



# WBT900

## User's Manual

### 900 MHz Wireless BACnet MSTP Radio



Thank you for your purchase of the WBT900, Wireless BACnet MSTP Transceiver. With appropriate placement and antenna selection, the WBT900 can expand any BACnet MSTP network providing access to previously unreachable locations.

Detailed setup instructions are included in this manual. Should you have any technical questions, please contact your distributor for support or email [support@aic-wireless.com](mailto:support@aic-wireless.com).



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101 N. Washington Street  
Sylvester, Georgia 31791

(229) 776-2510  
1-877-424-2953  
FAX: (229) 776-2512

## **OPERATIONAL SUMMARY**

The WBT900 Transceiver allows the user to create a long-range, wireless BACnet MSTP network with numerous Client units (baud rate dependent) per Server transceiver.

Configuring a wireless link with the WBT900 requires the establishment of five elements:

1. Each radio must know whether it is to be a Server or Client.
2. The Server must know how many Clients are expecting communication with it.
3. The Server and any given Client must agree on which radio frequency channel they are using. This can be set manually using a HyperTerminal interface and preconfigured configuration files.
4. The Client must be assigned a unique subscriber ID to specify which time division slot it will use when communicating with the Server.
5. The Server and any given Client must share a common 128-bit encryption key and Network ID.

The Server automatically scans for the best of the 12 available radio frequency channels, encrypts BACnet MSTP data received from the network, and transmits it wirelessly to the correct Client. The Server is constantly monitoring the radio link and can automatically change the channel if performance is degraded due to interference. If two Server units are very close to one another, they may interfere if operating on adjacent frequency channels. Place them at least 20 feet apart or manually select non-adjacent channels for their operation. Also, the Client should be placed at least 10 feet from the Server to avoid overloading the WBT900 receiver.

Any BACnet MSTP client device can be connected to a WBT900 Client. Each Client encrypts the BACnet MSTP traffic received from the

attached device and transmits the data wirelessly to its Server. Each Client can be plugged directly into an BACnet MSTP network/device without adding drivers or loading software. Essentially, once the Server/Client pair is configured and running it behaves like a continuous BACnet MSTP cable.

## WBT900 SETUP

### LOADING DEVICE USB DRIVERS

(Note: USB drivers and configuration files can be downloaded from [www.aic-wireless.com](http://www.aic-wireless.com))

1. If drivers were obtained in a zip format, unzip them to a place that you can find on your computer such as *Desktop* or *My Documents*.
2. Connect the WxT900 device via USB-B cable to your computer. Power should not be applied at this time.
3. The *Found New Hardware* wizard should pop up and ask how you would like to install the drivers.
4. Select the option that allows you to search for the drivers yourself and select *Next*.
5. Using the *Browse* button, find the unzipped folder that contains the USB drivers and highlight it. The folder name convention should follow the format *WxT\_USB\_LINK*. Click *Next*.
6. You will get a pop up window stating that the drivers are not signed by Windows. Select *Continue Anyway*.
7. Windows will grab and install the correct drivers from the folder.
8. **DO NOT UNPLUG THE USB CABLE YET. This installation process (STEP 3-7) will be prompted TWICE AND THE PREVIOUS STEPS SHOULD BE COMPLETED AGAIN.**

9. The drivers should now be installed.

## LOADING CONFIGURATION FILES

1. With the device connected via USB, adjust COM Port Settings to "115200 baud, 8 data bits, no parity, 1 stop bit, no flow control" in *Device Manager* (Found under *Control Panel>System>Hardware Tab>Device Manager* button>*Port (COM & LPT)>Wxt\_USB\_LINK>Properties*.
2. **With power disconnected** from the radio and **USB connected**, open Hyper Terminal and create a new connection by typing a connection name in the pop up box on the screen and hit *Enter*.
3. Select the COM port that the device is using along with the serial settings used for programming; 115200, 8 data bits, no parity, 1 stop bit, no flow control. Hit *Enter*.
4. Make sure you have a connection established by verifying the timer is counting at the bottom left corner of the window.
5. If not, click the phone with the receiver-off-the-hook icon at the top of the window.
6. Plug power into the radio.
7. A "ü" (u Dieresis) should appear.
8. The text menu will pop up displaying the firmware version and a selection of <u>, <d>, or <h>
9. Type "u" and the ENTER key for upload. **NOTE:** the u will **NOT** display when typed.
10. The § "Section Symbol" will appear on the next line.
11. Select "Transfer" from the menu bar at the top of the window.
12. Select "Send File" from the drop down menu.
13. A browse window will popup and you need to select "X Modem" from the "Protocol" Dropdown menu.

14. Browse to the configuration file that you want and hit "Send".
15. When complete, hit "d" ENTER to display back to you the file you just uploaded. NOTE: the "d" will NOT display when typed.
16. Unplug USB and cycle power. The radio is now using new settings.

### **CONFIGURATION FILE PARAMETERS**

1. **Network:** – 6 digit number. Must be the same for all devices on the wireless network.
2. **Key:** – 32 digit number. Encryption key used by all devices on a network to securely transmit data. Must be the same for all devices on the wireless network.
3. **ID:** – Address assigned to Client radios. There may only be one Client radio per network with the same ID. This number is used by Server radios to set the maximum number of Clients on the network. On Server radios, this number should be set to the maximum number of Clients that are currently on the network. Do not set this number erroneously high. **Site Survey** mode may be entered to evaluate a new installation by setting the ID of both Server and Client to 63. This mode allows two radios to link and send test packets. A link quality on the devices front panel will allow the installer to make an accurate determination of the best antenna type and location.
4. **Bit Delay:** – number of bits to wait for a pad byte. Pad bytes are not used by all brands. Typically, this value will never change.
5. **MTU:** – (Maximum Transmission Units) – the number of bytes allowed to accumulate in the radios buffer before

the bytes are sent. This number may be adjusted lower improve response time or higher to improve overall efficiency. MTU will vary according to baud rate. This is because different baud rates require different amounts of time to send packets to the radios buffer thereby changing the available amount of time for RF transmission.

6. **KO:** – (Knock Out) -- buffer clearing mechanism expressed in bit times. If the radio loses power or is interrupted in the middle of a packet, the incomplete packet will only remain in the buffer for this amount of bit time. This number is typically left unchanged
7. **BR:** – (Baud Rate) – Serial communication speed: 6=9600, 5=19200, 4=38400, 3=57600, 2=76800, 1=115200.
8. **CH:** – (Channel) – Typically left at 00(Auto). Available channels are 01 to 12. All radios to stay on a set channel must have the same channel number. There is no intelligent channel swapping in this mode. If interference occurs data will be lost.
9. **MODE:**-- Used to assign a radio to a Server or Client. 1=Server, 3=Client
10. **BT:**-- (Bit Time) -- used to add 95ns padding to bytes on the serial output. This number should be set to 01 unless otherwise instructed.
11. **SB:**-- (Stop-Bits) – used to add stop-bit padding to bytes on the serial output. This number should be set to 1 unless otherwise instructed.
12. **TN:**-- (Transmit Number) – set to 1 unless otherwise instructed.

**Example Configuration Text File**

Network: 123456

Key: 1234 5678 9098 7654 3212 3456 7890 9876

ID: 01

Bit Delay: 07

MTU: 046

KO: 20

BR: 2

CH: 00

MODE: 3

BT: 01

SB: 1

TN: 1

**INSTALLATION INSTRUCTIONS**

1. Connect BACnet MSTP bus to terminals labeled A +, B - and SH (Shield).
2. Connect 12-24 VAC/DC power as labeled.\*\*
3. Digital LED sequence should begin, "AIC", "BAC", "revision number".
4. WBT900 will begin searching for paired unit(s). *Note: For radios configured as a server, the LED channel numbers will descend from 12 to 0, and reverse for client radios.*
5. Perform a local download on the remote BACnet MSTP site.
6. Verify the RF network communication with the Channel, Link Quality LQ, RFTX, RFRX, SER TX, and SER RX LEDs.
7. Lastly, perform a network commission at the base station site to establish the link with the remote location.



**\*\*WARNING: If using AC power option, a 24 VAC isolation transformer must be used! Ensure neither of the two secondaries are bonded.**

*Note: As with any RF network, plan ahead for proper antenna selection and placement. It is the intention of AIC Wireless to provide a reliable wireless communication device for existing BACnet networks. However, in some conditions, reliability is determined largely by correct antenna placement, which is the responsibility of the installer. This product is **NOT TO BE USED** in situations where life safety issues may arise. AIC Wireless makes no claims, expressed or implied, of the products usefulness with regard to specific applications. Determination of the product's suitability for a particular application is the sole responsibility of the purchasing parties. In any installation, ensure the devices are properly protected from the elements by installing in an appropriate enclosure. Additional surge protection devices may be necessary to protect from lighting and/or power surges.*

**900 MHz CHANNEL TABLE**

1	903.12500 MHz
2	905.20833 MHz
3	907.29167 MHz
4	909.37500 MHz
5	911.45833 MHz
6	913.54167 MHz
7	915.62500 MHz
8	917.70833 MHz
9	919.79167 MHz
10	921.87500 MHz
11	923.95833 MHz
12	926.04167 MHz

**NOTE: The number of client transceivers that can be placed on any given network is directly impacted by the network's MSTP baud rate. The slower the baud rate the fewer the number clients that can be placed on the network.**

**LIMITED WARRANTY**

This product is warranted to the original purchaser for normal use for a period of 360 days from the date of purchase. If a defect covered under this warranty occurs, AIC Wireless will repair or replace the defective part, at its option, at no cost. This warranty does not cover defects resulting from misuse, lightning or modification of the product. Appropriate actions should be taken by the installer to ensure surge protection is present.

**Compliance Statement ( Part 15.19 )**

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.

**Warning ( Part 15.21 )**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**RF Exposure ( OET Bulletin 65 )**

To comply with FCC RF exposure requirements for mobile transmitting devices, this transmitter should only be used or installed at locations where there is at least 20cm separation distance between the antenna and all persons.

**Information to the User - Part 15.105 (b)**

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 or more 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.

For Support Information, contact AIC Wireless at 229-776-2510, or e-mail

[support@aic-wireless.com](mailto:support@aic-wireless.com)

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*Sylvester, Georgia 31791*

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