900 MHz High Throughput Wireless Ethernet Terminal Server (Model HT2+) Installation Guide

V1.0a

PRELIMINARY

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SPREAD SPECTRUM WIRELESS DATA TRANSCEIVER INSTALLATION GUIDE

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900 MHz High Throughput Wireless Ethernet Terminal Server Installation Guide

This installation guide covers all models of the FreeWave Technologies 900 MHz High Throughput DST transceivers sold under FCC ID KNY-42182112519.

All transceiver models sold under FCC ID KNY-42182112519 must be installed professionally. This transceiver is only approved for use when installed in devices produced by FreeWave Technologies or third party OEMs approved by FreeWave Technologies. The antenna(s) to be used must be installed to provide a separation distance of at least 23cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. This transceiver must be installed in a NEMA enclosure.

PRELIMINARY

FCC Notification

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.

This device must be operated as supplied by FreeWave Technologies, Inc. Any changes or modifications made to the device without the express written approval of FreeWave Technologies may void the user's authority to operate the device.

CAUTION: This device has a maximum transmitted output power of 1W (30 dBm). It is required that the transmit antenna be kept at least 23 cm away from nearby persons to satisfy FCC RF exposure requirements.

Note: 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 may 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.

Note: Whenever any FreeWave Technologies module is placed inside an enclosure a label ***must*** be placed on the outside of that enclosure which includes the module's FCC ID.

UL Notification

Model# HT2+ is not UL approved at this time.

PRELIMINARY

A. Transceiver installation steps

To install the HT2+ series transceivers, follow the basic steps given below.

1. Mount the transceiver to the flat, stable surface using mounting holes in the case of the enclosure. Transceiver models sold under FCC ID KNY-42182112519 are to be installed professionally in NEMA enclosures.

2. Install the antenna and connect the antenna feedline to the transceiver. If you are installing a directional antenna, preset the antenna's direction appropriately. The antenna must be professionally installed on fixed-mounted permanent outdoor structures for satisfying RF exposure requirements.

3. Connect a computer to the transceiver's RJ45 port or to an Ethernet connection on the same network segment as the transceiver (please refer to the HT2+ manual for additional information). This computer will be used to set the radio configuration.

4. Install the power for the radio.

5. Connect to the transceiver's Web page and set the radio configuration according to the system topology and data terminal equipment requirements. Default transceiver settings allow users to do a quick installation without major changes in transceiver's configuration. However, there is one parameter that ***must be considered for a new installation – the transceiver's power output setting. ("Transmit Power". Radio Setup menu > Transmission Characteristics section.)***

   Transceiver output power level *must be* set according to the tables given below to satisfy FCC maximum EIRP requirement. Per FCC regulations, any antenna used with FreeWave transceivers must either be one of the approved antennas shown below or an antenna approved by FreeWave Technologies with comparable performance parameters. FreeWave Technologies offers a variety of Omni-directional and directional external antennas, with both bracket and magnetic mounts. The complete list of antennas available from FreeWave Technologies including antenna gains, antenna manufacturer's information and antenna's characteristics is shown below:

The following antennas are approved for use with FreeWave HT2+ model transceivers:

900MHz Directional Antennas

Gain	Manufacturer	Manufacturer Model Number	FreeWave Model Number
11dBi	Larsen	YA5900-W	EAN0900YA
10dB	BlueWave	BMY890K5502N4	EAN0900YC

NOTE: Use of EAN0900YA requires a cable equivalent to FreeWave part # AS1504xx. This 150' LMR-400 cable and will provide ~5.85dB of attenuation, thus allowing the transceiver to run at full power and comply with FCC regulations. Scale other high gain antennas accordingly.

900MHz Omni-directional Antennas

PRELIMINARY

Gain	Manufacturer	Manufacturer Model Number	FreeWave Model Number
6dB	Antenex	FG9026	EAN0906NF
5dB	Antenex Maxrad	EB8965C BMEFC8985HD	EAN0905WC
3dB	Maxrad	MAX-9053	EAN0900WC
0dB	JEMA	JA900SS	EAN0900WR
0dB	Mobile Mark	PSTG0-915FW	EAN0900RQ
0dB	Mobile Mark	PSTN3-915S	EAN0900SH
0dB	Mobile Mark	PSTG0-915SE	EAN0900SQ
0dB	Mobile Mark	PSTN3-915N	EAN0900NH

WARNING: ***Any antennas placed outdoors must be properly grounded. Use extreme caution when installing antennas and follow all instructions included with the antennas.***

Table 1 below provides the maximum output power settings for HT2+ FreeWave transceivers at given antenna gain (10 dB and 6 dB Yagi antennas are given as an example) and cable loss combinations.

NOTE: ***It is the installer's responsibility to ensure that the emission limits are not exceeded***.

Table 1: Output Power Settings at given Antenna Gain & Cable Loss combination.

		Cable Loss			
		1dB	2dB	3dB	4dB
Antenna Gain	10dB	7	8	9	10
	6dB	10	10	10	10

Table 2 below shows how the RFXmitPower settings on the radio correspond to the EIRP of the transceiver-cable-antenna combination for the 10 dB Yagi antenna at different cable loss values.

Table 2: EIRP for 10dB Yagi Antenna, Cable loss vs. RF Xmit Power Setting.

		Cable Loss			
		1dB	2dB	3dB	4dB
RF Xmit Power	10	**39.00**	**38.00**	**37.00**	36.00
	9	**37.80**	**36.80**	35.80	34.80
	8	**36.58**	35.58	34.58	33.58
	7	34.91	33.91	32.91	31.91
	6	32.63	31.63	30.63	29.63

Shaded area indicates combinations where EIRP limitations exceed FCC regulations and RF Xmit Power must be reduced.

Table 3 below is similar to the Table 2, but shows the information for the 6 dB Yagi antenna.

PRELIMINARY

Table 3: EIRP for 6dB Yagi Antenna, Cable loss vs. RF Xmit Power Setting.

		Cable Loss			
		1dB	2dB	3dB	4dB
RF Xmit Power	10	35.00	34.00	33.00	32.00
	9	34.80	33.80	32.80	31.80
	8	32.39	31.39	30.39	29.39
	7	31.24	30.24	29.24	28.24
	6	29.90	28.90	27.90	26.90

Follow the steps below to configure the Power Output Level:

- ✓ Connect to the transceiver's Web page (See the HT2+ User Manual for further instructions).
- ✓ Click the "Radio Setup" Link.
- ✓ Choose an appropriate setting in "Transmit Power", as defined from the previous tables.
- ✓ Click the "Save Changes" button. After the page refreshes, click the "Reboot" button and wait for the transceiver to restart.

6. Repeat the steps above for each transceiver in the network.

NOTE. Please, be advised that antennas other than listed in this section can potentially be used with the transceiver provided that:

- these antennas are of a similar type to the listed above;
- antenna gain does not exceed 5 dB for omni-directional and 11 dBi for directional antenna;
- overall system EIRP does not exceed 36 dBm.

WARNING: Any antenna other than listed in this section needs to be approved by FreeWave Technologies before its use to assure that the transceiver in combination with the new antenna meets FCC requirements.

B. Transceiver Location

PRELIMINARY

Placement of the FreeWave transceiver is likely to have a significant impact on its performance. In general, the rule of thumb with FreeWave is that the higher the placement of the antenna the better the communication link - height is everything! In practice you should also place the transceiver away from computers, telephones, answering machines, and other similar equipment. To improve the data link, FreeWave Technologies offers directional and omni-directional antennas with cable lengths ranging from 3 to 200 feet.

When using an external antenna, placement of that antenna is critical to a solid data link. Other antennas in close proximity are a potential source of interference; use the Radio Statistics or Diagnostics software to help identify potential problems. It is also possible that slight adjustments in antenna placement (as little as 2 feet) will solve noise problems. In extreme cases, such as when the transceiver is located close to Pager or Cellular Telephone transmission towers, FreeWave offers a band pass filter to reduce the out of band noise.

C. Power Connection

The HT2+ transceivers can be operated from any well-filtered DC power source, input voltages of 6V to 30V. The power source should be capable of providing at least 550 milliamps of continuous current at 12V DC.

Transceiver is designed to operate in negative ground systems only.

PRELIMINARY