Anybus® Wireless Bolt Serial™

STARTUP GUIDE

Important User Information

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1. Preface

1.1. About This Document

This document describes how to install Anybus® Wireless Bolt Serial™.

For additional documentation and software downloads, FAQs, troubleshooting guides and technical support, please visit www.anybus.com/support.

1.2. Document Conventions

Safety Symbols

DANGER
Instructions that must be followed to avoid an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
Instructions that must be followed to avoid a potential hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION
Instruction that must be followed to avoid a potential hazardous situation that, if not avoided, could result in minor or moderate injury.

IMPORTANT
Instruction that must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.

Information Symbols

> **NOTE**
> Additional information which may facilitate installation and/or operation.

> **TIP**
> Helpful advice and suggestions.

1.3. Trademarks

Anybus® is a registered trademark and Wireless Bolt Serial™ is a trademark of HMS Networks AB.

All other trademarks are the property of their respective holders.

2. Safety

2.1. General 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 equipment meet appropriate susceptibility specifications for this type of RF energy.

⚠ **CAUTION**
This equipment contains parts that can be damaged by electrostatic discharge (ESD). Use ESD prevention measures to avoid damage.

⚠ **CAUTION**
Minimum temperature rating of the cable to be connected to the field wiring terminals, 90 °C.

⚠ **CAUTION**
Use copper wire only for field wiring terminals.

⚠ **CAUTION**
This equipment 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 used if a shielded Ethernet cable is used, in order to meet emission requirements.

2.2. Intended Use

The intended use of this equipment is as a communication interface and gateway. The equipment receives and transmits data on various physical levels and connection types.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

3. Preparation

3.1. Support and Resources

For additional documentation and software downloads, FAQs, troubleshooting guides and technical support, please visit www.anybus.com/support.

> **TIP**
> Have the product article number available, to search for the product specific support web page. You find the product article number on the product cover.

3.2. Network Environment

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

3.3. Placement

Antenna Considerations

The characteristics of the internal antenna should be considered when choosing the placement and orientation of the unit.

Required Distance Between Devices

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

3.4. Bluetooth Limitations

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

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

3.5. I/O-Data Cycle Time Considerations

Based on recommendations from industrial equipment suppliers, such as Rockwell and Siemens, use the following minimum I/Odata cycle times for PROFINET and EtherNet/IP networks:

- Wireless link Point-to-Point with Bluetooth PANU-PANU or Wi-Fi Access Point to Station: 32 ms
- Wireless link with Access Point and up to 4 wireless clients/stations, Bluetooth or Wi-Fi: 64 ms

3.6. Digital Input

The digital input can be used to control roaming between Bluetooth access points (NAP).

For more information, refer to the AT Commands Reference Guide at www.anybus.com/support.

> **❗ IMPORTANT**
> If voltage is applied to the digital input for more that 10 seconds the unit will be reset to factory defaults.

4. Installation

4.1. Mechanical Installation

Placement
- The device is intended to be mounted on top of a machine or cabinet through an M50 (50.5mm) hole using the included sealing ring and nut.
- The top mounting surface, in contact with the sealing, must be flat with a finish equivalent to Ra 3.2 or finer and cleaned and free from oils and greases.
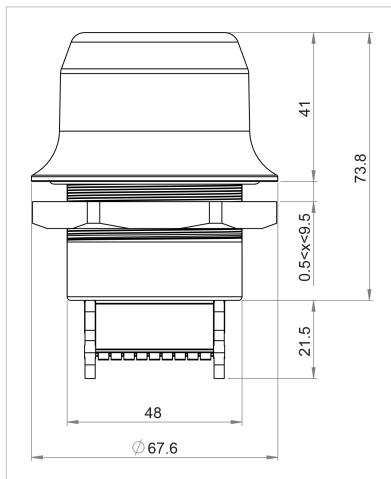
Installation

❗ IMPORTANT
Make sure that the sealing ring is correctly placed in the circular groove in the top part of the housing before tightening the nut.

❗ IMPORTANT
Always hold the BOTTOM part of the unit when untightening the nut, not the top part (the cap).

Tightening torque: 5 Nm ±10 %

All measurements are in mm.

Figure 1. Installation drawing

4.2. Connector

The 18-pin connector is common for several models of the Anybus Wireless Bolt. Some pins may have a different function depending on model. Unused pins should not be connected.
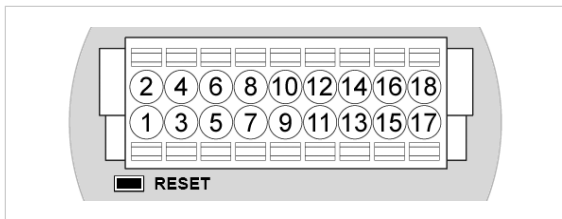

Figure 2. 18-Pin connector

The location of the **RESET** button can be used as a reference for the pin numbering when the connector is attached to the Bolt Serial. Pin 1 will be the pin closest to the **RESET** button.

> **NOTE**
> The Ethernet interface is intended for configuration purposes only. Bolt Serial is not designed for permanent Ethernet communication.

> **NOTE**
> A and B marking differs between different devices, in this product A is TX-/RX- or D- and B is TX+/RX+ or D+.

Pin	Name	Description
1	VIN	Power + (9–30 V)
2	GND	Power Ground
3	DI	Digital input + (9–30 V)
4	DI_GND	Digital input ground
5	ETN_RD+	Ethernet receive + (white/orange)

Pin	Name	Description
6	ETN_RD-	Ethernet receive - (orange)
7	ETN_TD-	Ethernet transmit - (green)
8	ETN_TD+	Ethernet transmit + (white/green)
9	RS485_B	RS-485 B Line
10	FE/Shield	Ethernet: Functional Earth
		Serial and CAN: Functional Earth and Shield
11	RS232_TXD	RS-232 Transmit
12	RS485_A/RS232_RXD	RS-485 A Line / RS-232 Receive
13	RS232_RTS	RS-232 Request To Send (Not used for Wireless Bolt Serial.)
14	RS232_CTS	RS-232 Clear To Send (Not used for Wireless Bolt Serial.)
15	ISO_5V	Isolated 5 V for serial interface
16	RS232_GND/RS485_GND	Isolated Ground for Serial interface
17	CAN_L	CAN Low (Not used for Wireless Bolt Serial.)
18	CAN_H	CAN High (Not used for Wireless Bolt Serial.)

Note:

- Use RS-485 when connecting multiple devices to a Bolt Serial.
- The Ethernet wire colors refer to the **T568A** standard.
- If using a shielded Ethernet cable the shield must be unconnected.
- RS-232 and RS-485 cannot be used at the same time.
- Use termination for RS-485 and CAN when required.
- RS485 Common signal reference ground (SC) is the RS485_GND pin.

4.3. Cabling

Before You Begin

> **NOTE**
> When using **Easy Config Modes**, the Bolt Serial that is to be configured as a Client does not need to be connected to the Ethernet wires. Only power and Serial wiring are used.

> **NOTE**
> To maintain signal integrity, low emission and high immunity to EMI, untwist the twisted pair cable as little as possible.

Procedure

Create connector cable for Bolt Serial
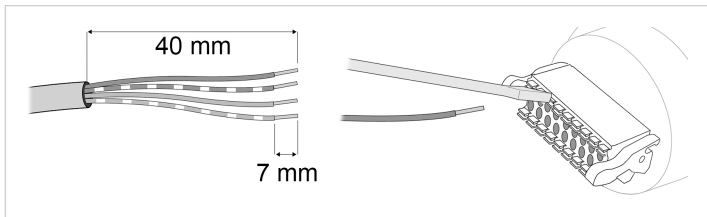
1. Cut off one of the connectors on a standard Cat5e or Cat6 Ethernet cable.
2. Strip off about 40 mm (1½ inch) of the cable jacket and untwist the orange, orange/white, green and green/white wires.
   The shield and the other wires are not used.
3. Strip off about 7 mm (¼ inch) of the isolation on each wire.
4. Push the pin spring release next to each socket on the connector and insert the correct wire end according to Connector (page 9).

5. Connect the wires from the Serial device to the connector in the same way as the Ethernet wiring.

6. Connect the wires from the power supply to the connector in the same way as the Ethernet wiring.

NOTE
Ensure that polarity is not reversed.

5. Configuration

5.1. Required IP Address Settings

To be able to access the Bolt Serial built-in web interface you may need to adjust the IP settings, choose one of the following methods.

The Bolt Serial default IP address is 192.168.0.99.

Option 1 - Set a Static IP Address on Your PC

On the PC accessing the Bolt Serial built-in web interface, set a static IP address within the same IP address range as the Bolt Serial IP address.

Note that when you change to a static IP address on your PC, internet access is lost.

Option 2 - Change the IP Address on the Bolt Serial Ethernet port

Use the software application HMS IPconfig to find and change the IP address on the Bolt Serial Ethernet port, to one within the same IP address range as the PC accessing the Bolt Serial built-in web interface.

To download the installation files, please visit www.anybus.com/support and enter the product article number to search for the Bolt Serial support web page. You find the product article number on the product cover.

Result

Now you can enter the Bolt Serial IP address in your web browser and search to access the built-in web interface login page.

5.2. Bolt Serial Built-In Web Interface

The Bolt Serial built-in web interface is used to configure, maintain and troubleshoot the Bolt Serial. Parameters can be set individually or using pre-configured Easy Config modes.

The web interface is accessed by pointing a web browser to the IP address of the unit.

The default address is 192.168.0.99.

See also Required IP Address Settings (page 13).

The configuration settings are described in detail in the User Manual.

System Overview			
Easy Config	**IP**		
Network Settings	IP Assignment	**Static**	
WLAN Settings	IP Address	**192.168.0.99**	
Bluetooth Settings	Subnet Mask	**255.255.255.0**	
Bluetooth LE Settings	Default Gateway	**192.168.0.99**	
Firmware Update	Internal DHCP Server	**Disabled**	
AT Commands	**LAN**		
System Settings	Connection	**Connected**	
Help	MAC Address	**00-30-11-19-43-2C**	
	WLAN		
Save and Reboot	Status	**On**	
Cancel All Changes	Operating Mode	**Client**	
	Connection	**Connected**	
	MIMO	**Enabled**	
	World Mode (1-11,36-140)	**Enabled**	
	Channel	**Auto**	
	Channel Bands	**2.4 GHz & 5 GHz**	

Figure 3. System Overview page example
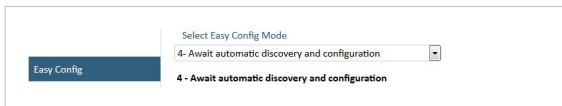
5.3. Configuring with Easy Config

Figure 4. The default mode is Easy Config Mode 4

By default Wireless Bolt and Bridge starts in **Easy Config Mode 4**.

Configuration of Wireless Bolt and Bridge Clients can be performed wirelessly, via a PC connected to the Wireless Bolt or Bridge Access Point.

After factory reset, Wireless Bolt will by default start in Easy Config Mode 4, if there is no Ethernet connection.

When connection is established via the wireless interface, the Wireless Bolt or Bridge Client does not need to be connected with an Ethernet cable during configuration.

5.4. Available Easy Config Modes

Bolt Serial may be configured using one of the pre-configured Easy Config modes.

> **NOTE**
>
> By default, the unit starts in **Easy Config Mode 4**. The unit awaits automatic configuration during 120 seconds or until receiving a configuration.

> **NOTE**
>
> To cancel Easy Config mode 11, the unit must be reset to factory default settings. See Reset to Factory Default

Table 1. Easy Config modes

EC	Role	Description
1	Bluetooth PANU	Used for setting up point-to-point communication.
		The unit scans for another unit in Config Mode 4. The unit listens for 40 seconds or until a configuration is established.
		When a unit in mode 4 is detected: The scanning unit configures itself as a Bluetooth PANU Client, sends a connection configuration to the detected unit, and restarts. The detected unit restarts and attempt to connect to the first unit as a PANU Client.
2	N/A	Reset configuration to factory defaults.
3	N/A	Reset IP settings to factory defaults.
4	Client	Configure units in mode 4 as Clients.
		Wait for automatic configuration. The unit listens for 120 seconds or until receiving a configuration.
		When mode 4 is used with mode 1, 5 or 6, Serial Settings TCP Mode Client is activated automatically.
5	WLAN AP	The unit scans for other units in Config Mode 4 and configure them as Clients. Timeout occur after 120 seconds.
6	Bluetooth NAP	Restart as Access Point and connect Clients.
11	(any)	Enable PROFIsafe mode. The unit is locked in PROFIsafe mode.
		No other configuration settings are changed.

5.5. Configuration with AT Commands

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

Use AT commands to setting advanced parameters, that are not accessible in the Bolt Serial built-in web interface.

AT commands can be used to read out parameters in text format and for batch configuration using command scripts.

For a complete list of supported AT commands, click **Help** in the built-in web interface. See also the AT Commands Reference Guide at www.anybus.com/support.

Procedure
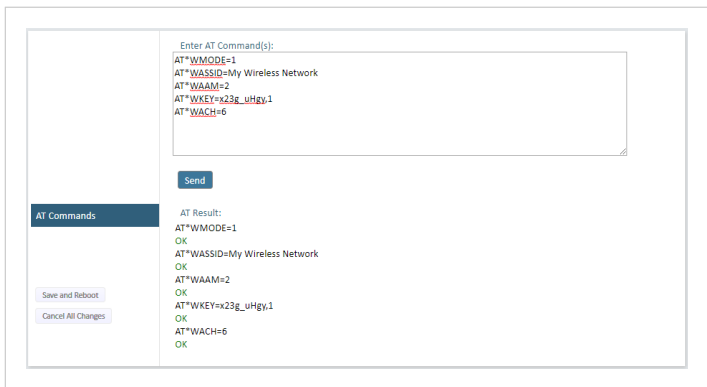
Figure 5. AT Commands and AT Results

1.   Enter or paste the AT commands into the **Enter AT Command(s)** text field.
2.   Click **Send**.
3.   The result codes are displayed in the **AT Result** panel.

5.6. Set Up Wireless Infrastructure

Connect two or more Bolt Serial units via WLAN or Bluetooth using Easy Config.

Procedure

Connecting the Devices
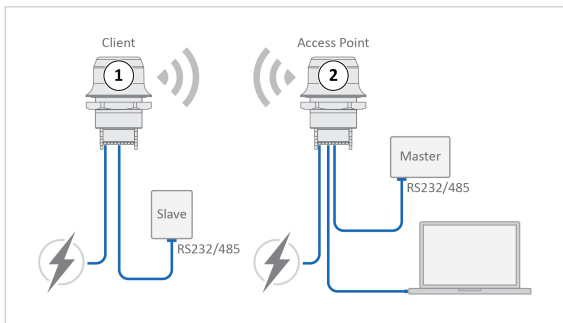

Figure 6. Serial bridge

1. Connect Client 1 to a Slave serial device. See also Connect to LAN, Serial and Power.
2. Connect Access Point 2 to the Master device.
3. Connect Access Point 2 to your PC, with an Ethernet cable.
4. Connect Access Point 2 to power.

Activate Easy Config

1. Navigate to the web interface of Access Point 2.
   The default address to Access Point unit 2 is 192.168.0.99.

2.   Activate one of the following Easy Config Modes:
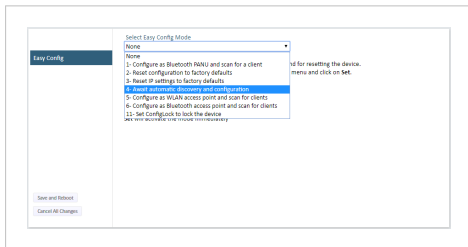
Figure 7. Easy Config modes menu

- Easy Config Mode 1 for Bluetooth PANU-PANU. Used for setting up point-to-point communication.
- Easy Config Mode 5 for WLAN.
- Easy Config Mode 6 for Bluetooth.
3.   Connect Client 1 to power.
4.   Automatic configuration of the units starts:
   - Client 1 starts up in Easy Config Mode 4 and is open for automatic configuration during 120 seconds.
   - Access Point 2 will discover and configure Client 1 as a Client and configure itself as an Access Point.
   - Client 1 will be assigned the first free IP address in the same Ethernet subnet as Access Point 2.
     The default address to Client 1 is 192.168.0.100.

Troubleshooting if no connection is established during Easy Config Mode

- Ensure that Client 1 is disconnected from Ethernet.
- Disconnect Client 1 from power and repeat the steps to activate Easy Config.
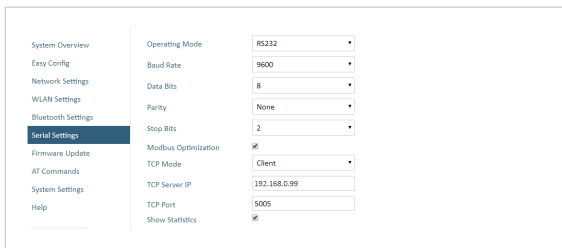
Add Additional Bolt Serial Clients

Option when using Easy Config Mode 1: Continue with the configuration, see Serial Configuration (page 20).

Option when using Easy Config Mode 5 or 6: You can add up to 6 additional Bolt Serial Clients to the serial bridge.

To add additional Clients:

1. Connect the Client to a serial device.
2. Automatic configuration of the Client starts.
    The Client will be assigned the next free IP address in the current Ethernet subnet.

3. To add more Clients, repeat step 1 and 2.

Serial Configuration

Figure 8. Serial port settings example

1. From the PC connected to Access Point 2, navigate to the built-in web interface of each Bolt Serial Client.
2. Select the **Serial Settings** tab.
3. Configure the serial port settings. For more information refer to the Bolt Serial User Manual.
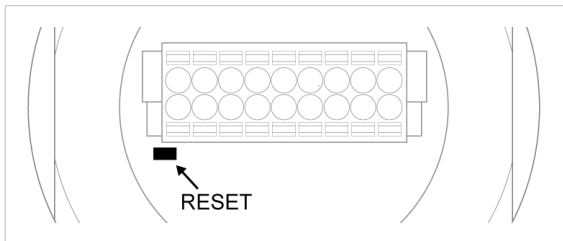
6. Troubleshooting

6.1. Reset to Factory Default

> **!** **IMPORTANT**
> If there is no Ethernet connection available after a factory reset, the Bolt
> Serial starts in the default Easy Config Mode 4.

Any one of these actions will restore the unit to factory default settings.

Reset Using the RESET Button

Press and hold **RESET** for >10 seconds and then release it.

Reset Via the Built-In Web Interface

Launch the built-in web interface > On the **System Settings** page, click **Factory Restore**.

Reset Using Easy Config
To reset Bolt Serial to factory default, execute Easy Config Mode 2.

See Activate an Easy Config Mode in the Built-In Web Interface.

Reset Using AT Command
To reset Bolt Serial to factory default, issue the AT command **AT&F** and then restart the unit.

See Configuration with AT Commands (page 17).

Reset Using Digital Input
To reset Bolt Serial to factory default, apply voltage to the digital input for >10 seconds.

See Connector (page 9).

6.2. Recovery Mode

If the built-in web interface cannot be accessed, the unit can be reset by starting in Recovery Mode and reinstalling the firmware.

Before You Begin

> **!** **IMPORTANT**
> Use Recovery Mode only when the unit is unresponsive and the built-in web interface cannot be accessed. Firmware updates should normally be carried out through the built-in web interface.

Procedure

To enter Recovery Mode

1. Press and hold **MODE** button during startup.
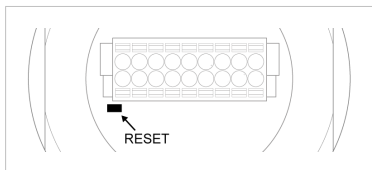

Figure 9. RESET button

2. Bolt Serial enters Recovery Mode.

To Reinstall the Firmware

1. To reinstalling the firmware, you need Anybus Firmware Manager II. Download Anybus Firmware Manager II from www.anybus.com/support.
2. Install Anybus Firmware Manager II on your PC.
3. Launch Anybus Firmware Manager II and follow the instructions to reinstall the firmware.

7. Technical Data

For complete technical specifications and regulatory compliance information, please visit
www.anybus.com/support.

7.1. Technical Specifications

Order code	AWB2010	AWB2011
Color	Black	White top and black base
Connector	Included plug connector	
	(2x9p; 3.5mm, Phoenix DFMC 1.5/9-ST-3.5, push-in spring connection).	
Range	Up to 100 meters free line of sight	
Antenna	One internal antenna. Dual-band 2,4GHz and 5GHz.	
Temperature compatibility	Operating: Shadow black and white: -40 to +65 °C	
	Direct sunlight: Black -40 to +45 °C, White -40 to +65 °C	
	Storage temperature: -40 to +85 °C	
Weight	81 g	
Housing material	Top: Valox 357X(f1) PBT/PC. Suitable for outdoor use with respect to exposure to ultraviolet light, water exposure and immersion in accordance with UL 746C.	
	Bottom: Celanex: XFR 6840 GF15. PBT glass reinforced plastic.	
IP protection class	IP66, IP67 and UL NEMA 4X for top (outside the host), IP21 for bottom (inside the host).	
Dimensions	Diameter: 68 mm.	
	Height: 75 mm (95 mm including connector).	
	Outside height: 41 mm.	
Mounting	M50 screw and nut (50.5 mm hole needed).	
Power	9-30 VDC (-5% +20%), Cranking 12V (ISO 7637-2:2011 pulse 4).	
	Reverse polarity protection. (Consumption: 0.7W idle, 1.7W max.)	
Configuration	Three different methods: 1. Accessing the built-in web pages in the product 2. Sending AT-commands via Telnet/Raw TCP and Serial 3. Using Easy Config modes.	
Vibration compatibility	Sinusodial vibration test according to IEC 60068-2-6:2007 and with extra severities; Number of axes: 3 mutually perpendicular (X:Y:Z), Duration: 10 sweep cycles in each axes, Velocity: 1 oct/min, Mode: in operation, Frequency: 5-500 Hz, Displacement ±3.5 mm, Acceleration: 2g.	
	Shock test according to IEC 60068-2-27:2008 and with extra severities; Wave shape: half sine, Number of shocks: ±3 in each axes, Mode: In operation, Axes ± X,Y,Z, Acceleration: 30 g, Duration: 11 ms.	

Order code	AWB2010	AWB2011
Humidity compatibility	EN 600068-2-78: Damp heat, +40°C, 93% humidity for 4 days.	
Digital input	Usage: To control roaming between Bluetooth access points (NAP)	
Wired interface	Serial: RS232/485	
	Baud rate: 2.400 - 921.600 kbit/s, data bits 5-8, stop bits 1-2, parity None, Odd, Even. Transparent serial protocol transfer including support for Modbus-RTU.	
	Ethernet: 10/100BASE-T with automatic MDI/MDIX auto cross-over detection. For configuration only.	
Wireless LAN	Wireless standards: WLAN 802.11 a, b, g, n, d, r (fast roaming).	
	Operation modes: Access point or Client	
	WiFi channels: 2.4 GHz, channel 1-11 + 12-13 depending on regulatory domain scan. 5 GHz Access Point: 36-48 (U-NII-1), 5 GHz Client: 100-116 + 132-140 and 120-128 depending on regulatory domain scan. (U-NII-1, U-NII-2, U-NII-2e).	
	RF output power: 13.75 dBm	
	Max number of slaves for Access Point: 7	
	Power consumption: 54mA@24VDC	
	Net data throughput: 20 Mbps. Link speed: max 65 Mbps (802.11n SISO)	
	Security: WEP 64/128, WPA, WPA-PSK and WPA2, TKIP and AES/CCMP, LEAP, PEAP including MS-CHAP.	
Classic Bluetooth	Wireless standards (profiles): PANU & NAP	
	Operation modes: Access point or Client	
	RF output power: 9.75 dBm	
	Max number of slaves for Access Point: 7	
	Power consumption: 36 mA@24VDC	
	Net data throughput: ~1 Mbps	
	Bluetooth version support: Classic Bluetooth v2.1	
	Security: Authentication & Authorization, Encryption & Data Protection, Privacy & Confidentiality, NIST Compliant, FIPS Approved	

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