Anybus® Wireless Bridge II™

USER MANUAL

SCM-1202-032-EN 1.5 ENGLISH

Connecting Devices™

Important User Information

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1 Preface

1.1 About This Document

This document describes how to install and configure Anybus Wireless Bridge II.

For additional related documentation and file downloads, please visit the Anybus support website at www.anybus.com/support.

Included Additional Files

SCM-1202-064	UL Ord.Loc. compliance information
SCM-1202-065	UL Haz.Loc. compliance information
SCM-1202-066	ATEX compliance information

1.2 Document History

Version	Date	Description
1.0	2017-03-31	First public release
1.1	2017-04-19	Minor update
1.2	2017-07-14	Added Bluetooth bridge mode
1.3	2017-10-04	Update for SP2
1.4	2017-12-21	Updated for FW 1.3.9
1.5	2018-02-02	Minor update

1.3 Document Conventions

Ordered lists are used for instructions that must be carried out in sequence:

1. First do this
2. Then do this

Unordered (bulleted) lists are used for:

- Itemized information
- Instructions that can be carried out in any order

...and for action-result type instructions:

► This action...

➡ leads to this result

Bold typeface indicates interactive parts such as connectors and switches on the hardware, or menus and buttons in a graphical user interface.

```
Monospaced text is used to indicate program code and other
kinds of data input/output such as configuration scripts.
```

This is a cross-reference within this document: *Document Conventions, p. 4*

This is an external link (URL): www.hms-networks.com

This is additional information which may facilitate installation and/or operation.

! This instruction must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.

Caution
This instruction must be followed to avoid a risk of personal injury.

WARNING
This instruction must be followed to avoid a risk of death or serious injury.

2 Description

2.1 Product Description

Anybus Wireless Bridge II provides wireless communication over WLAN and/or Bluetooth® to wired networks.

Typical applications for Anybus Wireless Bridge II include:

- Adding wireless cloud connectivity to industrial devices
- Accessing devices from a laptop, smartphone or tablet
- Ethernet cable replacement between devices

Limitations:

Bluetooth PAN (Personal Area Network) may not work with some devices due to different implementations of Bluetooth by different manufacturers.

WLAN 5 GHz cannot be used at the same time as WLAN 2.4 GHz or Bluetooth.

2.2 Bluetooth or WLAN?

Use Bluetooth when...

- ...the wireless link has an Anybus Wireless Bridge II or Anybus Wireless Bolt at both ends.
- ...an interruption-free connection is more important than data throughput speed.
- ...interference robustness is important – e.g. in an industrial environment.
- ...a Profinet I/O cycle time or EtherNet/IP RPI of 64 ms or more is acceptable.

Use WLAN when...

- ...connecting to other types of wireless devices or a WLAN infrastructure.
- ...high data throughput speed is more important than connection reliability.
- ...large file transfers are expected.
- ...WLAN channel frequency planning is possible.
- ...a low Profinet I/O cycle time or EtherNet/IP RPI is desired.

2.3 Model Name – Certification Identifier

The model name is used to identify the product for various certifications. It consists of a model prefix followed by two designators for the specific interface configuration and functionality.

Prefix	AWB3	Anybus Wireless Bridge II
Interface configuration	A B	Internal antenna (Closed Type), interfaces: Dual M12 External antenna (Open Type), interfaces: Dual M12, RP-SMA
Functionality	A B	Ethernet with digital input Ethernet w/o digital input

Example: AWB3AA = Anybus Wireless Bridge II with internal antenna, Ethernet networking and digital input.

3 Installation

3.1 Safety

Caution
This equipment emits RF energy in the ISM (Industrial, Scientific, Medical) band. Make sure that all medical devices used in proximity to this device meet appropriate susceptibility specifications for this type of RF energy.

! This product is recommended for use in both industrial and domestic environments. For industrial environments it is mandatory to use the functional earth connection to comply with immunity requirements. For domestic environments the functional earth must be omitted if a shielded Ethernet cable is used, in order to meet emission requirements.

! This product contains parts that can be damaged by electrostatic discharge (ESD). Use ESD prevention measures to avoid damage.

See also additional safety instructions in the included compliance information.

3.2 General Information

Make sure that you have all the necessary information about the capabilities and restrictions of your local network environment before installation.

The characteristics of the internal antenna should be considered when choosing the placement and orientation of the unit (unless an external antenna is used).

See *Technical Data, p. 35* for details about the antenna characteristics.

For optimal reception, wireless devices require a zone between them clear of objects that could otherwise obstruct or reflect the signal. A minimum distance of 50 cm between the devices should also be observed to avoid interference.

See also *Wireless Technology Basics, p. 34*.

3.3 Mechanical Installation

Anybus Wireless Bridge II can be screw-mounted directly onto a flat surface or mounted on a standard DIN rail using the optional DIN mounting kit.

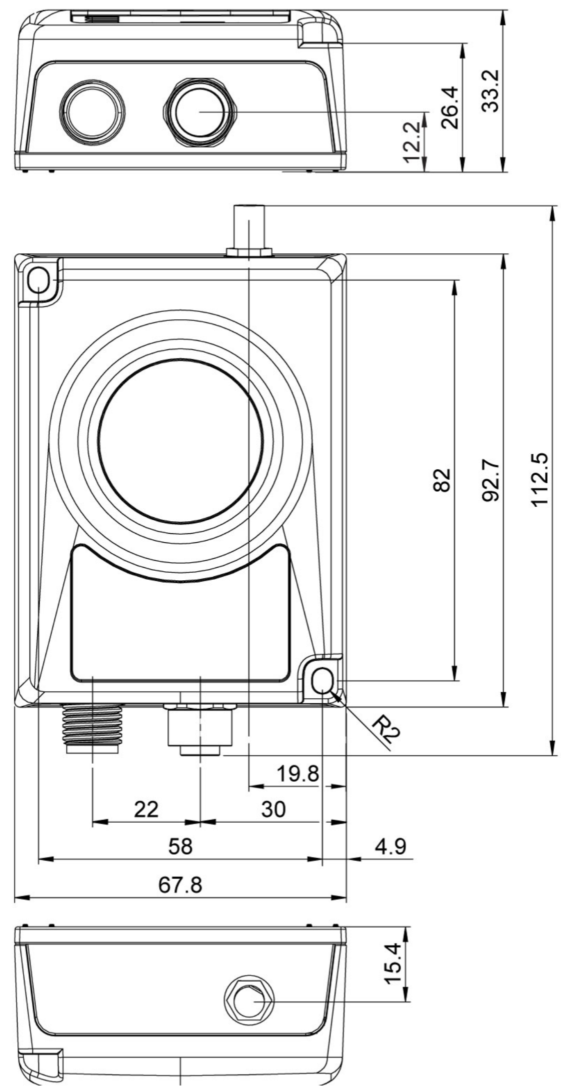


Fig. 1 Installation drawing

All measurements are in mm.

3.4 Connectors

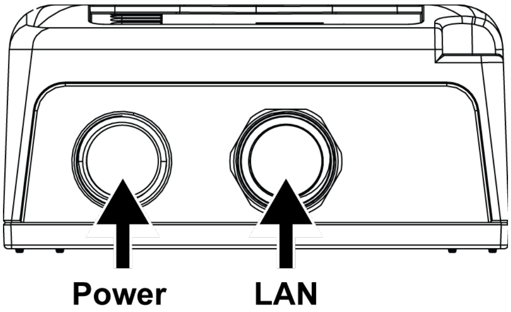
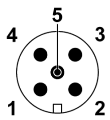


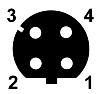
Fig. 2 M12 connectors

Power Connector (A-coded male M12)

	Pin	Function
	1	Power + (9–30 V)
	2	Digital Input Ground
	3	Power Ground
	4	Digital Input + (9–30 V)
	5	Functional Earth

! Signal wiring for the digital input must be carried in the same cable as power and functional earth if wiring length exceeds 3 meters.

LAN Connector (D-coded female M12)

	Pin	Function	Color coding (T568B)
	1	Transmit +	Orange/White
	2	Receive +	Green/White
	3	Transmit -	Orange
	4	Receive -	Green

3.5 LED Indicators

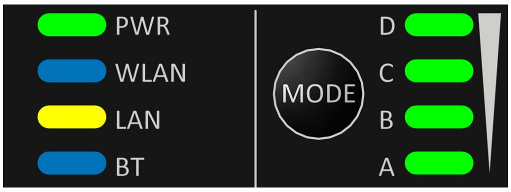


Fig. 3 LED indicators

PWR	Off	No power
	Green	Normal operation
WLAN	Off	WLAN disabled or no power
	Blue, blinking	Access Point: No clients, awaiting connections
	Blue	Access Point: Connected to at least one client Client: Connected to access point
	Blue, flickering	WLAN data activity (when connected)
	Purple, blinking	Client: Scanning for access points
	Purple	Client: Connecting to a detected access point
	Red	Unrecoverable error
LAN	Off	No Ethernet connection
	Yellow	Ethernet link present
	Yellow, flickering	Ethernet data activity (when connected)
BT	Off	Bluetooth disabled or no power
	Blue, blinking	NAP: No clients, awaiting connections
	Blue	NAP: Connected to at least one PANU client PANU: Connected to NAP
	Blue, flickering	Bluetooth data activity (when connected)
	Purple	PANU: Trying to connect to NAP
	Red	Unrecoverable error

RSSI (WLAN Client) / Link Quality (Bluetooth PANU)

				No connection
A				RSSI/Link Quality < 25 %
A	B			RSSI/Link Quality 25–50 %
A	B	C		RSSI/Link Quality 50–75 %
A	B	C	D	RSSI/Link Quality > 75 %

Additional LED indications are used when the unit is in Recovery Mode.
See *Recovery Mode LED Indications, p. 25*.

4 Configuration

4.1 General

Anybus Wireless Bridge II can be configured via the web interface or using one of the pre-configured **Easy Config** modes.

Advanced configuration can be carried out by issuing AT (modem) commands through the web interface or over a Telnet or RAW TCP connection to port 8080.

4.2 Easy Config

1. Power on the unit and wait for the **Link Quality** LEDs to light up and go out again, then immediately press and release the **MODE** button.
2. Press **MODE** repeatedly to cycle through the Easy Config modes until the desired mode is indicated by the **A-B-C-D** LEDs.
3. Within 20 seconds of step 2, press and hold **MODE** for 2 seconds. When the button is released the unit will restart in the selected mode.

Easy Config Modes

Mode	Role	Description	LED			
2	—	Reset configuration to factory defaults.		B		
3	—	Reset IP settings to factory defaults.	A	B		
4	Client	Wait for automatic configuration.			C	
5	WLAN AP	Configure units in mode 4 as clients. Restart as access point and connect clients.	A		C	
6	Bluetooth NAP			B	C	
7	WLAN AP	Configure units in mode 4 as clients. Restart as access point and connect clients. Apply PROFINET optimizations to all units.	A	B	C	
8	Bluetooth NAP					D
10	—	Apply PROFINET optimizations and restart.		B		D

Modes 5 – 8 will scan for units in mode 4. Detected units will be reconfigured as clients, and the scanning unit will restart as an access point. The clients will then restart and connect to the access point.

Modes 7 and 8 will additionally apply PROFINET optimization to all the units. PROFINET messages will then have priority over TCP/IP frames.

Mode Timeout

- Modes 5 – 8 will time out after 120 seconds. Apply the mode again to repeat the scan.
- Mode 4 will listen for 120 seconds or until receiving a configuration.

> **!** The IP address of a client may be changed by the configuration from the access point. Active browser sessions could therefore be lost.

4.3 Web Interface

The web interface is accessed by pointing a web browser to the IP address of the Wireless Bridge. The default IP address is **192.168.0.99**. The computer accessing the web interface must be in the same IP subnet as the Wireless Bridge.

> **!** The web interface is designed for the current stable versions of Internet Explorer, Chrome, Firefox and Safari. Other browsers may not support the full functionality of the web interface.

4.3.1 System Overview

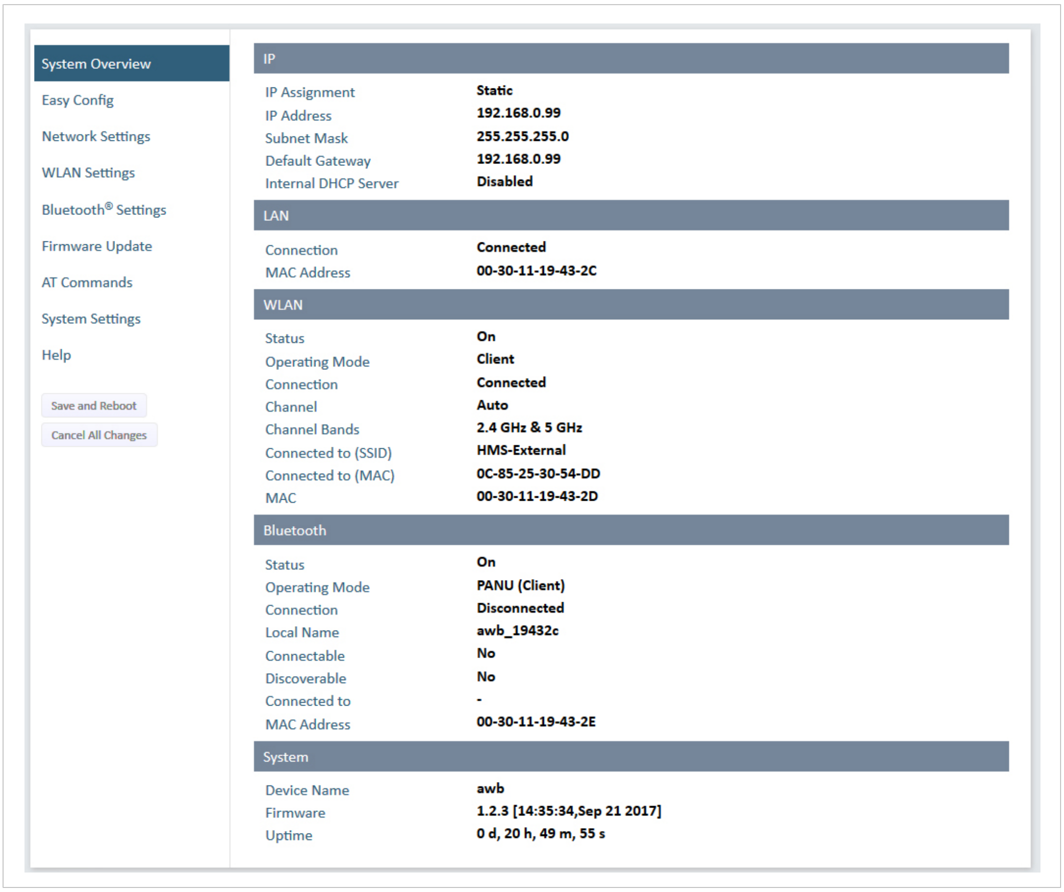


Fig. 4 System Overview page

The **Save and Reboot** button will become enabled if the unit must be restarted for a parameter change to come into effect.

To revert to the currently active configuration without saving the parameter changes, click on **Cancel All Changes**.

4.3.2 Easy Config

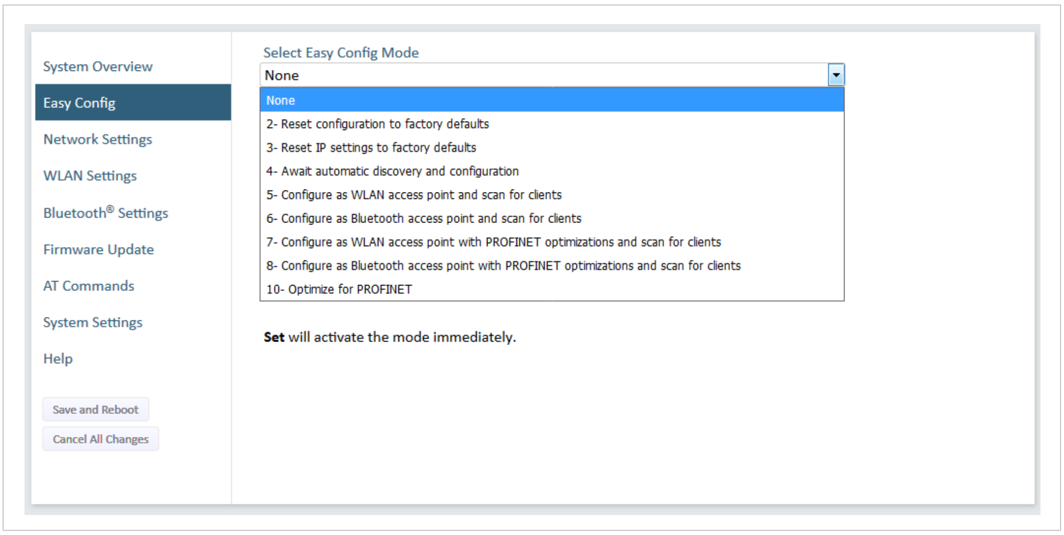


Fig. 5 Easy Config page

To activate an Easy Config mode, select it from the dropdown menu and click on **Set**.

Easy Config Modes

Mode	Role	Description	LED			
2	—	Reset configuration to factory defaults.		B		
3	—	Reset IP settings to factory defaults.	A	B		
4	Client	Wait for automatic configuration.			C	
5	WLAN AP	Configure units in mode 4 as clients. Restart as access point and connect clients.	A		C	
6	Bluetooth NAP			B	C	
7	WLAN AP	Configure units in mode 4 as clients. Restart as access point and connect clients. Apply PROFINET optimizations to all units.	A	B	C	
8	Bluetooth NAP					D
10	—	Apply PROFINET optimizations and restart.		B		D

Modes 5 – 8 will scan for units in mode 4. Detected units will be reconfigured as clients, and the scanning unit will restart as an access point. The clients will then restart and connect to the access point.

Modes 7 and 8 will additionally apply PROFINET optimization to all the units. PROFINET messages will then have priority over TCP/IP frames.

Mode Timeout

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- Mode 4 will listen for 120 seconds or until receiving a configuration.

!	The IP address of a client may be changed by the configuration from the access point. Active browser sessions could therefore be lost.

4.3.3 Network Settings

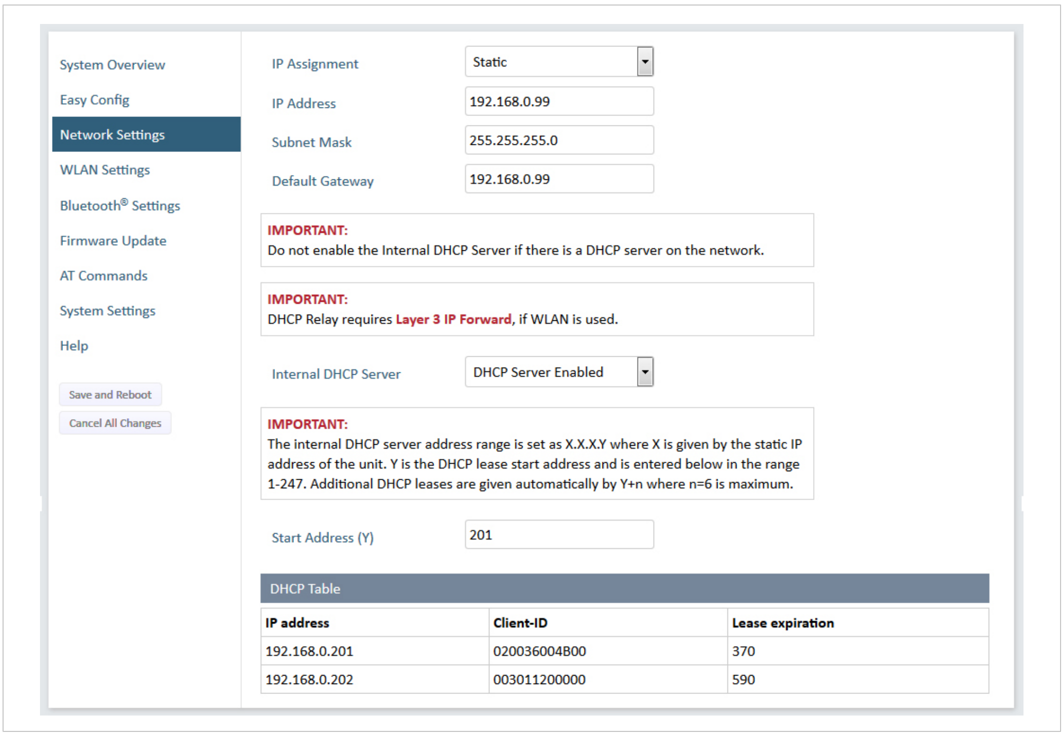


Fig. 6 Network Settings page

IP Assignment Select static or dynamic IP addressing (DHCP)

IP Address Static IP address for the unit
The browser should automatically be redirected to the new address after clicking on **Save and Reboot** (not supported by all browsers).

Subnet Mask Subnet mask when using static IP

Default Gateway Default gateway when using static IP

Internal DHCP Server **Disabled:** No internal DHCP functionality

DHCP Relay Enabled: The unit can receive a DHCP request on one interface and resend it to a DHCP server located on one of the other interfaces.
Only a single DHCP server can be active for all the connected interfaces.
If WLAN is used, the forwarding mode must be set to Layer 3 IP Forward.

DHCP Server Enabled: Activates an internal DHCP server. This option is only available when IP Assignment is set to Static.
Do not enable this option if there is already a DHCP server on the network!

Start Address (Y) The internal DHCP server will assign up to 7 IP addresses starting from **X.X.X.Y**, where **X** is taken from the current static IP address setting, and **Y** is the value in **Start Address**. Already allocated addresses will be skipped, including the address of the unit itself. The subnet mask setting will be ignored.

Examples:
IP Address: 192.168.0.99, Start Address: 101
DHCP range = 192.168.0.101 – 192.168.0.107

IP Address: 192.168.0.103, Start Address: 101
DHCP range = 192.168.0.101 – 192.168.0.108
7 addresses are allocated but the address of the unit is skipped.

4.3.4 WLAN Settings – Client Mode

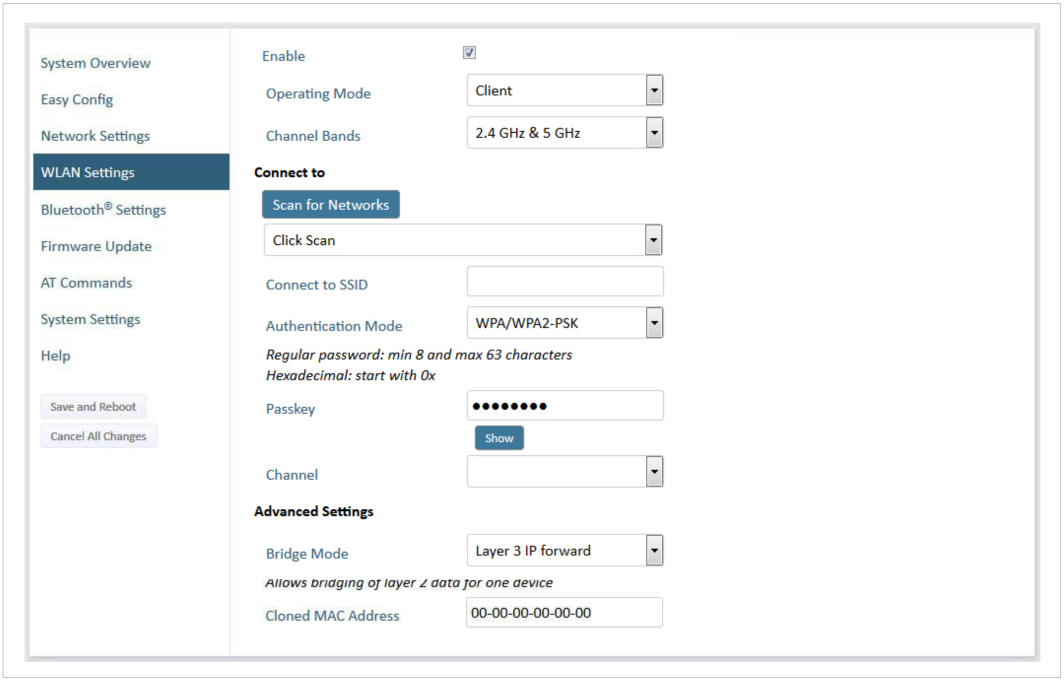


Fig. 7 WLAN Settings – Client

Enable	Enable/disable the WLAN interface.
Operating Mode	Choose operation as WLAN Client or Access Point. If Access Point is selected, additional parameters will be visible.
Channel Bands	Choose to scan on only the 2.4 GHz or 5 GHz channel band, or on both (default). The unit must be rebooted to enable the new setting.

The unit can be configured to scan on both the 2.4 GHz and 5 GHz channel bands but can only communicate on one band at a time.

Scan for Networks	Click to scan the selected frequency band(s) for discoverable WLAN networks. Select a network from the dropdown menu to connect to it.
Connect to SSID	To connect manually to a network, enter its SSID (network name) here. This can be used if the network does not broadcast its SSID.
Authentication Mode	Select the authentication/encryption mode required by the network. **Open** = No encryption or authentication
Passkey	Enter the passkey when using WPA/WPA2-PSK or WEP64/128.
Username, Domain, Passphrase	Authentication details when using LEAP or PEAP (WPA2 Enterprise).
Channel	Select a specific channel to use when scanning for networks. Which channels are available depend on the **Channel Bands** setting. **Auto** = all channels will be scanned (default).

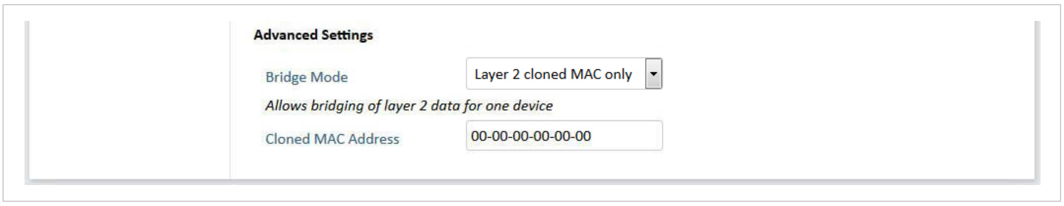


Fig. 8 WLAN Client – Advanced Settings

Advanced Settings	
Bridge Mode	**Layer 2 tunnel** = All layer 2 data will be bridged over WLAN. Use when multiple devices on both sides of an Ethernet network bridge must be able to communicate via WLAN (many-to-many). Only works between Anybus Wireless Bolt or Wireless Bridge II devices. **Layer 2 cloned MAC only** = Layer 2 data from only a single MAC address (specified below) will be bridged over WLAN (many-to-one). **Layer 3 IP forward** (default) = IP data from all devices will be bridged over WLAN. This mode must be used when using the DHCP Relay function.
Cloned MAC Address	The MAC address to use with **Layer 2 cloned MAC only** (see above).

4.3.5 WLAN Settings – Access Point Mode

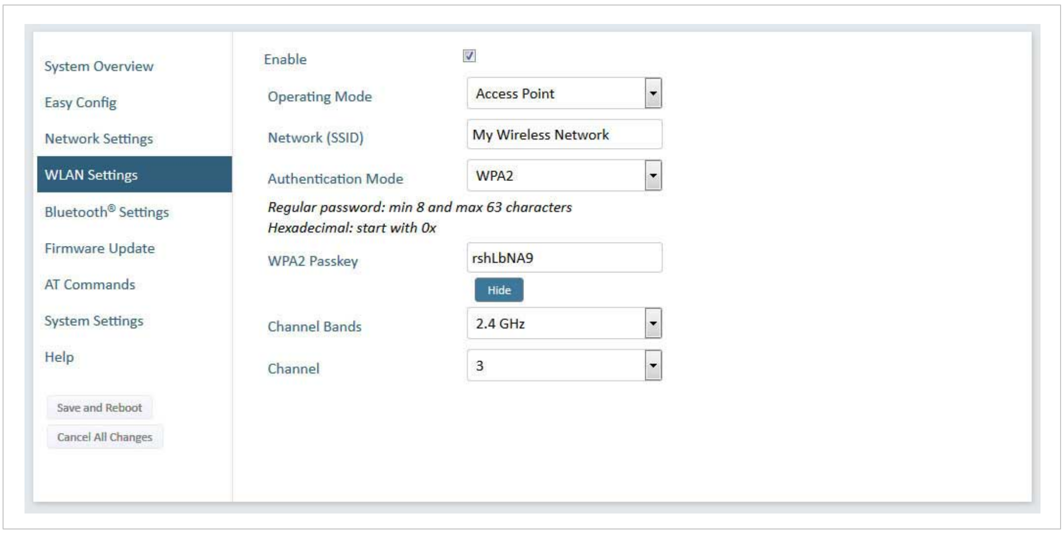


Fig. 9 WLAN Settings – Access Point

The following settings are specific when Access Point mode is selected.

Network (SSID)	Enter an SSID (network name) for the Wireless Bridge. If this entry is left blank, the unit will generate an SSID which includes the last 6 characters of the MAC ID.
Authentication Mode	Select the authentication/encryption mode to use for the access point. **Open** = No encryption or authentication **WPA2** = WPA2 PSK authentication with AES/CCMP encryption
WPA2 Passkey	Enter a string in plain text or hexadecimal format to use for authentication. Regular (plain text) passwords must be between 8 and 63 characters. All characters in the ASCII printable range (32–126) are allowed, except `"` (double quote) `,` (comma) and `\` (backslash). Hexadecimal passwords must start with `0x` and be **exactly** 64 characters. See also the example passwords below.
Channel Bands, Channel	Select the WLAN channel band and channel to use for the access point.

Password examples

For plain text passwords a combination of upper and lower case letters, numbers, and special characters is recommended.

Example of a strong plain text password:
`uS78_xpa&43`

Example of hexadecimal password:
`0x000102030405060708090a0b0c0d0e0f101112131415161718191a1b1c1d1e1f`

> **!** Do not use the example passwords above in a live environment!

4.3.6 Bluetooth Settings – General

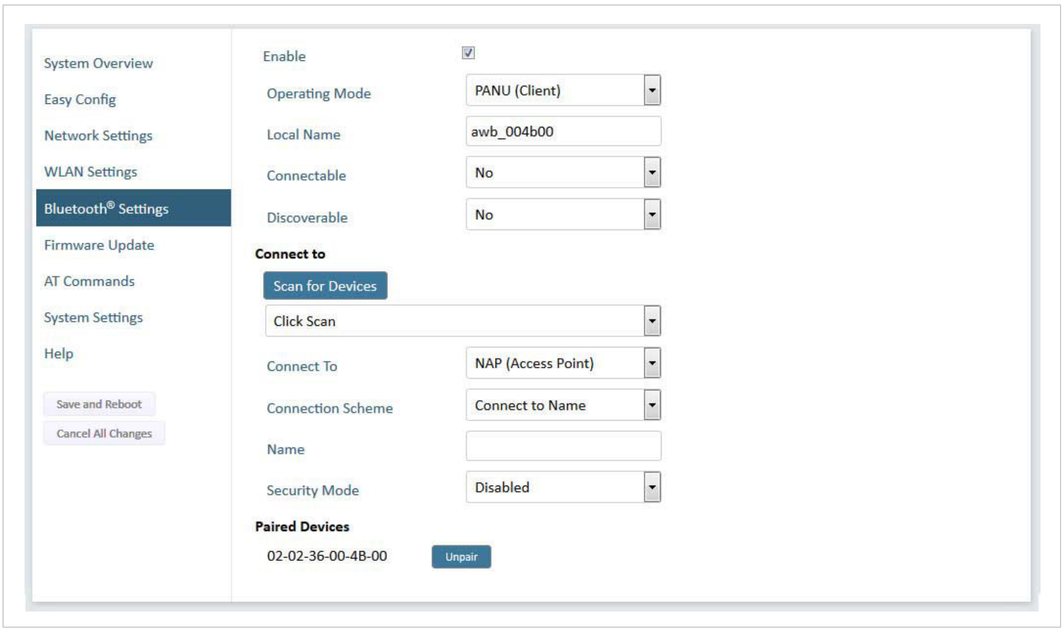


Fig. 10 Bluetooth Settings

Enable	Enable/disable the Bluetooth interface.
Operating Mode	**PANU (Client)** = The unit will operate as a Bluetooth PAN (Personal Area Network) User device. It can connect to another single Bluetooth PANU device or to a Bluetooth Network Access Point. **NAP (Access Point)** = The unit will operate as a Bluetooth Network Access Point. It can connect to up to 7 Bluetooth PANU devices.
Local Name	Identifies the unit to other Bluetooth devices. If left blank, the unit will use a default name including the last 6 characters of the MAC ID.
Connectable	Enable to make the unit accept connections initiated by other Bluetooth devices.
Discoverable	Enable to make the unit visible to other Bluetooth devices.
Security Mode	**Disabled** = No encryption or authentication. **PIN** = Encrypted connection with PIN code security. This mode only works between two units of this type and brand (not with third-party devices). PIN codes must consist of 4 to 6 digits. **Just Works** = Encrypted connection without PIN code.
Paired Devices	Lists the currently connected Bluetooth devices.

4.3.7 Bluetooth Settings – PANU Mode

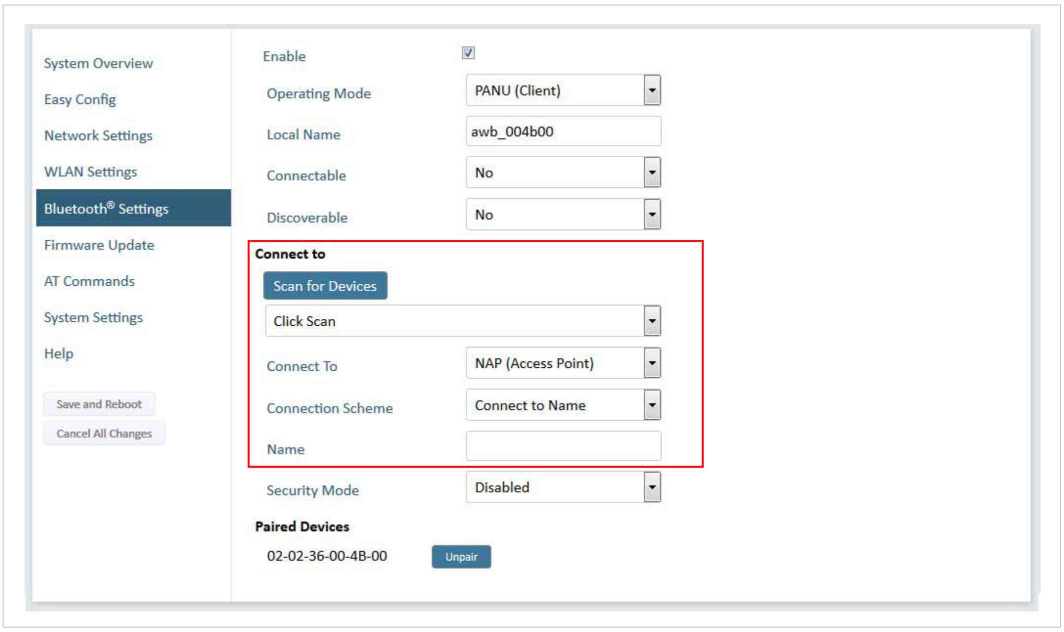


Fig. 11 Bluetooth Settings – PANU

PANU mode only	
Scan for Devices	Scans the network for discoverable Bluetooth devices. To connect to a device, select it from the dropdown menu when the scan has completed.
Connect To	Used when connecting manually to a NAP or PANU device.
Connection Scheme	Choose whether to select a Bluetooth device by MAC address or name when connecting manually.
Name	Name of the Bluetooth device to connect to.

4.3.8 Bluetooth Settings – NAP Mode

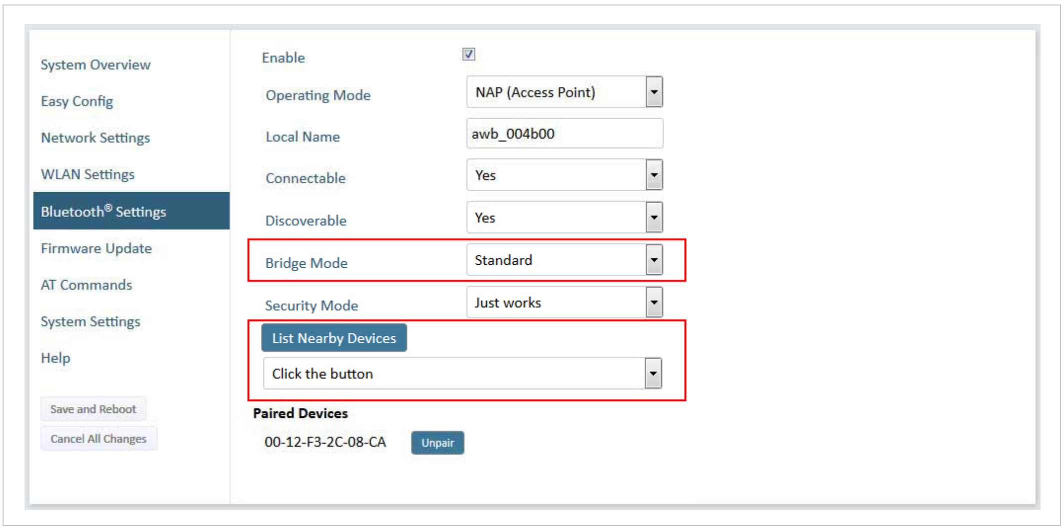


Fig. 12 Bluetooth settings – NAP

NAP mode only	
Bridge Mode	**Standard** = Default mode. **Layer 3 IP forward** = IP data will be bridged over Bluetooth. This mode must be used when connecting to an Android device over Bluetooth. The network must have an active DHCP server.
List Nearby Devices	Scans the network and lists discoverable Bluetooth devices. Pairing cannot be initiated in NAP mode.

4.3.9 Firmware Update

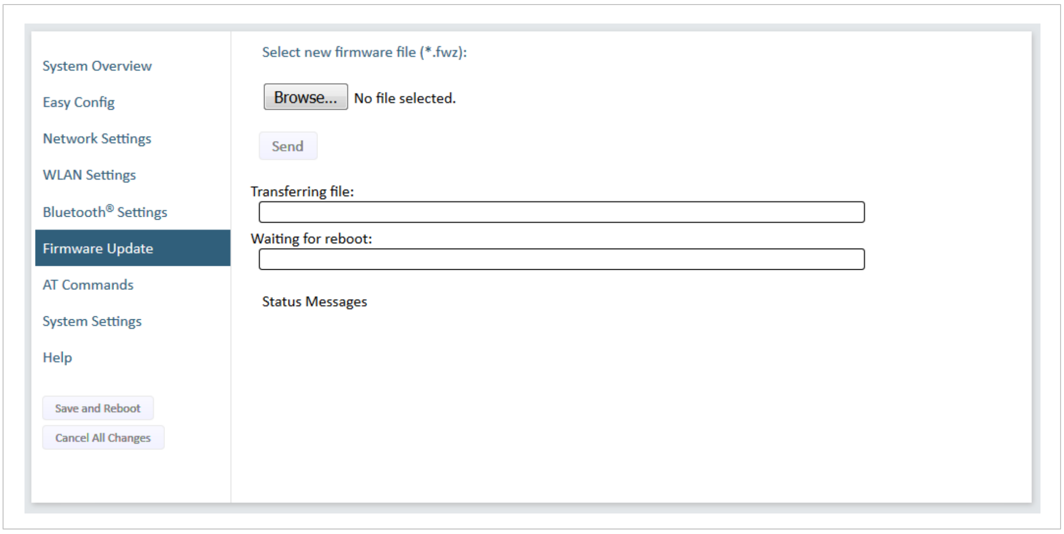


Fig. 13 Firmware Update

Click on **Browse** to select a firmware file, then click on **Send** to download it to the unit.

Both progress bars will turn green when the firmware update has been completed. The unit will then reboot automatically.

4.3.10 AT Commands

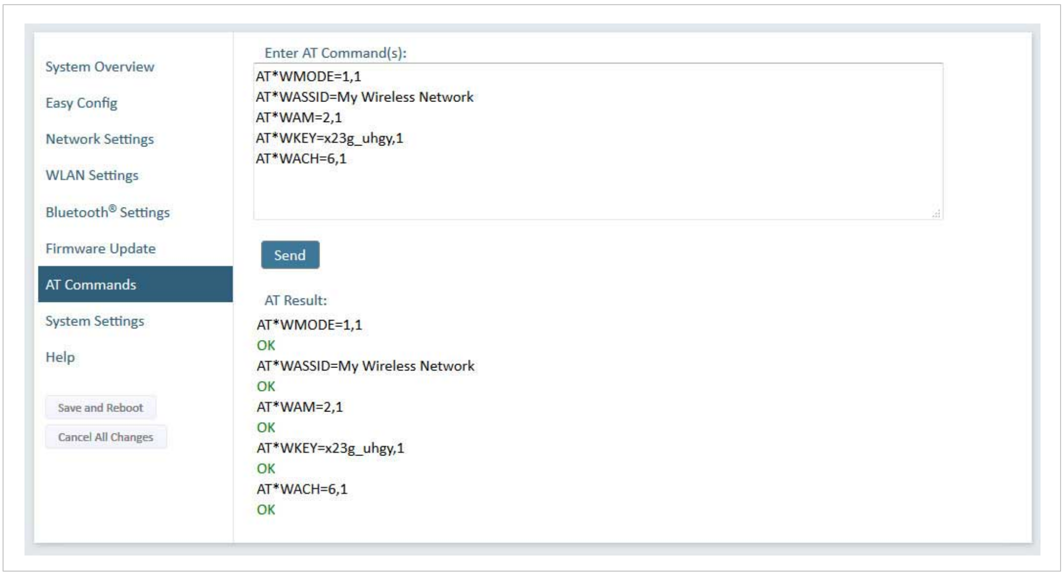


Fig. 14 AT Commands

AT commands can be used for setting advanced parameters that are not accessible in the web interface, to read out parameters in text format, and for batch configuration using command scripts.

Enter or paste the commands into the text box, then click on **Send**. The result codes will be displayed below the text box.

See the *AT Commands Reference Guide* for a complete list of supported AT commands.

4.3.11 System Settings

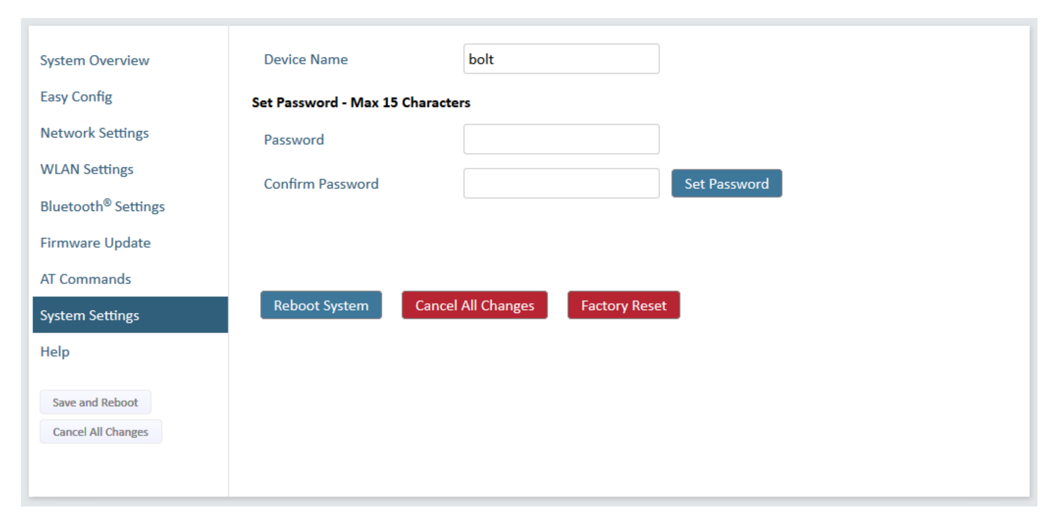


Fig. 15 System Settings

Device Name	Enter a descriptive name for the unit.
Password	Enter a password for accessing the web interface.
Reboot System	Reboots the system without applying changes.
Cancel All Changes	Restores all parameters in the web interface to the currently active values.
Factory Reset	Resets the unit to the factory default settings and reboots.

! Setting a secure password for the unit is strongly recommended.

4.4 Factory Restore

Any one of these actions will restore the factory default settings:

- Holding **MODE** pressed for >10 seconds and then releasing it
- Executing **Easy Config Mode 2**
- Clicking on **Factory Restore** on the **System Settings** page
- Issuing the AT command **AT&F** and then restarting the unit

Default Network Settings

IP Assignment	Static
IP Address	192.168.0.99
Subnet Mask	255.255.255.0
Default Gateway	192.168.0.99

Default WLAN Settings

Operating Mode	Client
Channel Bands	2.4 GHz & 5 GHz
Authentication Mode	WPA/WPA2–PSK
Channel	Auto
Bridge Mode	Layer 3 IP forward

Default Bluetooth Settings

Operating Mode	PANU (Client)
Local Name	[generated from MAC address]
Security Mode	Just works

Default System Settings

Password	[empty]

> **!** Setting a secure password for the unit is strongly recommended.

4.5 MODE Button

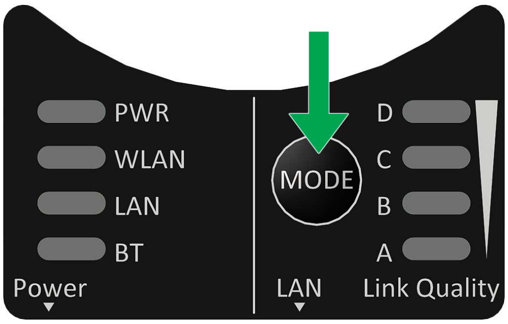


Fig. 16 Overlay

The **MODE** button can be used to restart or reset the unit as well as for selecting an Easy Config mode.

► Press and hold the button for >10 seconds and then release it to reset to the factory default settings (when the unit is powered on).

► Press and hold the button during startup to enter *Recovery Mode*.

Recovery Mode

If the web interface cannot be accessed, the unit can be reset by starting in Recovery Mode and reinstalling the firmware using Anybus Firmware Manager II, which can be downloaded from www.anybus.com/support.

> **!** Firmware updates should normally be carried out through the web interface. Recovery Mode should only be used if the unit is unresponsive and the web interface cannot be accessed.

Recovery Mode LED Indications

In Recovery Mode the LEDs will indicate firmware update status:

PWR	Green	Firmware update in progress
	Green, blinking	Waiting for valid firmware
WLAN + **BT**	Alternating red/blue	Firmware update in progress

A Configuration Examples

A.1 Ethernet Bridge via WLAN or Bluetooth®

Configuration with Easy Config

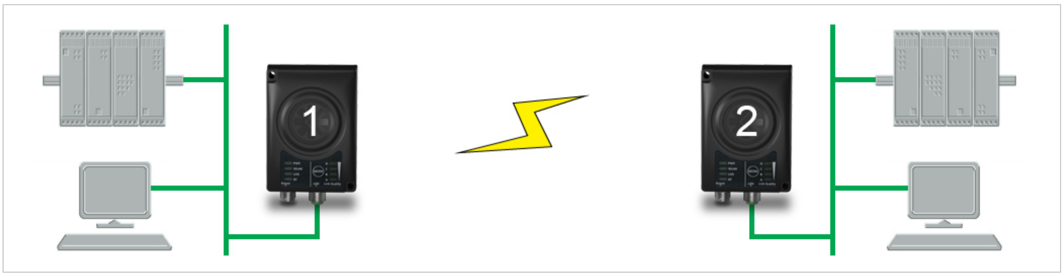


Fig. 17 Ethernet bridge

This example describes how to connect two Ethernet network segments via WLAN or Bluetooth using Easy Config.

Configuration

1. Power on the first unit and wait for the LEDs to light up and go out, then press **MODE** and release it immediately.
2. Press **MODE** repeatedly until only LED **C** is lit (Easy Config Mode 4), then confirm by pressing and holding **MODE** for 2 seconds.

   This unit will now be discoverable and open for automatic configuration.
3. Power on the second unit and wait for the LEDs to light up and go out, then press **MODE** and release it immediately..
4. Press **MODE** repeatedly on the second unit until **A** + **C** are lit (Mode 5) for WLAN, or **B** + **C** (Mode 6) for Bluetooth, then confirm by pressing and holding **MODE** for 2 seconds.

   This unit should now automatically discover and configure unit 1 as a WLAN or Bluetooth client, and configure itself as an access point.

   Unit 1 will automatically be assigned the first free IP address within the same Ethernet subnet as unit 2.

Adding More Devices

Up to 6 additional clients can be added by repeating the procedure. Each new client will be assigned the next free IP address within the current subnet.

A.2 PROFINET networking via Bluetooth®

Configuration with Easy Config

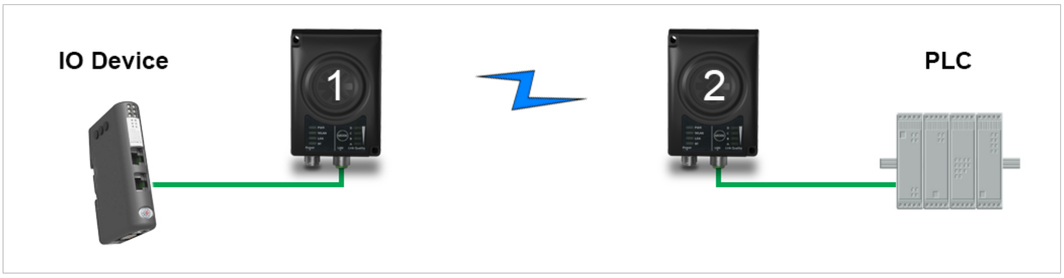


Fig. 18 PROFINET wireless network

This example describes how to connect a PROFINET IO device and a PROFINET PLC over Bluetooth using two Wireless Bridges and Easy Config.

The Wireless Bridges will be configured with PROFINET optimization, which means that PROFINET messages will have priority over TCP/IP frames.

See the respective documentation for the IO device and PLC on how to configure them for PROFINET communication.

Configuration

1. Reset both Wireless Bridges to the factory default settings.
2. Connect Wireless Bridge 1 to the IO device and Wireless Bridge 2 to the PLC.
3. Set Wireless Bridge 1 to Easy Config **Mode 4**.

   This unit will now be discoverable and open for automatic configuration.
4. Set Wireless Bridge 2 to Easy Config **Mode 8**

   This unit should now automatically discover and configure unit 1 as a Bluetooth client, and configure itself as an access point. Both units will be optimized for PROFINET.

The IO device should now be able to communicate with the PLC as if using a wired connection.

Adding More Devices

Up to 6 additional clients can be added by repeating the procedure. Each new client will be assigned the next free IP address within the current subnet.

! The IO cycle update time for each IO device must be set to ≥ 64 ms.

A.3 EtherNet/IP™ Networking via Bluetooth®

Configuration with Easy Config

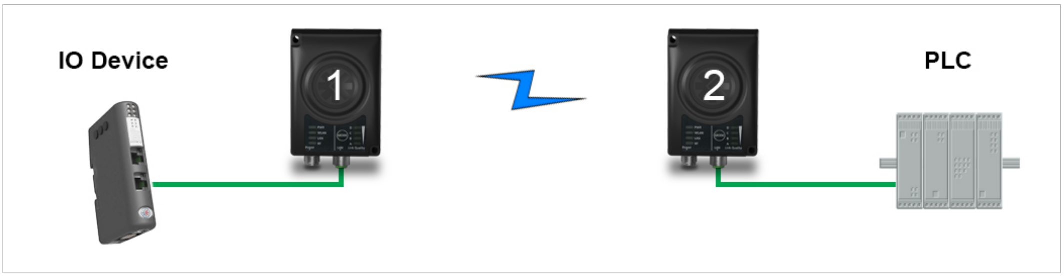


Fig. 19 EtherNet/IP wireless network

This example describes how to connect an EtherNet/IP IO device and an EtherNet/IP PLC over Bluetooth using two Wireless Bridges and Easy Config.

See the respective documentation for the IO device and PLC on how to configure them for EtherNet/IP communication.

Configuration

1. Reset both Wireless Bridges to the factory default settings.
2. Connect Wireless Bridge 1 to the IO device and Wireless Bridge 2 to the PLC.
3. Set Wireless Bridge 1 to Easy Config **Mode 4**.

   This unit will now be discoverable and open for automatic configuration.
4. Set Wireless Bridge 2 to Easy Config **Mode 6**

   This unit should now automatically discover and configure unit 1 as a Bluetooth client, and configure itself as an access point.

The IO device should now be able to communicate with the PLC as if using a wired connection.

Adding More Devices

Up to 6 additional clients can be added by repeating the procedure. Each new client will be assigned the next free IP address within the current subnet.

!	The Requested Packet Interval (RPI) for each IO device must be set to ≥ 64 ms.

A.4 Ethernet network to existing WLAN

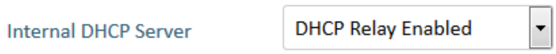
Fig. 20 Connecting to a WLAN

This example describes how to connect a machine with an internal Ethernet network to an existing WLAN.

This setup allows traffic on network layer 3, but not layer 2. This means that TCP/IP based protocols such as EtherNet/IP, Modbus TCP and BACnet can be used on the WLAN, but not protocols that use layer 2 traffic, such as PROFINET.

Configuration

1. Reset the Wireless Bridge to the factory default settings.
2. In **Network Settings**, configure the IP settings as required by the wireless network.
3. If the network uses DHCP, select **DHCP Relay Enabled**.



4. In **WLAN Settings**, click on **Scan for Networks**.
5. When the scan has completed, select the wireless network from the dropdown list.
6. If required, select the authentication mode and enter the passkey for the wireless network.

> **!** WLAN Bridge Mode must be set to Layer 3 IP forward (the default setting).

7. Click on **Save and Reboot**.

The Ethernet network should now be able to access the WLAN access point.

A.5 Adding single Ethernet node to WLAN

Fig. 21 Adding WLAN connectivity

This example shows how to connect a PLC with an Ethernet network interface to an existing WLAN with support for layer 2 and layer 3 traffic. The WLAN interface in the Wireless Bridge will clone the MAC address of the Ethernet interface in the PLC.

Only a single Ethernet node will be able to communicate via a third-party WLAN access point in this setup.

Configuration

1. Reset the Wireless Bridge to the factory default settings.
2. In **Network Settings**, configure the IP settings as required by the wireless network.
3. In **WLAN Settings**, click on **Scan for Networks**.
4. When the scan has completed, select the wireless network from the dropdown list.
5. If required, select the authentication mode and enter the passkey for the wireless network.
6. Click on **Save and Reboot**.
7. Check the **System Overview** page to confirm that the WLAN connection is established before continuing.
   DO NOT SKIP THIS STEP! After the final steps of the configuration procedure the web interface may no longer be accessible from the network without doing a factory reset.
8. In **WLAN Settings**, set **Bridge Mode** to **Layer 2 cloned MAC only**.
9. Enter the MAC address of the PLC in the **Cloned MAC Address** field.
10. Click on **Save and Reboot**.

The Wireless Bridge will now function as a WLAN interface for the PLC using the MAC address of its Ethernet interface.

A.6 Accessing PLC via WLAN from Handheld Device

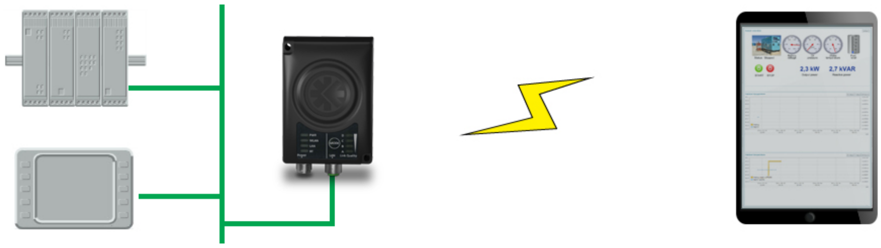


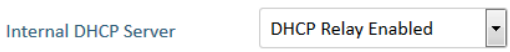
Fig. 22 Accessing a PLC from a handheld device using WLAN

This example describes how to use a Wireless Bridge to access the web interface of a PLC on a wired network from a tablet or smartphone which uses DHCP. The Wireless Bridge will function as a WLAN access point.

Please refer to the documentation for the handheld device and PLC on how to configure their respective network settings.

Configuration

1. Reset the Wireless Bridge to the factory default settings.
2. In **Network Settings**, configure the IP settings as required.
   a. If the wired network uses DHCP, select **DHCP Relay Enabled**. The DHCP server on the network will now be able to allocate an IP address to the handheld device.

   b. If the wired network uses static IP, select **DHCP Server Enabled** and set a **Start Address** for DHCP addressing. Make sure that the address range does not contain any existing addresses on the network.

   The Wireless Bridge will now function as a DHCP server and allocate an IP address to the handheld device over WLAN.

> **!** Do not enable the internal DHCP Server if there is already a DHCP server on the network, as this may cause IP address conflicts.

3. In **WLAN Settings**, set **Operating Mode** to **Access Point**.

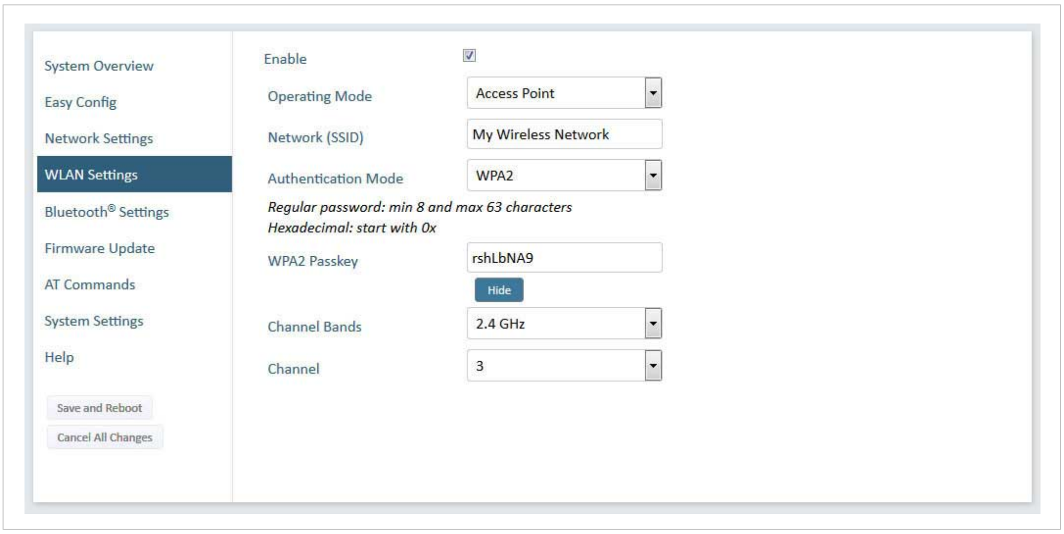


Fig. 23 WLAN Settings

4. Enter a unique **SSID** (network name) for the new wireless network.
5. Set **Authentication Mode** to **WPA2** and enter a passkey.
6. Select a **Channel band** and a **Channel**.
7. Click on **Save and Reboot**.

You should now be able to connect to the SSID of the Wireless Bridge on your handheld device and access the PLC by by entering its IP address in a browser.

B Wireless Technology Basics

Wireless technology is based on the propagation and reception of electromagnetic waves. These waves respond in different ways in terms of propagation, dispersion, diffraction and reflection depending on their frequency and the medium in which they are travelling.

To enable communication there should optimally be an unobstructed line of sight between the antennas of the devices. However, the so called *Fresnel Zones* should also be kept clear from obstacles, as radio waves reflected from objects within these zones may reach the receiver out of phase, reducing the strength of the original signal (also known as phase cancelling).

Fresnel zones can be thought of as ellipsoid three-dimensional shapes between two wireless devices. The size and shape of the zones depend on the distance between the devices and on the signal wave length. As a rule of thumb, at least 60 % of the first (innermost) Fresnel zone must be free of obstacles to maintain good reception.

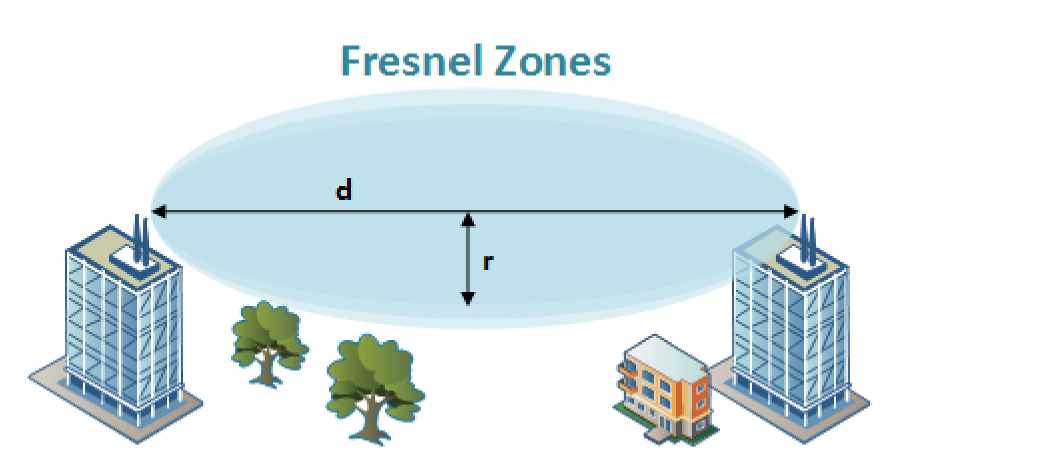


Fig. 24 Fresnel zones

Area to keep clear of obstacles (first Fresnel zone)

Distance (d)	Fresnel zone radius (r)	
	2.4 GHz (WLAN or Bluetooth)	5 GHz (WLAN)
100 m	1.7 m	1.2 m
200 m	2.5 m	1.7 m
300 m	3.0 m	2.1 m
400 m	3.5 m	2.4 m

The wireless signal may be adequate even if there are obstacles within the Fresnel zones, as it always depends on the number and size of the obstacles and where they are located. This is especially true indoors, where reflections on metal objects may actually help the propagation of radio waves. To reduce interference and phase cancelling, the range may also need to be limited by reducing the transmission power. For determining the optimal configuration and placement of wireless devices it is therefore recommended to use a wireless signal analysis tool.

C Technical Data

C.1 Technical Specifications

Order code	**AWB3000**	**AWB3010**
Wireless antenna	Internal	External
Maximum range	400 m (WLAN and Bluetooth) *Using an external antenna does not extend the range but allows separate placement of antenna and unit (e.g. if unit is placed in an enclosure).*	
Wired Interface type	Ethernet	
Communication	See Anybus Wireless Bridge II Datasheet	
Dimensions (LxWxH)	93 x 68 x 33.2 mm	
Weight	120 g	
Operating temperature	-40 to +65 °C	
Storage temperature	-40 to +85 °C	
Humidity	EN 600068-2-78: Damp heat, +40 °C, 93 % humidity for 4 days	
Pressure	850 to 1050 mB	
Housing	Plastic	
Protection class	IP65	
Mounting	Screw mount or DIN rail using optional clip	
Power connector	M12 male A-coded	
Ethernet connector	M12 female D-coded	
Power supply	9–30 VDC (-5 % +20 %) Cranking 12 V (ISO 7637-2:2011 pulse 4) Reverse polarity protection	
Power consumption	0.7 W (idle), 1.7 W (max)	
Certifications	See www.anybus.com/support and the compliance information appended to the User Manual.	

C.2 Internal Antenna Characteristics

Anybus Wireless Bridge II has 3 independent quarter wave monopole antennas. The following radiation diagrams and tables show the characteristics of the different antennas as measured under laboratory test conditions. The diagrams can be used as a general guide for finding the optimal placement and orientation of the units.

The diagrams use a color spectrum from violet to red to indicate signal gain. The closer to the red end of the spectrum, the stronger the signal.

2.4 GHz Section of Dual Band Antenna

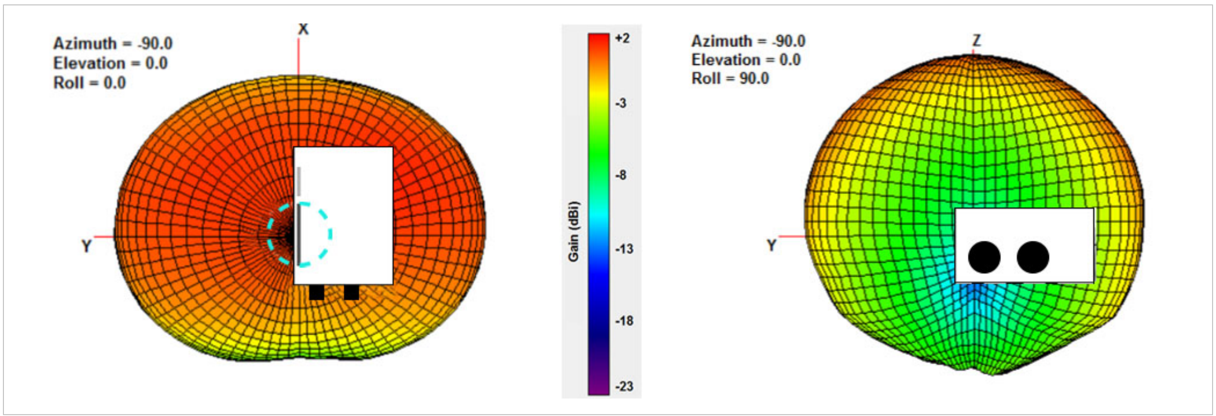


Fig. 25 2.4 GHz antenna gain and directivity in horizontal and vertical planes

Test	Antenna	Section	F	Avg Gain	Peak Gain	Dir	Comment
#	Dual band	2.4GHz	MHz	dBi %	dBi	dB	In Plastic Box
148			2400	-2.78 52.7	+1.61	4.3	
149			2440	-2.24 60.5	+1.80	3.9	
150			2485	-1.89 64.7	+2.00	3.9	

5 GHz Section of Dual Band Antenna

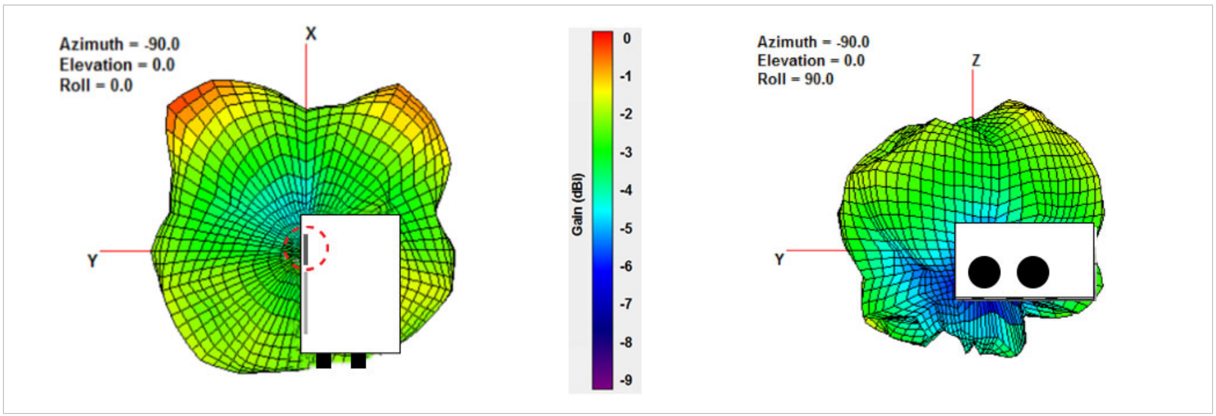


Fig. 26 5 GHz antenna gain and directivity in horizontal and vertical planes

Test	Antenna	Section	F	Avg Gain	Peak Gain	Dir	Comment
#	Dual band	5GHz	MHz	dBi %	dBi	dB	In Plastic Box
151			5150	-4.80 33.1	-2.48	2.3	
152			5250	-3.42 45.5	-0.75	2.7	
153			5400	-3.13 48.6	-0.14	3.0	
154			5600	-1.96 63.7	+0.48	2.4	

2.4 GHz MIMO Antenna

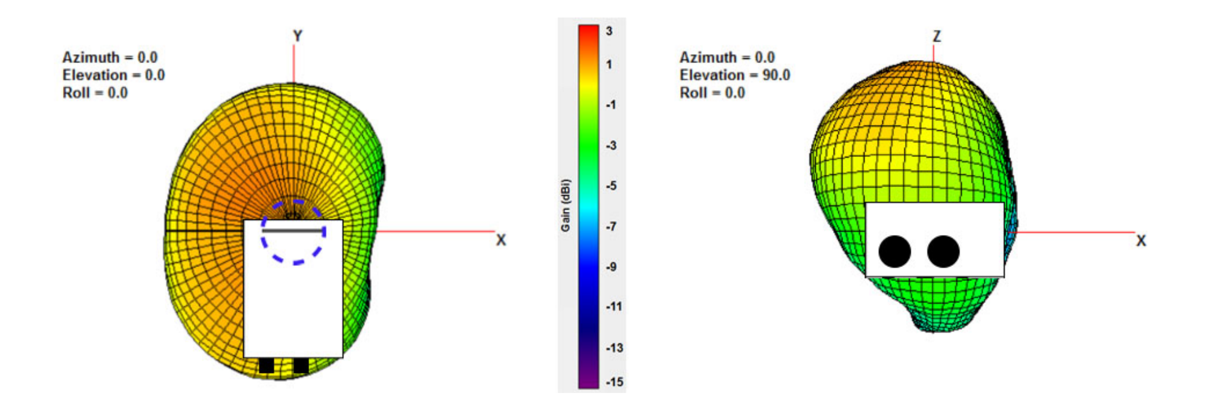


Fig. 27 2.4 GHz MIMO antenna gain and directivity in horizontal and vertical planes

Test	Antenna	Section	F	Avg Gain	Peak Gain	Dir	Comment
#	MIMO	-	MHz	dBi %	dBi	dB	In Plastic Box
168			2400	-1.95 63.8	+2.66	4.6	
169			2440	-1.65 68.4	+2.88	4.5	
170			2485	-1.42 72.1	+2.76	4.2	

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