GuardianB™
Class B Public Safety BDA
For First Responders

TOWERIQ™
SIGNAL WHERE IT MATTERS

FCC NOTICE

The TowerIQ GuardianB signal booster is Class B booster. Under Section 90.219(d)(5) of the Commission's rules, all Part 90 Class B signal booster installations must be registered with the FCC.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference in which the user will be required to correct the interference at his own expense.

Filing Registrations. To register a Part 90 Class B signal booster, go to the Part 90 Signal Booster Registration and Discovery page at www.fcc.gov/signal-boosters/registration. Enter an FCC Registration Number (FRN) and Password in the upper-right corner of the screen. Then click on "LOGIN."

On the Signal Booster Information page, enter either (1) latitude and longitude (in decimal degrees) of the booster location and click on the "Get Address Info" button; or (2) the booster, city, and state, and click on the "Get Lat/Long button. The registration tool will provide a map of the booster location to verify the location is correct. Next, check the box(es) for the frequencies within the operating range of the signal booster and enter at least one call sign associated with the booster. Then enter the filer's Company Information (Company Name, Company Attention, Address, Email registration, enter Signature Information (Title, Name), and click "Submit." The system will generate a confirmation, including a booster ID number, which you may print for your records. Each booster must be submitted separately. Using the links in the upper-right corner of the Signal Booster Confirmation page, you can "Add a Booster," "View Your Boosters" or "Log out."

Accessing Registrations. Each registration will be available to the public on the same day it is filed with the Commission. Registrations may be accessed at: www.fcc.gov/signal-boosters/registration. Click on "View All Boosters" from the Part 90 Signal Booster Registration and Discovery page. The registrations can be searched and sorted by booster ID number, name of the filer, city, county, state, zip code, latitude/longitude, or call sign.

For further information please contact the FCC Licensing Support Hotline at (877) 480-3201 or submit an online help request at https://esupport.fcc.gov/onlinerequest.htm. Support hours are Monday thru Friday, 8:00–6:00 p.m. Eastern Time, except for Federal holidays.

Applicant's name: TowerIQ, Inc.

Address: 13723 Riverport Drive

C/O Potter Electric Signal Company

Saint Louis, MO 63043

 Contact person: michaelm@pottersignal.com; Call: 314-683-2218

FCC Contact information is https://signalboosters.fcc.gov/signal-boosters/ Federal Communications Commission

45 L Street NE Washington, DC 20554

Phone: 1-888-225-5322

TTY: 1-888-835-5322

CHAPTER 1: INTRODUCTION & OVERVIEW

1.1 Product Overview

GuardianB is a Class B, "1/2"-watt or "2"-watt, bi-directional amplifier with a maximum gain of 80 dB supporting both the 700 and 800 MHz Public Safety frequency bands.

In the majority of cases, newly constructed buildings with considerable size, or existing buildings that increase capacity by expanding the building footprint are required to have signal strength of -95 dBm or better in designated critical areas – Emergency Command Centers, Fire Pump Rooms, stairwells, standpipe, cabinets, etc. – in order to receive a certificate of occupancy. Guardian B meets the code for NFPA 72/1221 and IFC 510 and features a Type 4 rated amplifier housing.

Additionally, the GuardianB comes equipped with integrated alarming compatibility, UPS and Ethernet enabled remote monitoring. TowerIQ provides an industry leading 3-year warranty

1.2 Package Contents

Your BDA box contains the following items:

- GuardianB bi-directional amplifier with Type 4 rated housing and mounting kit
- Integrated alarm cable (5 ft)

1.3 Additional Items Needed

The GuardianB needs the following additional components for a complete install:

- One External antenna (directional Yagi)
- Multiple Inside antennas (omnidirectional domes and/or directional panels)
- Cable splitter for inside antennas
- Sufficient lengths of ultra-low loss interior/exterior cable, 50-ohm
- Lightning surge arrestor
- Grounded surge suppressor for DC power supply
- Ethernet cable

Note: Some component options are listed in table below. Not all accessories are listed.

1.4 Key Features & Benefits

- Improves coverage for Public Safety Band cellular network frequencies: (UL: 788-805, 806-816MHz | DL: 758-775, 851-861MHz)
- 80 dB gain, 1/2 W or 2 W system
- UL2524 2nd Edition
- Meets the code for NFPA 72/1221 and IFC 510
- Type-4 rated amplifier housing. No additional Type 4 enclosure needed
- Supplementary ethernet port with built-in TowerIQ Sentry™ Web Server for local and remote configuration and monitoring.
- Integrated alarming
- Connects to UL2524 LIsted UPS for external battery backup
- Automatic gain control (AGC) and Oscillation Detection
- Energy-saving operation allows bands to remain dormant when not in use
- A/C 110V and D/C 24V power option
- Independently adjustable frequency attenuation for uplink and downlink (Reduce gain in -1 dBm increments)
- Industry leading 3-year warranty

1.5 Optional Accessories

TowerIQ provides many optional features and accessories for the GuardianB Amplifier. Note, some component options are listed in table below. Not all accessories are listed.

See your TowerIQ sales person for all compatible part numbers

Outdoor Antenna Options
3996048 - Directional Wide Band 50Ω Yagi Antenna (698-960 MHz); N-Female connectors; 8 dBi. Note: Must use at least 2 dB insertion loss
Inside Antenna Options
3996140 - Omni-directional Wide Band 50 Ω Dome Antennas (698 -960 MHz); N-Female connectors; 3 dBi
3996141 - Directional Wide Band 50 Ω Panel Antennas (698-960 MHz); N-Female connectors; 6 dBi. Note: Must use at least 4 dB insertion loss cable for this option
Note: The sum of antenna gain (dBi) and cable loss (dB) cannot exceed 2.
Ultra Low-Loss Coaxial Cable
3996129 - Trilogy 1/2 inch air dielectric plenum rated cable
Splitters, Couplers & Accessories
Wide Band Couplers (698-2700 MHz)
Wide Band Splitters (698-2700 MHz)
TQ-LP Lightning Protector
5 dB; 10 dB; 20 dB RF Attenuator
TQ-Mount-Pole: L Bracket mount with U bolt hardware for donor antenna mount to J-bar
TQ-Mount-JBar: Steel 1 inch J-Bar mount for donor antenna. Antenna mount not included

TowerIQ's fire-rated plenum cable is UL-rated for plenum ceilings (UL E473791)

1.6 How it Works

The GuardianB amplifies signals that reach a building from the nearest radio tower, and from radios inside the building going back to the tower. This compensates for weak reception caused by distance, topography, building structure, etc. The BDA receives the signal from an outside antenna, amplifies that signal, and then rebroadcasts it via antenna(s) inside the building, where it can then be picked up by radios inside. In the reverse direction, interior antennas also pick up signals coming from radios, where they are amplified by the BDA, and then passed to the exterior antenna for rebroadcast back to the tower.

1.7 A Word About Safety

Follow all safety precautions in this manual. This information is designed to prevent personal injury, equipment malfunction, and/or radio interference. You are responsible for ensuring a safe installation.

Your installation may require working in high locations such as roofs and/or ladders. Follow applicable safety regulations and best practices to avoid falling. Take care not to drop objects from any high area. Cordon off ground areas directly below the section of roof you are working on, or below your ladder whenever possible.

In addition, as a qualified installer, you are responsible for knowing and following all applicable codes and regulations and for obtaining all required permits and inspections.

Always use appropriate personal protective equipment such as goggles, gloves, hard hat, etc. as needed, and as required. Failure to exercise caution when working in high areas could cause a fall and personal injury.

> ⚠ RF SAFETY WARNING: ANY ANTENNA USED WITH THIS DEVICE MUST BE LOCATED AT LEAST 8 INCHES FROM ALL PERSONS.

> ⚠ CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY TOWERIQ COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

1.8 Warning Notices:

Caution: notices may also be used in this manual to draw attention to matters that do not constitute a risk of causing damage to the equipment but where there is a possibility of seriously impairing its performance, e.g. by mishandling or gross maladjustment. Warnings and Cautions within the main text do not incorporate labels and may be in shortened form.

These draw the attention of personnel to hazards that may cause damage to the equipment. An example of use is the case of static electricity hazard.

Caution: Risk of explosion if battery is replaced by an incorrect type. Dispose used batteries according to the instructions.

Disconnection of the 2 RF connectors may cause damage to the equipment when power is on. The application antenna and RF cable are not provided. The sum of antenna gain (dBi) and cable loss (dB)should not exceed 3 dB for inside antenna and 9 dBi for outside antenna, shortest distance from human is 0.805m

Important: Unauthorized antenna cables and/or coupling devices may not be used. Changes or modifications not expressly approved by the TowerIQ could void the user's authority to operate the equipment.

Use of unauthorized antennas, cables, and/or coupling devices not conforming with ERP/EIRP and/or indoor only restrictions is prohibited

Home/ personal use are prohibited.

Note: If the insertion loss of the outside cable exceeds 3dB, the VSWR alarm will be affected.

CHAPTER 2: BDA INTERFACE & CONNECTIONS

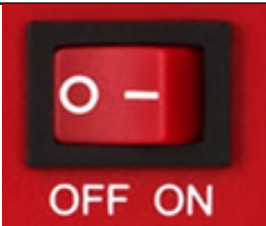2.1 GuardianB 1/2W BDA Interface Overview
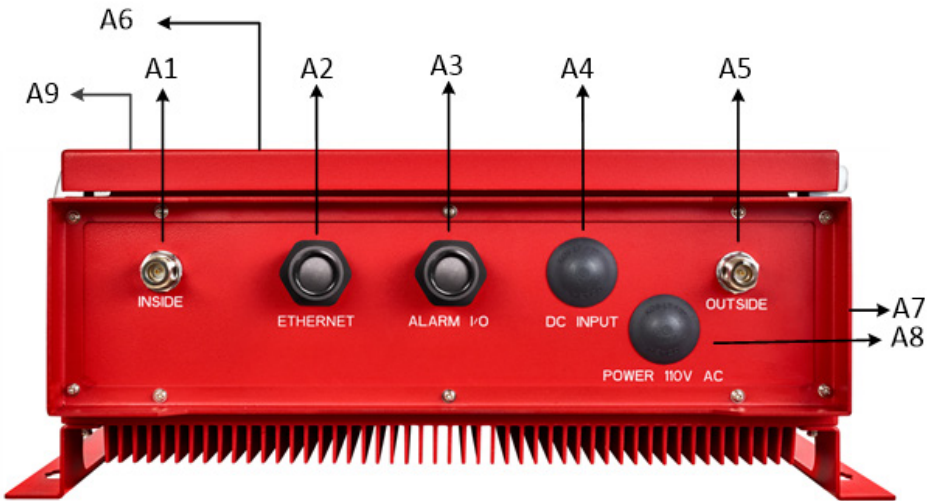
| Interface	Type	Description
A1	INSIDE	N Female for INSIDE cable and antenna
A2	ETHERNET	Cat5e Standard Ethernet Cable Device
A3	ALARM I/O	To Fire Department Control Box
A4	DC INPUT	Connect UPS, voltage range is 18.5-29V; DC power is the secondary power supply, and secondary power (DC input) source shall be UL2524 listed.
A5	OUTSIDE	N Female for OUTSIDE cable and antenna
A6	USB	Used to initialize the network connection devices
A7	GROUNDING LUG	Grounding lug
A8	POWER 110 VAC	Connect to 110VAC or 110V of UL2524 listed UPS
A9	ALARM LEDs	Indicate an alarm condition

BDA Interface & Connections

2.2 ON/OFF Switch

An ON/OFF switch is used to cut off the connection between RF module and both the DC input and the power supply output." with a ON/OFF switch picture.

2.3 RF Interfaces (A6 & A1)

A6 — N-type Female for OUTSIDE cable and antenna

A1 — N-type Female for INSIDE cable and antenna

2.4 Power Wiring for AC and DC Power for 24 UPS/Battery Backup
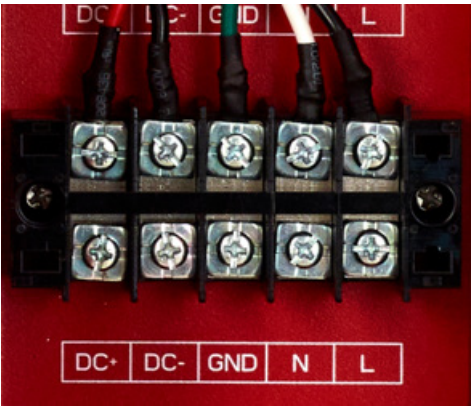
DC+	Battery positive input (Red)
DC-	Battery negative input (Black)
GND	Ground (Green)
N	AC N input (White)
L	AC L input (Black)
Wire Gauge: 14 to 22 AWG	

Note: 1/4" spacing is to be maintained between power limited and non-power limited Circuits
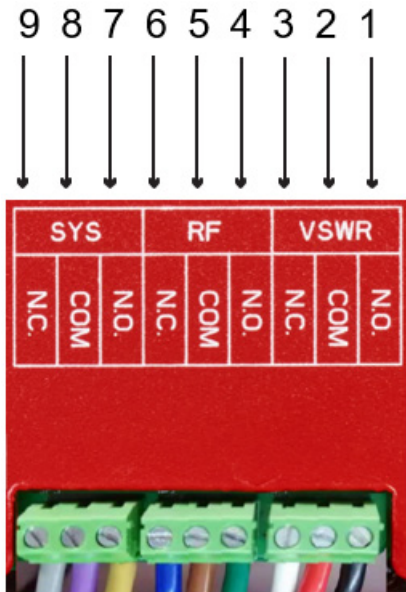
2.5 GUI Interface

GUI interfaces are for firmware update.

GUI1 is for Sentry Board; GUI2 is for RF board.

2.6 Fire Alarm I/O Interface

Number	Definition	Wire Color on Cable
1	VSWR Alert (N.O.)	Black
2	VSWR Alert (COM)	Red
3	VSWR Alert (N.C.)	White
4	Oscillation Detected Alert (N.O.)	Green
5	Oscillation Detected Alert (COM)	Brown
6	Oscillation Detected Alert (N.C.)	Blue
7	Component Alert (N.O.)	Yellow
8	Component Alert (COM)	Purple
9	Component Alert (N.C.)	Gray

Note: these connections need to be made to Power Limited sources.

2.7 VSWR Alarm Trigger Criteria

The VSWR Alarm is triggered under the following:

- VSWR Alarm caused by outdoor VSWR abnormal
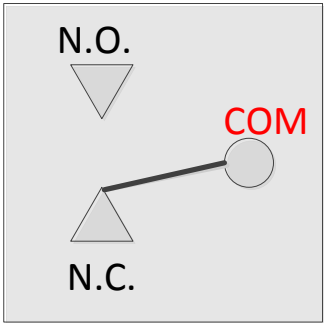
Relay Shown In Non-Alarm Condition for N.C.
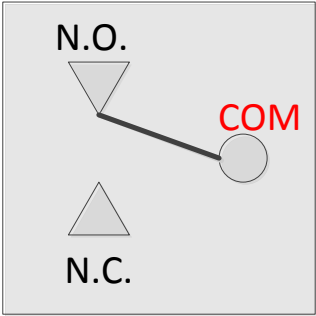
Alarm Condition for N.C.

Relay Shown In Non-Alarm Condition for N.O.

Alarm Condition for N.O.

2.8 Oscillation Detected Alert Trigger Criteria

The Oscillation Detected Alert is triggered undeR the following conditions:

- The isolation between outside antenna and inside antenna is not enough.

Relay Shown In Non-Alarm Condition for N.C.
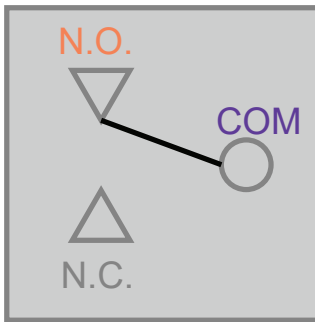
Alarm Condition for N.C.

Relay Shown In Non-Alarm Condition for N.O.

Alarm Condition for N.O.

2.9 Component Alert Trigger Criteria

The Component Alert is triggered under the following:

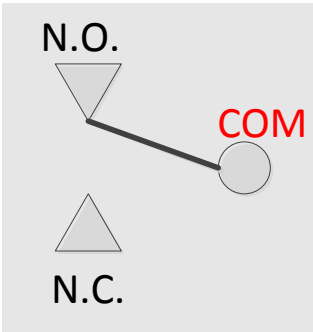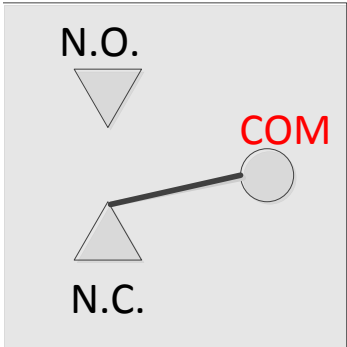• Repeater current is abnormal

Relay Shown In Non-Alarm Condition for N.C.

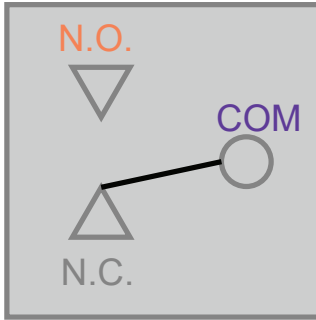Alarm Condition for N.C.
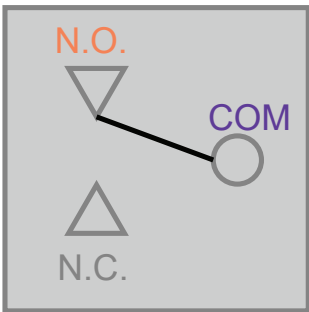
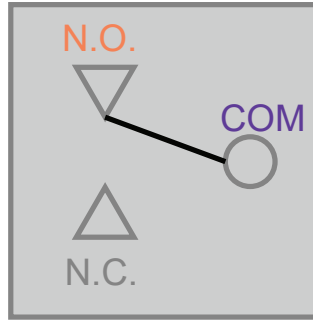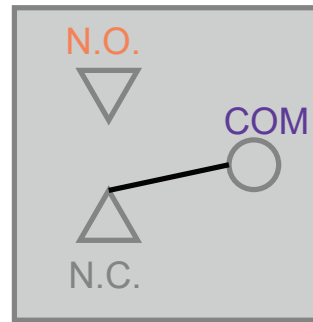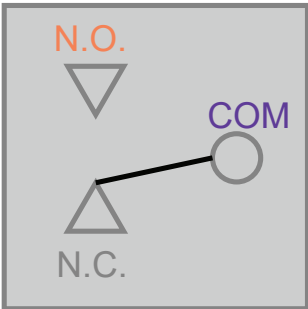Relay Shown In Non-Alarm Condition for N.O.
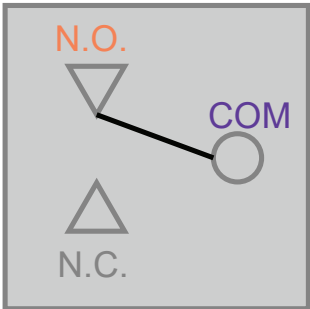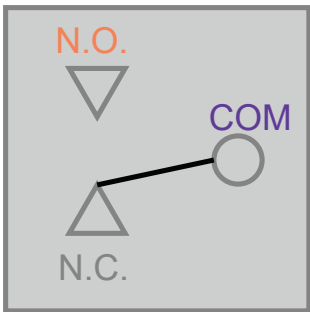

Alarm Condition for N.O.

2.10 Load Restrictions

Alarm Dry Contact Output Restrictions: 1 A at 30 VDC (Resistive)

Note: these connections need to be made to Power Limited sources.

2.11 Ethernet Interface

The Ethernet port is used to connect the user device to the Guardian UHF embedded Sentry web server via a standard web browser such as Google Chrome, Microsoft Edge, or Apple Safari. The Sentry web server provides the user with the ability to configure and monitor the status of the BDA. You can connect your browser enabled device to the Guardian BDA using a standard RJ45 Cat 6 (or higher) ethernet cable either directly or via the watertight through hole connector at the bottom of the Guardian BDA (see section 2.1 interface A7).
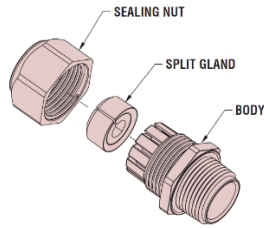
Ethernet Assembly Drawing
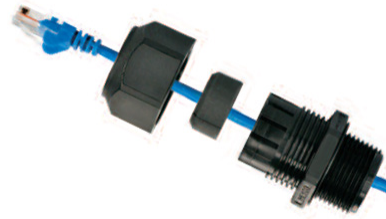
Ethernet Connector

2.12 USB Interface

The USB connector is on top of the GuardianB unit, below the DIP switches, as shown below.

Only when initializing the network connection equipment, after initialization unplug the USB cable.

As shown, the Type 4 housing must be open to gain access to this port. The interface is used to initialize network connections using a computer. Be sure to unplug the USB cable after the network initialization is completed.
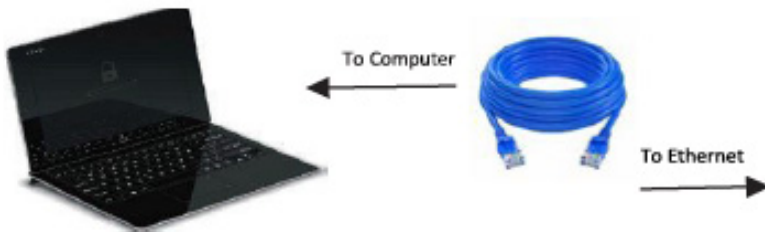
2.13 GUI1, GUI2 Interface

1. The GUI connector is located inside the Guardian UHF unit enclosure at the lower left side of the interior panel as shown below. The GUI (USB) interface is used for firmware updates and is not normally utilized by the user.
2. The UL50/NEMA Type 4 enclosure door must be open to gain access to the GUI port.
3. Be sure to unplug the USB cable and close and lock the enclosure door after the Guardian UHF RF board firmware update is completed.
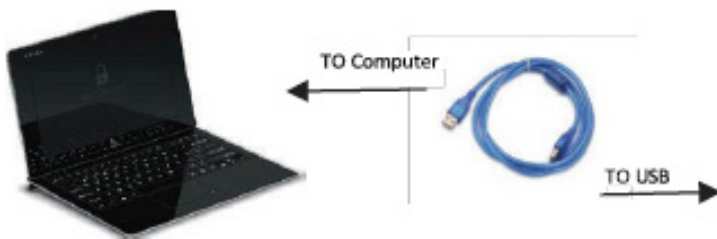
BDA Interface & Connections

2.14 Alarm LEDs

		Status	Description
1	AC Power Normal	Green ON	AC Power is working properly
		OFF	
2	AC Power Loss /DC Power Switchover	Red ON	AC Power is not working, and BDA has switched to DC Power.
		OFF	
3	Donor Antenna Malfunction	Red ON	Connection to the donor antenna has been interrupted or is not present. Possible bad connector or cable termination.
		OFF	
4	RF Malfunction /Oscillation Detected	Red ON	RF emitting device can't function because oscillation is happening, often caused by indoor and outdoor antennas being too close.
		OFF	
5	System Component Malfunction /BDA Failure	Red ON	Some system components failing. Overpowering has occurred.
		Off	
6	Silencing (button)	If the trouble is triggered, press this button to silence the audible alarm. It needs to be pressed once every 22 hours when it's in silencing position or the booster will sound.	

Note: Dedicated building annunciation shall provide to indicate DC loss or low DC secondary power source. Secondary power source annunciator needs to be installed adjacent to the BDA system and the BDA shall be located in close proximity to the FACP. Please refer to the wiring instruction provided by the secondary power source.

CHAPTER 3: PLANNING THE INSTALLATION

3.1 Installation Overview

Typically, a BDA installation follows these steps:

1. Choose a mounting location for the exterior antenna. The recommended Yagi directional antenna is, pointed directly at the radio tower (line of sight). The antenna is typically mounted on the wall or roof of the side of the building with the strongest signal. A grounded lightning protector is required between the exterior antenna and the BDA.
2. Next, choose the mounting location of the interior antenna(s), being sure to take separation requirements into account. Long, narrow spaces benefit most from directional flat-panel antennas, while more square spaces benefit more from omnidirectional dome antennas.
3. Choose where to mount the BDA. This should be in a secure indoor location near a grounded power source.
4. Map the cabling route between the exterior antenna and the BDA and between the BDA and interior antennas.
5. Proceed with a 'soft installation' connecting components without securing their placement until testing can be completed.
6. Power on the BDA and perform configuration and testing explained in Chapter 5.
7. Complete installation by securing the placement of the BDA, antennas and other components,

Important Installation Safety Precautions:

- The exterior antenna must not be co-located or operating in conjunction with any other antenna.
- Always use a properly installed TowerIQ lightning protector between the exterior antenna and the BDA.
- Always power off the BDA before working on the roof of the building, or anywhere in close proximity to the external antenna.
- Comply with all antenna separation requirements to prevent signal oscillation.

CAUTION: FAILURE TO PROPERLY INSTALL A LIGHTNING PROTECTOR CAN RESULT IN DAMAGE TO THE BDA, ANTENNAS, AND WIRING.

CAUTION: SIGNAL OSCILLATION CAN CAUSE RADIO INTERFERENCE WITH RADIO TOWERS AND RESULT IN CIVIL AND/OR CRIMINAL PENALTIES.

3.2 Exterior Antenna Overview

The Yagi antenna receives and transmits signals over a focused area. It must be aimed directly (line of sight) toward the radio tower that provides the strongest signal to the building. The exterior antenna and mast (if any) must be mounted in a location that meets all of the following criteria:
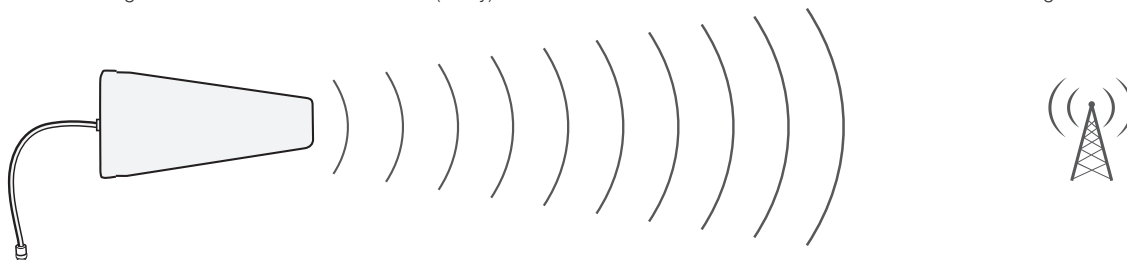
- Best signal strength.
- Not co-located with other antennas or used in conjunction with other antennas.
- Away from all power lines.
- At least 6 ft. from lightning rod antennas.
- At least 32 in. from any person.

These distances are general guidelines only. Refer to the applicable building and electrical codes in your area to determine specific local requirements.

3.3 Interior Antenna Overview

You may use any combination of omnidirectional (dome) and/or directional (flat panel) interior antennas to obtain balanced signal strength throughout the structure.
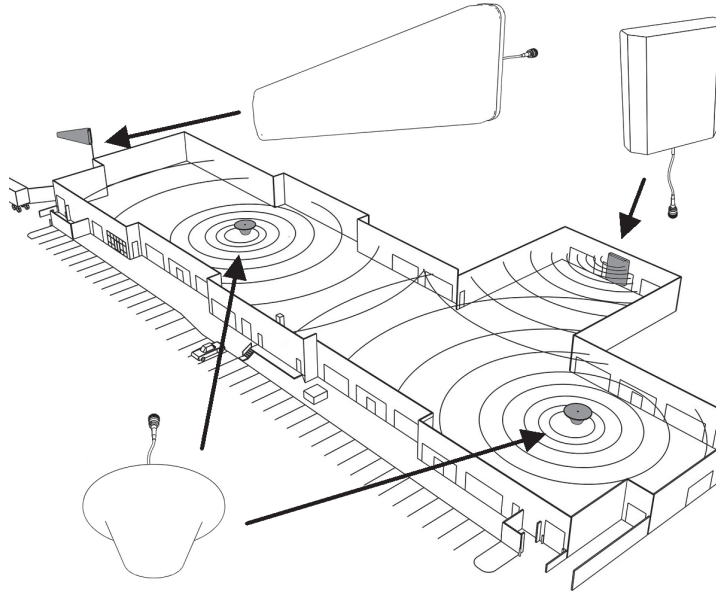
Dome antennas provide 360-degree hemispherical coverage suitable for mostly square areas, while flat panel antennas provide a focused zone of coverage suitable for long narrow areas. The example above uses two dome antennas and one panel antenna to provide full coverage

Keep in mind that floor structures in multistory buildings can cause significant signal loss, which means that you may need to install interior antennas on more than one floor. Here is an example of a multistory installation:
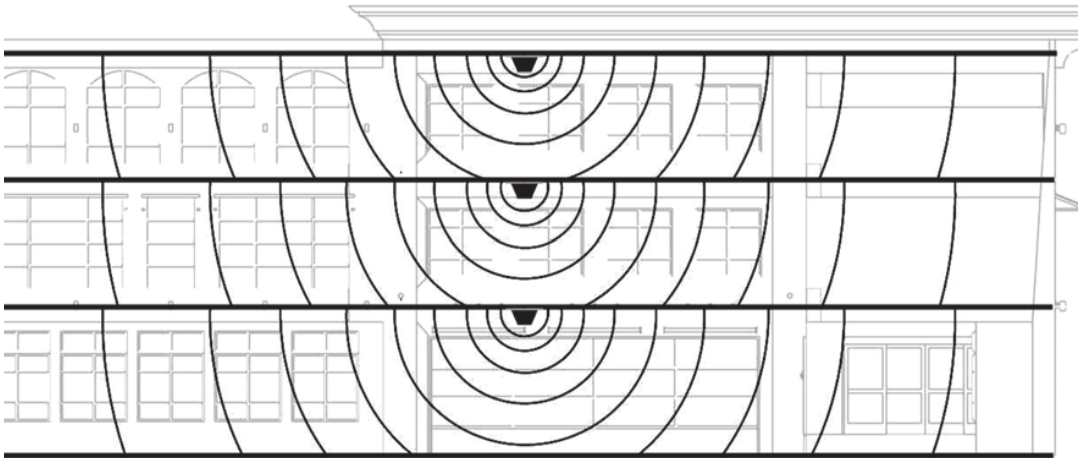
Note: You may not need antennas on every floor of a multistory building, depending on factors such as building material, BDA gain, etc.

3.4 Antenna Separation

Proper antenna separation prevents signal oscillation (feedback) that can interfere with the radio tower. Separation is measured in a straight line from the exterior antenna to the closest interior antenna. The closest allowable distance depends on a number of factors, such as BDA gain level, building material, etc. Recommended separation distances are:

Amplifier gain	Min. separation (ad)
40 dB	5'-6'
45 dB	15'-20'
50 dB	50'
55 dB	60'
65 dB	75-80'
70 dB	100'
75 dB	100'-120'
80 dB	120'-180'

Vertical separation is more important than horizontal separation. If you are unable to obtain the required separation horizontally, try raising the exterior antenna. You may also try reducing the BDA gain as described in Chapter 5 of this manual.

Antenna Safety Precautions:

You can mix and match dome and directional antennas as needed to obtain proper coverage throughout the building or area where you need to boost the signal. If you use a Yagi exterior antenna, you should normally aim it away from all interior antennas, regardless of separation, to prevent oscillation.

Antenna Aiming
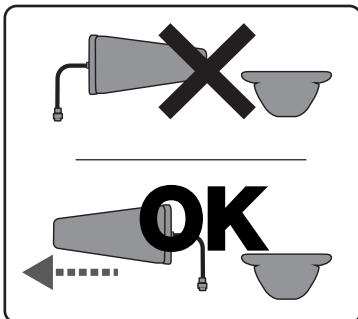
CAUTION: SIGNAL OSCILLATION CAN CAUSE RADIO INTERFERENCE WITH RADIO TOWERS AND RESULT IN CIVIL AND/OR CRIMINAL PENALTIES.

3.5 BDA Location

Select an indoor location for the BDA that meets the following criteria:

• Indoor dry
• Ambient air temperature is 25°C
• Away from tightly enclosed or overly hot spaces
• Power and warning lights are easily visible
• Shortest possible cable runs to all antennas

3.6 Accessories

The final step in the planning process is to make sure you have all of the necessary accessories to complete the installation. You will need all of the items listed in Chapter 1 of this manual plus some or all of the following:

- Cable clips: Use these to secure the cables to interior and exterior walls/ceilings.
- Appropriately rated sealant/caulking to waterproof exterior cable entry points
- Hand and/or power tools as needed to complete the installation
- Personal Equipment (PPE): Use all PPE required by local codes and/or best practices to help ensure personal safety during installation.

> ⚠ CAUTION: YOU ARE RESPONSIBLE FOR ENSURING THAT THE INSTALLATION MEETS ALL APPLICABLE CODES.

Note: You may need to obtain a permit from your local building department to install the BDA and antennas. Check your local building and/or electrical codes.

3.7 Need Help?

If you need help planning your installation, contact a qualified installer, the reseller who supplied you with the BDA, or TowerIQ:

Call: 844-626-7638, 7 a.m. to 5 p.m. PST, Monday – Friday
Email: cs-guardian@tower-iq.com

CHAPTER 4: INSTALLATION

4.1 Soft Installation

Perform a "soft" installation of all components to test signal coverage and oscillation before making the installation permanent. Avoid making holes or other permanent attachments during this phase. Refer to Chapter 5 for configuration and testing instructions. Proceed with final installation once configuration and testing are complete.

4.2 Exterior Antenna

Mount the exterior antenna in the location you selected during planning. Follow all of the instructions included with the antenna to ensure that your installation is done properly. Here are a few reminders and essential steps:

• A Yagi antenna is mounted horizontally with drip hole facing down and aimed at the desired radio tower (line of sight).
• Mount the antenna.
• Connect a length of cable to the antenna and hand-tighten.
• Run the cable along the planned route.
• Install a properly grounded TQ-LP lightning protector.
• Seal any exterior cable entry points on building exterior with caulking or sealant.

> ⚠ WARNING: DO NOT TOUCH ANY LIVE ELECTRICAL WIRES OR ALLOW THE ANTENNA OR CABLING TO TOUCH ANY LIVE ELECTRICAL WIRES.

> ⚠ CAUTION: AVOID AIMING A YAGI ANTENNA TOWARD ANY INTERIOR ANTENNA.

Installation

4.3 Interior Antennas

Mount the interior antenna(s) in the location(s) you selected when planning. Follow all instructions included with the antenna(s) to ensure the installation(s) are done properly.

Here are a few reminders and essential steps:

- Dome antennas are mounted on the ceiling as close to the center of the desired coverage area as possible, domed (convex) side pointing down.
- Flat panel antennas should be wall-mounted as close as possible to the center of the wall, or at one end of long narrow space.
- Mount the antenna.
- Connect a length of cable to the antenna and tighten until hand-tight.
- If you are installing multiple antennas, run the cable to the splitter location and connect the cable to one of the outputs on the splitter.
- Connect another length of cable to the input side of the splitter (if used) and run this cable to the BDA location.
- It is important to keep the cable runs equal or use taps to ensure a harmonious install.

> ⚠ CAUTION: VERIFY THAT ALL INTERIOR ANTENNAS MEET THE SEPARATION REQUIREMENTS DESCRIBED IN THE PREVIOUS CHAPTER, AND THAT NO ANTENNA IS AIMED TOWARD THE EXTERIOR ANTENNA.

> ⚠ CAUTION: DO NOT CONNECT AN INTERIOR ANTENNA TO THE SPLITTER INPUT.

4.4 Mounting the BDA

Mount the GuardianB as follows:

- Verify that the selected location meets all criteria described in the previous chapter.
- Mount a 24 inch x 24 inch x 3⁄4 inch thick sheet of plywood on top of sheetrock, secured into wall studs where the Type 4 housing is to be placed. The plywood should be flush against wall.
- Once the plywood is secure, attach the Type 4 housing to the plywood base using the screws provided. In most installations, the housing will be oriented so the I/O ports are facing down.
- Connect the donor antenna cable to the signal booster connector port marked OUTSIDE and tighten the connection.
- Connect the service antenna cable to the signal booster connector port marked INSIDE and tighten the connection.

> ⚠ CAUTION: DO NOT POWER ON THE BDA UNTIL INSTRUCTED TO DO SO.

> ⚠ CAUTION: NEVER POWER ON THE BDA WHEN ANY ANTENNAS ARE DISCONNECTED AS THIS COULD DAMAGE THE BDA.

CHAPTER 5: POWER ON

5.1 Powering on the BDA

1. Make sure the exterior and interior antenna cables are firmly connected to their corresponding ports on the Type enclosure.
2. Verify that the green Power light is illuminated.
3. When the booster is turned on, the band lights will flash red and green for approximately 2 seconds.

> ⚠ CAUTION: DO NOT PROCEED BEYOND THIS POINT UNTIL THE BDA IS POWERED ON AND NO RED WARNING LIGHTS ARE ILLUMINATED.

> ⚠ CAUTION: ONLY USE THE POWER SUPPLY INCLUDED WITH THE BDA. USE OF ANOTHER POWER SUPPLY COULD DAMAGE THE BDA AND/OR POWER SUPPLY.

CHAPTER 6: TESTING AND TROUBLESHOOTING

6.1 Band LED Conditions

This section will help you interpret the LED indicators on your GuardianB. But first, here are a few configuration and testing points to keep in mind:

- If the control light for a specific frequency band is flashing red or red-yellow, try increasing the antenna separation between the inside and outside antennas as much as possible first, then restarting the booster.
- Attenuation can be lowered to a maximum of 30 dB through sentry software and maximum of 30 dB using the booster's dip switches.
- Attenuation greater than 30 dB (either made by the booster's dip switches or cumulative adjustments of dip switches and software) will cause the affected band to shut off and display a solid red led.

6.2 LED Conditions

LED INDICATIONS

LED Color	LED Condition	Resolution
GREEN	ON	Normal operation.
GREEN	FLASHING	Normal operation. The Automatic Gain Control (AGC) is self-adjusting.
RED	FLASHING	Indicates Oscillation
RED	SOLID	RF link is off
RED-GREEN	FLASHING	The RF board is being reprogrammed

Refer to your Sentry Monitoring Software for more information about LED codes. Meanwhile, if you have any questions during setup, please reach out to our U.S.-based support technicians:

Call: 844-626-7638
Email: cs-guardian@tower-iq.com

6.3 System Maintenance

The rated current of the replaceable fuse is 4A and the size is 3.65(.25") X31.75(1.25") mm(inches), we recommend Littelfuse 0332004MXP or other UL listed fuses.
 No user maintainable components within this system. In the event of any system malfunction, please contact a licensed installer.
Caution: De-Energize Unit Prior to Servicing

6.4 Testing & Troubleshooting

Once the booster is powered on (and no Warning lights are on), assess the signal in locations of needed signal improvement. Refine the antenna locations and/or gain levels as needed, then complete the permanent installation when you are confident the system will perform well.

A few tips and some perspective:
- It's not realistic to expect full reception everywhere in the building.
- As a general rule, increasing gain by 6dB doubles the coverage distance of the interior antennas. Start at the lowest gain and increase gradually as needed.
- If one or more red Warning lights comes on, it indicates there is oscillation in that band and adjustments are needed
- If you can't get the coverage reasonably well-balanced, you may need to install an additional interior antenna and/or a different type of interior antenna and/or relocate interior antennas.

CHAPTER 7: SENTRY CONFIGURATION & MONITORING

7.1 Sentry Software Introduction

TowerIQ's Sentry is a secure web browser-based signal-booster management solution. It aids in the installation, optimization, and ongoing management of your Guardian UHF BDA. It provides installers with tools for seamless system configurations, and it helps pinpoint malfunctions due to unforeseen changes in the amplifier landscape, such as new towers or repeater systems. Features include:

- Narrowband/Broadband channel configuration and activation
- Per channel Gain setting
- Uplink and Downlink Squelch level setting and activation
- Quick notification about booster changes and over-power situations.
- Allows offsite monitoring related to BDA performance, such as uplink/downlink power, outside signal strength or frequency band status (On/Off)
- Helps optimize installations by monitoring and identifying the strongest signal strength available.
- Use any device with a standard browser
- Remote access and configuration if BDA connected to the internet.

7.2 Ethernet Connection

Ethernet Connection: Plug the Ethernet cable into the yellow-capped socket on the bottom of the UL50/NEMA Type 4 enclosure, labeled Ethernet. Once the connections are made, power on the Guardian UHF BDA. Note: The Ethernet cable length should not exceed 30 meters (98.5ft) and the cable should be rated Cat 6 or higher.

7.3 Web Browser Configuration

Once your device has been connected to the Guardian BDA Ethernet port you must launch your preferred browser and point it to the Sentry web server using the local network Sentry IP address. The Sentry web server local network (laptop to BDA) IP address has been assigned at the factory with a static (fixed) Class C private IP address as follows: 192.168.1.15. If you do not have this address available, you can determine the Sentry web servers address using the ipconfig utility if you are using a Windows 10 or 11 machine:

To find your local or private IP address from the Command Prompt in any version of Windows, simply press the Windows key + X or right click the Start Menu (See 1 & 2 below). If using the Windows key + X select the PowerShell or command prompt option which will launch the PowerShell. At the prompt type in: arp -a (See 3 below). This will provide IP information on all devices on your Ethernet adapter. Since this is a local network with only the user and Sentry web server the address can be easily determined:
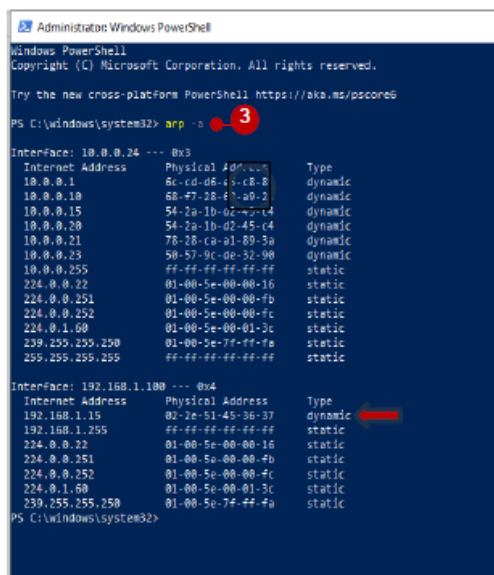
7.4 Password Protected Access

Access to the Sentry Web Server is password protected. There are two levels of password access: 1) Admin, and 2) User. The Admin access can change passwords while the User access cannot. The factory default Admin user/password combination is Admin, Admin, and the User combination is User, User. It is highly recommended that the administrator changes the passwords immediately during the first power up of the Guardian BDA. Once the user device browser connects to the Sentry web server the browser will display the login page:

Once logged into the Sentry web server the administrator can modify the Admin and/or the User password. Select Password Update from the left-hand column of the browser.

To change the password simply type in the new password (up to 25 alphanumeric characters) and click the Save button. On the next login attempt the saved password will be required to successfully login. The Administrator password must be stored in a safe location. If lost the administrator will need to contact Tower-IQ support for assistance in resetting the Admin password.
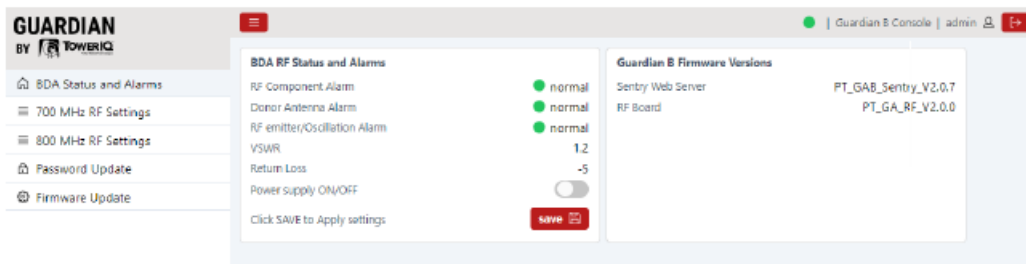

NOTE: KEEP YOUR ADMIN PASSWORD IN A SAFE LOCATION. IN THE EVENT YOUR ADMIN PASSWORD IS LOST THEN YOU MUST CONTACT TOWER-IQ SUPPORT TO RESET YOUR ADMIN PASSWORD

7.5 BDA Status and Alarms

BDA RF Status and Alarms – This dialog box provides BDA system status/alarm reporting and isolation testing features. The RF amplifier can also be turned ON/OFF.

    a.   Alarms:
- i. Component Status – Green: RF Component Normal, Red: System Component Failure
- ii. Donor Antenna – Green: Donor Antenna Normal, Red: Donor Antenna Alarm (High VSWR) or poor outside signal strength (< -85dB)
- iii. RF Emitter – Green: RF Board Status OK, Red: RF Board Alarm

    b.   Isolation Test: Uplink and downlink isolation can be tested and reported by clicking on the associated toggle switch

    c.   VSWR (Voltage Standing Wave Ratio) – Indicates level of reflected RF energy back into the BDA due to poor impedance matching in the Donor line. VSWR levels greater than 1.5 will cause the BDA to automatically shut down to protect the RF amplifier.

    d.   Return Loss (dB) – Similar to VSWR but on a different scale. High return loss (>10dB) means less reflected RF energy back into the BDA (less is better).

    e.   Power Supply - RF amplifier ON/OFF Toggle. When OFF no RF energy is produced by the BDA

Guardian B Firmware Versions – This dialog box displays the current firmware versions for the RF Board and Sentry web server are listed. Note that only the Sentry web server firmware can be updated by the customer.
Note: Once updates are complete for each dialog box the user must click the save button to apply changes.

7.6 700MHz & 800MHz RF Settings

The RF Settings pages for the 700MHz and 800MHz bands are used for RF configuration and reporting BDA status and are accessed via the left-hand page selection column (see arrow below). There are two (2) dialog boxes on each page that provide configuration and status:
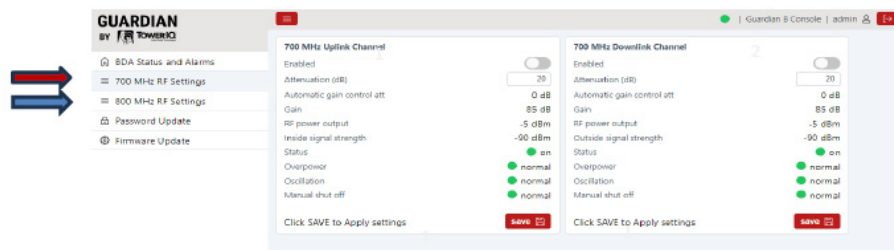
700 MHz and 800 MHz Uplink Channel and Downlink Channels – These dialog boxes provide for enabling and configuration of the Uplink/Downlink Channels and provide Uplink/Downlink Channel status reporting. The following configuration settings are accessible to the user:

    f.   Enabled – Channel enabled. This switch must be in the ON position to turn ON the corresponding channel. Note that the 700 MHz Uplink channel MUST be turned ON for both 700 MHz and 800 MHz operation due to shared uplink PA.

    g.   Attenuation (dB) - Sets the band attenuation in decibels (dB) between 1dB and 30dB.

    h.   Automatic Gain Control (dB) – Displays the AGC applied to the Uplink or Downlink Channel. High AGC levels can be an indicator of poor isolation or other adverse conditions that should be identified and corrected.

    i.   Gain (dB) – Displays the Uplink/Downlink System Gain

    j.   RF Power Output (dB) – Displays the instantaneous Uplink/Downlink RF power output

    k.   Inside/Outside Signal Strength (dB) – Displays the Inside (Service) or Outside (Donor) Signal Strength

    l.   Status/Alarm Indicators (Red/Green) –
- i. Status (Green: Channel enabled, Red: Channel disabled),
- ii. Overpower (Green: Normal power level, Red: Overpower condition),
- iii. Oscillation (Green: Oscillation not present, Red: Oscillation present)

    m. Manual Shut Off – Green: RF Power Amplifier ON, Red: RF Power Amplifier OFF

Note: Once updates are complete for each dialog box the user must click the save button to apply changes.

7.7 Firmware Update

The Firmware Update page provides the user with the ability to update the Sentry web server firmware. TowerIQ may periodically provide firmware updates to add features, update security, or provide bug fixes. The user must store the TowerIQ provided firmware file (.bin formatted file) on the user device to download the update.

Step 1: Select the Firmware Update page from the page selection column on the left-hand side of the browser page. The

firmware update page will be displayed with the Firmware Update dialog box.

Step 2: In the Firmware Update dialog box click on the "Select .bin file" button next to the "Upload New Firmware" selection.
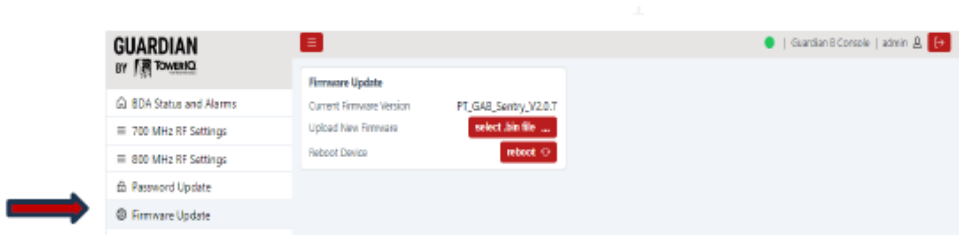
Step 3: The user will select the TowerIQ provided firmware update file (.bin format)
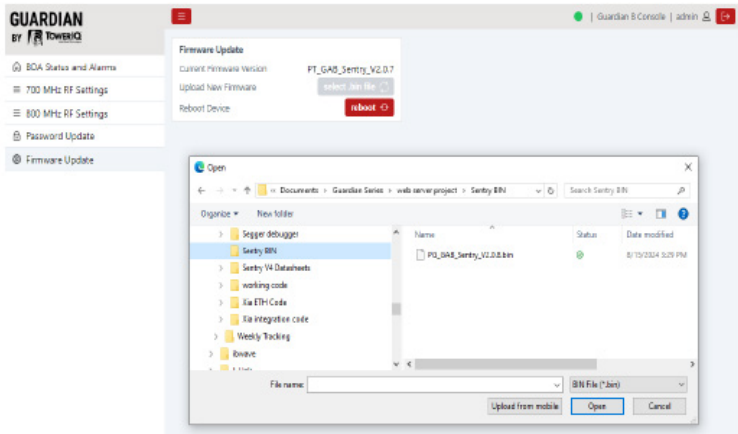
Step 4: The user will click on the "Reboot" button. The Guardian BDA will reboot, and the browser page will be automatically refreshed with the new Sentry web server version..
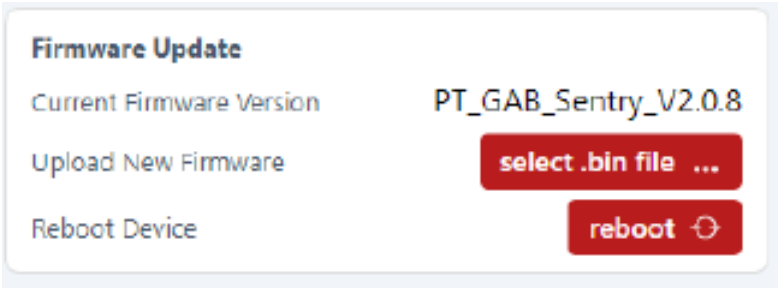
CHAPTER 8: SPECIFICATIONS

Electrical		Unit of measure	700 MHz	800 MHz
Frequency Range, Uplink		MHz	788-805	806 – 816
Frequency Range, Downlink		MHz	758-775	851 – 861
Bandwidth		MHz	17	10"
Total Output Power, Uplink		dBm	27	27
Total Output Power, Downlink		dBm	/33	/33
Maximum System Gain		dB	80	80
Gain Adjustment Range (1dB step)		dB	25	25
Pass Band Ripple, p-p		dB	10	≤5
Uplink Noise Figure		dB	≤5	≤5
System Group Delay		usec	1.5	1.5
Intermodulation		dBm	≤-13	≤-13
Spurious	9 kHz to 1 GHz	dBm	FCC Compliance	FCC Compliance
	1 GHz to 12.75 GHz	dBm	FCC Compliance	FCC Compliance
Absolute Maximum RF Input Power		dBm	-10	-10
Impedance:		ohm	50Ω	50Ω
FCC ID:			2AXVJGUARD-B2UL	
Certifications			FCC Part 90	
Alarm Dry Contact Output Restrictions			1 A at 30 VDC (Resistive) These connections need to be made to power limited Sources	

Mechanical Specifications				
Dimensions (H x W x D):		in (mm)	21.2 x 17.2 x 8.0 in (550 x 436 x 203 mm)	
Weight (Booster only):		lbs (kg)	45.9 lbs (20.8 kg)	
Weight (Box as shipped):		lbs	53 lbs	
Power Supply		AC	110AC 50/60 Hz @0.9A	
		DC	24 V @2.0A	
Power Consumption	Single band	W	40	
	Dual band	W	60	
Enclosure Cooling			Convection	
RF Connectors			N-Female	
Operating Temperature		°F (°C)	-4 to +122 (-20 to +50)	
Operating Humidity			95%	
Environmental Class:			Type-4	

CHAPTER 9: SAFETY AND COMPLIANCE

FCC Compliance

This a Class B booster. The product has been tested and found to comply with the Booster Requirements per FCC Part 90.

| Part 90 Signal Boosters | THIS IS A 90.219 CLASS B DEVICE |

WARNING: This is **NOT** a **CONSUMER** device. It is designed for installation by **FCC LICENSEES** and **QUALIFIED INSTALLERS**. You **MUST** have an **FCC LICENSE** or the express consent of an FCC Licensee to operate this device. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.

15.105: 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.

WARNING: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY TOWERIQ COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

CHAPTER 10: WARRANTY

For questions regarding your warranty, contact a TowerIQ representative at 844-626-7638 or email guardian@tower-iq.com.

10.1 Warranty Periods

Your warranty includes the following periods:

- Three-Year Product Warranty: TowerIQ products are covered under a three-year product warranty from the date of purchase. This protects the customer from any defects or problems the product may have that are solely the fault of TowerIQ. Incorrect installation or misuse will void this warranty. Upon the return of a defective product, TowerIQ will issue the customer a working replacement. All returned packages should contain all products distributed.

10.2 Three-Year Product Warranty

TowerIQ warrants its products for three years from the date of purchase against defects in workmanship and/or materials. Specifications are subject to change. The three-year warranty only applies to products meeting the latest FCC Certification Guidelines stated on 2/20/2013 and going into effect April 30, 2014. A two-year warranty applies to any products manufactured before May 1, 2014.

Products returned by customers must be in their original, un-modified condition, shipped in the original or protective packaging with proof-of-purchase documentation enclosed, and a Return Merchandise Authorization (RMA) number printed clearly on the outside of the shipping container.

Buyers may obtain an RMA number for warranty returns by calling the TowerIQ Return Department toll-free at 844-626-7638. Any returns received by TowerIQ without an RMA number clearly printed on the outside of the shipping container will be returned to sender. In order to receive full credit for signal boosters, all accessories originally included in the signal booster box must be returned with the signal booster. (The Buyer does not need to include accessories sold in addition to the signal booster, such as antennas or cables.)

This warranty does not apply to any product determined by TowerIQ to have been subjected to misuse, abuse, neglect, or mishandling that alters or damages the product's physical or electronic properties.

TowerIQ warrants to the Buyer that each of its products, when shipped, will be free from defects in material and workmanship, and will perform in full accordance with applicable specifications. The limit of liability under this warranty is, at TowerIQ's option, to repair or replace any product or part thereof which was purchased up to THREE YEARS after May 1, 2014 or TWO YEARS for products purchased before May 1, 2014, as determined by examination by TowerIQ, prove defective in material and/or workmanship. Warranty returns must first be authorized in writing by TowerIQ. Disassembly of any TowerIQ product by anyone other than an authorized representative of TowerIQ voids this warranty in its entirety. TowerIQ reserves the right to make changes in any of its products without incurring any obligation to make the same changes on previously delivered products.

As a condition to the warranties provided for herein, the Buyer will prepay the shipping charges for all products returned to TowerIQ for repair, and TowerIQ will pay the return shipping with the exception of products returned from outside the United States, in which case the Buyer will pay the shipping charges.

The Buyer will pay the cost of inspecting and testing any goods returned under the warranty or otherwise, which are found to meet the applicable specifications or which are not defective or not covered by this warranty.

Products sold by TowerIQ shall not be considered defective or non-conforming to the Buyer's order if they satisfactorily fulfill the performance requirements that were published in the product specification literature, or in accordance with samples provided by TowerIQ. This warranty shall not apply to any products or parts thereof which have been subject to accident, negligence, alteration, abuse, or misuse. TowerIQ makes no warranty whatsoever in respect to accessories or parts not supplied by it.

10.3 Limitations of Warranty, Damages and Liability

EXCEPT AS EXPRESSLY SET FORTH HEREIN, THERE ARE NO WARRANTIES, CONDITIONS, GUARANTEES, OR REPRESENTATIONS AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHER WARRANTIES, CONDITIONS, GUARANTEES, OR REPRESENTATIONS, WHETHER EXPRESSED OR IMPLIED, IN LAW OR IN FACT, ORAL OR IN WRITING.

TowerIQ AGGREGATE LIABILITY IN DAMAGES OR OTHERWISE SHALL NOT EXCEED THE PAYMENT, IF ANY, RECEIVED BY CELLPHONE-MATE, INC. FOR THE UNIT OF PRODUCT OR SERVICE FURNISHED OR TO BE FURNISHED, AS THE CASE MAY BE, WHICH IS THE SUBJECT OF CLAIM OR DISPUTE. IN NO EVENT SHALL TowerIQ BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES, HOWSOEVER CAUSED.

All matters regarding this warranty shall be interpreted in accordance with the laws of the State of California, and any controversy that cannot be settled directly shall be settled by arbitration in California in accordance with the rules then prevailing of the American Arbitration Association, and judgment upon the award rendered may be entered in any court having jurisdiction thereof. If one or more provisions provided herein are held to be invalid or unenforceable under applicable law, then such provision shall be ineffective and excluded to the extent of such invalidity or unenforceability without affecting in any way the remaining provisions hereof.

WARNING: E911 location information may not be provided or may be inaccurate for calls served BY USING THIS DEVICE.

<div align="center">

1609 Park 370 Place

Hazelwood, MO 63042

844.626.7638

www.toweriq.nyc

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