

# WAC-2004 User's Manual

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[www.moxa.com/product](http://www.moxa.com/product)

**MOXA**®

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# WAC-2004 User's Manual

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# Introduction

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The WAC-2004 is Moxa's high-end Wireless Access Controller that incorporates with the **AWK-RTG (Rail Train to Ground) series** and is designed **specifically for Railway applications**. The WAC-2004 supports not only single-subnet roaming (Layer 2), it also allows roaming between multiple subnets (Layer 3) with Mobile IP technology.

The following topics are covered in this chapter:

- ❑ **Overview**
- ❑ **Package Checklist**
- ❑ **Product Features**
- ❑ **Product Specifications**
- ❑ **Interface Specifications**
  - LED Indicators
  - Power Reset Button
  - Gigabit Ethernet Port Connection
  - Serial Console Connection
  - Power Socket
  - Beeper

## Overview

The goal of zero-latency roaming is to allow clients to seamlessly maintain their communications as they move from one access point to another. The advanced Moxa Wireless Access Controller, WAC-2004, together with controller-based Turbo Roaming technology, enables **millisecond-level roaming over multiple IP subnets**. The advanced roaming algorithm, along with Mobile IP technology, allows wireless clients to roam between APs in different IP subnets within milliseconds while upholding stringent security in extremely demanding environments. The WAC-2004 is rated to operate at temperatures of 0 to 50°C and is rugged enough for on-site installation in any harsh industrial environment.

## Package Checklist

The WAC-2004 series wireless access controller is shipped with the following items. If any of these items are missing or damaged, please contact your customer service representative.

- WAC-2004 series wireless controller
- 1 AC power cord (C13 type, US or EU)
- 1 serial console cable (DB9 type, female-to-female)
- 4 RJ45 connector protective caps
- Rackmount kit
- Quick installation guide (printed)
- Warranty card

**NOTE** Depending on the country code, US or EU AC power cords come standard with each WAC-2004 package. For other AC power cords, please order separately.

## Product Features

### Advanced Turbo Roaming Support

- Layer-3 Mobile IP tunneling roaming (Controller + HA)
- Millisecond level L2 and L3 handover
- Wireless security support:
  - WPA/WPA2-Personal/Enterprise
  - EAP methods: TLS, TTLS, PEAP
- Less-than-50 ms inter-controller handover
- Less-than-500 ms controller backup recovery
- WAC-Centralized CCoA assignment
- Inter-WAC security setting

### Value-added Networking Functions

- Support up to 500 APs
- Ethernet port-binding for Ethernet redundancy
- 450 Mbps of total tunneling bandwidth
- 1+1 WAC/HA hot swap redundancy
- Configuration back-up with ABC-01

**Useful Utilities and Remote Configuration**

- RS-232/Telnet console management
- Web Console (HTTP/HTTPS) management
- Firmware upgrade from TFTP, Web Console, and utility
- Supports SNMP
- Configuration backup and reset

**Industrial-grade Design**

- Rackmount fanless design
- Redundant power

## Product Specifications

**WLAN Interface****Standards:**

IEEE 802.11i for Wireless Security

IEEE 802.3 for 10BaseT

IEEE 802.3u for 100BaseT(X)

IEEE 802.3ab for 1000BaseT

**Security:**

WPA /WPA2-Personal and Enterprise (IEEE 802.1X/RADIUS, TKIP, and AES)

**Supported Models:**

AWK-RTG series

Customized versions of AWK series

**Interface**

**LAN Port:** 10/100/1000BaseT(X), auto negotiation speed (RJ45-type)

- P1: communication port for WAC/HA
- P2-4: reserved

**Console:** RS-232 (DB9-type, male)

- Serial signals: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND

**LED Indicators:** PWR1, PWR2, FAULT, STATE, 100M x 4, 1000M x 4

**Wireless Access Control**

**AP Support:** AWK-RTG series

**WAC Failover:** 1-on-1 hot backup

**Roaming Support:** single/multi-channel roaming (up to 3 channels), inter-controller roaming

**Handover Time:** millisecond-level with wireless security

**Mobile IP Tunneling**

**Tunneling:** home agent to mobile node

**Tunneling Capacity:** up to 450 Mbps

**CoA Assignment:** WAC-based management

**HA failover:** 1-to-1 hot backup

**Management**

**Device Management:** Web console, Telnet, and SSH access

**Remote Management:** External management utility and SNMP support

**Network Monitoring:** AWK AP/Client connection status monitoring

**Physical Characteristics**

**Housing:** SECC sheet metal (1 mm)

**Weight:** 5.48 kg

**Dimensions:** 325 x 440 x 44 mm (12.80 x 17.32 x 1.73 in) (without rackmount ears)

**Installation:** Standard 19-inch rackmounting

**Environmental Limits**

**Operating Temperature:** 0 to 50°C  
**Storage Temperature:** -40 to 85°C (-40 to 185°F)  
**Ambient Relative Humidity:** 5 to 95% (non-condensing)

**Power Requirements**

**Input Voltage:** 100 to 240 VAC/VDC auto-ranging, 47 to 63 Hz, redundant dual AC power inputs  
**Power Consumption:** 80 W

**Standards and Certifications**

**Safety:** UL 60950-1  
**EMC:** EN 55032 Class A, EN 61000-3-2, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A  
**Green Product:** RoHS, CRoHS, WEEE

**Reliability**

**MTBF (mean time between failures):** 383,478 hrs

**Warranty**

**Warranty Period:** 3 years  
**Details:** [www.moxa.com/warranty](http://www.moxa.com/warranty)



**ATTENTION**

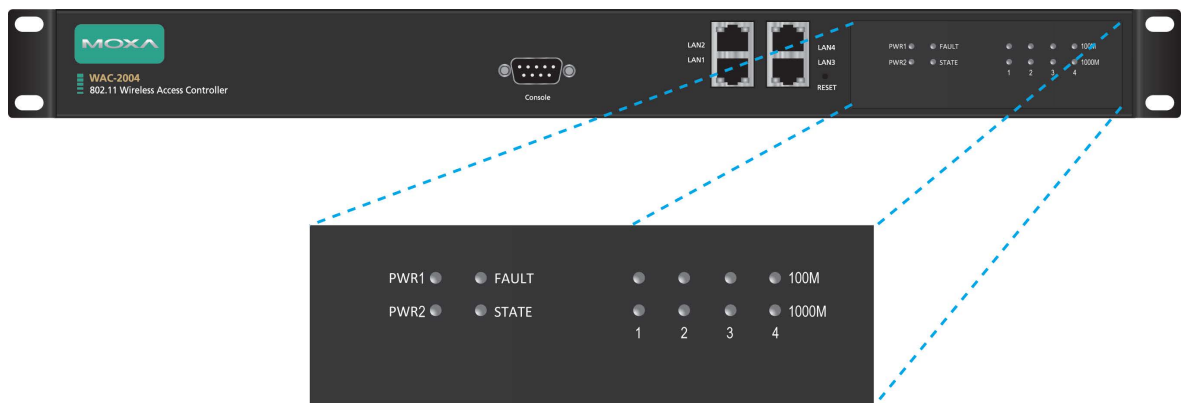
The WAC-2004 is NOT designed for use by the general public. A well-trained technician is required to safely deploy the WAC-2004.

# Interface Specifications

This section provides detailed introduction on the WAC-2004 interfaces.

## LED Indicators

The LEDs on the front panel of the WAC-2004 provide quick and easy means of determining the current operational status and wireless settings.



LED	Color	State	Description
PWR1	Green	On	Power is being supplied from power input 1.
		Off	Power is not being supplied from power input 1.
PWR2	Green	On	Power is being supplied from power input 2.
		Off	Power is not being supplied from power input 2.
FAULT	Red	On	Booting; System Error.
		Blinking (fast)	IP address conflict (interval: 0.5 sec).
		Off	Normal status.

LED	Color	State	Description
STATE	Green/ Red	Green	Software Ready
		Green (Blinking)	The device has been located by Search Utility. (interval: 1sec)
		Red	Bootling error
Gigabit LAN LEDs 1, 2 (3, 4 Reserved)	Green / Orange	Green	100 Mbps Ethernet mode.
		Orange	1000 Mbps (Gigabit) Ethernet mode.
		Off	No activity or 10 Mbps Ethernet mode.

## Power Reset Button



The RESET button located on the top panel of WAC-2004 is for **power reset ONLY**. You can reboot the WAC-2004 by pressing the RESET button with a pointed object, such as an unfolded paper clip.

System Reboot: Press and release the RESET button

**NOTE** For configuration reset:  
**Web Console (HTTP/HTTPS):** Maintenance → Load Factory Default  
**Telnet/Serial Console:** Maintenance → Load Factory Default

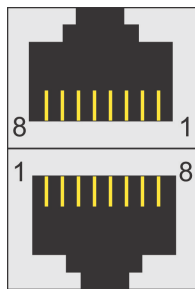
## Gigabit Ethernet Port Connection



The WAC-2004 offers one pair of gigabit Ethernet ports with the port binding feature enabled (LAN 1 and LAN 2) for Ethernet failover redundancy. It also has two extra Ethernet ports (LAN 3-4) reserved for future expansion. When the cable is properly connected, the LED on the front panel will glow to indicate a proper connection.

See below for detailed pin assignment and LED indication:

Pin	10/100 Mbps	1000 Mbps
1	ETx+	TRD(0)+
2	ETx-	TRD(0)-
3	ERx+	TRD(1)+
4	---	TRD(2)+
5	---	TRD(2)-
6	ERx-	TRD(1)-
7	---	TRD(3)+
8	---	TRD(3)-



LED	Color	Description
Gigabit RJ45 Connector	Green	100 Mbps Ethernet mode
	Orange	1000 Mbps (Gigabit) Ethernet mode
	Off	Not operating or 10 Mbps Ethernet mode

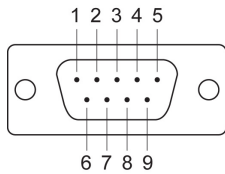


**NOTE** The pin numbers for the 8-pin RJ45 connectors (and ports) are typically not labeled on the connector (or port). Refer to the diagram above to see how the RJ45 pins are numbered.

## Serial Console Connection



The WAC-2004 offers a serial port with DB9 male connector for its console access. The pin assignments are shown in the following table:



Pin	RS-232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS

**NOTE** The pin numbers for the male DB9 connectors are stated in the table above. The pinhole numbers for the female DB9 connectors are usually labeled on the connector. However, the numbers are typically very small, so you may need to use a magnifying glass to see the numbers clearly.

## Power Socket

The WAC-2004 offers a dual power supply for power failover redundancy. Input voltage ranges from **100 to 240 VAC/VDC, 47 to 63 Hz**, with a male **C13** connector. For US models, the device comes with a US power cord; for EU models, device comes with an EU power cord. As for other countries, please purchase power cords separately.



## Beeper

The beeper emits one short beep when the power is turned on and two short beeps when the system is ready. When the device is located by Search Utility, the beeper emits beeps every second to indicate its location.

## Getting Started

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This chapter explains how to access the WAC-2004 for the first time. There are three ways to access the controller: (1) Web Console, (2) Telnet Console, or (3) Serial Console. The Web and Telnet Consoles are suitable for remote management as the controller can be accessed over an existing network. The Serial Console can be used if you do not have the WAC-2004's IP address; however it requires using a RS-232 serial cable to connect WAC-2004 to your PC's COM port.

In addition, the Web Console provides a more complete collection of functions for status monitoring and controller administration; where the Telnet and Serial Consoles only provide basic administration functions.

The following topics are covered in this chapter:

- ❑ **Using Web Console to Access the WAC-2004**
- ❑ **Using Telnet Console to Access the WAC-2004**
- ❑ **Using Serial Console to Access the WAC-2004**

# Using Web Console to Access the WAC-2004

The WAC-2004's Web Console provides a convenient way to modify controller configuration, monitor the controller and governed AP/Client status, and upgrade FW remotely over an existing network. The recommended web browser is Microsoft® Internet Explorer 8.0 or later releases with JVM (Java Virtual Machine).

Default Web Console access information	
IP	192.168.127.253
Submask	255.255.255.0
Username	admin
Password	moxa

**NOTE** Firmware Version 1.6 password: moxa  
Firmware Versions 1.0 to 1.5 password: root

**NOTE** To use the WAC-2004's management and monitoring functions from a PC host connected to the same LAN as the WAC-2004, you must make sure that the PC host and the WAC-2004 are on the same logical subnet. The WAC-2004's default IP is 192.168.127.253.

### **Step 1: Connect the WAC-2004 to a notebook or PC with an Ethernet cable**

The WAC-2004 supports MDI/MDI-X auto-sensing so you can use either a straight-through cable or crossover cable to connect the WAC-2004 to your computer.

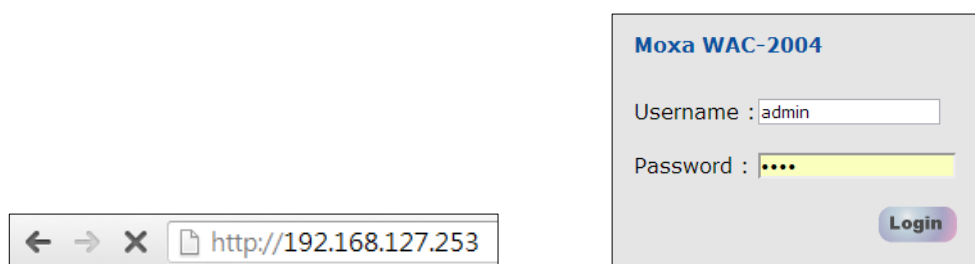
### **Step 2: Setting up the computer IP address**

Choose an IP address on the same subnet as the WAC-2004. Since the WAC-2004's default IP address is 192.168.127.253, and the subnet mask is 255.255.255.0, you should set the IP address of the computer to 192.168.127.xxx/24.

**NOTE** After you select Maintenance → Load Factory Default and click the Submit button, the WAC-2004 will be reset to factory default settings and the IP address will be reset back to 192.168.127.253/24.

### **Step 3: Use the web-based manager to configure the WAC-2004**

Open your computer web browser and type `http://192.168.127.253` in the address field to access the homepage of the WAC-2004 Web Console. For first-time configuration, enter the default username and password (shown below) and click on the Login button:



For security reasons, we strongly recommend changing the default password. Select Maintenance → Password, and then follow the on-screen instructions to change the password.



### **ATTENTION**

For security reasons, each authenticated login will have a 5-minute idle timeout. If your session is left idle for more than 5 minutes, you will need to re-authenticate your login.

**NOTE** After clicking **Submit** to apply changes, the web page will refresh and (Updated) will appear on the page, and at the same time, a flashing reminder on the upper-right corner of the web page will be displayed

To activate the changes, click the **Restart** button, and then the **Save** and **Restart** button. It will take about 40 seconds for the WAC-2004 to complete the reboot procedure.

## Using Telnet Console to Access the WAC-2004

For basic configuration, Telnet is another option.

Default Telnet console access information	
IP	192.168.127.253
Submask	255.255.255.0
Username	admin
Password	moxa

**NOTE** Firmware Version 1.6 password: moxa  
Firmware Versions 1.0 to 1.5 password: root

### **Step 1: Connect the WAC-2004 to a notebook or PC with an Ethernet cable**

The WAC-2004 supports MDI/MDI-X auto-sensing so you can use either a **straight-through cable** or **crossover cable** to connect the WAC-2004 to your computer.

### **Step 2: Setting up the computer IP address**

Choose an IP address on the same subnet as the WAC-2004. Since the WAC-2004's default IP address is 192.168.127.253, and the subnet mask is 255.255.255.0, you should set the IP address of the computer to 192.168.127.xxx/24.

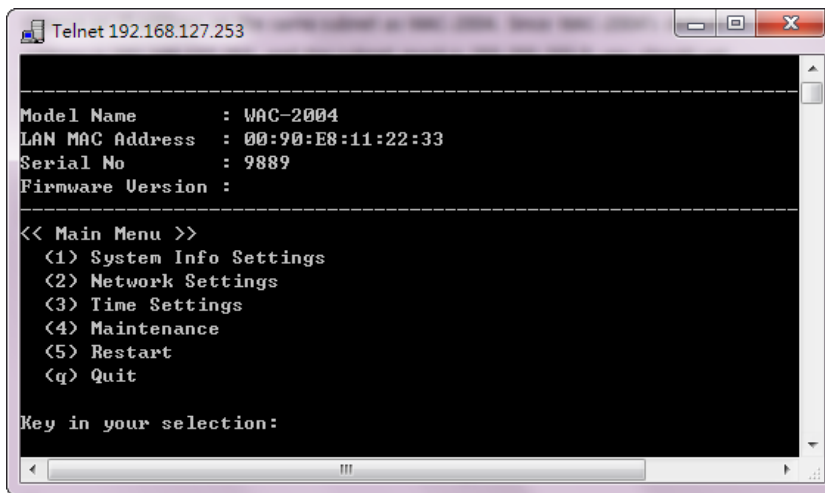
### **Step 3: Establish Telnet connection.**

On Windows XP, click Start → Run. Telnet to the WAC-2004's IP address (see below)  
(You may also issue the telnet command from the MS-DOS prompt.).



### **Step 4: Authentication for Telnet console access**

After the Telnet connection is established, you will be asked to enter username and password. For first-time configuration, please use the default username and password (please refer to section: Using Web Console to access the WAC-2004)



### **Step 5: Basic text-based management interface**

Once authentication is complete, a list of text-based menu will be available to you. The following is a summary on the menu items:

Item	Label	Description
1	System Info Settings	Basic system information, such as Device name, Device location, Device description, Device contact information.
2	Network Settings	Basic network parameters, such as IP mode, IP address, Submask, Gateway, DNS settings, etc...
3	Time Settings	Basic time setting, such as Static time setting, Time server setting, etc...
4	Maintenance	Reset configuration back to factory default.
5	Restart	Reboot the system.
q	Quit	Exit Telnet console.

## Using Serial Console to Access the WAC-2004

If you do not have the WAC-2004's IP address, but you can physically reach the device, use Serial Console to manage the device or obtain the IP address.

Default Serial Console access information	
Baud Rate	115200
Data Bits	8
Parity	None
Stop Bits	1
Terminal	VT100
Username	admin

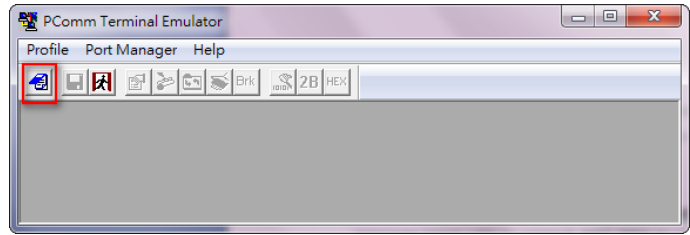
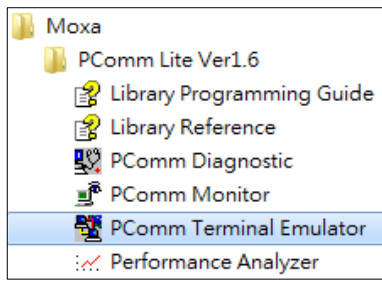
**NOTE** We recommend using Moxa PComm Terminal Emulator, which can be downloaded free of charge from Moxa's website.

### **Step 1: Connect the WAC-2004 to your computer**

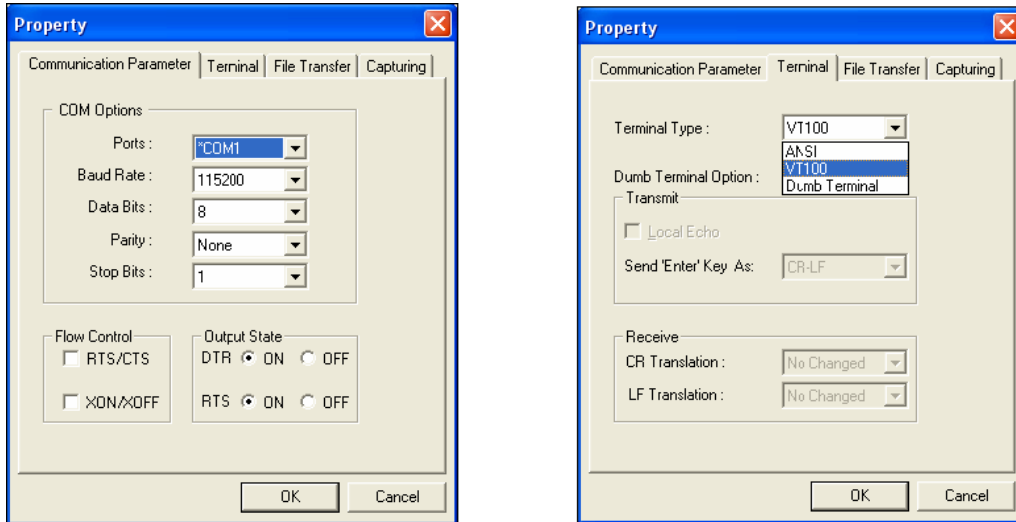
Before running PComm Terminal Emulator, use a DB9 female to DB9 female crossover serial cable to connect the WAC-2004 to your PC's COM port

### **Step 2: Connect to the WAC-2004 Serial Console**

Start PComm Terminal Emulator → Click Start → Programs → PCommLite X.X → Terminal Emulator.



Use the Open icon or select Open in the Port Manager menu to establish a new connection.

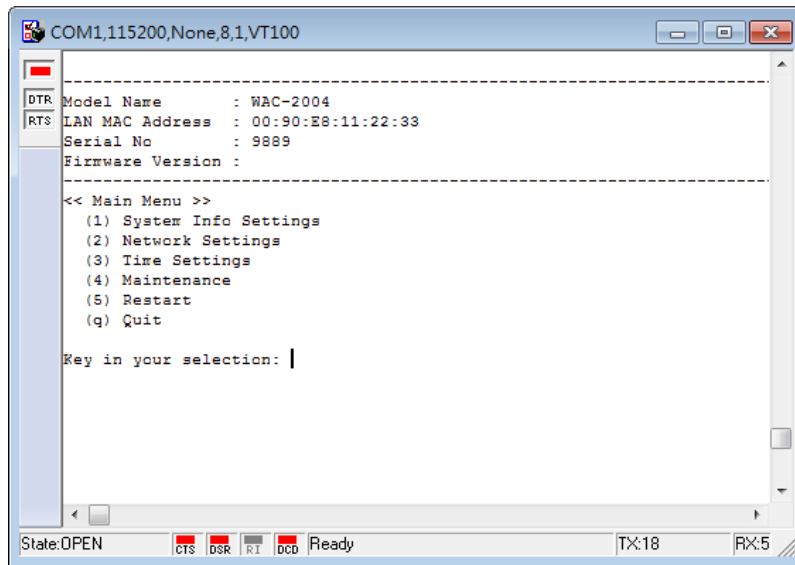


The Communication Parameter page of the Property window will appear. Select the appropriate COM port for Console Connection, 115200 for Baud Rate, 8 for Data Bits, None for Parity, and 1 for Stop Bits

Click the Terminal tab, and select VT100 for Terminal Type. Click OK to establish the connection.

**Step 3: Authentication for Serial Console access**

After the connection is established, you will be asked to enter username and password. For first-time configuration, please use the default username and password (please refer to section: Using Web Console to access the WAC-2004)



**Step 4: Basic text-based management interface**

(Please refer to section: Using Telnet Console to Access the WAC-2004)



**ATTENTION**

If you unplug the RS-232 cable or trigger DTR, a disconnection event will be evoked to enforce logout for network security. You will need to log in again to resume operation.

**NOTE**

To modify the appearance of the PComm Terminal Emulator window, select **Edit → Font** and then choose the desired formatting options.

# Web Console Configuration

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The WAC-2004's Web Console provides a convenient way to modify the controller's configuration, monitor the controller and governed AP/Client status, and upgrade FW remotely over an existing network. The recommended web browser is Microsoft® Internet Explorer 8.0 or later releases with JVM (Java Virtual Machine).

This chapter provides a detailed introduction and description to each WAC-2004 management function. For information on how to access Web Console, please refer to **Chapter 2: Using Web Console to Access the WAC-2004**.

The following topics are covered in this chapter:

## ❑ Function Map

### ❑ Overview

### ❑ Basic Settings

- System Info Settings
- Network Settings
- Time Settings

### ❑ Controller Settings

- Basic WAC Settings
- WAC Security Settings
- Mobile IP Settings

### ❑ Advanced Settings

- SNMP Agent

### ❑ Auto Warning Settings

- System Log
- Syslog
- E-mail
- Trap

### ❑ Status

- System Log
- Power Status
- Managed Device List
- Mobile IP Status
- LAN Status

## ❑ Maintenance

- Console Settings
- Ping
- Firmware Upgrade
- Config Import Export
- MIB Export
- Load Factory Default
- Username/Password
- Locate Device

## ❑ Save Configuration

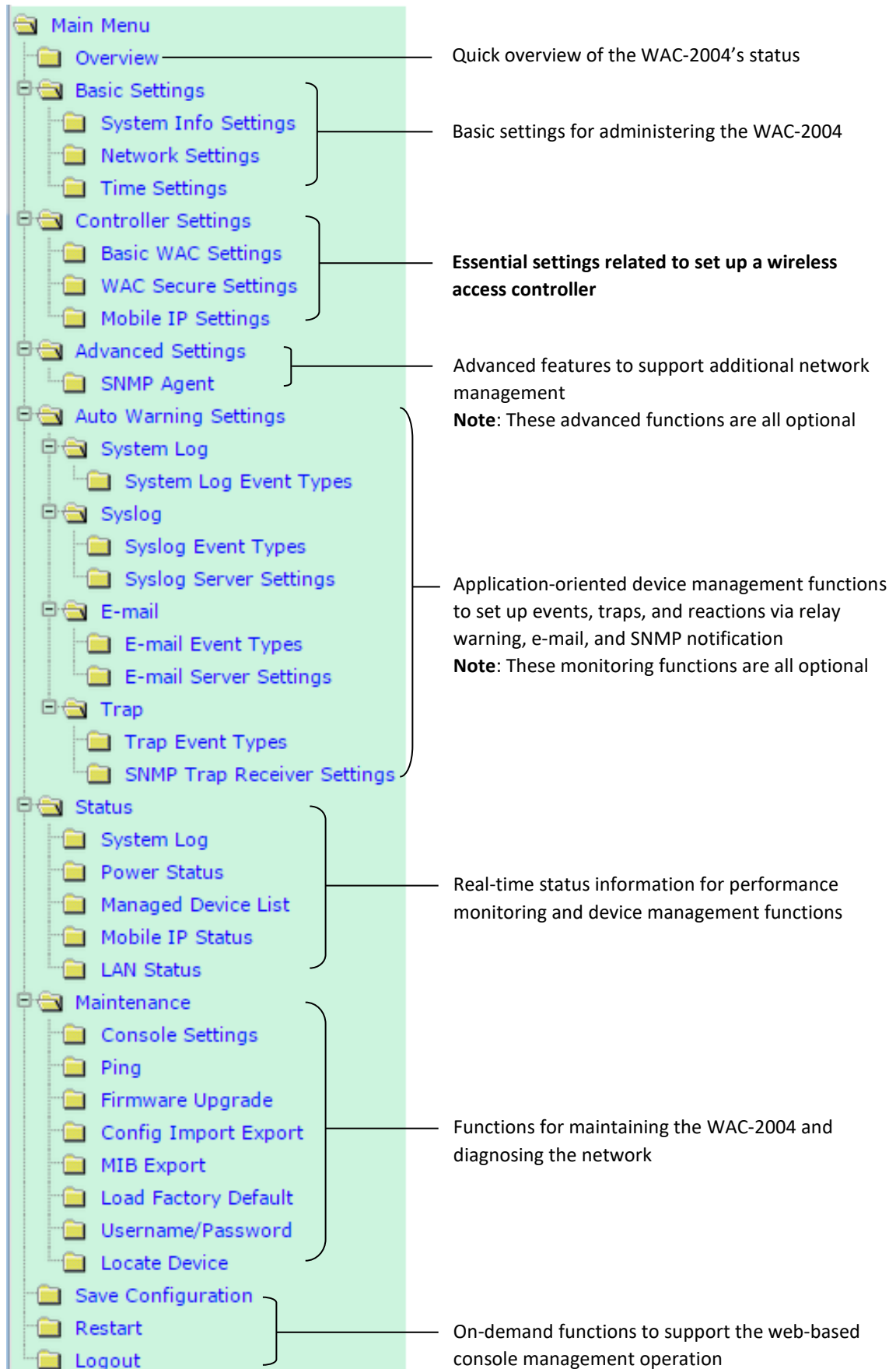
## ❑ Restart

## ❑ Logout



# Function Map

The Function Map provides a convenient means of determining which functions you need to use.



# Overview

The **Overview** page summarizes the WAC-2004's current status. The information is categorized into several groups: **System info**, **Device info**, and **Controller info**.

Overview	
All information on this page are active values.	
System info	
Model name	WAC-2004
Device name	WAC-2004-1A Main Controller
Serial No.	9889
System up time	0 days 02h:45m:17s
Firmware version	0
Device info	
Device MAC address	00:90:E8:11:22:33
IP address	192.168.127.253
Subnet mask	255.255.255.0
Gateway	
Controller info	
Roaming domain	Not setting
WAC group multicast IP	239.0.1.150
WAC mode	Primary WAC
Backup WAC IP address	
Priority 1 roaming threshold	-75 (-75 to -35 dBm)
Priority 1 roaming difference	0 (0 to 30 dB)
Priority 1 roaming link quality	30 / 70
Priority 2 roaming threshold	-55 (-75 to -35 dBm)
Priority 2 roaming difference	10 (0 to 30 dB)
Priority 2 roaming link quality	20 / 70
Roaming stable interval	3 *50 ms

# Basic Settings

The Basic Settings group includes the most commonly used settings required by administrators to maintain and control the WAC-2004.

## System Info Settings

The **System Info** items, especially **Device name** and **Device description**, are displayed and included on the **Overview** page, in SNMP information, and in alarm emails. Setting **System Info** items makes it easier to identify the different WAC-2004 units connected to your network.

System Info Settings	
Device name	<input type="text" value="WAC-2004-1A Main Controller"/>
Device location	<input type="text" value="Area 32, 5th Floor, Skycity"/>
Device description	<input type="text" value="Main CBTC Controller"/>
Device contact information	<input type="text" value="John Johnson, its@skycity.com"/>
<input type="button" value="Submit"/>	

**Device name**

Setting	Description	Factory Default
Max. 31 of characters	This option is useful for specifying the role or application of different WAC-2004 units.	WAC-2004_<Serial No. of this WAC-2004>

**Device location**

Setting	Description	Factory Default
Max. of 31 characters	Specifies the location of different WAC-2004 units	None

**Device description**

Setting	Description	Factory Default
Max. of 31 characters	Use this space to record a more detailed description of the WAC-2004	None

**Device contact information**

Setting	Description	Factory Default
Max. of 31 characters	Provides information about whom to contact in order to resolve problems. Use this space to record contact information of the person responsible for maintaining this WAC-2004.	None

## Network Settings

The Network Settings configuration panel allows you to modify the usual TCP/IP network parameters. An explanation of each configuration item is given below.

**Network Settings**

**IP address**

**Subnet mask**

**Gateway**

**Primary DNS server**

**Secondary DNS server**

**IP address**

Setting	Description	Factory Default
WAC-2004 IP address	Identifies the WAC-2004 on a TCP/IP network.	192.168.127.253

**Subnet mask**

Setting	Description	Factory Default
WAC-2004 subnet mask	Identifies the type of network to which the WAC-2004 is connected (e.g., 255.255.0.0 for a Class B network, or 255.255.255.0 for a Class C network).	255.255.255.0

**Gateway**

Setting	Description	Factory Default
WAC-2004 default gateway	The IP address of the router that connects the LAN to an outside network.	None

**Primary/Secondary DNS server**

Setting	Description	Factory Default
IP address of the Primary/Secondary DNS server	The IP address of the DNS Server used by your network. After entering the DNS Server's IP address, you can input the WAC-2004's URL (e.g., http://ap11.abc.com) in your browser's address field instead of entering the IP address. The Secondary DNS server will be used if the Primary DNS server fails to connect.	None

## Time Settings

The WAC-2004 has a time calibration function based on information from an NTP server or user specified Date and Time information. Functions such as Auto warning can add real-time information to the message.

**Time Settings**

Date (YYYY/MM/DD) Time (HH:MM:SS)

Current local time  /  /   :  :

---

Time zone

Daylight saving time  Enable

Starts at     :  (HH:MM)

Stops at     :  (HH:MM)

Time offset

Time server 1

Time server 2

Query period  (600~9999 seconds)

The **Current local time** shows the WAC-2004's system time when you open this web page. You can click on the **Set Time** button to activate the updated date and time parameters. An "(Updated)" string will appear to indicate that the change is complete. Local time settings will be immediately activated in the system without running Save and Restart.

**NOTE** The WAC-2004 has a built-in real time clock (RTC). We strongly recommend that users update the **Local time** for the WAC-2004 after the initial setup or a long-term shutdown, especially when the network does not have an Internet connection for accessing the NTP server or there is no NTP server on the LAN.

### Current local time

Setting	Description	Factory Default
User adjustable time	The date and time parameters allow configuration of the local time, with immediate activation. Use 24-hour format: yyyy/mm/dd hh:mm:ss	Local time

### Time zone

Setting	Description	Factory Default
User selectable time zone	The time zone setting allows conversion from GMT (Greenwich Mean Time) to local time.	GMT (Greenwich Mean Time)

**ATTENTION**

Because the current local time will be adjusted automatically as the time zone is being adjusted, you will need to configure the time zone prior to inputting the current local time.

### Daylight saving time

Setting	Description	Factory Default
Enable/Disable	Daylight saving time (also known as DST or summer time) involves advancing clocks (usually 1 hour) during the summer time to provide an extra hour of daylight in the afternoon.	Disable

When **Daylight saving time** is enabled, the following parameters will be shown:

- **Starts at:** The date that daylight saving time begins.
- **Stops at:** The date that daylight saving time ends.
- **Time offset:** Indicates how many hours forward the clock should be advanced.

*Time server 1/2*

Setting	Description	Factory Default
IP/Name of Time Server 1/2	IP or Domain name of the NTP time server. The 2nd NTP server will be used if the 1st NTP server fails to connect.	None

*Query period*

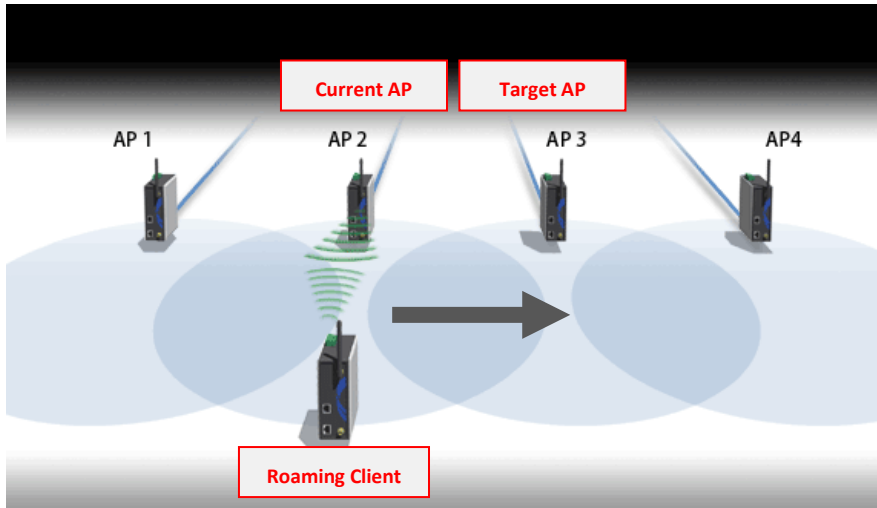
Setting	Description	Factory Default
Query period time (600 to 9999 seconds)	This parameter determines how often the time is updated from the NTP server.	600 (seconds)

# Controller Settings

The Controller Settings group includes the most important settings, which enable administrators to set up the Wireless Access Controller services.

## Basic WAC Settings

The **controller information** (including Roaming domain, Roaming threshold, Roaming difference, etc...) are displayed on the **Overview** page.



Basic WAC Settings	
Inter WAC enable	<input checked="" type="checkbox"/>
WAC group ID	MOXA
WAC passphrase	.....
WAC group multicast IP	239.0.1.150
WAC mode	Primary WAC
Backup WAC IP address	
Roaming domain	FF:90:E8:00 : 01 : F3
Priority 1 roaming threshold	-75 (-75 to -35 dBm)
Priority 1 roaming difference	0 (0 to 30 dB)
Priority 1 roaming link quality	30 / 70
Priority 2 roaming threshold	-55 (-75 to -35 dBm)
Priority 2 roaming difference	10 (0 to 30 dB)
Priority 2 roaming link quality	20 / 70
Roaming stable interval	3 * 50 ms
Bond option	Disable
<input type="button" value="Submit"/>	

**Inter WAC enable**

Setting	Description	Factory Default
Enable/Disable	Enable or disable the Inter WAC feature	Enable

**WAC group ID**

Setting	Description	Factory Default
Max. 31 of characters	The group ID for WACs to recognize each other as a member of the same WAC community, and hence the inter WAC feature will operate properly	Moxa

**WAC passphrase**

Setting	Description	Factory Default
Max. 63 of characters (masked)	The passphrase for inter WAC security and to prevent rouge WAC	None

**WAC group multicast IP**

Setting	Description	Factory Default
Multicast IP	The multicast IP address for inter WAC communication	239.0.1.150

**WAC mode**

Setting	Description	Factory Default
Primary WAC	Act as a primary WAC	Primary WAC
Backup WAC	Act as a backup WAC	

**Primary/Backup WAC IP address**

Setting	Description	Factory Default
IP address	The IP address of the pairing controller, when one fails, another controller will take over its function in the network (within 500ms)	None

**Roaming domain**

Setting	Description	Factory Default
6 Hex characters	This specifies the area served by the WAC-2004. All related controllers, APs, and clients use this as identification to work and communicate with each other.	<The Mac address of the WAC-2004>

**NOTE** The **Roaming domain** must be set at the time of initial (first time) installation. Configure the priority 1 or 2 roaming settings for the RTG access points.

**Priority 1/2 roaming threshold**

Setting	Description	Factory Default
Signal strength (dBm)	The signal strength of the current AP and Client must be lower than this threshold.	Priority 1: -75 Priority 2: -50

**Priority 1/2 roaming difference**

Setting	Description	Factory Default
Relative value (dB)	The signal strength between the target AP and Client must be greater than this value	Priority 1: 0 Priority 2: 10

**Priority 1/2 roaming link quality**

Setting	Description	Factory Default
Link quality (Integer)	The link quality (signal strength – Background noise) between the target AP and Client must be greater than this threshold	Priority 1: 30 Priority 2: 20

**Roaming stable interval**

Setting	Description	Factory Default
Multiple of 50ms (Integer)	The above three conditions must stay true for X amount of time to ensure a stable state.	3 (x50ms)

**Bond option**

Setting	Description	Factory Default
Enable/Disable	Enable or disable the LAN1/2 port bonding feature for Ethernet connection redundancy.	disable

## WAC Security Settings

By enabling the 802.1X/EAP on the WAC-2004, the controller acts as an **authentication proxy/relay** between the APs and the RADIUS server. So when configuring your RADIUS server, instead of entering IPs for every authentication requester (in normal cases, it will be your APs), you only need to enter the IP for the WAC-2004.

**WAC Secure Settings**

**RADIUS proxy settings**

802.1X/ EAP

Primary RADIUS server IP

Primary RADIUS server port

Primary RADIUS shared key

Secondary RADIUS server IP

Secondary RADIUS server port

Secondary RADIUS shared key

**802.1X/ EAP**

Setting	Description	Factory Default
Enable/Disable	Enables EAP proxy/relay support.	Disable

**Primary/ Secondary RADIUS server IP**

Setting	Description	Factory Default
The IP address of the RADIUS server	Specifies the delegated RADIUS server for EAP	None

**Primary/ Secondary RADIUS server port**

Setting	Description	Factory Default
Port number	Specifies the port number of the delegated RADIUS server	1812

**Primary/ Secondary RADIUS shared key**

Setting	Description	Factory Default
Max. 63 characters	The secret key shared between the AP and RADIUS server.	None

**NOTE** The wireless security settings of all the APs that are deployed in the same **roaming domain** must be consistent and homogeneous. Different security settings in same-grouped APs may cause **Turbo Roaming** failures. Refer to the AWK-RTG manual for detailed information about the Wireless Setting.

# Mobile IP Settings

Mobile IP allows you to access the same IP address even when the Client is travelling across different subnets.

**Mobile IP Settings**

Mobile IP  Enable

Tunnel bandwidth  Support 200 tunnels (Estimated)

No.	Enable	IP address	Subnet mask	RF1 Start IP address	RF1 Number of available IP	RF1 Gateway	RF2 Start IP address	RF2 Number of available IP	RF2 Gateway
1	<input checked="" type="checkbox"/>	<input type="text" value="10.10.0.0"/>	<input type="text" value="255.255.255.0"/>	<input type="text" value="10.10.62.10"/>	<input type="text" value="5"/>	<input type="text" value="10.10.62.1"/>	<input type="text" value="10.10.63.10"/>	<input type="text" value="5"/>	<input type="text" value="10.10.63.1"/>
2	<input checked="" type="checkbox"/>	<input type="text" value="10.10.1.0"/>	<input type="text" value="255.255.255.0"/>	<input type="text" value="10.10.72.10"/>	<input type="text" value="5"/>	<input type="text" value="10.10.72.1"/>	<input type="text" value="10.10.73.10"/>	<input type="text" value="5"/>	<input type="text" value="10.10.73.1"/>
3	<input type="checkbox"/>	<input type="text" value="10.10.2.0"/>	<input type="text" value="255.255.255.0"/>	<input type="text" value="10.10.82.10"/>	<input type="text" value="5"/>	<input type="text" value="10.10.82.1"/>	<input type="text" value="10.10.83.10"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
4	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
5	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
6	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
7	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
8	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
9	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
10	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
11	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
12	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
13	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>
14	<input type="checkbox"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="5"/>	<input type="text" value="0.0.0.0"/>

**Mobile IP**

Setting	Description	Factory Default
Enable/Disable	Enable or disable Mobile IP feature	Enable

**Tunnel bandwidth**

Setting	Description	Factory Default
1-25 Mbps	Bandwidth per single Mobile IP tunnel (total bandwidth 450 Mbps)	10 Mbps

**Enable**

Setting	Description	Factory Default
Enable/Disable	Enable or disable a particular mobile rule	Disable

**IP address**

Setting	Description	Factory Default
IP address	The IP address of the trackside access point.	0.0.0.0

**Subnet mask**

Setting	Description	Factory Default
Subnet mask	The subnet mask of the trackside access point. Configure the subnet mask to limit the IP address range for the mobile IP network.	0.0.0.0

**RF1/2 Start IP address**

Setting	Description	Factory Default
Starting CCoA IP address	The starting IP for CCoA IP Assignment for the specified subnet of each radio interface	0.0.0.0

**RF1/2 Number of available IP**

Setting	Description	Factory Default
Number of IPs	Number of IPs can be assigned in the specified subnet of each radio interface	5

**RF1/2 Gateway**

Setting	Description	Factory Default
Default gateway	The default gateway for the specified CCoA subnet of each radio interface	0.0.0.0



# Advanced Settings

Advanced features to support additional network management

## SNMP Agent

The WAC-2004 supports SNMP V1/V2c/V3. SNMP V1 and SNMP V2c use a community string match for authentication, which means that SNMP servers access all objects with read-only or read/write permissions using the community string *public/private* (default value). SNMP V3, which requires you to select an authentication level of MD5 or SHA, is the most secure protocol. You can also enable data encryption to enhance data security.

The WAC-2004's MIB can be found in the software CD and supports reading/writing the attributes via SNMP.

SNMP security modes and security levels supported by the WAC-2004 are shown in the following table. Select the security mode and level that will be used to communicate between the SNMP agent and manager.

Protocol Version	Setting on UI web page	Authentication Type	Data Encryption	Method
SNMP V1, V2c	V1, V2c Read Community	Community string	No	Use a community string match for authentication
	V1, V2c Write/Read Community	Community string	No	Use a community string match for authentication
SNMP V3	No-Auth	No	No	Use account with admin or user to access objects
	MD5 or SHA	Authentication based on MD5 or SHA	No	Provides authentication based on HMAC-MD5, or HMAC-SHA algorithms. 8-character passwords are the minimum requirement for authentication.
	MD5 or SHA	Authentication based on MD5 or SHA	Data encryption key	Provides authentication based on HMAC-MD5 or HMAC-SHA algorithms, and data encryption key. 8-character passwords and a data encryption key are the minimum requirements for authentication and encryption.

The following parameters can be configured on the **SNMP Agent** page. A more detailed explanation of each parameter is given below the following figure.

**SNMP Agent**

**Enable** Disable ▾

**Remote management** Disable ▾

**Read community**

**Write community**

**SNMP agent version** V1, V2c ▾

**Admin authentication type** No Auth ▾

**Admin privacy type** Disable ▾

**Privacy key**

**Private MIB information**

**Device object ID** enterprise.8691.15.13

**Enable**

Setting	Description	Factory Default
Enable	Enables SNMP Agent	Disable
Disable	Disables SNMP Agent	

**Read community (for V1, V2c)**

Setting	Description	Factory Default
V1, V2c Read Community	Use a community string match with a maximum of 31 characters for authentication. This means that the SNMP agent can access all objects with read-only permissions using this community string.	public

**Write community (for V1, V2c)**

Setting	Description	Factory Default
V1, V2c Read /Write Community	Use a community string match with a maximum of 31 characters for authentication. This means that the SNMP agent can access all objects with read/write permissions using this community string.	private

**SNMP agent version**

Setting	Description	Factory Default
V1, V2c, V3, or V1, V2c, or V3 only	Select the SNMP protocol version used to manage the WAC.	V1, V2c

**Admin auth type (for V1, V2c, V3, and V3 only)**

Setting	Description	Factory Default
No Auth	Use admin account to access objects. No authentication	No Auth
MD5	Provide authentication based on the HMAC-MD5 algorithms. 8-character passwords are the minimum requirement for authentication.	
SHA	Provides authentication based on HMAC-SHA algorithms. 8-character passwords are the minimum requirement for authentication.	

**Admin privacy type (for V1, V2c, V3, and V3 only)**

Setting	Description	Factory Default
Disable	No data encryption	Disable
DES	DES-based data encryption	
AES	AES-based data encryption	

**Private Key**

Setting	Description	Factory Default
Max. 63 characters	A data encryption key is the minimum requirement for data encryption.	None

**Private MIB Information Device Object ID**

Also known as **OID**, this is the WAC-2004's enterprise value and is fixed.

# Auto Warning Settings

Since industrial-grade devices are often located at the endpoints of a system, these devices will not always know what is happening elsewhere on the network. This means that these devices, including wireless APs or clients, must provide system maintainers with real-time alarm messages. Even when system administrators are out of the control room for an extended period, they can still be informed of the status of devices almost instantaneously when exceptions occur.

In addition to logging these events, the WAC-2004 supports different approaches to warn engineers automatically, such as SNMP trap, and e-mail.

## System Log

### System Log Event Types

Detail information for grouped events is shown in the following table. You can check the box for **Enable log** to enable the grouped events. All default values are enabled (checked). The log for system events can be seen in **Status → System Log**.

System Log Event Types	
Event group	Enable log
System-related events	<input checked="" type="checkbox"/>
Network-related events	<input checked="" type="checkbox"/>
Config-related events	<input checked="" type="checkbox"/>
Power events	<input checked="" type="checkbox"/>
Controller-related events	<input checked="" type="checkbox"/>

System-related events	Event is triggered when...
System restart (warm start)	The WAC-2004 is rebooted, such as when settings are changed (IP address, subnet mask, etc.).
Network-related events	Event is triggered when...
LAN link on	The LAN port is connected to a device or network.
LAN link off	The port is disconnected (e.g., the cable is pulled out, or the opposing device shuts down).
Config-related events	Event is triggered when...
Configuration changed	A configuration item has been changed.
Configuration file import via Web Console	The configuration file is imported to the WAC-2004.
Console authentication failure	An incorrect password is entered.
Firmware upgraded	The WAC-2004's firmware is updated.
Power events (HW Rev. 1.1 only)	Event is triggered when ...
Power on	The WAC-2004 is turned on.
Power off	The WAC-2004 is turned off.
Controller-related events	Event is triggered when...
CPU status	CPU over-temperature or overload
AP status	AP joined/left
STA status	Client joined/left
Home Agent status	Home Agent overload and connection changed
Controller status	Primary/Backup WAC up/down, Inter WAC joined/left
Roaming status	Client roaming

# Syslog

This function provides the event logs for the Syslog server. The function supports up to three configurable Syslog servers and Syslog server UDP port numbers. When an event occurs, the event will be sent as a Syslog UDP packet to the specified Syslog servers.

## Syslog Event Types

Detail information for the grouped events is shown in the following table. You can check the box for **Enable log** to enable the grouped events. All default values are enabled (checked). Details for each event group (except WAC RSSI report events) can be found on the "System log Event Types" table.

Syslog Event Types	
<b>Event group</b>	<input type="checkbox"/> <b>Enable log</b>
System-related events	<input checked="" type="checkbox"/>
Network-related events	<input checked="" type="checkbox"/>
Config-related events	<input checked="" type="checkbox"/>
Power events	<input checked="" type="checkbox"/>
Controller-related events	<input checked="" type="checkbox"/>
RSSI report events	<input type="checkbox"/>

RSSI report events	Event is triggered when...
RSSI between governed Client and its monitor-APs.	Continuously reports the RSSI value between the governed Client and its monitor-APs. This report is used by "Moxa RSSI Transformer" to assist site surveying and system setup.

## Syslog Server Settings

You can configure the parameters for your Syslog servers in this page.

Syslog Server Settings	
Syslog server 1	<input type="text"/>
Syslog port	<input type="text" value="514"/>
Syslog server 2	<input type="text"/>
Syslog port	<input type="text" value="514"/>
Syslog server 3	<input type="text"/>
Syslog port	<input type="text" value="514"/>

### Syslog server 1 / 2 / 3

Setting	Description	Factory Default
IP address	Enter the IP address of the 1st/ 2nd/ 3rd Syslog Server	None

### Syslog port

Setting	Description	Factory Default
Port destination (1 to 65535)	Enter the UDP port of the corresponding Syslog server	514

# E-mail

## E-mail Event Types

Check the box for **Active** to enable the event items. All default values are deactivated (unchecked). Details for each event item can be found on the "System log Event Types" table.

E-mail Event Types	
Event	<input type="checkbox"/> Active
Cold start	<input type="checkbox"/>
Warm start	<input type="checkbox"/>
Power 1 transition (On-->Off)	<input type="checkbox"/>
Power 1 transition (Off-->On)	<input type="checkbox"/>
Power 2 transition (On-->Off)	<input type="checkbox"/>
Power 2 transition (Off-->On)	<input type="checkbox"/>
Configuration changed	<input type="checkbox"/>
Console authentication failure	<input type="checkbox"/>
LAN1 link On	<input type="checkbox"/>
LAN1 link Off	<input type="checkbox"/>
LAN2 link On	<input type="checkbox"/>
LAN2 link Off	<input type="checkbox"/>
LAN3 link On	<input type="checkbox"/>
LAN3 link Off	<input type="checkbox"/>
LAN4 link On	<input type="checkbox"/>
LAN4 link Off	<input type="checkbox"/>
Home Agent Status	<input type="checkbox"/>
Roaming Status	<input type="checkbox"/>
CPU status	<input type="checkbox"/>
AP status	<input type="checkbox"/>
STA status	<input type="checkbox"/>
Controller Status	<input type="checkbox"/>

## E-mail Server Settings

You can set up to 4 e-mail addresses to receive alarm emails from the WAC-2004. The following parameters can be configured on the **E-mail Server Settings** page. In addition, a **Send Test Mail** button can be used to test whether the Mail server and e-mail addresses work well. More detailed explanations about these parameters are given after the following figure.

E-mail Server Settings	
Mail server (SMTP)	<input type="text"/>
User name	<input type="text"/>
Password	<input type="text"/>
From e-mail address	<input type="text"/>
To e-mail address 1	<input type="text"/>
To e-mail address 2	<input type="text"/>
To e-mail address 3	<input type="text"/>
To e-mail address 4	<input type="text"/>

### Mail server (SMTP)

Setting	Description	Factory Default
IP address	The IP Address of your email server.	None

### User name & Password

Setting	Description	Factory Default
	User name and password used in the SMTP server	None

**From e-mail address**

Setting	Description	Factory Default
Max. 63 characters	Enter the administrator's e-mail address which will be shown in the "From" field of a warning e-mail.	None

**To E-mail address 1/ 2/ 3/ 4**

Setting	Description	Factory Default
Max. 63 characters	Enter the receivers' e-mail addresses.	None

## Trap

Traps can be used to signal abnormal conditions (notifications) to a management station. This trap-driven notification can make your network more efficient.

Because a management station usually takes care of a large number of devices that have a large number of objects, it will be overloading for the management station to poll or send requests to query every object on every device. It would be better if the managed device agent could notify the management station by sending a message known as a trap for the event.

### Trap Event Types

Details for each event group can be found on the "System log Event Types" table.

Trap Event Types	
Event	<input type="checkbox"/> Active
Cold start	<input type="checkbox"/>
Warm start	<input type="checkbox"/>
Power 1 transition (On-->Off)	<input type="checkbox"/>
Power 1 transition (Off-->On)	<input type="checkbox"/>
Power 2 transition (On-->Off)	<input type="checkbox"/>
Power 2 transition (Off-->On)	<input type="checkbox"/>
Configuration changed	<input type="checkbox"/>
Console authentication failure	<input type="checkbox"/>
LAN1 link On	<input type="checkbox"/>
LAN1 link Off	<input type="checkbox"/>
LAN2 link On	<input type="checkbox"/>
LAN2 link Off	<input type="checkbox"/>
LAN3 link On	<input type="checkbox"/>
LAN3 link Off	<input type="checkbox"/>
LAN4 link On	<input type="checkbox"/>
LAN4 link Off	<input type="checkbox"/>
CPU status	<input type="checkbox"/>
AP status	<input type="checkbox"/>
STA status	<input type="checkbox"/>
Controller Status	<input type="checkbox"/>
Home Agent Status	<input type="checkbox"/>
Roaming Status	<input type="checkbox"/>

### SNMP Trap Receiver Settings

SNMP traps are defined in SMIV1 MIBs (SNMPv1) and SMIV2 MIBs (SNMPv2c). The two styles are basically equivalent, and it is possible to convert between the two. You can set the parameters for SNMP trap receivers through the web page.

**SNMP Trap Receiver Settings**

SNMP alert type Trap ▼

1st Trap version V1 ▼

1st Trap server IP/name 10.241.1.27

1st Trap community alert

2nd Trap version V1 ▼

2nd Trap server IP/name

2nd Trap community alert

3rd Trap version V1 ▼

3rd Trap server IP/name

3rd Trap community alert

#### SNMP alert type

Setting	Description	Factory Default
Trap	Send the event notification to the Trap Receiver once and once only	Trap
Inform	Send the event notification to the Trap Receiver and expecting an acknowledgement. If the acknowledgement is not received, controller will resend the notification	

#### 1st / 2nd Trap version

Setting	Description	Factory Default
V1	SNMP trap defined in SNMPv1	V1
V2	SNMP trap defined in SNMPv2	

#### 1st / 2nd Trap server IP/name

Setting	Description	Factory Default
IP address or host name	Enter the IP address or name of the trap server used by your network.	None

#### 1st / 2nd Trap community

Setting	Description	Factory Default
Max. of 31 characters	Use a community string match with a maximum of 31 characters for authentication.	alert

# Status

## System Log

Triggered events are recorded in System Log. You can export the log contents to an available viewer by clicking **Export Log**. You can use the **Clear Log** button to clear the log contents and the **Refresh** button to refresh the log.

**System Log**

```
( 1) 2009/06/04,23h:55m:58s System cold start
( 2) 2009/06/04,23h:56m:00s Backup WAC down
( 3) 2009/06/04,23h:56m:00s HA 192.168.127.156 connected
( 4) 2009/06/04,23h:56m:01s CPU overload
( 5) 2009/06/04,23h:56m:02s LAN link on
( 6) 2009/06/04,23h:56m:05s Backup WAC up
( 7) 2009/06/04,23h:56m:24s LAN link off
( 8) 2009/06/04,23h:56m:27s LAN link on
( 9) 2009/06/04,23h:57m:32s LAN link off
(10) 2009/06/04,23h:57m:34s LAN link on
(11) 2009/06/05,04h:04m:08s System cold start
(12) 2009/06/05,04h:04m:10s Backup WAC down
(13) 2009/06/05,04h:04m:10s HA 192.168.127.156 connected
(14) 2009/06/05,04h:04m:15s Backup WAC up
(15) 2009/06/05,04h:10m:18s LAN link on
(16) 2009/06/05,04h:14m:37s LAN link off
(17) 2009/06/05,04h:14m:43s LAN link on
(18) 2009/06/05,18h:03m:18s System cold start
(19) 2009/06/05,18h:03m:20s Backup WAC down
(20) 2009/06/05,18h:03m:20s HA 192.168.127.156 connected
```

Export Log   Clear Log   Refresh

## Power Status

The **Power Status** page displays the status of power inputs 1 and 2.

**Power Status**

Auto refresh

Input status	On / Off
Power 1 status	Off
Power 2 status	Off

## Managed Device List

The **Managed Device List** displays all AWK APs, which are managed by the WAC-2004; the associated clients are also displayed here. Select the **Auto refresh check box** to enable periodic updates.

**Managed Device List**

Auto refresh

Refresh timer 3

Number of managed AP(s) 2

Number of managed client(s) 1

AP					Client				
IP	MAC	Channel	Noise Level (dBm)	Status	IP	MAC	RSSI (dB)	Signal Strength (dBm)	Status
172.28.2.1	06:90:E8:00:03:DE	1	-96	On	N/A	N/A	N/A	N/A	N/A
172.28.0.1	06:90:E8:00:03:DF	1	-96	On	172.26.0.1	00:90:E8:17:1A:A1	63	-33	On

All monitored APs will be listed on the left-hand side of the table, along with their IP addresses, MAC addresses, operating channels, noise level, and device status.



All monitored Clients will be listed on the right-hand side of the table, along with their IP addresses, MAC addresses, RSSI and Signal Strength values against the associated AP, as well as the status of the Client device.

## Mobile IP Status

The Mobile IP Status displays the status of all Mobile IP Clients, which are managed by this particular WAC-2004. This page contains two main tables - **CCoA Subnet Status** and **Home Subnet Status**.

The **CCoA Subnet Status** table provides the Mobile IP Client's IP information from the CCoA's (Collocated Care-of-Address) point of view.

Mobile IP Status

Auto refresh

Refresh timer 4

CCoA Subnet Status			
Start IP/Count	Netmask	Gateway	CCoA-Station Pair
172.28.0.51 / 5	255.255.255.192	172.28.0.62	172.28.0.52 - 172.26.0.1
172.28.2.51 / 5	255.255.255.192	172.28.2.62	
172.28.4.51 / 5	255.255.255.192	172.28.4.62	
172.28.6.51 / 5	255.255.255.192	172.28.6.62	

↑ CCoA-IP      ↑ MN-IP

The **Home Subnet Status** table provides the Mobile IP Client's IP information from the HA's (Home Agent) point of view.

Home Subnet Status	
HA	Service Station
172.26.15.201	172.26.0.1 - 172.28.0.52

↑ MN-IP      ↑ CCoA-IP

## LAN Status

The following table shows the status of each port, including the Speed, Duplex type, Link Status, and TX/RX Packets flow.

LAN Status

Auto refresh

LAN No	Speed	Duplex	Link Status/Admin Down	Tx Packets	Rx Packets
LAN 1	1000M	FULL	ON/N	109652	109463
LAN 2	10M	HALF	OFF/N	0	0
LAN 3	10M	HALF	OFF/N	0	0
LAN 4	10M	HALF	OFF/N	0	0

# Maintenance

Maintenance functions provide the administrator with tools to manage the WAC-2004 and wired/wireless networks.

## Console Settings

You can enable or disable access permission for the following consoles: HTTP, HTTPS and Telnet connections. For more security, we recommend you only allow access to the secured console.

**Console Settings**

HTTP console  Enable  Disable

HTTPS console  Enable  Disable

Telnet console  Enable  Disable

SSH console  Enable  Disable

---

Submit

## Ping

**Ping** helps to diagnose the integrity of wired or wireless networks. By inputting a node's IP address in the **Destination** field, you can use the **ping** command to make sure it exists and whether or not the access path is available.

**Ping**

Destination

Ping

If the node and access path are available, you will see that all packets were successfully transmitted with no loss. Otherwise, some, or even all, packets may get lost, as shown in the following figure.

**Ping**

Destination

Ping

---

PING 192.168.127.2 (192.168.127.2): 56 data bytes

--- 192.168.127.2 ping statistics ---

4 packets transmitted, 0 packets received, 100% packet loss

## Firmware Upgrade

The WAC-2004 can be enhanced with more value-added functions by installing firmware upgrades.

Note that while the firmware is being upgraded, all APs controlled by the WAC-2004 will be out of service. Click the **Browse** button to specify the firmware image file and click **Firmware Upgrade and Restart** to start the firmware upgrade. After the progress bar reaches 100%, the WAC-2004 will reboot itself.

When upgrading your firmware, the WAC-2004's other functions are forbidden.

**Firmware Upgrade**

Select update image  WAC2004\_1.2\_...12110902.rom

---



### ATTENTION

Please make sure the power source is stable when you upgrade your firmware. An unexpected power breakup may damage your WAC-2004.

## Config Import Export

You can backup or restore the WAC-2004's configuration with **Config Import Export**.

**Config Import Export**

**Config Import**

Select configuration file

---

**Config Export**

---

In the **Config Import** section, click **Browse** to specify the configuration file and click **Config Import** button to begin importing the configuration.

In the **Config Export** section, click the **Config Export** button and save the configuration file onto your local storage media. The configuration file is a text file and you can view and edit it with a general text-editing tool.

You can also backup or restore the WAC-2004's configuration via **TFTP**.

**TFTP Import**

TFTP server IP

Configuration path

File name

---

**TFTP Export**

---

**TFTP server IP**

Setting	Description	Factory Default
IP address	The IP address of the TFTP server	None

**Configuration path**

Setting	Description	Factory Default
File system characters (a-z, A-Z, 0-9, etc...)	The relative path to the configuration file on the TFTP server	None

**File name**

Setting	Description	Factory Default
File system characters (a-z, A-Z, 0-9, etc...)	The file name of the configuration file	None

In the **Config Import** section, click **Config Import** button to begin importing the configuration.

In the **Config Export** section, click the **Config Export** button and the configuration file will be saved to the specified TFTP server as "**importTFTP.ini**".

## MIB Export

Click **MIB Export** to save a MIB file to your local storage. The configuration file is a **.my** file that you can import with a general SNMP tool. This operation allows you to control or configure the WAC-2004 remotely.

**MIB Export**

**MIB Export**

---

## Load Factory Default

Use this function to reset the WAC-2004 and roll all settings back to the factory default values.

**Load Factory Default**

**Reset to Factory Default**

Click **Activate** to reset all settings, including the console password, to the factory default values.  
The system will be restarted immediately.

---

## Username/Password

You can change the administration username and password for each of the WAC-2004's console managers by using the **Password** function. Before you set up a new password, you must input the current password and reenter the new password for confirmation. For your security, do not use the default password **moxa**, and remember to change the administration password regularly.

**NOTE** Firmware Version 1.6 password: moxa  
Firmware Versions 1.0 to 1.5 password: root

**Username/Password**

**Username**

---

**Current password**

**New password**

**Confirm password**

---

## Locate Device

The Locate Device function allows you to easily find your device. When you click the "Start to locate" button, the beeper of the device you are looking for will start beeping, and the device's LED will blink continuously.

**Locate Device (Beeper & LED)**

**Status: Ready to locate**

---

After finding your device, you can click "Stop locating" to stop the beep and blinking of LED.

**Locate Device (Beeper & LED)**

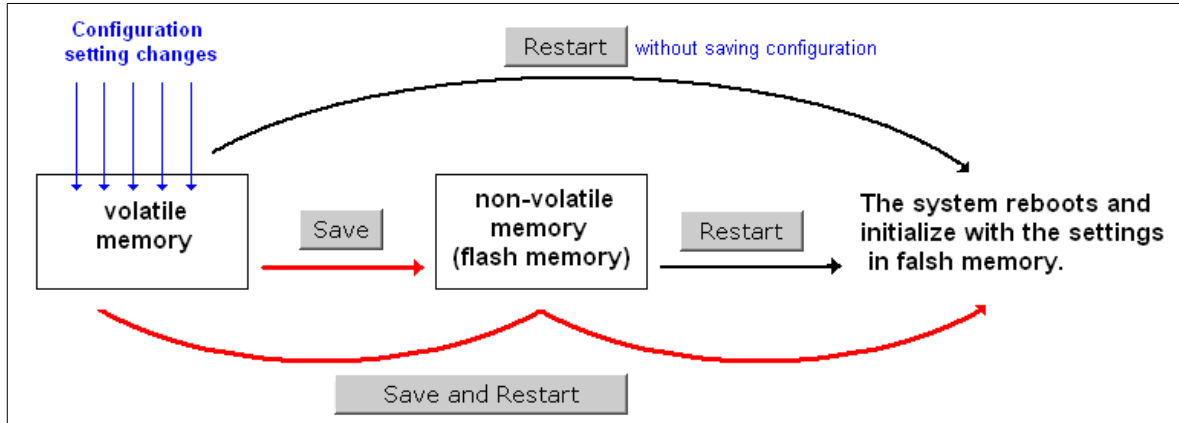
**Status: Locating...**

---

# Save Configuration

The following figure shows how the WAC-2004 stores the setting changes into volatile and non-volatile memory. All data stored in volatile memory will disappear when the WAC-2004 is shutdown or rebooted unless they are saved onto the flash (non-volatile) memory. Because the WAC-2004 starts up and initializes with the settings stored in flash memory, all new changes must be saved to flash memory before restarting the WAC-2004.

This also means the new changes will not work unless you run either the **Save Configuration** function or the **Restart** function.



After clicking on **Save Configuration** in the left menu box, the following screen will appear. Click **Save** to update the configuration settings in the flash memory at this time. Alternatively, you may choose to run other functions and put off saving the configuration until later. However, the new setting changes will remain in the non-volatile memory until you save the configurations.

**Save Configuration**

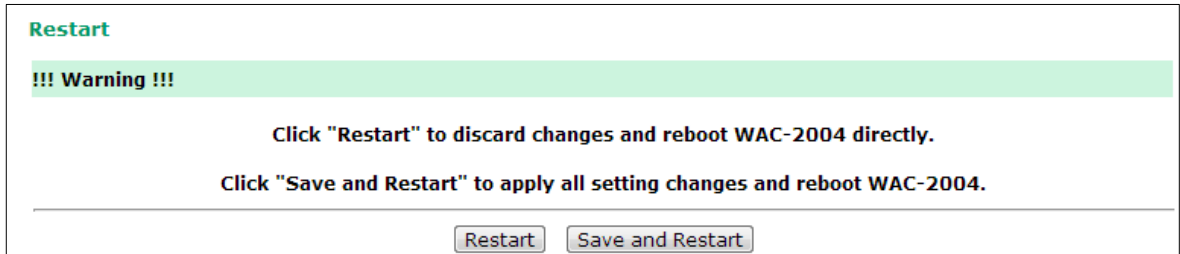
If you have submitted any configuration changes, you must save the changes and restart the system before they take effect. Click **Save** to save the changes in WAC-2004's memory. Click **Restart** to activate new settings in the navigation panel.

---

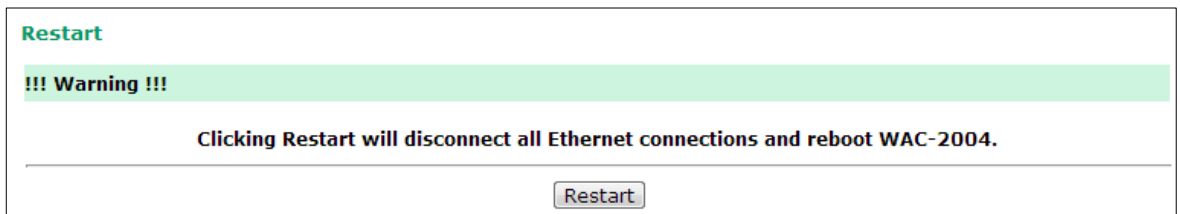
# Restart

If you submitted configuration changes, you will see a blinking alert message on the upper right corner of the screen. After making all your changes, click the **Restart** function in the left menu box. One of two different screens will appear.

If you made changes recently but did not save, you will be given two options. Clicking the **Restart** button here will reboot the WAC-2004, and all setting changes will be ignored. Clicking the **Save and Restart** button will apply all setting changes and then reboot the WAC-2004.



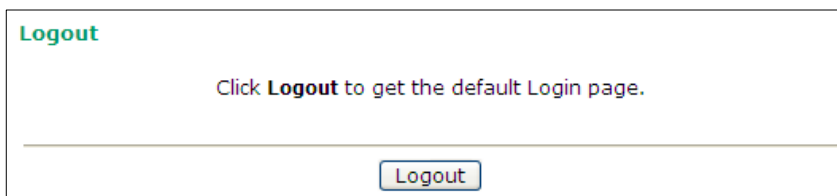
If you run the **Restart** function without changing any configurations or saving all your changes, you will see just one **Restart** button on your screen.



You will not be able to run any of the WAC-2004's functions while the system is rebooting.

# Logout

**Logout** helps users disconnect the current HTTP or HTTPS session and go to the Login page. For security reasons, we recommend you logout before quitting the console manager.



# Software Installation and Configuration

---

The following topics are covered in this chapter:

- **Overview**
- **AWK Search Utility**
  - Installing AWK Search Utility
  - Configuring AWK Search Utility



## Overview

The Documentation & Software CD included with your WAC-2004 is designed to make the installation and configuration procedure easy and straightforward. This auto-run CD includes AWK Search Utility (to broadcast search for all WAC/AWK's accessible over the network), the WAC-2004 User's Manual, and Quick Installation Guide.

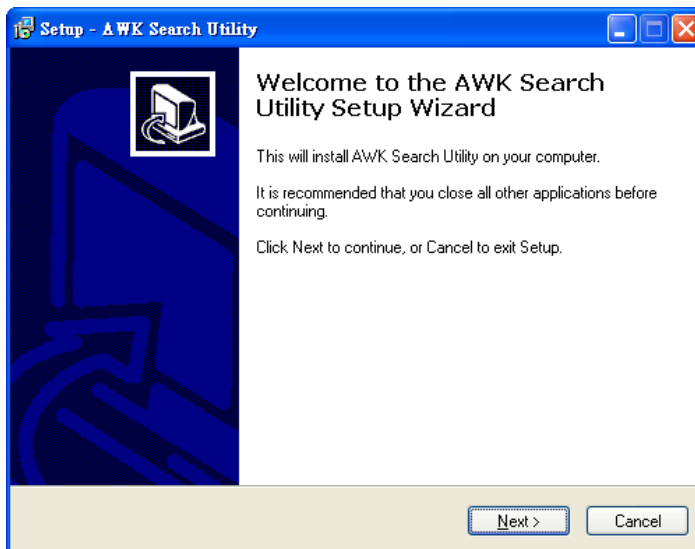
**NOTE** Screenshots in this section are for example only. The model number shown in the figures may differ from that of your unit.

## AWK Search Utility

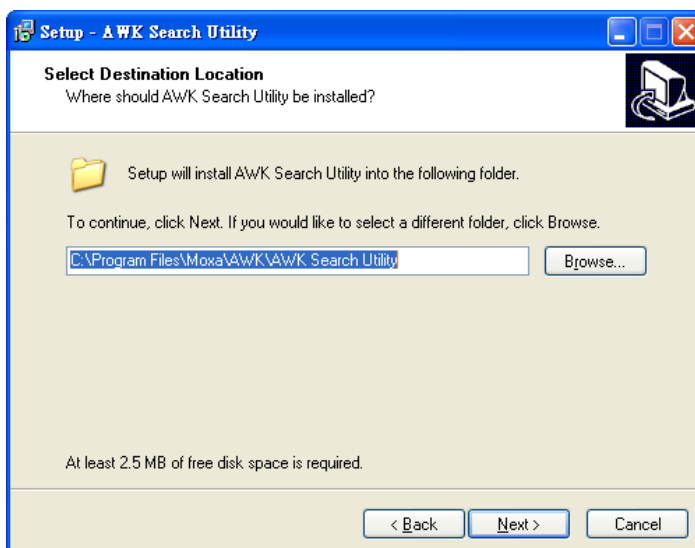
### Installing AWK Search Utility

Click the **INSTALL UTILITY** button in the AWK Installation CD auto-run window to install AWK Search Utility. Once the program starts running, click **Yes** to proceed.

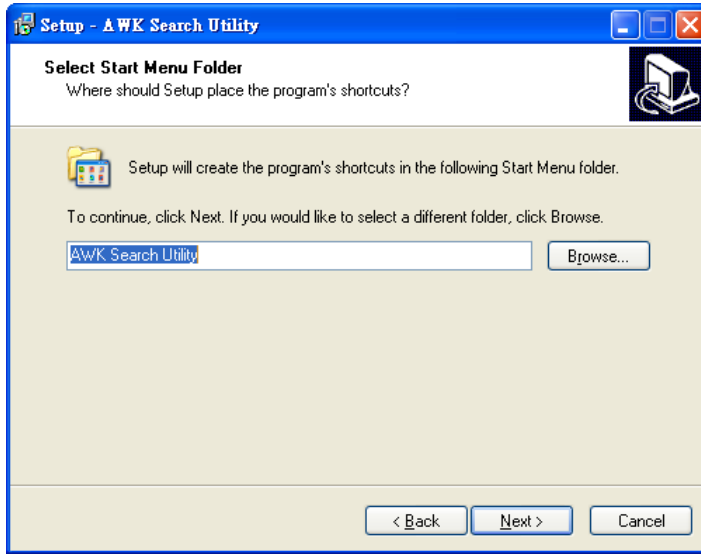
1. Click **Next** when the **Welcome** screen opens to proceed with the installation.



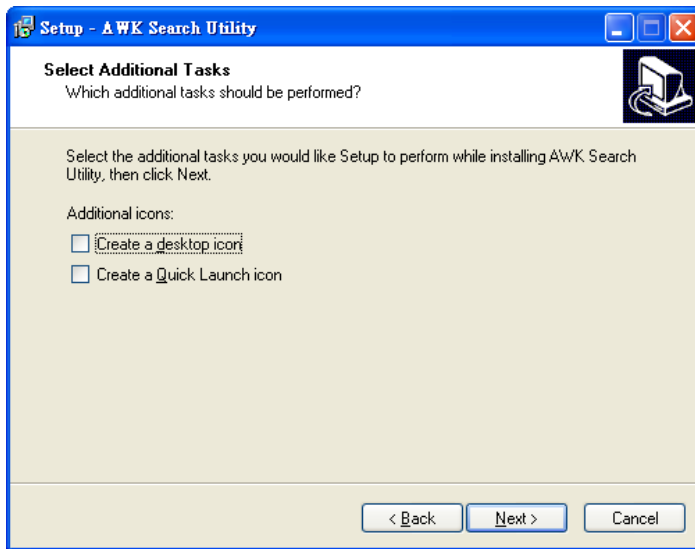
2. Click **Next** to install program files to the default directory, or click **Browse** to select an alternate location.



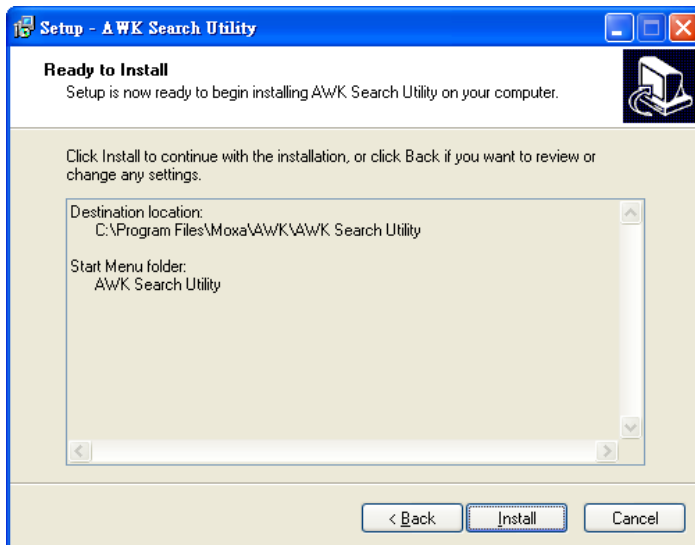
3. Click **Next** to create the program's shortcut files to the default directory, or click **Browse** to select an alternate location.



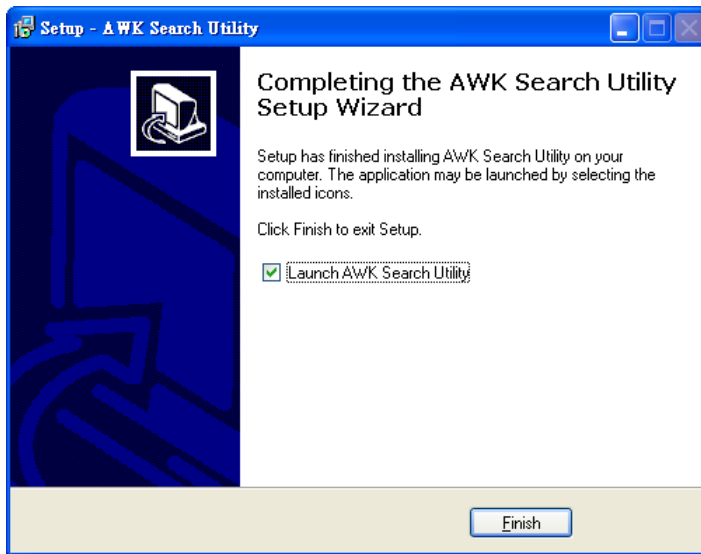
4. Click **Next** to select additional tasks.



5. Click **Next** to proceed with the installation. The installer then displays a summary of the installation options.

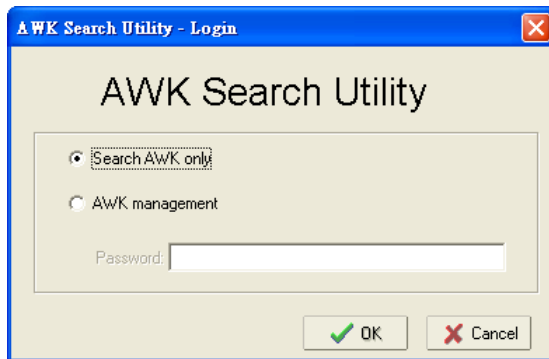


6. Click **Install** to begin the installation. The setup window will report the progress of the installation. To change the installation settings, click **Back** and navigate to the previous screen.
7. Click **Finish** to complete the installation of AWK Search Utility.

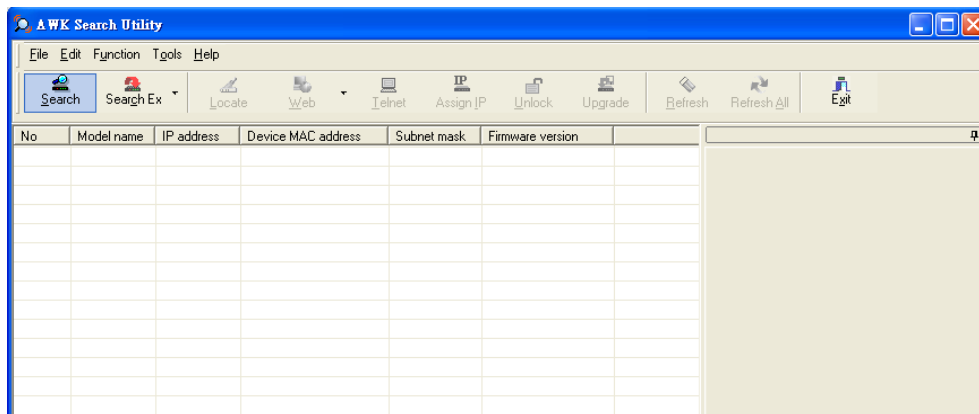


## Configuring AWK Search Utility

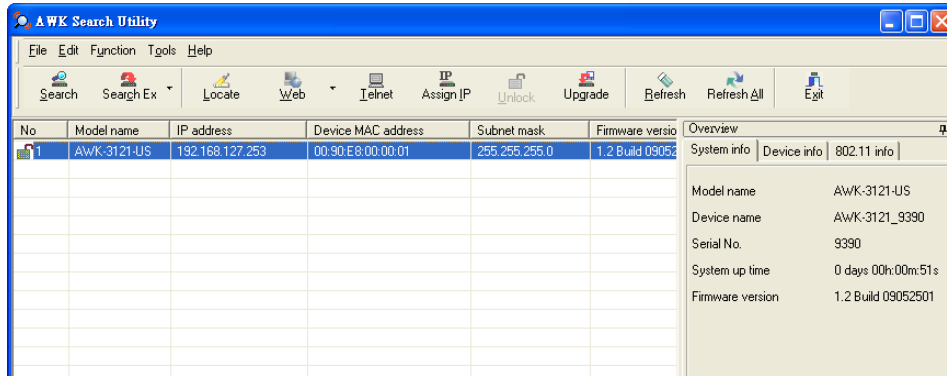
1. The **Search** function is used to locate all AWK devices and WAC controllers that are connected to the same LAN as your computer. After locating a device, you will be able to perform simple device management activities, such as change the IP address, etc... Start the **AWK Search Utility** program. When the Login page appears, select the "Search AWK only" option to search for AWKs and to view each AWK's configuration. Select the "AWK management" option to assign IPs, upgrade firmware, and locate devices.



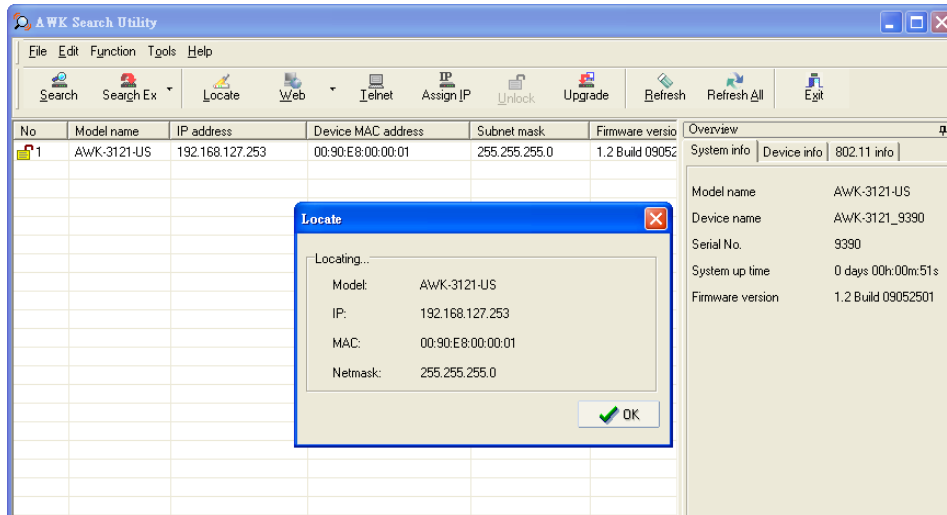
2. Open the AWK Search Utility and then click the **Search** icon.



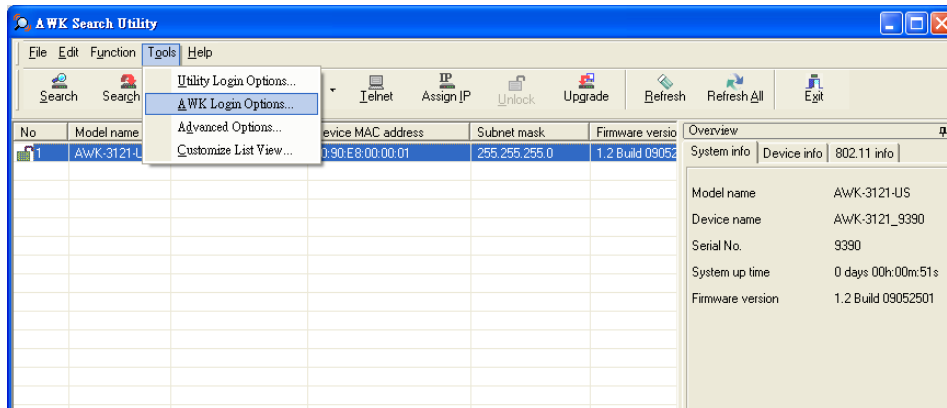
- The "Searching" window indicates the progress of the search. When the search is complete, all WAC and AWK units that were located will be displayed in the AWK Search Utility window.



- Click **Locate** to cause the selected device to beep.



- The **Search Utility** only supports WAC configurations via the Web or telnet (other functions will be deactivated).
- Go to **Tools** → **AWK login Options** to manage and unlock additional AWKs.



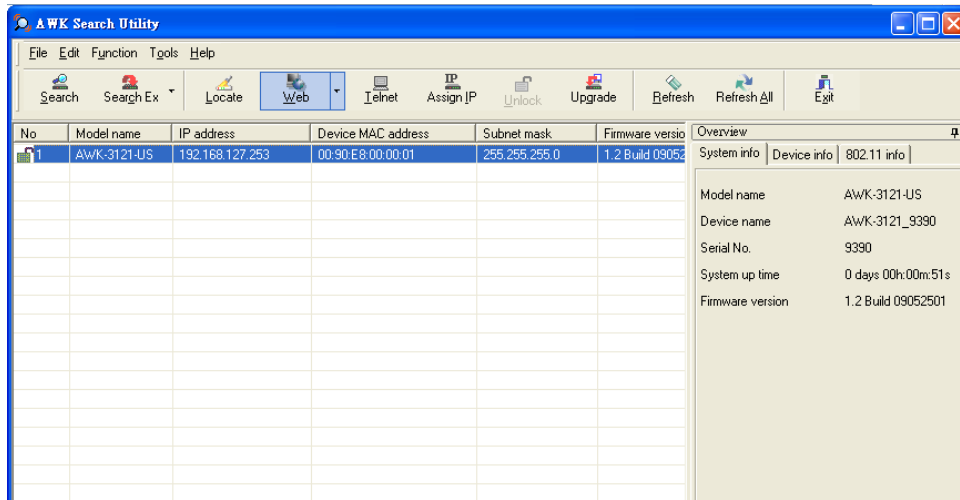
- Use the scroll down list to select the MAC addresses of those AWKs/WACs you would like to manage, and then click **Add**. Key in the password for the AWK device and then click **OK** to save. If you return to the search page and search for the devices again, you will find that the AWK will unlock automatically.



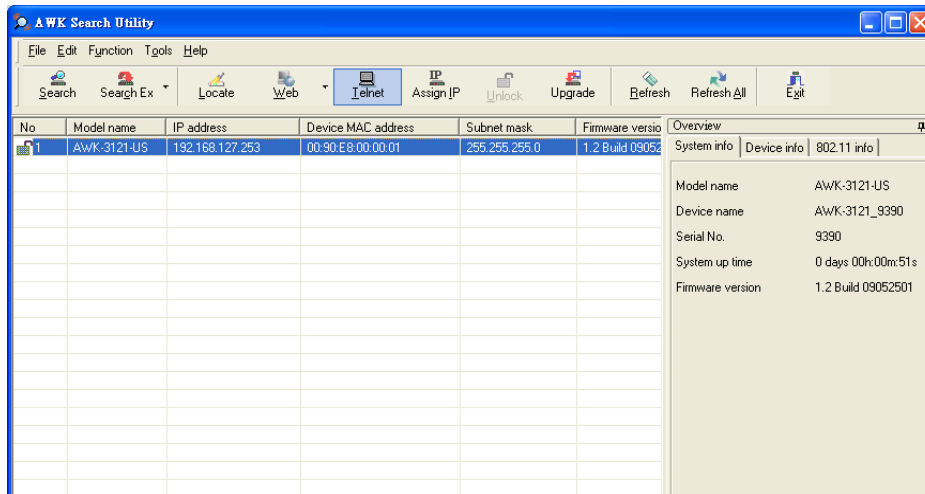
**ATTENTION**

For security purposes, we suggest you can change the AWK search utility login password instead of using the default.

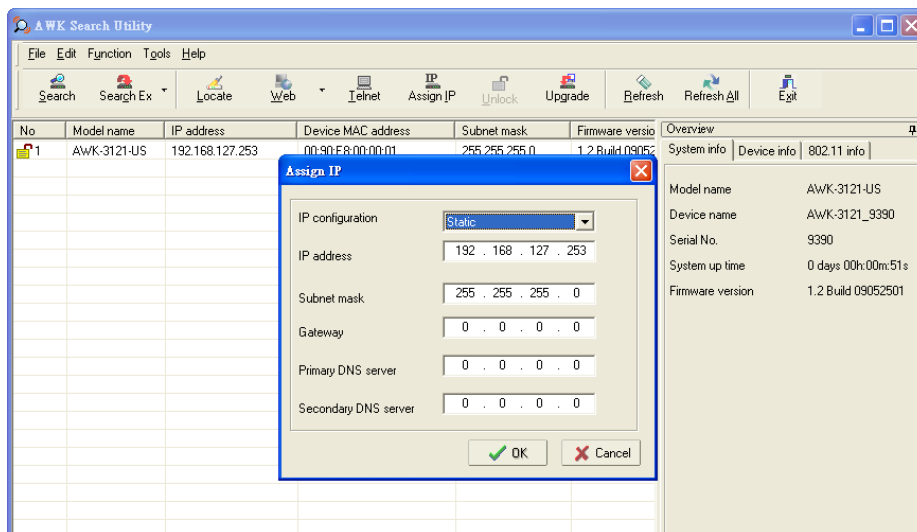
To modify the configuration of the highlighted WAC or AWK, click on the Web icon to open the Web Console. This will take you to the Web Console, where you can make all configuration changes. Refer to Chapter 3, "Using the Web Console," for information on how to use the Web Console.



8. Click on **Telnet** if you would like to use telnet to configure your WACs and AWKs.



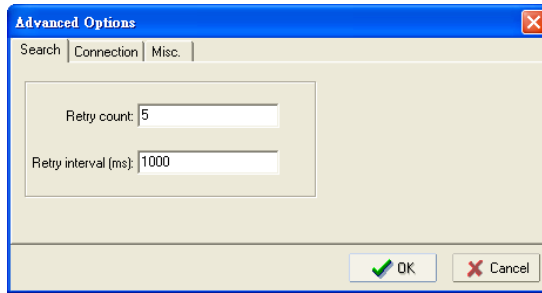
9. Click **Assign IP** to change the IP setting.



Go to **Tools** → **Advanced Options** to find Search, Connection and Miscellaneous settings. See following for detail explanation:

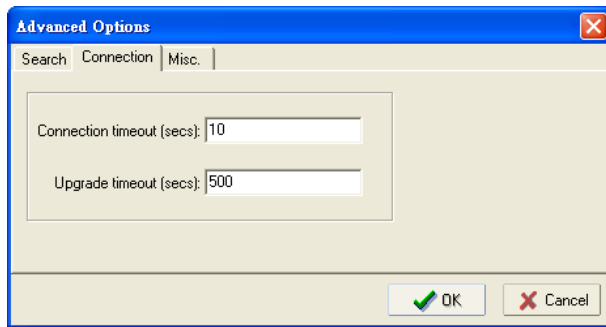
### Search

- **Retry count (default=5):** Indicates how many times the search will be retried automatically.
- **Retry interval (ms):** The time lapse between retries.



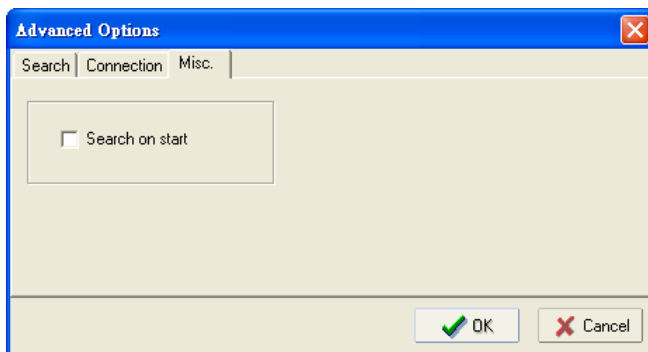
### Connection

- **Connection timeout (secs):** Use this option to set the waiting time for the **Default Login, Locate, Assign IP, Upload Firmware, and Unlock** to complete.
- **Upgrade timeout (secs):** Use this option to set the waiting time for the connection to disconnect while the firmware is upgrading. Use this option to set the waiting time for the firmware to write to flash.



### Misc.

**Search on start:** Checkmark this box if you would like the search function to start searching for devices after you log in to the AWK search Utility.



# A

## References

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This chapter provides more detailed information about wireless-related technologies. The information in this chapter can help you administer your WAC-2004s and plan your industrial wireless network better.

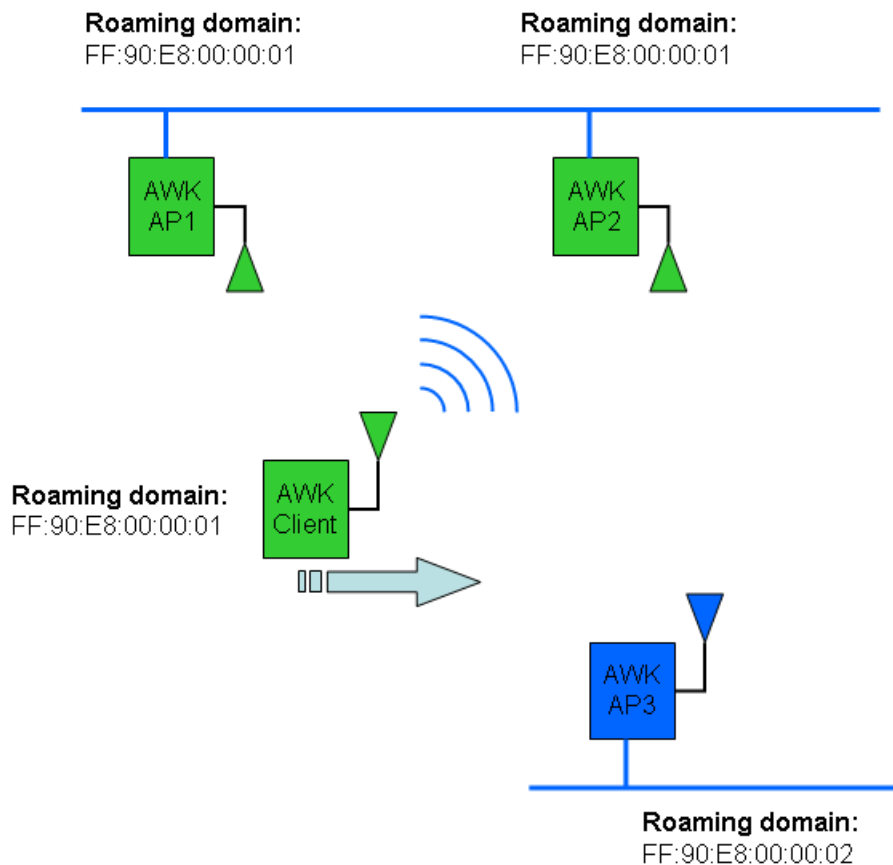
The following topics are covered in this appendix:

- ▣ **Roaming Domain**

# Roaming Domain

A roaming domain defines an area where all related wireless controllers, APs, and clients work together to enable fast roaming. Such a domain is specified as six groups of two hexadecimal digits beginning with the fixed identifier, **FF:90:E8**.

Note that the default value of a roaming domain resembles a controller's MAC address; however, it is not necessary to take the last 3-bytes of a controller's MAC address to form a roaming domain. You may take any six hexadecimal digits to form a unique roaming domain; this will be dissimilar enough for other roaming domains to tell themselves apart.



The purpose of a roaming domain is to ensure that wireless clients roam in the same area, and do not jump onto unintended areas. For example, as illustrated above, a wireless client is disconnected from **AWK AP1** and is trying to connect to the next AP. Even though **AWK AP2** and **AWK AP3** have the same SSID, channel, and wireless settings, the client will not roam onto **AWK AP3** because it is in a different roaming domain. A **roaming domain** setting provides wireless clients with consistent roaming among specific APs.



# B

## Supporting Information

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This chapter presents additional information about this manual and product. You can also learn how to contact Moxa for technical support.

The following topics are covered in this appendix:

- **About This User's Manual**
- **DoC (Declaration of Conformity)**
  - Federal Communication Commission Interference Statement

## About This User's Manual

This manual is mainly designed for, but not limited to, the following hardware and firmware for the WAC-2004:

- Hardware Rev: **1.0**
- Firmware Ver: **1.2**

You are strongly recommended to check with your sales representative for the latest product datasheet, firmware, QIG (Quick Installation Guide), UM (User's Manual), and related information.

## DoC (Declaration of Conformity)

### Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**FCC Caution:** To assure continued compliance, (example – use only shielded interface cables when connecting to computer or peripheral devices). Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

#### **FCC Radiation Exposure Statement**

*This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator & your body.*

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.

<b>NOTE</b> The availability of some specific channels and / or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end user.
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------