



**PS71090-P8 2W Public Safety Signal
Booster**
Users Guide

PRODUCT MANUAL



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Preface

This Preface includes the following:

- Purpose
- Scope
- Audience
- Document Organization
- References
- Document Conventions
- Safety Notices
- Technical Support
- Acronyms and Abbreviations
- Copyright and Trademark Acknowledgements

Purpose

This manual contains information and procedures for the operation of the Westell PS71090 Public Safety Signal Booster.

Changes that occur after the publishing date may be incorporated by a complete manual revision or as additions.

Scope

Reference this manual when there is a need to add enhanced signal capability to a new or existing system, to monitor a system, make maintenance adjustments, or address alarms.

Audience

This manual is intended for installers and users who are familiar with similar types of equipment.

Document Organization

This manual includes the following chapters:

- **Chapter 1: General Information** – Outlines the document purpose and intended users, application, product registration, safety guidelines, disclaimer and FCC Part 90, FCC Warning Labels.
- **Chapter 2: Product Overview** – Provides product information, describes product features and lists accessories.
- **Chapter 3: Product Specification** – Provides tables containing RF, power, mechanical and environmental specifications. Also provides information about GUI items, alarm status and alarm relay.
- **Chapter 4: Product Appearance** – Provides physical specifications, photographs and information about the external and internal Signal Booster configuration.
- **Chapter 5: Installation Guidelines** – Lists guidelines for installing the Signal Booster and antennas.
- **Chapter 6: Software Installation** – Outlines the steps required to install the software.
- **Chapter 7: System Operation** – Describes product operation, including how to open the communication port and describes the functions in the Status and Control pages.
- **Appendix A: Important Product Information** – Provides the product registration number and internal power supply information.
- **Appendix B: Acronyms and Abbreviations** – A table of acronyms and abbreviations and definitions for each.

References

- FCC Part 90

Document Conventions

Table P-1 lists the conventions used throughout this document.

Table P-1: Document Conventions

Convention	Description
DANGER!	Description of an imminent hazard that, if not avoided, may result in severe personal injury or death. Before you work on equipment, be aware of the hazards involved with electrical and RF circuitry and be familiar with standard practices for preventing accidents.
WARNING!	Description of an imminent hazard that, if not avoided, may result in personal injury or serious equipment damage.
CAUTION	Description of a conditions or practice that could cause damage to equipment or property. Communicates information that is crucial to preventing loss of data or damage to hardware or software, and actions that could result in equipment failure.
IMPORTANT	Additional important information that the user must be aware of, but is not related to a hazard.
NOTE	Additional information that is beneficial for the user to know, but is not related to a hazard.
Bold	Bold text indicates an action or provides emphasis.
Click	Instructs the user to press the primary (typically left) mouse button while the pointer is over the specified location.
Right-click	Instructs the user to press the secondary (typically right) mouse button while the pointer is over the specified location.
Double-click	Instructs the user to press the primary (typically left) mouse button twice, rapidly, while the pointer is over the specified location.
Select	Instructs the user to perform a selection on the screen by clicking an active object.
Enter	Instructs the user to type text using the keyboard.
>	Indicates a level in a menu. For example, Start>Programs prompts the user to click on Start, then locate and click Programs under the Start menu.

Safety Notices

This general safety information applies to both operating and service personnel. Specific warnings and cautions are located in other parts of this manual where they apply and may not appear in this summary. Failure to comply with these precautions or specific warnings elsewhere in the manual violates the safety standards of design, manufacture, and intended use of equipment.

Westell assumes no liability for the customer's or user's failure to comply with these requirements:

- **Explosive atmospheres** - To avoid explosion or fire, do not operate this product in the presence of flammable gases or fumes.
- **Lightning danger** - Do not install or make adjustments to this unit during an electrical storm.

WARNING!

Changes and Modifications not expressly approved by Westell can void your authority to operate this equipment under Federal Communications Commission's rules.

Technical Support

If you suspect a malfunction with this product or have a technical question, call your dealer or the Westell Support Line at: (603) 626-6677, Toll Free (USA) 1-877-844-4274, press option 2, and then option 1. Westell Support can also be reached via email at IBWsupport@westell.com.

Acronyms and Abbreviations

Refer to Appendix B for definitions of the acronyms and abbreviations used in this manual.

Copyright and Trademark Acknowledgements

The following products are referred to in this manual:

-  **WESTELL** is a registered trademark of Westell Technologies, Inc.

1 General Information

1.1 Document Purpose and Intended Users

The purpose of this document is to provide a step-by-step procedure to help experienced technicians or engineers install and commission an in-building Passive Wireless Distributed Antenna System (DAS) using Westell's PS71090 2W Public Safety Signal Booster. Follow the instructions in this guide to minimize risks associated with modifying a live system and preclude service interruptions. This document assumes the technician or engineer understands the basic principles and functionality involved with an RF Signal Booster and in-building wireless systems. This guide has been written to address the practical concerns of the installer.

1.2 Application

Use this guide whenever there is a need to add enhanced signal capability to an existing system or when a Signal Booster is included in a new installation.

1.2.1 Product Registration Information

The serial number is located on the label on right-side of the enclosure. Record this number in Figure 1-1. Retain this manual, along with proof of purchase, to serve as a permanent record of your purchase.

MODEL NUMBER	SERIAL NUMBER	PURCHASE DATE
<input type="text"/>	<input type="text"/>	<input type="text"/>
POINT OF SALE COMPANY		
<input type="text"/>		

Figure 1-1: Product Registration

1.3 Safety Guidelines

The general safety information in this guideline applies to both operations and service personnel. Specific warnings and cautions are located in the applicable manual sections, but may not appear in this summary. Failure to comply with these precautions or specific warnings elsewhere in the manual violates safety standards of design, manufacture, and intended use of equipment. Westell assumes no liability for the customer's failure to comply with these requirements:

Grounding: This Signal Booster is designed to operate at 110VAC @ 1.0A maximum current and must always be operated with the ground wire properly connected.

Explosive atmospheres: To avoid explosion or fire, do not operate this product in the presence of flammable gases or fumes.

Lightning danger: Do not install or adjust this unit during an electrical storm.

No user-serviceable parts are inside the unit. Hazardous voltages are present when the cover is removed. Opening the chassis will void your warranty. If you suspect a malfunction with this product, call your dealer or Westell's technical support line at 1.877.844.4274.

CAUTION

Turn the Signal Booster power off when connecting or disconnecting cables.

1.3.1 Important Safety Information

Antennas used for the purpose of radiating signals indoors are limited to a maximum gain of 3 dBi. Each antenna must be positioned to observe minimum separation requirements from all users and bystanders.

The following guidelines must be used when considering separation distances:

- Indoor antennas must be placed so that under normal conditions, personnel cannot come within 20 cm (~8 in) of any inside antenna. Adhering to this minimum separation will ensure that the employee or bystander cannot exceed RF exposures beyond the maximum permissible limit as defined by FCC Regulations section 1.1310 Limits for general population/uncontrolled exposure.
- Outdoor antenna must be positioned so that under normal conditions, personnel cannot approach closer than 120 cm (~4 ft.). A directional antenna having a maximum gain of 3.75 dBi is used, and precautions should be taken to prevent personnel from routinely passing through the main radiation beam at a distance closer than specified.

1.4 FCC Part 90 Signal Boosters

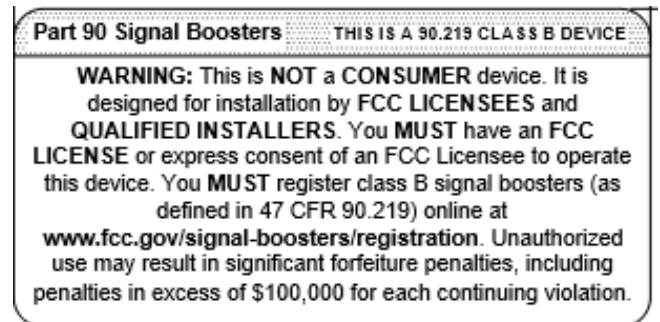
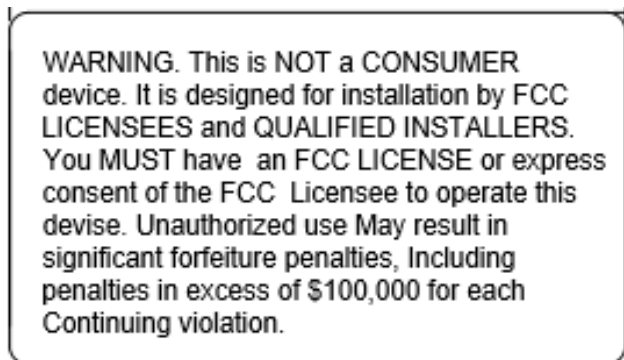
WARNING!

THIS IS A 90.219 CLASS B DEVICE

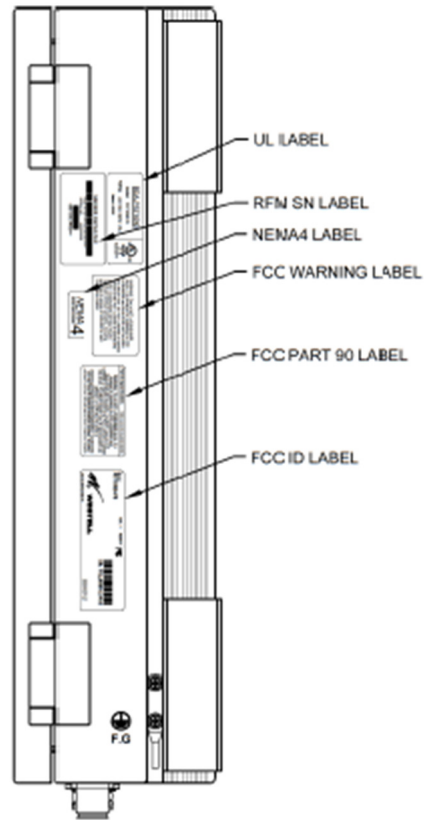
This is not a consumer device. It is designed for installation by FCC licensees and qualified installers. You must have an FCC license or express consent of an FCC Licensee to operate this device. You must register class B signal boosters (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

FCC Warning Labels

The following labels will appear on the PS71090 Signal Booster in accordance with the FCC:



FCC Label Placement on the PS71090:



Right-Side View

1.5 FCC Contact Information:

Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Phone: 1-888-225-5322

TTY: 1-888-835-5322

Fax: 1-866-418-0232

2 Product Overview

2.1 Product Information

The PS71090 Signal Booster was developed for use in enclosed structures where signals from local public safety towers to operate mobile units is poor or unavailable. Adequate signal strength must be available outside the structure as a prerequisite to achieving in-building coverage. The device is connected to an external antenna, normally located on a roof, and to one or more internal antennas placed strategically throughout the area where wireless service is desired.

The external antenna is typically directional, such as a Yagi or Panel antenna. Internal antennas are typically omnidirectional, although various other types may be used, depending on the coverage application. The Signal Booster amplifies both the uplink (mobile to base) and downlink (base to mobile) signals, thus facilitating communications to and from the intended wireless infrastructure.

With a maximum total of 90 dB nominal gain on both the uplink and downlink, gain can be adjusted over a range from 60 dB to 90 dB in 1 dB steps.

The Signal Booster is controlled using a computer connected to the RJ45 Female Network Connector labeled 'GUI'. There are also LED indicators to indicate alarm status, OSC and power. Refer to Figure 4-1.

2.2 Product Features

- Easy installation
- Light and small
- Control using a Windows-based Graphical User Interface (GUI) and accessed by connecting a laptop or desktop computer to the 8P8C/RJ45 Female Network Connector labeled 'GUI'
- User gain control
- Automatic level control
- Automatic shutdown function
- Oscillation protection
- Overdrive protection
- Under/over voltage protection
- Fault protection
- Alarm notification
- SNMP
- Persistent status and error information
- Battery Back-up Input

2.3 Included Accessories

Table 2-1 contains the items that are shipped with the PS71090 Public Safety Signal Booster.











Table 2-1: Included Accessories

Quantity	Description
1	AC Power Cable, 5 feet 10 inches
1	DC Power Cable, 5 feet 10 inches
1	Ethernet cable, 6 feet 1 inch
1	Alarm Relay Serial Cable, 4 feet 9 inches
1	USB Drive containing the User Manual and Software
5	Mounting Screws
5	Drywall Anchors
2	Cabinet Keys

2.4 Optional Accessories

A complete line of accessories is available from Westell. Check with your Westell distributor for any additional items needed. Some products that are suitable for most in-building needs are listed in Table 2-2.

Table 2-2: Optional Accessories

Donor Antenna			
CSI-AY/746-896/11	Yagi, 11 dB, Public Safety 700/800 (746-896 MHz)		
Clearlink-APD/698-940/-153/15/4310f	Panel Donor Antenna, Low-Band, 698-960, High Isolation		
Server/Coverage Antenna			
ClearLink-O/698-2.7K/N	CS03-011-429		
ClearLink-D/698-2.7K/N	CS03-012-389		
Hybrid Coupler		4.3-10 Type Connector	N-Type Connector
3 dB	ClearLink-HC3/340-2.7K/N	ClearLink-HC3/340-2.7K/4310	
Power Tapper (Non-PIM Rated)		4.3-10 Type Connector	N-Type Connector
6 dB	ClearLink-PT6/340-2.7K/4310	ClearLink-PT6/340-2.7K/N	
7 dB	ClearLink-PT7/340-2.7K/4310	ClearLink-PT7/340-2.7K/N	
8 dB	ClearLink-PT8/340-2.7K/4310	ClearLink-PT8/340-2.7K/N	
10 dB	ClearLink-PT10/340-2.7K/4310	ClearLink-PT10/340-2.7K/N	
13 dB	ClearLink-PT13/340-2.7K/4310	ClearLink-PT13/340-2.7K/N	
15 dB	ClearLink-PT15/340-2.7K/4310	ClearLink-PT15/340-2.7K/N	
20 dB	ClearLink-PT20/340-2.7K/4310	ClearLink-PT20/340-2.7K/N	
30 dB	ClearLink-PT30/340-2.7K/4310	ClearLink-PT30/340-2.7K/N	
Directional Coupler (Non-PIM Rated)		4.3-10 Type Connector	N-Type Connector
5 dB	ClearLink-DC5/340-2.7K/4310	ClearLink-DC5/340-2.7K/N	
6 dB	ClearLink-DC6/340-2.7K/4310	ClearLink-DC6/340-2.7K/N	
10 dB	ClearLink-DC10/340-2.7K/4310	ClearLink-DC10/340-2.7K/N	
15 dB	ClearLink-DC15/340-2.7K/4310	ClearLink-DC15/340-2.7K/N	
20 dB	ClearLink-DC20/340-2.7K/4310	ClearLink-DC20/340-2.7K/N	
30 dB	ClearLink-DC30/340-2.7K/4310	ClearLink-DC30/340-2.7K/N	
Power Divider (Non-PIM Rated)		4.3-10 Type Connector	N-Type Connector
2:1	CLEARLINK-SPD2/340-2.7K/4310	ClearLink-SPD2/340-2.7K/N	
3:1	ClearLink-SPD3/340-2.7K/4310	ClearLink-SPD3/340-2.7K/N	
4:1	ClearLink-SPD4/340-2.7K/4310	ClearLink-SPD4/340-2.7K/N	
Adapter			
4.3-10 (M) to N (F)	CS48-132-633		
Battery Back-up			
12 Hour Battery Back-up	PS-BBU-01		

3 Product Specification

3.1 RF Specifications

Table 3-1: RF Specifications

Parameter		Specification	Note
Frequency Range	UL	806~809 MHz Sub-Band1 806~816 MHz Sub-Band2 806~824 MHz Sub-Band3	independently Controlled via the GUI
	DL	851~854 MHz Sub-Band1 851~861 MHz Sub-Band2 851~869 MHz Sub-Band3	
Linear Output Power	UL / DL	+33dBm	
Gain	UL / DL	90dB (±1.0dB)	
Gain Adjustment Range	UL / DL	30dB±1dB	1dB step
AGC Range	UL / DL	25dB (±1dB)	
Pass Band Ripple	UL / DL	±1.5dB Typ. (Peak-To-Peak 3dB)	
3rd Order Intercept Point	UL / DL	+42.5dBm	
Input VSWR	UL / DL	< 2:1	
Maximum Input No damage Power	UL / DL	+10dBm	
Propagation Delay	UL / DL	4µs Max.	
Noise Figure	UL	5dB Typ. 6.5dB Max.	
Input / Output Impedance	UL / DL	50 Ohms	

3.2 Power Specification

Table 3-2: Power Specifications

Parameter	Specification	Note
Main Power Input Voltage	110 VAC	Internal AC DC Power Supply
Battery / DC Input Voltage	24 VDC to 30 VDC	External Battery Power Supply
Power Connector	IEC320	AC/DC
Power Consumption	110 AC Input: <100W Max. 24 VDC Input: <65W Max.	<0.9 Amps Max. <2.7 Amps Max.

3.3 Mechanical Specification

Table 3-3: Mechanical Specifications

Parameter	Specification	Note
Size	17.7 x 14.1 x 4.7 in	L x H x D
Connectors	Donor/Coverage Antenna Ports: 4.3-10 (f)	Matting Male Connector Torque 3.7 ft.-lbs.
	AC Power In	AC cord
	DC (Battery) Power In	DC cord
	Frame Ground	Two-Lug Ground
	RJ-45 Ethernet-1 (10/100 Base-T)	GUI Interface
	RJ-45 Ethernet-2 (10/100 Base-T)	SNMP Interface
	9-Pin D-SUB, female	Alarm Relay Interface
Mounting Type	Wall-Mount with 4 holes	2 holes in each side
Enclosure Lock	Key Lock	Two-Key Lock
Heat Dissipation	Natural Convection	
Finish	Red color Paint	

3.4 Environmental Specification

Table 3-4: Environmental Specifications

Parameter	Specification	Note
Operating Temperature	-30°C ~ +50°C (ambient)	-22F ~ +122F
Storage Temperature	-40° C ~ +60° C (ambient)	-40° F to +140° F
Operating Humidity	5% ~ 95%	
Environmental	IP-65, NEMA 4 Compliance	

3.5 GUI Items

Table 3-5: GUI Items

Parameter	Specification	Note
UL/DL Output Readings	5dBm to 38dBm	Reads and displays the UL/DL output power
Alarm Readout Displays	PLL LD(Lock Detector), Isolation, UL/DL shutdown, DC Fail, Relay Status, UL/DL VSWR, Manual Amp, Antenna Failure, Power, UL HPA Fail, DL HPA Fail	Displays alarm status
UL/DL Shutdown Setting	23dBm to 37dBm	Use to set the peak power (shutdown level)
UL/DL Gain Setting / Attenuation	60dB to 90dB Gain 0dB to 30dB Attenuation.	Used to set the UL/DL system gain.
System Location Display	PS71090-P8 PS-SMR800 Company, Address, City, State, Contact	Displays the Signal Booster name and information.
Control Send	All Control Page Settings	Used to save settings in the Control page.
Isolation	Settable to 0db -or- 15dB.	
VSWR	Adjustable from 1-30	
Quit	None	Closes the GUI page.

Refer to **Section 6 System Operation** for more information about the GUI.

3.6 Alarm Status

Table 3-6 Alarm Status

Mask Item	Alarm Enable[√] Disable[]	Condition/ Troubleshooting	AC Power Input	DC Power Input	Repeater Unit LED			GUI Display
					POWER	ISO	ALARM	
AC FAIL	[√]	Power : AC (Normal)	O	X	Solid	OFF	OFF	ALL GREEN (Normal)
DC FAIL	[√]							
BATT FAIL (L)	[√]							
BATT FAIL (H)	[√]							
PLL LD	[√]	PLL LD (Alarm1 & Alarm2)	X	O	Solid	OFF	Blinking	Relay Status : RED PLL LD : RED DL/UL HPA : RED Manual Amp : RED Rest GREEN
Isolation	[√]	Minimum isolation between Donor & server Antenna = Gain+15dB (Alarm1 & Alarm2)	X	O	Solid	Blinking	OFF	Relay Status : RED Isolation : RED DL/UL HPA : RED Manual Amp : RED Rest GREEN
Shutdown (DL/UL)	[√]	Too strong signal from CELL TOWER. AGC Out of Range. (Alarm2)	X	O	Solid	OFF	Solid	Relay Status : RED Shutdown (DL/UL) : RED DL/UL HPA : RED Manual Amp : RED Rest GREEN
AC FAIL	[√]	DC ONLY DC Voltage : 27V Alarm All Enable (Alarm1)	X	O	Solid	OFF	OFF	Relay Status : RED AC FAIL : RED Rest GREEN
DC FAIL	[√]							
BATT FAIL (L)	[√]							
BATT FAIL (H)	[√]							
AC FAIL	[]	DC ONLY DC Voltage : 27V Disable / Mask : AC FAIL (Normal)	X	O	Solid	OFF	OFF	Relay Status : GREEN AC FAIL : RED Rest GREEN
DC FAIL	[√]							
BATT FAIL (L)	[√]							
BATT FAIL (H)	[√]							

DL VSWR	[√]	DL VSWR : > set Value (Alarm3)	X	O	Solid	OFF	Solid	Relay Status: RED DL VSWR: RED Rest GREEN
	[]	Disable Alarm (Normal)			Solid	OFF	OFF	Relay Status: GREEN DL VSWR: RED Rest GREEN
UL VSWR	[√]	UL VSWR : > set Value (Alarm3)	X	O	Solid	OFF	Solid	Relay Status: RED UL VSWR: RED Rest GREEN
	[]	Disable Alarm (Normal)			Solid	OFF	OFF	Relay Status: GREEN UL VSWR: RED Rest GREEN
Manual Amp	[√]	Manual Amp (Alarm2)	X	O	Solid	OFF	Solid	Relay Status: RED Manual Amp: RED DL/UL HPA Fail : RED Rest GREEN
AC FAIL	[]	Power : DC DC Voltage : <23.2V (+/- 0.3V) Disable Alarm : AC FAIL (Alarm1)	X	O	Blinking	OFF	OFF	Relay Status: RED AC FAIL: RED DC FAIL: RED BATT FAIL (LOW): RED Rest GREEN
DC FAIL	[√]							
BATT FAIL (L)	[√]							
BATT FAIL (H)	[√]							
AC FAIL	[]	Power : DC	X	O	Blinking	OFF	OFF	Relay Status: RED AC FAIL: RED DC FAIL: RED BATT FAIL (HIGH): RED Rest GREEN
DC FAIL	[√]	DC Voltage : 28.8V (+/- 0.3V) Disable Alarm : AC FAIL (Alarm1)						
BATT FAIL (L)	[√]							
BATT FAIL (H)	[√]							

DL HPA FAIL	[√]	DL HPA FAIL (Alarm2)	X	O	Solid	OFF	Solid	Relay Status: RED Manual Amp: RED DL HPA FAIL: RED Rest: GREEN
UL HPA FAIL	[√]	UL HPA FAIL (Alarm2)	X	O	Solid	OFF	Solid	Relay Status: RED Manual Amp: RED UL HPA FAIL: RED Rest: GREEN
DC OVER CURRENT (UL)	[√]	UL Input power too Strong (Alarm2)	X	O	Solid	OFF	Solid	Relay Status: RED Manual Amp: RED UL HPA FAIL: RED Rest: GREEN

3.7 Alarm Relay

Table 3-7 Alarm Relay

Shutdown Signal	Relay Status	Note
Normally Open	NO (pin 2) + CC (pin 3)	PIN 1 NC, PIN 2 NO, PIN 3 CC PIN 4 NC, PIN 5 NO, PIN 6 CC PIN 7 NC, PIN 8 NO, PIN 9 CC
Normally Closed	NC (pin 1) + CC (pin 3)	

NOTE

Either method in Table 3-7 would trigger the following alarms: Antenna Malfunction, PA Failure and Power Failure.

- **ALARM 1 : System component failure, and/or loss of power – AC/DC (Pin 1,2,3)**
- **ALARM 2 : Active PA System failure / PA system failure (Pin 4,5,6)**
- **ALARM 3 : Antenna failure – Donor and Server VSWR Alarm (Pin7,8,9)**
(See Appendix C for VSWR Alarm Timing Diagram)

4 Product Appearance

4.1 External Configuration

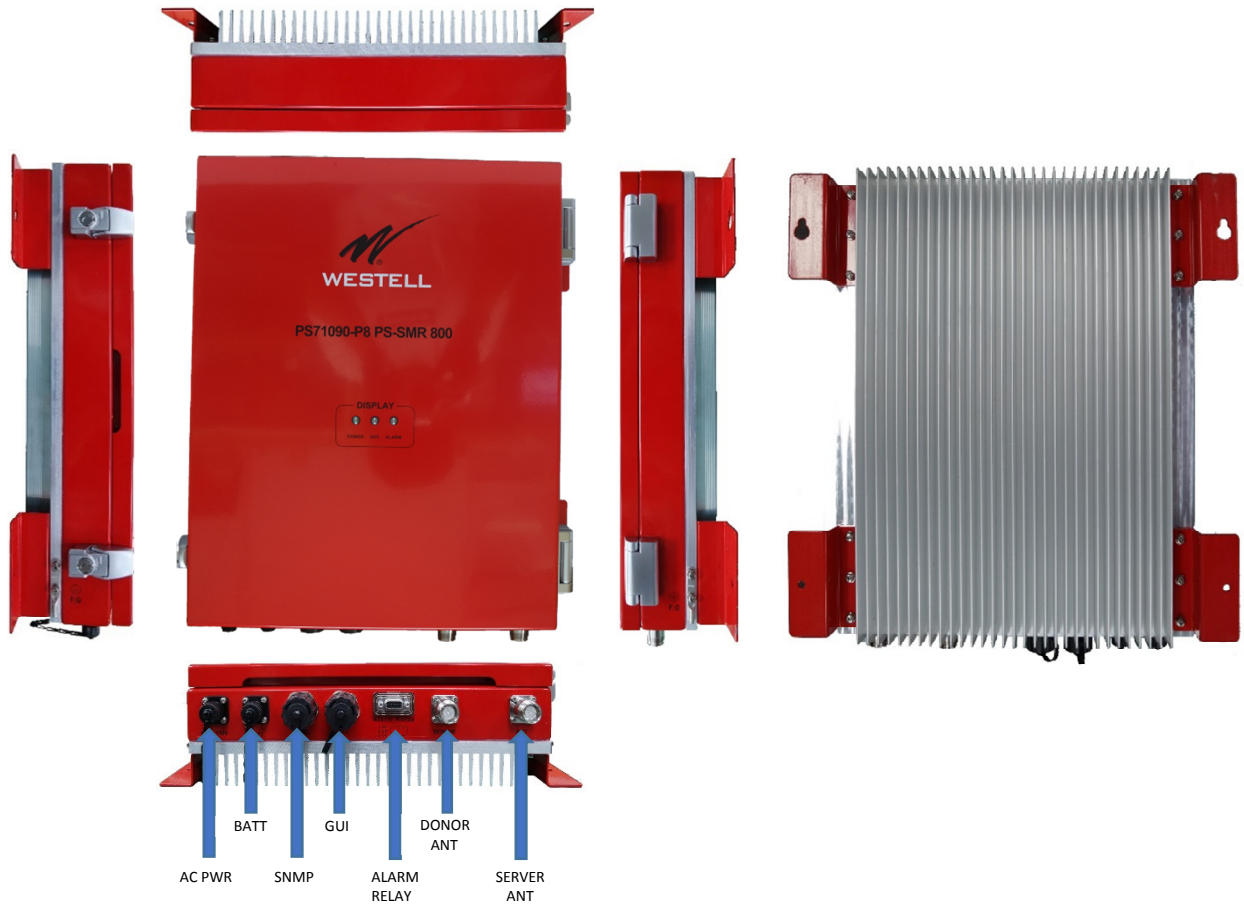


Figure 4-1: External Product Configuration

5 Installation Guidelines

5.1 Important Installation Guidelines

- The PS71090 Signal Booster is designed for indoor use only.
- The PS71090 Signal Booster must be installed in a vertical orientation (i.e. Connectors on the bottom of the unit).
- Inadequate isolation between the outside and inside antennas may cause regenerative feedback in the system.
 - This feedback can cause the amplifier to emit a continuous signal at maximum Amplitude, and, in some cases, interfere with normal operation of the donor site. Careful consideration of the layout and placement of the system is imperative to minimize this possibility and to minimize the amount of signal leaking from the Building.
- Do not disassemble the Signal Booster.

DANGER!

- Refer to the 1.3 Safety Guidelines section for proper antenna selection and installation. To avoid serious injury, death and/or damage to the Signal Booster, do not install donor or server antennas near overhead power lines or high power components. Allow enough distance so that falling antennas would not come in contact with those components.
- Electric shock may occur if the Signal Booster is installed in close proximity to water.

WARNING!

- Amplifier or handset damage may occur if a handset is connected directly to the Signal Booster or to the coax that leads to the Signal Booster.
- The PS71090 Signal Booster must be connected to ground for protection.
- We recommend that installers do not wear jewelry or metal accessories when installing this Signal Booster.
- Do not place cables or tools that may damage the Signal Booster in close proximity to it.
- Check the installation site for hazardous conditions such as water-covered floors or badly worn or damaged cables prior to installation.
- Lifespan and performance of the Signal Booster may be reduced if the unit is operating outside its nominal temperature range.

CAUTION

- **Close proximity to the donor or server antennas with the Signal Booster in operation may expose users or installers to RF fields that exceed FCC limits for human exposure.**
- **Turn power to the Signal Booster off when connecting or disconnecting cables.**

5.2 Donor Antenna Installation Guidelines

- Accurately determine the azimuth to the donor site. Obtain the donor site information and approval from the service provider/carrier.
- Ensure that the radiation path to the donor site is unobstructed.
- Mount the donor antenna at or toward the edge of the roof, in the direction of the donor site. Avoid having the RF signal from the donor pass above the location(s) of the service antennas. Normally, the service antennas are installed behind and below the donor antenna, as viewed from above. This approach helps avoid interference and feedback to and from the service antennas.
- Normally, mounting the donor antenna higher will allow a less obstructed path to the donor site. However, in high traffic metro areas, avoid mounting the donor antenna higher than necessary, as the quality of the donor signal may become less stable and it is more likely to encounter adjacent channel interference.
- When possible, shield the rear of a donor antenna by locating it so that any HVAC units and/or penthouse structures are behind the antenna, relative to the donor cell site location.

5.3 Indoor Antenna Installation Guidelines

- Use omnidirectional antennas (see section 2.4. Optional Accessories) indoors and locate them centrally with respect to the intended coverage area to minimize signal leakage to the outside. Only use directional antennas indoors in special cases when higher gain and directionality would be helpful and RF exposure limits will not be exceeded.
- To avoid Signal Booster uplink overload and gain limiting, mount the indoor antennas away from areas where mobile subscribers frequently use their phones / radios, such as desks or dispatch areas. **Note: If the signal level from Antenna at the UL service port is >-12dBm, Add external attenuation to avoid shutdown alarm**
- To determine the quantity and locations of indoor antennas, measure Received Signal Strength Indication (RSSI) using DM Tool software to determine areas of weak signals. These are the approximate areas where indoor antennas may be needed.
- Be aware that the signal from an indoor antenna, in most cases, can be expected to penetrate approximately two standard sheet rock walls to reach users. If the signal must travel through more than two walls, or if the walls are made of materials other than sheet rock, it may be necessary to split the available signal and add more antennas.

5.4 Mounting the Signal Booster

Follow the instructions in this section to mount the Signal Booster on a wall.

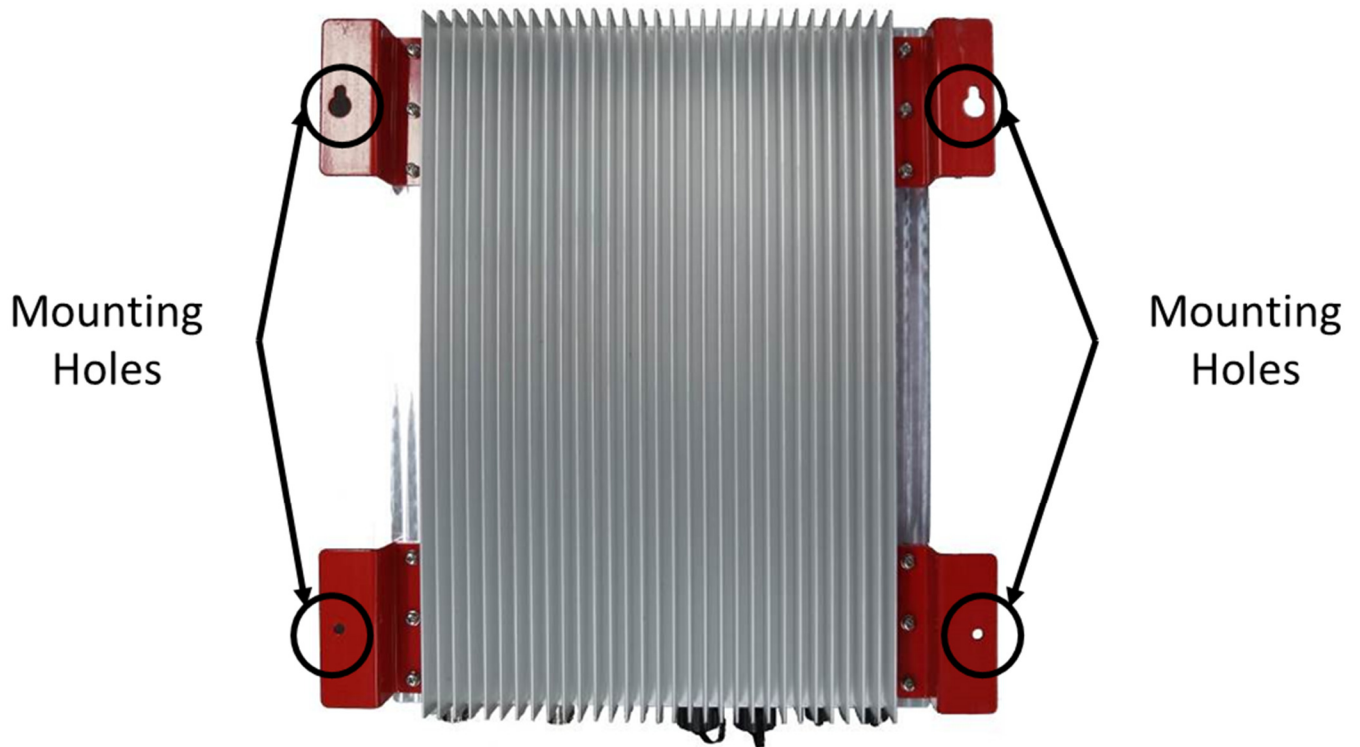


Figure 5-1: Signal Booster Mounting

1. Using the PS71090 as a template, mark the four (4) locations for the wall anchoring system screws.
2. Move the PS71090 unit and drill the mounting holes at the marks in the wall.
Install a wall anchor in each of the four (4) drilled holes.
3. Install the top two (2) screws into the anchors, leaving enough room to slide the screws into the oblong holes of the top of the unit's mounting positions.
4. Once the Unit is hung on the top two (2) screws finish fastening the top screws.
5. Install the bottom two (2) screws into the anchors, fastening the Unit to the wall.

5.5 Verifying the Physical System Setup

- Check all cables for shorts and opens. Verify that there are no cables with loose or poor connections. RF leakage could cause oscillation to occur under some conditions.
- If the rooftop antenna (donor antenna) is directional, check it for proper alignment along the calculated compass heading. Typically, the directional antenna would be aimed at the same site that your handset uses, but that may not always be the case.
- If cables and alignment are acceptable, and a problem persists, use a spectrum analyzer to examine the signal environment in which the unit is operating. The existence of strong adjacent channel signals within the frequency band(s) can cause the AGC to reduce the amplifier's gain or cause alarms. In some cases, additional filtering or attenuation may be required to reject these unwanted signals. In some instances, the donor antenna can be reoriented horizontally to place the interference source in an antenna pattern null.

5.6 Controlling the Signal Booster

Control and monitoring the Signal Booster requires that a properly configured computer with Westell PS71090 control software installed is connected via an Ethernet cable, such as the one shown in Figure 5-2A. Connect the Ethernet cable from the Network Interface port of a computer to the GUI port on the bottom end panel of the Signal Booster.



Figure 5-2A: Ethernet Cable

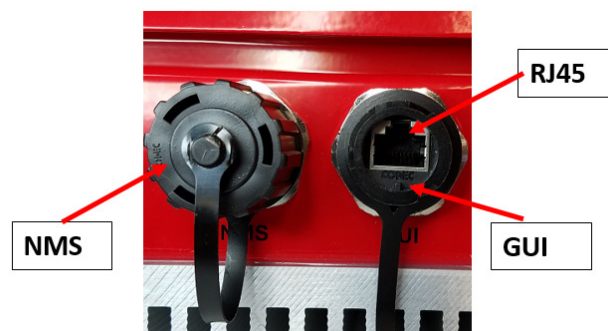


Figure 5-2B: Ethernet Connectors

5.7 Connecting to the Alarm Relay Panel

Use the provided Alarm Relay Serial Cable to connect the PS71090 Public Safety Signal Booster to the alarm relay panel. If the provided cable is not long enough for your system, you will need to build one.

1. Strip the outer serial cable insulation back to expose the inner conductors, Figure 5-3.
2. Strip back the insulation on the ends of each conductor. (Tin wires as needed.)

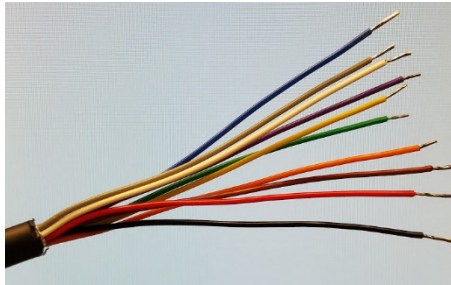


Figure 5-3: Stripped Alarm Wire

3. Remove the protective cover on the Alarm Relay 9 position D-Sub connector.



Figure 5-4: Alarm Relay 9 Position D-Sub Connector

- Connect the 9 position D-Sub connector at one end of the serial cable to the Alarm Relay connector on the PS71090, Figure 5-6. Be sure to fasten the connector screws securely.



Figure 5-5: Alarm Relay Cable Connected to Signal Booster

- Connect the stripped end of the serial cable to the alarm relay panel. Refer to Table 5-1 for connection information.

Table 5-1: Alarm Relay Connections

Pin Number	Contact Type	Conductor Color (supplied Cable)	Alarm Number
1	NC (Normally Closed)	Black	Alarm One
2	NO (Normally Open)	Brown	Alarm One
3	CC (Common Connection)	Red	Alarm One
4	NC (Normally Closed)	Orange	Alarm Two
5	NO (Normally Open)	Yellow	Alarm Two
6	CC (Common Connection)	Green	Alarm Two
7	NC (Normally Closed)	Blue	Alarm Three
8	NO (Normally Open)	Violet	Alarm Three
9	CC (Common Connection)	Grey	Alarm Three
		White	Unused

5.8 Connecting the Power Cable

Use the provided AC Power Cable to connect the PS71090 Public Safety Signal Booster to an AC power source.

1. Remove the cap from the AC 110V power connector on the Signal Booster, Figure 5-6.

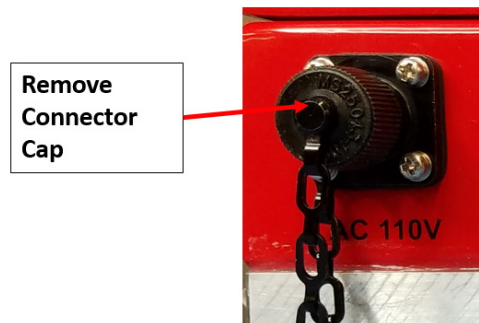


Figure 5-6: Remove the Power Connector Cap

2. Connect the power cable to the AC 110V power connector on the Signal Booster, Figure 5-7.

NOTE

The Signal Booster connector and the cable connector are keyed as shown in Figure 5-7.

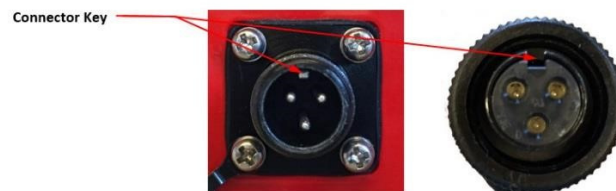


Figure 5-7: Connector Keys

3. Screw the connector on securely.

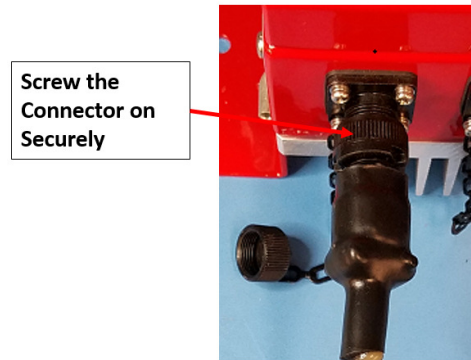


Figure 5-8: Power Cable Connected to Signal Booster

4. When the Signal Booster is properly set up and ready to have power applied, plug the other end into the 110VAC outlet.



Figure 5-9: Power Cable Connected to Signal Booster

5.9 Connecting the Battery Back-up Cable

Use the provided DC Power Cable to connect the PS71090 Public Safety Signal Booster to a 24-30VDC Battery Back-up / power source. (White = positive, Black = Negative)



Figure 5-10: Battery Cable Connected to Signal Booster

6 System Operation

6.1 Operating the Program

Access the PS71090 Public Safety Signal Booster using the provided **PS71090-P8 PS-SMR800** software through a LAN connection. The Signal Booster ships with the IP address **192.168.1.150** on the **GUI** port.

To connect directly to the Signal Booster from a laptop or PC with a crossover CAT-5E cable or over a LAN, change the TCP/IP settings on your computer to enable a connection to a host that has a static IP.

Open Control Panel\All Control Panel Items\Network Connections

Choose appropriate Local area connection:

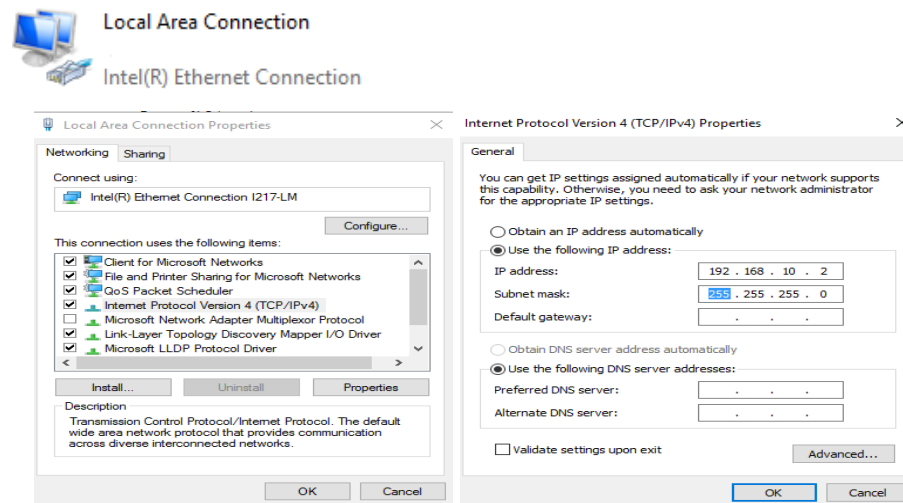


Figure 6.1: Network Connection Set-up

- 1) Select **Use the following IP Address** and enter the IP address **192.168.1.x**, where 'x' is any number from 2 to 254, inclusive, other than 150.

e.g. Set Computer IP to 192.168.1.2

- 2) Ensure that the subnet mask is set to 255.255.255.0.

NOTE

Refer questions about these settings to your IT department.

- 3) Navigate to the RSSMR78M4B3301 directory- on the included USB drive.
- 4) Locate Setup application software file and double-click to install, as seen below.

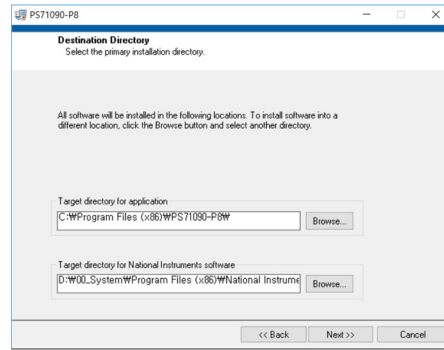


Figure 6.2: Destination Directory

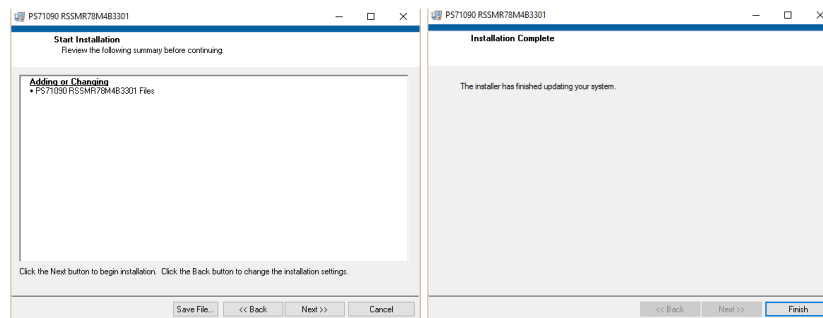


Figure 6.3: Software Installation

5) Click Next and Finish

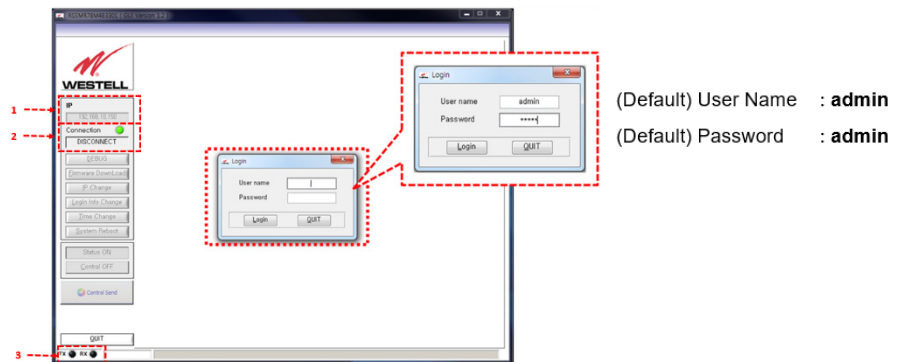


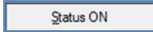
Figure 6.4: PS71090 GUI Log-In

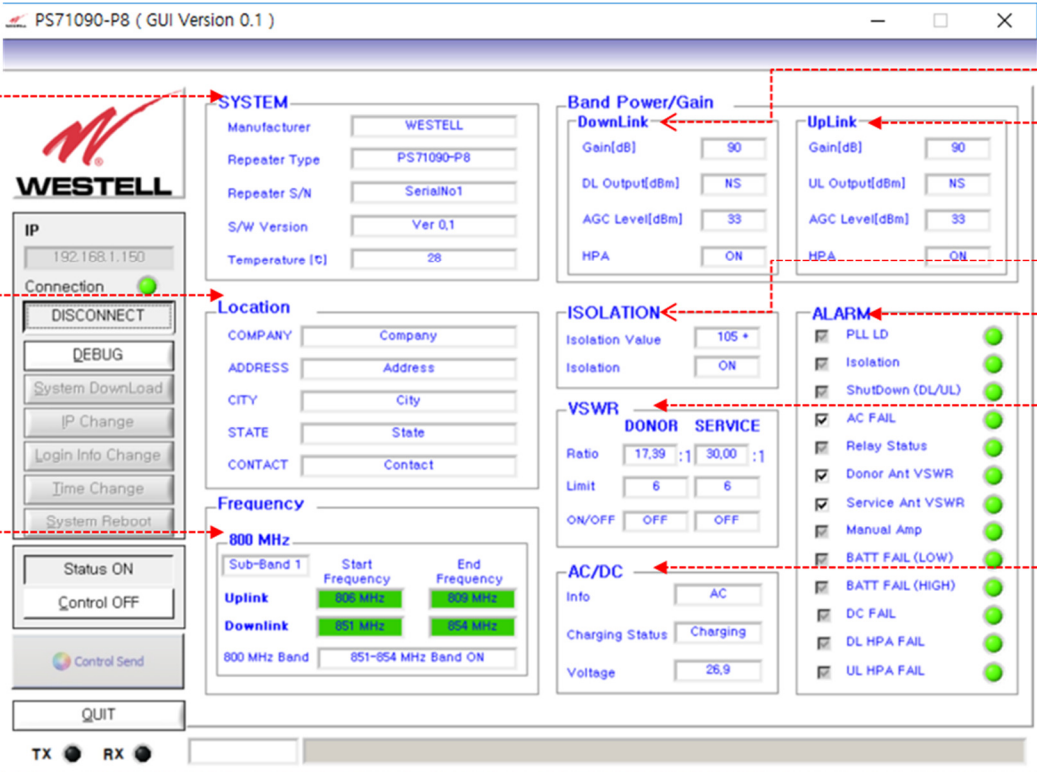
Item	Description
1	IP Address Field (editable when Connect button is displayed)
2	Connect/Disconnect toggle button
3	TX/RX LED indicates the state of communication with the Signal Booster and GUI

6) Verify that the IP address in the upper left of the page is correct 192.168.1.150, if it is not, edit it in the IP Address field.

7) Click the Connect button. The button label changes to Disconnect.

6.2 Status

Clicking the **Status** button in the menu on the left of the page changes the button text to  and displays the Status Mode page, described in this section.



The screenshot shows the GUI for the PS71090-P8 device in Status Mode. The interface is divided into several sections:

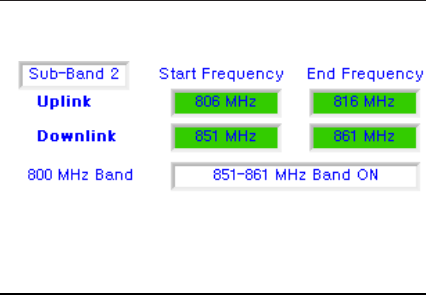
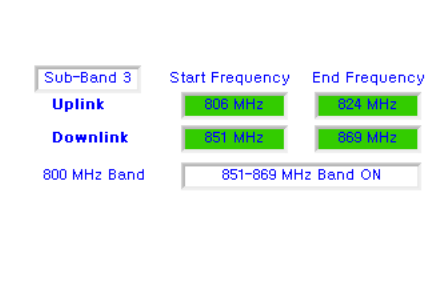
- 1**: Points to the WESTELL logo and system information fields (Manufacturer: WESTELL, Repeater Type: PS71090-P8, Repeater S/N: SerialNo1, S/W Version: Ver 0,1, Temperature [C]: 28).
- 2**: Points to the left-hand menu containing buttons for DISCONNECT, DEBUG, System DownLoad, IP Change, Login Info Change, Time Change, System Reboot, Status ON, Control OFF, Control Send, and QUIT.
- 3**: Points to the Frequency section, specifically the 800 MHz band configuration (Sub-Band 1, Uplink: 808 MHz to 819 MHz, Downlink: 801 MHz to 804 MHz, 800 MHz Band: 851-854 MHz Band ON).
- 4**: Points to the Band Power/Gain section, including DownLink and UpLink Gain (90 dB), DL/UL Output (NS), AGC Level (33), and HPA (ON).
- 5**: Points to the UpLink section, showing Gain (90 dB), UL Output (NS), AGC Level (33), and HPA (ON).
- 6**: Points to the HPA (High Power Amplifier) status, which is currently ON.
- 7**: Points to the ISOLATION section, showing Isolation Value (105+) and Isolation (ON).
- 8**: Points to the VSWR (Voltage Standing Wave Ratio) section, showing Ratio (17.39 : 1) and Limit (6).
- 9**: Points to the ALARM section, which lists various system alerts with green status indicators, including PLL LD, Isolation, ShutDown (DL/UL), AC FAIL, Relay Status, Donor Ant VSWR, Service Ant VSWR, Manual Amp, BATT FAIL (LOW), BATT FAIL (HIGH), DC FAIL, DL HPA FAIL, and UL HPA FAIL.

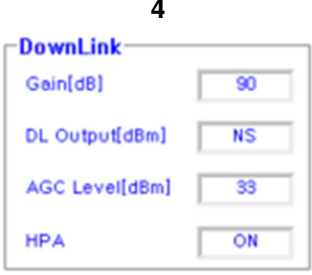
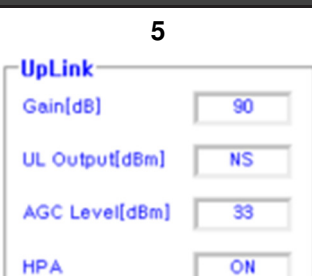
Figure 6-5: Status Mode Page

Item #	Section	
1 SYSTEM Manufacturer: WESTELL Repeater Type: PS71090-P8 Repeater S/N: SerialNo1 S/W Version: Ver 0.1 Temperature [C]: 28	System Not User-Configurable/Informational Only	
	Manufacture	Displays the Signal Booster's manufacturer
	Signal Booster Type	Displays Signal Booster Model Number
	Signal Booster S/N	Displays Signal Booster Serial Number
	S/W Version	Displays firmware version of the control board
	Temperature	Displays internal temperature of the Signal Booster

Item #	Section	
2 Location COMPANY: Company ADDRESS: Address CITY: City STATE: State CONTACT: Contact	Location	
	Company	Company information display
	Address	Address information display
	City	City information display
	State	State information display
	Contact	Contact information display

Item #	Section	
3 Sub-Band 1 Uplink: 806 MHz - 809 MHz Downlink: 851 MHz - 854 MHz 800 MHz Band: 851-854 MHz Band ON	800 MHz	
	Sub-band 1	
	Uplink	
	Start Frequency	Displays sub-band 1 uplink Start frequency
	Stop Frequency	Displays sub-band 1 uplink Stop frequency
	Downlink	
	Start Frequency	Displays the sub-band 1 downlink start frequency
	Stop Frequency	Displays sub-band 1 downlink Stop frequency
	800MHz Band	Allows sub-band 1 to be set to Select
	Sub-band 2	
	Uplink	
	Start Frequency	Displays sub-band 2 uplink Start frequency

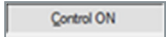
Item #	Section	
	Stop Frequency Displays sub-band 2 uplink Stop frequency	
	Downlink	
	Start Frequency Displays sub-band 2 downlink start frequency	
	Stop Frequency Displays sub-band 2 downlink Stop frequency	
	800MHz Band Allows sub-band 2 to be set to Select	
	Sub-band 3	
	Uplink	
	Start Frequency Displays sub-band 3 uplink Start frequency	
	Stop Frequency Displays sub-band 3 uplink Stop frequency	
	Downlink	
	Start Frequency Displays sub-band 3 downlink Start frequency	
	Stop Frequency Displays sub-band 3 downlink Stop frequency	
	800MHz Band Allows sub-band 3 to be set to Select	

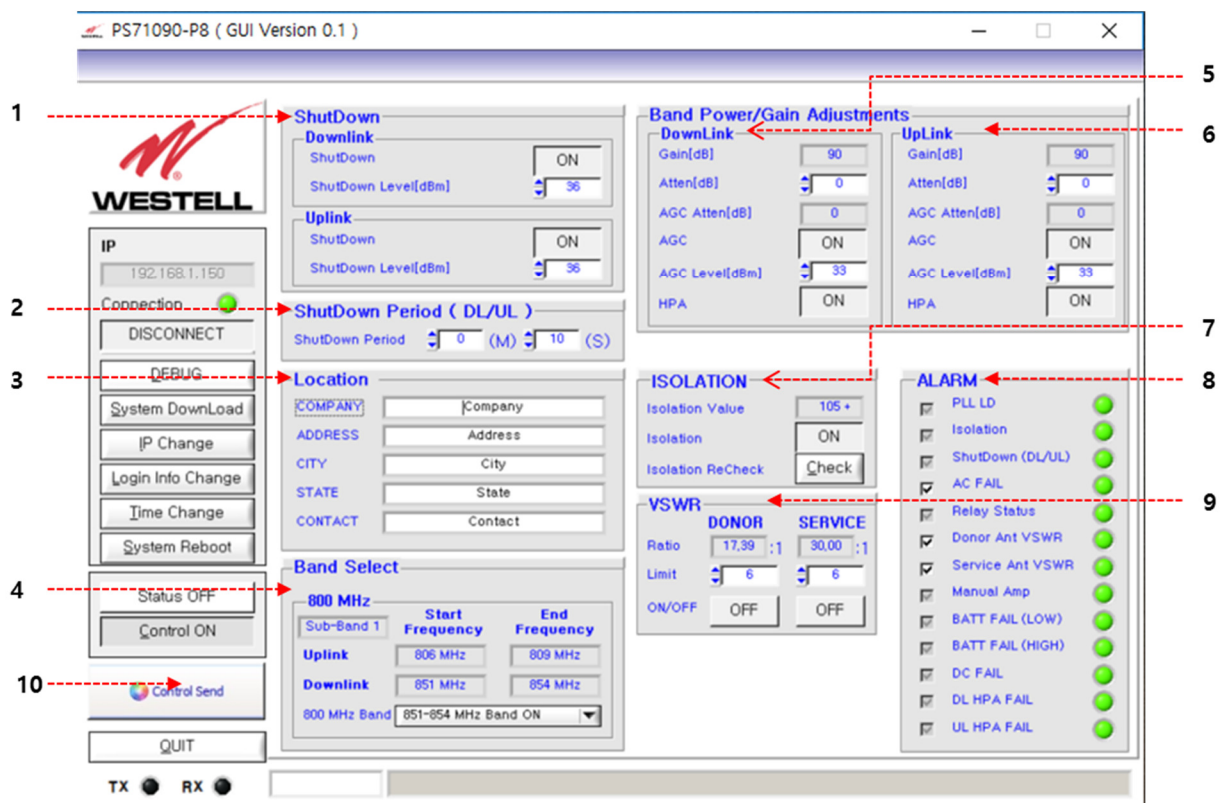
Item #	Section	
4 	Downlink	
	Gain [dB] Displays downlink gain	
	Output (dBm) Displays Output value	
	AGC Level [dBm] Displays Automatic Gain Control Level	
	HPA Displays Down link HPA On/Off	
	Item #	
	Section	
	5 	Uplink
Gain (dB) Displays status of the uplink gain		
UL Output [dBm] Displays uplink output level		
ALC Level [dBm] Displays Automatic Gain Control Level		
HPA Displays Up link HPA On/Off		

Item #	Section				
<p>6</p> <p>ISOLATION</p> <p>Isolation Value <input type="text" value="105 +"/></p> <p>Isolation <input type="text" value="ON"/></p>	<p>Isolation</p>				
	<table border="1"> <tr> <td>Isolation Value</td> <td>When power is on, an isolation check is performed and the values are displayed</td> </tr> <tr> <td>Isolation</td> <td>The isolation check can be performed with the RF on or off</td> </tr> </table>	Isolation Value	When power is on, an isolation check is performed and the values are displayed	Isolation	The isolation check can be performed with the RF on or off
	Isolation Value	When power is on, an isolation check is performed and the values are displayed			
	Isolation	The isolation check can be performed with the RF on or off			
<p>Note: Neither the isolation check, nor recheck, will indicate a change in power levels if the unit's own power has been switched off.</p>					
Item #	Section				
<p>7</p> <p>ALARM</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> PLL LD <input type="radio"/> <input checked="" type="checkbox"/> Isolation <input type="radio"/> <input checked="" type="checkbox"/> ShutDown (DL/UL) <input type="radio"/> <input checked="" type="checkbox"/> AC FAIL <input type="radio"/> <input checked="" type="checkbox"/> Relay Status <input type="radio"/> <input checked="" type="checkbox"/> DL VSWR <input type="radio"/> <input checked="" type="checkbox"/> UL VSWR <input type="radio"/> <input checked="" type="checkbox"/> Manual Amp <input type="radio"/> <input checked="" type="checkbox"/> BATT FAIL (LOW) <input type="radio"/> <input checked="" type="checkbox"/> BATT FAIL (HIGH) <input type="radio"/> <input checked="" type="checkbox"/> DC FAIL <input type="radio"/> <input checked="" type="checkbox"/> DL HPA FAIL <input type="radio"/> <input checked="" type="checkbox"/> UL HPA FAIL <input type="radio"/> 	<p>Alarm Status Not User-Configurable/Informational Only (GREEN = Normal; RED = Alarm)</p>				
	PLL LD	Display alarm			
	Isolation	Display alarm			
	Shutdown (DL/UL)	Display alarm			
	DC Fail	Display alarm			
	Relay Status	Display alarm			
	DL VSWR	DL Path VSWR check			
	UL VSWR	UL Path VSWR check			
	Manual Amp	User HPA OFF Alarm			
	BATT FAIL (LOW)	BATT Low Power Alarm			
	BATT FAIL (HIGH)	BATT High Power Alarm			
	DC FAIL	BATT / AC Power Alarm			
	DL HPA FAIL	DL Path HPA Alarm			
	UL HPA FAIL	UL Path HPA Alarm			
Item #	Section				
<p>8</p> <p>VSWR</p> <p>DL UL</p> <p>Ratio <input type="text" value="8.72"/> :1 <input type="text" value="30.00"/> :1</p> <p>Limit <input type="text" value="6"/> <input type="text" value="6"/></p> <p>ON/OFF <input type="text" value="ON"/> <input type="text" value="ON"/></p>	<p>VSWR (DL / UL)</p>				
	Ratio	VSWR Ratio Status Display, 0.00 to 30.00			
	Limit	VSWR Ratio Alarm Limit , Set 0.00 to 30.00			
	On/Off	VSWR Alarm Display Enable(On)/Display(Off)			

Item #	Section	
9 AC/DC Info <input type="text" value="AC"/> Charging Status <input type="text" value="Charging"/> Voltage <input type="text" value="26.9"/>	AC/DC	
	Info	AC or BATT Status Display
	Charge Status	Charge Status Display Charge / Discharge
	Voltage	AD or DC Voltage Display 0.0 ~ 29.0

6.3 Control




Clicking the **Control** button in the menu on the left of the page changes the button text to  and displays the Control Mode page, described in this section.



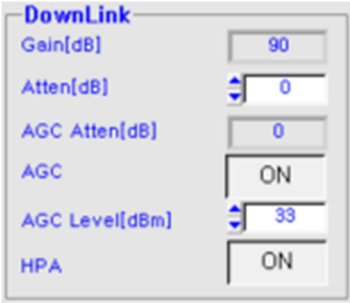
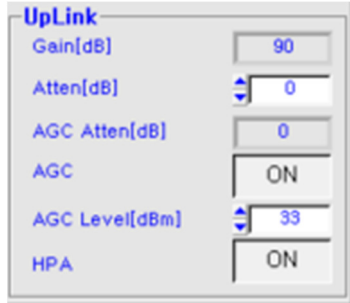
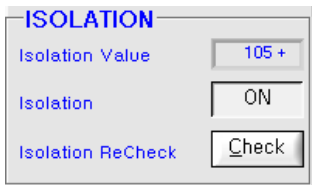
The screenshot shows the 'Control Mode' page of the PS71090-P8 GUI. The interface is divided into several sections:


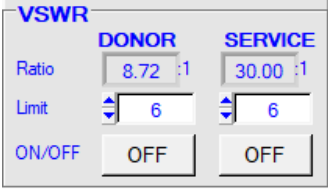

- 1:** Westell logo and IP address (192.168.1.150).
- 2:** Connection status (green dot) and buttons for DISCONNECT, DEBUG, System DownLoad, IP Change, Login Info Change, Time Change, and System Reboot.
- 3:** Location fields for COMPANY, ADDRESS, CITY, STATE, and CONTACT.
- 4:** Band Select section for 800 MHz, showing Sub-Band 1, Uplink (806-809 MHz), and Downlink (851-854 MHz) frequencies.
- 5:** ShutDown controls for Downlink and Uplink, including ShutDown Level (dBm) and ShutDown Period (DL/UL).
- 6:** Band Power/Gain Adjustments for DownLink and UpLink, including Gain (dB), Atten (dB), AGC, and HPA settings.
- 7:** ISOLATION controls, including Isolation Value (105+), Isolation (ON), and Isolation ReCheck (Check).
- 8:** VSWR (Voltage Standing Wave Ratio) controls for DONOR and SERVICE antennas, including Ratio and Limit.
- 9:** ALARM status panel with various indicators like PLL LD, Isolation, ShutDown (DL/UL), AC FAIL, Relay Status, Donor Ant VSWR, Service Ant VSWR, Manual Amp, BATT FAIL (LOW), BATT FAIL (HIGH), DC FAIL, DL HPA FAIL, and UL HPA FAIL.
- 10:** Control buttons: Status OFF, Control ON, and Control Send.

Figure 6-6: Control Mode Page

Item #	Section	
<p>1</p> 	<p>Shutdown Allows the shut-down level to be set</p>	
	Downlink	
	Shutdown	Allows the downlink shutdown level to be set to on or off.
	Shutdown Level [dBm]	Allows the maximum shutdown level to be set between 23 and 37
	Uplink	
	Shutdown	Allows the uplink shut down level to be set to on or off
Shutdown Level [dBm]	Allows the maximum shutdown level to be set between 23 and 37	
Item #	Section	
<p>2</p> 	<p>Shutdown Period Allows the shutdown period to be set</p>	
	Shutdown Period	Allows the shutdown period to be set in minutes and seconds.
Item #	Section	
<p>3</p> 	<p>Location</p>	
	Company	Company information display
	Address	Address information display
	City	City information display
	State	State information display
	Contact	Contact information display

Item #	Section										
<p style="text-align: center;">4</p> 	<p>Band Select: 800 MHz</p> <p style="text-align: center;">Sub-band 1</p> <p style="text-align: center;">Uplink</p> <table border="1" data-bbox="621 394 1433 548"> <tr> <td>Start Frequency</td> <td>Displays sub-band 1 uplink Start frequency</td> </tr> <tr> <td>Stop Frequency</td> <td>Displays sub-band 1 uplink Stop frequency</td> </tr> </table> <p style="text-align: center;">Downlink</p> <table border="1" data-bbox="621 604 1433 758"> <tr> <td>Start Frequency</td> <td>Displays sub-band 1 downlink Start frequency</td> </tr> <tr> <td>Stop Frequency</td> <td>Displays sub-band 1 downlink Stop frequency</td> </tr> <tr> <td>800 MHz Band</td> <td>Allows sub-band 1 to be set to Select</td> </tr> </table>	Start Frequency	Displays sub-band 1 uplink Start frequency	Stop Frequency	Displays sub-band 1 uplink Stop frequency	Start Frequency	Displays sub-band 1 downlink Start frequency	Stop Frequency	Displays sub-band 1 downlink Stop frequency	800 MHz Band	Allows sub-band 1 to be set to Select
Start Frequency	Displays sub-band 1 uplink Start frequency										
Stop Frequency	Displays sub-band 1 uplink Stop frequency										
Start Frequency	Displays sub-band 1 downlink Start frequency										
Stop Frequency	Displays sub-band 1 downlink Stop frequency										
800 MHz Band	Allows sub-band 1 to be set to Select										
	<p style="text-align: center;">Sub-band 2</p> <p style="text-align: center;">Uplink</p> <table border="1" data-bbox="621 909 1433 1062"> <tr> <td>Start Frequency</td> <td>Displays sub-band 2 uplink Start frequency</td> </tr> <tr> <td>Stop Frequency</td> <td>Displays sub-band 2 uplink Stop frequency</td> </tr> </table> <p style="text-align: center;">Downlink</p> <table border="1" data-bbox="621 1119 1433 1272"> <tr> <td>Start Frequency</td> <td>Displays sub-band 2 downlink start frequency</td> </tr> <tr> <td>Stop Frequency</td> <td>Displays sub-band 2 downlink Stop frequency</td> </tr> <tr> <td>800 MHz Band</td> <td>Allows sub-band 2 to be set to Select</td> </tr> </table>	Start Frequency	Displays sub-band 2 uplink Start frequency	Stop Frequency	Displays sub-band 2 uplink Stop frequency	Start Frequency	Displays sub-band 2 downlink start frequency	Stop Frequency	Displays sub-band 2 downlink Stop frequency	800 MHz Band	Allows sub-band 2 to be set to Select
Start Frequency	Displays sub-band 2 uplink Start frequency										
Stop Frequency	Displays sub-band 2 uplink Stop frequency										
Start Frequency	Displays sub-band 2 downlink start frequency										
Stop Frequency	Displays sub-band 2 downlink Stop frequency										
800 MHz Band	Allows sub-band 2 to be set to Select										
	<p style="text-align: center;">Sub-band 3</p> <p style="text-align: center;">Uplink</p> <table border="1" data-bbox="621 1419 1433 1572"> <tr> <td>Start Frequency</td> <td>Displays sub-band 3 uplink Start frequency</td> </tr> <tr> <td>Stop Frequency</td> <td>Displays sub-band 3 uplink Stop frequency</td> </tr> </table> <p style="text-align: center;">Downlink</p> <table border="1" data-bbox="621 1629 1433 1782"> <tr> <td>Start Frequency</td> <td>Displays sub-band 3 downlink start frequency</td> </tr> <tr> <td>Stop Frequency</td> <td>Displays sub-band 3 downlink Stop frequency</td> </tr> <tr> <td>800 MHz Band</td> <td>Allows sub-band 3 to be set to Select</td> </tr> </table>	Start Frequency	Displays sub-band 3 uplink Start frequency	Stop Frequency	Displays sub-band 3 uplink Stop frequency	Start Frequency	Displays sub-band 3 downlink start frequency	Stop Frequency	Displays sub-band 3 downlink Stop frequency	800 MHz Band	Allows sub-band 3 to be set to Select
Start Frequency	Displays sub-band 3 uplink Start frequency										
Stop Frequency	Displays sub-band 3 uplink Stop frequency										
Start Frequency	Displays sub-band 3 downlink start frequency										
Stop Frequency	Displays sub-band 3 downlink Stop frequency										
800 MHz Band	Allows sub-band 3 to be set to Select										

Item #	Section	
5 	Downlink	
	Gain [dB]	Displays downlink gain
	Atten [dB]	Sets attenuation value
	AGC Atten [dB]	Displays attenuation value controlled by AGC
	AGC	Control Auto Level Control Function On/Off
	AGC Level [dBm]	Sets the unit's maximum ALC output value
	HPA	Down link HPA On/Off
Item #	Section	
6 	UpLink	
	Gain (dB)	Displays status of the uplink gain
	Atten [dB]	Sets the attenuation value
	AGC Atten [dB]	Displays attenuation value controlled by AGC
	AGC	Control Auto Gain Control Function On/Off
	AGC Level [dBm]	Sets the unit's maximum AGC output value
	HPA	Uplink HPA On/Off
Item #	Section	
7 	Isolation	
	Isolation Value	When power is on, an isolation check is performed and the values display.
	Isolation	The isolation check can be performed with the RF on or off.
	Isolation Recheck	The isolation check can be performed with the RF on or off.
	Note: Neither the isolation check nor recheck will indicate a change in power levels if the unit's own power has been switched off.	

Item #	Section	
<p>8</p> 	<p>Alarm (GREEN = Normal; RED = Alarm)</p>	
	PLL LD	Displays alarm
	Isolation	Displays alarm
	ShutDown (DL/UL)	Displays alarm
	DC Fail	Displays alarm
	Relay Status	Displays alarm
	DL VSWR	DL Path VSWR check
	UL VSWR	UL Path VSWR check
	Manual Amp	User HPA OFF Alarm
	BATT FAIL (LOW)	BATT Low Power Alarm
	BATT FAIL (HIGH)	BATT High Power Alarm
	DC FAIL	BATT / AC Power Alarm
	DL HPA FAIL	DL Path HPA Alarm
	UL HPA FAIL	UL Path HPA Alarm
	Item #	Section
<p>9</p> 	<p>VSWR</p>	
	DL/UL	
	Ratio	VSWR Ratio Status Display, 0.00 to 30.00
	Limit	VSWR Ratio Alarm Limit , Set 0.00 to 30.00
On/Off	VSWR Alarm Display Enable(On)/Display(Off)	
Item #	Section	
<p>10</p> 	<p>Control Send</p>	
	<p>When the unit is fully configured, the settings can be sent to the Signal Booster by clicking the Control Send button.</p>	

7 Firmware Upgrade

7.1 Upgrading the Firmware

Follow the instructions in this section to upgrade to a newer version of system firmware, if necessary.

1. Click the **Control** button to display the Control page.
2. Click in the IP menu located on the left side of the Control page. The Firmware Upgrade progress window, Figure 7-1, displays.

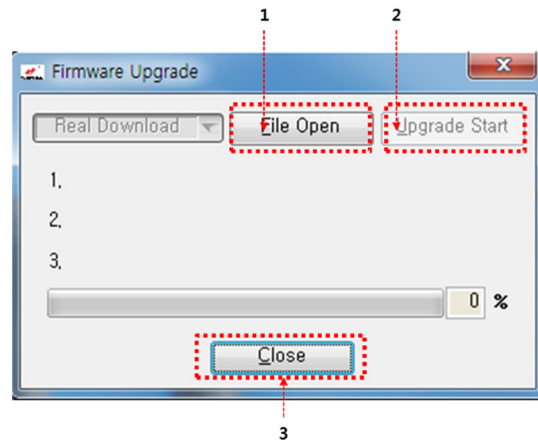


Figure 7-1: Firmware Upgrade Progress Window File Open Tab

3. Click the **File Open** tab in the Firmware Upgrade progress window to display it, Figure 7-1.
4. Click to select the desired version file.
5. Click in the **Specify INI File to Open** browser window, Figure 7-2. The Firmware Version Check dialog window displays, Figure 7-2.

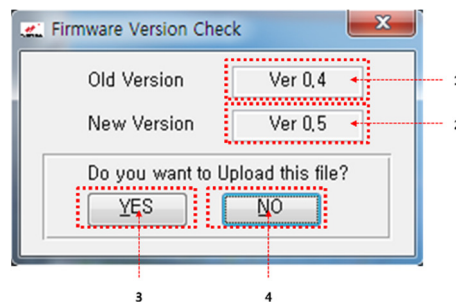


Figure 7-2: Firmware Version Check

6. Click in the Firmware Version Check dialog window, Figure 7-3. The firmware upgrade begins, as indicated by the progress bar in the Firmware Version Check window, Figure 7-3.

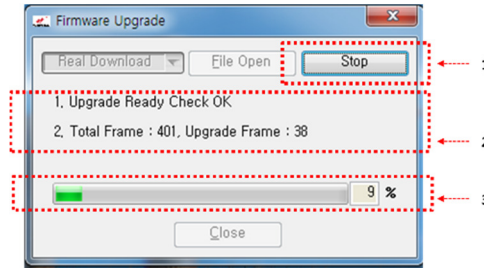


Figure 7-3: Firmware Update Status

#	Item	Function
1	Stop	Button to Stop Upgrade
2	Status	Display real-time upgrade status
3	Progress	Display Upgrade Progress

Note: You can stop the upgrade by pressing the Stop button.

7. When upgrade is completed, Firmware Upgrade Window is closed.

7.2 IP Change

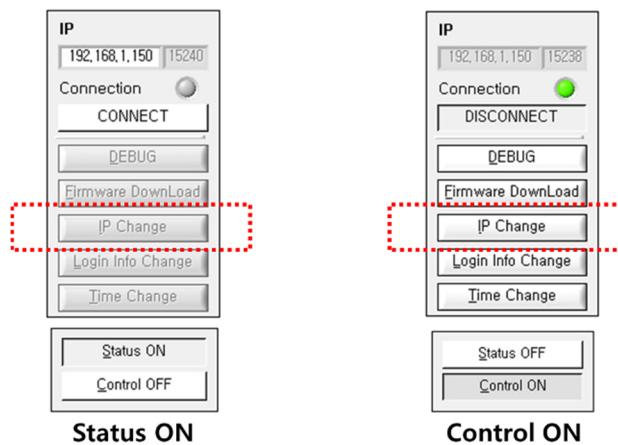


Figure 7-4: IP Settings

1. With Control ON, the IP Change button is activated.

7.2.1 IP Change Window

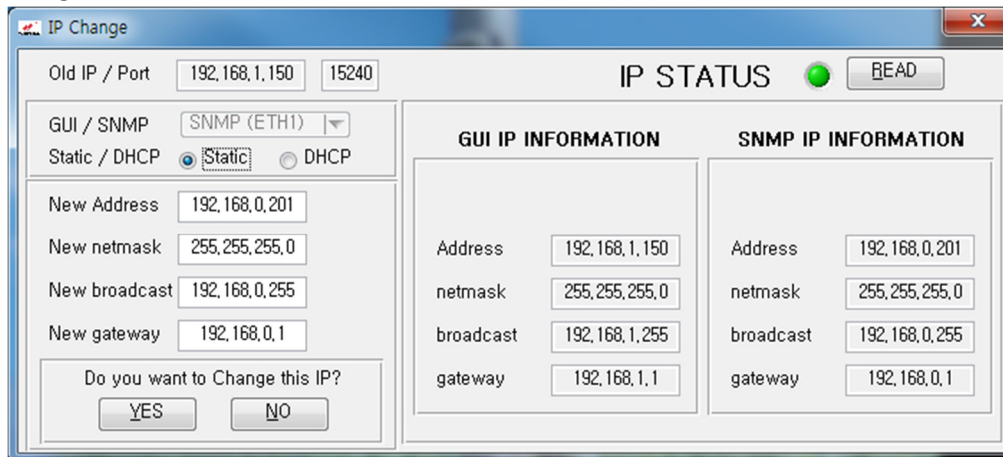


Figure 7-5: IP Change Window

1. Successful completion of IP Read, Status LED turns green and change icon is activated
2. When the IP Change Window is opened, the current status is displayed, Figure 7-10
 - a. Static IP can be set. (See 7.2.2)
 - b. DHCP IP can be set. (See 7.2.3)

7.2.2 Static IP Setting

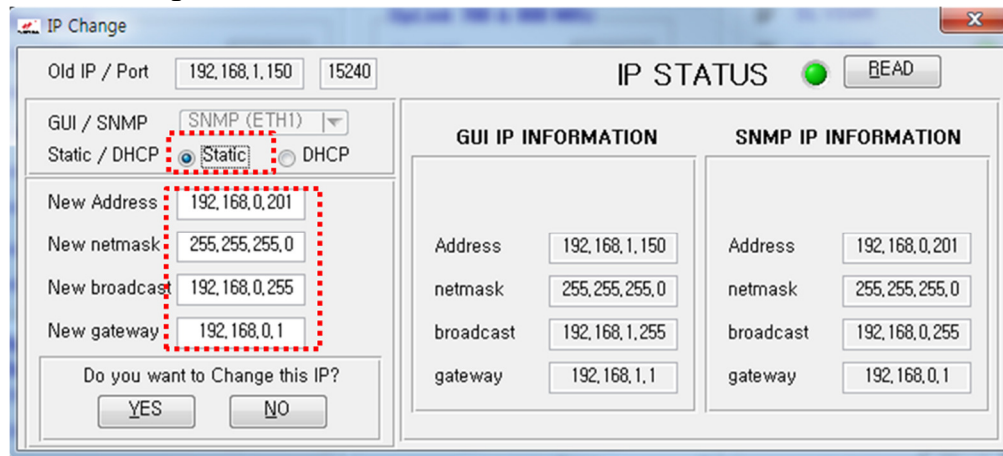


Figure 7-6: Static IP Setting

1. Please write the Address / netmask / broadcast / gateway
2. If have all information set, please press YES button.

7.2.3 DHCP IP Setting

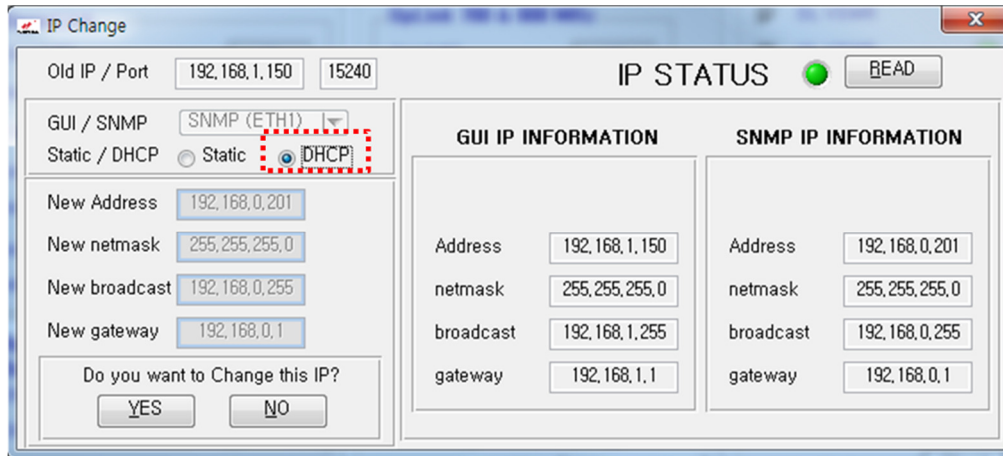


Figure 7-7: DHCP IP Setting

1. After DHCP select please click the YES button.

Appendix A Important Product Information

A.1 Registration Number

FCC – NVRPS71090-P8

A.2 UL

This product is UL Listed.

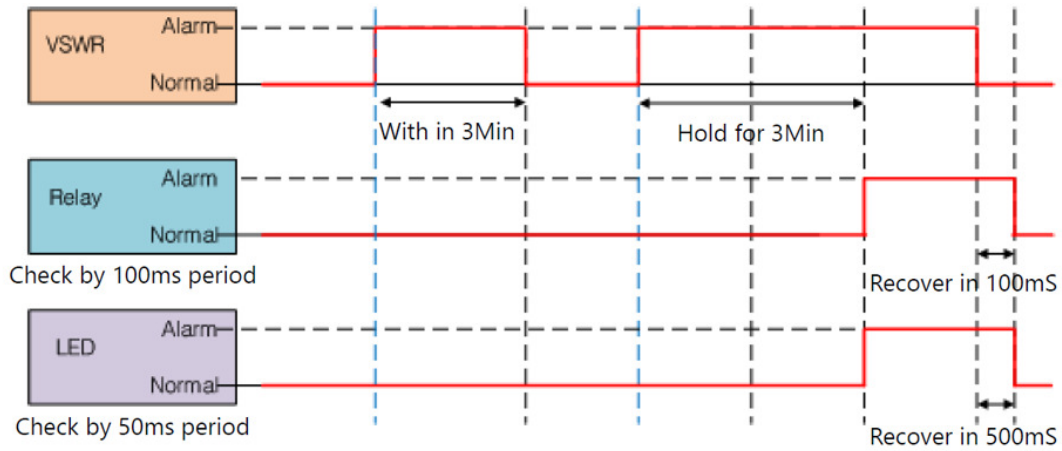
Appendix B Acronyms and Abbreviations

Table B-1 contains the acronyms and abbreviations used in this manual, along with a definition for each one.

Table B-1: Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AC	Alternating Current
AGC	Automatic Gain Control
COM	Communications
dB	Decibels
dBc	Decibels relative to the carrier
dB _i	Decibels relative to isotropic
dBm	The power ratio in decibels (dB) of the measured power referenced to one milliwatt (mW)
DC	Direct Current
DL	Downlink
FCC	Federal Communications Commission
HPA	High-Powered Amplifier
IF SAW	Intermediate Frequency Surface Acoustic Wave
IP	Internet Protocol
LAN	Local Area Network
LED	Light Emitting Diode
MHz	Megahertz
NMS	Network Management System
OSC	Oscillator
PLL LD	Phase-locked loop with lock detection
RF	Radio Frequency
RS-232C	Serial Communication Standard
UL	Uplink
UPS	Uninterruptable Power Supply
VAC	Volts Alternating Current (AC Voltage)
VSWR	Voltage Standing Wave Ratio

Appendix C Downlink & Uplink VSWR Alarm Timing Diagram



1. VSWR Normal → Alarm Condition
 - a) If VSWR Alarm Event > 3 Min, then the Relay & LED: Normal → Alarm
 - b) If VSWR Alarm Event < 3 Min, then the Relay & LED: Normal
2. VSWR Alarm → Normal
 - a) If VSWR Alarm Condition goes away, then Relay recovers within 100mS and LED recovers within 500mS