Industrial Wireless
Access Point/Bridge/Client

User Manual IE-WL-VL-AP-BR-CL series

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Weidmüller

User Manual IE-WL-VL-AP-BR-CL series

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Introduction

The IE-WL-VL-AP-BR-CL industrial a/b/g/n high speed wireless Access Point products are ideal wireless solutions for hard-to-wire applications that use mobile equipment connected over a TCP/IP network. The IE-WL-VL-AP-BR-CL is rated to operate at temperatures ranging from -25 to 60°C for standard models and -40 to 75°C for wide temperature models and is rugged enough for any harsh industrial environment.

Overview

The IE-WL-VL-AP-BR-CL is 802.11n compliant to deliver speed, range, and reliability to support even the most bandwidth-intensive applications. The 802.11n standard incorporates multiple technologies, including Spatial Multiplexing MIMO (Multi-In, Multi-Out), 20 and 40 MHz channels, and dual bands (2.4 GHz and 5 GHz) to provide high speed wireless communication, while still being able to communicate with legacy 802.11a/b/g devices.

The device's operating temperature ranges from -25 to 60°C for standard models and -40 to 75°C for wide temperature models and is rugged enough for all types of harsh industrial environments. Installation of the IE-WL-VL-AP-BR-CL is easy using DIN-Rail mounting or distribution boxes, and with its wide operating temperature range, IP30-rated housing with LED indicators, and DIN-Rail mounting it is a convenient yet reliable solution for all types of industrial wireless applications.

Package Checklist

Weidmüller's IE-WL-VL-AP-BR-CL is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

- 1 IE-WL-VL-AP-BR-CL Wireless Access Point/Bridge/Client
- 2x 2.4/5GHz omni-directional antennas, 2 dBi, RP-SMA (male)
- Hardware Installation Guide (printed)
- Cable holder with 1 screw
- 1x RJ-45 protective cap for console port

Product Features

- IEEE 802.11a/b/g/n compliant
- Advanced wireless security
  - 64-bit and 128-bit WEP/WPA/WPA2
  - SSID Hiding/IEEE 802.1X/RADIUS
  - Packet access control & filtering
- STP/RSTP support for network system redundancy
- Long-distance transmission support (5 GHz channel only)
- Turbo Roaming enables rapid handover (Client/Client-Router/Slave mode)
- AeroLink Protection supported for redundant wireless communication

- EBR-MODULE RS232 (backup and restore module) for configuration import/export
- RS-232 console management
- 2DI+1DO for on-site monitoring and warnings
- Wide -40 to 75°C operating temperature range (-T model)
- Redundant 12 to 48 VDC power inputs or IEEE 802.3af Power over Ethernet
- DIN-Rail mounting
- IP30 protected high-strength metal housing

ATTENTION

- The IE-WL-VL-AP-BR-CL is NOT a portable mobile device and should be located at least 20 cm away from the human body.
- The IE-WL-VL-AP-BR-CL is NOT designed for the general public. A well-trained technician should be enlisted to ensure safe deployment of IE-WL-VL-AP-BR-CL units, and to establish a wireless network.

Functional Design

Device Ports

Serial (RS232) configuration console port

RJ45 Ethernet port (10/100/1000 BaseTX)

LED Indicators

The LEDs on the front panel of the IE-WL-VL-AP-BR-CL provide a quick and easy means of determining the current operational status and wireless settings.

The **FAULT** LED indicates system failures and user-configured events. If the IE-WL-VL-AP-BR-CL cannot retrieve the IP address from a DHCP server, the **FAULT** LED will blink at half second intervals. The **SIGNAL** LEDs indicate signal strength, and only operate in **Client** mode.

Fault LED

Signal strength LEDs

The following table summarizes how to read the device's wireless settings from the LED displays. More information is available in Chapter 3 in the "Basic WLAN Setup" section.

LED	Color	State	Description
Front Panel LED Indicators (System)			
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.
PoE	Amber	On	Power is being supplied via PoE.
		Off	Power is not being supplied via PoE.
FAULT	Red	On	System is booting up, or a system configuration error or relay event has occurred.
		Blinking (fast at intervals of 0.5 second)	Cannot get an IP address from the DHCP server
		Blinking (slow at intervals of 1 second)	IP address conflict
		Off	Error condition does not exist.
STATE	Green	On	System startup is complete, and the system is in operation.
		Blinking (fast at intervals of 0.5 second)	AeroLink Protection is enabled and is currently in "Backup" state
		Blinking (slow at intervals of 1 second)	The device has been located by the WLAN Administration Tool.
	Red	On	System is booting up
SIGNAL (5 LEDs)	Green	On	Wi-Fi Signal Level (for Client/Slave/Client-Router Modes only)
		Off	
WLAN	Green	On	WLAN function is in Client/Slave/Client-Router mode and has established a link with an AP.
		Blinking	WLAN data transmission is in Client/Slave/Client-Router mode.
		Off	WLAN is not in Client/Slave/Client-Router mode or has not established a link with an AP.
	Amber	On	WLAN is in AP/Master mode.
		Blinking	WLAN data transmission is in AP/Master mode.
		Off	WLAN is not in use or not working properly
LAN	Green	On	LAN port's 1000 Mbps link is **active**.
		Blinking	Data is being transmitted at 1000 Mbps.
		Off	LAN port's 1000 Mbps link is **inactive**.
	Amber	On	LAN port's 10/100 Mbps link is **active**.
		Blinking	Data is being transmitted at 10/100 Mbps.
		Off	LAN port's 10/100 Mbps link is **inactive**.

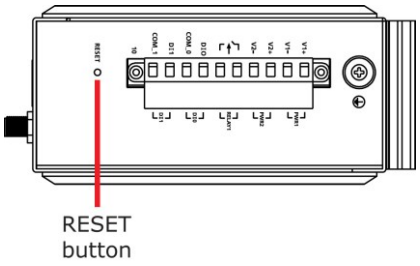
Beeper

The beeper emits two short beeps when the system is ready.

Reset Button

The **RESET** button is located on the top panel of the IE-WL-VL-AP-BR-CL. You can reboot the device or reset it to factory default settings by pressing the **RESET** button with a pointed object such as an unfolded paper clip.

- **System reboot:** Hold the RESET button down for under 5 seconds and then release.
- **Reset to factory default:** Hold the RESET button down for *over* 5 seconds until the **STATE** LED starts blinking green. Release the button to reset the IE-WL-VL-AP-BR-CL.



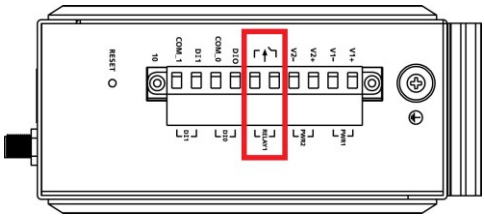
Relay (Digital Output)

The IE-WL-VL-AP-BR-CL has one relay output consisting of the 2 terminal block contacts on the top panel, as shown below. These relay contacts are used to forward system failures and user-configured events.

The two wires attached to the relay contacts form an open circuit when a user-configured event is triggered. If a user-configured event does not occur, the relay circuit will remain closed. For safety reasons, the relay circuit is kept open when the IE-WL-VL-AP-BR-CL is not powered up.

Summary of the IE-WL-VL-AP-BR-CL's Relay Status

Power Status	Event	Relay
Off	–	Open
On	Yes	Open
	No	Short



2

Getting Started

This chapter explains how to install Weidmüller's IE-WL-VL-AP-BR-CL for the first time, and quickly set up your wireless network and test whether the connection is running well. The Function Map discussed in the third section provides a convenient means of determining which functions you need to use.

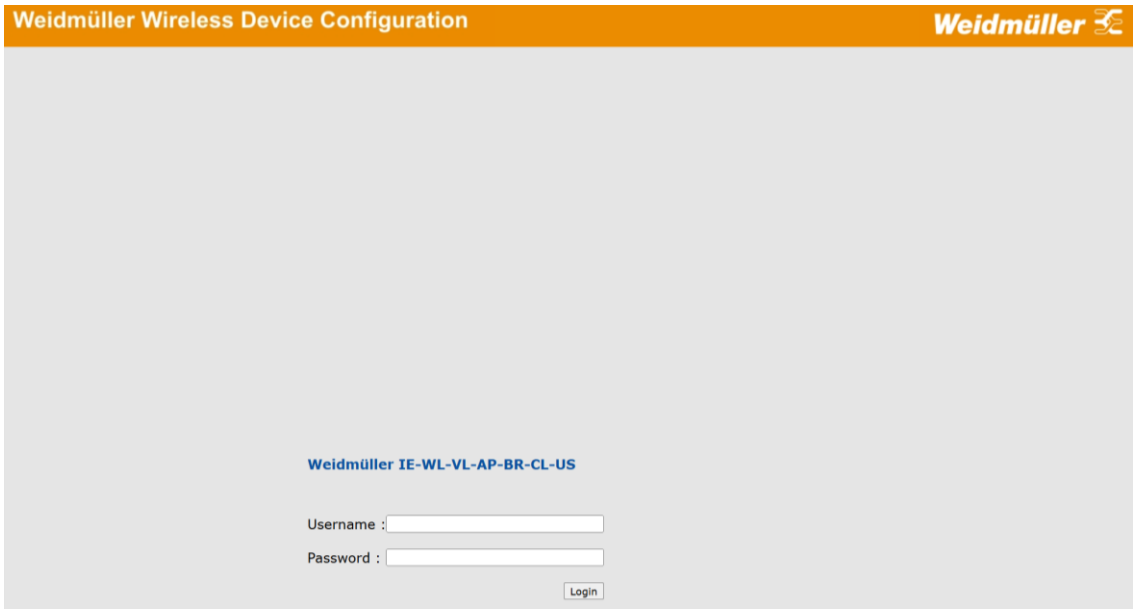
First-time Installation and Configuration

Before installing the IE-WL-VL-AP-BR-CL, make sure that all items in the Package Checklist are in the box. You will need access to a notebook computer or PC equipped with an Ethernet port. The IE-WL-VL-AP-BR-CL has a default IP address that must be used when connecting to the device for the first time.

- **Step 1: Select the power source.**
  The IE-WL-VL-AP-BR-CL can be powered by a DC power input or PoE (Power over Ethernet). The IE-WL-VL-AP-BR-CL will use whichever power source you choose.
- **Step 2: Connect the IE-WL-VL-AP-BR-CL to a notebook or PC.**
  Since the IE-WL-VL-AP-BR-CL supports MDI/MDI-X auto-sensing, you can use either a straight-through cable or crossover cable to connect the IE-WL-VL-AP-BR-CL to a computer. The LED indicator on the IE-WL-VL-AP-BR-CL's LAN port will light up when a connection is established.
- **Step 3: Set up the computer's IP address.**
  Choose an IP address on the same subnet as the IE-WL-VL-AP-BR-CL. Since the IE-WL-VL-AP-BR-CL's default IP address is **192.168.1.110**, and the subnet mask is **255.255.255.0**, you should set the IP address of the computer to **192.168.1.xxx**.

NOTE After you select **Maintenance → Load Factory Default** and click the **Submit** button, the device will be reset to factory default settings and the IP address will be reset to **192.168.1.110**.

- **Step 4: Use the web-based manager to configure the IE-WL-VL-AP-BR-CL**
  Open your computer's web browser and type **http://192.168.1.110** in the address field to access the homepage of the web-based Network Manager. Before the homepage opens, you will need to enter the user name and password as shown in the following figure. For first-time configuration, enter the default user name and password and then click on the **Login** button:

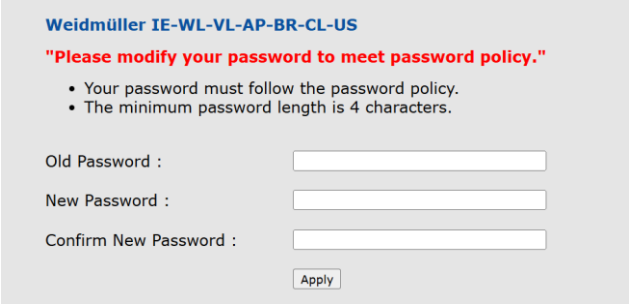


NOTE The default login credentials are:

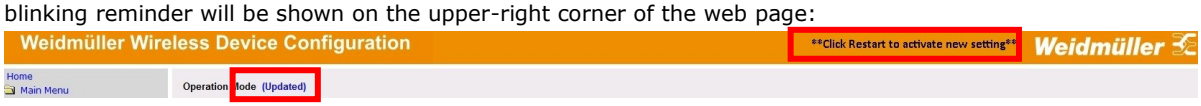
Username: **admin**

Password: **Detmold**

Once successfully logged in using the default credentials, you will be prompted to update the password. To enhance security and allow configuration changes, we strongly recommend updating the default password. You cannot change any configuration settings on the IE-WL-VL-AP-BR-CL when logged in with the default password.



NOTE After you click **Submit** to apply changes the web page will refresh **(Updated)** will appear on the page and a blinking reminder will be shown on the upper-right corner of the web page:



To activate the changes click **Restart** and then **Save and Restart** after you change the settings. About 30 seconds are needed for the IE-WL-VL-AP-BR-CL to complete the reboot procedure.

- **Step 5: Select the IE-WL-VL-AP-BR-CL operation mode.**
  By default, the IE-WL-VL-AP-BR-CL's operation mode is set to AP. You can change to other modes in **Wireless LAN Setup → Operation Mode**. Detailed information about configuring the IE-WL-VL-AP-BR-CL's operation mode can be found in Chapter 3.
- **Step 6: Test communications.**
  In the following sections we describe two test methods that can be used to ensure that a network connection has been established.

Communication Testing

After installing the IE-WL-VL-AP-BR-CL you can run a sample test to make sure the device and wireless connection are functioning normally. Two testing methods are described below. Use the first method if you are using only one IE-WL-VL-AP-BR-CL device, and use the second method if you are using two or more units.

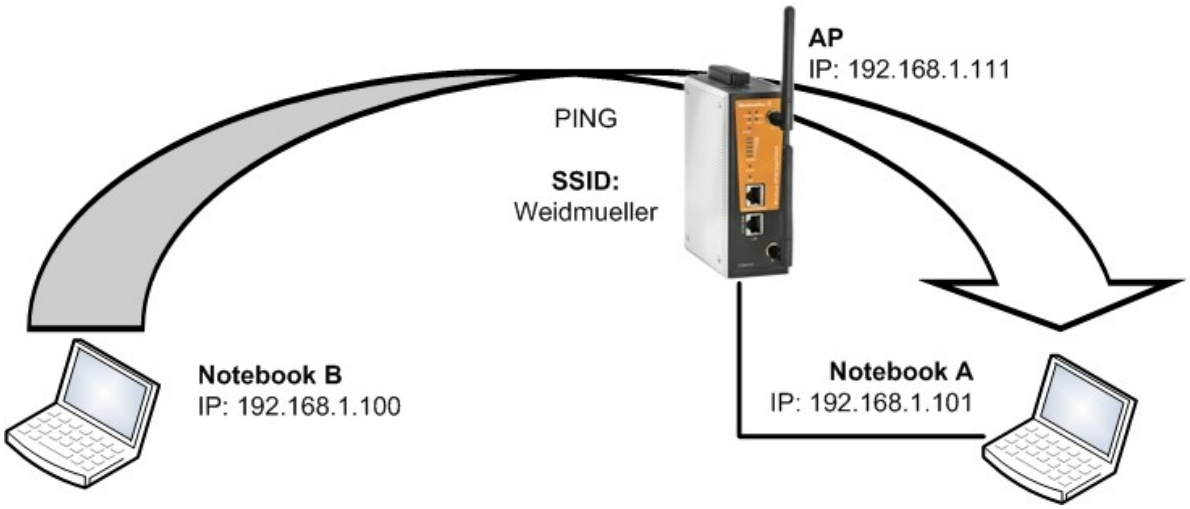
How to Test One IE-WL-VL-AP-BR-CL

If you are only using one IE-WL-VL-AP-BR-CL, you will need a second notebook computer equipped with a WLAN card. Configure the WLAN card to connect to the IE-WL-VL-AP-BR-CL (NOTE: the default SSID is **Weidmueller**), and change the IP address of the second notebook (Notebook B) so that it is on the same subnet as the first notebook (Notebook A), which is connected to the IE-WL-VL-AP-BR-CL.

After configuring the WLAN card, establish a wireless connection with the IE-WL-VL-AP-BR-CL and open a DOS window on Notebook B. At the prompt, type

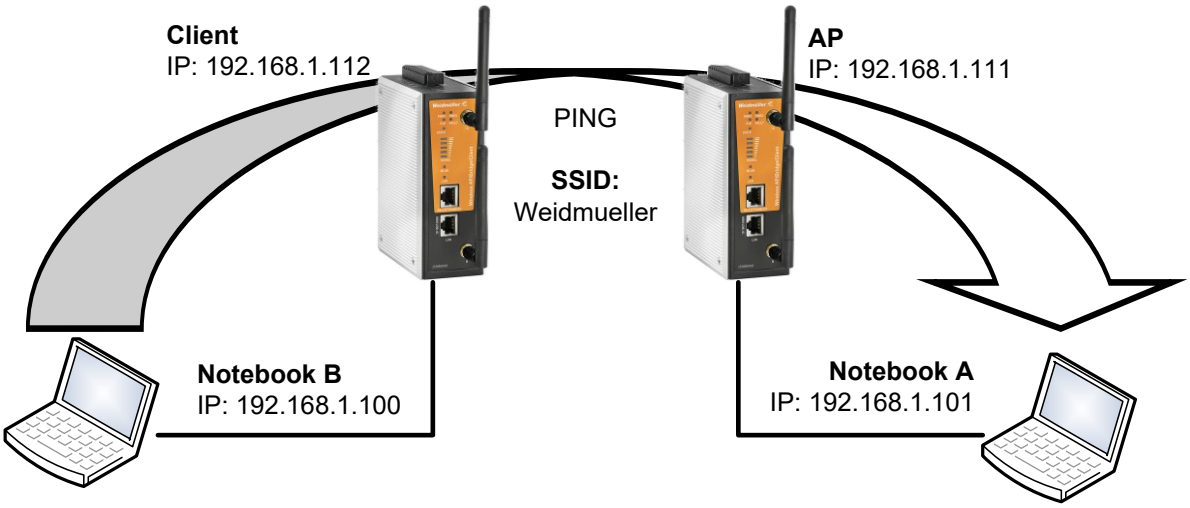
ping *<IP address of notebook A>*

and then press **Enter** (see the figure below). A "Reply from IP address …" response means the communication was successful. A "Request timed out." response means the communication failed. In this case, recheck the configuration to make sure the connections are correct.



How to Test Two or More IE-WL-VL-AP-BR-CL Units

If you have two or more IE-WL-VL-AP-BR-CL units, you will need a second notebook computer (Notebook B) equipped with an Ethernet port. Use the default settings for the first IE-WL-VL-AP-BR-CL connected to notebook A and change the second or third IE-WL-VL-AP-BR-CL connected to notebook B to Client mode, and then configure the notebooks and IE-WL-VL-AP-BR-CL units properly.

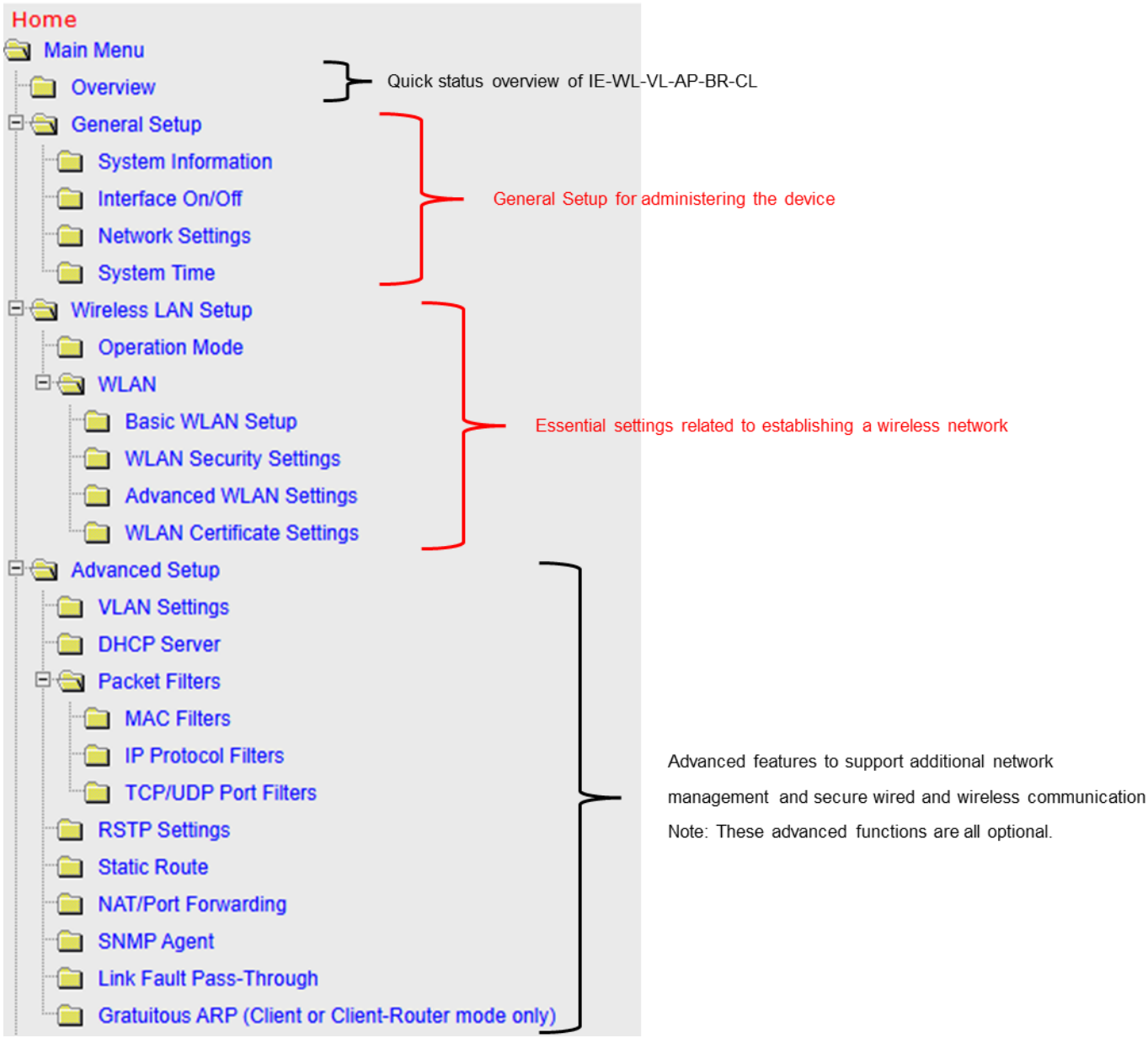


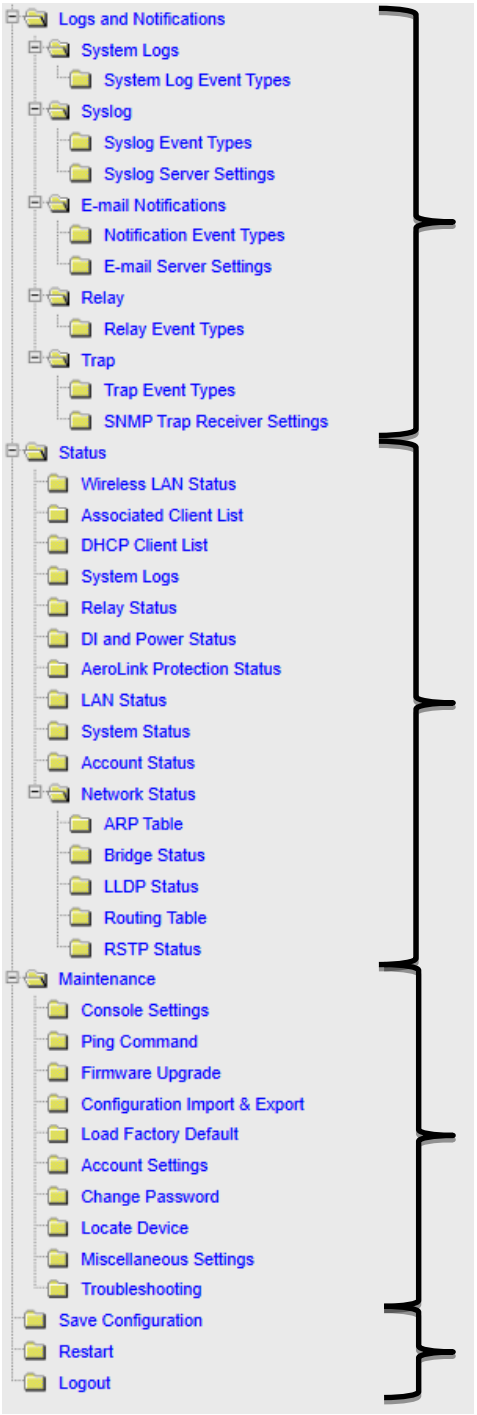
After setting up the testing environment, open a DOS window on notebook B. At the prompt, type:

ping *<IP address of notebook A>*

and then press **Enter**. A "Reply from IP address …" response means the communication was successful. A "Request timed out" response means the communication failed. In this case, recheck the configuration to make sure the connections are correct.

Function Map





Application-oriented device management functions to set up events, traps, and reactions via relay warning, e-mail, and SNMP notification

Note: These functions are all optional.

Current status information for monitoring wired/wireless network performance, advanced services, and device management functions.

Functions for maintaining the IE-WL-VL-AP-BR-CL, and for diagnosing the network.

On-demand functions to support the web-based console management operation.

3

Web Console Configuration

In this chapter, we explain all aspects of web-based console configuration. Weidmüller's easy-to-use management functions help you set up your IE-WL-VL-AP-BR-CL and make it easy to establish and maintain your wireless network.

Web Browser Configuration

Weidmüller IE-WL-VL-AP-BR-CL's web browser interface provides a convenient way to modify its configuration and access the built-in monitoring and network administration functions. recommended web browser is Chrome version 109.0.5414.120 (Official Build, 64-bit).

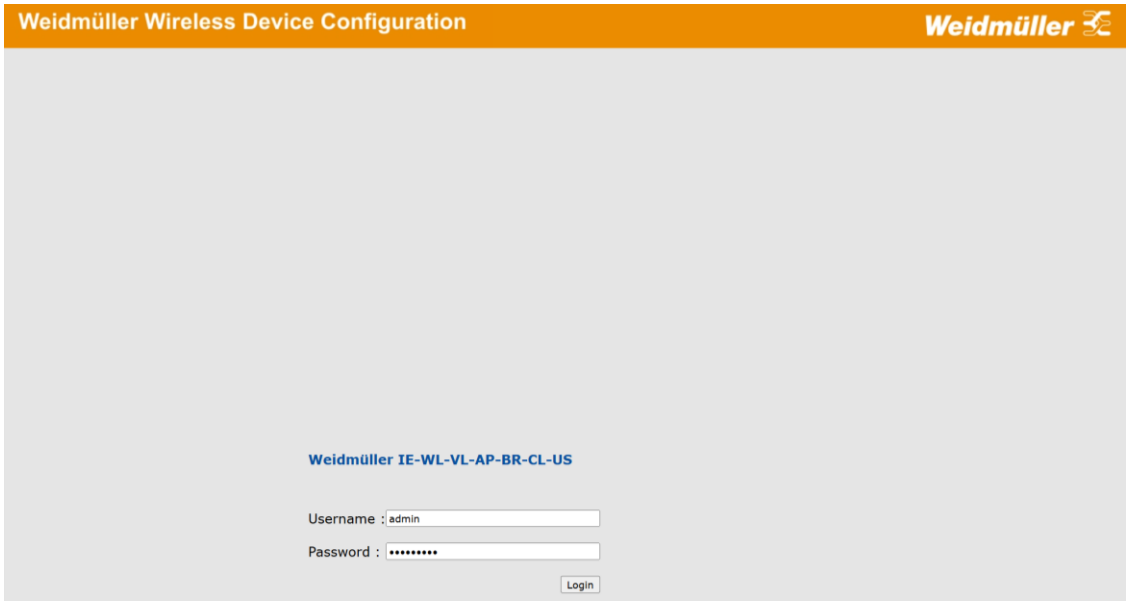
NOTE To use the IE-WL-VL-AP-BR-CL's management and monitoring functions from a PC host connected to the same LAN as the IE-WL-VL-AP-BR-CL, you must make sure that the PC host and the IE-WL-VL-AP-BR-CL are on the same logical subnet. Similarly, if the IE-WL-VL-AP-BR-CL is configured for other VLAN settings, you must make sure your PC host is on the management VLAN.

The Weidmüller IE-WL-VL-AP-BR-CL's default IP is **192.168.1.110**.

Follow these steps to access the IE-WL-VL-AP-BR-CL's web-based console management interface.

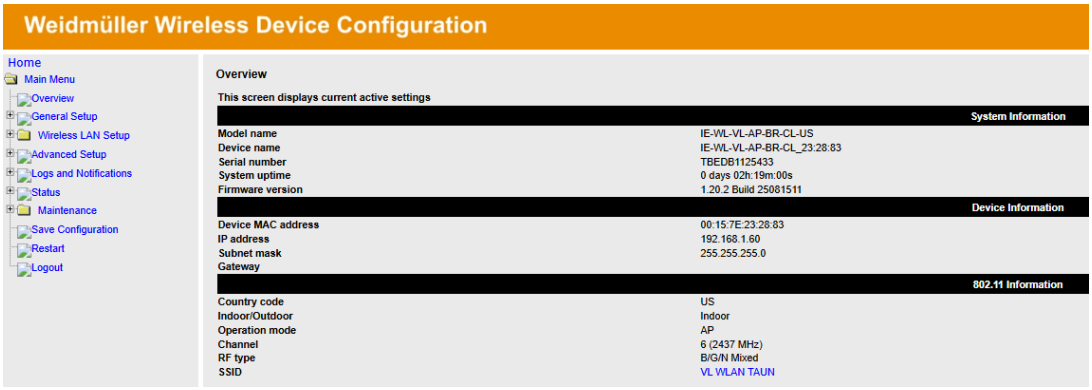
1. Open your web browser (e.g., Internet Explorer) and type the IE-WL-VL-AP-BR-CL's IP address in the address field. Press **Enter** to establish the connection.

2. The Web Console Login page will open. Enter the password (default Username = **admin**; default Password = **Detmold**) and then click **Login** to continue.



You may need to wait a few moments for the web page to download to your computer. Note that the Model name and IP address of your IE-WL-VL-AP-BR-CL are both shown in the title bar of the web page. This information can be used to help you identify multiple IE-WL-VL-AP-BR-CL units.

3. Use the menu tree on the left side of the window to open the function pages to access each of the IE-WL-VL-AP-BR-CL's functions.

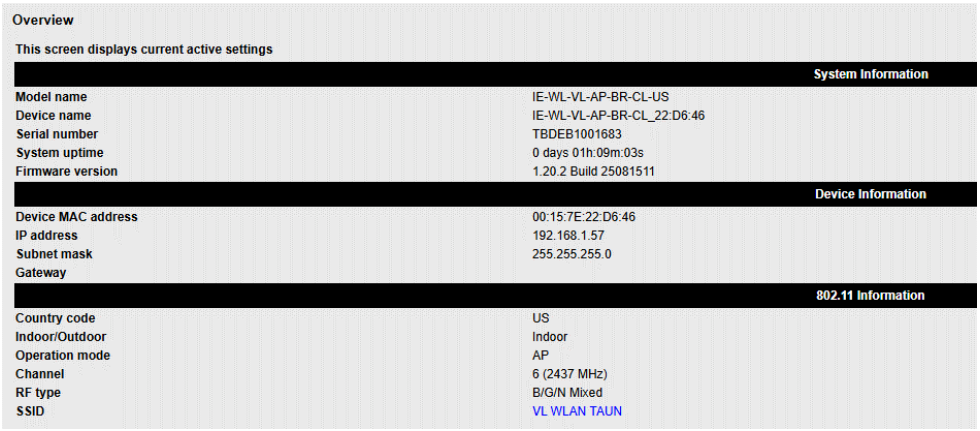


In the following paragraphs, we describe each IE-WL-VL-AP-BR-CL management function in detail. A quick overview is available in this manual in the "Function Map" section of Chapter 2.

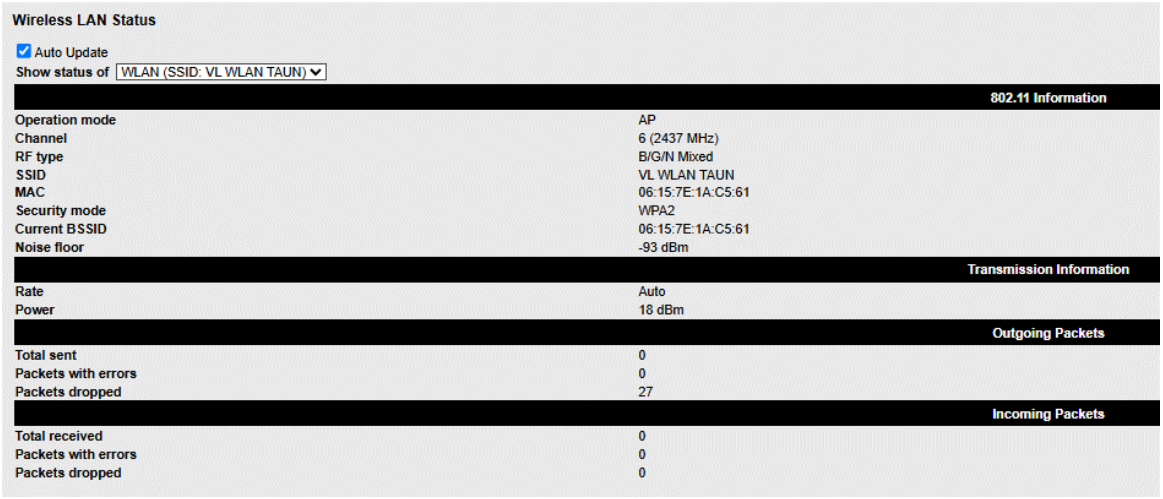
NOTE The model name of the IE-WL-VL-AP-BR-CL is shown as IE-WL-VL-AP-BR-CL -XX, where XX indicates the country code. The country code indicates the IE-WL-VL-AP-BR-CL version and which frequencies it uses. We use **IE-WL-VL-AP-BR-CL-US** as an example in the following figures. (The country code and model name that appears on your computer screen may be different than the one shown here.)

Overview

The **Overview** page summarizes the IE-WL-VL-AP-BR-CL's current status. The information is categorized into several groups: **System Information, Device Information** and **802.11 Information**.



Click on the SSID link to see more detailed information on 802.11 settings, as shown in the following figure:

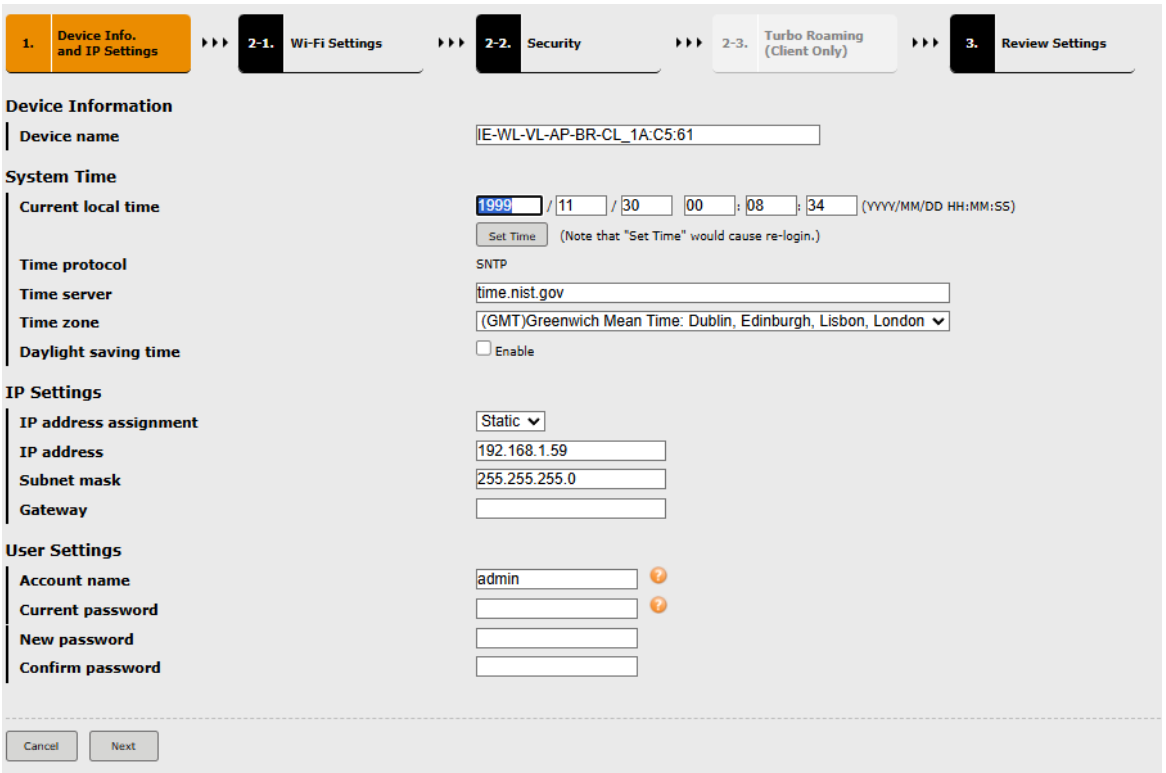


NOTE The **802.11 Information** that is displayed might be different for different operation modes.

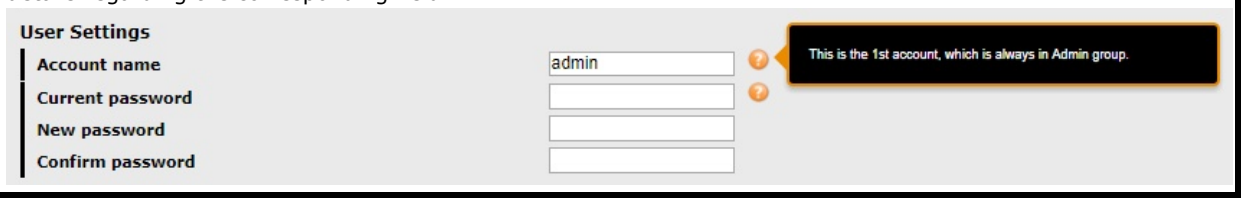
Quick Setup

The IE-WL-VL-AP-BR-CL provides a quick setup wizard to help you configure the basic settings including device information and wireless settings.

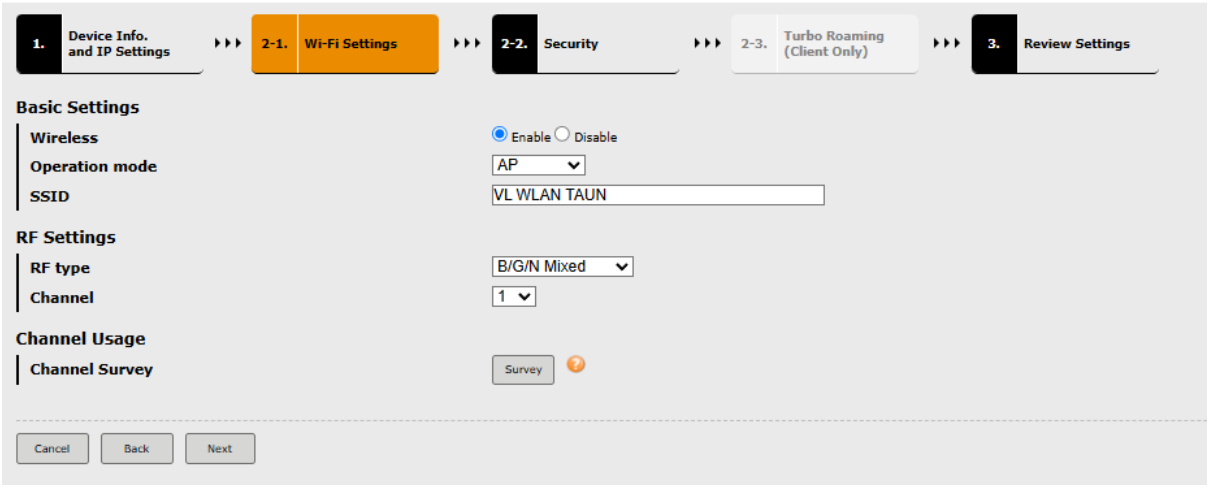
Once you enter the setup, links to each step in the process are displayed at the top of the page. You can either click **Next** to go to the next step or click directly on a link at the top of the page to go to a specific step.



NOTE You can move your cursor on the question mark symbol next to a field to view a tooltip that provides additional details regarding the corresponding field.



In the **Wi-Fi Settings** step, you can configure the basic Wi-Fi settings and use the channel survey provided in the **Channel Usage** section to find out if a channel is clear or congested. This function can help you deploy a clear channel without requiring the use of a channel analysis tool.



Channel Usage Result - 2.4 GHz

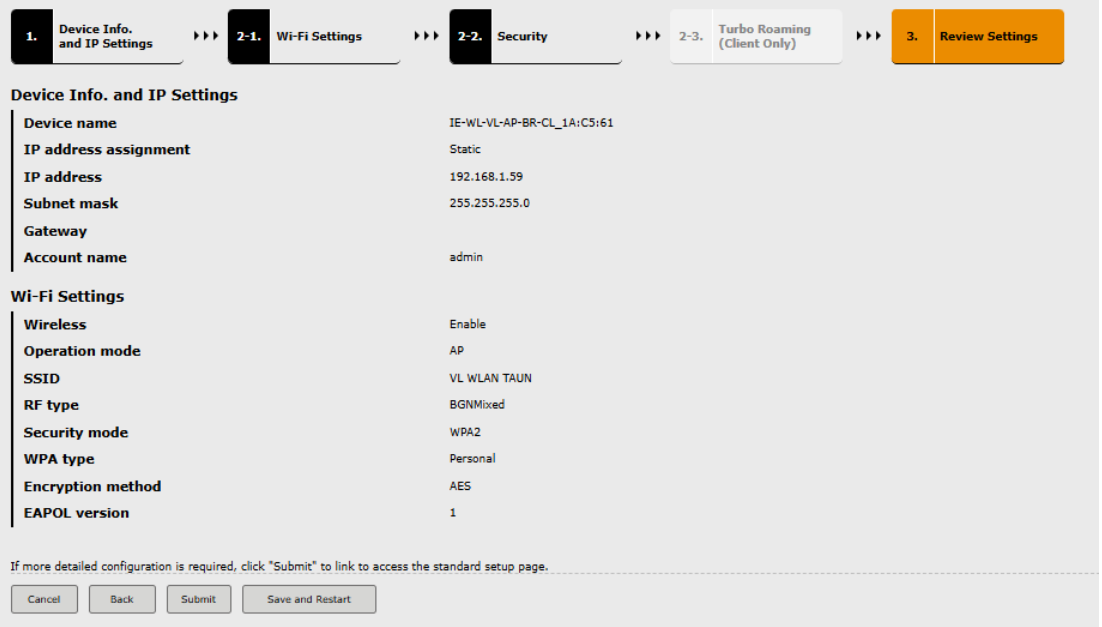
Channel	1	2	3	4	5	6	7
Number of APs	8	0	0	0	0	15	1
Loading (%)	28	22	30	29	42	50	26
Noise floor (dBm)	-107	-106	-107	-106	-105	-106	-105
Channel	8	9	10	11	--	--	--
Number of APs	0	0	0	10	--	--	--
Loading (%)	30	26	21	20	--	--	--
Noise floor (dBm)	-106	-106	-105	-105	--	--	--

Channel Usage Result - 5 GHz

Channel	36	40	44	48	52	56	60
Number of APs	1	4	4	4	0	0	0
Loading (%)	1	1	1	1	0	0	0
Noise floor (dBm)	-116	-116	-116	-116	-116	-115	-116
Channel	64	100	104	108	112	116	120
Number of APs	0	0	0	0	0	0	0
Loading (%)	0	0	0	0	0	0	0
Noise floor (dBm)	-116	-118	-118	-118	-117	-118	-118
Channel	124	128	132	136	140	149	153
Number of APs	0	0	1	0	0	0	0
Loading (%)	1	1	2	1	1	0	0
Noise floor (dBm)	-116	-117	-119	-119	-119	-119	-118
Channel	157	161	165	--	--	--	--
Number of APs	0	0	0	--	--	--	--
Loading (%)	0	0	0	--	--	--	--
Noise floor (dBm)	-119	-118	-119	--	--	--	--

Setting	Description
Number of APs	The number of APs which use this channel.
Load	A measure of how congested a channel, expressed in a percentage value. Both the 802.11 and non-802.11 signals will affect the channel loading.
Noise floor	A summation of the noise level from all sources.

You can see a complete preview of the Wi-Fi parameters that you configured when you click on the final step in the setup process (**Review Settings).**

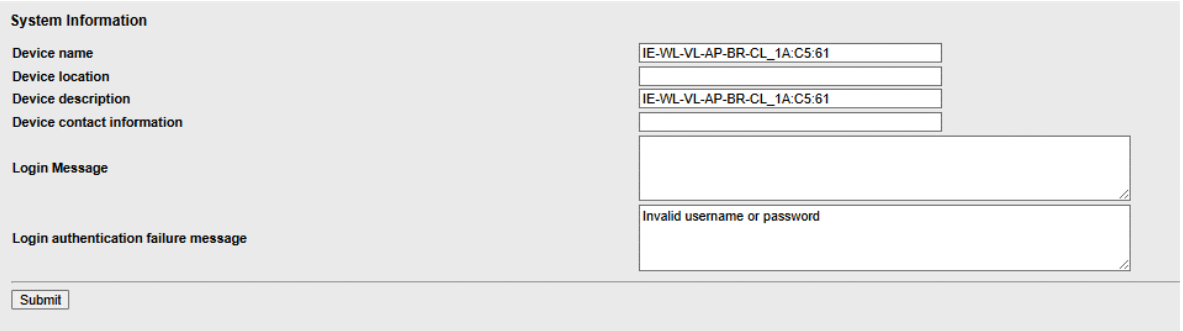


General Setup

The **General Setup** group includes the most commonly used settings required by administrators to maintain and control the IE-WL-VL-AP-BR-CL.

System Information

The **System Information** items, especially ***Device name*** and ***Device description***, are displayed and included on the **Overview** page, in SNMP information, and in alarm emails. Setting **System Information** items makes it easier to identify the different IE-WL-VL-AP-BR-CL units connected to your network.



Device name

Setting	Description	Factory Default
Max. 31 of characters	This option is useful for specifying the role or application of different IE-WL-VL-AP-BR-CL units.	IE-WL-VL-AP-BR-CL _*<Serial No. of this device>*

Device location

Setting	Description	Factory Default
Max. of 31 characters	Specifies the location of different IE-WL-VL-AP-BR-CL units.	None

Device description

Setting	Description	Factory Default
Max. of 31 characters	Use this space to record a more detailed description of the IE-WL-VL-AP-BR-CL	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 IE-WL-VL-AP-BR-CL.	None

Login Message

Setting	Description	Factory Default
Max. of 31 characters	Enter a message to display to all users when they log in	Blank

Login authentication failure message

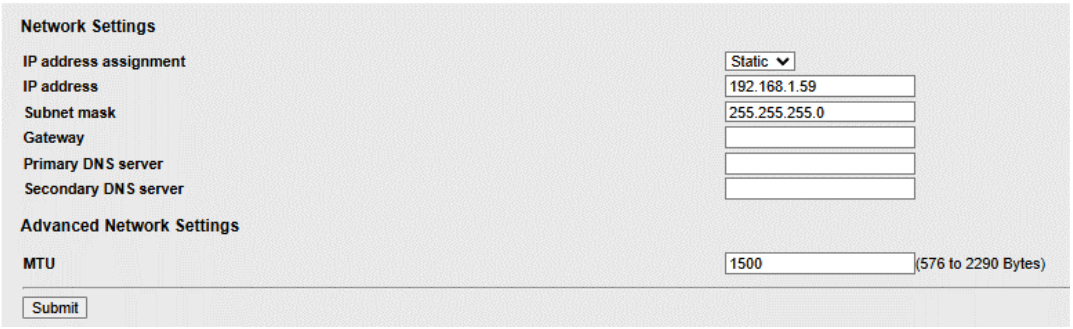
Setting	Description	Factory Default
Max. of 31 characters	Enter the login authentication failure message to display to the user who logs in with an invalid username or password	None

Interface On/Off

Network Settings

The Network Settings configuration panel allows you to modify the usual TCP/IP network parameters. However, due to the addition of the Client-Router operation mode, this panel provides two different sets of network parameters. Explanations for both types of configurations are given below.

Network Settings for AP/Client/Master/Slave Operation Modes



IP address assignment

Setting	Description	Factory Default
DHCP	The IE-WL-VL-AP-BR-CL's IP address will be assigned automatically by the network's DHCP server	Static
Static	Set up the IE-WL-VL-AP-BR-CL's IP address manually.	

IP address

Setting	Description	Factory Default
IE-WL-VL-AP-BR-CL's IP address	Identifies the IE-WL-VL-AP-BR-CL on a TCP/IP network.	192.168.1.110

Subnet mask

Setting	Description	Factory Default
IE-WL-VL-AP-BR-CL's subnet mask	Identifies the type of network to which the IE-WL-VL-AP-BR-CL 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
IE-WL-VL-AP-BR-CL's default gateway	The IP address of the router that connects the LAN to an outside network.	None

Primary/ Secondary DNS server

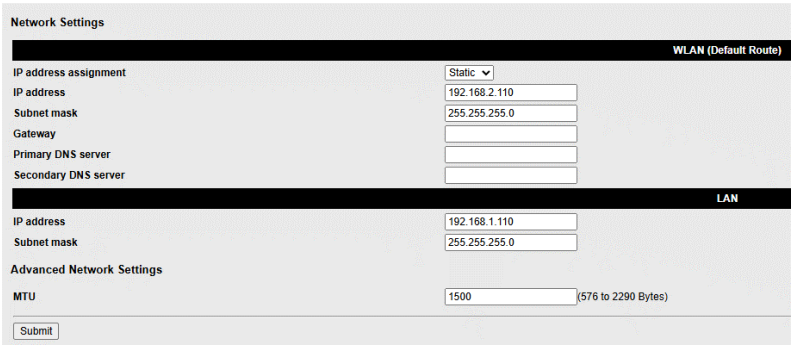
Setting	Description	Factory Default
IP address of the Primary/Secondary DNS server	The IP address of the DNS Server used by your network. After entering the DNS Server's IP address, you can input the IE-WL-VL-AP-BR-CL's URL (e.g., http://ap1.weidmueller.com) in your browser's address field instead of entering the IP address. The Secondary DNS server will be used if the Primary DNS server fails to connect.	None

MTU

Setting	Description	Factory Default
576 to 2290	MTU (Maximum Transmission Unit) refers to the maximum size of an IP packet that can be transmitted without fragmentation over a given medium.	1500

NOTE The MTU setting applies to all networking interfaces including Ethernet and Wi-Fi interfaces.

Network Settings for Client-Router Operation Mode



WLAN IP address assignment

Setting	Description	Factory Default
DHCP	The IE-WL-VL-AP-BR-CL WLAN interface's IP address will be assigned automatically by the network's DHCP server	Static
Static	Set up the IE-WL-VL-AP-BR-CL WLAN interface's IP address manually.	

WLAN IP address

Setting	Description	Factory Default
IE-WL-VL-AP-BR-CL WLAN interface's IP address	Identifies the IE-WL-VL-AP-BR-CL WLAN interface's IP address on a TCP/IP network.	192.168.2.110

WLAN subnet mask

Setting	Description	Factory Default
IE-WL-VL-AP-BR-CL WLAN interface's subnet mask	Identifies the type of network to which the device's WLAN interface 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

WLAN gateway

Setting	Description	Factory Default
IE-WL-VL-AP-BR-CL WLAN interface's default gateway	The IP address of the router that connects the WLAN 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 IE-WL-VL-AP-BR-CL's URL (e.g., http://ap1.weidmueller.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

LAN IP address

Setting	Description	Factory Default
IE-WL-VL-AP-BR-CL LAN interface's IP address	Identifies the IE-WL-VL-AP-BR-CL LAN interface's IP address on a TCP/IP network.	192.168.1.110

LAN subnet mask

Setting	Description	Factory Default
IE-WL-VL-AP-BR-CL LAN interface's subnet mask	Identifies the type of network to which the device's LAN interface 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

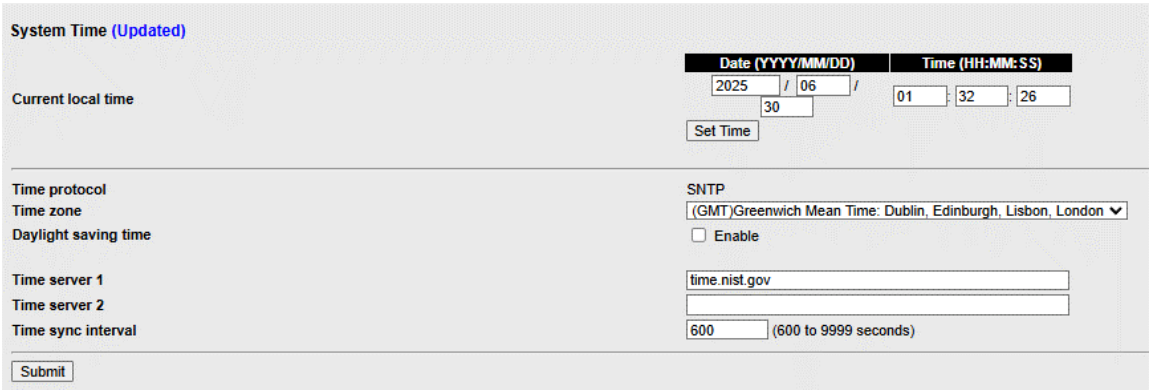
MTU

Setting	Description	Factory Default
576 to 2290	MTU (Maximum Transmission Unit) refers to the maximum size of an IP packet that can be transmitted without fragmentation over a given medium.	1500

NOTE The MTU setting applies to all networking interfaces including Ethernet and Wi-Fi interfaces.

System Time

The IE-WL-VL-AP-BR-CL has a time calibration function based on information from an NTP server or user specified Date and Time information. Functions such as **Logs and Notifications** can add real-time information to the message.



The ***Current local time*** shows the IE-WL-VL-AP-BR-CL'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 system time will be immediately activated in the system without running Save and Restart.

NOTE The IE-WL-VL-AP-BR-CL has a built-in real time clock (RTC). We strongly recommend that users update the **Current local time** for the IE-WL-VL-AP-BR-CL 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	None

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

Changing the time zone will automatically adjust the **Current local time**. You should configure the **Time zone** before setting the **Current local time**.

Daylight saving time

Setting	Description	Factory Default
Enable/ Disable	Daylight saving time (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.	time.nist.gov

Time sync interval

Setting	Description	Factory Default
Time interval for NTP server synchronization (600 to 9999 seconds)	This parameter determines how often the time is synchronized from the NTP server.	600 (seconds)

Wireless LAN Setup

The IE-WL-VL-AP-BR-CL provides two different sets of wireless operation modes: AP/client modes for point-to-multipoint communication and master/slave modes for transparent point-to-point communication. The major differences between these two operation modes are the MAC address translation on the client/slave radio.

AP/client: The IP-Bridging mechanism is used to overcome limitations of the 802.11 standards. In this case, the MAC address of the devices connected to the client radio will be replaced with the client's MAC address. Under AP/client modes, communication problems might be encountered when you have a MAC authenticated system or MAC (Layer 2) based communication. In this case, you will need to change the network to use the master/slave operation mode.

Master/slave: A transparent point-to-point protocol that allows the devices' MAC addresses to remain unchanged when the packets get through the slave radio. If you are looking for a worry-free wireless solution to replace your wired system, use Master/Slave.

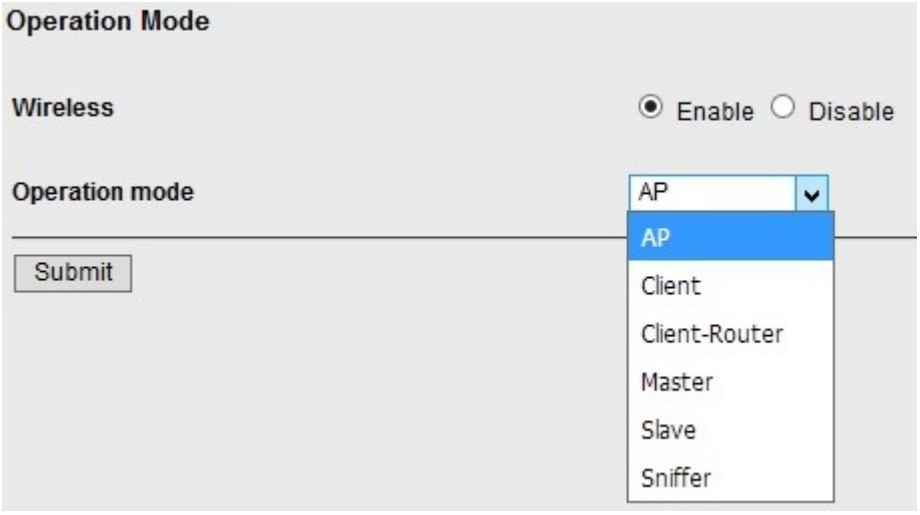
Client-router: A variation of standard client mode. WLAN behavior is identical with client mode, but a router behavior was added to separate the WLAN and LAN subnets. This allows network planners to allocate private IP addresses behind the client radio. More information on the Static Route, NAT, and Port Forwarding functions can be found in the **Advanced Setup** section.

Sniffer: To provide an easier way for our customers to analyze wireless traffic, the IE-WL-VL-AP-BR-CL supports a "Sniffer" mode to co-work with Wireshark packet sniffer software.

NOTE Although it is more convenient to use dynamic bridging, there is a limitation—the Client can only transmit IP-based packets between its wireless interface (WLAN) and Ethernet interface (LAN); other types of traffic (such as IPX and AppleTalk) are not forwarded.

Operation Mode

The IE-WL-VL-AP-BR-CL supports six operation modes—AP, Client, Client-Router, Master, Slave, and Sniffer—each of which plays a distinct role on the wireless network.



Wireless enable

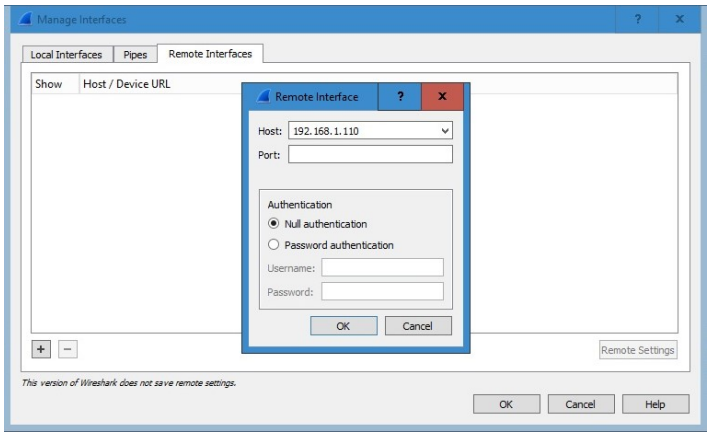
Setting	Description	Factory Default
Enable/Disable	The RF (Radio Frequency) module can be manually turned on or off.	Disable

Operation mode

Setting	Description	Factory Default
AP	The IE-WL-VL-AP-BR-CL plays the role of wireless Access Point	AP
Client	The IE-WL-VL-AP-BR-CL plays the role of wireless Client	
Client-Router	The IE-WL-VL-AP-BR-CL plays the role of wireless Client, but includes the router function to divide the WLAN and LAN interfaces into two subnets.	
Master	The IE-WL-VL-AP-BR-CL plays the role of wireless Master.	
Slave	The IE-WL-VL-AP-BR-CL plays the role of wireless Slave.	
Sniffer	Turns the device into a remote Wireshark interface to capture 802.11 packets for analysis.	

Sniffer mode instructions:

1. Set operation mode to Sniffer mode on the IE-WL-VL-AP-BR-CL and then save/reboot the device.
2. Connect the device to a laptop with Wireshark installed (v1.12.0 or later release) via Ethernet.
3. Add a remote interface by entering the IP address of the IE-WL-VL-AP-BR-CL.



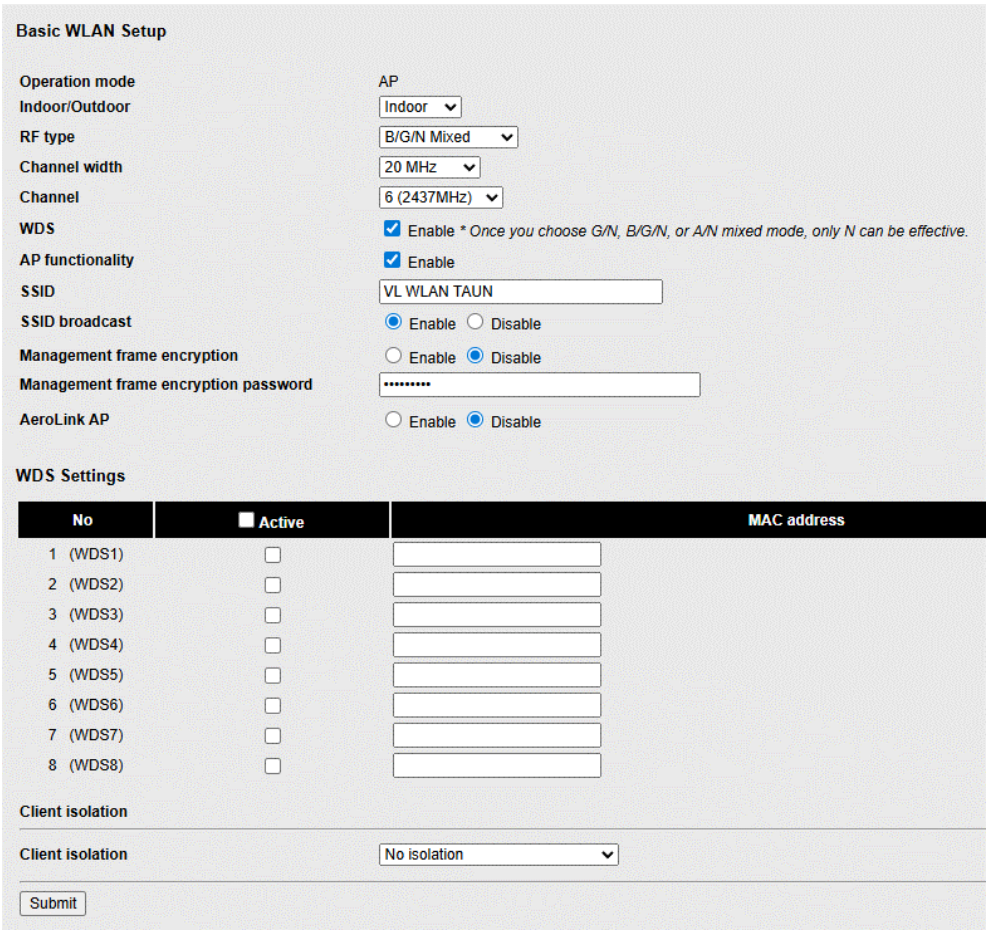
4. Start capturing the 802.11 wireless packets with Wireshark.

Basic WLAN Setup

The "Basic WLAN Setup" panel is used to add and edit SSIDs. An SSID is a unique identifier that wireless networking devices use to establish and maintain wireless connectivity. Multiple access points on a network or sub-network can use the same SSIDs. You can configure your IE-WL-VL-AP-BR-CL to use up to 9 SSIDs, and configure each SSID differently. All of the SSIDs are active at the same time; that is, client devices can use any of the SSIDs to associate with the access point.

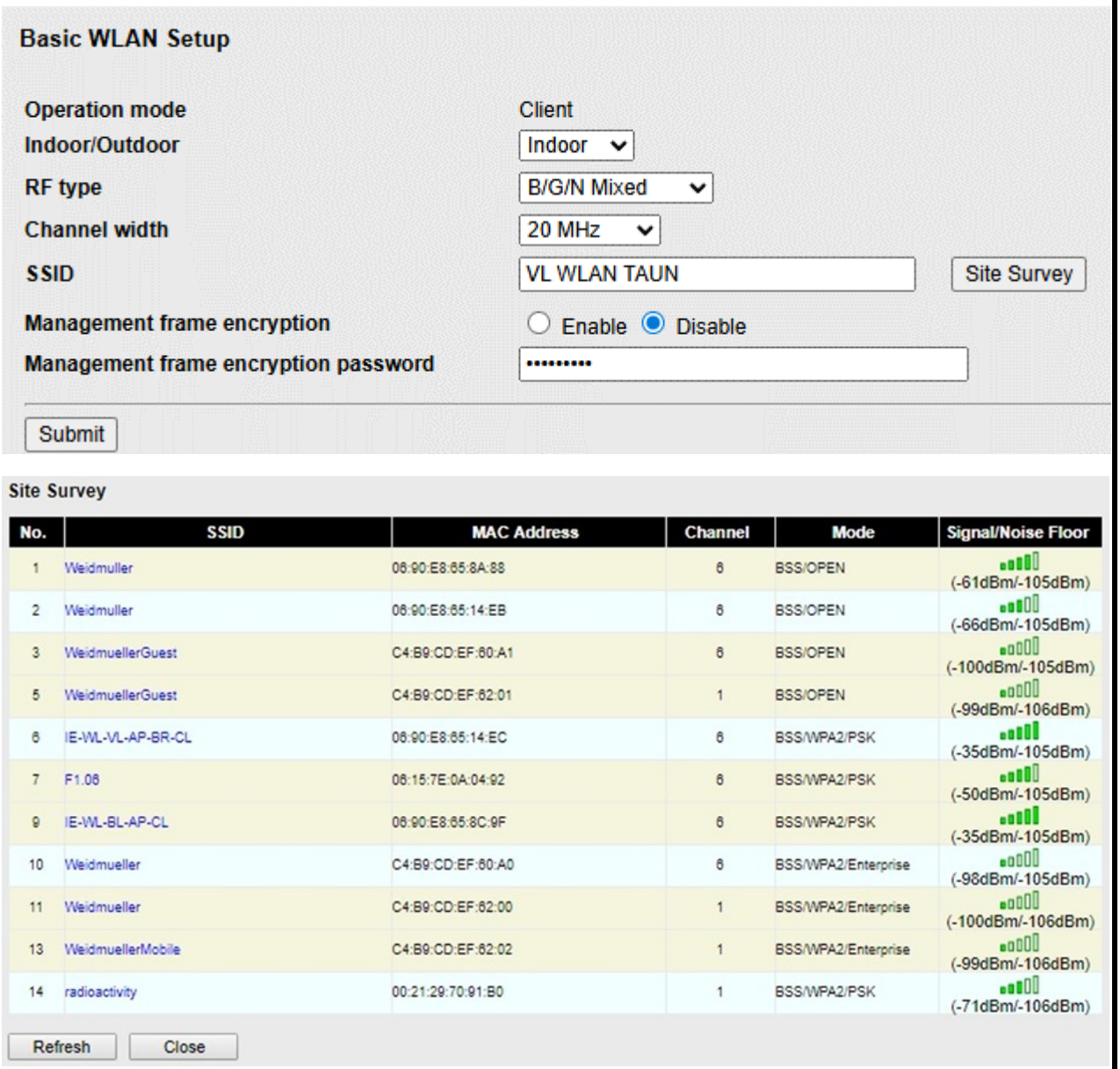
Click on **Add SSID** to create more SSIDs.

Click on **Edit** to assign different configuration settings to each SSID. The configuration panel appears as follows:



NOTE

When you switch to **Client, Client-Router, or Slave modes**, a **Site Survey** button will be available on the Basic WLAN Setup panel. Click the "Site Survey" button to view information about available APs, as shown in the following figure. You can click on the SSID of an entity and bring the value of its SSID onto the SSID field of the Basic WLAN Setup page. Click the **Refresh** button to re-scan and update the table.



Indoor/outdoor

Setting	Description	Factory Default
Indoor/outdoor	Select the usage environment, available channels vary depending on the selection	Indoor

WDS (for AP mode only)

In a WDS (Wireless Distribution System) configuration, a wireless link is established between two IEEE 802.11 APs. Wireless packets transmitted across the WDS link at the link layer and comply with the IEEE 802.11 WDS format. To establish a static WDS bridge link, the APs at both ends of the WDS link must be configured manually with each other's device MAC address. WDS can only be configured in a star or tree topology to prevent loops in the network that may affect performance.

Setting	Description	Factory Default
Enable/Disable	Establish a static wireless link based on the Wireless Distribution System (WDS).	Disable

NOTE WPA/WPA2 encryption is **not** supported in WDS, only OPEN/WEP security is available. When WDS is enabled, you can create a strictly point-to-point WDS link by disabling AP functionality. The IE-WL-VL-AP-BR-CL supports up to 8 WDS links to other APs or wireless bridges. Enter the target device's MAC address to set up a WDS link. If WDS is enabled, a list of bridge connections will appear.

RF type

Setting	Description	Factory Default
2.4 GHz		
B	Only supports the IEEE 802.11b standard	B/G/N Mixed
G	Only supports the IEEE 802.11g standard	
B/G Mixed	Supports IEEE 802.11b/g standards, but 802.11g may operate at a slower speed if when 802.11b clients are on the network	
G/N Mixed	Supports IEEE 802.11g/n standards, but 802.11n may operate at a slower speed if 802.11g clients are on the network	
B/G/N Mixed	Supports IEEE 802.11b/g/n standards, but 802.11g/n may operate at a slower speed if 802.11b clients are on the network	
N Only (2.4 GHz)	Only supports the 2.4 GHz IEEE 802.11n standard	
5 GHz		
A	Only supports the IEEE 802.11a standard	
A/N Mixed	Supports IEEE 802.11a/n standards, but 802.11n may operate at a slower speed if 802.11a clients are on the network	
N Only (5 GHz)	Only supports the 5 GHz IEEE 802.11n standard	

Channel (for AP mode only)

Setting	Description	Factory Default
Available channels vary with RF type	This option is only adjustable when the IE-WL-VL-AP-BR-CL plays the role of wireless AP. If the device acts as a wireless client, it follows the channel of the associated access point	6 (in B/G/N Mixed mode)

NOTE The IE-WL-VL-AP-BR-CL supports DFS channels in AP mode and will automatically detect interfering radar signals. The IE-WL-VL-AP-BR-CL will perform a 60-seconds scan to check for radar signals before starting to use the DFS channel. If a radar signal was detected, the IE-WL-VL-AP-BR-CL will move to another channel after 10 seconds. The channel with the interfering radar signal will be unavailable for 30 minutes.

Channel width (for any 11N RF type only)

Setting	Description	Factory Default
20 MHz	Select your channel width, If you are not sure which option to use, select 20/ 40 MHz (Auto)	20 MHz
20/40 MHz		

Channel bonding

Channel bonding shows the channel used by the AP if **Channel width** is set to 20/40 MHz

SSID

Setting	Description	Factory Default
Max. of 31 characters	The SSID of a client and the SSID of the AP must be identical for the client and AP to be able to communicate with each other.	Weidmueller

SSID broadcast (for AP mode only)

Setting	Description	Factory Default
Enable/ Disable	SSID can be broadcast or not	Enable

ATTENTION

If the **SSID broadcast** function is disabled, APs and clients cannot establish connections on DFS channels. This is because clients are only allowed to do passive scanning of DFS channels; active scanning on these channels is forbidden.

Management Frame Encryption

Setting	Description	Factory Default
Enable/Disable	Enable this function for increased security. Management Frame encryption function allows users to set a specific password for any two devices to connect with each other.	Disable

Aerolink AP

Setting	Description	Factory Default
Enable/Disable	Enable the AeroLink APs to monitor Ethernet communication on the AP side in order to trigger AeroLink Protection on the client side under milliseconds recovery time. NOTE: AeroLink Protection should be also enabled on the client side at the same time.	Disable

Client Isolation (for AP Mode only)

Client isolation is used to isolate the wireless clients connected to one or more APs. Isolated clients cannot communicate with each other, which increases security. Depending on the type of client isolation, you can specify exceptions (for clients) within the isolation network. This function is useful for cases such as enterprise server services for example.

Setting	Description	Factory Default
No isolation	No isolation is applied.	No isolation
Isolated within the same AP	All clients associated with this AP will be isolated from one another.	
Isolated within the same subnet	All clients in the specified subnet will be isolated from one another. The subnet is defined by the gateway address and subnet mask.	

NOTE If Client Isolation is enabled, it will be impossible to ping or configure clients directly from the management PC.

AP functionality

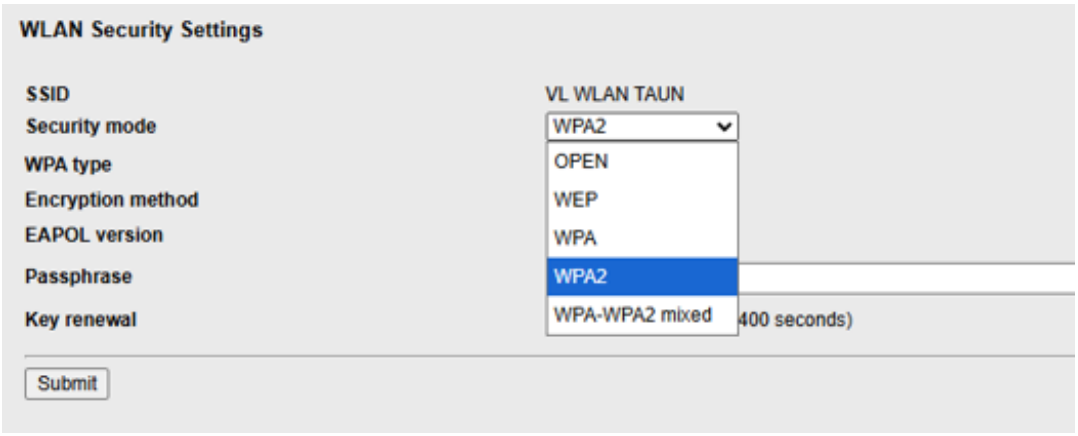
Setting	Description	Factory Default
Enable/Disable	Enable this option to allow the IE-WL-VL-AP-BR-CL to perform additional AP functions such as connecting standard Wi-Fi clients in addition to acting as a bridge AP.	Disable

NOTE Both the AP and client devices must be in the same channel and use the same security settings. In addition, an identical SSID is necessary for clients that roam between APs in Bridge mode. The Client will automatically scan for any AP that is using the defined SSID and will establish a bridge link with the matching AP.

WLAN Security Settings

The IE-WL-VL-AP-BR-CL provides four standardized wireless security modes: **Open**, **WEP** (Wired Equivalent Privacy), **WPA** (Wi-Fi Protected Access), and **WPA2**. Several security modes are available in the IE-WL-VL-AP-BR-CL by selecting ***Security mode*** and ***WPA type***:

- **Open:** No authentication, no data encryption.
- **WEP:** Static WEP (Wired Equivalent Privacy) keys must be configured manually.
- **WPA/WPA2-Personal:** Also known as WPA/WPA2-PSK. You will need to specify the Pre-Shared Key in the ***Passphrase*** field, which will be used by the TKIP or AES engine as a master key to generate keys that actually encrypt outgoing packets and decrypt incoming packets.
- **WPA/WPA2-Enterprise:** Also called WPA/WPA2-EAP (Extensible Authentication Protocol). In addition to device-based authentication, WPA/WPA2-Enterprise enables user-based authentication via IEEE 802.1X. The IE-WL-VL-AP-BR-CL can support three EAP methods: EAP-TLS, EAP-TTLS, and EAP-PEAP.
- **WPA-WPA2 mixed:** IE-WL-VL-AP-BR-CL supports WPA/WPA2 at the same time. IE-WL-VL-AP-BR-CL is able to authenticate with both Wi-Fi clients that use WPA and WPA2.



Security mode

Setting	Description	Factory Default
Open	No authentication	Open
WEP	Static WEP is used	
WPA*	WPA is used	
WPA2*	Supports IEEE 802.11i with "TKIP/AES + 802.1X"	
WPA-WPA2 mix*	Both WPA and WPA2 clients are able to connect to IE-WL-VL-AP-BR-CL at the same time	

** This option is not supported when using WDS*

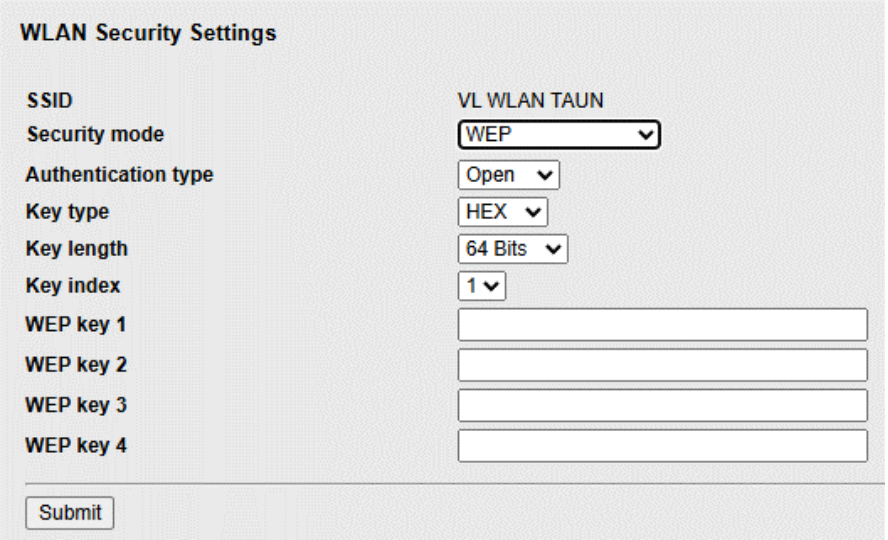
Open

For security reasons, you should **NOT** set security mode to Open System, since authentication and data encryption are **NOT** performed in Open System mode.

WEP (only for legacy mode)

NOTE Weidmüller includes **WEP** security mode only for legacy purposes. **WEP** is highly insecure and is considered fully deprecated by the Wi-Fi alliance. We do not recommend the use of **WEP** security under any circumstances.

According to the IEEE 802.11 standard, WEP can be used for authentication and data encryption to maintain confidentiality. Shared (or Shared Key) authentication type is used if WEP authentication and data encryption are both needed. Normally, Open (or Open System) authentication type is used when WEP data encryption is run with authentication.



When WEP is enabled as a security mode, the length of a key (so-called WEP seed) can be specified as 64/128 bits, which is actually a 40/104-bit secret key with a 24-bit initialization vector. The IE-WL-VL-AP-BR-CL provides 4 entities of WEP key settings that can be selected to use with ***Key index***. The selected key setting specifies the key to be used as a *send-key* for encrypting traffic from the AP side to the wireless client side. All 4 WEP keys are used as *receive-keys* to decrypt traffic from the wireless client side to the AP side.

The WEP key can be presented in two ***Key types***, HEX and ASCII. Each ASCII character has 8 bits, so a 40-bit (or 64-bit) WEP key contains 5 characters, and a 104-bit (or 128-bit) key has 13 characters. In hex, each character uses 4 bits, so a 40-bit key has 10 hex characters, and a 128-bit key has 26 characters.

Authentication type

Setting	Description	Factory Default
Open	Data encryption is enabled, but without authentication	Open
Shared	Data encryption and authentication are both enabled.	

Key type

Setting	Description	Factory Default
HEX	Specifies WEP keys in hex-decimal number form	HEX
ASCII	Specifies WEP keys in ASCII form	

Key length

Setting	Description	Factory Default
64 bits	Uses 40-bit secret keys with 24-bit initialization vector	64 bits
128 bits	Uses 104-bit secret key with 24-bit initialization vector	

Key index

Setting	Description	Factory Default
1-4	Specifies which WEP key is used	Open

WEP key 1-4

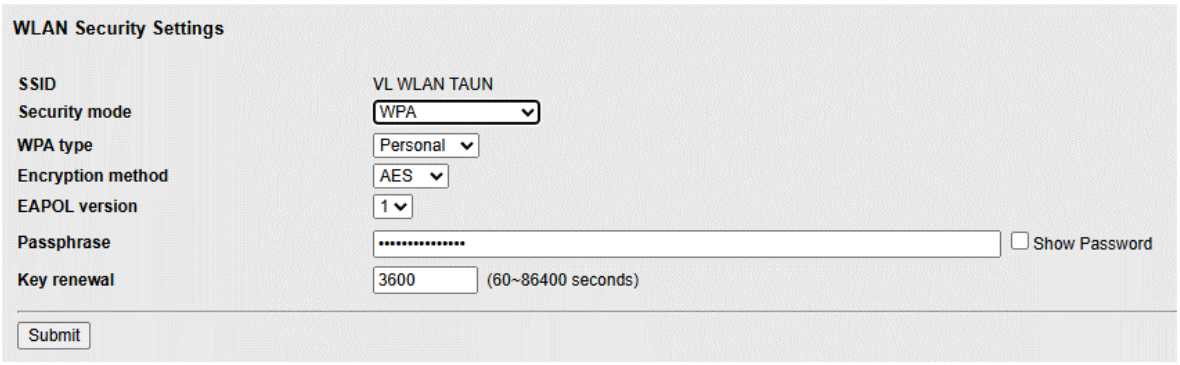
Setting	Description	Factory Default
ASCII type: 64 bits: 5 chars 128 bits: 13chars HEX type: 64 bits: 10 hex chars 128 bits: 26 hex chars	A string that can be used as a WEP seed for the RC4 encryption engine.	None

WPA/WPA2-Personal

WPA (Wi-Fi Protected Access) and WPA2 represent significant improvements over the WEP encryption method. WPA is a security standard based on 802.11i draft 3, while WPA2 is based on the fully ratified version of 802.11i. The initial vector is transmitted, encrypted, and enhanced with its 48 bits, twice as long as WEP. The key is regularly changed so that true session is secured.

Even though AES encryption is only included in the WPA2 standard, it is widely available in the WPA security mode of some wireless APs and clients as well. The IE-WL-VL-AP-BR-CL also supports AES algorithms in WPA and WPA2 for better compatibility.

Personal versions of WPA/WPA2, also known as WPA/WPA-PSK (*Pre-Shared Key*), provide a simple way of encrypting a wireless connection for high confidentiality. A ***Passphrase*** is used as a basis for encryption methods (or cipher types) in a WLAN connection. The passphrases should be complicated and as long as possible. There must be at least 8 ASCII characters in the Passphrase, and it could go up to 63. For security reasons, this passphrase should only be disclosed to users who need it, and it should be changed regularly.



WPA type

Setting	Description	Factory Default
Personal	Provides Pre-Shared Key-enabled WPA and WPA2	Personal
Enterprise	Provides enterprise-level security for WPA and WPA2	

Encryption method

Setting	Description	Factory Default
TKIP**	Temporal Key Integrity Protocol is enabled	AES
AES	Advance Encryption System is enabled	
Mixed*	Provides TKIP broadcast key and TKIP+AES unicast key for some legacy AP clients. This option is rarely used.	

*** This option is only available with 802.11a/b/g standard*

** This option is available for legacy mode in AP/Master only and does not support AES-enabled clients.*

Passphrase

Setting	Description	Factory Default
8 to 63 characters	Master key to generate keys for encryption and decryption. Check Show Password to display the password in clear text.	None

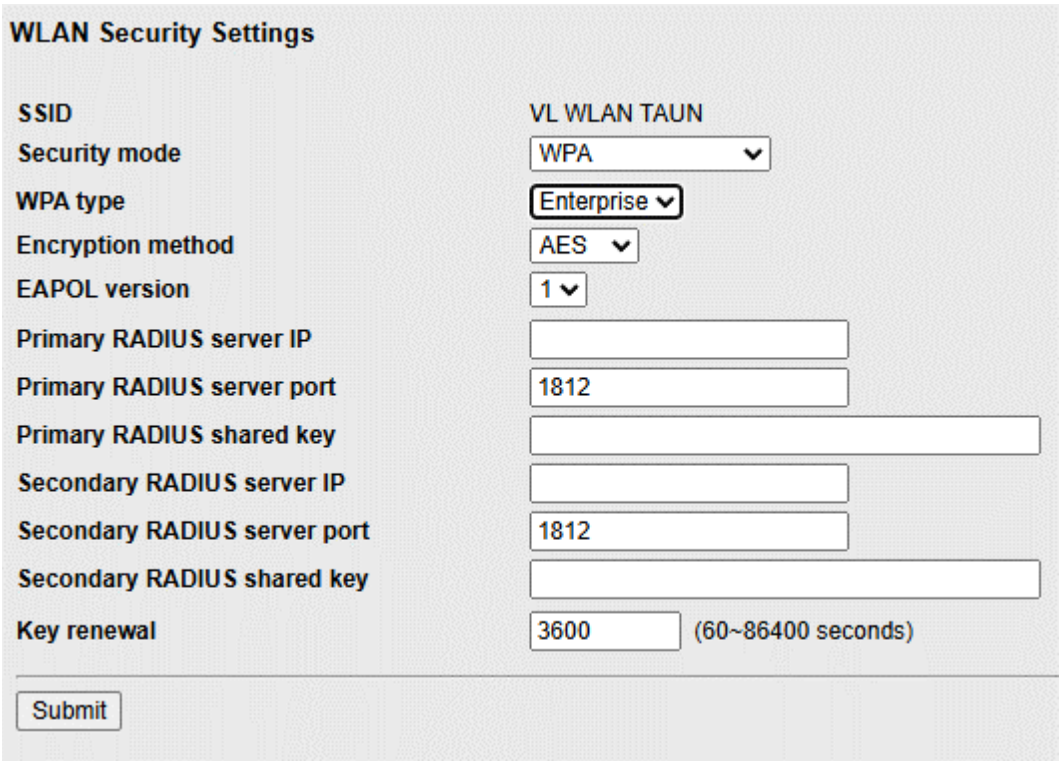
Key renewal (for AP/Master mode only)

Setting	Description	Factory Default
60 to 86400 seconds (1 minute to 1 day)	Specifies the time period of group key renewal	3600 (seconds)

NOTE The ***key renewal*** value dictates how often the wireless AP encryption keys should be changed. The security level is generally higher if you set the key renewal value to a shorter number, which forces the encryption keys to be changed more frequently. The default value is 3600 seconds (60 minutes). Longer time periods can be considered if the line is not very busy.

WPA/WPA2-Enterprise (for AP/Master mode)

By setting ***WPA type*** to **Enterprise**, you can use **EAP** (*Extensible Authentication Protocol*), a framework authentication protocol used by 802.1X to provide network authentication. In these Enterprise-level security modes, a back-end RADIUS (Remote Authentication Dial-In User Service) server is needed if IEEE 802.1X functionality is enabled in WPA /WPA2. The IEEE 802.1X protocol also offers the possibility of carrying out an efficient connection authentication on a large-scale network. It is not necessary to exchange keys or passphrases.



WPA type

Setting	Description	Factory Default
Personal	Provides Pre-Shared Key-enabled WPA and WPA2	Personal
Enterprise	Provides enterprise-level security for WPA and WPA2	

Encryption method

Setting	Description	Factory Default
TKIP**	Temporal Key Integrity Protocol is enabled	AES
AES	Advance Encryption System is enabled	
Mixed*	Provides TKIP broadcast key and TKIP+AES unicast key for some legacy AP clients. This option is rarely used.	

*** This option is only available with 802.11a/b/g standard*

** This option is available for legacy mode in AP/Master only and does not support AES-enabled clients.*

Primary/Secondary RADIUS server IP

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

Primary/Secondary RADIUS 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

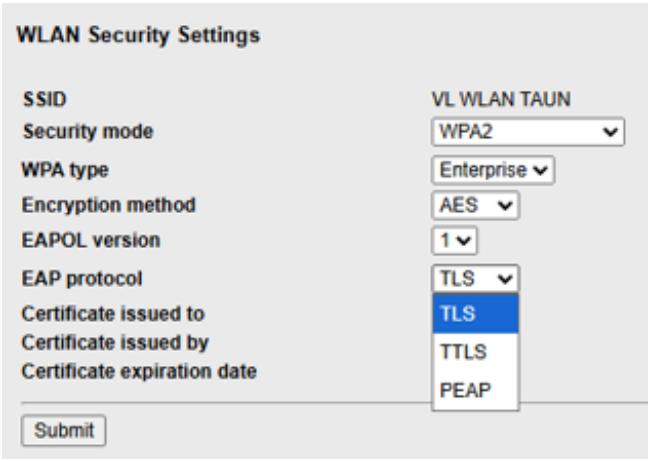
Max. of 31 characters	The secret key shared between AP and RADIUS server	None

Key renewal

Setting	Description	Factory Default
60 to 86400 seconds (1 minute to 1 year)	Specifies the time period of group key renewal	3600 (seconds)

WPA/WPA2-Enterprise (for Client/Client-Router/Slave mode)

When used as a client, the IE-WL-VL-AP-BR-CL can support three EAP methods (or ***EAP protocols***): **EAP-TLS**, **EAP-TTLS**, and **EAP-PEAP**, corresponding to WPA/WPA-Enterprise settings on the AP side.



Encryption method

Setting	Description	Factory Default
TKIP**	Temporal Key Integrity Protocol is enabled	TKIP
AES	Advance Encryption System is enabled	

***This option is only available with 802.11a/b/g standard.*

EAP protocol

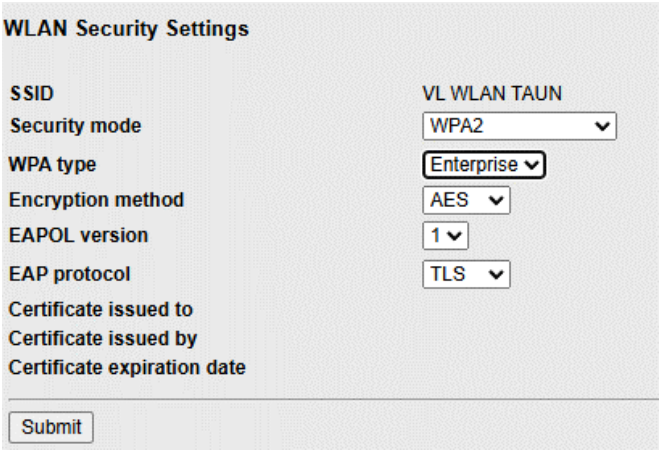
Setting	Description	Factory Default
TLS	Specifies Transport Layer Security protocol	TLS
TTLS	Specifies Tunneled Transport Layer Security	
PEAP	Specifies Protected Extensible Authentication Protocol, or Protected EAP	

Before choosing the EAP protocol for your WPA/WPA2-Enterpise settings on the client end, please contact the network administrator to make sure the system supports the protocol on the AP end. Detailed information on these three popular EAP protocols is presented in the following sections.

EAP-TLS

TLS is the standards-based successor to Secure Socket Layer (SSL). It can establish a trusted communication channel over a distrusted network. TLS provides mutual authentication through certificate exchange. EAP-TLS is also secure to use. You are required to submit a digital certificate to the authentication server for validation, but the authentication server must also supply a certificate.

You can use **Basic WLAN Setup** → **WLAN Certificate Settings** to import your WLAN certificate and enable EAP-TLS on the client end.



You can check the current certificate status in ***Current Status*** if it is available.

- **Certificate issued to:** Shows the certificate user
- **Certificate issued by**: Shows the certificate issuer
- **Certificate expiration date**: Indicates when the certificate has expired

EAP-TTLS

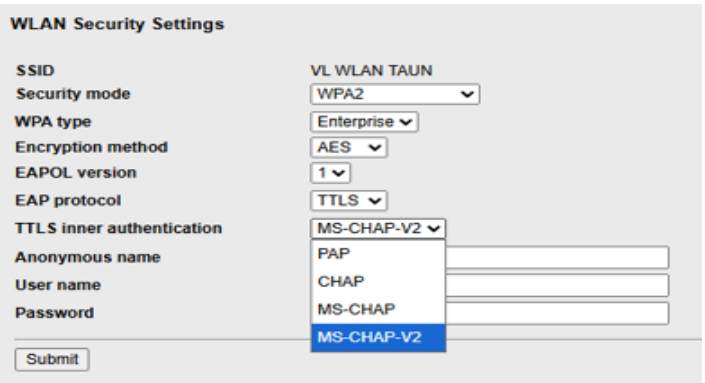
It is usually much easier to re-use existing authentication systems, such as a Windows domain or Active Directory, LDAP directory, or Kerberos realm, rather than creating a parallel authentication system. As a result, TTLS (Tunneled TLS) and PEAP (Protected EAP) are used to support the use of so-called "legacy authentication methods."

TTLS and PEAP work in a similar way. First, they establish a TLS tunnel (EAP-TLS for example), and validate whether the network is trustworthy with digital certificates on the authentication server. This step establishes a tunnel that protects the next step (or "inner" authentication), and consequently is sometimes referred to as "outer" authentication. The TLS tunnel is then used to encrypt an older authentication protocol that authenticates the user for the network.

As you can see, digital certificates are still needed for outer authentication in a simplified form. Only a small number of certificates are required, which can be generated by a small certificate authority. Certificate reduction makes TTLS and PEAP much more popular than EAP-TLS.

The IE-WL-VL-AP-BR-CL provides some non-cryptographic EAP methods, including **PAP**, **CHAP**, **MS-CHAP**, and **MS-CHAP-V2**. These EAP methods are not recommended for direct use on wireless networks. However, they may be useful as inner authentication methods with TTLS and PEAP.

Because the inner and outer authentications can use distinct user names in TTLS and PEAP, you can use an anonymous user name for the outer authentication, with the true user name only shown through the encrypted channel. Keep in mind that not all client software supports anonymous alteration. Confirm this with the network administrator before you enable identity hiding in TTLS and PEAP.



TTL inner authentication

Setting	Description	Factory Default
PAP	Password Authentication Protocol is used	MS-CHAP-V2
CHAP	Challenge Handshake Authentication Protocol is used	
MS-CHAP	Microsoft CHAP is used	
MS-CHAP-V2	Microsoft CHAP version 2 is used	

Anonymous

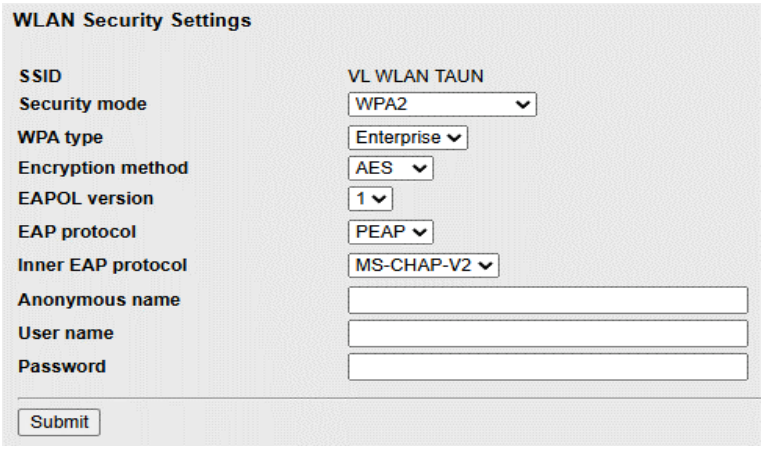
Setting	Description	Factory Default
Max. of 31 characters	A distinct name used for outer authentication	None

User name & Password

Setting	Description	Factory Default
	User name and password used in inner authentication	None

PEAP

There are a few differences in the TTLS and PEAP inner authentication procedures. TTLS uses the encrypted channel to exchange attribute-value pairs (AVPs), while PEAP uses the encrypted channel to start a second EAP exchange inside of the tunnel. The IE-WL-VL-AP-BR-CL provides **MS-CHAP-V2** merely as an EAP method for inner authentication.



Inner EAP protocol

Setting	Description	Factory Default
MS-CHAP-V2	Microsoft CHAP version 2 is used	MS-CHAP-V2

Anonymous

Setting	Description	Factory Default
Max. of 31 characters	A distinct name used for outer authentication	None

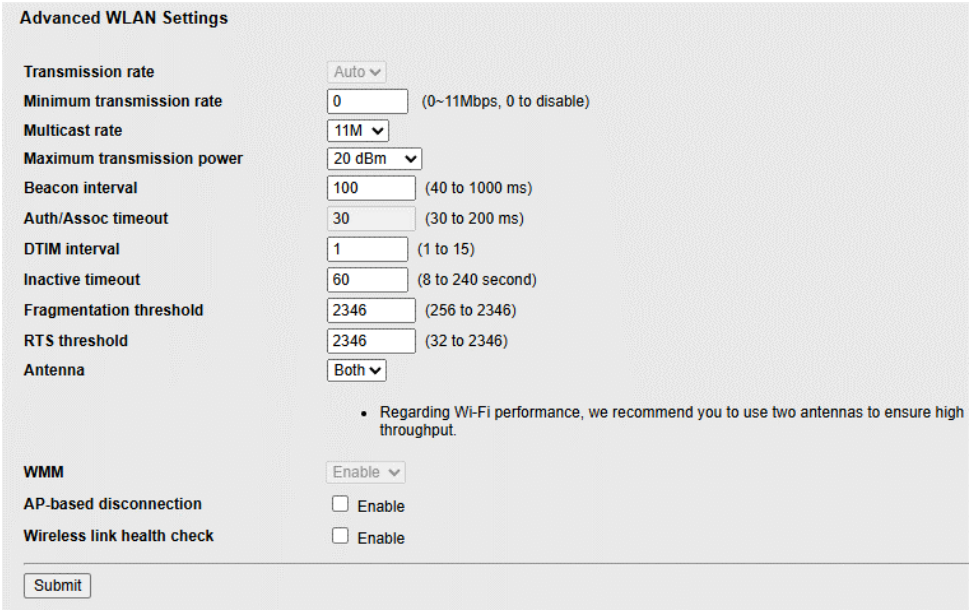
User name & Password

Setting	Description	Factory Default
	User name and password used in inner authentication	None

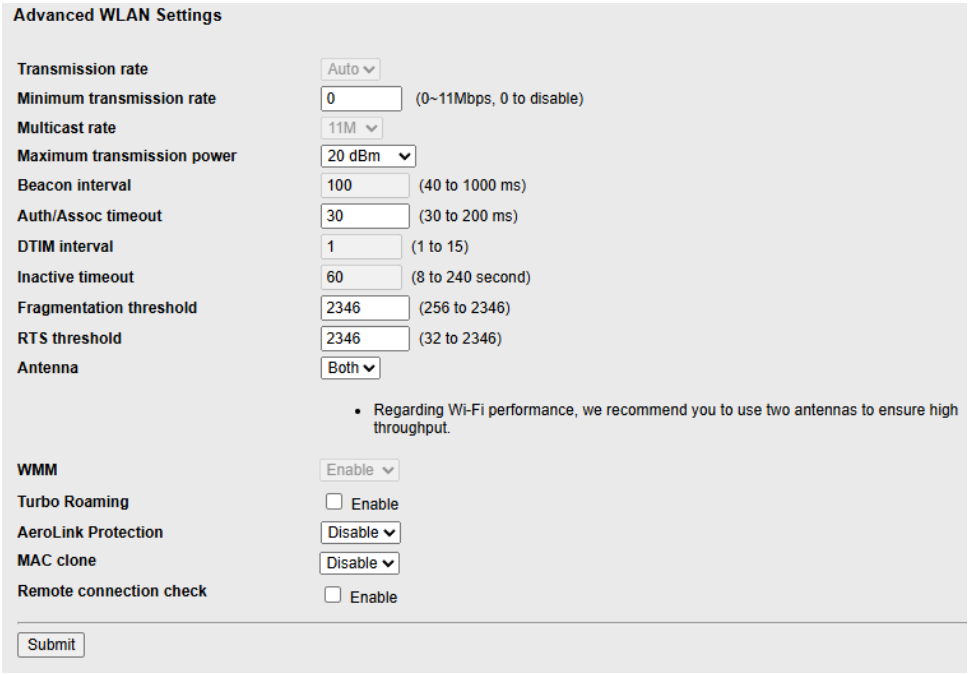
Advanced WLAN Settings

Additional wireless-related parameters are presented in this section to help you set up your wireless network in detail.

Settings when IE-WL-VL-AP-BR-CL is in **AP mode**.



Settings when IE-WL-VL-AP-BR-CL is in **Client mode**.



Transmission rate

Setting	Description	Factory Default
Auto	The IE-WL-VL-AP-BR-CL senses and adjusts the data rate automatically	Auto
Available rates	Users can manually select a target transmission data rate but does not support when RF type are G/N mixed, B/G/N mixed and A/N mixed.	

Minimum transmission rate

Setting	Description	Factory Default
0 to 11 Mbps (0 to disable)	By setting a minimum transmission rate, the IE-WL-VL-AP-BR-CL will avoid communicate with weak signal wireless links to maintain overall wireless performance and optimize the wireless frequency usage.	0 (Disable)

Multicast rate

Setting	Description	Factory Default
Available rates	You can set a fixed multicast rate for the transmission of broadcast and multicast packets on a per-radio basis. This parameter can be useful in an environment where multicast video streaming is occurring in the wireless medium, providing the wireless clients are capable of handling the configured rate	11M

Maximum Transmission power

Setting	Description	Factory Default
Available power	Users can manually select a target power to mask max output power. Because different transmission rates would have their own max output power, please reference product datasheet.	18 dBm (EU-model) 20 dBm (US-model)

Beacon interval (for AP/Master mode only)

Setting	Description	Factory Default
Beacon Interval (40 to 1000 ms)	Indicates the frequency interval of the beacon	100 (ms)

Auth/Assoc timeout (for Client/Client-router/Slave mode only)

Setting	Description	Factory Default
30 to 200 ms	Specifies how long before the authentication/association management times out.	30 ms

Inactive timeout (for AP mode only)

Setting	Description	Factory Default
8 to 240 seconds	Specifies how long before access point starts sending out client alive packets	60 seconds

DTIM interval (for AP/Master mode only)

Setting	Description	Factory Default
Data Beacon Rate (1 to 15)	Indicates how often the IE-WL-VL-AP-BR-CL sends out a Delivery Traffic Indication Message	1

Fragmentation threshold

Setting	Description	Factory Default
Fragment Length (256 to 2346)	Specifies the maximum size a data packet before splitting and creating another new packet	2346

RTS threshold

Setting	Description	Factory Default
RTS/CTS Threshold (32 to 2346)	Determines how large a packet can be before the Access Point coordinates transmission and reception to ensure efficient communication	2346

NOTE You can refer to the related glossaries in Appendix A for detailed information about the above-mentioned settings. By setting these parameters properly, you can better tune the performance of your wireless network.

Antenna

Setting	Description	Factory Default
A/B/Both	Specifies the output antenna port. Setting "Antenna" to Both allows 2x2 MIMO communication under 802.11n and 2T2R* communication in legacy 802.11a/b/g modes.	Both

*Note: 2T2R is different from 802.11n's multiple spatial data stream (2x2 MIMO), which doubles the throughput. 2T2R transmits/receives the same piece of data on both the antenna ports.

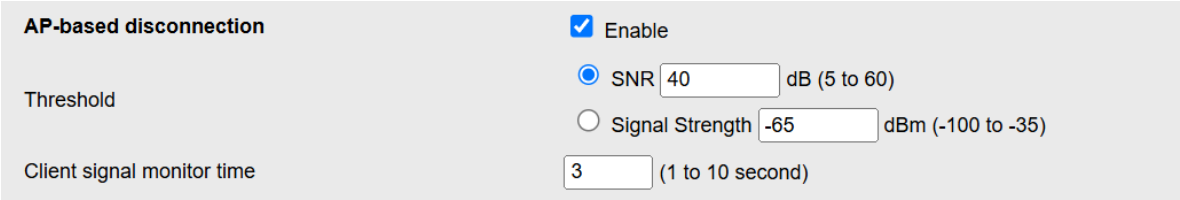
WMM

Setting	Description	Factory Default
Enable/Disable	WMM is a QoS standard for WLAN traffic. Voice and video data will be given priority bandwidth when enabled with WMM supported wireless clients. Note: WMM will always be enabled under 802.11n mode.	Enable

AP-based disconnection (for AP mode only)

Setting	Description	Factory Default
Enable/Disable	Enable or disable AP-based disconnection. This feature aims to make sure the client is always associated to the AP with the best SNR/signal strength. The associated client will be forced to connect to another AP when the SNR/Signal strength drops below the configured threshold during the specified monitoring period.	Disable

When AP-based disconnection is enabled, the following parameters will be shown:



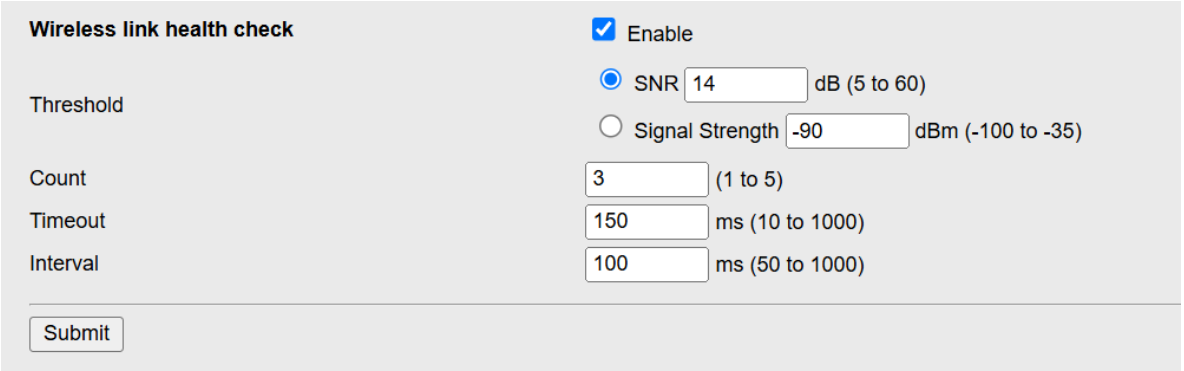
• **Threshold:** Specify either the signal-to-noise (SNR) or signal strength threshold to determine when clients will roam to another AP once the respective value drops below the set threshold.

• **Client-signal monitor time:** Specify the duration of the signal check (in seconds). The default is 3 seconds.

Wireless link health check (for AP mode only)

Setting	Description	Factory Default
Enable/ Disable	Enable or disable wireless link health check. When enabled, this feature will help detect and recover unstable connections.	Disable

When Wireless link health check is enabled, the following parameters will be shown:



• **Threshold:** Specify either the signal-to-noise (SNR) or signal strength threshold to determine when the AP will perform a health check on the wireless client connections.

• **Count:** Specify the number of ping packets that will be sent in a check.

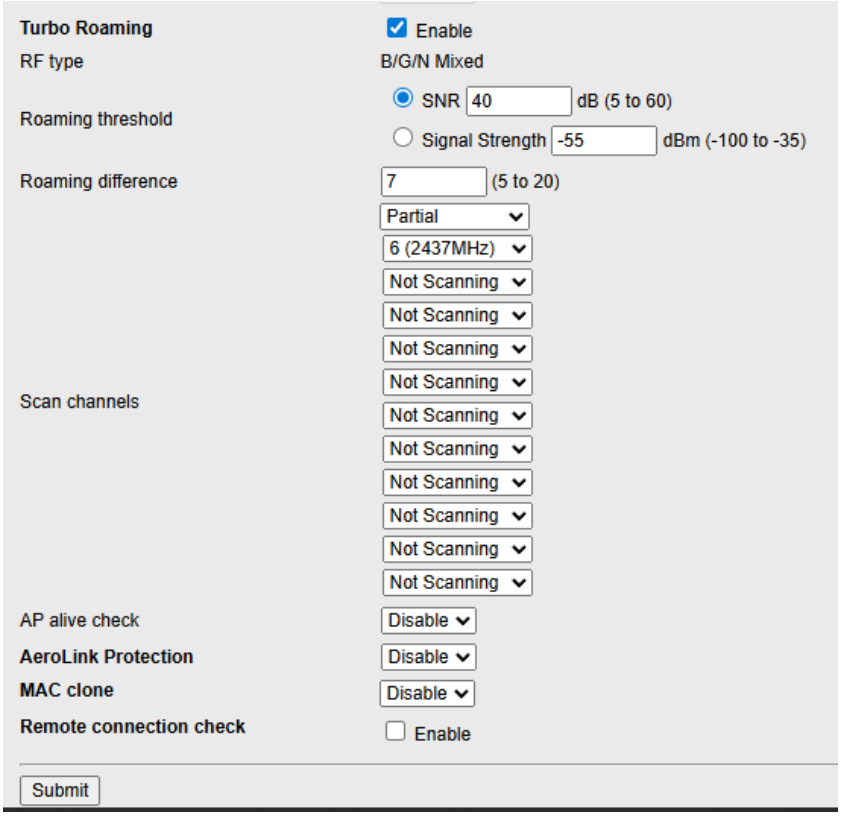
• **Timeout:** Specify the duration (in ms) of receiving no response before the check times out.

• **Interval:** Specify the ping interval (in ms).

Turbo Roaming (for Client mode only)

Setting	Description	Factory Default
Enable/ Disable	Weidmüller's Turbo Roaming can enable rapid handover when the IE-WL-VL-AP-BR-CL, as a client, roams among a group of APs.	Disable

When Turbo Roaming is enabled, the following parameters will be shown:



- **Roaming threshold:** Determines when to start looking for new AP candidates. If the current connection quality (SNR or Signal Strength) is lower than the specified threshold, the IE-WL-VL-AP-BR-CL will start background scanning and look for next-hop candidates.
  The following table lists the default threshold values for different RF types:

RF Type	RSSI	Signal Strength
Legacy 2.4G	30	-65
Legacy 5G	30	-65
N-mode 2.4G	40	-55
N-mode 5G	40	-50

NOTE While the IE-WL-VL-AP-BR-CL is scanning the background, its wireless performance will be reduced by 1/3 of its normal performance.

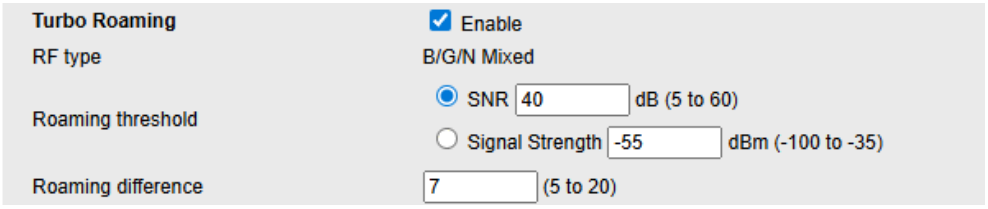
- **Roaming difference:** Determines if roaming should be executed. After background scan has been triggered, the roaming will only occur if the AP candidate(s) provide a better (Roaming difference) connection quality than the current connection. If multiple access points fulfill the criteria, the IE-WL-VL-AP-BR-CL will pick the best one to roam to.
- **Scan channels:** This function is used to check the usable channels for roaming. Select all to check all channels or select Partial to check up to 11 pre-defined communication and roaming channels.

NOTE The more channels are configured, the longer the scan will take to complete. This may increase the risk of disconnection if applied to fast moving clients. In high-density client environments, it may also cause performance drops.

- **AP alive check:** Allows the turbo roaming function to recover the network connection faster when an AP has a sudden disconnection (such as losing power).

NOTE Enabling this feature causes the IE-WL-VL-AP-BR-CL to send out alive check packets every 10 ms when there is no traffic; the high transmission frequency of small alive check packets could potentially affect your other wireless communications that use the same channel, so only enable this feature when you have full control of the designated radio channel.

- **AP candidate threshold:** After the "AP alive check" declares the current access point is no longer available, the surrounding access points must have good enough connection qualities (SNR/Signal Strength) in order to qualify as AP candidates for client association.



NOTE The Turbo Roaming recovery time (<150 ms) listed in the product documentation is an average of test results documented, in optimized conditions, across APs configured with interference-free 20-MHz RF channels, WPA2-PSK security, and default Turbo Roaming parameters. The clients are configured with 3-channel roaming at 100 Kbps traffic load. However, a combination of factors affect the AP handover recovery time of a roaming client, including but not limited to the following:

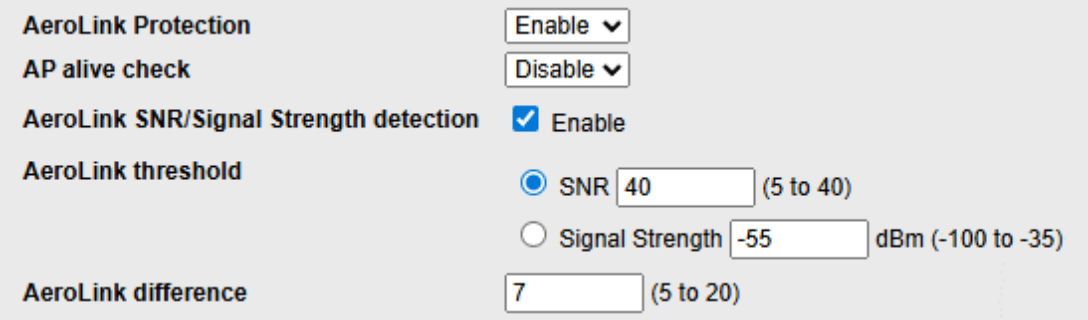
• On-site RF interference
• Velocity of the moving client devices
• Application traffic throughput
• Turbo Roaming parameters configured. i.e., Roaming threshold, Roaming difference, and AP candidate threshold.

Therefore, a site survey prior to device deployment is recommended to evaluate the ideal parameter settings on both clients and APs so that you can come up with an optimal deployment plan for your applications.

AeroLink Protection (for Client/Slave mode only)

Setting	Description	Factory Default
Enable/Disable	Enable AeroLink Protection to allow wireless clients on the same LAN network to automatically negotiate with each other and form a redundant wireless communication, for more details, see Status → AeroLink Protection Status	Disable

When **AeroLink Protection** is enabled, the following parameter will be shown:



• **AP alive check:** Select **Enable** to allow AeroLink Protection to react faster to WLAN disconnections
• **AeroLink SNR/Signal Strength detection:** Allows AeroLink to react based on SNR/Signal Strength threshold values
• **AeroLink threshold:** Determines when to start looking for redundant wireless devices. If the current connection quality (SNR or Signal Strength) is lower than the specified threshold, clients will start looking for other suitable wireless devices.
• **AeroLink difference:** Determines when clients should switch to another communication path. After looking for redundant wireless devices has been triggered, switching to redundant wireless devices will only occur if the candidate provides a better (AeroLink difference) connection quality than the current connection.

NOTE Enabling the AeroLink feature causes the IE-WL-VL-AP-BR-CL to send out alive check packets every 10 ms when there is no traffic; the high transmission frequency of small alive check packets could potentially affect your other wireless communications that use the same channel, so only enable this feature when you have full control of the designated radio channel.

MAC clone (for Client mode only)

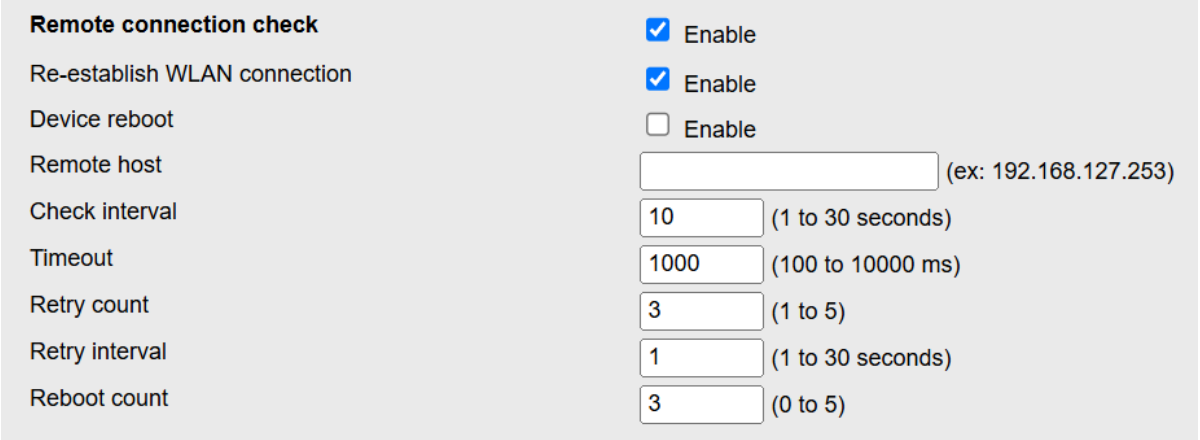
Setting	Description	Factory Default
MAC clone	Enabling this feature allows the IE-WL-VL-AP-BR-CL client to copy the MAC address of the equipment connected to the LAN. This overcomes the limitation of the IP-Bridged behavior in a MAC-sensitive network (MAC-based communication or MAC-authenticated network).	Disable
MAC clone method	• Auto: The client copies the MAC address of the device connected to the LAN if only one device is connected. • Static: The client shares the assigned MAC address with multiple devices connected to the LAN. This allows for multiple devices to connect to the IE-WL-VL-AP-BR-CL via the LAN and only one of them needs to be assigned a MAC address.	Auto
MAC clone static address	Specifies the static MAC address that the connected IE-WL-VL-AP-BR-CL devices should copy.	-

NOTE Auto MAC Cloning cannot be used together with Link Fault Pass Through.

Remote connection check (for Client/Client-router/Slave mode only)

Setting	Description	Factory Default
Enable/Disable	Enable remote connection check to automatically check the status of the connection and re-establish the connection when a connection failure occurs	Disable

When Remote connection check is enabled, the following parameters will be shown:



• **Re-establish WLAN connection:** Re-establish the WLAN connection in the event of a connection failure.

• **Device reboot:** Reboot the IE-WL-VL-AP-BR-CL in the event of a connection failure.

NOTE If **Re-establish WLAN connection** and **Device reboot** are both enabled, the IE-WL-VL-AP-BR-CL will attempt to restore the WLAN connection first. If re-establishing the WLAN connection fails, the IE-WL-VL-AP-BR-CL will reboot.

Remote host: Enter the IP address of a remote host to ping. This is used for the WLAN connection alive and packet-level connection checks.

• **Check interval:** Specify the time interval when the IE-WL-VL-AP-BR-CL checks the connection. The range is between 1 to 30 seconds, the default is every 10 seconds.

• **Timeout:** Specify the duration the IE-WL-VL-AP-BR-CL must wait before terminating the connection. The range is between 100 to 10,000 ms, the default is 1000 ms.

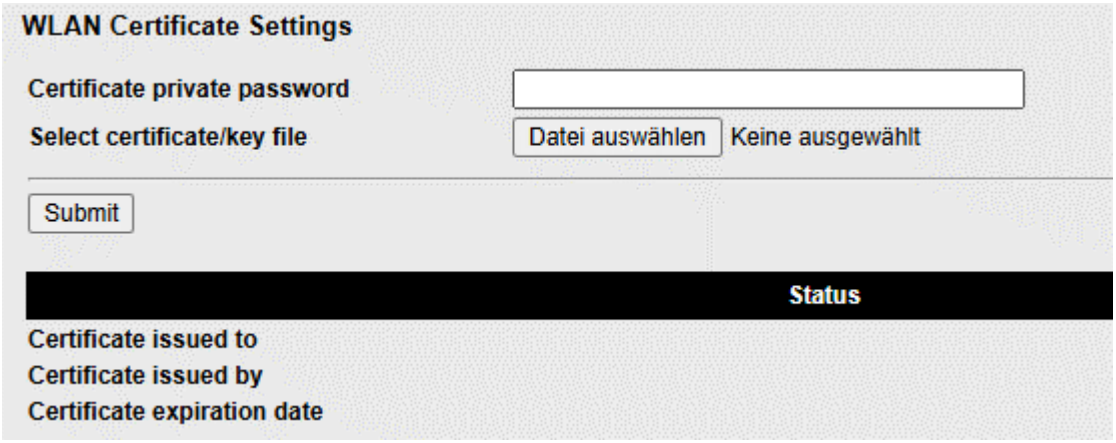
• **Retry count:** Specify the number of times the IE-WL-VL-AP-BR-CL the will check the connection status. If the connection fails more than the specified number of tries, the device will attempt to recover the WLAN connection. The range is between 1 to 5, the default is 3 retries.

• **Retry Interval:** Specify the time interval in between each retry. The range is between 1 to 30 seconds, the default is 1 second.

• **Reboot count:** If **Device reboot** is enabled, specify the number of times the IE-WL-VL-AP-BR-CL will reboot after failing to re-establish the connection.

WLAN Certificate Settings (For EAP-TLS in Client/Slave Mode Only)

When EAP-TLS is used, a WLAN Certificate will be required at the client end to support WPA/WPA2-Enterprise. The IE-WL-VL-AP-BR-CL can support the **PKCS #12**, also known as *Personal Information Exchange Syntax Standard*, certificate formats that define file formats commonly used to store private keys with accompanying public key certificates, protected with a password-based symmetric key.



Current status displays information for the current WLAN certificate, which has been imported into the IE-WL-VL-AP-BR-CL. Nothing will be shown if a certificate is not available.

Certificate issued to: Shows the certificate user

Certificate issued by: Shows the certificate issuer

Certificate expiration date: Indicates when the certificate has expired

You can import a new WLAN certificate in ***Import WLAN Certificate*** by following these steps, in order:

1. Input the corresponding password (or key) in the **Certificate private password** field and then click **Submit** to set the password.
2. The password will be displayed in the Certificate private password field. Click on the **Browse** button in ***Select certificate/key file*** and select the certificate file.
3. Click **Upload Certificate File** to import the certificate file. If the import succeeds, you can see the information uploaded in ***Current Certificate***. If it fails, you may need to return to step 1 to set the password correctly and then import the certificate file again.

NOTE The WLAN certificate will remain after the IE-WL-VL-AP-BR-CL reboots. Even though it is expired, it can still be seen on the ***Current Certificate***.

Advanced Setup

Several advanced functions are available to increase the functionality of your IE-WL-VL-AP-BR-CL and wireless network system. A VLAN is a collection of clients and hosts grouped together as if they were connected to the broadcast domains in a Layer-2 network. The DHCP server helps you deploy wireless clients efficiently. Packet filters provide security mechanisms, such as firewalls, in different network layers. Moreover, the IE-WL-VL-AP-BR-CL can support STP/RSTP protocol to increase reliability across the entire network, and SNMP support can make network management easier.

Using Virtual LAN

Setting up Virtual LANs (VLANs) on your IE-WL-VL-AP-BR-CL increases the efficiency of your network by dividing the LAN into logical segments, as opposed to physical segments. In general, VLANs are easier to manage.

The Virtual LAN (VLAN) Concept

What is a VLAN?

A virtual LAN, commonly known as a VLAN, is a group of hosts with a common set of requirements that communicate as if they were attached to the same broadcast domain, regardless of their physical location. A VLAN has the same attributes as a physical LAN, but it allows for end stations to be grouped together even if they are not located on the same network switch. Network reconfiguration can be done through software instead of physically relocating devices.

VLANs now extend as far as the reach of the access point signal. Clients can be segmented into wireless sub-networks via SSID and VLAN assignment. A Client can access the network by connecting to an AP configured to support its assigned SSID/VLAN.

Benefits of VLANs

VLANs are used to conveniently, efficiently, and easily manage your network in the following ways:

- Manage adds, moves, and changes from a single point of contact
- Define and monitor groups
- Reduce broadcast and multicast traffic to unnecessary destinations
- Improve network performance and reduce latency
- Increase security
- Secure network restricts members to resources on their own VLAN
- Clients roam without compromising security

VLAN Workgroups and Traffic Management

The AP assigns clients to a VLAN based on a Network Name (SSID). The AP can support up to 9 SSIDs per radio interface, with a unique VLAN configurable per SSID.

The AP matches packets transmitted or received to a network name with the associated VLAN. Traffic received by a VLAN is only sent on the wireless interface associated with that same VLAN. This eliminates unnecessary traffic on the wireless LAN, conserving bandwidth and maximizing throughput.

In addition to enhancing wireless traffic management, the VLAN-capable AP supports easy assignment of wireless users to workgroups. In a typical scenario, each user VLAN represents a department workgroup; for example, one VLAN could be used for a marketing department and the other for a human resource department.

In this scenario, the AP would assign every packet it accepted to a VLAN. Each packet would then be identified as marketing or human resource, depending on which wireless client received it. The AP would insert VLAN headers or “tags” with identifiers into the packets transmitted on the wired backbone to a network switch.

Finally, the switch would be configured to route packets from the marketing department to the appropriate corporate resources such as printers and servers. Packets from the human resource department could be

restricted to a gateway that allowed access to only the Internet. A member of the human resource department could send and receive e-mail and access the Internet, but would be prevented from accessing servers or hosts on the local corporate network.

Configuring Virtual LAN

VLAN Settings

To configure the IE-WL-VL-AP-BR-CL's VLAN, use the VLAN Setting page to configure the ports.

Management VLAN ID

Setting	Description	Factory Default
VLAN ID ranges from 1 to 4094	Set the management VLAN of this IE-WL-VL-AP-BR-CL.	1

Port

Type	Description	Trunk Port
LAN	This port is the LAN port on the IE-WL-VL-AP-BR-CL.	Yes
WLAN	This is a wireless port for the specific SSID. This field will refer to the SSID that you have created. If more SSIDs have been created, new rows will be added.	

Port PVID

Setting	Description	Factory Default
VLAN ID ranging from 1 to 4094	Set the port's VLAN ID for devices that connect to the port. The port can be a LAN port or WLAN ports.	1

VLAN Tagged

Setting	Description	Factory Default
A comma-separated list of VLAN IDs. Each of the VLAN IDs range from 1 to 4094.	Specify which VLANs can communicate with this specific VLAN.	(Empty)

NOTE The VLAN feature can allow wireless clients to manage the AP. If the VLAN Management ID matches a VLAN ID, then those wireless clients who are members of that VLAN will have AP management access.

CAUTION: Once a VLAN Management ID is configured and is equivalent to one of the VLAN IDs on the AP, all members of that User VLAN will have management access to the AP. Be careful to restrict VLAN membership to those with legitimate access to the AP.

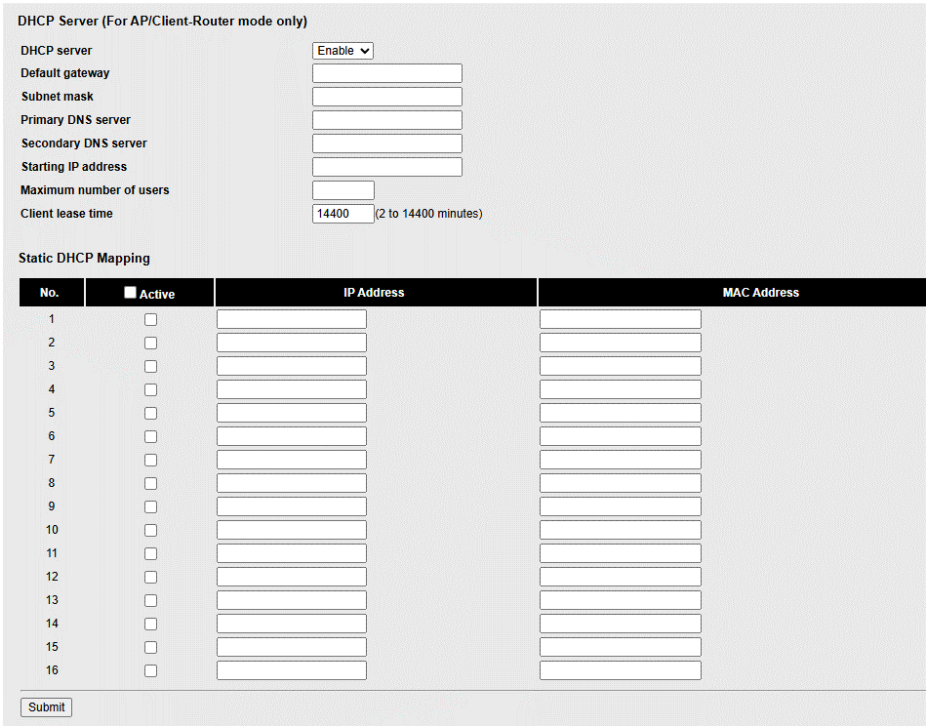
DHCP Server (for AP/Client-Router mode only)

DHCP (Dynamic Host Configuration Protocol) is a networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time, instead of assigning permanent IP addresses.

The IE-WL-VL-AP-BR-CL can act as a simplified DHCP server and easily assign IP addresses to your DHCP clients by responding to the DHCP requests from the client ends. The IP-related parameters you set on this page will also be sent to the client.

You can also assign a static IP address to a specific client by entering its MAC address. IE-WL-VL-AP-BR-CL provides a **Static DHCP mapping** list with up to 16 entities. Be reminded to check the **Active** check box for each entity to activate the setting.

You can check the IP assignment status under **Status → DHCP Client List**.



DHCP server

Setting	Description	Factory Default
Enable	Enables IE-WL-VL-AP-BR-CL as a DHCP server	Disable
Disable	Disable DHCP server function	

Default gateway

Setting	Description	Factory Default
IP address of a default gateway	The IP address of the router that connects to an outside network	None

Subnet mask

Setting	Description	Factory Default
Subnet mask	Identifies the type of sub-network (e.g., 255.255.0.0 for a Class B network, or 255.255.255.0 for a Class C network)	None

Primary/ Secondary DNS server

Setting	Description	Factory Default
IP address of 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 use URL as well. The Secondary DNS server will be used if the Primary DNS server fails to connect.	None

Start IP address

Setting	Description	Factory Default
IP address	Indicates the IP address which IE-WL-VL-AP-BR-CL can start assigning	None

Maximum number of users

Setting	Description	Factory Default
1 to 128	Specifies how many IP address can be assigned continuously	None

Client lease time

Setting	Description	Factory Default
2 to 14400 minutes	The lease time for which an IP address is assigned. The IP address may go expired after the lease time is reached.	14400 minutes (10 days)

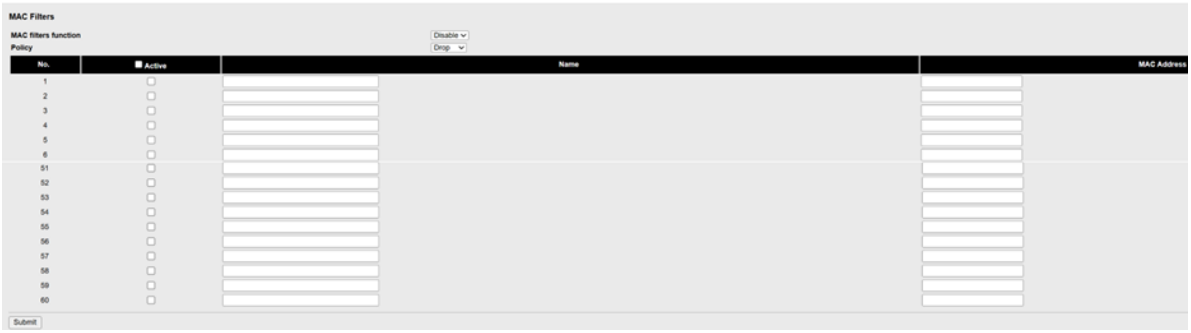
Packet Filters

The IE-WL-VL-AP-BR-CL includes various filters for IP-based LAN-to-WAN packets, as well as WLAN-to-WLAN traffic between different SSIDs. These filters can be configured as a firewall policy to enhance network security.

NOTE The Packet Filter function does not apply to WLAN-to-WLAN traffic within the same SSID.

MAC Filters

The IE-WL-VL-AP-BR-CL's MAC filter is a policy-based filter that can allow or filter out IP-based packets with specified MAC addresses. The IE-WL-VL-AP-BR-CL provides 60 entities for setting MAC addresses in your filtering policy. Remember to check the **Active** check box for each entity to activate the setting.



MAC filters

Setting	Description	Factory Default
Enable	Enables MAC filters	Disable
Disable	Disables MAC filters	

Policy

Setting	Description	Factory Default
Accept	Only the packets fitting the entities on list can be allowed.	Drop
Drop	Any packet fitting the entities on list will be denied.	

ATTENTION

Be careful when you enable the filter function:
Drop + "no entity on list is activated" = all packets are **allowed**
Accept + "no entity on list is activated" = all packets are **denied**

IP Protocol Filters

The IE-WL-VL-AP-BR-CL's IP protocol filter is a policy-based filter that can allow or filter out IP-based packets with specified IP protocol and source/destination IP addresses.

The IE-WL-VL-AP-BR-CL provides 60 entities for setting IP protocol and source/destination IP addresses in your filtering policy. Four IP protocols are available: **All**, **ICMP**, **TCP**, and **UDP**. You must specify either the Source IP or the Destination IP. By combining IP addresses and netmasks, you can specify a single IP address or a range of IP addresses to accept or drop. For example, "IP address 192.168.1.1 and netmask 255.255.255.255" refers to the sole IP address 192.168.1.1. "IP address 192.168.1.1 and netmask 255.255.255.0" refers to the range of IP addresses from 192.168.1.1 to 192.168.1.255. Remember to check the **Active** check box for each entity to activate the setting.

IP protocol filters

Setting	Description	Factory Default
Enable	Enables IP protocol filters	Disable
Disable	Disables IP protocol filters	

Policy

Setting	Description	Factory Default
Accept	Only the packets fitting the entities on the list can be allowed	Drop
Drop	Any packet fitting the entities on the list will be denied	

ATTENTION

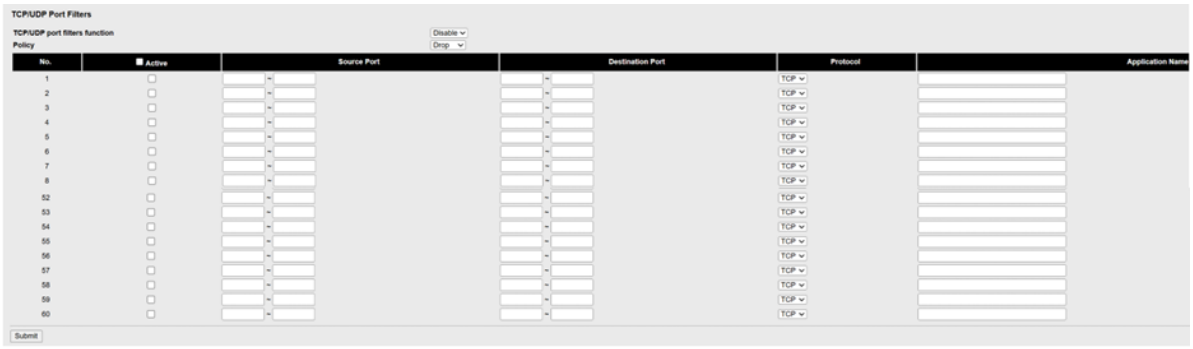
Be careful when you enable the filter function:
Drop + "no entity on list is activated" = all packets are **allowed.**
Accept + "no entity on list is activated" = all packets are **denied.**

TCP/UDP Port Filters

The IE-WL-VL-AP-BR-CL's TCP/UDP port filter is a policy-based filter that can allow or filter out TCP/UDP-based packets with a specified source or destination port.

The IE-WL-VL-AP-BR-CL provides 60 entities for setting the range of source/destination ports of a specific protocol. In addition to selecting TCP or UDP protocol, you can set either the source port, destination port, or both. The end port can be left empty if only a single port is specified. Of course, the end port cannot be larger than the start port.

The **Application name** is a text string that describes the corresponding entity with up to 31 characters. Remember to check the **Active** check box for each entity to activate the setting.



TCP/UDP port filters

Setting	Description	Factory Default
Enable	Enables TCP/UDP port filters	Disable
Disable	Disables TCP/UDP port filters	

Policy

Setting	Description	Factory Default
Accept	Only the packets fitting the entities on list can be allowed.	Drop
Drop	Any packet fitting the entities on list will be denied.	

ATTENTION

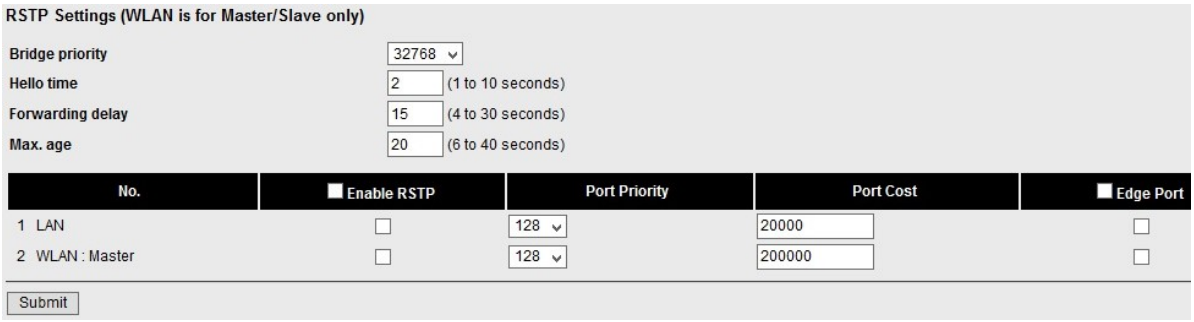
Be careful when you enable the filter function:
Drop + "no entity on list is activated" = all packets are **allowed**
Accept + "no entity on list is activated" = all packets are **denied**

RSTP Settings (Master or Slave Mode only)

The IE-WL-VL-AP-BR-CL supports IEEE 802.1D for Spanning Tree Protocol (STP) and IEEE 802.1w for Rapid STP standards. In addition to eliminating unexpected path looping, STP/RSTP can provide a backup path recovery if a wired/ wireless path fails accidentally. The reliability and availability can increase because this fail-over function.

IE-WL-VL-AP-BR-CL's STP/RSTP feature is disabled by default. To be completely effective, you must enable RSTP/STP on every IE-WL-VL-AP-BR-CL connected to your network. If IE-WL-VL-AP-BR-CL plays a **Slave** role, which is connected to a device (PLC, RTU, etc.) as opposed to network switch equipment, it is not necessary to enable STP/RSTP. The reason is that it will cause unnecessary negotiation. IE-WL-VL-AP-BR-CLs support STP/RSTP in **Master or Slave mode** only.

The following figures indicate which Spanning Tree Protocol parameters can be configured. A more detailed explanation of each parameter is given below the figure.



NOTE The recovery time for STP/RSTP is around 25 to 35 seconds.

RSTP status

This field will appear only when selected to operate STP/RSTP. It indicates whether this IE-WL-VL-AP-BR-CL is the Root of the Spanning Tree (the root is determined automatically) or not.

Bridge priority

Setting	Description	Factory Default
Numerical value selected by user	You can increase the bridge priority by selecting a lower number. A higher bridge priority brings a greater chance of being established as the root of the Spanning Tree topology.	32768

Hello time

Setting	Description	Factory Default
Numerical value input by user (1 – 10 seconds)	The root of the Spanning Tree topology periodically sends out a "hello" message to other devices on the network to check if the topology is healthy. Hello time indicates how often the root sends hello messages.	2 (seconds)

Forwarding delay

Setting	Description	Factory Default
Numerical value input by user (4 to 30 seconds)	The amount of time this device waits before checking to see if it should change to a different topology.	15 (seconds)

Max. age

Setting	Description	Factory Default
Numerical value input by user (6 to 40 seconds)	As a non-root role, if the device has not received a hello message from the root longer than Max. age, it will reconfigure itself as a root. Once two or more devices on the network are recognized as a root, the devices will renegotiate to set up a new Spanning Tree topology.	20 (seconds)

Enable RSTP

Setting	Description	Factory Default
Enable/Disable	Enables or disables the port as a node on the Spanning Tree topology.	Disable (unchecked)

Port priority

Setting	Description	Factory Default
Numerical value selected by user	Increase this port's priority as a node on the Spanning Tree topology by inputting a lower number.	128

Port cost

Setting	Description	Factory Default
Enable/Disable	Input a higher cost to indicate that this port is less suitable as a node for the Spanning Tree topology	WLAN Interface: 200000 LAN Interface: 20000

Edge port

Setting	Description	Factory Default
Checked/Unchecked	Sets a port, which no BPDU expectedly goes through, as an edge port	Unchecked, except AP port

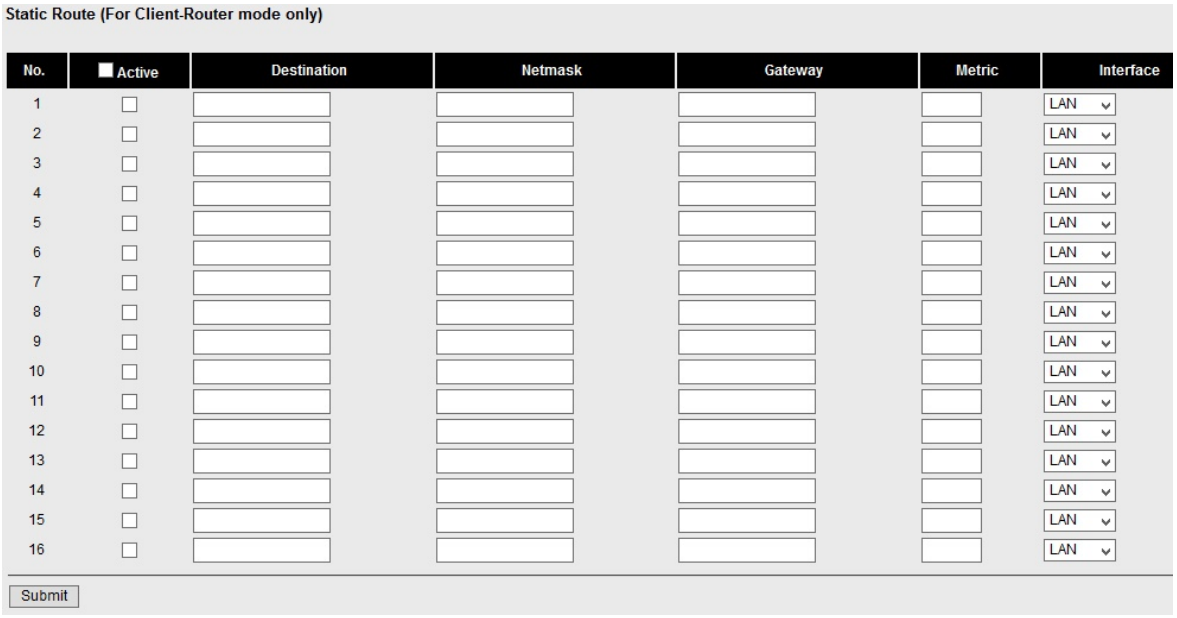
NOTE We recommend you set an edge port for the port, which is connected to a non-STP/RSTP sub-network or an end device (PLC, RTU, etc.) as opposed to network equipment. This can prevent unnecessary waiting and negotiation of STP/RSTP protocol, and accelerate system initialization. When an edge port receives BPDUs, it can still function as an STP/RSTP port and start negotiation.
Setting an edge port is different from disabling STP/RSTP on a port. If you disable STP/RSTP, a port will not deal with STP/RSTP BPDUs at all.

Port Status

Port Status indicates the current Spanning Tree status of this port. **Forwarding** for normal transmission, or **Blocking** to block transmission.

Static Route (For Client-Router Mode only)

The Static Route page is used to configure the IE-WL-VL-AP-BR-CL's static routing table.



Active

Click the checkbox to enable Static Routing.

Destination

Specifies the destination IP address.

Netmask

Specifies the subnet mask for this IP address.

Gateway

Specifies the IP address of the router that connects the LAN to an outside network.

Metric

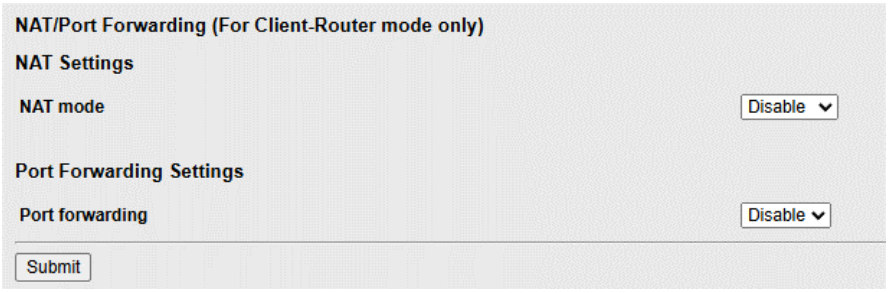
Specifies a "cost" for accessing the neighboring network.

Interface

Specifies the designated network interface for this routing rule.

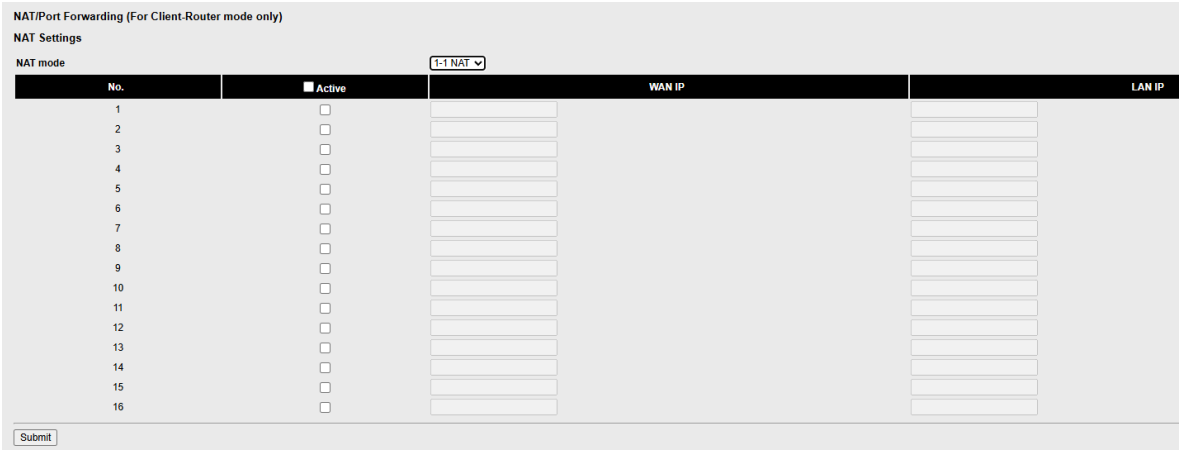
NAT Settings/Port Forwarding (For Client-Router mode only)

Network Address Translation (NAT) and Port Forwarding is supported in the IE-WL-VL-AP-BR-CL to facilitate the Client-Router operation mode. This feature translates the outgoing communication from private IPs to external IPs (WAN IP).



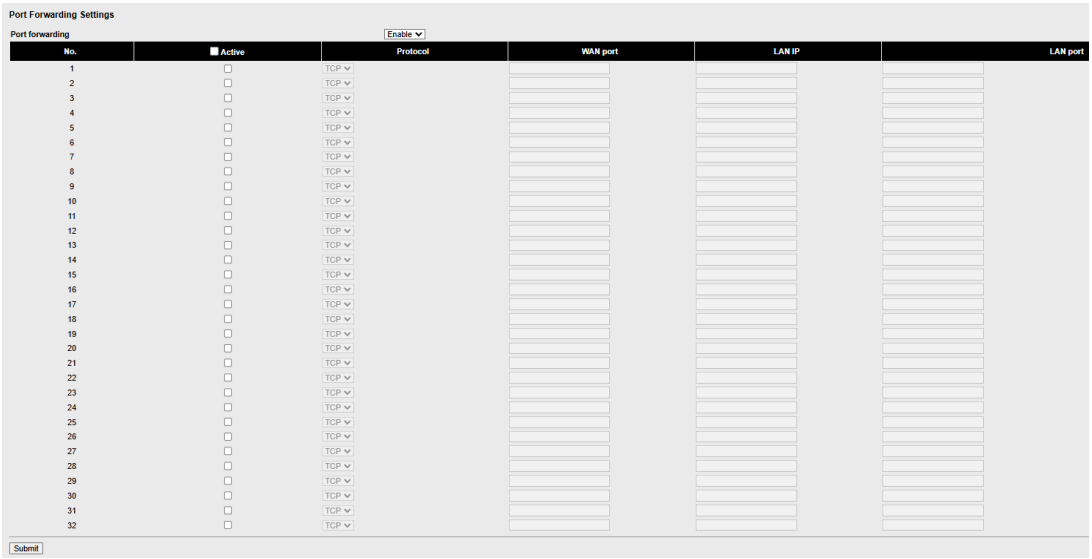
Setting	Description	Factory Default
NAT mode	Enable (N-1 NAT or 1-1 NAT) or disable the NAT mode.	Disable
Port Forwarding	Enable or disable the port forwarding function	Disable

NAT



Setting	Description
Active	Click the checkbox to enable 1-1 NAT
WAN IP	Specifies the "forward to" WAN IP
LAN IP	Specifies the "forward to" LAN IP

Port Forwarding



Setting	Description
Active	Click the checkbox to enable Port Forwarding rule(s).
Protocol	Specifies the communication protocol.
WAN Port	Specifies the external port to be forwarded to
LAN IP	Specifies the "forward to" LAN IP
LAN Port	Specifies the "forward to" LAN Port

In order to allow external devices to initiate the communication, Port Forwarding is used to specify a static map between external ports (WAN Port) and internal IP/port combos (LAN IP/LAN Port), so as to allow external devices to initiate connection with this device.

SNMP Agent

The IE-WL-VL-AP-BR-CL 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.

SNMP security modes and security levels supported by the IE-WL-VL-AP-BR-CL 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

Protocol Version	Setting on UI web page	Authentication Type	Data Encryption	Method
	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

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

Remote management

Setting	Description	Factory Default
Enable	Allow remote management via SNMP agent	Disable
Disable	Disallow remote management via 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 accesses 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 switch.	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.	

Authentication username: Determines one account setting among 8 possible accounts as the SNMP authentication account setting when the authentication type is MD5/SHA.

Admin private key (for V1, V2, 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

A data encryption key is the minimum requirement for data encryption (maximum of 63 characters)

Private MIB Information Device Object ID

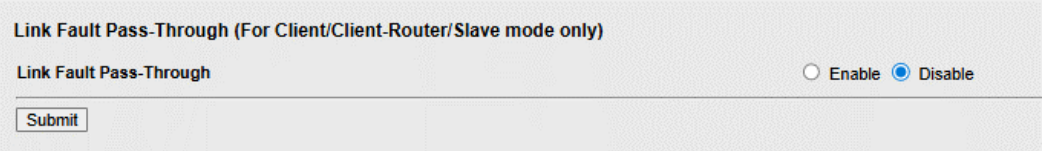
Also known as ***OID***. This is the IE-WL-VL-AP-BR-CL's enterprise value. It is fixed.

Link Fault Pass-Through (for Client/Slave mode only)

This function means if Ethernet port is link down, wireless connection will be forced to disconnect. Once Ethernet link is recovered, IE-WL-VL-AP-BR-CL will try to connect to AP.

If wireless is disconnected, IE-WL-VL-AP-BR-CL restarts auto-negotiation on Ethernet port but always stays in the link failure state. Once the wireless connection is recovered, device will try to recover the Ethernet link.

System log will indicate the link fault pass through events in addition to the original link up/down events.



Link Fault Pass-Through

Setting	Description	Factory Default
Enable	Enables Link Fault Pass-Through	Disable
Disable	Disables Link Fault Pass-Through	

NOTE Auto MAC Cloning cannot be used together with Link Fault Pass Through.

Gratuitous ARP (for Client/Client-router mode only)

Gratuitous ARP is a broadcast packet that the client (the device) sends to all nodes to share or update the latest IP/MAC mapping table to prevent nodes from dropping packets.

Gratuitous ARP enable

Setting	Description	Factory Default
Enable/Disable	Enable or disable Gratuitous ARP functionality. Enabling this function helps detect and prevent unstable connections.	Disable

When enabled, the function behaves differently depending on the operation mode of the device. Refer to the following descriptions::

• **Client** mode: You can enter the IP/MAC address of the legacy device connected to the Ethernet port of the IE-WL-BL-AP-CL. The IE-WL-BL-AP-CL will send the GARP packet:

a. To **LAN** with the **user-defined IP/MAC address**. Sending GARP packets to LAN is configurable.

b. To **WLAN** with a **user-defined IP address** and **its own MAC address**.

• **Client-Router** mode: You need to enable **NAT** for GARP first to allow the server on the AP side to access the devices connected to the Ethernet ports of the IE-WL-BL-AP-CL. The IE-WL-BL-AP-CL will send the GARP packet to WLAN as:

a. **N-to-1**: With its **own WAN IP** and **MAC address**.

b. **1-to-1**: With its **own WAN MAC address** and the **1-to-1 IP** configured by the user in the NAT configuration.

When Gratuitous ARP is enabled, the following options will be shown:

Gratuitous ARP to LAN

Setting	Description	Factory Default
Enable/Disable	Enable or disable sending Gratuitous ARP packets to LAN	Disable

Send Period

Setting	Description	Factory Default
10-1000 seconds	Specify the interval at which GARP packets are sent (in seconds).	180

IP Address/MAC Address

Setting	Description	Factory Default
IP/MAC address	The corresponding IP/MAC address of the devices under the client. You can specify up to 4 entries.	Empty

ATTENTION

When specifying an IP or MAC address, you must provide the associated IP or MAC address for that entry.

Logs and Notifications

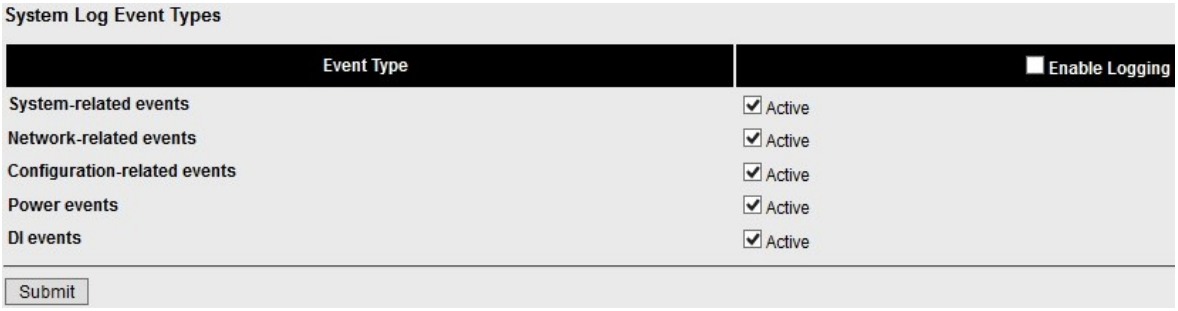
Since industrial-grade devices are often located at the endpoints of a system, these devices will not always know what is happening elsewhere on the network. This means that these devices, including wireless APs or clients, must provide system maintainers with real-time alarm messages. Even when system 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 IE-WL-VL-AP-BR-CL supports different approaches to warn engineers automatically, such as SNMP trap, e-mail, and relay output. It also supports two digital inputs to integrate sensors into your system to automate alarms by email and relay output.

System Logs

System Log Event Types

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



System-related events	Event is triggered when…
System warm start	The IE-WL-VL-AP-BR-CL is rebooted, such as when its settings are changed (IP address, subnet mask, etc.).
System cold start	The IE-WL-VL-AP-BR-CL is rebooted by power down.
Watchdog triggers reboot	The IE-WL-VL-AP-BR-CL is rebooted by watchdog .
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).
Client joined/ left (for AP/Master mode)	A wireless client is associated or disassociated.
WLAN connected to AP (for Client/Slave mode)	The IE-WL-VL-AP-BR-CL is associated with an AP.
WLAN disconnected (for Client/Slave mode)	The IE-WL-VL-AP-BR-CL is disassociated from an AP.
RSTP changed	The RSTP topology has changed
RSTP new root bridge ID	The RSTP changes its root bridge ID
Client Roaming from previous AP to current AP (for Client/Slave mode)	A client roams from a previous AP to the current AP if the signal strength of the current AP is greater than the previous AP by a certain value.
IP address conflict	The IE-WL-VL-AP-BR-CL has the same IP address as another device connected to the same subnet.
Link fault pass-through LAN/WLAN connected because of WLAN/LAN up	The WLAN/LAN link is up and the Link fault pass-through (LFPT) enables the LAN/WLAN functionality.

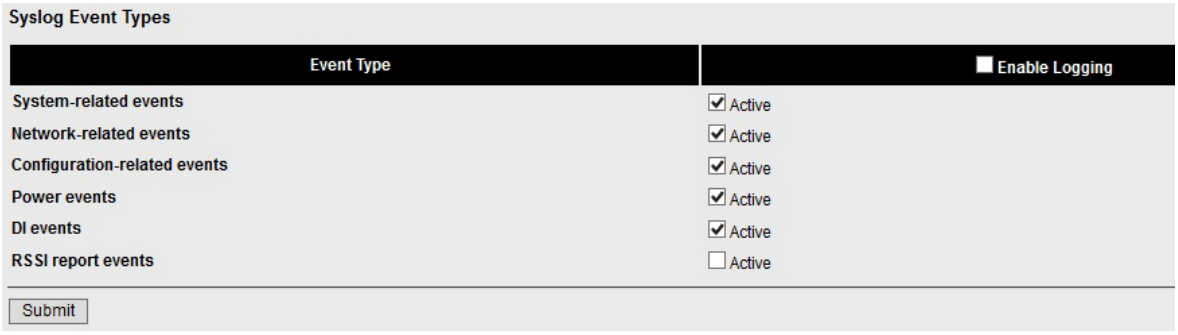
Link fault pass-through LAN/WLAN disconnected because of WLAN/LAN down	The WLAN/LAN link is down and the Link fault pass-through (LFPT) disables the LAN/WLAN functionality.
Channel availability check over DFS frequency (for AP/Master mode)	The channel availability check (CAC) is started on channel [channel] at [frequency] GHz for 60 sec./ The channel availability check (CAC) task has been completed on channel [channel] at [frequency] GHz./ A radar signal is detected on channel [channel] at [frequency] GHz.
AeroLink protection state	The AeroLink protection state changes. AeroLink states: Initialize (init)/ Discovery/ Idle/ Negotiation (nego)/ Back up/ Active/ Changed/ Undefined (undef) AeroLink detection methods: SNR/Signal Strength/Disconnection
Configuration-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 IE-WL-VL-AP-BR-CL.
Console authentication failure	An incorrect password is entered.
Firmware upgraded	The IE-WL-VL-AP-BR-CL's firmware is updated.
Loaded the configuration from EBR-MODULE RS232	The configuration is successfully loaded/there is an error loading the configuration from EBR-MODULE RS232.
Saving configuration to EBR-MODULE RS232	The configuration is successfully saved/there is an error saving the configuration to EBR-MODULE RS232.
EBR-MODULE RS232 failure	IE-WL-VL-AP-BR-CL cannot detect an EBR-MODULE RS232 at the console port.
Configuration reset to default	The configuration is reset to factory default.
Power events	**Event is triggered when…**
Power 1/2 transition (On -> Off)	The IE-WL-VL-AP-BR-CL is powered down in PWR1/2.
PoE transition (On -> Off)	The IE-WL-VL-AP-BR-CL is powered down in PoE.
Power 1/2 transition (Off -> On)	The IE-WL-VL-AP-BR-CL is powered via PWR1/2.
PoE transition (Off -> On)	The IE-WL-VL-AP-BR-CL is powered via PoE.

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.

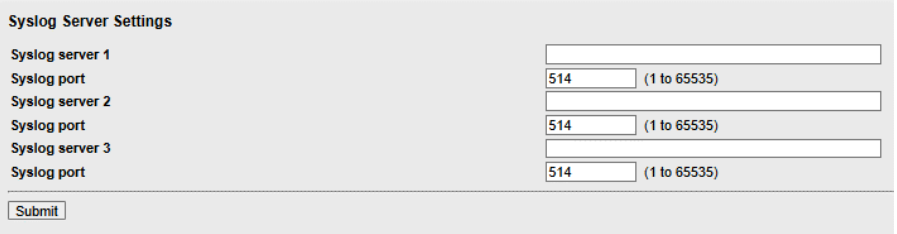
Syslog Event Types

Detailed information for the grouped events is shown in the following table. Check the box for **Enable logging** to enable the grouped events. All default values are enabled (checked). Detailed descriptions of the event types are available in the System Logs section.



Syslog Server Settings

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



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

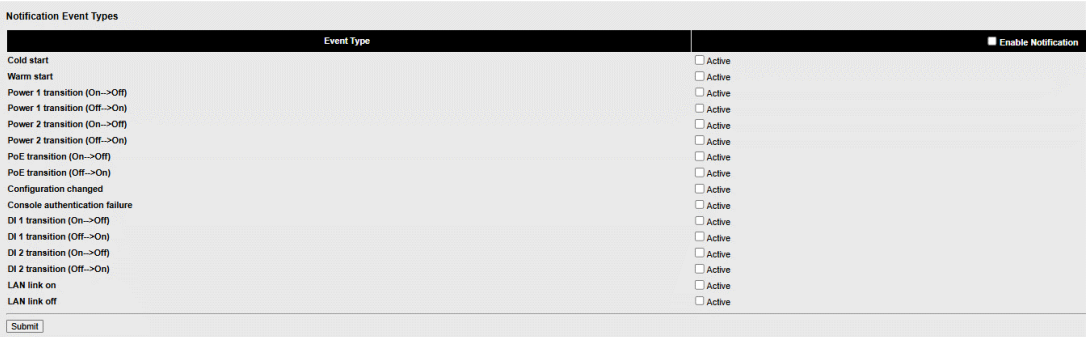
Setting	Description	Factory Default
Port destination (1 to 65535)	Enter the UDP port of the corresponding Syslog server	514

NOTE The **RSSI report events (Only for Client mode)** event type is useful during the site survey stage and uses a special utility to draw RSSI table values. However, this function increases the traffic load; we recommend setting this function to **disable** during normal usage.

E-mail Notifications

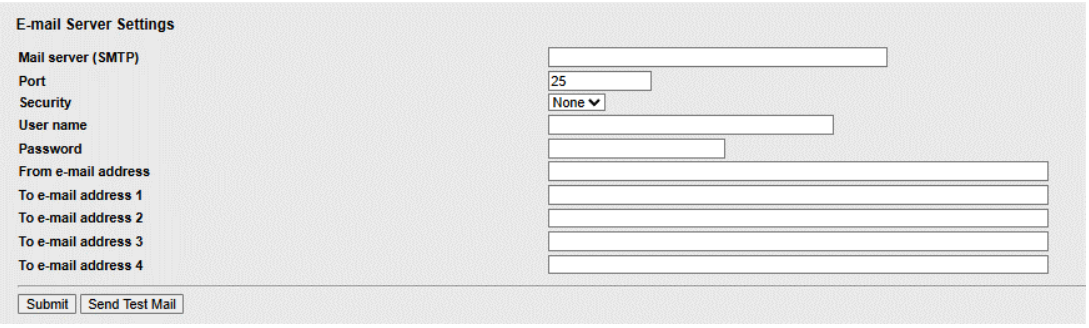
Notification Event Types

Check the box for **Active** to enable the event items. All default values are deactivated (unchecked). Detailed descriptions of the event types are available in the *System Logs* section.



E-mail Server Settings

You can set up to 4 e-mail addresses to receive alarm emails from the IE-WL-VL-AP-BR-CL. 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.



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

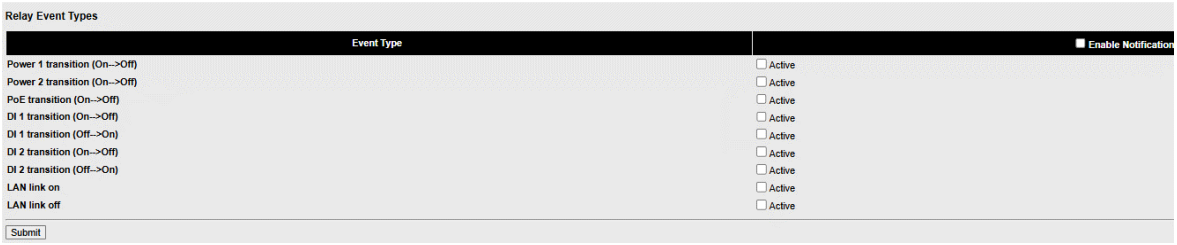
Relay

The IE-WL-VL-AP-BR-CL has one relay output, which consists of 2 terminal block contacts on the IE-WL-VL-AP-BR-CL's top panel. These relay contacts are used to indicate user-configured events and system failure.

The two wires attached to the relay contacts form an open circuit when a user-configured event is triggered. If a user-configured event does not occur, the relay circuit will remain closed. For safety reasons, the relay circuit is kept open when the IE-WL-VL-AP-BR-CL is not powered.

Relay Event Types

You can check the box for **Active** to enable the event items. All default values are deactivated (unchecked). Detailed descriptions of the event types are available in the *System Logs* section.

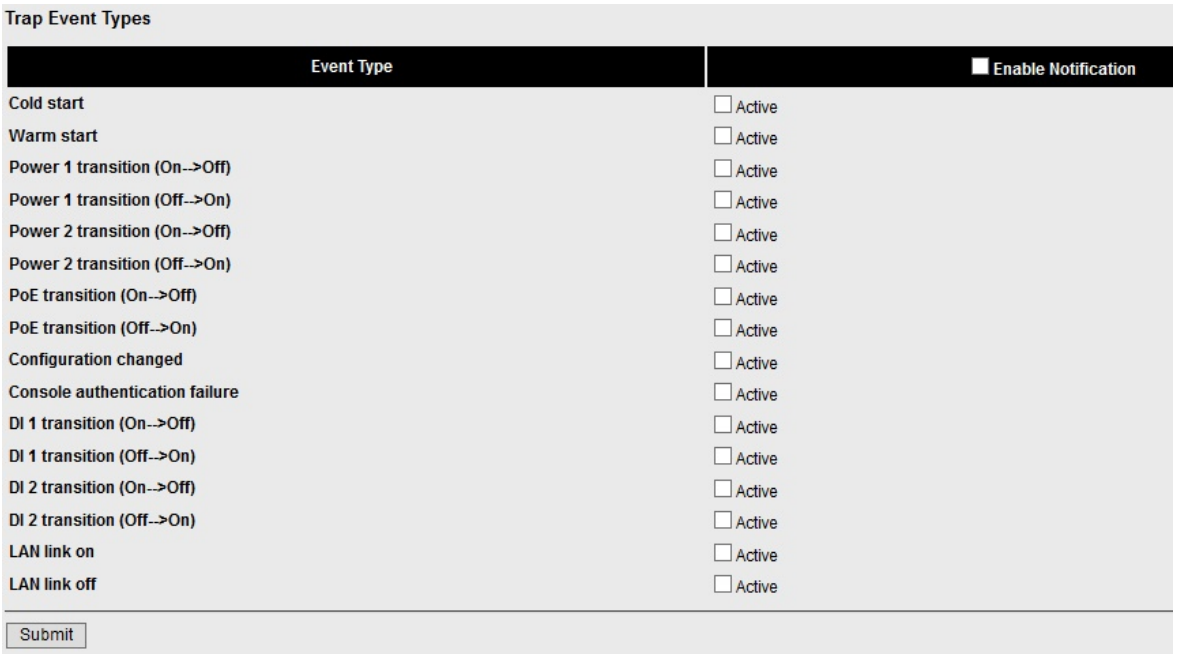


Trap

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



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.

1st / 2nd / 3rd trap version

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

1st / 2nd / 3rd 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 / 3rd trap community

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

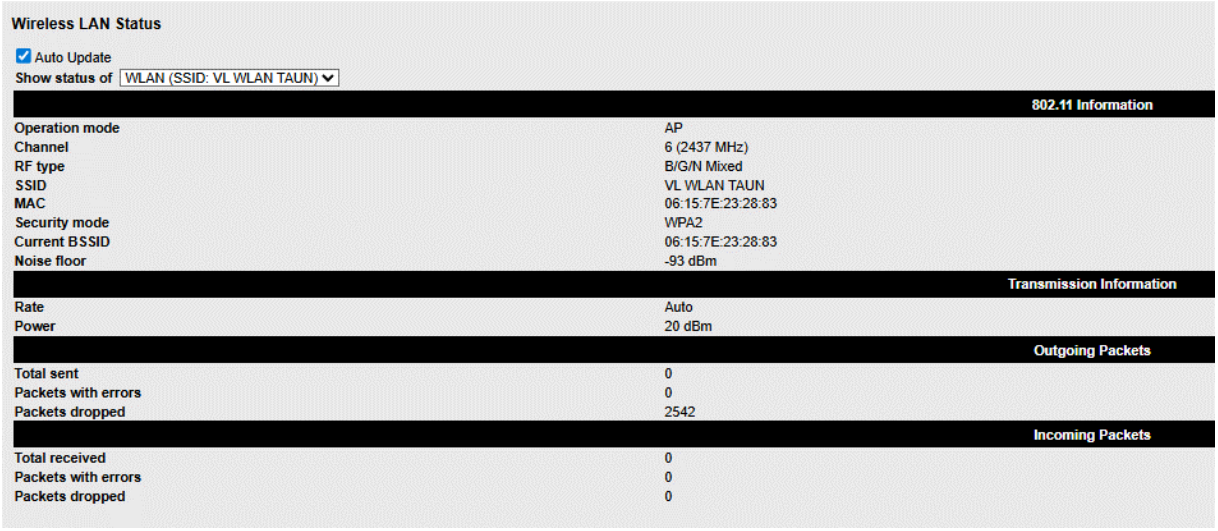
Status

Wireless LAN Status

The status for **802.11 Information** parameters, such as Operation mode and Channel, are shown on the **Wireless Status** page. The status will refresh every 5 seconds if the **Auto refresh** box is checked.

Certain values for **802.11 Information** may not show up due to different operation modes. As a result, **Current BSSID, Signal strength,** and **SNR** are not available in AP mode.

It is helpful to use the continuously updated information on this page, such as **Signal strength, Noise floor,** and **SNR**, to monitor the signal strength of the IE-WL-VL-AP-BR-CL in Client mode.



Associated Client List (for AP/Master Mode Only)

The Associated Client List shows all the clients that are currently associated with a particular IE-WL-VL-AP-BR-CL. This page provides useful information for easier network diagnosis:

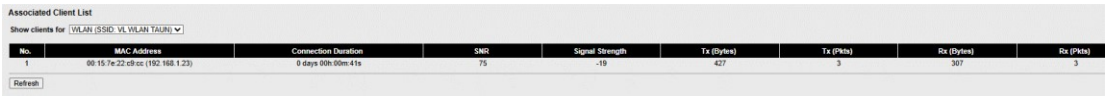
MAC Address: Displays the associated client MAC address. If DHCP server is enabled on this AP/Master, the IP address will also be displayed.

Connection Duration: States how long the client has been connecting to this AP/Master.

SNR/Signal Strength: States the Signal-Noise Ratio/Signal Strength of the associated client. This is especially useful for identifying a weak signal client that is potentially reducing the overall wireless performance.

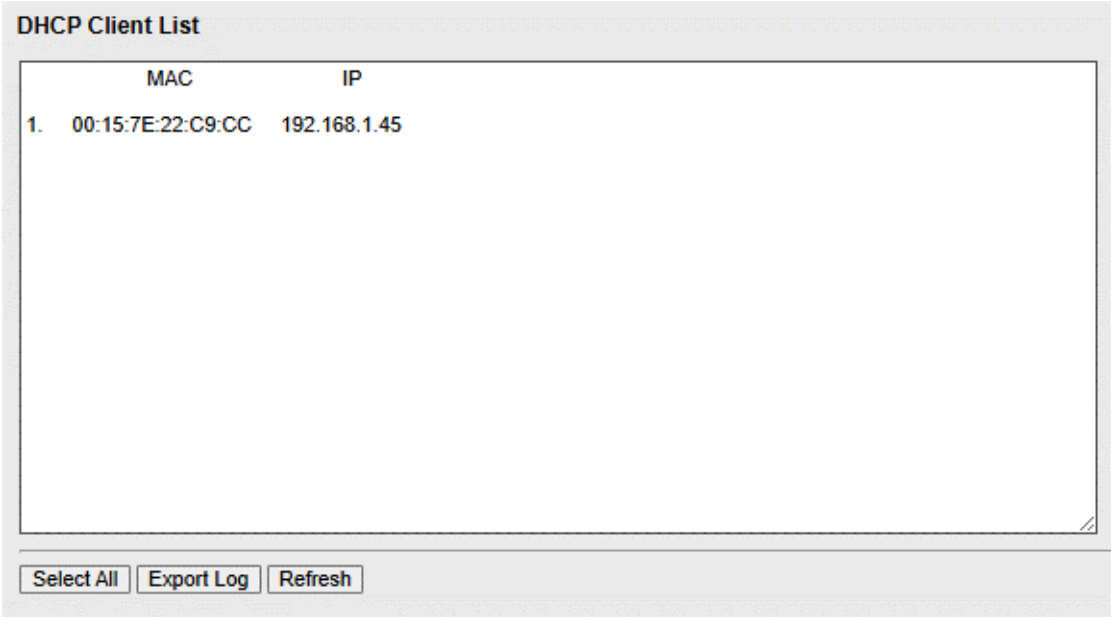
Tx (Bytes/Pkts): Records the AP-to-client traffic after a client is associated.

Rx (Bytes/Pkts): Records the client-to-AP traffic after a client is associated.

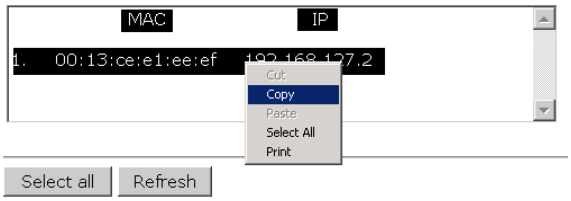


DHCP Client List (for AP Mode Only)

The DHCP Client List shows all the clients that require and have successfully received IP assignments. You can click the **Refresh** button to refresh the list.

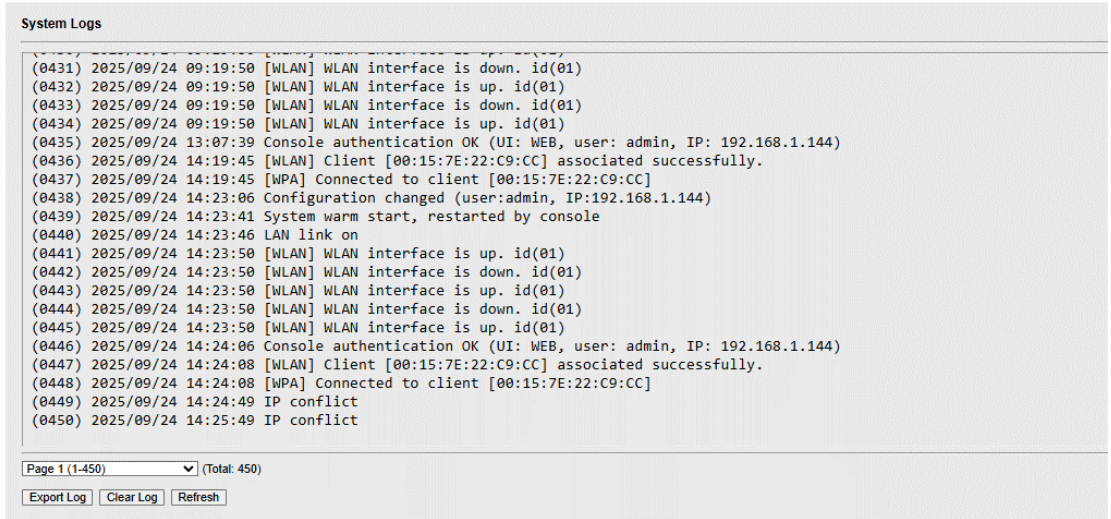


You can press **Select all** button to select all content in the list for further editing.



System Logs

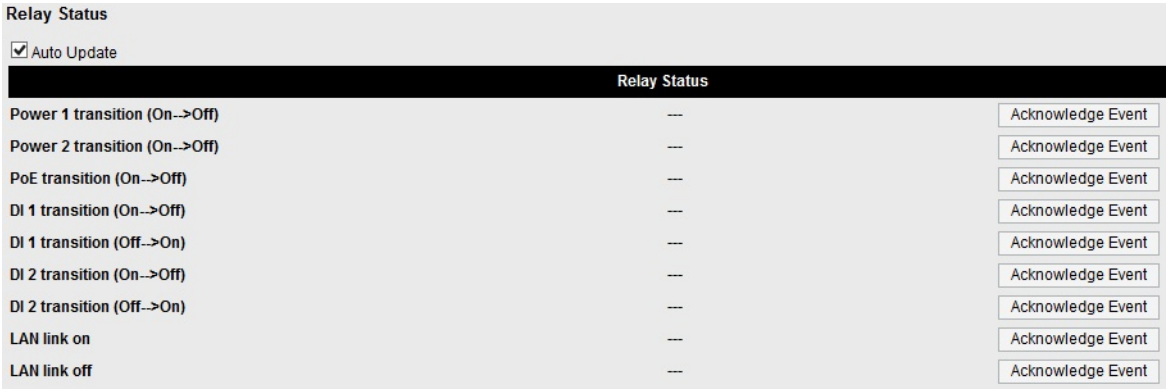
Triggered events are recorded in System Log. You can export the log contents to an available viewer by clicking **Export Log**. You can use the **Clear Log** button to clear the log contents and the **Refresh** button to refresh the log.



Relay Status

The status of user-configurable events can be found under **Relay Status**. The status will refresh every 5 seconds if the **Auto refresh** box is checked.

If an event is triggered, it will be noted on this list. System administrators can click **Acknowledge Event** when he has acknowledged the event and addressed it.

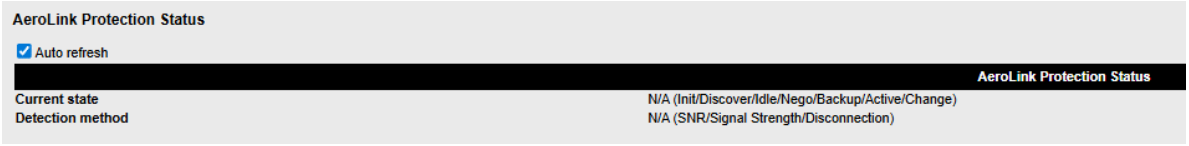


DI and Power Status

The status of power inputs and digital inputs is shown on this web page. The status will refresh every 5 seconds if the **Auto refresh** box is checked.

AeroLink Protection Status (For Client/Slave Mode only)

After you have enabled AeroLink Protection in the **Advanced WLAN Setup** panel, the current state of the AeroLink Protection is displayed here for easy diagnosis.



A member of the AeroLink Protection group can take one of the following seven states:

- **Initiation State (Init)**: Initiates the AeroLink Protection Protocol
- **Discovering State (Discover)**: Discovers other AeroLink Protection members for further negotiation
- **Idle State (Idle)**: Internal protocol checkpoint
- **Negotiation State (Nego)**: Negotiates with other AeroLink Protection members and elects an Active node.
- **Backup State (Backup)**: After negotiation, this node is assigned as a Backup node. All traffic will go through the Active node instead.

NOTE When a node is in Backup state, the STATE LED will be blinking.

- **Active State (Active)**: After negotiation, this node is assigned as Active node, which means that all traffic will go through this node.
- **Role Change State (Change)**: If the Active node is no longer capable of data transmission via the WLAN, it will turn into Change State to trigger the re-negotiation of the Active node from the Backup nodes.

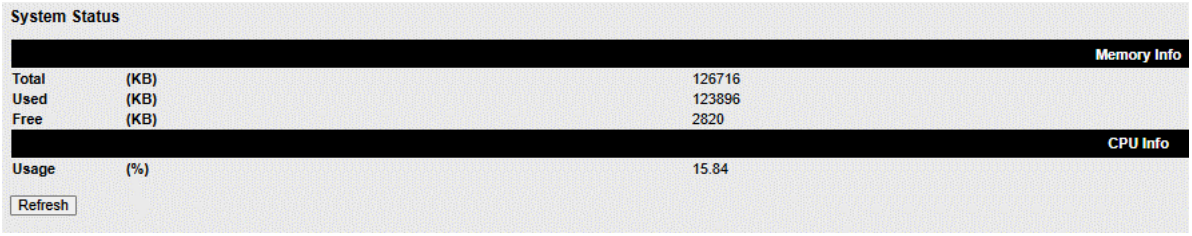
AeroLink Protection function can adopt one of the following detection methods:

- **SNR:** Checks the Signal-Noise Ratio (SNR) of the associated client
- **Signal Strength:** Checks the Signal Strength of the associated client
- **Disconnection:** Checks for disconnection

System Status

The system status section indicates the status of the device memory and CPU usage in the current device.

NOTE A CPU overload can result in a watchdog-triggered reboot of the system. Factors such as a high number of firewall rules (IP/MAC/Protocol filters) and traffic PPS (packet per second) contribute to the rise in CPU usage.

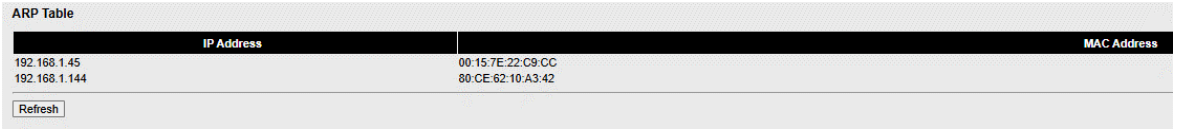


Network Status

The network status section indicates the network status of the device with respect to ARP, bridge status, LLDP, RSTP, and the routing table.

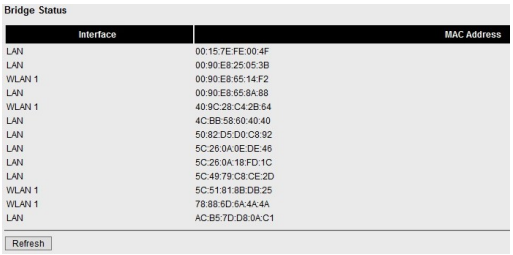
ARP Table

Address Resolution Protocol (ARP) Table - indicates the current IP to MAC address mapping for the device.



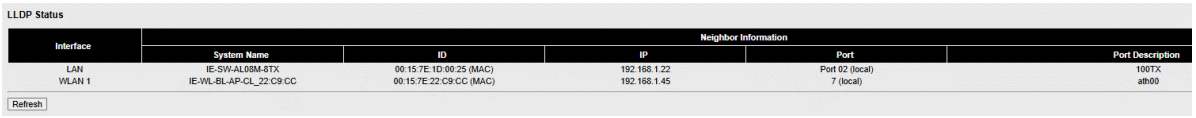
Bridge Status

Bridge Status indicates the current status of the network bridge on the device. The interfaces and the corresponding MAC addresses in this section are the entry points for ingress traffic.



LLDP Status

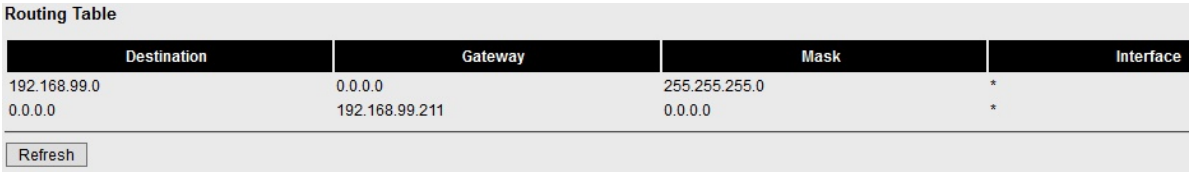
Displays information on neighboring devices collected via LLDP (Link Layer Discovery Protocol).



NOTE The LLDP function in IE-WL-VL-AP-BR-CL does not support IEEE 802.3.

Routing Table

The **Routing Table** displays the routing information for the current device.



RSTP Status

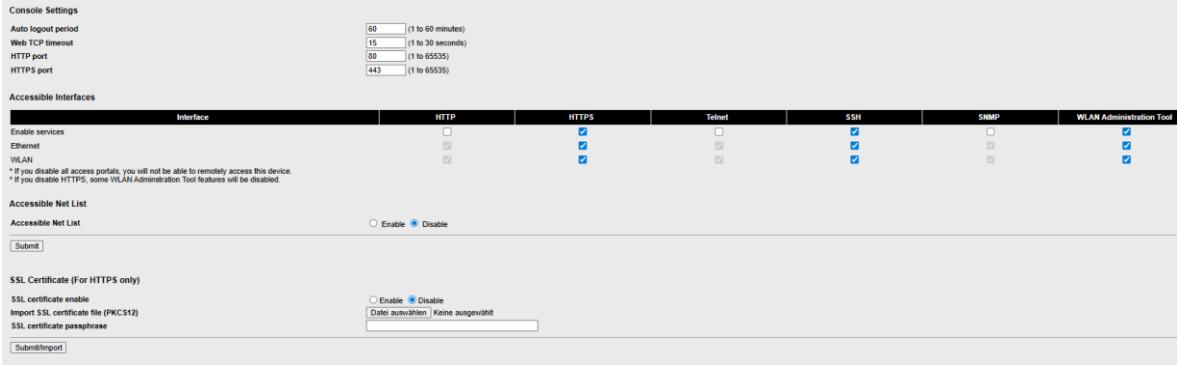
Displays the Spanning Tree Protocol parameters configured.

Maintenance

Maintenance functions provide the administrator with tools to manage the IE-WL-VL-AP-BR-CL and wired/wireless networks.

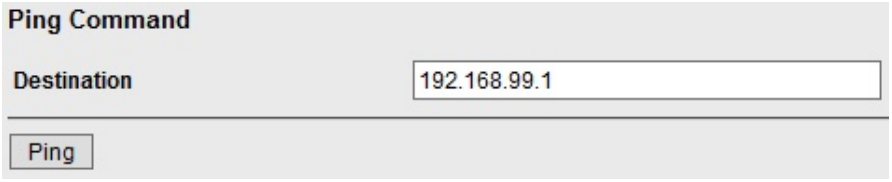
Console Settings

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

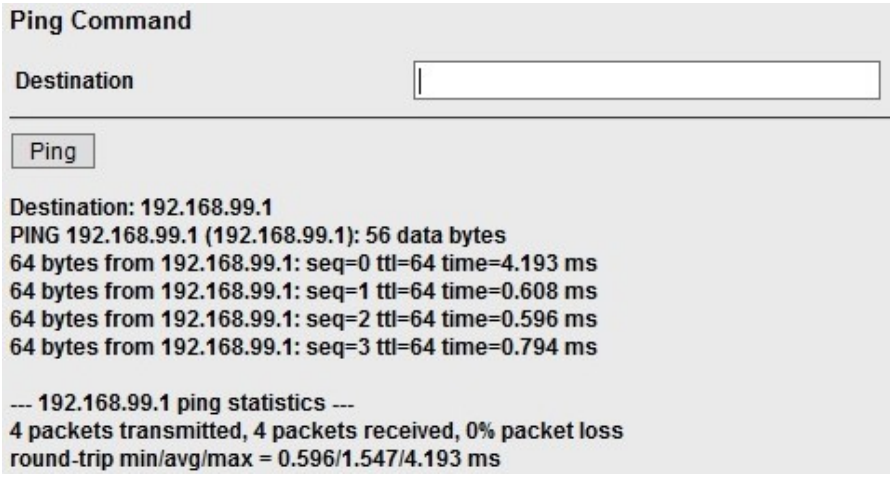


Ping

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.



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.



Firmware Upgrade

The IE-WL-VL-AP-BR-CL can be enhanced with more value-added functions by installing firmware upgrades. The latest firmware is available at Weidmüller's EShop under the respective article number.

Before running a firmware upgrade, make sure the IE-WL-VL-AP-BR-CL is off-line. 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 IE-WL-VL-AP-BR-CL will reboot itself.

When upgrading your firmware, the IE-WL-VL-AP-BR-CL's other functions are forbidden.

NOTE For security reasons, a firmware signature mechanism was added to firmware v1.20.2. As a result, when uploading firmware in v1.20.2 or higher, you must upload a ZIP file that includes both the firmware file (.rom) and signature file (.sig).
When upgrading to v1.20.2, you only need to upload the firmware file (.rom).

NOTE If you need to downgrade from v1.20.2 to an earlier version for any reason, please contact Weidmüller Technical Support.

ATTENTION

Please make sure the power source is stable when you upgrade your firmware. An unexpected power breakup may damage your IE-WL-VL-AP-BR-CL.

Firmware upgrade may change the current roaming configuration. Please check the roaming configuration of the device after it reboots.

Configuration Import and Export

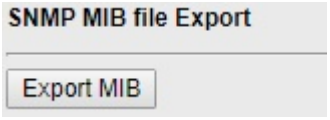
You can back up and restore the device's configuration using the **Configuration Import & Export** function.

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

In the **Configuration Export** section, click the **Export Configuration** 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 back up or restore the EBR-MODULE RS232 (external backup and restore module) configuration using **Export Configuration** or **Import Configuration**.

The SNMP MIB file is also available from SNMP MIB File EXPORT.

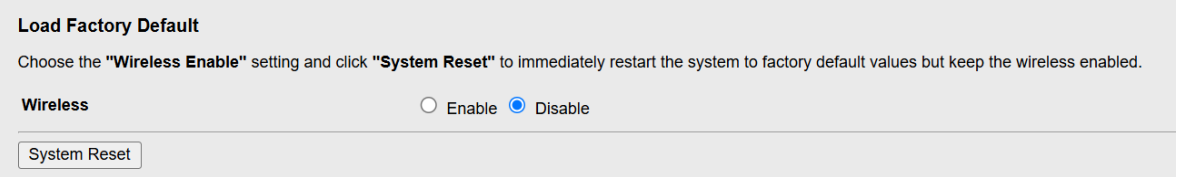


To download the configuration to the IE-WL-VL-AP-BR-CL:

1. Turn off the IE-WL-VL-AP-BR-CL.
2. Plug in the EBR-MODULE RS232 to the IE-WL-VL-AP-BR-CL's RS-232 console.
3. Turn on IE-WL-VL-AP-BR-CL.
4. IE-WL-VL-AP-BR-CL will detect the EBR-MODULE RS232during the boot up process, and download the configuration from the EBR-MODULE RS232 to the IE-WL-VL-AP-BR-CL automatically. Once the configuration downloads correctly, the IE-WL-VL-AP-BR-CL emits three short beeps and then continues with the boot-up process.
5. Once the IE-WL-VL-AP-BR-CL has booted up successfully, it will emit the normal two beeps, and the ready LED will turn to solid green.

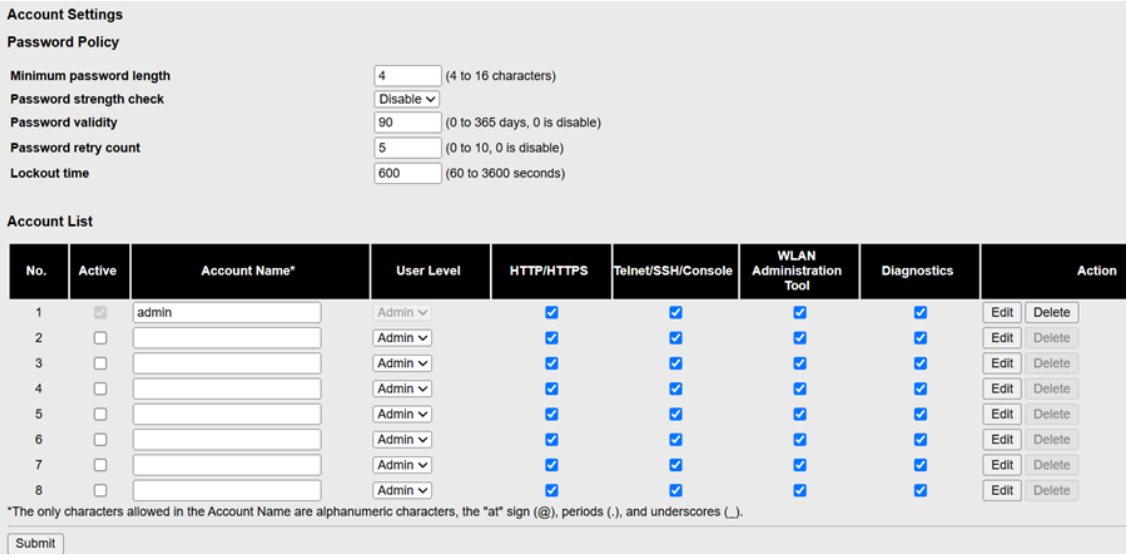
Load Factory Default

Use this function to reset the IE-WL-VL-AP-BR-CL and rollback all settings (except for Basic WLAN indoor/outdoor settings) to the factory default values. If you want to keep wireless enabled, select the "Enable" option for Wireless before clicking **System Reset**. You can also reset the hardware by pressing the reset button on the top panel of the IE-WL-VL-AP-BR-CL.



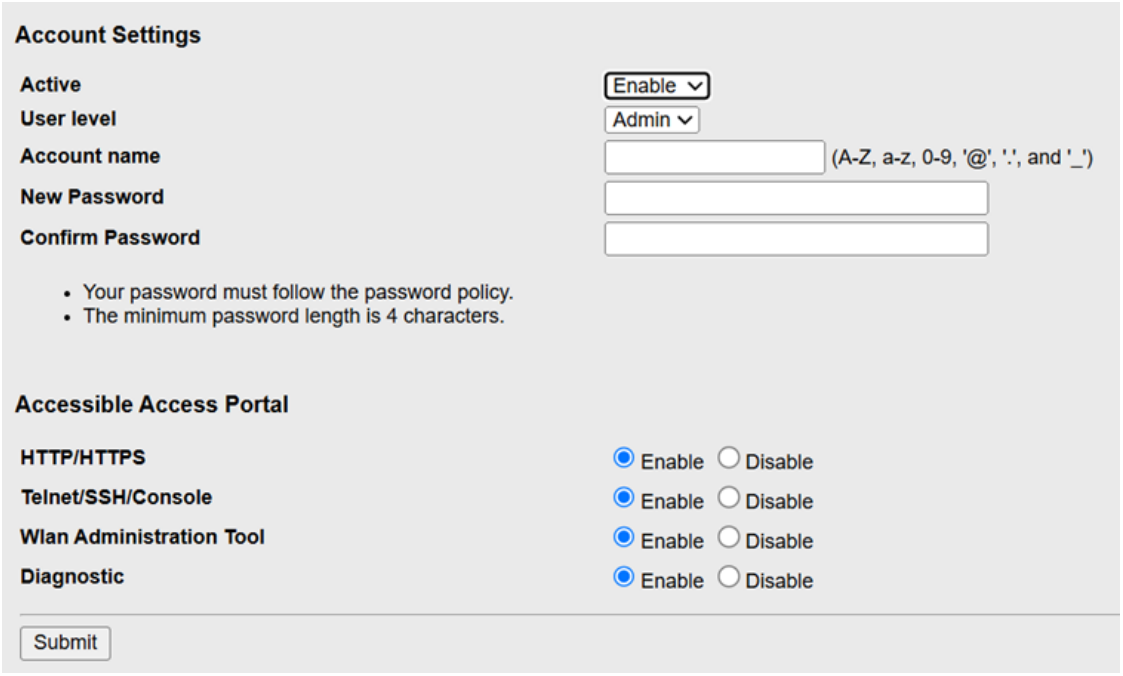
Account Settings

To ensure that devices located at remote sites are secure from hackers, we recommend setting up a high-strength password the first time you configure the device.



Field	Description	Default setting
Minimum password length	By default, passwords can be between 4 and 16 characters. For improved security, we recommend changing the minimum password length to at least 8 characters the first time you configure the device.	4
Password strength check	Enable the password strength check option to ensure that users are required to select high-strength passwords.	Disable
Password validity	The number of days after which the password must be changed. Passwords should be updated regularly to protect against hackers.	90 days
Password retry count	The number of consecutive times a user can enter an incorrect password while logging in before the device's login function is locked.	5
Lockout time	The number of seconds the device's login function will be locked after n consecutive unsuccessful login attempts, where n = the password retry count.	600 seconds

Click **Edit** to create a new, or edit an existing, user account. The items shown below can be configured.



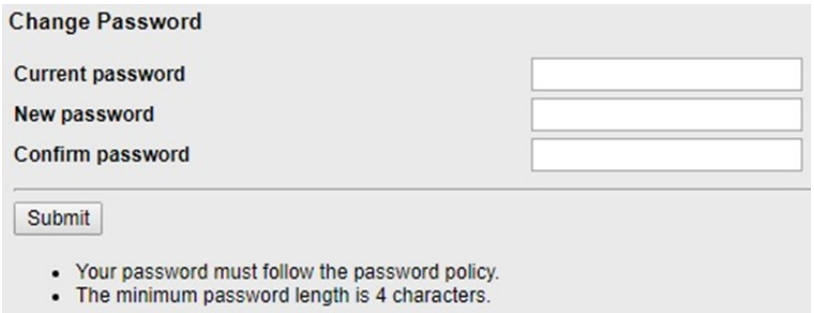
Field	Description	Default Setting
Active	Select Enable to enable the user account.	Disable
User level	Administrator: Allows the user to access the Web UI, change the device's configuration, and use the device's import/export capability. User: Allows the user to access the Web UI, but the user will not be able to change the device's configuration or use the device's import/export capability.	Admin
Account name	The username of the account.	Admin
New Password	The password used to log in to the device.	Detmold
Confirm Password	Retype the password. If the Confirm Password and New Password fields do not match, you will be asked to reenter the password.	N/A

Change Password

Use the **Change Password** function to change the password of existing user accounts. First input the current password, and then type the new password in the **New password** and **Confirm password** input boxes.

NOTE To maintain a higher level of network security, do not use the default password (Detmold), and be sure to change all user account passwords regularly.

Note: To maintain a higher level of network security, do not use the default password (Detmold), and be sure to change all user account passwords regularly.

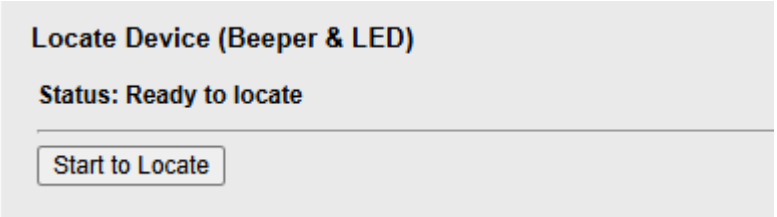


NOTE If the Password-strength test option is enabled, you will be prompted to use passwords that adhere to the following password policy:

- The password must contain at least one digit: 0, 1, 2, …, 9.
- The password must contain both upper- and lower-case letters:
- A, B, …, Z, a, b, …, z.
- The password must contain at least one of the following special characters:
- ~!@#$%^&-_|;:,.<>[]{}
- The password must have more characters than the minimum password length (default = 4).

Locate Device

When you click **Start to Locate** button, the IE-WL-VL-AP-BR-CL uses a beeper, and a blinking State LED indicator to let you know its location.



Misc. Settings

Additional settings to help you manage your IE-WL-VL-AP-BR-CL are available on this page.

Reset button

Setting	Description	Factory Default
Always Enable	The IE-WL-VL-AP-BR-CL's Reset button works normally.	Always enable
Disable the Factory Reset Function after 60 Seconds	The IE-WL-VL-AP-BR-CL's reset to default function will be inactive 60 seconds after the IE-WL-VL-AP-BR-CL finishes booting up.	

Allow special characters

Setting	Description	Factory Default
Enable/disable	Allow or prohibit the use of special characters (` ' " | ; & $). For security reasons, we recommend disabling special characters.	Enable

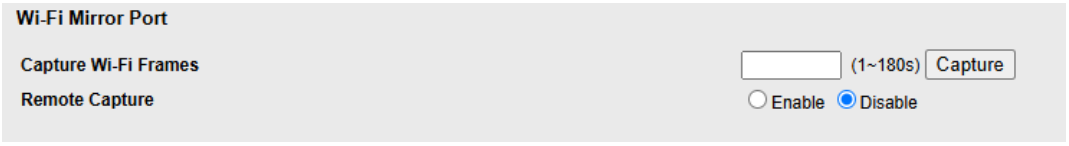
Troubleshooting

This feature allows you to quickly obtain the current system status and provide diagnostics information to Weidmüller engineers.

To export the current device information, click **Export**. If more detailed Wi-Fi information is required, enable **Wi-Fi Analysis** and then click **Export**. Retrieving the additional information may take up to 3 minutes.

Wi-Fi Mirror Port

A Wi-Fi mirror port can help you obtain the current Wi-Fi communication behavior of your network over the current channel when it is not convenient to set up a Wi-Fi sniffer in the system operating environment.



To setup a Wi-Fi mirror port, you will need a computer with the Wireshark tool installed, which will be used to connect to the IE-WL-VL-AP-BR-CL via the Ethernet.

NOTE A Wi-Fi mirror port is useful for gathering information. However, the DFS function may not work properly when you enable the Wi-Fi Mirror Port function. Hence, we recommend disabling the Wi-Fi Mirror Port function during normal usage.

To set up a Wi-Fi mirror port for short-term monitoring, do the following:

1. Enter the duration in the **Capture Wi-Fi Frames** box. You can enter a value between 1 to 180 seconds.
2. Click **Capture**.
3. Wait for a timeout on the web console.

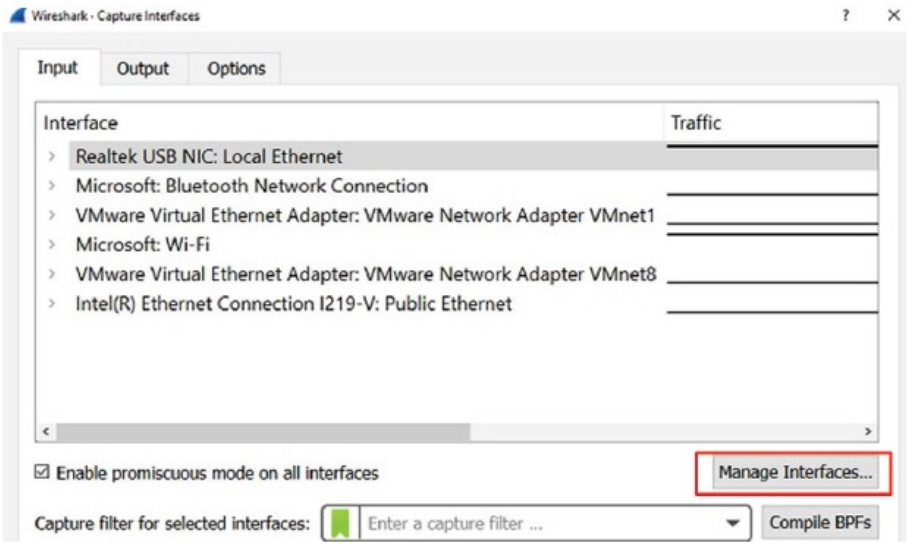
You will be able to download a report from the web browser.

To set up a Wi-Fi mirror port for long-term monitoring, do the following:

1. On the **Wi-Fi Mirror Port** page, set the **Remote Capture** option to **Enable**.

2. Run the Wireshark tool on your computer, click **Capture** and then click **Options**.

3. In the **Input** tab of the Wireshark tool, click **Manage Interfaces**.



4. Click **Remote Interfaces** and add a new interface.

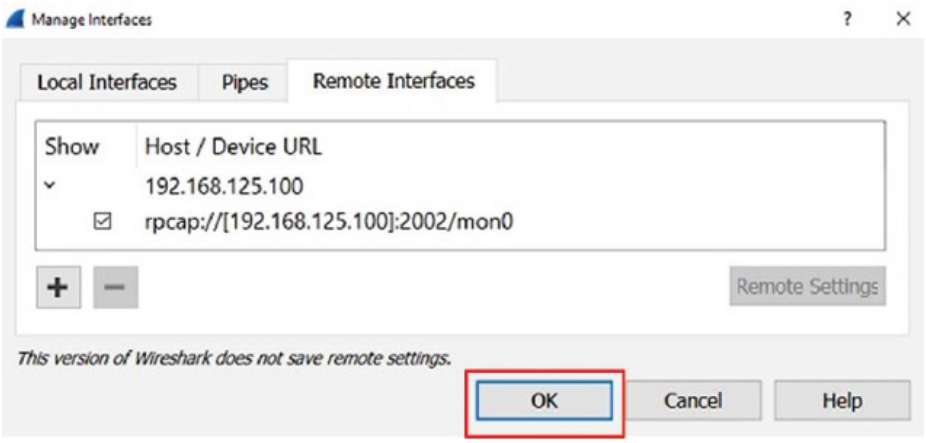
5. Enter the information for your IE-WL-VL-AP-BR-CL device.

   Port: 2002

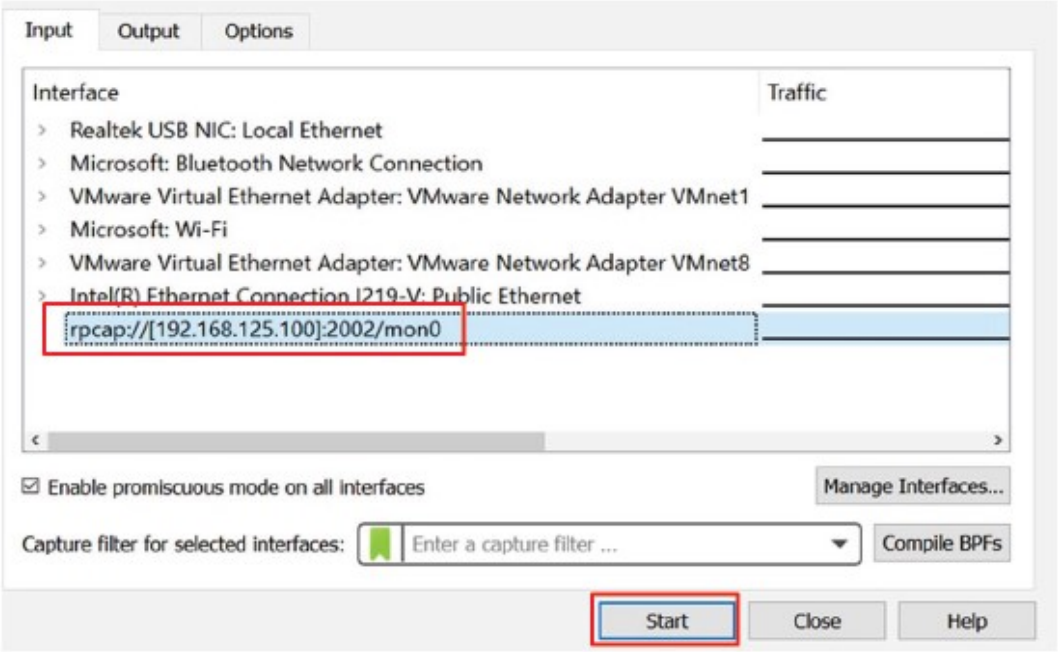
   Auth: Null authentication

   Host: < *IE-WL-VL-AP-BR-CL IP*>

6. Click **OK**.



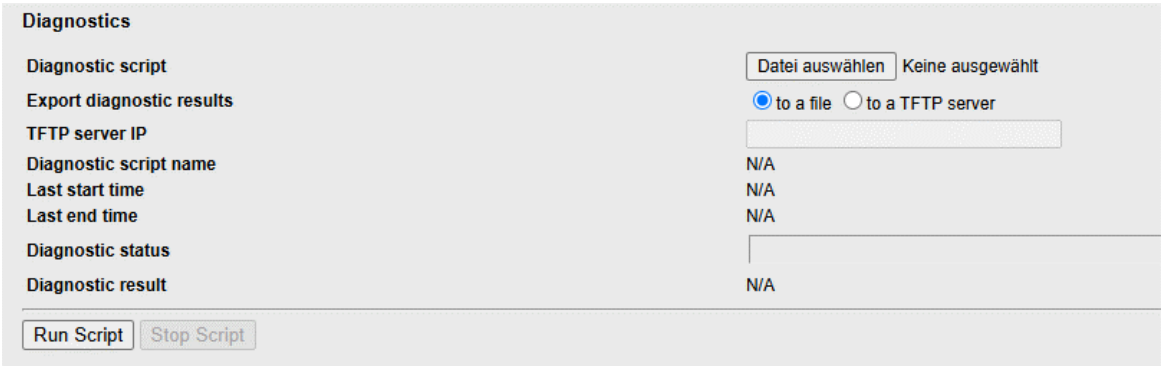
7. Select Input > Interface > rpcap://...:2002/mon0.



Diagnostics

For cases where advanced troubleshooting is required, contact a Weidmüller support who can provide you with an encrypted script file. The encrypted script file can capture additional details on the system.

To run the script, browse to and select the script file using **Browse** and click **Run Script** after you have filled in the following details:

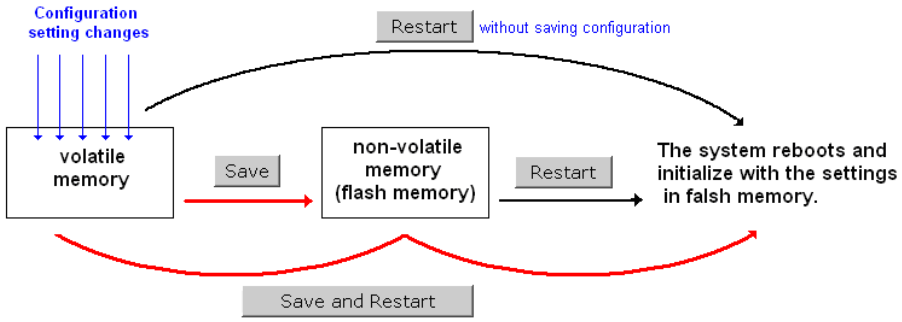


Setting	Description
Diagnostic script	Use the **Browse** button to select the Weidmüller diagnosis script file.
Export diagnostic results	Select if you want to export: • **to a file** • **to a TFTP server**
TFTP server IP	If you have selected the TFTP option, specify the IP address of the TFTP server.
Diagnostic script name	Displays the name of the script file
Last start time	Displays the start time of the last script execution
Last end time	Displays the end time of the last script execution
Diagnostic status	Displays the progress of the system diagnostics
Diagnostic result	Displays the result of the system diagnostics. If you have selected the export **to a file** option, the system log is encrypted and packed into a file. The limit on the log file size is 1 MB. When the size of the log file reaches 1MB another file is created. A maximum of 5 files (5MB) will be kept for downloading. When the number of files exceeds five, the oldest file is deleted.

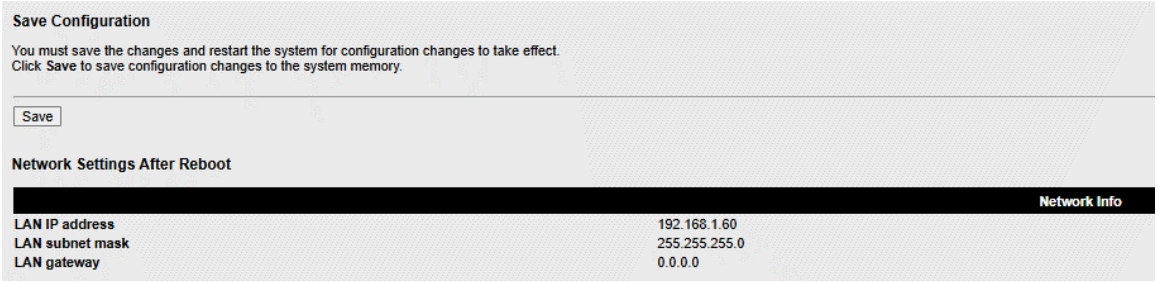
Save Configuration

The following figure shows how the IE-WL-VL-AP-BR-CL stores the setting changes into volatile and non-volatile memory. All data stored in volatile memory will disappear when the IE-WL-VL-AP-BR-CL is shutdown or rebooted. Because the IE-WL-VL-AP-BR-CL starts up and initializes with the settings stored in flash memory, all new changes must be saved to flash memory before restarting the IE-WL-VL-AP-BR-CL.

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



After you click on **Save Configuration** in the left menu box, the following screen will appear. Click **Save** if you wish 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.

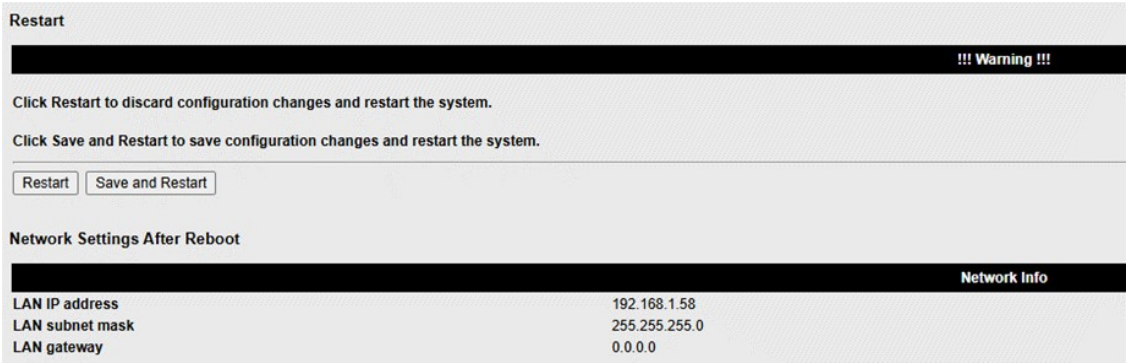


Restart

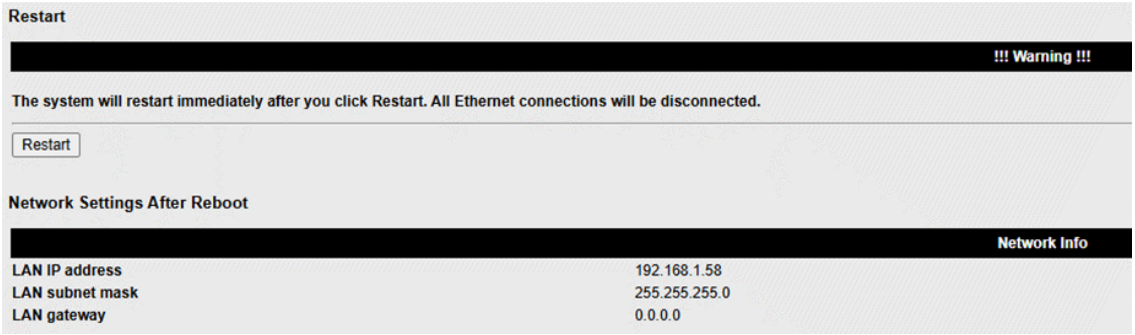
If you submitted configuration changes, you will find a blinking string in the upper right corner of the screen. After making all your changes, click the **Restart** function in the left menu box. One of two different screens will appear.

If you made changes recently but did not save, you will be given two options. Clicking the **Restart** button here will reboot the IE-WL-VL-AP-BR-CL directly, and all setting changes will be ignored.

Clicking the **Save and Restart** button will apply all setting changes and then reboot the IE-WL-VL-AP-BR-CL.



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 IE-WL-VL-AP-BR-CL'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.

4

Software Installation and Configuration

Overview

IE-WL-VL-AP-BR-CL series can be managed by WLAN Administration Tool.

WLAN Administration Tool

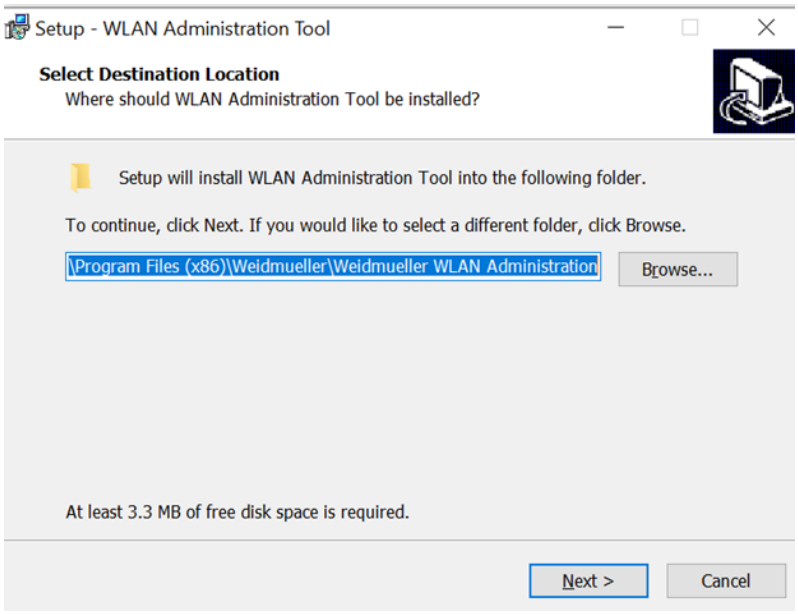
NOTE You may download the WLAN Administration Tool from the Weidmüller website using the following path:

1. Open https://eshop.weidmueller.com/
2. Put in the article number of your WLAN device within the search field (e.g. 2536680000)
3. Click on the tile “Software Support”
4. Download “WLAN Administration Tool” from section” Software”

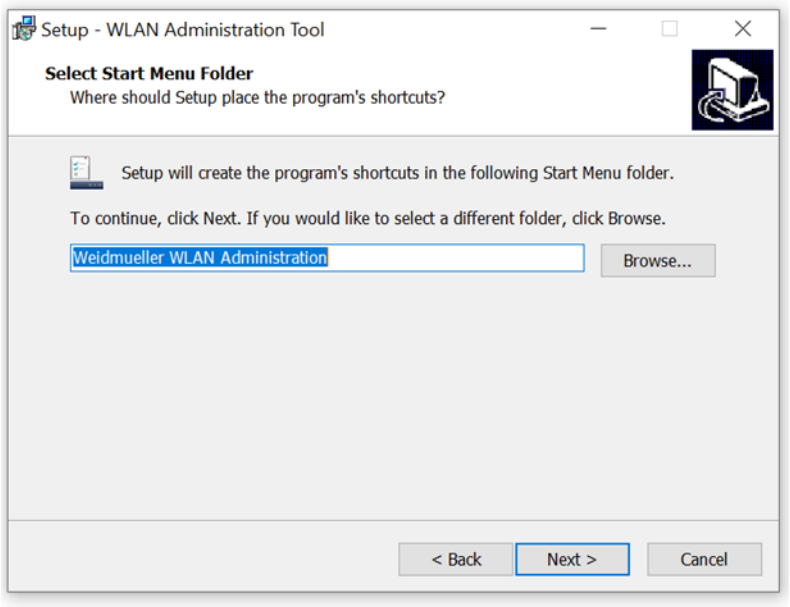
Installing WLAN Administration Tool

For example, if the file was placed on the Windows desktop, it should appear as follows. Simply double click on the icon to run the program.

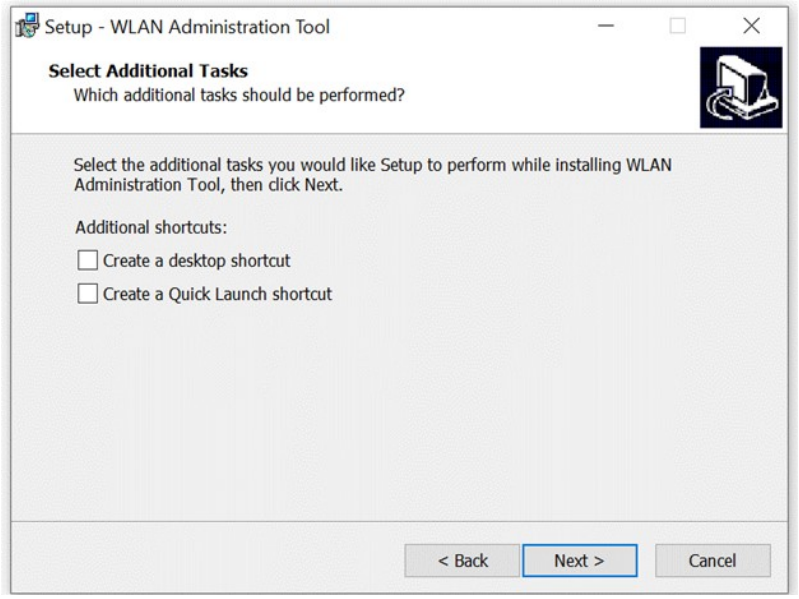
1. Click **Next** to install program files to the default directory or click **Browse** to select an alternate location.



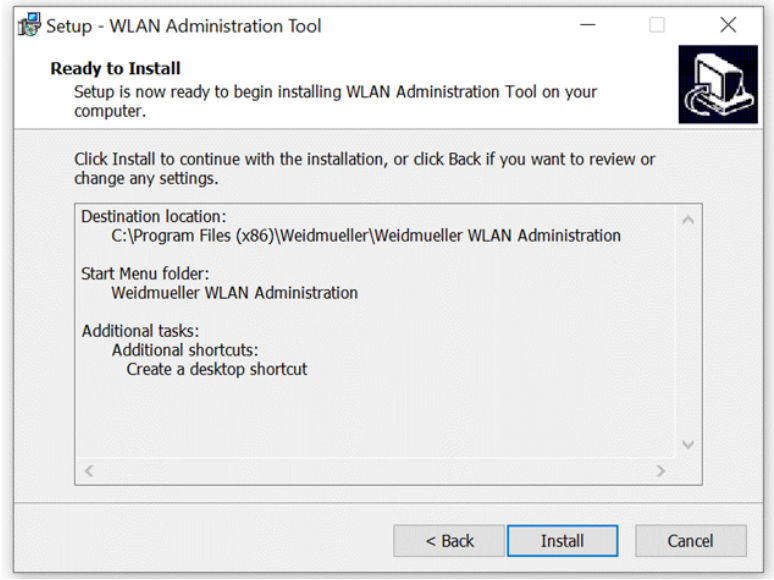
2. Click **Next** to create the program’s shortcut files to the default directory or click **Browse** to select an alternate location.



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

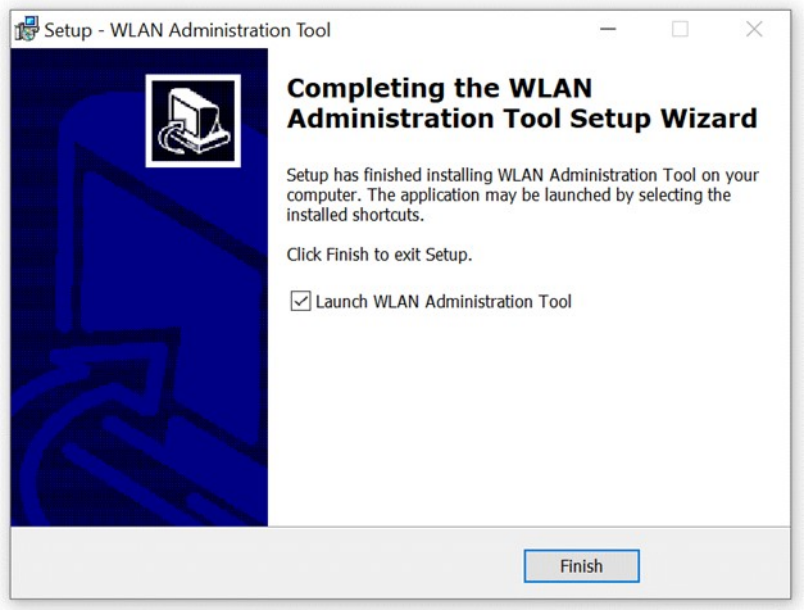


4. Click **Next** to proceed with the installation. The installer then displays a summary of the installation options.



5. 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.

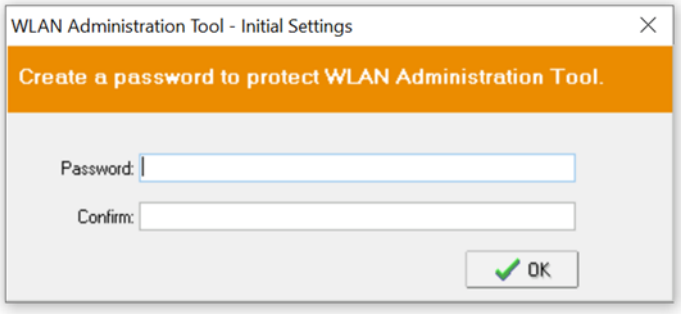
6. Click **Finish** to complete the installation of WLAN Administration Tool.



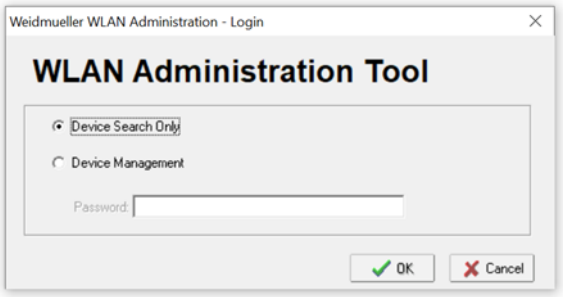
Configuring WLAN Administration Tool

The Broadcast Search function is used to locate all IE-WL-VL-AB-BR-CL APs that are connected to the same LAN as your computer. After locating an IE-WL-VL-AB-BR-CL, you will be able to change its IP address. Since the Broadcast Search function searches by TCP packet and not IP address, it doesn't matter if the IE-WL-VL-AB-BR-CL is configured as an AP or Client. In either case, APs and Clients connected to the LAN will be located, regardless of whether or not they are part of the same subnet as the host.

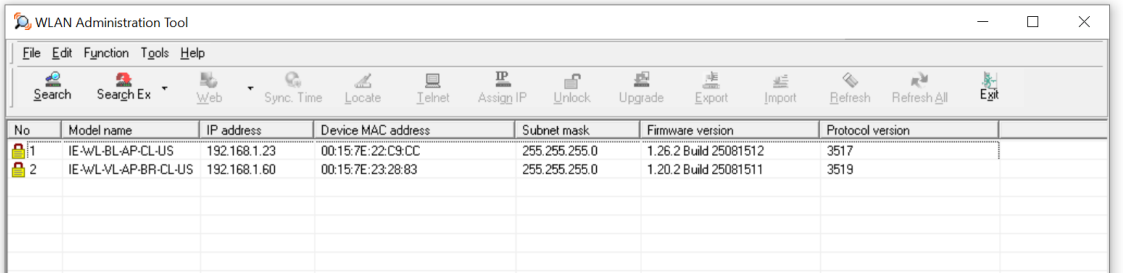
1. Start the **WLAN Administration Tool** program. After the first start of the WLAN Administration Tool the following window appears. There you have the possibility to set a password for access to the "device management function"



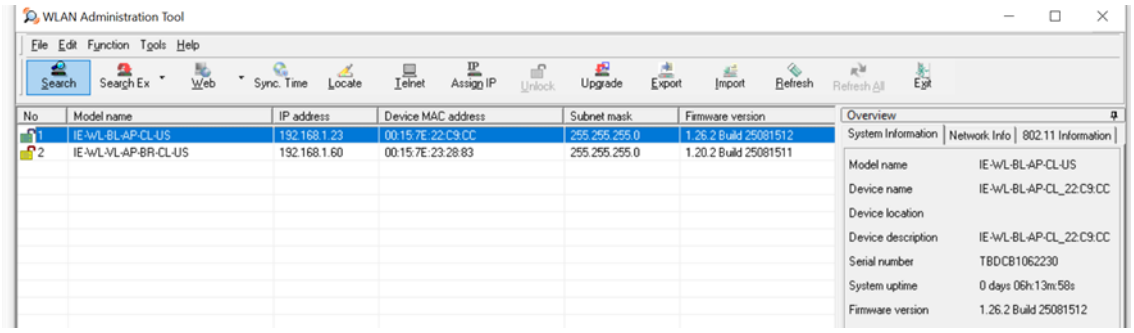
2. When the Login page appears, select the "Search Device only" option to search for IE-WL-VL-AB-BR-CLs and to view each IE-WL-VL-AB-BR-CL's configuration. Select the "Device management" option to assign IPs, upgrade firmware, and locate devices.



3. The WLAN Administration Tool will start automatically. Then click the **Search** icon.



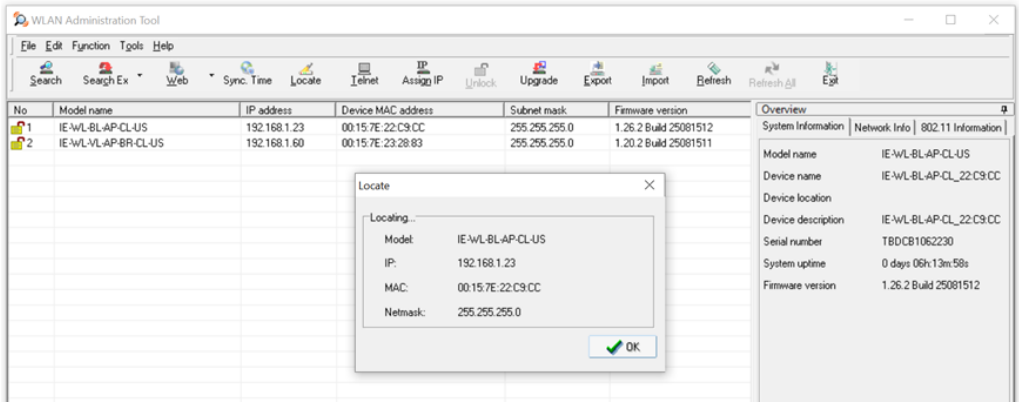
4. The "Searching" window indicates the progress of the search. When the search is complete, all IE-WL-VL-AB-BR-CLs that were located will be displayed in the WLAN Administration Tool window.



ATTENTION

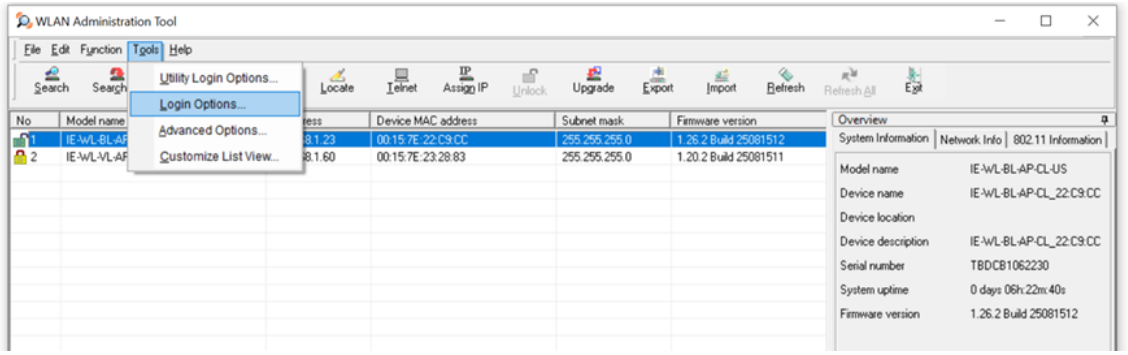
Depending on the Windows Firewall settings the list of devices might be empty. In this case, please add the WLAN Administration Tool in your Windows Defender Firewall as an approved application. Windows security settings may differ at different interfaces.

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

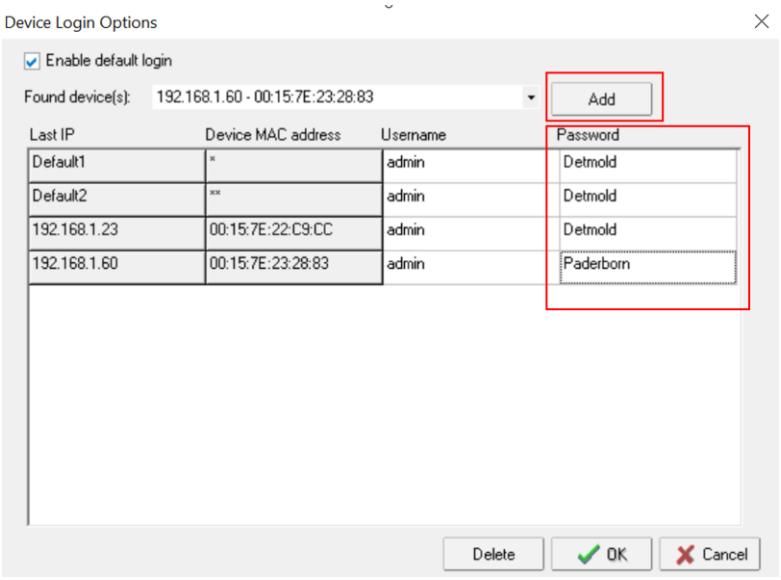


6. Make sure your IE-WL-VL-AB-BR-CL is **unlocked** before using the Administration Tool's icons setting. The IE-WL-VL-AB-BR-CL will unlock automatically if the password is set to the default. Otherwise, you must enter the new password manually.

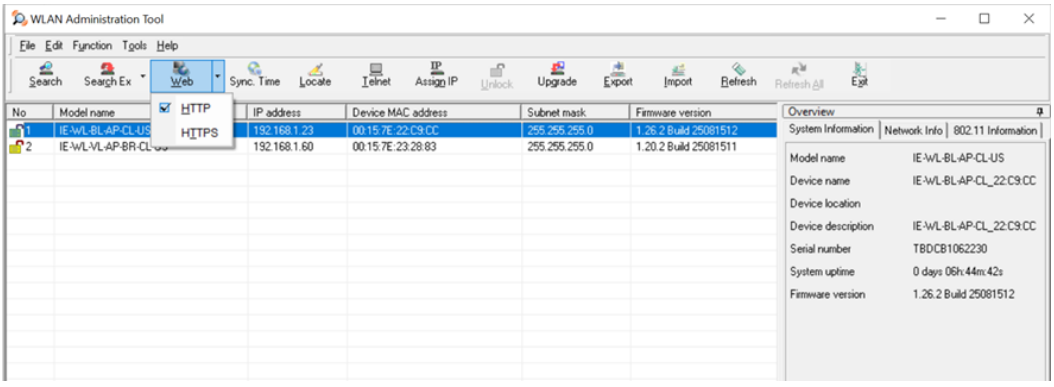
7. Go to **Tools → Device Login Options** to manage and unlock additional IE-WL-VL-AB-BR-CLs.



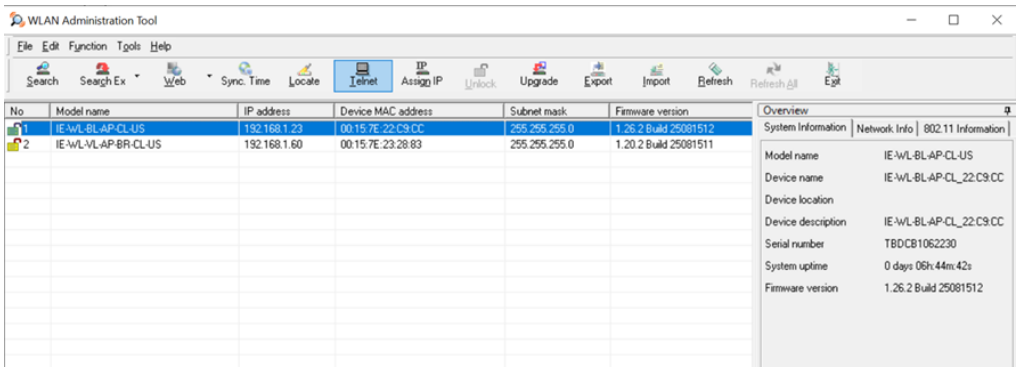
8. Use the scroll down list to select the MAC addresses of those IE-WL-VL-AB-BR-CLs you would like to manage, and then click **Add**. Key in the password for the IE-WL-VL-AB-BR-CL device and then click **OK** to save. If you return to the search page and search for the IE-WL-VL-AB-BR-CL again, you will find that the IE-WL-VL-AB-BR-CL will unlock automatically.



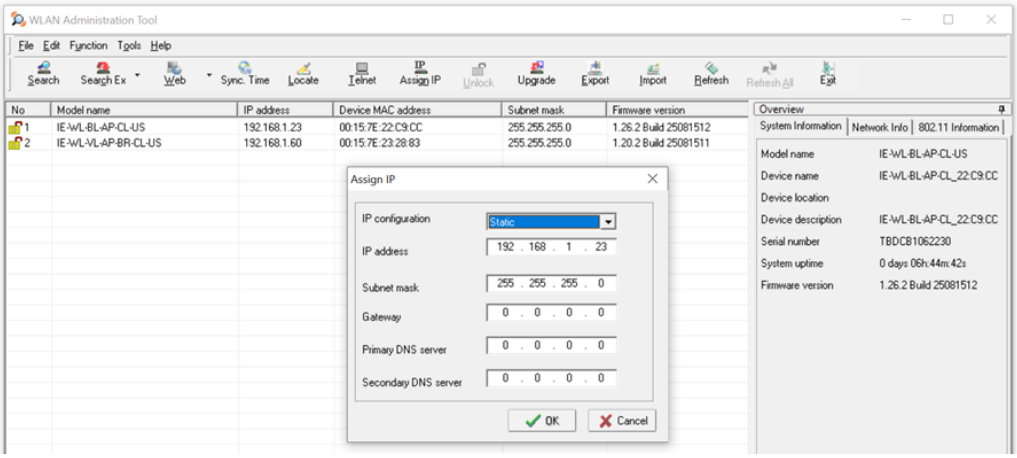
To modify the configuration of the highlighted IE-WL-VL-AB-BR-CL, click on the Web icon to open the web console. This will take you to the web console, where you can make all configuration changes. Refer to Chapter 3, "Using the Web Console," for information on how to use the web console.



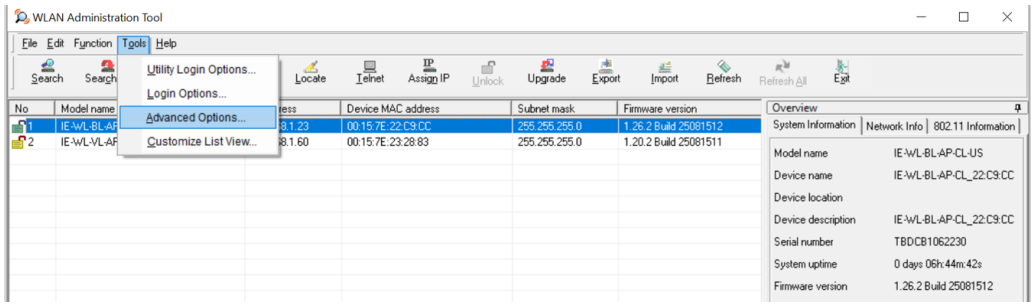
Click on **Telnet** if you would like to use telnet to configure your IE-WL-VL-AB-BR-CL.



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

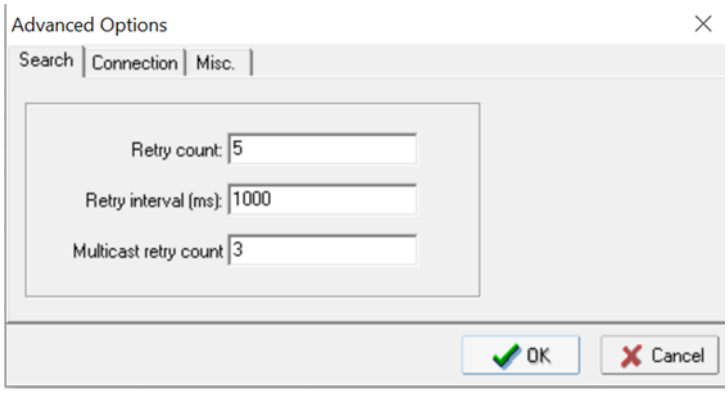


The three advanced options—**Search**, **Connection**, and **Miscellaneous**—are explained below:



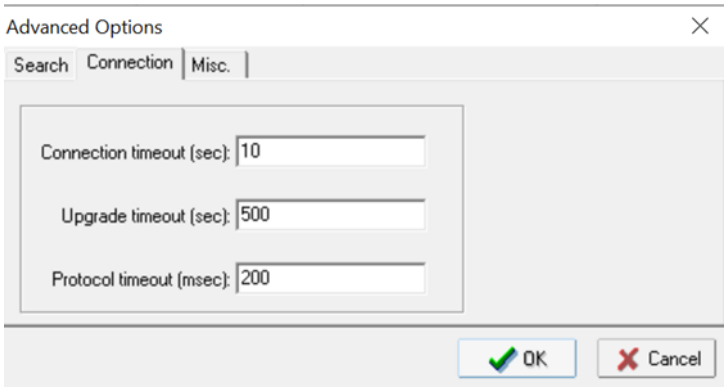
Search

- **Retry count (default=5):** Indicates how many times the search will be retried automatically.
- **Retry interval (ms):** The time lapsed 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 WLAN Administration Tool.

5

Additional Consoles

Overview

In addition to HTTP access, there are four ways to access IE-WL-VL-AP-BR-CL: serial console, Telnet console, SSH console, and HTTPS console. The serial console connection method, which requires using a short serial cable to connect the IE-WL-VL-AP-BR-CL to a PC's COM port, can be used if you do not know the IE-WL-VL-AP-BR-CL's IP address. The other consoles can be used to access the IE-WL-VL-AP-BR-CL over an Ethernet LAN, or over the Internet.

RS-232 Console Configuration (115200, None, 8, 1, VT100)

The serial console connection method, which requires using a short serial cable to connect the IE-WL-VL-AP-BR-CL to a PC's COM port, can be used if you do not know the IE-WL-VL-AP-BR-CL's IP address. It is also convenient to use serial console configurations when you cannot access the IE-WL-VL-AP-BR-CL over Ethernet LAN, such as in the case of LAN cable disconnections or broadcast storming over the LAN.

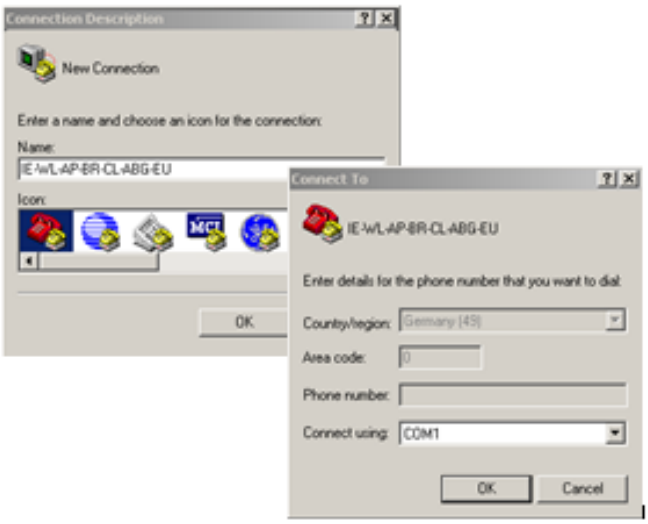
ATTENTION

Do not use the RS-232 console manager when the IE-WL-VL-AP-BR-CL is powered at reversed voltage (ex. -48VDC), even though reverse voltage protection is supported.

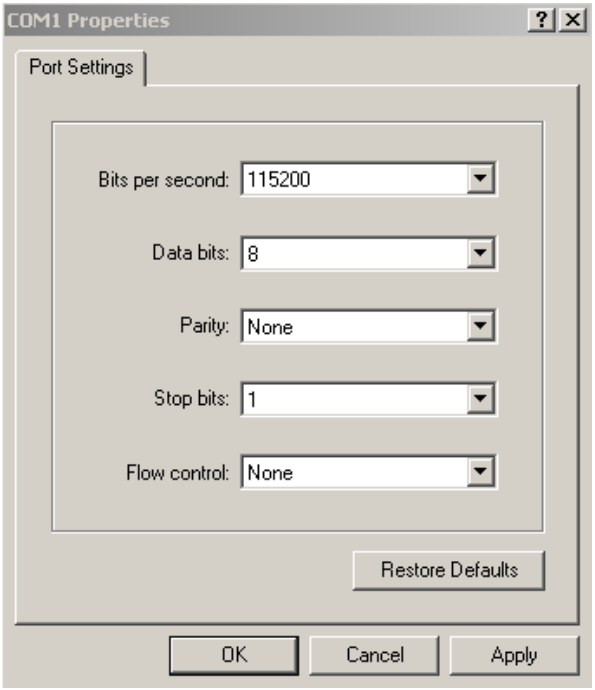
NOTE We recommend using Hyper Terminal Program, which is already installed under Windows XP operating system.

Before running Hyper Terminal Program, use an RJ45 to DB9-F (or RJ45 to DB25-F) cable to connect the device's RS-232 console port to your PC's COM port (generally COM1 or COM2, depending on how your system is set up). After starting Hyper Terminal Program, take the following steps to access the RS-232 console configuration.

1. From the Windows desktop, click Start –> Programs -> Accessories -> Communications -> Hyper Terminal.
2. Start Hyper Terminal and enter a name of your choice for the new connection. Select the appropriate COM port for console connection in the "New Connection" window.



3. Select following Communication Parameter for the console connection:
   115200 for Baud Rate, **8** for Data Bits, **None** for Parity, and **1** for Stop Bits and None for Flow control. Click on **OK** to continue.



4. The Console login screen will appear. Enter **t**he default login "**admin**" and then enter the default **Console Password** "**Detmold**" (this is the same as the Web Browser password) and then press **Enter**.

```
-------------------------------------------------
Model Name        : IE-WL-VL-AP-BR-CL-US
LAN MAC Address   : 00:15:7E:22:D6:46
Serial No         : TBDEB1001683
Firmware Version  : 1.20.2 Build 25081511
-------------------------------------------------
<< Main Menu >>
  (1) System Info Settings
  (2) Network Settings
  (3) Time Settings
  (4) Maintenance
  (6) Restart
  (q) Quit

Key in your selection:
```

5. The IE-WL-VL-AB-BR-CL´s Main Menu will be displayed
6. After entering the Main Menu, use the shown keys to move to select options.

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.

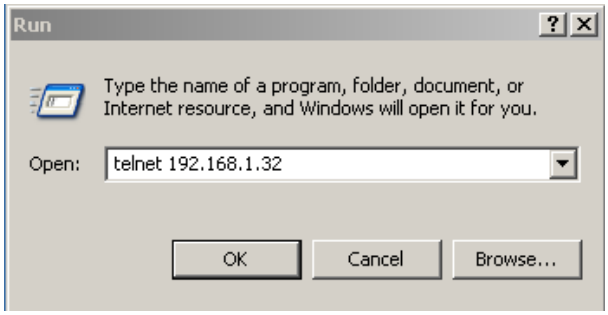
Configuration by Telnet and SSH Consoles

You can use Telnet or SSH client to access the IE-WL-VL-AB-BR-CL and manage the console over a network. To access the device's functions over the network from a PC host that is connected to the same LAN as the IE-WL-VL-AB-BR-CL, you need to make sure that the PC host and the IE-WL-VL-AB-BR-CL are on the same logical subnet. To do this, check your PC host's IP address and subnet mask.

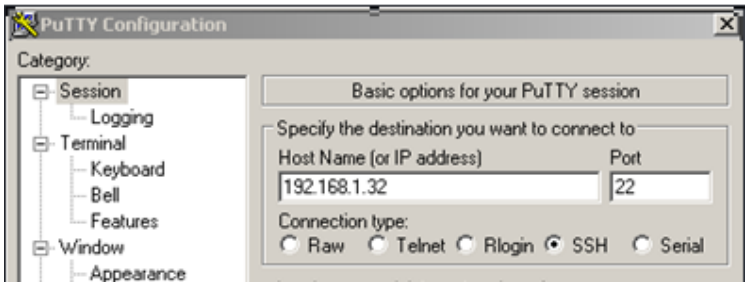
NOTE The device's default IP address is **192.168.1.110** and the default subnet mask is **255.255.255.0** (for a Class C network). If you do not set these values properly, please check the network settings of your PC host and then change the IP address to 192.168.1.xxx and subnet mask to 255.255.255.0.

Follow the steps below to access the console utility via the Telnet command or using an SSH client.

1. From Windows Desktop, run **Start** → **Run**, and then use Telnet to access the IE-WL-VL-AB-BR-CL's IP address from the Windows Run window (you may also issue the telnet command from the MS-DOS prompt).



2. When using SSH client (ex. PuTTY), please run the client program (ex. putty.exe) and then input the device's IP address, specifying **22** for the SSH connection port.



3. The Console login screen will appear. Please refer to the previous paragraph "RS-232 Console Configuration" and for login and administration.

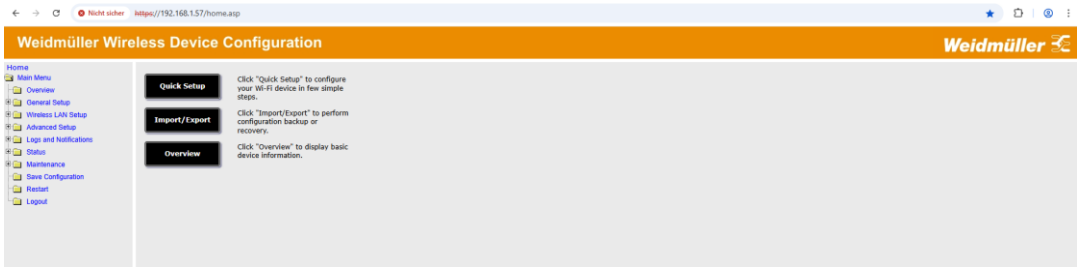
Configuration by Web Browser with HTTPS/SSL

To secure your HTTP access, the IE-WL-VL-AB-BR-CL supports HTTPS/SSL encryption for all HTTP traffic. Perform the following steps to access the IE-WL-VL-AB-BR-CL's web browser interface via HTTPS/SSL.

1. Open your web browser and type https://< IE-WL-VL-AB-BR-CL's IP address> in the address field. Press **Enter** to establish the connection.

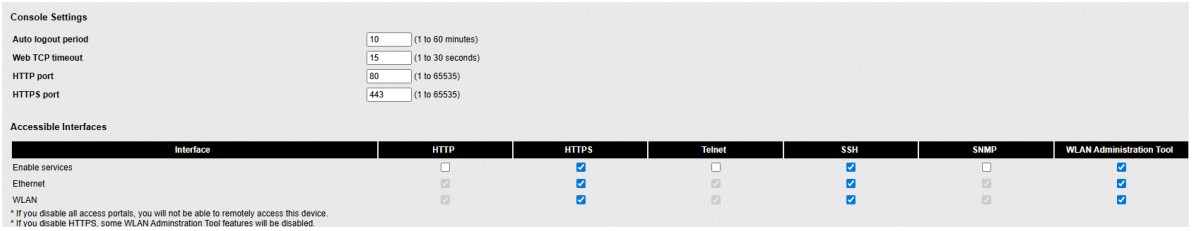
2. Warning messages will pop out to warn users that the security certificate was issued by a company they have not chosen to trust.

Select **Yes** to accept the certificate and then enter the device's web browser interface secured via HTTPS/SSL. (You can see the protocol in URL is **https**.) Then you can use the menu tree on the left side of the window to open the function pages to access each of IE-WL-VL-AB-BR-CL's functions.



Disabling Telnet and Browser Access

If you are connecting the IE-WL-VL-AB-BR-CL to a public network but do not intend to use its management functions over the network, then we suggest disabling both Telnet Console and Web Configuration. Please run **Maintenance → Console Settings** to disable them, as shown in the following figure.



A

References

This chapter provides more detailed information about wireless-related technologies. The information in this chapter can help you administer your IE-WL-VL-AP-BR-CLs and plan your industrial wireless network better.

AeroLink Protection

In industrial applications, such as communication between off-shore oil platforms, or train-to-ground communications, a reliable wireless bridge is essential to minimize system downtime and maximize system availability. Weidmüller's AeroLink Protection provides a reliable wireless bridge between two networks to form network-level redundancy.

1. **Communication Failover:** AeroLink Protection members can negotiate with each other to automatically elect an Active node for data communication. If the Active node is no long capable of sending data to its access point, it will inform other Backup nodes to resume the communication via another path.
2. **Frequency-Interference Failover:** This concept is similar to the previous model. If the communication frequency experiences interference and data can no longer be transmitted over the Active frequency, it will resume the connection via another Backup frequency.
3. **Device Failover:** After covering the communication and frequency failures, in order to provide a single-point-of-failure free wireless network, AeroLink Protection also checks the device status. If the Active node has a power failure, the Backup nodes will automatically resume the wireless communication.
4. **Scalable:** AeroLink Protection is designed to allow scalable backup paths so that users can realize complete wireless redundancy from all of the above failure types by increasing the number of backup nodes.
5. **Fast Recovery:** In addition to maintaining a redundant wireless network, another key is providing uninterrupted communication even when a failure occurs. AeroLink protection is designed to restore commutation from all failures with 300 ms.
   A member of the AeroLink Protection group can take one of the following seven states:

- **Initiation State (Init)**: Initiates the AeroLink Protection Protocol
- **Discovering State (Discover)**: Discovers other AeroLink Protection members for further negotiation
- **Idle State (Idle)**: Internal protocol checkpoint
- **Negotiation State (Nego)**: Negotiates with other AeroLink Protection members and elects an Active node.
- **Backup State (Backup)**: After negotiation, this node is assigned as a Backup node. All traffic will go through the Active node instead.

NOTE	When a node is in Backup state, the STATE LED will be blinking.

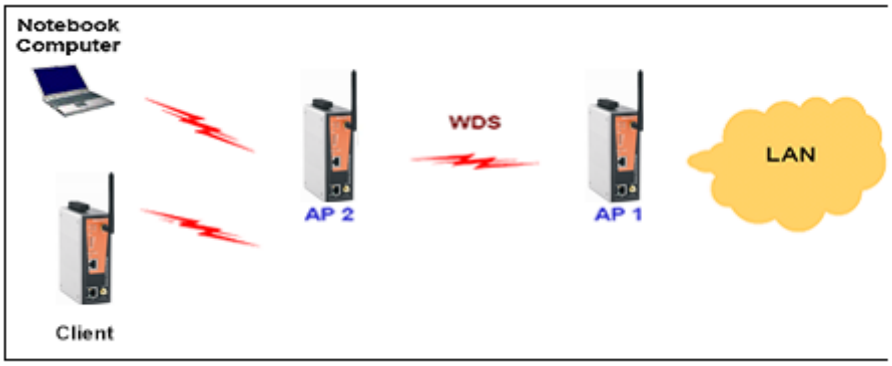
- **Active State (Active)**: After negotiation, this node is assigned as Active node, which means that all traffic will go through this node.
- **Role Change State (Change)**: If the Active node is no longer capable of data transmission via the WLAN, it will turn into Change State to trigger the re-negotiation of the Active node from the Backup nodes.

The AeroLink Protection function can adopt one of the following three detection methods:

- SNR: States the Signal-Noise Ratio (SNR) of the associated client.
- Signal Strength: States the Signal Strength of the associated client
- Disconnection

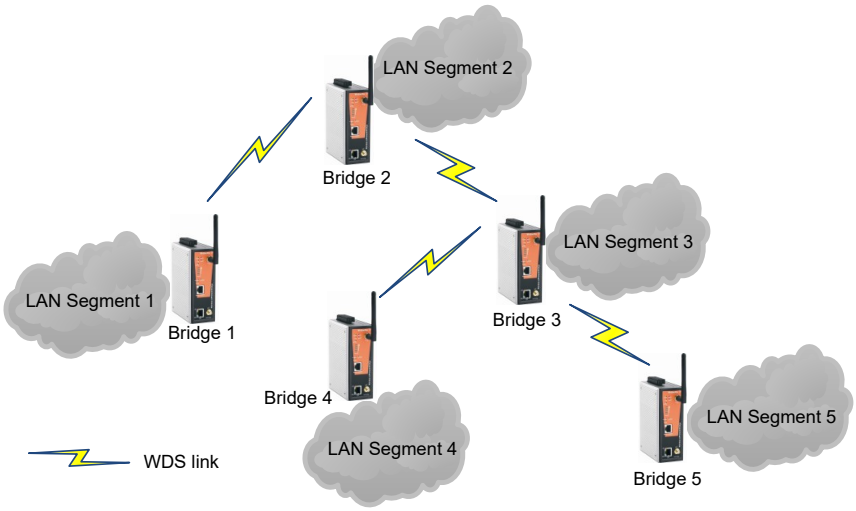
Wireless Distribution System (WDS)

Traditionally, APs are connected via Ethernet LAN ports. By using a Wireless Distribution System (WDS), APs can communicate with one another wirelessly. For example, AP 2 acts as an access point for the notebook computers or other IEEE 802.11-enabled clients, and forwards packets sent from the notebook computers to AP 1 through WDS. Then, AP 1 forwards the packets to the Ethernet LAN. Packets destined for the notebook computers follow a reverse path from the Ethernet LAN through the APs to the notebook computers. In this way, AP 2 acts as an "AP repeater."



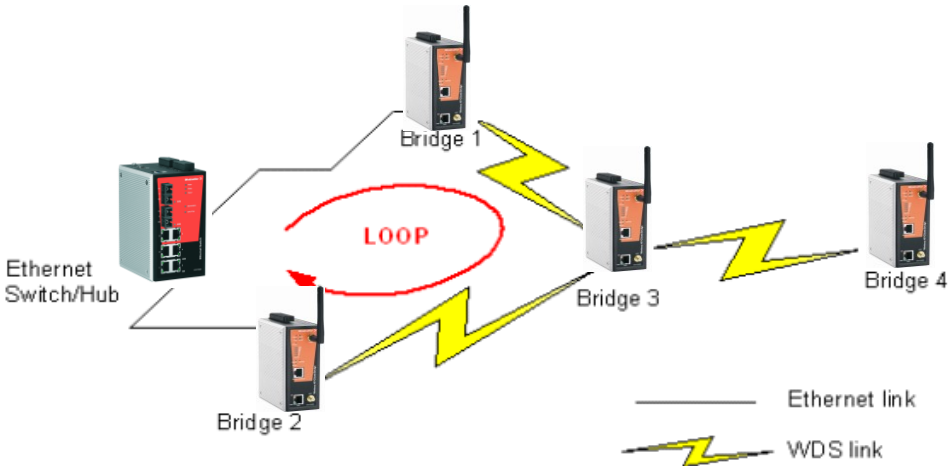
By using WDS, two or more LAN segments can be connected wirelessly. As illustrated in the figure below, a pair of wireless LAN-to-LAN bridges is used to connect two LAN segments. Since the AP is WDS-enabled, it can be used as a wireless bridge.

It is a good idea to plan your wireless network by drawing a diagram so that you know how each IE-WL-VL-AP-BR-CL is connected to other peer APs or wireless bridges by WDS, and how bridges are connected to other peer bridges by WDS. See the following figure for an example of a network-planning diagram.



ATTENTION

Be sure to eliminate loops from networks that consist of wireless bridges, Ethernet switches, Ethernet links, and WDS links. If any loops exist, packets will circle around the loops and network performance will be seriously degraded. The following figure shows a network topology containing a loop.



Beacon

A beacon is a packet broadcast by the AP to keep the network synchronized. A beacon includes the wireless LAN service area, the AP address, the Broadcast destination address, a time stamp, Delivery Traffic Indicator Maps (DTIM), and the Traffic Indicator Message (TIM). Beacon Interval indicates the frequency interval of AP.

DTIM

Delivery Traffic Indication Map (DTIM) is contained in beacon frames. It is used to indicate that broadcast and multicast frames buffered by the AP will be delivered shortly. Lower settings result in more efficient networking, while preventing your PC from dropping into power-saving sleep mode. Higher settings allow your PC to enter sleep mode, thus saving power.

Fragment

A lower setting means smaller packets, which will create more packets for each transmission. If you have decreased this value and experience high packet error rates, you can increase it again, but it will likely decrease overall network performance. Only minor modifications of this value are recommended.

RTS Threshold

RTS Threshold (32-2346) – This setting determines how large a packet can be before the Access Point coordinates transmission and reception to ensure efficient communication. This value should remain at its default setting of 2,346. When you encounter inconsistent data flow, only minor modifications are recommended.

STP and RSTP

The STP/RSTP Concept

Spanning Tree Protocol (STP) was designed to help reduce link failures in a network, and provide protection from loops. Networks that have a complicated architecture are prone to broadcast storms caused by unintended loops in the network. The STP protocol is part of the IEEE 802.1D standard, 1998 Edition bridge specification.

Rapid Spanning Tree Protocol (RSTP) implements the Spanning Tree Algorithm and Protocol defined by IEEE 802.1w-2001 standard. RSTP provides the following benefits:

- The topology of a bridged network will be determined much more quickly compared to STP.
- RSTP is backward compatible with STP, making it relatively easy to deploy. For example:
  - Defaults to sending 802.1D-style BPDUs if packets with this format are received.
  - STP (802.1D) and RSTP (802.1w) can operate on the LAN ports and WLAN ports (AP and WDS1-WDS8) of the same IE-WL-VL-AP-BR-CL.

This feature is particularly helpful when the IE-WL-VL-AP-BR-CL connects to older equipment, such as legacy switches.

Differences between RSTP and STP

RSTP is similar to STP, but includes additional information in the BPDUs that allow each bridge to confirm that it has taken action to prevent loops from forming when it decides to enable a link to a neighboring bridge. Adjacent bridges connected via point-to-point links will be able to enable a link without waiting to ensure that all other bridges in the network have had time to react to the change. The main benefit of RSTP is that the configuration decision is made locally rather than network-wide, allowing RSTP to carry out automatic configuration and restore a link faster than STP.

B

Supporting Information

This chapter presents additional information about this product.

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.

FCC 15.407(e): Within the 5.15-5.25 GHz band, U-NII devices will be restricted to indoor operations to reduce any potential for harmful interference to co-channel MSS operations.

NOTE 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.

RED Compliance Statement

Weidmüller declares that the apparatus IE-WL-VL-AP-BR-CL complies with the essential requirements and other relevant provisions of Directive 2014/53/EU.

The 5150 to 5350 MHz frequency range is restricted to indoor use only. Outdoor operation in this range is strictly prohibited.

Safety

This equipment is designed with the utmost care for the safety of those who install and use it. However, special attention must be paid to the dangers of electric shock and static electricity when working with electrical equipment. All guidelines of this and of the computer manufacturer must therefore be always allowed to ensure the safe use of the equipment.

EU Countries Not Intended for Use

None.