on the following topics:

- Change network settings
- Configure VLAN
- Configure DHCP Server

5.1 Overview

5.1.1 VLAN

Virtual LAN (VLAN) logically groups users by their functionality instead of physical location. VLAN uses software to configure logical topologies on top of the physical network infrastructure. Users grouped into one VLAN may be located on different floors or in different buildings. However, all users on one VLAN can communicate with each other as if they were all on the same physical LAN.

The same concept extends to a wireless network. Wireless clients can be grouped into wireless sub-networks. A client can access the network by connecting to an AP which supports its assigned VLAN (see Figure 5.1).

VLANs provide many benefits:

- VLANs increase performance by limiting broadcast traffic for both wired and wireless networks.
- VLANs improve manageability by providing an easy, flexible way to modify logical groups in changing environments. When a computer is physically moved to another location, it can stay on the same VLAN without any hardware reconfiguration.
- VLANs increase security options. Broadcast traffic is only broadcast within the VLAN. This allows the network administrator to segment users requiring access to sensitive information into VLANs separate from the rest of the community.

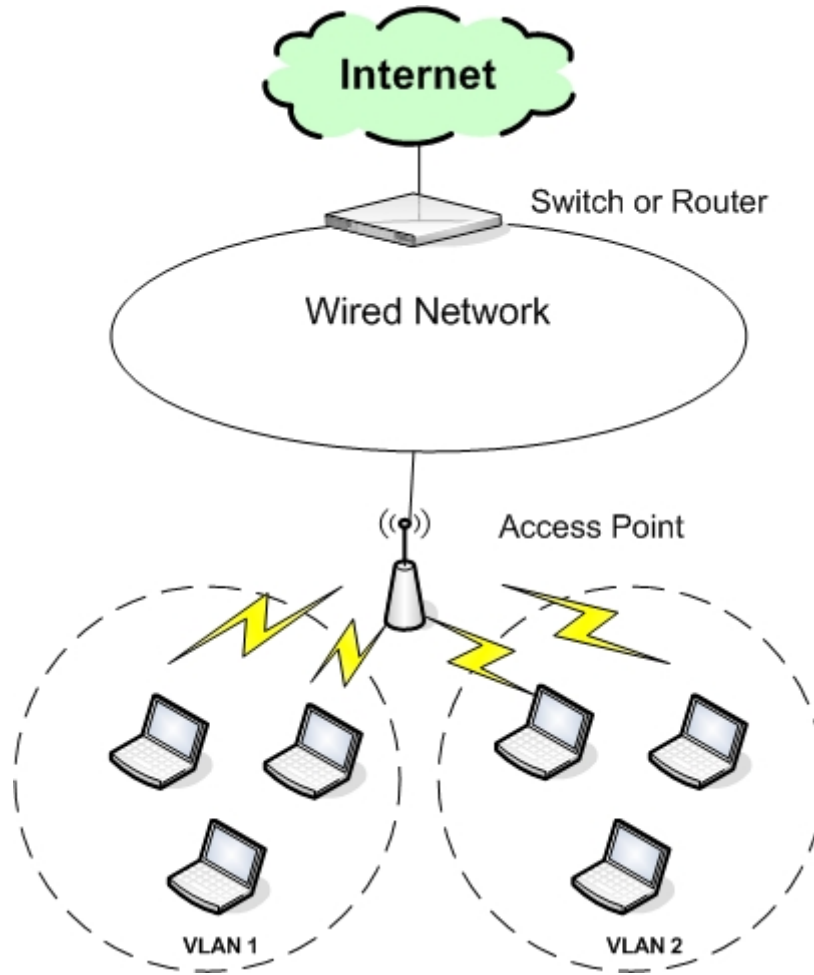


Figure 5.1 VLANs

5.1.2 DHCP

Dynamic Host Configuration Protocol (DHCP) is a protocol for assigning dynamic IP addresses to computers on a network. Dynamic addressing simplifies network administration because the software keeps track of IP addresses. This means a new computer can be added to a network without the hassle of manually assigning it a unique IP address.

5.2 Web Interface

5.2.1 Network Setting

Select *Network > IP* to change network parameters.

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Enable Save Reboot Logout Help

Network > IP

Setting

Mode: DHCP

IP: . . .

Netmask: . . .

Gateway: . . .

Management VLAN ID: Untagged Tagged VID: (0-4095)

Ethernet MAC Address: 00:03:79:11:73:3F
Radio 1 MAC Address: 00:03:79:11:73:40
Radio 2 MAC Address: 00:03:79:11:73:50

DNS

Primary DNS IP Address: 192 . 168 . 16 . 1

Secondary DNS IP Address: 0 . 0 . 0 . 0

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Mode:

DHCP: If DHCP is chosen, a dynamic IP address is assigned to AP by the DHCP Server. In addition, the subnet mask, default gateway and DNS server addresses are also assigned. Because DHCP assigns the IP address dynamically, different IP addresses may be assigned to the AP after each reboot.

Static: In order to have full control of the IP address, the administrator may choose to use the Static IP. If Static mode is chosen, the administrator assigns the static IP address, subnet mask, default gateway and DNS server address for the AP. The AP will always have the same IP address after each reboot.

IP address

For DHCP mode: The DHCP Server assigns a dynamic IP address to the AP.
For Static mode: Enter the static IP address for the AP.

Netmask

For DHCP mode: The DHCP Server assigns a network mask to the AP.
For Static mode: Enter the network mask for the AP.

Gateway

For DHCP mode: The DHCP Server assigns a default gateway to the AP.
For Static mode: Enter the default gateway for the AP.

Management VLAN ID

By default, VLAN support is disabled. All packets sent by the AP are *untagged*. To enable VLAN support, click *tagged* and enter a VID value between 0 and 4095. Before enabling VLAN support, the VLAN setting needs to be pre-configured on a VLAN-aware switch, such as the Intelicis Cypress 1024.

Primary or Secondary DNS

Optionally enter the primary or secondary Domain Name Server (DNS) IP address. DNS translates domain names into IP addresses. Using DNS, network users are allowed to use more descriptive names such as www.example.com rather than 198.105.232.4.

5.2.2 VLAN

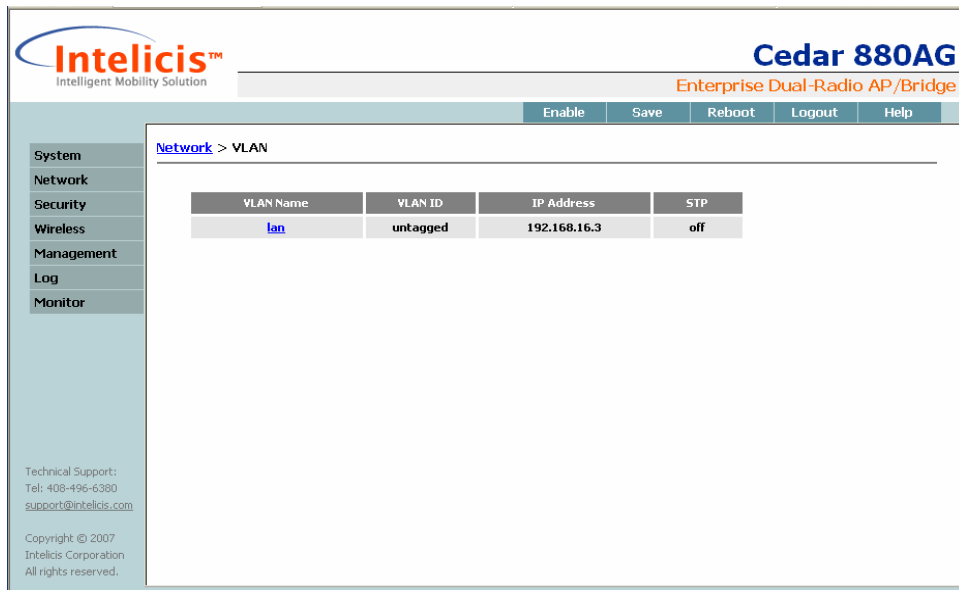
Select *Network*->*VLAN* to display the Virtual LANs in the system.

By default, VLAN support is disabled in Cedar. In this case, a single *lan* with the VLAN ID untagged is displayed.

After the administrator enables VLAN support, additional VLANs are created by the system. The generated VLAN name has the following format:

vlan<vlan id>

Some examples would be vlan88 and vlan99.



Click the VLAN name to display detailed VLAN information.

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MAC Address	Interface	Local	Aging Timer
00:00:00:00:00:00	r1.link1.utg	no	209.25
00:03:47:bb:1d:e4	eth0.utg	no	65.15
00:03:79:10:01:2b	eth0.utg	no	0.24
00:03:79:10:02:88	r1.link1.utg	no	199.19

STP

The 802.1d Spanning Tree Protocol (STP) is used to prevent interfaces from looping.

- **On:** STP is enabled. If a loop is detected, one of the connections will be disconnected.
- **Off:** (default) STP is disabled.

Aging Time

Specify how long an inactive MAC address remains in the MAC table before it is removed from the table. The default is 300 seconds (5 minutes).

Interfaces

Display a list of interfaces associated with this VLAN. The system initially comes with three interfaces: eth0 (Ethernet), wlan0 (wireless radio 1) and wlan1 (wireless radio 2). Enabling VLAN support automatically creates new interfaces. The status of each interface is one of the following:

- **Learning:** Interface is learning.
- **Forwarding:** Interface is actively forwarding packets.
- **Blocked:** Interface is blocked.

MAC Table

Displays a list of MAC addresses associated with this VLAN.

- **MAC Address:** MAC address of the client's machine
- **Interface:** The interface the client's machine is associated with
- **Local:** Whether or not the client's machine is associated with the AP locally

- **Aging time:** Number of seconds remaining before this entry is removed due to inactivity

5.2.3 DHCP

If DHCP is not available in your network, Cedar can be configured to assign dynamic IP addresses to computers on the network. Select *Network>DHCP* to perform this function.

The screenshot shows the Intelicis Cedar 880AG web interface. The top navigation bar includes 'Enable', 'Save', 'Reboot', 'Logout', and 'Help'. The left sidebar lists menu items: System, Network, Security, Wireless, Management, Log, and Monitor. The main content area is titled 'Network > DHCP' and contains two sections: 'Setting' and 'Pool'. In the 'Setting' section, 'DHCP Setting' is set to 'Off' (radio button selected) and 'DHCP Status' is 'stop'. In the 'Pool' section, 'Pool Status' is set to 'Off' (radio button selected). Below this are input fields for 'Net', 'Netmask', 'Range', 'Gateway', 'DNS', and 'WINS', all currently set to 0.0.0.0. The 'Lease Time (sec)' is set to 1800.

DHCP Setting

On: Enable DHCP service.

Off: (default) Disable DHCP service.

Pool Status

The pool status should be turned on to enable DHCP service.

Net

Specify the subnet where you want the DHCP to be enabled, for example, 192.168.1.0.

Netmask

Specify the network mask for the subnet.

Range

Enter a range of IP addresses which are to be allocated for dynamic IP addresses only. Each time a DHCP request comes in; the DHCP server assigns an IP address from this range to its users.

Gateway

Enter the default gateway IP address which the DHCP server will assign to its users.

DNS

Enter the DNS IP address which the DHCP server will assign to its users.

WINS

Enter the Windows Internet Name Server IP address which the DHCP server will assign to its Windows users.

Lease Time

Enter how long the assigned IP address is valid for. The default is 1800 seconds (30 minutes).

5.3 Examples

5.3.1 Configure Static IP Address

- 1 Consult your ISP or IT department to acquire a static IP address, network mask, default gateway and DNS for your AP.
- 2 Click *Network->IP* from the Cedar web interface to modify the network settings.
- 3 Select *Static* as the network mode. The three parameters of IP, Network Mask and Gateway become enabled.
- 4 Enter the IP, Network Mask and Gateway parameters.
- 5 Optionally enter the DNS parameters.
- 6 Click *Apply*.
- 7 The address change takes effect immediately. You will need to re-login using the new IP address to continue with the rest of the configuration.
- 8 Save the configuration.

5.3.2 Configure Management VLAN ID

1. Consult your IT department to acquire the VLAN ID setting. Make sure the device (e.g. switch) that the AP connects to will support VLAN. The VLAN ID needs to be pre-configured there.

2. Click *Network->IP* from Cedar web interface to modify the network settings.
3. Select *Tagged*, and enter the VLAN ID.
4. The VLAN ID change takes effect immediately. You will need to change the port which the AP is using to a trunk port.
5. Save the configuration.

6 Security

This chapter contains information on the following topics:

- Configure RADIUS profile
- Configure 802.1x authentication
- Configure MAC authentication
- Configure Filter to block certain traffic

6.1 Overview

6.1.1 802.1x Authentication

Wireless Networks provide enormous flexibility, but they can also create potential security problems in the network. Extensible Authentication Protocol (EAP) is an authentication method that addresses the security issues in the wireless network. It is part of the 802.1x WLAN standards defined by IEEE.

The IEEE 802.1x specification uses three important terms. The user or client who wants to be authenticated is called a supplicant. The actual server doing the authentication, typically a RADIUS server, is called the authentication server. And the device in between, such as a wireless access point, is called the authenticator. One of the key points of 802.1x is that the authenticator can be small and simple - all of the processing is done by the supplicant and the authentication server. This makes 802.1x ideal for wireless access points, which are typically small and have limited memory and processing power.

Figure 6.1 illustrates a simple 802.1x authentication sequence.

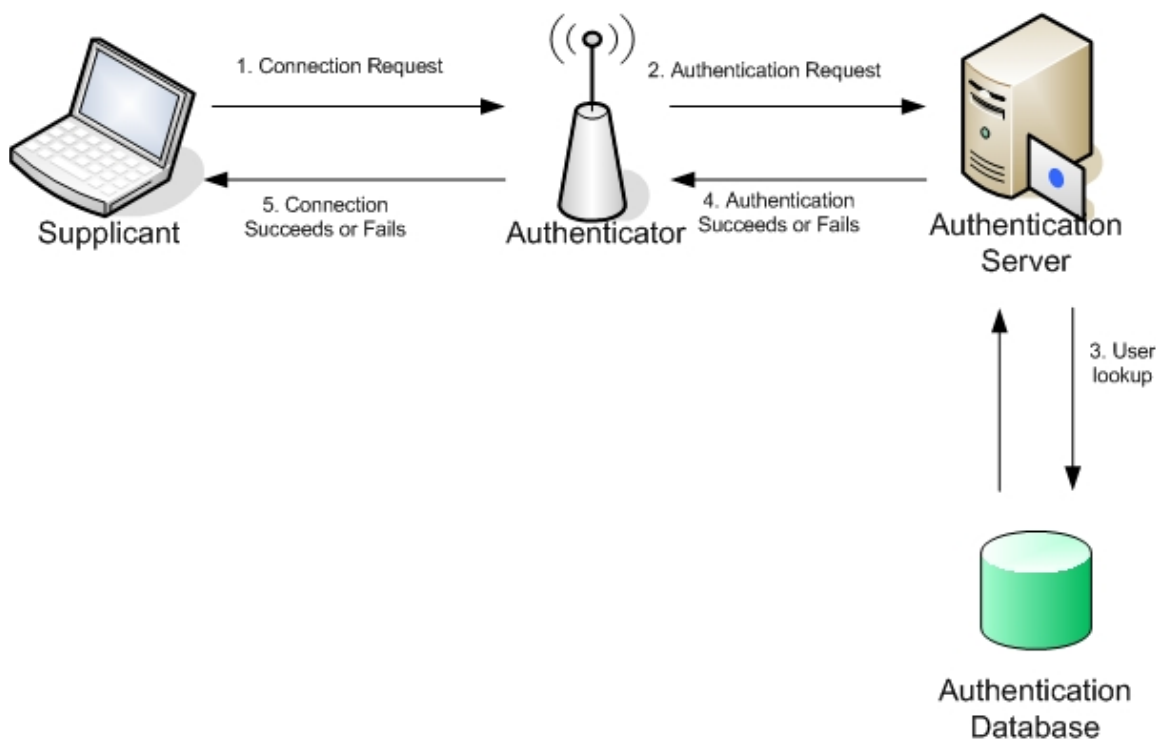


Figure 6.1 802.1x authentication sequence

1. The supplicant sends an authentication request containing identification and connection information to the authenticator.
2. The authenticator performs an initial negotiation with the supplicant to establish connection information (username, password, etc). The authenticator then forwards the user information in an authentication request to the RADIUS Server.
3. The RADIUS Server looks up the supplicant information in a local or remote RADIUS database.
4. If the information is found, the RADIUS server responds with a success message, which is then passed onto the supplicant. The authenticator now allows access to the network with possible restrictions based on attributes that came back from the authentication server. For example, the authenticator might switch the supplicant to a particular virtual LAN. If the information is not found, the RADIUS server responds with a reject message.
5. Based on the information it receives from the RADIUS server, the authenticator accepts or refuses the connection request.

6.1.2 MAC Authentication

Although 802.1x authentication addresses security issue for the wireless network, its implementation may not be practical for every wireless devices (e.g. PDA) because it requires supplicant software to be installed on all wireless client machines.

MAC authentication provides an alternative solution. It controls wireless access to the network by storing a list of MAC addresses on a local or RADIUS server. This list of MAC addresses identifies the authorized stations that may access the wireless network.

6.2 Web Interface

6.2.1 RADIUS Profile

RADIUS profile is used to store RADIUS server information. Select *Security->RADIUS* to list the available RADIUS profiles in the system. Click the existing profile name to enter the editing screen or click the **Add** button to create a new one.

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Profile Name

Enter a descriptive name for the profile. The maximum length is 15.

RADIUS NAS IP

When the authenticator (AP) sends the user connection information (username, password, etc) to the RADIUS server, it also sends its IP as an authenticator identifier. The NAS (Network Access Server) IP is optional. When specified, it can be used to identify where the authentication request is being sent from.

RADIUS Failover Limit

Cedar first tries to use the primary RADIUS Server for authentication. If the primary RADIUS server is down, Cedar retries for a number of times. It then

switches to the secondary RADIUS server for authentication. The parameter specifies the number of retries. The default is 4.

Primary Auth Server Retry Period

If the primary RADIUS server is down, Cedar will use the secondary RADIUS server for authentication. In the meantime, Cedar will periodically retry the primary RADIUS server and check if it is up again. The parameter specifies the retry period. The default setting is 600 seconds (10 minutes).

Auth Server IP Address

Enter the IP address for the primary and/or secondary authentication RADIUS server.

Auth Server Port

Enter the listening port number for the primary and/or secondary authentication RADIUS server. The default setting is 1812.

Auth Server Secret

Enter the secret for communicating with the primary and/or secondary authentication RADIUS server. If the Cypress RADIUS server is used, this secret must match the secret configured in the RADIUS Network Access Server (NAS).

Accounting Server IP Address

Enter the IP address for the primary and/or secondary accounting RADIUS server.

Accounting Server Port

Enter the listening port number for the primary and/or secondary accounting RADIUS server. The default setting is 1813.

Accounting Server Secret

Enter the secret for communicating with the primary and/or secondary accounting RADIUS server. If the Cypress RADIUS server is used, this secret must match the secret configured in the RADIUS Network Access Server (NAS).

6.2.2 802.1x Profile

The combination of 802.1x authentication profile and RADIUS profile are used to perform 802.1x authentication. Select *Security->802.1x Authentication* to list the available 802.1x profiles in the system. Click the existing profile name to enter the editing screen or click the *Add* button to create a new one.

The screenshot shows the Intelicis Cedar 880AG web interface. The top navigation bar includes the Intelicis logo and the product name 'Cedar 880AG Enterprise Dual-Radio AP/Bridge'. A secondary navigation bar contains buttons for 'Enable', 'Save', 'Reboot', 'Logout', and 'Help'. The left sidebar lists menu items: System, Network, Security, Wireless, Management, Log, and Monitor. The main content area is titled 'Security > 802.1x Authentication > Add Profile'. The form contains the following fields:

- * Profile Name:
- Reauthentication: (dropdown menu)
- Reauthentication Period (sec):
- Dynamic WepKey Length (bit): (dropdown menu)
- WepKey Update Interval (sec): (0, or 60 - 2592000)

An 'Apply' button is located below the form fields. At the bottom left of the page, there is technical support information: 'Technical Support: Tel: 408-496-6380 support@intelicis.com' and a copyright notice: 'Copyright © 2007 Intelicis Corporation All rights reserved.'

Profile Name

Enter a descriptive name for the profile. The maximum length is 15.

Re-authentication

- **On:** Cedar will automatically re-authenticate the clients based on the re-authentication period parameter.
- **Off:** (default) Cedar will not automatically re-authenticate the clients.

Re-authentication Period

This parameter specifies the re-authentication timer in seconds. The default setting is 3600 seconds (60 minutes).

Dynamic WepKey Length

If dynamic WEP keys are used for data encryption, this parameter defines the length of the generated keys in bits. The default is 128 bits.

WebKey Update Interval

Dynamic WEP keys are regenerated based on a pre-defined interval. This parameter defines this interval in seconds. The default is 300 seconds (5 minutes).

6.2.3 MAC Profile

The MAC profile is used to store MAC authentication information. The MAC authentication profile can be used alone or combined with the RADIUS profile to perform MAC authentication. Select *Security->MAC Authentication* to list the available

MAC profiles in the system. Click the existing profile name to enter the editing screen or click the **Add** button to create a new one.

The screenshot shows the web interface for the Cedar 880AG Enterprise Dual-Radio AP/Bridge. The page title is "Cedar 880AG Enterprise Dual-Radio AP/Bridge". The breadcrumb trail is "Security > MAC Authentication > Add Profile". The form contains the following elements:

- Profile Name:** A text input field with a red asterisk indicating it is required.
- Authentication Method:** A section with three radio button options:
 - Reject all users except for the ones on the Permit List.
 - Allow all users except for the ones on the Deny List.
 - Consult RADIUS server if not found on the Permit or Deny Lists.
- MAC List:** A section with two sub-sections:
 - Permit List:** A text input field and an "Add" button.
 - Deny List:** A text input field and an "Add" button.

Profile Name

Enter a descriptive name for the profile. The maximum length is 15.

Authentication Method

- **Reject all users except for the ones on the Permit List.**
- **Allow all users except for the ones on the Deny List.**
- **Consult RADIUS Server if not found on the Permit or Deny Lists:** The client's MAC address is first checked against the Permit and Deny Lists. If it is on the Permit List, access is granted. If it is on the Deny List, access is denied. If the client's MAC address is on neither one of the lists, the RADIUS server is checked. If it is on the RADIUS server, access is granted, otherwise, access is denied.

Permit List

A local list of the entire MAC addresses which are to be permitted access.

Deny List

A local list of the entire MAC addresses which are to be denied access.

6.2.4 Filter

A filter may be used to block traffic from certain users. Select **Security->Filter** to list the available filters in the system. Click the existing filter name to enter the editing screen or click the **Add** button to create a new one.

The screenshot shows the web interface for the Cedar 880AG Enterprise Dual-Radio AP/Bridge. The top navigation bar includes the Intelicis logo and the product name. Below the navigation bar, there are buttons for Enable, Save, Reboot, Logout, and Help. The main content area is titled 'Security > Filter > Add a filter rule'. The form contains the following fields:

- Priority:** A text input field with a '(1-999)' label.
- * MAC or IP Address:** A dropdown menu with 'Please Select' as the current selection.
- * Action:** Three radio buttons: 'Permit', 'Next', and 'Deny' (which is selected).
- Protocol:** A dropdown menu with 'Please Select' as the current selection.
- Interface:** A dropdown menu with 'Please Select' as the current selection.

An 'Apply' button is located at the bottom of the form. The sidebar on the left contains the following menu items: System, Network, Security, Wireless, Management, Log, and Monitor. At the bottom of the sidebar, there is technical support information and a copyright notice for 2007 Intelicis Corporation.

Priority

All the incoming and outgoing packets will be checked against the filter rules based on their priority. Low number means high priority (e.g. 1 is the highest priority) and will be checked first.

When a condition is met (e.g. the IP address matched), action will be taken immediately (e.g. permit or deny). Otherwise, the AP continues checking using the rest of the filter rules.

MAC or IP Address

Specify the MAC or IP address to be filtered. "000000000000" means all MAC addresses. "0.0.0.0" means all IP addresses.

Action

Permit: Packets which match the filter rule will be accepted.

Next: Packets which match the filter rule will be examined by the immediate next rule for further checking.

Deny: Packets which match the filter rule will be dropped.

Protocol

Select a protocol to be filtered. Options are **TCP**, **UDP** or **ICMP**.

Interface

Select an interface to be filtered.



Filter can be used to block traffic between different sub-nets or traffic to other APs.
Filter does not block traffic within the same AP.

6.3 Examples

6.3.1 802.1x Authentication

1 Identify a RADIUS server to be used for 802.1x authentication. Write down its IP address and server secret code. Confirm the authentication port is 1812.

2 Create some 802.1x user entries in the RADIUS server. For example,

User Name: test1

Password: xxx

Type: EAP

3 Click **Security->RADIUS** from the Cedar web interface to display all the RADIUS profiles.

4 Click **Add** to add a new profile. Enter the following sample data and use default for the rest of the parameters.

Profile Name: myRADIUS

Primary Auth Server IP Address: 192.168.1.1

Primary Auth Server Secret: xxxx

5 Click **Apply**.

6 Click **Security->802.1x Authentication** from the Cedar web interface to display the entire 802.1 x authentication profiles.

7 Click **Add** to add a new profile. Enter the following sample data and use default for the rest of the parameters.

Profile Name: my8021x

8 Click **Apply**.

9 Save the configuration.

6.3.2 MAC Authentication

- 1 Identify a RADIUS server to be used for MAC authentication. Write down its IP address and server secret code. Confirm the authentication port is 1812.

- 2 Create some MAC user entries in the RADIUS server. For example,

User Name: 000cf157b3bc

Password: <none>

Type: MAC

- 3 Click **Security->RADIUS** from the Cedar web interface to display all the RADIUS profiles.

- 4 Click **Add** to add a new profile. Enter the following sample data and use default for the rest of the parameters.

Profile Name: myRADIUS

Primary Auth Server IP Address: 192.168.1.1

Primary Auth Server Secret: xxxx

- 5 Click **Apply**.

- 6 Click **Security->MAC Authentication** from the Cedar web interface to display all the MAC authentication profiles.

- 7 Click **Add** to add a new profile. Enter the following sample data and use default for the rest of the parameters.

Profile Name: myMAC

Authentication Method: Consult RADIUS Server if not found on the permitted or rejected MAC lists.

- 8 Click **Apply**.

- 9 Save the configuration.

7 Wireless

This chapter contains information on the following topics:

- Configure Wireless Setting
- Configure WLAN
- Configure Radio 1 and 2
- Configure Bridge Link

7.1 Overview

7.1.1 WLAN

Similar to the Virtual LAN concept, WLAN is a way to logically group wireless users into sub-networks. Each WLAN may implement a different security mechanism and has a different level of access to the network. The administrator can selectively enable a list of WLANs on the AP. A wireless user is allowed to access the wireless network by connecting to an AP which supports his assigned WLAN.

A RADIUS server can be used to enforce WLAN access control. When a wireless user connects to the AP using a WLAN, he may or may not be authorized to use that WLAN. During the authentication phase, the RADIUS server not only authenticates the user but also returns user attributes (e.g. the user's VLAN ID) to the authenticator (AP). The AP can subsequently determine whether to allow the user access to the wireless network.

7.1.2 Bridge Link

Bridge Link is a cost effective way to connect Ethernet LANs from difference location using wireless devices. As described in Chapter 1, bridge link can work in a point-to-point or point-to-multipoint topology. You can use either topology to support:

- Single VLAN network: untagged packets are sent across the wireless bridge link.
- Multiple VLANs network: tagged packets are sent across the wireless bridge link.

Figure 7.1 illustrates a point-to-point bridge link topology supporting multiple VLANs network.

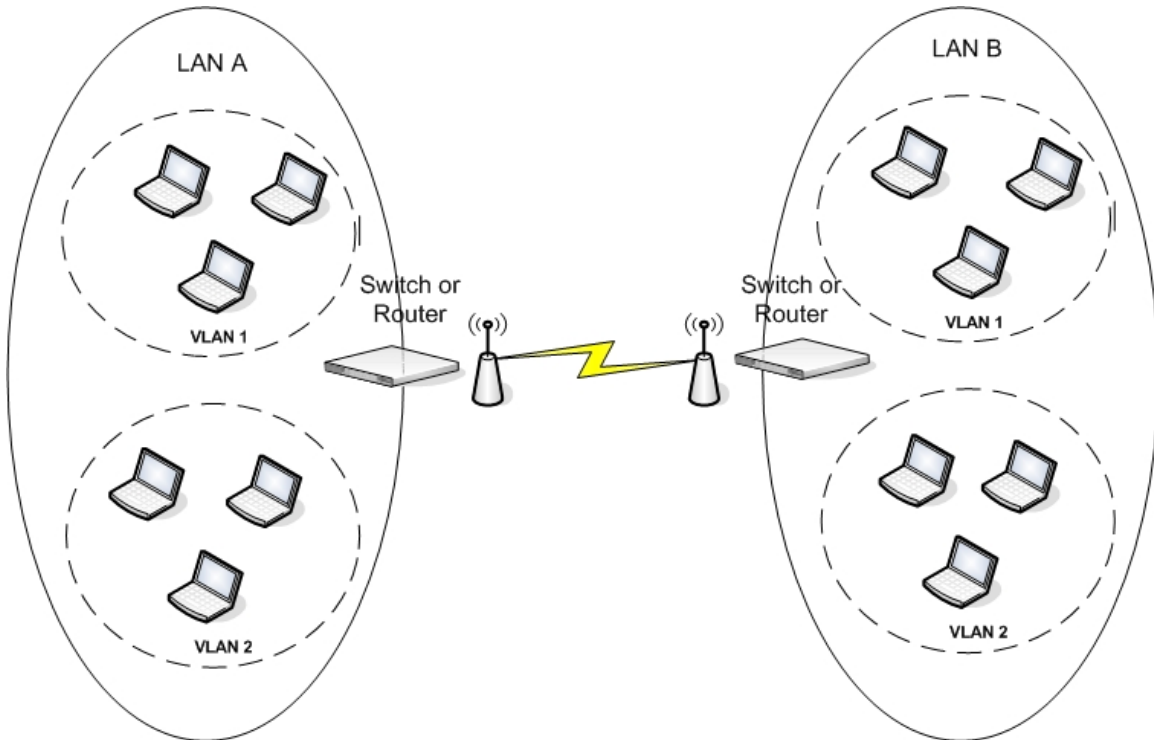


Figure 7.1 Bridge Link in Multiple VLANs Network

7.2 Web Interface

7.2.1 Wireless Setting

The screenshot shows the web interface for the Intelicis Cedar 880AG Enterprise Dual-Radio AP/Bridge. The interface includes a navigation menu on the left with options: System, Network, Security, Wireless, Management, Log, and Monitor. The main content area is titled 'Wireless' and contains the following settings:

- Wireless Setting: On Off
- Wireless Status: running
- Country Code: US
- 80211d World Mode: On Off
- EAP Relay: On Off

Buttons for 'Apply' and 'Cancel' are located at the bottom right of the settings area. The top right of the interface features buttons for 'Enable', 'Save', 'Reboot', 'Logout', and 'Help'. The Intelicis logo and 'Enterprise Dual-Radio AP/Bridge' text are visible at the top.

Wireless Setting

On: (default) Enable the wireless service.

Off: Disable the wireless service.

Wireless Status

Display the status of the wireless service.

Country Code

Display the AP's country code. The country code is set during the manufacture stage and can not be modified by the users.

80211d World Mode

If world mode is turned on, the AP broadcasts its local settings, such as the country code. The default setting is off.

EAP Relay

If EAP relay is turned on, the AP does not perform any EAP related authentication. Instead, the AP relays the requests to a wireless switch and relies on the switch to perform this function. The default setting is off.

7.2.2 WLAN

WLANs logically group users by their functionality. Each group may have a different access privilege, security level and encryption method. Select *Wireless->WLAN* to list the available WLANs in the system. Click the existing WLAN name to enter the editing screen or click the *Add* button to create a new one.

After a WLAN is created, add it to either one of the Radios to take effect. The system comes with the following two default WLANs:

- **Intelicis-a:** used by Radio 1
- **Intelicis-b:** used by Radio 2

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Enable Save Reboot Logout Help

Wireless > WLAN > Add WLAN

WLAN

* Name:

* SSID:

SSID Broadcast: On Off

* VLAN ID: Untagged Tagged VID: (0-4095)

Security Policy

No Security

Using 802.1x Authentication

- WEP with 802.1x Authentication
- WPA/TKIP with 802.1x Authentication
- WPA2/AES with 802.1x Authentication

Using Key/Passphrase

- Static WEP Key
- WEP Key 0:
- WEP Key 1:
- WEP Key 2:

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Name

Enter a descriptive name for the wireless network. The maximum length is 12.

SSID

SSID stands for Service Set Identifier, a 32 character unique identifier used by mobile users to connect to a wireless network.

SSID Broadcast

- **On:** (default) The SSID configured on the access point will be broadcast to all wireless devices within range.
- **Off:** The automatic SSID broadcast feature is disabled.

VLAN ID

Specify whether the VLAN ID tag will be used.

- **Untagged:** (default) The wireless packets of this WLAN are untagged.
- **Tagged & VLAN ID:** The wireless packets of this WLAN are tagged with the specified VLAN ID.

No Security

Wireless clients will establish association with the access point using the **Open** mode and **no** encryption implementation.

Using 802.1x Authentication

A wireless client will authenticate himself via RADIUS Server before using the wireless network. The administrator must configure a RADIUS profile which contains the RADIUS location and password information, as well as an 802.1x

profile which contains 802.1x specific information. The administrator may select one, two or all three of the association mode and encryption method combinations listed below:

- **Dynamic WEP with 802.1x authentication**
 - association mode is **Open**
 - encryption method is **Dynamic WEP**
- **WPA/TKIP with 802.1x authentication**
 - association mode is Wi-Fi Alliance's **WPA**
 - encryption method is **TKIP**
- **WPA2/AES with 802.1x authentication**
 - association mode is Wi-Fi Alliance's **WPA2**
 - encryption method is **AES**

Using Key/Passphrase

The authentication mechanism used between wireless clients and the wireless network is a pre-configured key or passphrase. The key or passphrase configured on the client's machine must match those stored on the AP. The administrator may choose one, two or all three of the association mode and encryption method combinations listed below:

- **Static WEP key**
 - association mode is **Open**
 - data encryption method used is **Static WEP key**

You must choose a default WEP Key index and fill in the WEP key.

- **WPA/TKIP with PSK**
 - association mode is Wi-Fi Alliance's **WPA**
 - encryption method is **TKIP**.

You must fill in the WPA Pre-Shared-Key Passphrase.

- **WPA2/AES with PSK**
 - association mode is Wi-Fi Alliance's **WPA2**
 - encryption method is **AES**

You must fill in the WPA2 Pre-Shared-Key Passphrase.

MAC Auth

- **On:** wireless clients are required to authenticate using their MAC address. You must choose a MAC authentication profile to be used for authentication.
- **Off:** (default) No MAC authentication is performed.

MAC Auth Profile

Specify the MAC authentication profile to be used for authentication. You must have already configured a MAC authentication profile in the system. If the MAC authentication method requires the RADIUS Server, you will also need to specify the RADIUS profile.

RADIUS Profile

Specify the RADIUS profile to be used for 802.1x or MAC authentication.

Forced Unicast Tx Rate

This parameter allows you to configure a transmission rate (in 100 kbps) that will be used for all unicast frames. The rate must be one of the AP's supported rates.

Maximum Unicast Tx Rate

This parameter allows you to set a maximum limit on the transmission rate to be used. By default, this option is disabled, which allows any supported rate to be used.

Min Rate to Associate

This parameter allows you to set a minimum rate required for association. If a client station does not support any rates equal to or greater than this rate, the association will be rejected.

DTIM

The Delivery Traffic Indication Message (DTIM) is used by the AP to indicate which client station, currently sleeping in low-power mode, have data buffered on the access point waiting for pick-up. DTIM should be left at 2, the default value. This parameter supports a range between 1 and 255.

Maximum Stations

This parameter specifies the maximum number of stations which can associate with the AP. The default is 256.

7.2.3 Radio

Select *Wireless->Radio 1* or *Wireless->Radio 2* to display radio specific parameters for radio 1 or 2. Except for WLAN and Bridge Link, most of the parameters can be left with their default values.

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Enable Save Reboot Logout Help

Wireless > Radio 2

Setting

RF: On Off

* Frequency: b g bg super-ag

* Channel: auto

Tx Power (dbm): auto

Operation

Mode: ap

Role: Base Non-base

Repeater: On Off

WLAN

Available WLAN	Selected WLAN
Intelicis-a	Intelicis-g drlun

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Available Bridge Link

link1

Selected Bridge Link

Add >>

<< Del

Advanced Tuning

Auto Channel List: 1 2 3 4 5 6
 7 8 9 10 11

Tx Rates: Basic : required tx rate for broad/multi/unicast packets.
 Supported : for unicast packets only.

1 Mbps:	<input checked="" type="checkbox"/> Basic	<input checked="" type="checkbox"/> Supported
2 Mbps:	<input checked="" type="checkbox"/> Basic	<input checked="" type="checkbox"/> Supported
5.5 Mbps:	<input checked="" type="checkbox"/> Basic	<input checked="" type="checkbox"/> Supported
11 Mbps:	<input checked="" type="checkbox"/> Basic	<input checked="" type="checkbox"/> Supported
6 Mbps:	<input type="checkbox"/> Basic	<input checked="" type="checkbox"/> Supported
9 Mbps:	<input type="checkbox"/> Basic	<input checked="" type="checkbox"/> Supported
12 Mbps:	<input type="checkbox"/> Basic	<input checked="" type="checkbox"/> Supported
18 Mbps:	<input type="checkbox"/> Basic	<input checked="" type="checkbox"/> Supported

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System
Network
Security
Wireless
Management
Log
Monitor

Beacon (ms): 100 ms (20-1000)
Preamble: Short Long
Fragmentation Threshold: 2346 (256-2346)
RTS Threshold: 2347 (0-2347)
CTS Protection: On Off
Antenna Setting: Diversity Ant 1 Ant 2
Channel Utilization to Drop (%): Off On % (0-99)
Channel Utilization to Deny (%): Off On % (0-99)
Intra BSS: On Off
Rogue AP Detection: On Off
WiFi Multimedia: On Off
Link Distance (km): 0 (0-50)

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Apply Cancel

RF

Enable or disable the radio.

- **On:** the default setting
- **Off:** disables the radio

Frequency

Select one of the communication modes between wireless clients and the Access Point. Radio 1 operates in frequency **a** or **super-ag**. Radio 2 operates in frequency **b**, **g**, **bg** or **super-ag**.

- **a:** The default setting for Radio 1.
- **b:** The radio supports 802.11b standard only.
- **g:** The radio supports 802.11g standard only.
- **bg:** The default setting for Radio 2. Choose bg if you want to support both 802.11b and 802.11g devices.
- **super-ag:** Enabling Super AG provides better performance by increasing radio throughput.

Channel

Select a channel for the AP. If **auto** is selected, the AP automatically chooses a relatively unused channel. The administrator can specify a list of “preferred” channels using Auto Channel List that you wish the AP to scan first. Channels not in the Auto Channel List will not be chosen by the AP.

If the administrator wants to manually set the channel, he needs to ensure that nearby devices do not use the same channel.

If bridge link is configured, all bridge links need to communicate on the same channel.

- **Auto:** the default setting. It allows the AP to select a free or relatively unused communication channel. Channels in the Auto Channel List are preferred channels and will be scanned first.
- **1-14:** used for frequencies b, g, and bg
- **36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 149, 153, 157, 161, 165:** used for frequency a
- **40, 48, 56, 153, 161:** used for frequency super-ag (radio 1)
- **6:** used for frequency super-ag (radio 2)



The channel regulation varies for every country. AP only allows you to set the channel that is legal in your country.

Transmit Power

Under certain circumstances, you may want to reduce the transmit power. An example would be when two radios are transmitting and receiving on nearby channels. To prevent one radio from interfering with the other, you may want to reduce its power.

- **Auto:** the default setting
- **1-20 dbm**

Mode

Select one of the operating modes for AP. The AP can operate as a regular AP, a Bridge or both.

AP: The AP operates as a regular access point.

BRGLNK: The AP operates as a Bridge.

AP, BRGLNK: The AP operates as both AP and Bridge.

Role

In a point-to-point or point-to-multipoint bridge link environment, one of the bridges has to be the base bridge. The rest of the bridges which associate with the base bridge become non-base bridges.

Base: The AP operates as a base bridge.

Non-Base: The AP associates with the base bridge.

Repeater

A repeater is not connected to a wired LAN. When an AP is configured as a repeater, its Ethernet port does not function. It has to rely on other Bridge or AP to forward packets.

On: Enable repeater mode.

Off: The default setting.

WLAN

- Add a WLAN to this Radio from the available WLAN list.
- Delete a WLAN from this Radio.

Bridge Link

- Add a Bridge Link to this Radio from the available Bridge Link list.
- Delete a Bridge Link from this Radio.

Auto Channel List

Auto Channel List is a list of preferred channels that the administrator wishes the AP to scan first when channel is set to “Auto”.

- **1-14:** used for frequencies b, g, and bg
- **36, 40, 44, 48, 52, 56, 60, 64, 149, 153, 157, 161, 165:** used for frequency a

Tx Rates

Select a frequency allows the AP to automatically set the default basic and supported rates. The user can then further fine tune the rates.

- **6, 9, 12, 18, 24, 36, 48, 54:** for frequency a
- **1, 2, 5.5 or 11:** for frequency b
- **6, 9, 12, 18, 24, 36, 48, 54:** for frequency g
- **1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48 or 54:** for frequency bg

Beacon

Beacon frames are transmitted by an AP at regular intervals to announce the existence of the wireless network. This parameter has a range of 20 to 1000 ms. The default setting is to send a beacon once every 100 ms.

Preamble

The preamble is used to allow stations to synchronize with the access point signal.

- **Long:** The long preamble uses the legacy 802.11 1 and 2 Mbps DSSS header.
- **Short:** The short preamble is provided to improve the efficiency of the network's throughput.

Fragmentation Threshold

The fragmentation threshold limits the size of packets transmitted on the network. If a packet exceeds the threshold, packet will be fragmented and sent as multiple frames. The range is 256 to 2346. The default setting is 2346.

RTS Threshold

RTS/CTS (Request to Send/Clear to Send) are used to control station access to the AP. A station initiates the process by sending a RTS. The AP receives the RTS and responds with a CTS. The station must receive a CTS frame before sending data. The range is 0 to 2347. When set to 2347 (the default setting), RTS is disabled.

CTS Protection

See description in RTS threshold.

- **On:** The default setting.
- **Off:** Disable CTS protection.

Antenna Setting

Antenna diversity improves performance of the AP by automatically selecting the best antenna for signal reception and transmission.

- **Diversity:** (default) Enable antenna diversity.
- **Ant1:** Always uses antenna 1.
- **Ant2:** Always uses antenna 2.

Channel Utilization to Drop

This load balancing feature attempts to maintain a useable throughput for a particular channel.

- **Off:** The default setting.
- **On:** Specify the parameter in percentage. If the air time related load is greater than the given threshold, disassociate a station. Stations that are sleeping in power-save mode are disassociated first.

Channel Utilization to Deny

This load balancing feature attempts to maintain a useable throughput for a particular channel.

- **Off:** The default setting.
- **On:** Specify the parameter in percentage. If the air time related load is greater than the given threshold, new stations are not allowed to associate with the AP.

Intra BSS

For security reasons, sometimes the administrator may need to disable communication between wireless clients.

- **On:** The default setting.
- **Off:** The AP blocks communication between wireless clients. Data traffic is allowed between the AP and its wireless clients and wired devices on the network, but not among wireless clients.

Rogue AP Detection

Enable/disable rogue AP detection.

- **Off:** The default setting.
- **On:** Enable rogue AP detection.

WiFi Multimedia

Quality of Service (QoS) is used to enhanced throughput and performance for time sensitive traffic such as voice, video and streaming data. Cedar's QoS support is based on the Wireless multimedia (WMM) standards.

- **Off:** The default setting.
- **On:** Enable WiFi multimedia support.

Link Distance

The typical distance between the wireless clients and AP is less than 1 kilometer (km). If your wireless network covers a bigger area, you may need to adjust this parameter. Increasing link distance automatically increases the packet acknowledge timeout period. This will impact the overall wireless network performance. The default setting is 0 (less than 1 km).

7.2.4 Bridge Link

A Bridge Link can greatly ease the difficulties involved in physically wiring LANs from different locations by connecting them wirelessly.

Select **Wireless->Bridge Link** to list the available Bridge Links in the system. Click the existing Bridge Link name to enter the editing screen or click the **Add** button to create a new one.

After a Bridge Link is created, add it to either one of the Radios in order for it to take effect.



For performance reasons, it is recommended that the Bridge Link to be added onto Radio 1. Radio 1 usually has less traffic and less interference.



All Bridge Links must be configured to use the same radio channel. Auto channeling is not allowed.



On the Radio where the Bridge Link is being added, the security policy of the primary (the first) WLAN must be WPA2/AES.

Make sure the signal quality of the Bridge Link is adequate because it greatly impacts the performance. Once a link is established, its signal quality and other statistics can be viewed by selecting **Monitor->Wireless Link**. Follow the steps below to improve the signal strength of the WDS link:

- The two APs should be placed such that there are minimal objects between them. Any steel or wood objects absorb RF energy. You should also consider radio interference from devices such as microwave ovens or other APs.
- Scan the channel activities to select a channel that is least busy.
- Adjust the power level setting when the distance of the two APs changes; the further the distance, the higher the power.
- Adjust the link distance parameter as you see fit.

The screenshot shows the configuration page for a Cedar 880AG Enterprise Dual-Radio AP/Bridge. The page title is 'Cedar 880AG Enterprise Dual-Radio AP/Bridge'. The Intelicis logo is in the top left. A navigation menu on the left includes System, Network, Security, Wireless, Management, Log, and Monitor. The main content area is titled 'Wireless > Bridge Link' and contains a form for adding a bridge link. The form has three required fields: Name, Link SSID, and Security Key. A note below the Security Key field states: '** Valid security key is 8-63 characters long with no space.' There are 'Apply' and 'Cancel' buttons at the bottom right of the form. Technical support information and copyright details are visible in the bottom left corner.

Name

Enter a descriptive name for the Bridge Link. The maximum length is 7.

Link SSID

Enter the SSID to be used between the base and non-base bridges. Each bridge link should have its own SSID configured.

Security Key

Enter the security key used between the base and non-base bridges. The security key should be 8 to 63 characters long.

7.3 Examples

7.3.1 WLAN with WPA and 802.1x Authentication

You should already have a RADIUS profile and an 802.1x authentication profile configured in the system.

- 1 Click **Wireless->WLAN** from the Cedar web interface to display all the WLANs.
- 2 Click **Add** to add a new profile. Enter the following sample data and use defaults for the remainder of the parameters.

Name: myWLAN
SSID: myWLAN
- 3 Select **Using 802.1x Authentication** for security policy. The parameters in this sub-section become enabled.
- 4 Click **WPA/TKIP with 802.1x Authentication**, and select an 802.1x Auth Profile from the list box.
- 5 Select a RADIUS Profile from the list box.
- 6 Click **Apply**.
- 7 Click **Wireless->Radio 2** from the Cedar web interface to display radio 2 parameters.
- 8 Click **myWLAN** from the available WLAN list box and add it to the selected WLAN list box.
- 9 Click **Apply**.
- 10 Save the configuration.

7.3.2 WLAN with WEP and MAC Authentication

You should already have a RADIUS profile and an MAC authentication profile configured in the system.

- 1 Click **Wireless->WLAN** from the Cedar web interface to display all the WLANs.
- 2 Click **Add** to add a new profile. Enter the following sample data and use defaults for the remainder of the parameters.

Name: myWLAN
SSID: myWLAN
- 3 Select **Using Key/Passphrase** for security policy. The parameters in this sub-section become enabled.

- 4 Click **Static WEP Key**, and enter a 5-, 13- or 16-character WEP key in the WEP Key 0 field. Make sure to use the same WEP key when configuring the wireless client software.
- 5 Turn MAC authentication on and select an MAC Auth Profile from the list box.
- 6 Select a RADIUS Profile from the list box.
- 7 Click *Apply*.
- 8 Click **Wireless->Radio 2** from the Cedar web interface to display radio 2 parameters.
- 9 Click **myWLAN** from the available WLAN list box and add it to the selected WLAN list box.
- 10 Click *Apply*.
- 11 Save the configuration.

7.3.3 Bridge Link

- 1 Click **Wireless->Bridge Link** from the Cedar web interface to display all the Bridge Links.
- 2 Click **Add** to add a new Bridge Link. Enter the following sample data and use default for the remainder of the parameters.

Name: myLink
- 3 Enter Link SSID (the remote Bridge should use the same SSID).
- 4 Enter a security key which is 8 to 63 characters long (the remote Bridge should configure with the same security key).
- 5 Click *Apply*.
- 6 Click **Wireless->Radio 1** from the Cedar web interface to display radio 1 parameters.
- 7 Change channel to a fixed channel (the remote Bridge should use the same channel).
- 8 Make sure the first WLAN on radio 1 uses WPA2/AES for security.
- 9 Select brglnk or ap,brglnk for mode.

- 10 Select base for role (the remote Bridge should use non-base role).
- 11 Click **myLink** from the available Bridge Link list box and add it to the selected Bridge Link list box.
- 12 Click *Apply*.
- 13 Save the configuration.

7.3.4 Bridge Link with Multiple VLANs

- 1 Follow instructions in Chapter 5.3.2 to configure management VLAN ID.
- 2 Follow instructions in Chapter 7.3.1 or 7.3.2 to create a WLAN. Assign a VLAN ID to the WLAN. When the WLAN is added to Radio 1 or 2, the system automatically creates VLAN for you. Select *Network->VLAN* to display all the Virtual LANs in the system
- 3 Follow instructions in Chapter 7.3.3 to create a bridge link. Add the WLAN created previously to the Radio where the bridge link is being added. This step makes bridge link work as a VLAN trunk port for the VLAN.

8 Management

8.1 Management Setting

The Cedar Command Line Interface is available through a serial console port, telnet or SSH. The Cedar Web Interface is accessible from any web browser on the network. The administrator can modify the telnet, SSH or Web interface setting by selecting *Management* from the menu.

The screenshot displays the Intelicis Cedar 880AG web interface. The top navigation bar includes the Intelicis logo, the product name 'Cedar 880AG Enterprise Dual-Radio AP/Bridge', and a menu with options: Enable, Save, Reboot, Logout, and Help. A left sidebar contains a menu with items: System, Network, Security, Wireless, Management (highlighted), Log, and Monitor. The main content area is titled 'Management' and contains three sections:

- TELNET:** Setting: On Off; Status: running; Port: 23; Buttons: Apply, Cancel.
- SSH:** Setting: On Off; Status: running; Port: 22; Note: † Required to restart server to take effect.; Buttons: Apply, Cancel.
- WEB:** Setting: On; Status: running; Port: 8080; Note: † Required to restart server to take effect.; Buttons: Apply, Cancel.

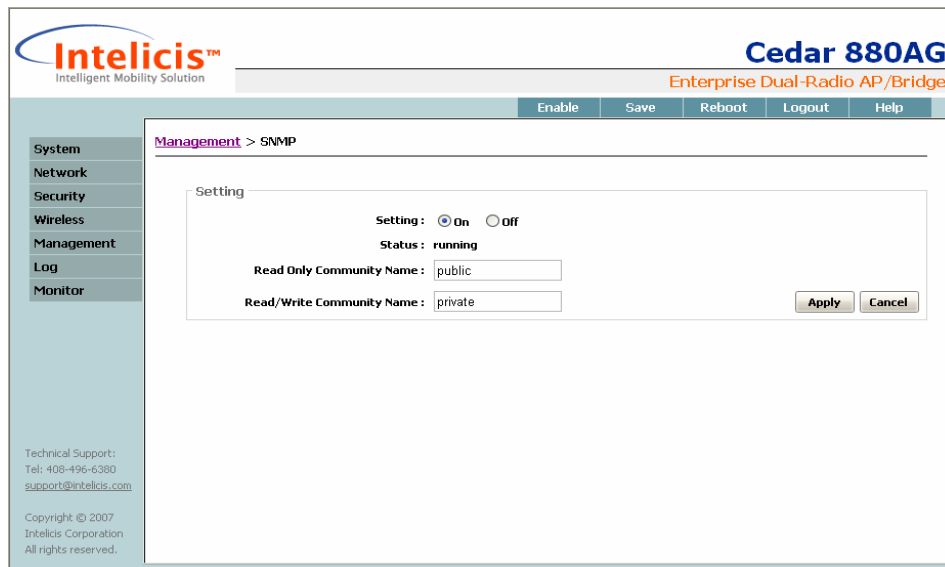
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8.2 SNMP

In addition to the command line interface and web interface, the Cedar access point can be managed through SNMP (Simple Network Management Protocol). One of the applications that use SNMP to manage the Cedar AP is the Intelicis Multi-Service Wireless Switch, Cypress 1024.

To display or change the setting of SNMP, select *Management -> SNMP*.



Setting

Enable or disable SNMP.

Read Only Community Name

The SNMP community name for read only (GET) operations. The default value is “public”.

Read/Write Community Name

The SNMP community name for read and write (SET) operations. The default value is “private”.

9 Log

The Cedar log file can be viewed by selecting **Log** from the menu.

The screenshot displays the Cedar 880AG web interface. At the top left is the Intelicis logo with the tagline 'Intelligent Mobility Solution'. At the top right, the title 'Cedar 880AG' is shown above the subtitle 'Enterprise Dual-Radio AP/Bridge'. A navigation bar contains buttons for 'Enable', 'Save', 'Reboot', 'Logout', and 'Help'. On the left side, a vertical menu lists various system categories: System, Network, Security, Wireless, Management, Log (which is highlighted), and Monitor. The main content area is titled 'System Log' and includes a 'Clear All Logs' link. Below the title, there are radio buttons for 'Setting' (On is selected) and 'Off', and the text 'Status: running'. It also indicates 'Total Number of Entries: 1' and provides 'Apply' and 'Cancel' buttons. A table below shows a single log entry:

Times	Severity	Description
Jun 29 10:40:17	Information	LOGIN:User 'admin' login on network port

At the bottom left of the interface, technical support information is provided: 'Technical Support: Tel: 408-496-6380 support@intelicis.com' and a copyright notice: 'Copyright © 2007 Intelicis Corporation All rights reserved.'

10 Monitor

This chapter contains information on the following topics:

- Monitor interfaces
- Monitor radios
- Monitor Rogue APs
- Monitor wireless users
- Monitor wireless links

10.1 Interfaces

Interface statistics are available for the administrator to monitor network activities. Select *Monitor->Interface* to list all interfaces in the system.

The screenshot shows the Intelicis Cedar 880AG web interface. The top navigation bar includes the Intelicis logo, the product name 'Cedar 880AG', and the subtitle 'Enterprise Dual-Radio AP/Bridge'. A secondary navigation bar contains buttons for 'Enable', 'Save', 'Reboot', 'Logout', and 'Help'. On the left, a sidebar menu lists various system categories: System, Network, Security, Wireless, Management, Log, and Monitor. The main content area is titled 'Monitor > Interface' and features a 'Refresh' link. Below the title is a table displaying interface statistics.

Interface Name	Tx Packets	Tx Bytes	Rx Packets	Rx Bytes	Status
eth0	54974183	4093190593	22611035	2134399653	Up
eth0.utq	27487557	4061066088	0	0	Up
lan	47352	4484035	265571	16198856	Up
lo	14	1046	14	1046	Up
wlan0	230959	19858856	0	0	Up
wlan1	262663	43365983	23600	2391375	Up

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Click the individual interface name to display detailed statistics.

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Monitor > Interface > lan [Refresh](#)

Interface Name : lan
Status : Up

Statistics

Tx Packets :	47363	Rx Packets :	265640
Tx Bytes :	4488272	Rx Bytes :	16202599
Tx Errors :	0	Rx Errors :	0
Tx Drops :	0	Rx Drops :	0
Tx Underruns :	0	Rx Overruns :	0
Tx Carriers :	0	Rx Frames :	0
Tx Collisions :	0		

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10.2 Wireless Statistics

Radio statistics are available for the administrator to monitor wireless network activities. Select *Monitor->Radio* to display radio 1 and radio 2 statistics.

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Enable Save Reboot Logout Help

Monitor > Radio [Refresh](#)

Radio 1 Statistics

Channel :	157	Frequency (MHz) :	5785
Tx Fragments :	2694948	Tx Multicasts :	460326
Tx Failed :	8602	Tx Retry :	386234
Tx Multiple Retries :	149804	Rx Frame Duplicates :	2096
Rx Fragments :	8144828	Rx Multicasts :	6011805
ACK Failures :	957384	RTS Failures :	0
FCS Errors :	664831	RTS Success :	0

Radio 2 Statistics

Channel :	11	Frequency (MHz) :	2462
Tx Fragments :	20947027	Tx Multicasts :	461053
Tx Failed :	7903	Tx Retry :	2405340
Tx Multiple Retries :	235753	Rx Frame Duplicates :	28129
Rx Fragments :	26306872	Rx Multicasts :	615362
ACK Failures :	2828784	RTS Failures :	0
FCS Errors :	650987	RTS Success :	0

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10.3 Rogue APs

Cedar periodically scans its coverage area for information about other access points. If any of the AP appears to be un-trusted or invalid, the administrator may consider to block its access by blocking the switch port that the AP is connected to.

Select **Monitor->Rogue AP** to display information about rogue APs.

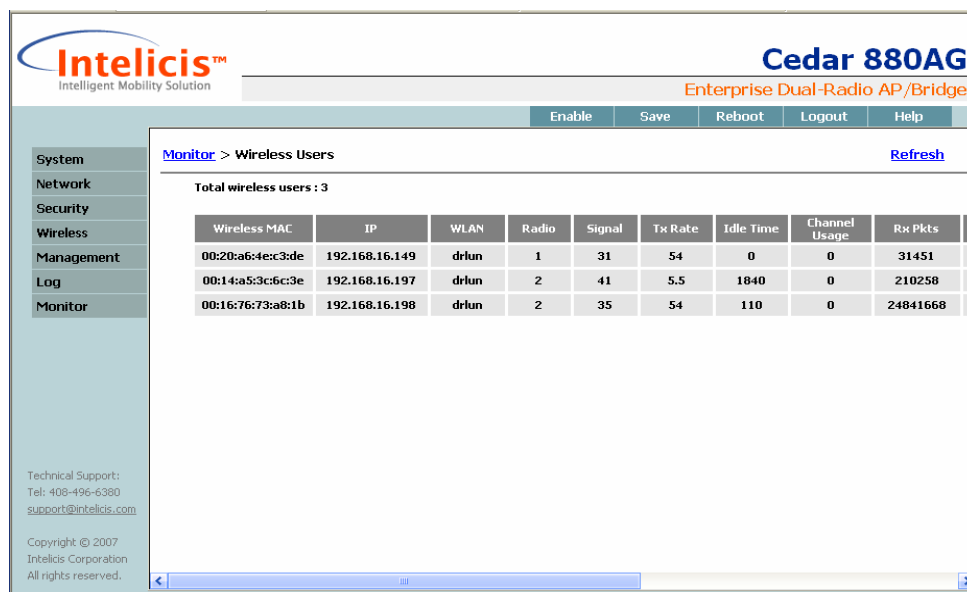
☞ The administrator needs to turn on the Rogue AP detection in the Radio screen in order to enable this feature.

The screenshot shows the web interface for the Cedar 860AG Enterprise Dual-Radio Access Point. The main content area displays the 'Monitor > Rogue AP' screen, which contains a table of detected rogue APs. The table has the following columns: Wireless MAC, Channel, Signal (RSSI), SSID, and Detected By. The detected APs include various models and brands such as Intelicis-a, zenexoffice, lun-g, VAI AP2, Weco, 2WIRES13, EI, VAI AP3, VAI AP1, NIVEUS, and Intersoft.

Wireless MAC	Channel	Signal (RSSI)	SSID	Detected By
00:03:79:1fff:40	36	21	Intelicis-a	radio 1
00:0c:41:ce:6f:89	6	11	zenexoffice	radio 2
00:03:79:1ffe:90	1	36	lun-g	radio 2
00:03:79:11:79:d0	10	0x0	0	radio 2
00:03:79:11:79:d1	10	0x0	0	radio 2
00:0fa3:1ca3:30	6	13	VAI AP2	radio 2
00:03:79:11:75:10	10	0x2	0	radio 2
00:04:88:ed:2d:97	7	9	Weco	radio 2
00:14:95:d7:fb:d1	6	20	2WIRES13	radio 2
00:09:5b:e9:5d:36	6	10	EI	radio 2
00:03:79:11:75:11	10	0x2	0	radio 2
00:0fa3:1c:96:43	6	14	VAI AP3	radio 2
00:0c:41:d6:41:2e	6	12	VAI AP1	radio 2
00:0f:66:bd:1b:a7	6	18	NIVEUS	radio 2
00:12:88:c8:ec:ce:9	6	51	Intersoft	radio 2

10.4 Wireless Users

The administrator can select **Monitor->Wireless Users** to monitor all the active wireless users.



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Enable Save Reboot Logout Help

Monitor > Wireless Users Refresh

Total wireless users : 3

Wireless MAC	IP	WLAN	Radio	Signal	Tx Rate	Idle Time	Channel Usage	Rx Pkts
00:20:a6:4e:c3:de	192.168.16.149	drlun	1	31	54	0	0	31451
00:14:a5:3c:6c:3e	192.168.16.197	drlun	2	41	5.5	1840	0	210258
00:16:76:73:a8:1b	192.168.16.198	drlun	2	35	54	110	0	24841668

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Description of the parameters:

Wireless MAC: MAC address of the wireless user.

IP: IP address of the wireless user.

WLAN: the WLAN which the wireless user associates to.

Radio: The radio (1 or 2) being used by the wireless user.

Signal: Signal to Noise Ratio at the AP when frames are received from the wireless user.

Tx Rate: Transmission rate.

Idle Time: The amount of the time the AP has remained inactive.

Channel Usage: A ratio indicating how busy the AP is.

Rx Pkts: Number of packets received.

Rx Bytes: Number of bytes received.

Tx Pkts: Number of packets transmitted.

Tx Bytes: Number of bytes transmitted.

10.5 Wireless Link

The administrator can select **Monitor->Wireless Link** to monitor all the remote bridge links. Detailed signal strength can be viewed by clicking the individual bridge link.

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Enable Save Reboot Logout Help

Monitor > Wireless Link Refresh

Total wireless links : 1

Wireless MAC	Link	Radio	Signal	Tx Rate	Idle Time	Channel Usage	Rx Pkts	Rx Bytes
00:03:79:11:7d:c0	link1	1	30	54	17930	0	6118451	550

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Description of the parameters:

Wireless MAC: MAC address of the remote bridge link.

Link: link name.

Radio: The radio (1 or 2) being used by the bridge link.

Signal: Signal to Noise Ratio at the AP when frames are received from the bridge link.

Tx Rate: Transfer rate.

Idle Time: The amount of the time the AP has remained inactive.

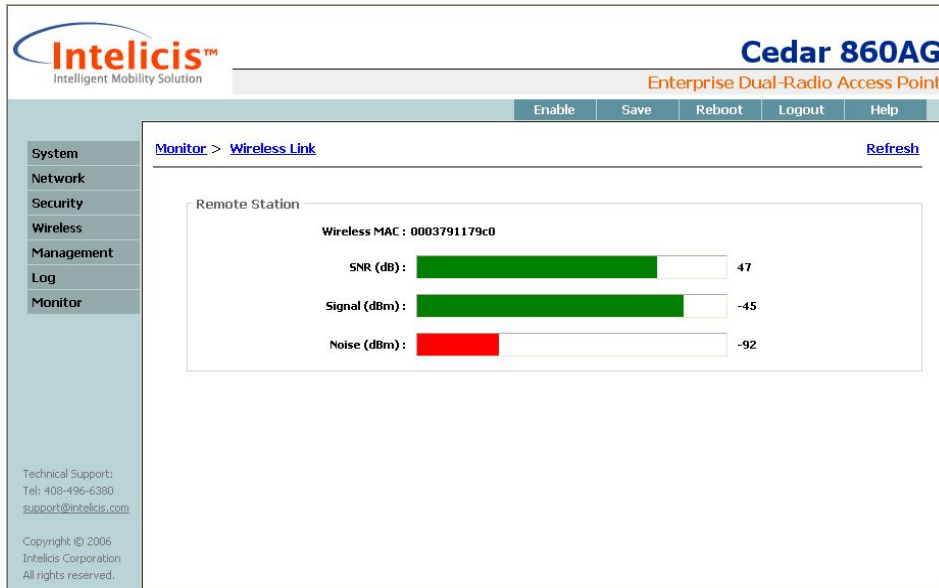
Channel Usage: A ratio indicating how busy the AP is.

Rx Pkts: Number of packets received.

Rx Bytes: Number of bytes received.

Tx Pkts: Number of packets transmitted.

Tx Bytes: Number of bytes transmitted.



Description of the parameters:

SNR: Signal-to-Noise Ratio at the AP when frames are received from the bridge link. SNR is calculated according to the following formula; the higher this number, the better the signal quality. It is highly recommended to maintain the SNR in green color (larger than 36).

$$\text{SNR (dB)} = \text{Signal (dBm)} - \text{Noise (dBm)}$$

Signal: Signal strength.

Noise: Noise level.



It is recommended to check SNR from both ends of the link to ensure the signal quality of the link is good.

11 Command Line Interface

The Command Line Interface is available through a serial console port, telnet or SSH. To establish a telnet or SSH connection, enter one of the following commands.

```
telnet 192.168.1.188
ssh 192.168.1.188
```

11.1 Base Commands

11.1.1 enable

Syntax:

enable

Description

This command allows the user to enter the privileged mode to do advanced configuration.

Example:

```
Cedar# enable
```

11.1.2 disable

Syntax:

disable

Description:

This command allows the user to leave the privileged mode and return back to basic mode.

Example:

```
Cedar# disable
```

11.1.3 config save

Syntax:

config save

Description:

Save the whole system configuration into non-volatile memory.

Example:

```
Cedar# config save
```

11.1.4 quit

Syntax:

quit

Description:

This command allows the user to quit from current CLI session. This command is equivalent to “exit”.

Example:

```
Cedar# quit
```

11.1.5 exit

Syntax:

exit

Description:

This command allows the user to quit from current CLI session. This command is equivalent to “quit”.

Example:

```
Cedar# exit
```

11.1.6 reboot

Syntax:

reboot

Description:

Reboot the system.

Example:

```
Cedar# reboot
```

11.1.7 **reset**

Syntax:

reset

Description:

Reset the current system configuration to manufacturer default and reboot the system.

Example:

```
Cedar# reset
```

11.1.8 **up arrow**

Syntax:

↑

Description:

Display the previous typed command from the command history table.

Example:

```
Cedar# ↑
```

11.1.9 **down arrow**

Syntax:

↓

Description:

Display the next typed command from the command history table.

Example:

```
Cedar# ↓
```

11.1.10 debug

Syntax:

```
debug { <module name> |  
        <module name> <level 1-5>  
}
```

Description:

This command is used for enabling debug messages. The global debug switch must be on in order to see the debug messages. The different debug level can be used to control the amount of debug messages in the specified module.

Example:

```
Cedar# debug //enable global switch for debug messages  
Cedar# debug auth 3
```

11.1.11 undebug

Syntax:

```
undebug { <module name> }
```

Description:

This command is used for disabling debug message. The global debug switch or specific module debug switch can be turned off by using this command.

Example:

```
Cedar# undebug  
Cedar# undebug auth
```

11.1.12 help

Syntax:

```
help or ?
```

Description:

Display the current available command options.

Example:

```
Cedar# help
Cedar# ?
```

11.2 System Commands

11.2.1 show system

Syntax

show system

Description:

Display system information; including system login name, model, firmware version, system time and system up time.

Example:

```
Cedar# show system
```

11.2.2 config system

Syntax:

```
config system {
    name <string> |
    login_name <string> |
    password <string> |
    enable_password <string> |
    session_timeout <# in minute> |
    export runtime_cfg <host/file name[/username/password]> |
    import runtime_cfg <host/file name[/username/password]>
}
```

Description:

Configure system related parameters.

name:	System name
login_name:	The username for system login.
password:	The password for system login.
enable_password:	The password to enter privilege mode to do advance configurations or operations
session_timeout:	The idle timeout for the CLI session.
time:	System time
export:	The AP configuration can be exported to a file on an FTP server.
import:	The CLI command file can be imported from an FTP server.

Example:

```
Cedar# config system name MyAP
Cedar# config system session_timeout 30

Cedar# config system import runtime_cfg 192.168.1.1/cli_batch
```

11.2.3 show sntp

Syntax

show sntp

Description:

Display SNTP related information, such as SNTP server location and offset.

Example:

```
Cedar# show sntp
```

11.2.4 config sntp

Syntax:

```
config sntp {  
    <on | off> |  
    server <ip address | server name> |  
    offset <# in hour>  
}
```

Description:

Configure SNTP related parameters.

server: SNTP server location.
offset: Offset to the UTC time.

Example:

```
Cedar# config sntp on  
Cedar# config sntp offset -8
```

11.2.5 upgrade

Syntax:

```
upgrade {  
    <ftp | tftp>  
    server <host> |  
    file <file name> |  
    username <username> |  
    password <password>  
}
```

Description:

Upgrade system firmware. The system uses the provided username and password to retrieve new firmware from either FTP or TFTP server and then performs the upgrade. If the username and password are not provided, 'anonymous' with no password are used to retrieve firmware.

Example:

```
Cedar# upgrade ftp server 10.10.10.123 file firmware09012004.bin
```

11.3 Network Commands

11.3.1 show interface

Syntax:

```
show interface { all | <if name>}
```

Description:

Display interface information.

all: Display the information of all interfaces.

Example:

```
Cedar# show interface lan
Cedar# show interface all
```

11.3.2 config interface

Syntax:

```
config interface <if name> {
    <on | off> |
    ip <0 | 1 | 2 | 3 | 4> {
        [addr <ip address>]
        [netmask <netmask address>]
        [mode <static | dhcp >]
        [clear]
    }
}
```

Description:

Configure interface IP addresses and operation mode. Each interface allows up to 5 different IP addresses.

clear: It is used to reset the IP and netmask to 0.0.0.0.

Example:

```
Cedar# config interface lan ip 0 addr 192.168.100.1 netmask
255.255.255.0
Cedar# config interface lan ip 0 mode static
```

11.3.3 show vlan

Syntax:

```
show vlan { all | <vlan name>}
```

Description:

Display vlan device information.

Example:

```
Cedar# show vlan all
Cedar# show vlan lan
```

11.3.4 config vlan

Syntax:

```
config vlan {
    mgmt_vid <vlan id #> |
    <vlan name> {
        aging <# in seconds> |
        stp <on | off>
    }
}
```

Description:

VLAN interface is created automatically by the system when management vid (mgmt_vid) or WLAN vid is configured to value other than “untagged”.

aging: The time interval an inactive MAC address remains in the MAC table before it is removed.

stp: Enable/Disable 802.1d Spanning Tree Protocol (STP).

Example:

```
Cedar# config vlan vlan80 stp on
Cedar# config vlan vlan80 aging 500
```

11.3.5 show ip

Syntax:

```
show ip {
    dhcp |
    dhcp table |
    dhcp pool <pool id> |
    dns |
    route
}
```

Description:

dhcp:	Display DHCP summary.
dhcp table:	Display client IP addresses assignment.
dhcp pool:	Display specific DHCP pool.
dns:	Display primary and secondary DNS.
route:	Display routing table.

Example:

```
Cedar# show ip dhcp
Cedar# show ip dhcp table

Cedar# show ip dhcp pool 0

Cedar# show ip dns

Cedar# show ip route
```

11.3.6 config ip

Syntax:

config ip {dhcp ... | dns ... | route ...}

Description:

dhcp:	Configure DHCP server related operations.
dns:	Configure DNS related operations.
route:	Configure routing table related operations.

Example:

See ‘config ip dhcp’, ‘config ip dns’ and ‘config ip route’ sections for details.

config ip dhcp

Syntax:

```
Config ip dhcp {
    <on | off> |
    pool <pool id> {
        <on | off> |
        [net <net address>]
        [netmask <netmask address>]
        [range_start <ip address>]
        [range_end <ip address>]
    }
}
```



```
        [dns <ip address>]
        [wins <ip address>]
        [gw <ip address>]
        [lease_time <time in seconds>]
    }
}
```

Description:

net:	The network address of the specified DHCP pool.
netmask:	The network mask address of the specified DHCP
range_start :	Starting IP address used for pool range control
range_end:	Ending IP address used for pool range control
dns:	Domain Name Server IP address
wins:	Windows Internet Name Server IP address
gw:	Gateway IP address.
lease_time:	Valid time period for assigned IP from DHCP server

Example:

```
Cedar# config ip dhcp on
Cedar# config ip dhcp pool 0 off

Cedar# config ip dhcp pool 0 net 10.60.0.0 netmask 255.255.0.0 gw
10.60.1.1

Cedar# config ip dhcp pool on
```

config ip dns

Syntax:

```
config ip dns {
    primary < ip address> |
    secondary <ip address>
}
```

Description:

Configure the IP address of the primary and secondary DNS servers.

Example:

```
Cedar# config ip dns primary 206.13.28.12
Cedar# config ip dns secondary 206.13.29.12
```

config ip route

Syntax:

```
config ip route {add | del} {  
    net <net address>  
    netmask <netmask address>  
    [gw <ip address>]  
    if < if name>  
}
```

Description:

add:	Add a route entry in the routing table.
del:	Delete a route entry in the routing table.
net:	The network address of the specified route will apply.
netmask:	The network mask address of the specified route will apply.
gw:	The gateway IP address of the specified route will apply.
if:	The interface of the specified route will apply.

Example:

```
Cedar# config ip route add net 10.60.0.0 netmask 255.255.0.0 if lan  
Cedar# config ip route add net 0.0.0.0 netmask 0.0.0.0 gw  
67.100.23.68 if lan  
  
Cedar# config ip route del net 10.60.0.0 netmask 255.255.0.0
```

11.4 Security Commands

11.4.1 show auth

Syntax:

```
show auth profile { all | <profile name> }
```

Description:

all:	Display all authentication profiles.
<profile name>:	Display detailed authentication profile.

Example:

```
Cedar# show auth profile all  
Cedar# show auth profile EAP
```

11.4.2 config auth

Syntax:

```
config auth { 8021x ... |  
              mac ... |  
              radius ...  
}
```

Description:

Configure 802.1x, mac or radius authentication profile.
See ‘config auth ...’ sections for details.

config auth radius

Syntax:

```
config auth radius profile {  
  add <profile name> |  
  del <profile name> |  
  <profile name> {  
    [radius_failover_limit <#>]  
    [radius_nas_ip <ip address>]  
    [primary_radius_retry_period <#>]  
    [primary_auth_ip <ip address>]  
    [primary_auth_port <#>]  
    [primary_auth_secret <string>]  
    [secondary_auth_ip <ip address>]  
    [secondary_auth_port <#>]  
    [secondary_auth_secret <string>]  
    [primary_accounting_ip <ip address>]  
    [primary_accounting_port <#>]  
    [primary_accounting_secret <string>]  
    [secondary_accounting_ip <ip address>]  
    [secondary_accounting_port <#>]  
    [secondary_accounting_secret <string>]  
  }  
}
```

Description:

radius_failover_limit:	Number of retries for the primary radius server before switching to the secondary radius server. Default is 4.
primary_radius_retry_period:	Retry period in seconds for the primary radius server. Default is 600.
radius_nas_ip:	IP address of the AP.
primary_auth_ip:	IP address of the primary authentication radius server.
primary_auth_port	The listen port number of the primary radius server. Default value is 1812
primary_auth_secret	The secret for communicating with the primary authentication radius server. Default value is 'changeitnow'
secondary_auth_ip:	IP address of the secondary authentication radius server.
secondary_auth_port:	The listen port number of secondary authentication radius server. Default value is 1812.
secondary_auth_secret:	The secret for communicating with the secondary authentication radius server. Default value is 'changeitnow'.
primary_accounting_ip:	IP address of the primary accounting radius server.
primary_accounting_port	The listen port number of primary accounting radius server. Default value is 1812
primary_accounting_secret	The secret for communicating with the primary accounting radius server. Default value is 'changeitnow'
secondary_accounting_ip:	IP address of the secondary accounting radius server.
secondary_accounting_port:	The listen port number of secondary accounting radius server. Default value is 1812.
secondary_accounting_secret:	The secret for communicating with the primary accounting radius server. Default value is 'changeitnow'.

Example:

```
Cedar# config auth radius profile add Cypress
Cedar# config auth radius profile Cypress primary_auth_ip
192.168.1.1

Cedar# config auth radius profile Cypress primary_auth_secret
mysecret
```

config auth 8021x*Syntax:*

```
config auth 8021x profile {
```

```
add <profile name> |
del <profile name> |
<profile name> {
    [reauthentication <on | off>]
    [reauthentication_period <# in seconds>]
    [wep_key_len < 64 | 128 >]
    [wep_key_interval < 0 | 60-2592000>]
}
}
```

Description:

reauthentication:	Enable/Disable re-authentication.
reauthentication_period:	Re-authentication timer in seconds. Default is 3600 seconds.
wep_key_len:	The length of the generated dynamic WEP keys in bits. Default is 128 bits.
Wep_key_interval:	The time interval the dynamic WEP keys will be re-generated. Default is 300 seconds.

Example:

```
Cedar# config auth 8021x profile add EAP
Cedar# config auth 8021x profile EAP wep_key_len 64
```

config auth mac

Syntax:

```
config auth mac profile {
    add <profile name> |
    del <profile name> |
    <profile name> {
        [permitadd <MAC address>]
        [permitdel <MAC address>]
        [denyadd <MAC address>]
        [denydel <MAC address>]
        [auth_method <permit | deny | radius>]
    }
}
```

Description:

permitadd:	Add an MAC address to the Permit List.
permitdel:	Delete an MAC address from the Permit List.
denyadd:	Add an MAC address to the Deny List.
denydel:	Delete an MAC address from the Deny List.
auth_method:	Choose from permit, deny or radius.

Example:

```
Cedar# config auth mac profile add MAC
Cedar# config auth mac profile MAC denyadd 000cf157b3be

Cedar# config auth mac profile MAC auth_method radius
```

11.4.3 show filter

Syntax:

show filter

Description:

Display all the filters.

Example:

```
Cedar# show filter
```

11.4.4 config filter

Syntax:

```
config filter {
    <on | off> |
    add {
        { mac | ip }<address> |
        [action <deny | permit | next>]
        [protocol <tcp | udp | icmp>]
        [src_port <port #>]
        [dst_port <port #>]
        [priority <1-n>]
        [if <interface name> ] } |
    del <filter id> |
    entry <filter id > {
        <on | off> |
        [mac <MAC address>]
```

```
[ip <ip address>]
[protocol <tcp | udp | icmp>]
[src_port <port #>]
[dst_port <port #>]
[priority <1-n>]
[if <interface name>]
[action <deny | permit | next>]
}
}
```

Description:

action: 'deny': packets that match the rules will be dropped.
'permit': packets that match the rules will be accepted.
'next': packets that match the rules will go to the immediate next rule to do further matching. It is used for multiple rule chain.

priority: '1' is the highest priority.

mac: '000000000000' means all MAC addresses.

ip: '0.0.0.0' means all IP addresses.

Example:

```
Cedar# config filter add mac 001122334455 action deny
Cedar# config filter entry 8 on

Cedar# config filter entry 8 order 1

Cedar# config filter del 8

Cedar# config filter on
```

11.5 Wireless Commands

11.5.1 show wireless

Syntax:

```
show wireless { summary | rogue | users | link | link <MAC address> }
```

Description:

summary: Display wireless summary information.
rogue: Display all the rogue APs detected by Cedar.
users: Display all the active wireless users which are using the AP.
link: Display all the wireless bridge links.
link <MAC>: Display individual wireless bridge link.

Example:

```
Cedar# show wireless summary
Cedar# show wireless rogue

Cedar# show wireless link
```

11.5.2 config wireless

Syntax:

```
config wireless {
    <on | off> |
    80211d < on | off > |
    eap_relay < on | off >
}
```

Description:

80211d: Enable/Disable 802.1 world mode.
eap_relay: Enable/Disable EAP related authentication in AP.

Example:

```
Cedar# config wireless on
Cedar# config wireless eap_relay off
```

11.5.3 show wlan

Syntax:

```
show wlan { all | <wlan name>}
```

Description:

all: Display a summary of all the WLANs.
<wlan name>: Display detailed WLAN configuration.

Example:

```
Cedar# show wlan all
Cedar# show wlan Intelicis-a
```

11.5.4 config wlan

Syntax:

```
config wlan {
    add <wlan name> |
    del <wlan name> |
    <wlan name> {
        [ssid <string>]
        [ssid_broadcast < on | off >]
        [vid < untagged | vlan id >]
        [tx_rate < auto | # >]
        [max_tx_rate < auto | #>]
        [min_associate_rate < auto | #>]
        [dtim <1-255>]
        [max_stations < 0-2077>]
        [associate < open | wpa | wpa2 | wpa-psk | wpa2-psk |
            wpa,wpa2 | wpa-psk,wpa2-psk >]
        [encrypt < none | wep | tkip | aes | wep,tkip | wep,aes |
            tkip,aes | wep,tkip,aes >]
        [wep_key_0 <string that is 5, 13 or 16 characters long>]
        [wep_key_1 <string that is 5, 13 or 16 characters long>]
        [wep_key_2 <string that is 5, 13 or 16 characters long>]
        [wep_key_3 <string that is 5, 13 or 16 characters long>]
        [default_wep_key < 0 | 1 | 2 | 3>]
        [wpa_psk < string that is 8 to 63 characters long>]
        [8021x_auth < on | off >]
        [8021x_auth_profile < clear | "profile name" >]
        [mac_auth < on | off >]
        [mac_auth_profile < clear | "profile name">]
        [radius_profile < clear | "profile name">]
    }
}
```

Description:

ssid:	A unique identifier used by mobile users to connect to a wireless network.
ssid broadcast:	Enable/Disable SSID to be broadcast to all wireless devices.
vid:	Enable/Disable VLAN tag to be used.
tx_rate:	A transmission rate that will be used for all unicast frames.
max_tx_rate:	Maximum limit on the transmission rate.
min_associate_rate:	Minimum transmission rate required for association.
dtim:	The Deferred Traffic Indicator Map used with clients that have power management enabled.
max_stations:	Maximum number of stations that can associate with the AP.
max_tx_rate:	Maximum limit on the transmission rate.
associate:	The association type between the client and AP connection.
encrypt:	The encryption mechanism used for the association.
wep_key_#:	The WEP key used for encryption.
default_wep_key:	The index to the WEP key.
wpa_psk:	WPA PSK passphrase.
8021x_auth:	Enable/Disable 802.1x authentication.
8021x_auth_profile:	The 802.1x auth profile to be used for authentication.
mac_auth:	Enable/Disable MAC authentication.
mac_auth_profile:	The MAC auth profile to be used for authentication.
radius_profile:	The RADIUS auth profile to be used for authentication.

Example:

```
Cedar# config wlan add wepkey
Cedar# config wlan wepkey associate open encrypt wep

Cedar# config wlan wepkey default_wep_key 0 wep_key_0 wepke

Cedar# config wlan wepkey mac_auth_profile MAC

Cedar# config wlan wepkey mac_auth on
```

11.5.5 show radio

Syntax:

```
show radio { 1 | 2 }
```

Description:

Display radio 1 or radio 2 detailed information.

Example:

```
Cedar# show radio 1
```

11.5.6 config radio

Syntax:

```
config radio <1 | 2> {
    [rf < on | off >]
    [freq < a | super-ag > for radio 1,
     <b|g|bg|super-ag> for radio 2]
    [channel < see below >]
    [auto_channel_list < see below >]
    [basic_rates < see below >]
    [supported_rates < see below>]
    [tx_power < auto | 0-20 dbm>]
    [mode < ap | brglnk | ap,brglnk>]
    [role < base | non-base>]
    [repeater < on | off>]
    [beacon <20-1000 ms>]
    [preamble < long | short>]
    [fragm_threshold < 256-2346 >]
    [rts_threshold < 0-2347 >]
    [cts_protection <on | off>]
    [antenna < diversity | 1| 2 >]
    [drop_load < off | 0-99 >]
    [deny_load < off | 0-99 >]
    [intra_bss < on | off>]
    [rogue_detection < on | off>]
    [wmm < on | off >]
    [distance < 0-50 kilometers >]
    [wlanadd < wlan name >]
    [wlandel < wlan name>]
    [brglnkadd < brglnk name>]
    [brglnkdel < brglnk name>]
}
```

Description:

rf:	Enable/Disable radio frequency.
freq:	Communication mode between wireless clients and the AP.
channel:	Channel used between wireless clients and the AP.
	auto: AP automatically chooses a relatively unused channel.
	freq b,g, bg: 1-14
	freq a: 36, 40, 44, 48, 52, 56, 60, 64, 149, 153, 157, 161, 165
	freq super-ag, radio 1: 40, 48, 56, 153, 161

	freq super-ag, radio 2: 6
auto_channel_list:	A list of channel numbers for auto-channeling. default: all the available channels freq b,g, bg: 1-14 freq a: 36, 40, 44, 48, 52, 56, 60, 64, 149, 153, 157, 161, 165
basic_rates & supported_rates:	Transmission rate used between wireless clients and the AP. freq a: 6, 9, 12, 18, 24, 36, 48, 54 freq b: 1, 2, 5.5, 11 freq g: 6, 9, 12, 18, 24, 36, 48, 54 freq bg: 1, 2, 5.5, 11, 6, 9, 12, 18, 24, 36, 48, 54
tx_power:	transmit power used between wireless clients and the AP.
mode:	AP only, bridge only or both.
role:	role of the bridge.
repeater:	Enable/disable repeater mode.
beacon:	Beacon transmit frequency.
preamble:	Allow wireless clients to synchronize with the AP.
fragm_threshold:	Fragmentation threshold.
rts_threshold:	Request-to-send threshold.
cts_protection:	Enable/Disable Clear-to-send protection.
antenna:	Antenna to receive and transmit signals.
drop_load:	If the air time load is greater than the given parameter, disassociate a station.
deny_load:	If the air time load is greater than the given parameter, new stations are not allowed.
intra_bss:	Enable/Disable communication between wireless clients within an AP.
rogue_detection:	Enable/Disable rogue AP detections.
mmm:	
distance:	
wlanadd:	Add a WLAN to this radio.
wlandel:	Remove a WLAN from this radio.
brglnkadd:	Add a bridge link to this radio.
brglnkdel:	Remove a bridge link from this radio.

Example:

```
Cedar# config radio 2 channel 10
Cedar# config radio 2 wlanadd newWLAN

Cedar# config radio 1 brglnkadd newLink
```

11.5.7 show brglnk

Syntax:

```
show brglnk { all | <brglnk name>}
```

Description:

all: Display a summary of all the bridge links.
<brglnk name>: Display detailed bridge link configuration.

Example:

```
Cedar# show brglnk all  
Cedar# show brglnk myLink
```

11.5.8 config brglnk

Syntax:

```
config brglnk {  
    add <brglnk name> |  
    del <brglnk name> |  
    <brglnk name> {  
        [link_ssid < string >]  
        [security_key <string that is 8 to 63 characters lon>]  
    }  
}
```

Description:

link_ssid: SSID used between the base and non-base bridges.
security_key: The security key used between the base and non-base bridges

Example:

```
Cedar# config brglnk add newLink  
Cedar# config brglnk newLink link_ssid 123 security_key 12345678
```

11.6 Management Commands

11.6.1 show telnet

Syntax:

```
show telnet
```

Description:

Display TELNET server configuration.

Example:

```
Cedar# show telnet
```

11.6.2 config telnet

Syntax:

config telnet {<on | off> | [port <port #>] }

Description:

Configure TELNET server parameters.

port: Port number which TELNET server will listen to

Example:

```
Cedar# config telnet port 12000
Cedar# config telnet on
```

11.6.3 show ssh

Syntax:

show ssh

Description:

Display SSH server configuration.

Example:

```
Cedar# show ssh
```

11.6.4 config ssh

Syntax:

config ssh {<on | off> | port <port #> }

Description:

Configure SSH server parameters.

Example:

```
Cedar# config ssh port 12000
Cedar# config ssh on
```

11.6.5 show web

Syntax:

show web

Description:

Display WEB server configuration.

Example:

```
Cedar# show web
```

11.6.6 config web

Syntax:

config web {<on | off> | port <port #>}

Description:

Configure WEB server settings.

Example:

```
Cedar# config web on
Cedar# config web port 80
```

11.6.7 show snmp

Syntax:

show snmp

Description:

Display SNMP configuration.

Example:

```
Cedar# show snmp
```

11.6.8 config snmp

Syntax:

```
config snmp {  
    <on | off> |  
    community <community name> {  
        [name <string>]  
        [write < on | off>]  
    }  
}
```

Description:

Configure SNMP community settings.

name: SNMP community name.
write: Enable or disable write privilege.

Example:

```
Cedar# config snmp on  
Cedar# config snmp community private write on  
Cedar# config snmp community public name aaa  
Cedar# config snmp community aaa write off
```

11.6.9 show syslog

Syntax:

```
show syslog
```

Description:

Display system logging events.

Example:

```
Cedar# show syslog
```


11.6.10 config syslog

Syntax:

config syslog {<on | off> | clear}

Description:

Configure system log settings.

Example:

```
Cedar# config syslog on  
Cedar# config syslog clear
```

11.7 Miscellaneous Commands

11.7.1 ping

Syntax:

ping <host>

Description:

A utility to test the network connection between two hosts.

Example:

```
Cedar# ping 100.100.100.1
```

11.7.2 traceroute

Syntax:

traceroute <host>

Description:

A network utility to retrieve network routing path information.

Example:

```
Cedar# traceroute www.yahoo.com
```

11.7.3 show arp

Syntax:

show arp

Description:

Display ARP table information.

Example:

```
Cedar# show arp
```

11.7.4 show memory

Syntax:

show memory

Description:

Display system memory usage information.

Example:

```
Cedar# show memory
```

11.8 Examples

11.8.1 System Commands

Here are some examples of how to execute system commands using the Command Line Interface.

1. To change the system's name:

```
Cedar# config system name MyCedar
```

2. To change the login password:

```
Cedar# config system password
Current Password:
New Password:
Re-confirmed:
```

3. To change the privilege password:

```
Cedar# config system enable_password
Current Password:
New Password:
Re-confirmed:
```

4. To change the SNTP offset to Pacific Standard Time zone.

```
Cedar# config sntp offset -8
```

5. To upgrade the firmware:

```
Cedar# upgrade ftp server 192.168.15.184 username admin password xxxx file
cedar880ag-05172005-1.0.0.120a.bin
```

6. To execute a CLI command file:

```
Cedar# import system runtime_cfg 192.168.15.184/batch.cli/admin/xxx
```

11.8.2 Network Commands

Network parameter changes take effect immediately. You can perform the following CLI commands via the console.

1. Configure static IP address, for example 192.168.1.188.

```
Cedar# config interface lan ip 0 mode static
Cedar# config interface lan ip 0 addr 192.168.1.188 netmask 255.255.255.0
Cedar# show interface lan
```

2. Configure default route. For example, direct all unknown traffic to 192.168.1.1. A default route has both the net and netmask parameters set to 0.0.0.0.

```
Cedar# config ip route add net 0.0.0.0 netmask 0.0.0.0 gw 192.168.1.1 if lan
Cedar# show ip route
```

3. Configure domain name servers. For example, change the primary DNS to 192.168.1.1

```
Cedar# config primary dns 192.168.1.1  
Cedar# show ip dns
```

4. Save the configuration changes.

```
Cedar# config save
```

5. Configure management VLAN ID, for example 4094.

```
Cedar# config vlan mgmt_vid 4094  
Cedar# show vlan all
```

11.8.3 802.1x Authentication

1. Create some 802.1x user entries in a Cypress RADIUS server.

```
Cedar# config radius user_db add test1/test1/eap  
Cedar# config radius user_db add test2/test2/eap
```

2. Create a RADIUS profile.

```
Cedar# config auth radius profile add myRADIUS  
Cedar# config auth radius profile myRADIUS primary_auth_ip 192.168.1.1  
Cedar# config auth radius profile myRADIUS primary_auth_secret xxx  
Cedar# show auth profile myRADIUS
```

3. Configure an 802.1x authentication profile.

```
Cedar# config auth 8021x profile add my8021x  
Cedar# config auth profile my8021x
```

4. Save the configuration changes.

```
Cedar# config save
```

11.8.4 MAC Authentication

1. Create a MAC user entry in a Cypress RADIUS server.

```
Cedar# config radius user_db add 000cf157b3bc//mac
```

2. Create a RADIUS profile.

```
Cedar# config auth radius profile add myRADIUS
Cedar# config auth radius profile myRADIUS primary_auth_ip 192.168.1.1
Cedar# config auth radius profile myRADIUS primary_auth_secret xxx
Cedar# show auth profile myRADIUS
```

3. Configure a MAC authentication profile.

```
Cedar# config auth mac profile add myMAC
Cedar# config auth mac profile myMAC auth_method radius
Cedar# show auth profile myMAC
```

4. Save the configuration changes.

```
Cedar# config save
```

11.8.5 WLAN with WPA and 802.1x Authentication

1. Create a WLAN.

```
Cedar# config wlan add myWLAN
Cedar# config wlan myWLAN ssid myWLAN
Cedar# config wlan myWLAN associate wpa encrypt tkip
Cedar# config wlan myWLAN radius_profile myRADIUS
Cedar# config wlan myWLAN 8021x_auth_profile my8021x
Cedar# config wlan myWLAN 8021x_auth on
Cedar# show wlan myWLAN
```

2. Add this WLAN to Radio 2.

```
Cedar# config radio 2 wlanadd myWLAN
Cedar# show radio 2
```

3. Save the configuration changes.

```
Cedar# config save
```

11.8.6 WLAN with WEP and MAC Authentication

1. Create a WLAN.

```
Cedar# config wlan add myWLAN
Cedar# config wlan myWLAN ssid myWLAN
Cedar# config wlan myWLAN associate open encrypt wep
Cedar# config wlan myWLAN default_wep_key 0 wep_key_0 wepke
Cedar# config wlan myWLAN radius_profile myRADIUS
Cedar# config wlan myWLAN mac_auth_profile myMAC
Cedar# config wlan myWLAN mac_auth on
Cedar# show wlan myWLAN
```

2. Add this WLAN to Radio 2.

```
Cedar# config radio 2 wlanadd myWLAN
Cedar# show radio 2
```

3. Save the configuration changes.

```
Cedar# config save
```

11.8.7 Bridge Link

1. Create a Bridge Link.

```
Cedar# config brglnk add myLink
Cedar# config brglnk myLink link_ssid 123
Cedar# config brglnk myLink security_key 12345678
Cedar# show brglnk myLink
```

2. Add this brglnk to Radio 1.

```
Cedar# config radio 1 channel 36
Cedar# config radio 1 mode brglnk
Cedar# config radio 1 role base
# Change primary wlan on radio 1 to wpa2/aes security
Cedar# config wlan Intelicis-a associate wpa2 encrypt aes
Cedar# config radio 1 brglnkadd myLink
Cedar# show radio 1
```

3. Save the configuration changes.

```
Cedar# config save
```

11.8.8 Bridge Link with Multiple VLANs

1. Configure management VLAN ID, for example 4094.

```
Cedar# config vlan mgmt_vid 4094
Cedar# show vlan all
```

2. Create a WLAN with VLAN ID.

```
Cedar# config wlan add myWLAN
Cedar# config wlan myWLAN ssid myWLAN vid 4094
Cedar# config wlan myWLAN associate wpa encrypt tkip
Cedar# config wlan myWLAN radius_profile myRADIUS
Cedar# config wlan myWLAN 8021x_auth_profile my8021x
Cedar# config wlan myWLAN 8021x_auth on
Cedar# show wlan myWLAN
```

3. Follow instructions in Chapter 11.8.7 to create bridge link and add it to Radio 1.
4. Add WLAN to Radio 1 and Radio 2 (Radio 1 is for brglnk, Radio 2 is for remote wireless clients)

```
Cedar# config radio 1 wlanadd myWLAN
Cedar# show radio 1
Cedar# config radio 2 wlanadd myWLAN
Cedar# show radio 2
```

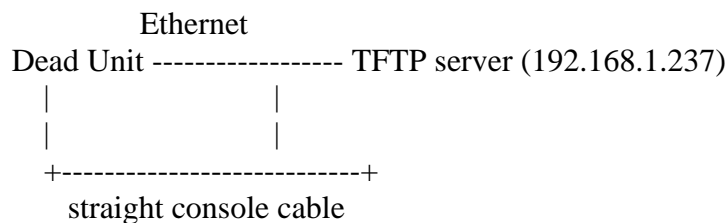
4. Save the configuration changes.

```
Cedar# config save
```

Appendix I - Recovery Procedure

If you are not able to receive the login prompt from Cedar via the console port, your AP may have been corrupted. Please follow the procedure described below to recover the AP.

1. Download the firmware burner (FwBurner) and firmware images (FwFlash.img) from the Intelicis website support.intelicis.com and save them in a TFTP server. Do not change the names of the images. Configure the IP of the TFTP server to 192.168.1.237.
2. Power off the dead unit and connect the LAN port of the dead unit with the TFTP server. Use a standard serial port cable to connect the console port with the TFTP server. The baud rate for the serial port is 115200.



3. Power on the dead unit and you will see "Start booting..." message in console. Press the Control C (^C) key immediately within 1 second. The boot loader will detect the Control C(^C) key and display the following prompt.

```
RedBoot>
```

4. Download the firmware burner image from TFTP server and run the burner by typing the following commands.

```
RedBoot> load FwBurner
```

If the download is successful, you will see the following message and prompt.

```
Entry point: 0x800100bc, address range: 0x80010000-0x80051b60  
RedBoot>
```

Note that it is normal to see different loaded address because of the different image size.

5. Typing "go" will start the burning process of the flash image. After the process has completed successfully, the unit will reboot automatically.

```
RedBoot>go  
Start booting...
```



```
Could not find valid MAC address for enet0. Using default!  
Ethernet eth0: MAC address 00:03:7f:e0:02:bf  
IP: 192.168.1.1/255.255.255.0, Gateway: 192.168.1.237  
Default server: 192.168.1.237, DNS server IP: 192.168.1.237
```

```
RedBoot(tm) bootstrap and debug environment [RAM]  
Non-certified release, version v2_0 - built 18:22:58, May 13 2006
```

```
Copyright (C) 2000, 2001, 2002, Red Hat, Inc.  
Copyright (C) 2005, Devicescape Software, Inc.
```

```
RAM: 0x80010000-0x81000000, 0x8006ad50-0x80fe1000 available  
FLASH: 0xbe000000 - 0xbe7e0000, 126 blocks of 0x00010000 bytes each.  
== Executing boot script in 4.000 seconds - enter ^C to abort  
RedBoot> load -r -v -b 0x80100000 FwFlash.img
```

```
Raw file loaded 0x80100000-0x8087ffff, assumed entry at 0x80100000  
RedBoot> burnflash  
** Flash burning process would take a while. Please wait.  
** Complete flash image burning successfully.  
** System is rebooting...
```

6. Now you should be able to gain access to the unit again and upgrade its firmware by the normal procedure described in Chapter 4.