Wattstopper®

Wireless BACnet® MS/TP Bridge with AES 256-bit/FIPS140.2 Encryption

No: 25175 – 2/17 rev. 1

Installation Instructions • Instructions d'Installation • Instrucciones de Instalación

Catalog Number • Numéro de Catalogue • Número de Catálogo: WBT900-F

Country of Origin: Made in China • Pays d'origine: Fabriqué en Chine • País de origen: Hecho en China

SPECIFICATIONS

Volts ..... 12-24 VAC or VDC
UL Standards Tested ..... UL 2043 plenum rated
902-928MHz Direct Sequence Spread Spectrum (DSSS)
Synchronous point-to-multipoint communication
Special Features
- Includes unity gain antenna
- FIPS-140.2 certified encrypted payload protection

DESCRIPTION AND OPERATION

The WBT900-F is designed to transport BACnet MSTP communication data over short to extended ranges using the 900 MHz frequency (902-928). All devices are plug-and-play, requiring no special programming tools. Using Hyperterminal, radios can be addressed to one another in the field. The WBT900-F provides a AES-256 bit/FIPS 140.2 Security layer.

The WBT900-F 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-F 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-F receiver.

Any BACnet MSTP client device can be connected to a WBT900-F 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.

900 MHz Channel Table

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

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 Wattstopper to provide a reliable wireless communication device for existing BACnet MSTP networks. However, in some conditions, reliability is determined largely by correct antenna placement, which is the responsiblity of the installer. This product is NOT TO BE USED in situations where life safety issues may arise. Wattstopper makes no claims, expressed or implied, of the product's 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.

WARNING: Extra care must be taken when attaching the antenna to the bridge unit. Finger tight is sufficient, using tools may damage the RPSMA connector if over tightened.

INSTALLATION

1. Connect BACnet 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-F begins searching for paired unit(s).
   NOTE: For radios configured as a server, the LED channel numbers descend from 12 to 0, and reverse for client radios.
5. Perform a local download on the remote BACnet site.
6. Verify the RF network communication with the Channel, Link Quality “LQ”, RFTX, RFRX, SER TX, and SER RX LEDs.
7. Finally, perform a network commission at the base station site to establish the link with the remote location.

CONFIGURATION

Step 1 Loading Device Drivers

1. If drivers were obtained in a zip format, unzip them to a location 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.
   The **Found New Hardware** wizard opens and asks how you would like to install the drivers.
3. Select the option that allows you to search for the drivers yourself, and click **Next**.
4. Browse to the unzipped folder that contains the USB drivers and select it.
   The folder name convention should follow format WxT_USB_LINK.
5. Click **Next**.
   A pop-up dialog opens stating that the drivers are not signed by Windows.
6. Select **Continue Anyway**.
   Windows installs the correct drivers from the folder.
7. DO NOT UNPLUG THE USB CABLE YET. This installation process (STEP 3-7) is prompted TWICE and the previous steps SHOULD BE COMPLETED AGAIN.
   The drivers are now installed.

Step 2 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>Port (COM & LPT)>Wxt_USB_LINK>Properties**.
2. With power disconnected from the radio and USB connected, open HyperTerminal and create a new connection by typing a connection name in the pop-up dialog.
3. Press **Enter**.
4. 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.
5. Press **Enter**.
   Make sure you have a connection established by verifying the timer is counting at the bottom left corner of the window. If not, click the phone with the receiver-off-the-hook icon at the top of the window.
6. Plug power into the radio.
   A “ü” displays.
7. The text menu opens, displaying the firmware version and a selection of <u>, <d>, or <h>
8. Type “u” and then press **Enter** to upload.
   NOTE: The u does NOT display when typed.
   The § “Section Symbol” displays on the next line.
9. Select **Transfer** from the menu bar at the top of the window.
10. Select **Send File** from the drop-down menu.
    A browse window opens.
11. Select “X Modem” from the **Protocol** drop-down.
12. Browse to the configuration file that you want, and click **Send**.
13. When complete, type “d“ and press **Enter** to display back to you the file you just uploaded.
    NOTE: The “d” does NOT display when typed.
14. Unplug USB and cycle power.
    The radio is now using new settings.

Step 3 Configuration File Parameters

- **Network** – 6 digit number. Must be the same for all devices on the wireless network.
- **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 with allow the installer to make an accurate determination of the best antenna type and location.
- **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.
- **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.
- **KO** (Knock Out) – buffer clearing mechanism expressed in bit times. If the radio looses 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.
- **BR** (Baud Rate) – Serial communication speed: 6=9600, 5=19200, 4=38400, 3=57600, 2=76800, 1=115200.
- **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.
- **Mode**: - Used to assign a radio to a Server or Client. 1=Server, 3=Client.
- **BT**: - (Bit Time) -- used to add 95ns padding to bytes on the serial output. This number should be set to 01 unless otherwise instructed.
- **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.
- **TN**: - (Transmit Number) - set to 1 unless otherwise instructed.

CONFIGURATION TEXT FILE EXAMPLE

Network: 123456

Key: 64 digit number (non-configurable)

ID: 01	CH: 00
Bit Delay: 07	MODE: 3
MTU: 046	BT: 01
KO: 20	SB: 1
BR: 2	TN: 1

FCC STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following 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. This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

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800.879.8585
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