



PS51080 Public Safety Repeater

User's 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 PS51080 Public Safety Repeater. 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.
- **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 repeater configuration.
- **Chapter 5: Installation Guidelines** – Lists guidelines for installing the repeater 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 wireless enhancement system using Westell's PS51080 Public Safety Repeater. 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 repeater and in-building 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 repeater is included in a new installation.

1.2.1 Product Registration Information

The serial number is located on the label on the panel near the power connectors. 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
POINT OF SALE COMPANY		

Figure 1-1: Product Registration

1.3 Safety Guidelines

The general safety information in this guideline applies to both operating 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 repeater is designed to operate at 110VAC @ 0.5A 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 repeater 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. The outdoor antenna used for the purpose of communicating to the wireless infrastructure is limited to 14 dBi gain, or any combination of gain and loss that equals 14 dB at input. 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 14 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.

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 PS51080 repeater 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 antenna. Internal antennas are typically omnidirectional, although various other types may be used, depending on the coverage application. The repeater 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 80 dB nominal gain on both the uplink and downlink, gain can be adjusted over a range from 50 dB to 80 dB in 1 dB steps.

The repeater is controlled using a computer connected to the 8P8C/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
- One body type
- 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
- External interfaces – serial
- Persistent status and error information



2.3 Included Accessories

Table 2-1 contains the items that are shipped with the PS51080 Public Safety Repeater.

Table 2-1: Included Accessories

Quantity	Description
1	AC 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

2.4 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

Item	Model Number or Description
Outside donor antenna panel	Clearlink-D/698-2.7 K/N
Inside omnidirectional antenna	ClearLink-O/698-2.7 K/N
Directional couplers	
6 dB	Clearlink-DC6/698-2.7K/N
10 dB	Clearlink-DC10/698-2.7K/N
15 dB	Clearlink-DC15/698-2.7K/N
20 dB	Clearlink-DC20/698-2.7K/N
30 dB	Clearlink-DC30/698-2.7K/N
Power dividers	
2:1	Clearlink-SPD2/698-2.7K/N
3:1	Clearlink-SPD3/698-2.7K/N
4:1	Clearlink-SPD4/698-2.7K/N



3 Product Specification

3.1 RF Specifications

Table 3-1: RF Specifications

Parameters		Specifications	Comments
Frequency range	UL(Uplink)	788~805MHz 806~809MHz Sub-Band1 806~816MHz Sub-Band2	Each band, 700 and 800 independently controlled by GUI
	DL (Downlink)	758~775MHz 851~854MHz Sub-Band1 851~861MHz Sub-Band2	
Frequency selectivity	UL/DL	@-40dBc $\pm$ 2MHz	
Gain	UL/DL	80dB ($\pm$ 1.0dB)	
Sub-band balance	UL/DL	$\pm$ 1.0dB	
Gain adjustment range	UL/DL	30dB/30dB $\pm$ 1 dB	1dB step
AGC (Automatic Gain Control) range	UL/DL	25 dB	
Pass band ripple	UL DL	$\pm$ 1.5dB Typ (Peak-To-Peak 3dB) $\pm$ 2.0dB Max (Peak-To-Peak 4dB)	
Linear output power	UL/DL	+27dBm	
3 rd order intercept point	UL/DL	+42.5dBm	
1 dB gain compression	UL/DL	31dBm	
Input VSWR (Voltage Standing Wave Ratio)	UL/DL	<2:1	
Max power input w/o damage	UL/DL	+10dBm	
Propagation delay	UL/DL	3 μ s Typ 4 μ s Max	
Noise figure @ maximum gain	UL/DL	6.5dB Typ. 8.0dB Max	

3.2 Power Specifications

Table 3-2: Power Specifications

Parameters	Specifications	Notes
Main power input voltage	AC110V	Internal AC DC Power Supply

3.3 Mechanical Specifications

Table 3-3: Mechanical Specifications

Parameters	Specifications	Notes
Dimensions	279 x 425.958 x 81.28 mm (L x H x D) 11 x 16.77 x 3.2 in (L x H x D)	
Weight	7.7 kg (~17 lbs.)	
Connectors	Link/service antenna ports	N-female
	Power Connectors	IEC320
	Frame ground	External grounding point provided on repeater, Figure 4-1
	RJ45 (8P8C)	GUI (Graphical User Interface)
	Alarm Relay (RS-232)	9P D-SUB, female
Mounting type	Wall mounting	
Heat dissipation	Natural convection	
Finish	Red color paint	

3.4 Environmental Specifications

Table 3-4: Environmental Specifications

Parameters	Specifications	Notes
Operating temperature	-30° to +50° C (ambient)	-22° F to +118° F
Storage temperature	-40° C to +60° C (ambient)	-40° F to +140° F
Humidity	95%	
NEMA	IP65, NEMA 4 Compliance	

3.5 GUI Items

Table 3-5: GUI Items

Parameters	Specifications	Notes
UL/DL Output Readings	5dBm to 30dBm	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	Displays alarm status
UL/DL Shutdown Setting	23dBm to 30dBm	Use to set the peak power (shutdown level)
UL/DL Gain Setting	0dB to 30dB	Used to set the UL/DL system gain.
System Location Display	PS51080 PS-SMR700/800 Company, Address, City, State, Contact	Displays the repeater 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

Repeater Unit LED			Condition/Troubleshooting
Power (Green)	OSC (Red)	Alarm (Red)	
X	X	X	Power supply inside the repeater is not functioning or is turned off.
Blinking	Blinking	Blinking	Checking isolation data.
Solidly lit	Off	Off	Normal condition at start up.
Solidly lit	Solidly lit	Solid	Insufficient data (isolation) exists between the DL and UL antenna. Remove power and re-install the DL and UL antenna to resolve isolation problem.
Solidly lit	Off	Solidly lit	Shut down alarm. The cell tower signal is too strong (exceeds AGC range). Attenuate DL path to clear alarm.
Solidly lit	Off	Blinking	PLL lock failure.
Blinking	Off	Off	Repeater is non-functional. Contact Westell customer support.
Blinking	Solidly lit	Solidly lit	Antenna Failure Alarm.

Refer to Figure 4-1 for LED locations.



3.7 Alarm Relay

Table 3-7: Alarm Relay

Shutdown Signal	Relay Status	Notes
Normally Open	NO (pin 2) + CC (pin 3)	PIN 1 NC, PIN 2 NO, PIN 3 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.

Table 3-8: Alarm Relay Connections

Pin Number	Contact Type	Conductor Color
1	NC	Black
2	NO	Brown
3	CC	Red



4 Product Appearance

4.1 External Configuration

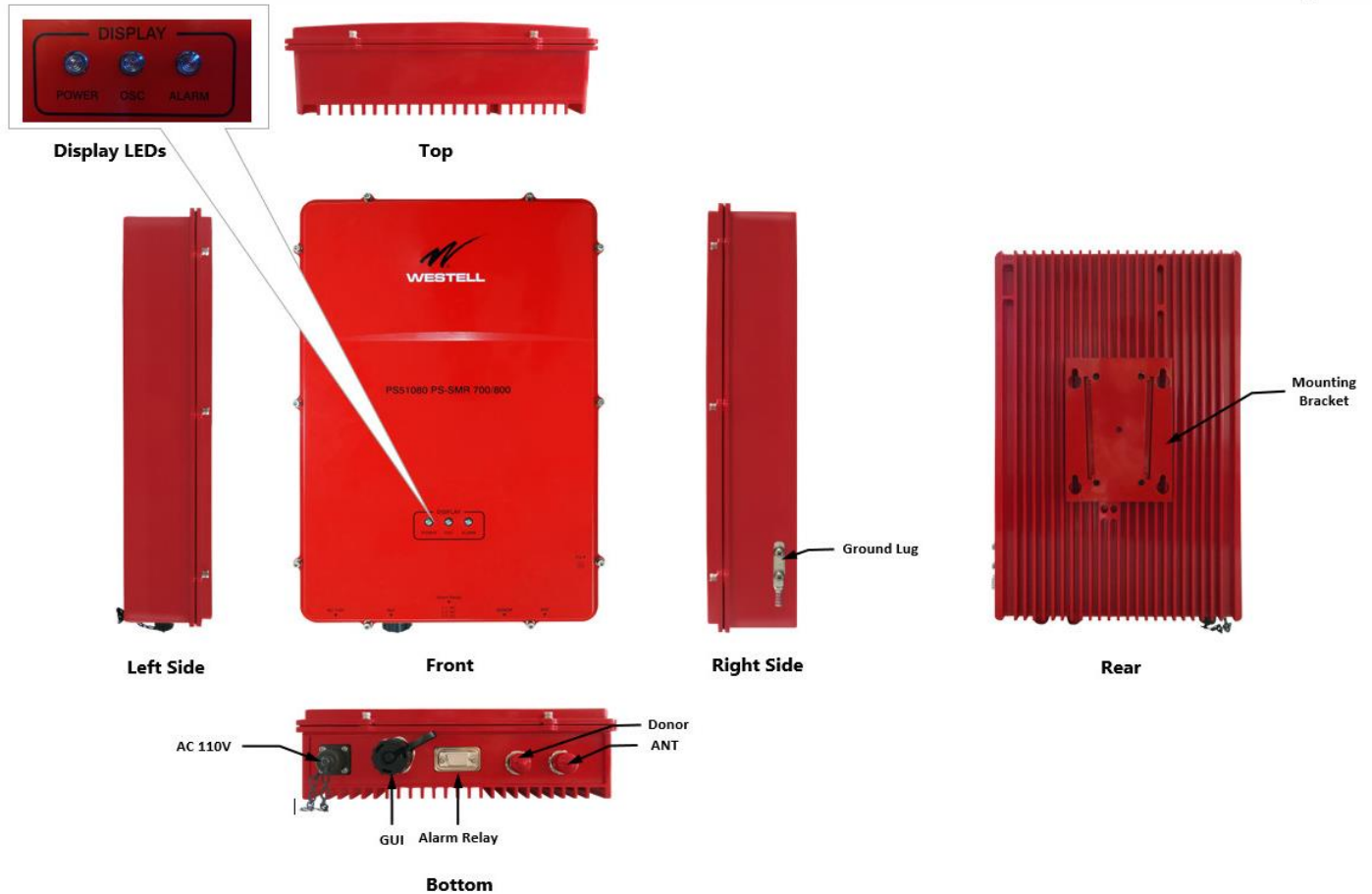


Figure 4-1: External Product Configuration

5 Installation Guidelines

5.1 Important Installation Guidelines

- The PS51080 repeater is designed for indoor use only.
- The PS51080 repeater must be installed in a vertical position on the mounting bracket.
- Install the PS51080 repeater in a dry, clean and dust-free environment.
- 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 repeater.

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 repeater, 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 repeater is installed in close proximity to water.

WARNING!

- Amplifier or handset damage may occur if a handset is connected directly to the repeater or to the coax that leads to the repeater.
- The PS51080 repeater must be connected to ground for protection.
- We recommend that installers do not wear jewelry or metal accessories when installing this repeater.
- Do not place cables or tools that may damage the repeater 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 repeater may be reduced if the unit is operating outside its nominal temperature range.



CAUTION

- Close proximity to the donor or server antennas with the repeater in operation may expose users or installers to RF fields that exceed FCC limits for human exposure.
- Turn power to the repeater 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 repeater uplink overload and gain limiting, mount the indoor antennas away from areas where mobile subscribers frequently use their phones, such as desks or dispatch areas.
- 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 Repeater

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



Figure 5-1: Repeater Mounting Bracket Mounted on Repeater Rear

1. If the mounting bracket is attached to the repeater, remove it.
 - a. Grasp the top of the mounting bracket and push firmly down to slide the bracket off the repeater.
2. Using the bracket as a template, mark the five locations for the wall anchoring system screws, Figure 5-2.

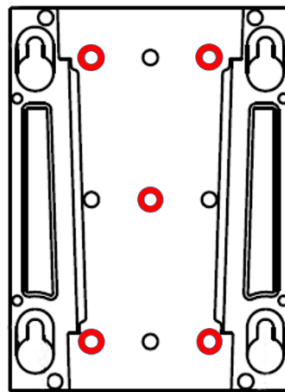


Figure 5-2: Mounting Bracket with Mounting Screw Holes Highlighted in Red

3. Move the mounting bracket and drill the mounting holes at the marks in the wall.

4. Install a wall anchor in each of the five drilled holes.
5. Place the mounting bracket over the anchors and install the five screws into the anchors, fastening the bracket to the wall.
6. Slide the repeater onto the receiver rails on the wall mount bracket.

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 Repeater

Control and monitoring the repeater requires that a properly configured computer with Westell PS51080 control software installed is connected via an ethernet cable, such as the one shown in Figure 5-3. Connect the Ethernet cable from the Network Interface port of a computer to the GUI port on the bottom end panel of the repeater.



Figure 5-3: Ethernet Cable

5.7 Connecting to the Alarm Relay Panel

Use the provided Alarm Relay Serial Cable to connect the PS51080 Public Safety Repeater 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 5-4. Only the red, black and brown conductors will be used. You may cut the remaining conductors back to end of the outer insulation to keep them out of the way.
2. Strip back the insulation on the ends of each conductor.

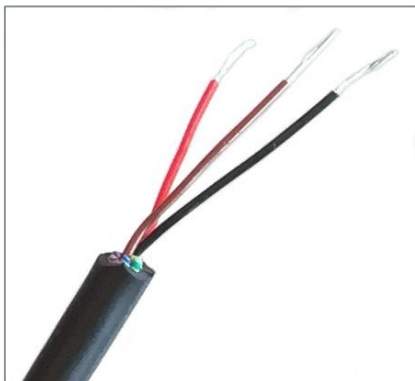


Figure 5-4: Stripped Cable Conductors

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

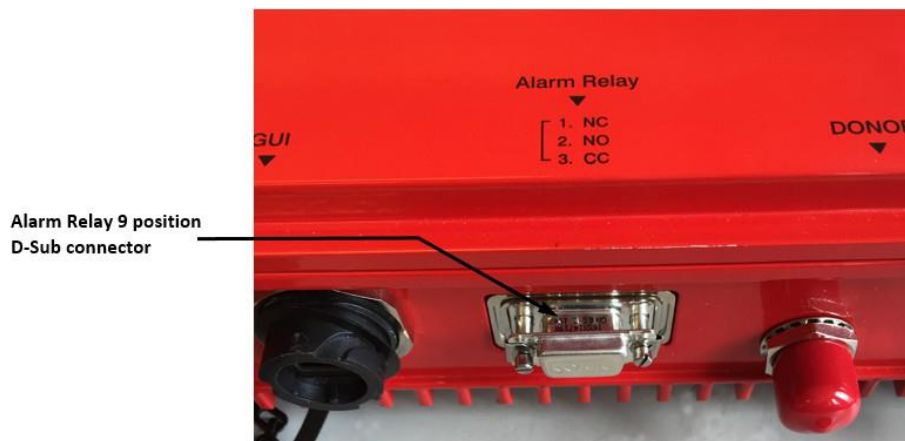


Figure 5-5: Alarm Relay 9 Position D-Sub Connector

4. Connect the 9 position D-Sub connector at one end of the serial cable to the Alarm Relay connector on the PS51080, Figure 5-6. Be sure to fasten the connector screws securely.



Figure 5-6: Alarm Relay Cable Connected to Repeater

5. 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
1	NC	Black
2	NO	Brown
3	CC	Red

5.8 Connecting the Power Cable

Use the provided AC Power Cable to connect the PS51080 Public Safety Repeater to an AC power source.

1. Remove the cap from the AC 110V power connector on the repeater, Figure 5-7.

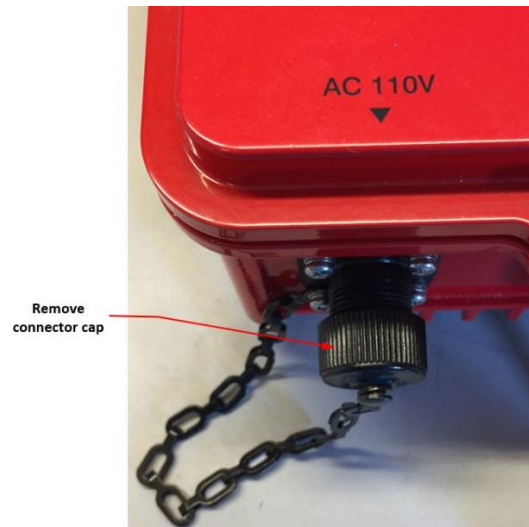


Figure 5-7: Remove the Power Connector Cap

2. Connect the power cable to the AC 110V power connector on the repeater, Figure 5-9 .

NOTE

The repeater connector and the cable connector are keyed as shown in Figure 5-8.

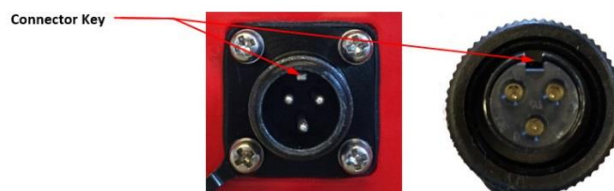


Figure 5-8: Connector Keys

Screw
connector on
securely



Figure 5-9: Power Cable Connected to Repeater

3. Screw the connector on securely.
4. When the repeater is properly set up and ready to have power applied, plug the other end into the 110VAC outlet.



Figure 5-10: Power Cable Connected to Repeater

6 System Operation

6.1 Operating the Program

Access the PS51080 Public Safety Repeater using the provided **PS51080 PS-SMR 700/800** software through a LAN connection. The repeater ships with the IP address 192.168.1.150.

To connect directly to the repeater 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.

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, Figure 6-1.
2. Ensure that the subnet mask is set to 255.255.255.0.

NOTE

Refer questions about these settings to your IT department.

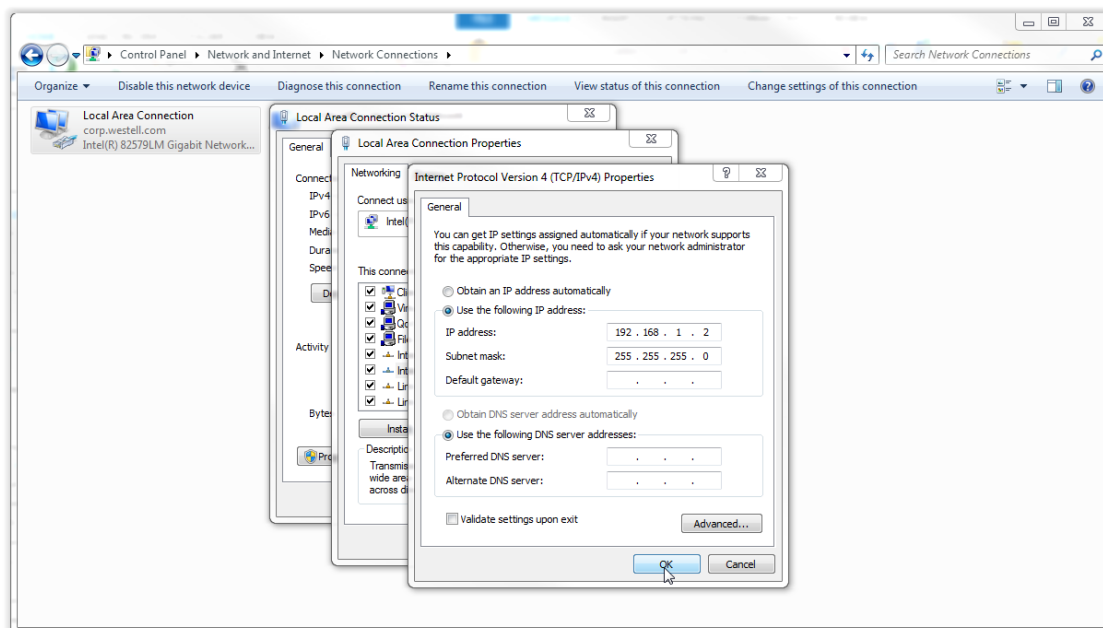


Figure 6-1: IP Settings



3. Navigate to the location where the **PS51080.exe** software file is saved, Figure 6-2, and double-click to run it. The Status page, Figure 6-3, displays.

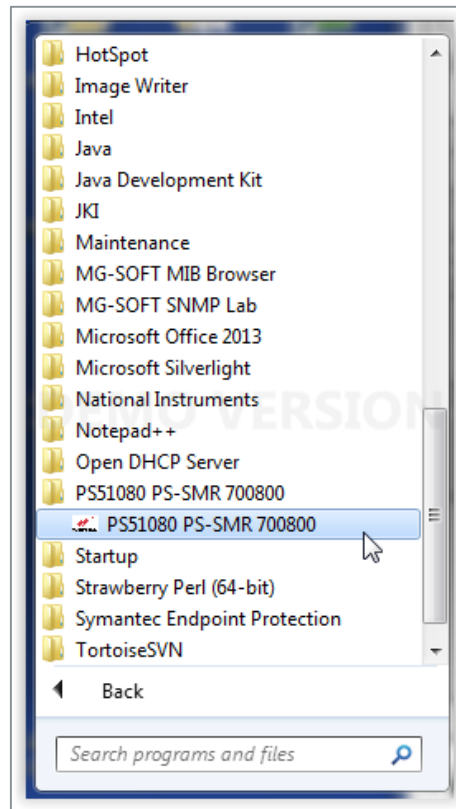


Figure 6-2: Run the Software

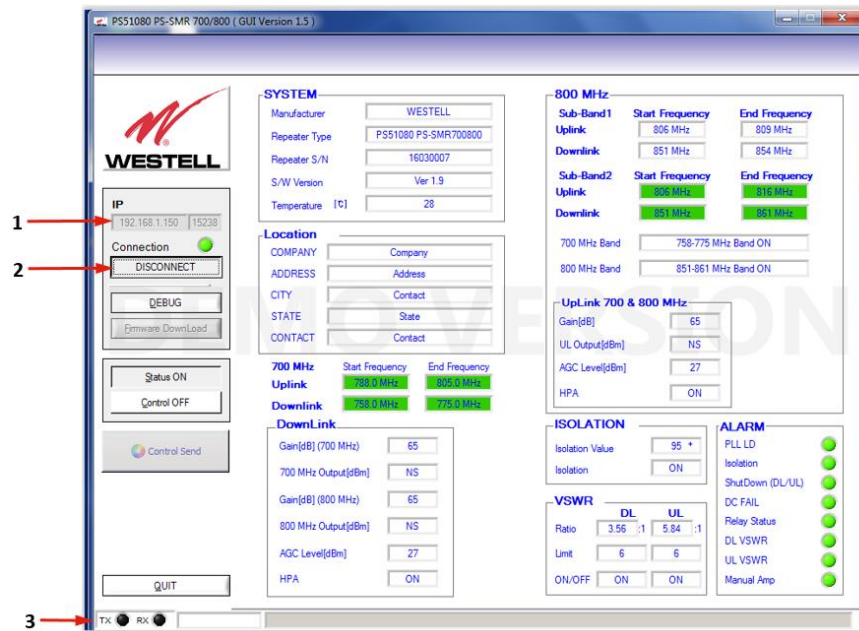


Figure 6-3: Status Page (after clicking connect)

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 repeater and GUI

- Verify that the IP address in the left menu IP section correct. If it is not, edit it in the IP Address field.
- In the left menu Connection section, 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 Status ON and displays the Status Mode page, Figure 6-4, described in this section.

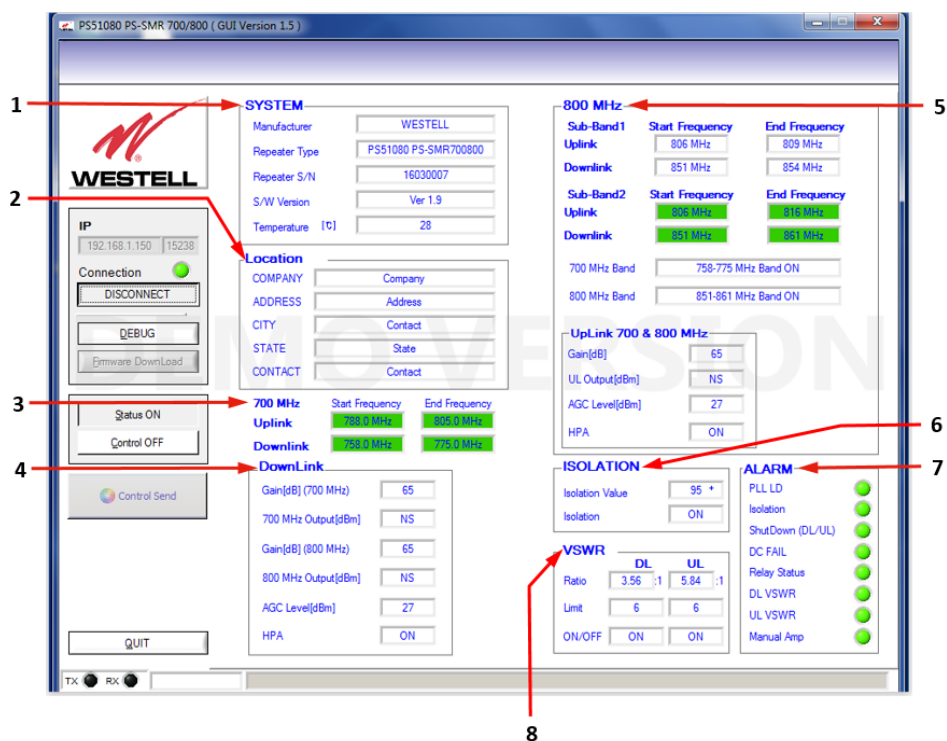


Figure 6-4: Status Mode Page

Item #	Section	
1	System Not User-Configurable/Informational Only	
	Manufacturer	Displays the repeater’s manufacturer
	Repeater Type	Displays repeater model
	S/W Version	Displays the firmware version of the control board
	Temperature	Displays the inner temperature of the repeater
2	Location	
	Company	Company information display
	Address	Address information display
	City	City information display
	State	State information display
	Contact	Contact information display

Figure 6-4: Status Mode Page, continued



Item #	Section	
3 700 MHz Start Frequency End Frequency Uplink 788.0 MHz 805.0 MHz Downlink 758.0 MHz 775.0 MHz	700 MHz	
	Uplink	
	Start Frequency	Displays the 700 MHz uplink start frequency
	End Frequency	Displays the 700 MHz uplink end frequency
	Downlink	
	Start Frequency	Displays the 700 MHz downlink start frequency
	End Frequency	Displays the 700 MHz downlink end frequency
	4 DownLink Gain[dB] (700 MHz) 80 700 MHz Output[dBm] NS Gain[dB] (800 MHz) 80 800 MHz Output[dBm] NS AGC Level[dBm] 20 HPA On	Downlink
Gain dB (700 MHz)		Displays the downlink gain in the 700 MHz range
700 MHz Output (dBm)		Displays the output level of the 700 MHz range
Gain dB (800 MHz)		Displays the downlink gain in the 800 MHz range
800 MHz Output (dBm)		Displays the output level of the 800 MHz range
AGC Level (dBm)		Sets the unit’s maximum AGC output value
HPA		This allows the user to toggle the downlink High Power Amplifier (HPA) on or off
5 800 MHz Sub-Band1 Start Frequency End Frequency Uplink 806 MHz 809 MHz Downlink 851 MHz 854 MHz Sub-Band2 Start Frequency End Frequency Uplink 806 MHz 816 MHz Downlink 851 MHz 861 MHz 700 MHz Band 758-775 MHz Band ON 800 MHz Band 851-861 MHz Band ON UpLink 700 & 800 MHz Gain[dB] 80 UL Output[dBm] NS AGC Level[dBm] 20 HPA On		800 MHz
	Sub-band 1	
	Uplink	
	Start Frequency	Displays the sub-band 1 uplink start frequency
	End Frequency	Displays the sub-band 1 uplink end frequency
	Downlink	
	Start Frequency	Displays the sub-band 1 downlink start frequency
	End Frequency	Displays the sub-band 1 downlink end frequency
	Sub-Band 2	
	Uplink	
	Start Frequency	Displays the sub-band 2 uplink start frequency
	End Frequency	Displays the sub-band 2 uplink end frequency

Figure 6-4: Status Mode Page, continued

Item #	Section	
5	Sub-band 2, continued	
	700 MHz Band	Displays the 700MHz band that is On.
	800 MHz Band	Displays the 800MHz band that is On.
	Uplink 700 & 800 MHz	
	Gain (dB)	Displays the status of the uplink gain
	Uplink Output (dBm)	Displays the uplink output level
	AGC Level (dBm)	Sets the unit's maximum AGC output value
	HPA	This allows the user to toggle the uplink High Power Amplifier on or off
6	Isolation	
	Isolation Value	Measured isolation value (air interface attenuation value) between donor antenna and service antenna.
	Isolation	Measured isolation value (air interface attenuation value) between donor antenna and service antenna. The isolation check can be performed with the RF on or off. On = Measure the Isolation and display the value in the Isolation Value field Off = Do not measure the isolation

ISOLATION

Isolation Value

95 +

Isolation

On



Figure 6-4: Status Mode Page, continued

Item #	Section	
7	Alarm Not User-Configurable/Informational Only	
	PLL LD	Display alarm (green = normal; red = alarm)
	Isolation	Display alarm (green = normal; red = alarm)
	Shutdown (DL/UL)	Display alarm (green = normal; red = alarm)
	DC FAIL	Display alarm (green = normal; red = alarm)
	Relay Status	Display alarm (green = normal; red = alarm)
	DL VSWR	DL Path VSWR check (green: Normal, red: Alarm)
	UL VSWR	UL Path VSWR check (green : Normal, red : Alarm)
	Manual Amp	User HPA OFF Alarm (green : Normal, red : Alarm)
	8	VSWR (Voltage Standing Wave Ratio)
DL/UL		
Ratio		VSWR Ratio Status Display, 0 to 30
Limit		VSWR Ratio Alarm Limit
On/Off		VSWR Alarm Display Enable(On)/Display(Off)

6.3 Control

Clicking the **Control** button in the menu on the left of the page changes the button text to Control ON and displays the Control Mode page, Figure 6-5, described in this section.

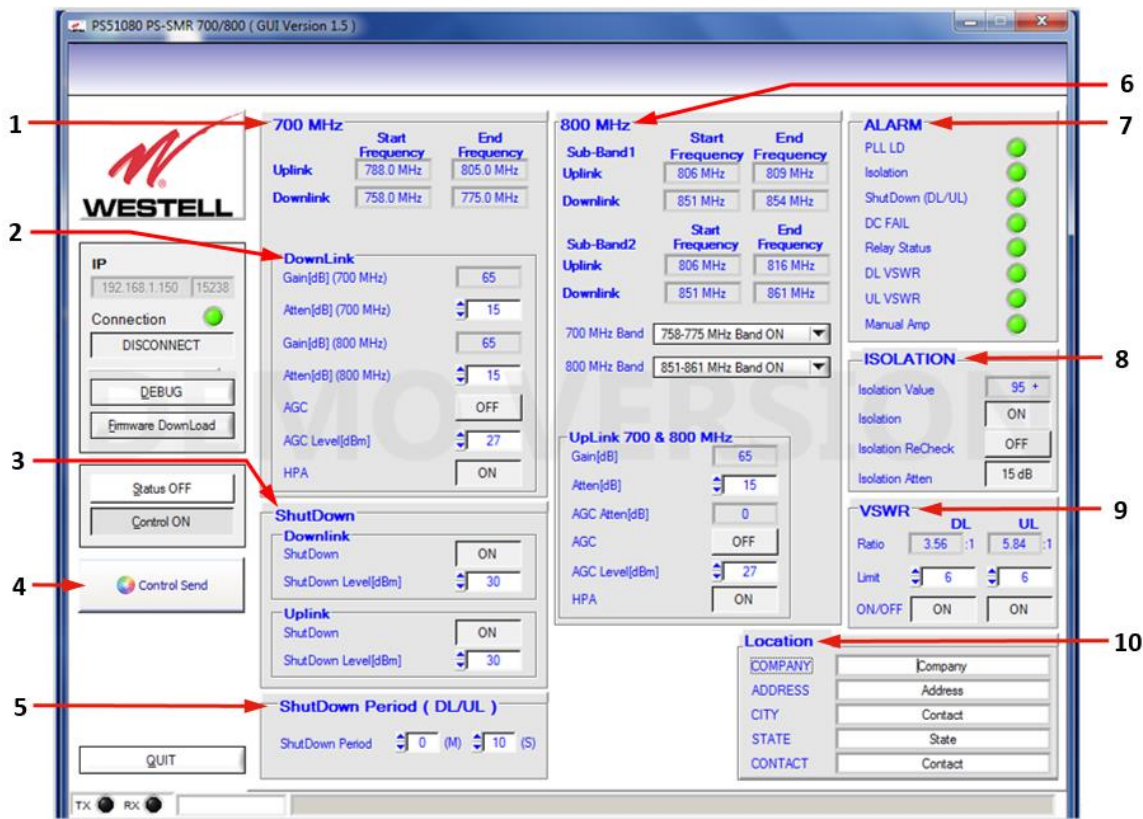


Figure 6-5: Control Mode Page

Item #	Section	
1 700 MHz Start Frequency End Frequency Uplink 793.0 MHz 805.0 MHz Downlink 763.0 MHz 775.0 MHz <td colspan="2">700 MHz</td>	700 MHz	
	Uplink	
	Start Frequency	Displays the 700 MHz uplink start frequency
	End Frequency	Displays the 700 MHz uplink end frequency
	Downlink	
	Start Frequency	Displays the 700 MHz downlink start frequency
	End Frequency	Displays the 700 MHz downlink end frequency

Figure 6-5: Control Mode Page, continued

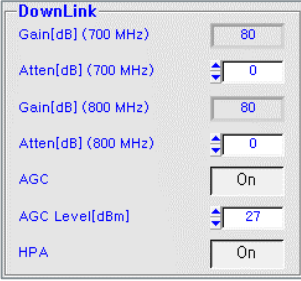
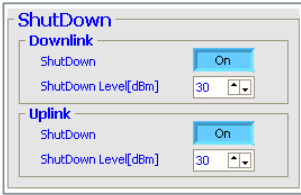
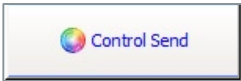
Item #	Section	
2 	Downlink	
	Gain dB (700 MHz)	Displays the downlink gain in the 700 MHz range
	Atten(dB)(700 MHz)	Display attenuation value controlled by downlink (700 MHz)
	Gain dB (800 MHz)	Displays the downlink gain in the 800 MHz range
	Atten(dB)(800 MHz)	Display attenuation value controlled by downlink (800 MHz)
	AGC	Auto Level Control Function On/Off
	AGC Level (dBm)	Sets the unit's maximum ALC output value
	HPA	Downlink HPA On/Off
3 	Shutdown Allows the shut down level to be set	
	Downlink	
	Shutdown	Allows the downlink shut down level to be set to on or off.
	Shutdown Level (dBm)	Allows the maximum shut down level to be set between 23 and 30.
	Uplink	
	Shutdown	Allows the uplink shut down level to be set to on or off
4 	Control Send	
	When the unit is fully configured, the settings can be sent to the repeater by clicking the Control Send button.	
5 	Shutdown Period Allows the shut down period to be set	
	Shutdown Period	Allows the shut down period to be set in minutes and seconds.

Figure 6-5: Control Mode Page, continued

Item #	Section																																	
6 800 MHz Sub-Band1 Uplink Start Frequency 806 MHz End Frequency 809 MHz Downlink Start Frequency 851 MHz End Frequency 854 MHz Sub-Band2 Uplink Start Frequency 806 MHz End Frequency 816 MHz Downlink Start Frequency 851 MHz End Frequency 861 MHz 700 MHz Band 758-775 MHz Band ON 800 MHz Band 851-861 MHz Band ON UpLink 700 & 800 MHz Gain[dB] 80 Atten[dB] 0 AGC Atten[dB] 0 AGC On AGC Level[dBm] 20 HPA On <tr><td colspan="2">800 MHz</td></tr> <tr><td colspan="2">Sub-band 1</td></tr> <tr><td colspan="2">Uplink</td></tr> <tr><td>Start Frequency</td><td>Displays the sub-band 1 uplink start frequency</td></tr> <tr><td>End Frequency</td><td>Displays the sub-band 1 uplink end frequency</td></tr> <tr><td colspan="2">Downlink</td></tr> <tr><td>Start Frequency</td><td>Displays the sub-band 1 downlink start frequency</td></tr> <tr><td>End Frequency</td><td>Displays the sub-band 1 downlink end frequency</td></tr> <tr><td colspan="2">Sub-band 2</td></tr> <tr><td colspan="2">Uplink</td></tr> <tr><td>Start Frequency</td><td>Displays the sub-band 2 uplink start frequency</td></tr> <tr><td>End Frequency</td><td>Displays the sub-band 2 uplink end frequency</td></tr> <tr><td colspan="2">Downlink</td></tr> <tr><td>Start Frequency</td><td>Displays the sub-band 2 downlink start frequency</td></tr> <tr><td>End Frequency</td><td>Displays the sub-band 2 downlink end frequency</td></tr> <tr><td>700 MHz Band Drop-Down List</td><td>Allows selection to turn the 758-775 MHz band on or off</td></tr> <tr><td>800 MHz Band Drop-Down List</td><td>Allows selection to turn on Sub-band 1, Sub-band 2 or Band Off.</td></tr>	800 MHz		Sub-band 1		Uplink		Start Frequency	Displays the sub-band 1 uplink start frequency	End Frequency	Displays the sub-band 1 uplink end frequency	Downlink		Start Frequency	Displays the sub-band 1 downlink start frequency	End Frequency	Displays the sub-band 1 downlink end frequency	Sub-band 2		Uplink		Start Frequency	Displays the sub-band 2 uplink start frequency	End Frequency	Displays the sub-band 2 uplink end frequency	Downlink		Start Frequency	Displays the sub-band 2 downlink start frequency	End Frequency	Displays the sub-band 2 downlink end frequency	700 MHz Band Drop-Down List	Allows selection to turn the 758-775 MHz band on or off	800 MHz Band Drop-Down List	Allows selection to turn on Sub-band 1, Sub-band 2 or Band Off.
	800 MHz																																	
	Sub-band 1																																	
	Uplink																																	
	Start Frequency	Displays the sub-band 1 uplink start frequency																																
	End Frequency	Displays the sub-band 1 uplink end frequency																																
	Downlink																																	
	Start Frequency	Displays the sub-band 1 downlink start frequency																																
	End Frequency	Displays the sub-band 1 downlink end frequency																																
	Sub-band 2																																	
	Uplink																																	
	Start Frequency	Displays the sub-band 2 uplink start frequency																																
	End Frequency	Displays the sub-band 2 uplink end frequency																																
	Downlink																																	
	Start Frequency	Displays the sub-band 2 downlink start frequency																																
	End Frequency	Displays the sub-band 2 downlink end frequency																																
	700 MHz Band Drop-Down List	Allows selection to turn the 758-775 MHz band on or off																																
800 MHz Band Drop-Down List	Allows selection to turn on Sub-band 1, Sub-band 2 or Band Off.																																	

Figure 6-5: Control Mode Page, continued

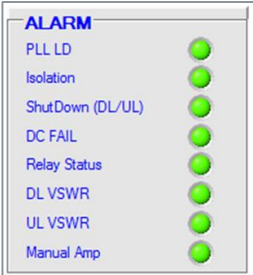
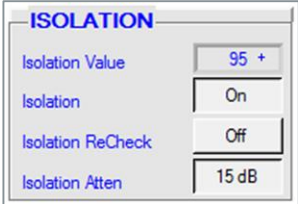
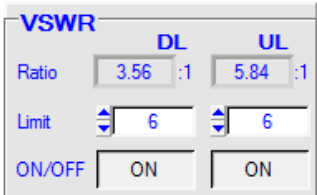
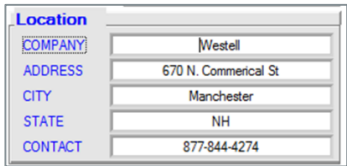
Item #	Section	
6, continued	Uplink 700 & 800 MHz	
	Gain (dB)	Displays the status of the uplink gain
	Atten	Displays the attenuation
	AGC Atten	AGC (automatic gain control), reduces gain to prevent in-band (measured) output power from exceeding the specified maximum output level.
	AGC	Control Auto Level Control Function On/Off
	AGC Level (dBm)	Sets the unit's maximum AGC output value
	HPA	Uplink HPA On/Off
7 	Alarm	
	PLL LD	Display alarm (green = normal; red = alarm)
	Isolation	Display alarm (green = normal; red = alarm)
	Shutdown (DL/UL)	Display alarm (green = normal; red = alarm)
	DC Fail	Display alarm (green = normal; red = alarm)
	Relay Status	Display alarm (green = normal; red = alarm)
	DL VSWR	DL Path VSWR check (green: Normal, red: Alarm)
	UL VSWR	UL Path VSWR check (green : Normal, red : Alarm)
	Manual Amp	User HPA OFF Alarm (green : Normal, red : Alarm)

Figure 6-5: Control Mode Page, continued

Item #	Section	
8 	Isolation	
	Isolation Value	When power is on, an isolation check is performed and the values display.
	Isolation	Measured isolation value (air interface attenuation value) between donor antenna and service antenna. The isolation check can be performed with the RF on or off. On = Measure the Isolation and display the value in the Isolation Value field Off = Do not measure the isolation
	Isolation Recheck	The isolation check can be performed with the RF on or off.
	Isolation Attenuation	This allows control of the isolation attenuation. After isolation check, attenuation is set automatically (0 to 30).
Note: Neither the isolation check nor recheck will indicate a change in power levels if the unit's own power has been switched off.		
9 	VSWR	
	DL/UL	
	Ratio	VSWR Ratio Status Display, 0 to 30.
	Limit	VSWR Ratio Alarm Limit, Set 0 to 30.
	On/Off	VSWR Alarm Display Enable (On)/Display (Off).
10 	Location	
	Company	Company information display
	Address	Address information display
	City	City information display
	State	State information display
	Contact	Contact information display

7 Installing Software

1. Insert the included media into your computer and locate the **Setup.exe** file, Figure 7-1.
2. Double-click the file to begin software installation, Figure 7-1.



Figure 7-1: Setup.exe file

3. Navigate to the destination directory in which you want to install the file, Figure 7-2.

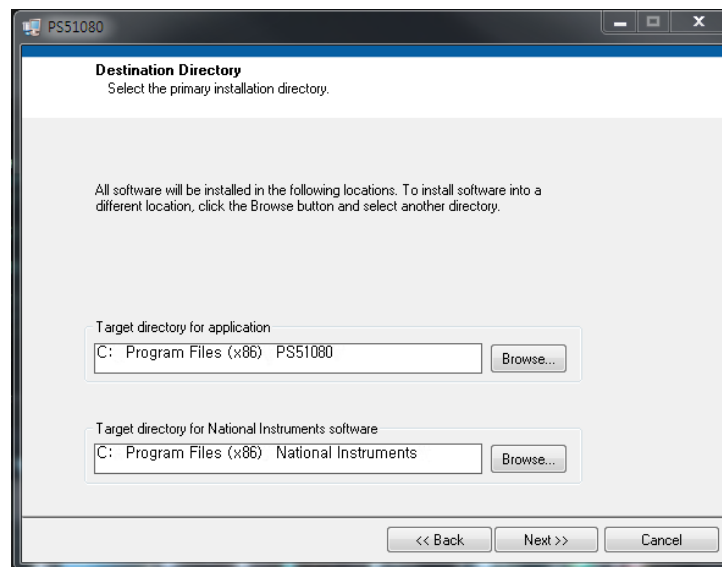


Figure 7-2: Navigate to the destination directory

4. When the window shown in Figure 7-3 displays, click **Next**. The progress window, Figure 7-4 displays.

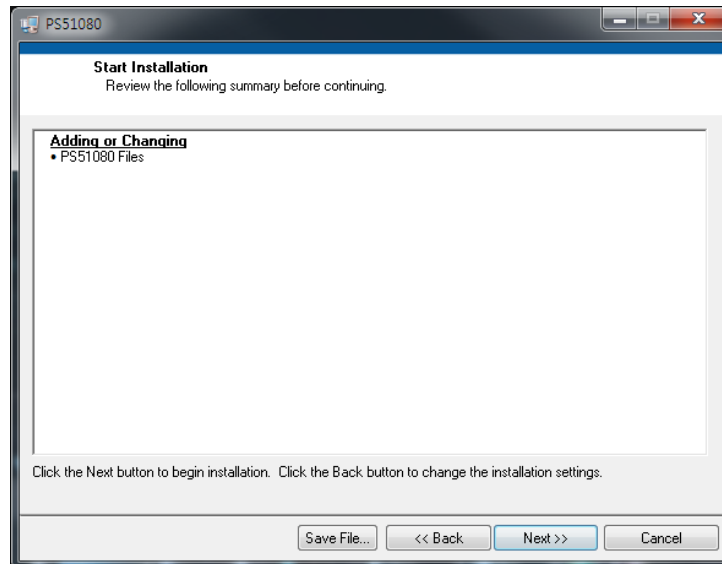


Figure 7-3: Click Next to Begin Installation

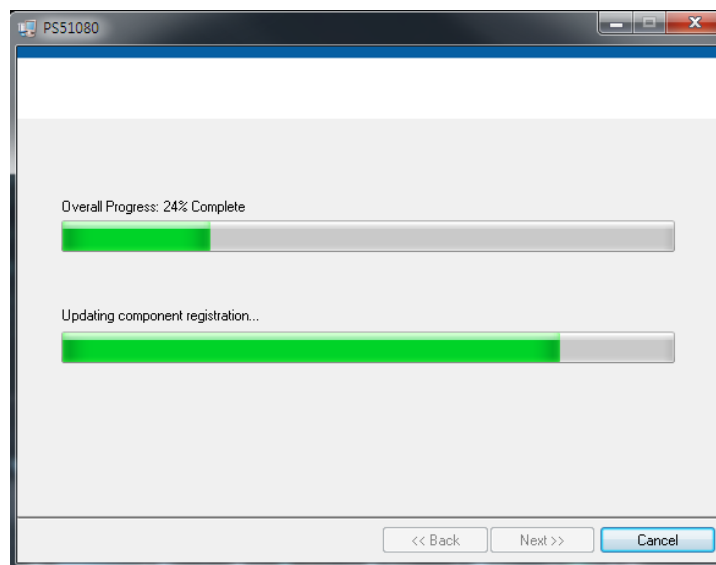


Figure 7-4: Installation Progress Window

5. When the installation is complete, click **Finish**, Figure 7-5.

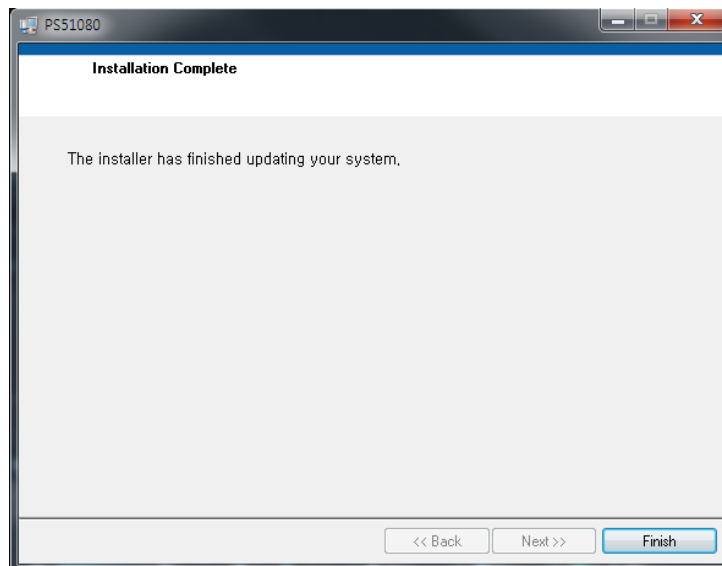


Figure 7-5: Installation Complete

7.1 Upgrading the Firmware

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

1. Click the **Control** button to display the Control page.
2. Click **Firmware DownLoad** in the IP menu located on the left side of the Control page. The Firmware Upgrade progress window, Figure 7-6, displays.

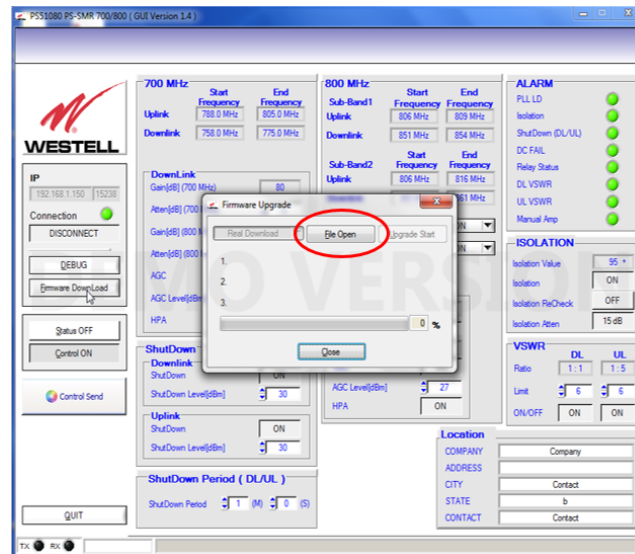


Figure 7-6: Firmware Upgrade Progress Window showing File Open tab

3. Click the **File Open** tab in the Firmware Upgrade progress window to display it, Figure 7-6.
4. When the **Select INI File to Open** browser displays, navigate to the location of the new software version BIN file, Figure 7-7.



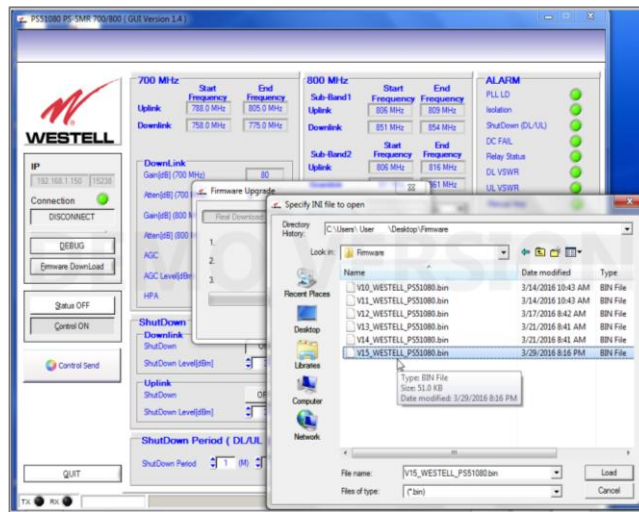


Figure 7-7: Navigate to the New Software BIN File

5. Click to select the desired version file.
6. Click in the **Specify INI File to Open** browser window, Figure 7-7. The Firmware Version Check dialog window displays, Figure 7-8.

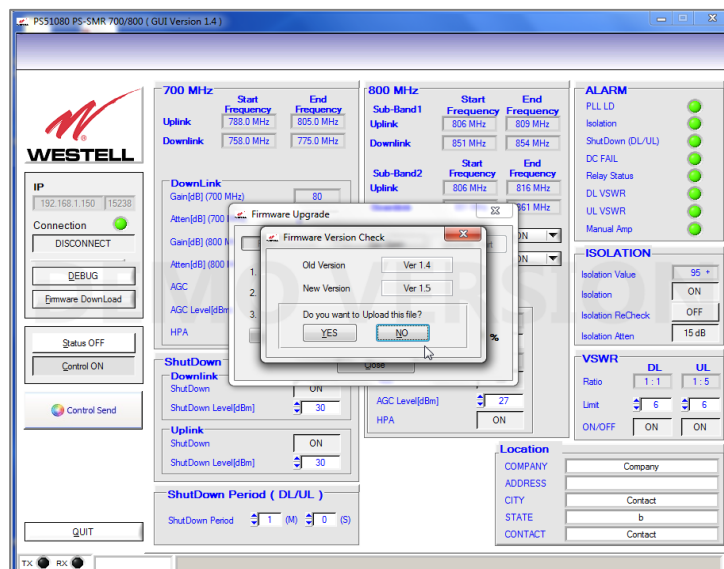


Figure 7-8: Firmware Version Check

7. Click in the Firmware Version Check dialog window, Figure 7-8. The firmware upgrade begins, as indicated by the progress bar in the Firmware Version Check window, Figure 7-9.



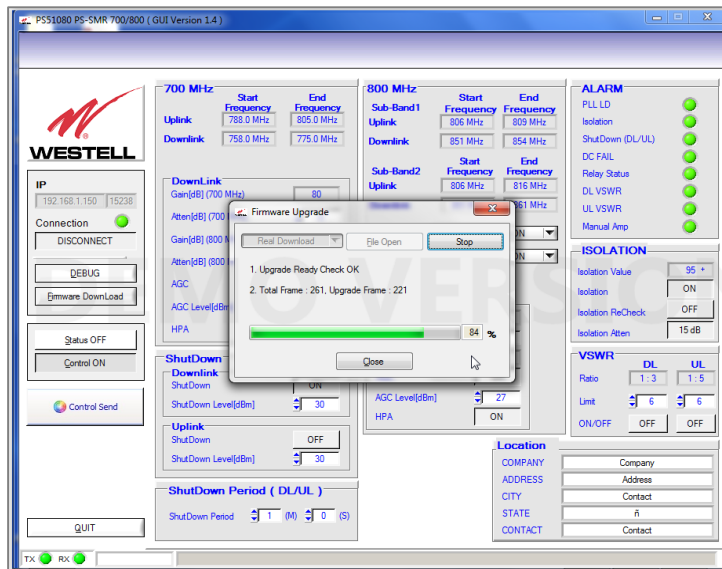


Figure 7-9: File Upload Begins

8. When **Step 3: Upgrade Complete** displays in the Firmware Version Check window, Figure 7-10, the upgrade is complete.

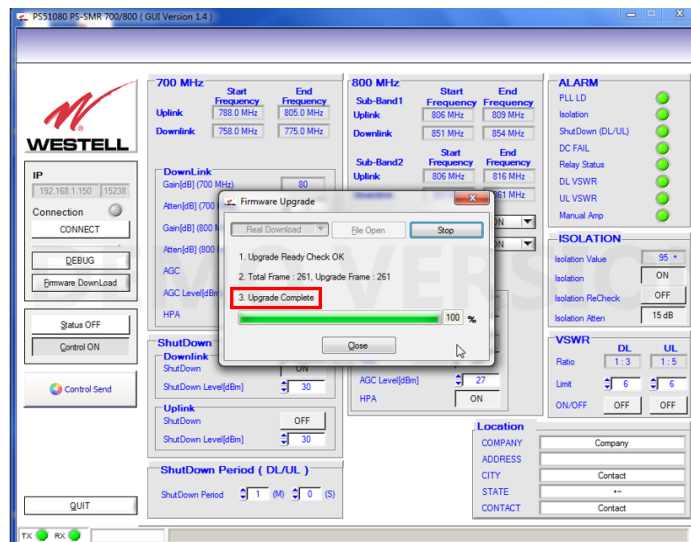


Figure 7-10: Upgrade Complete

9. Click **QUIT**, located at the bottom left corner of the screen, to close the PS51080 software application. The software version will not be updated until the application is closed and reopened.
10. Wait approximately 1 ½ minutes, then reopen the application.



11. Verify that the new version of software is indicated in the **System** section of the Control page, Figure 7-11.

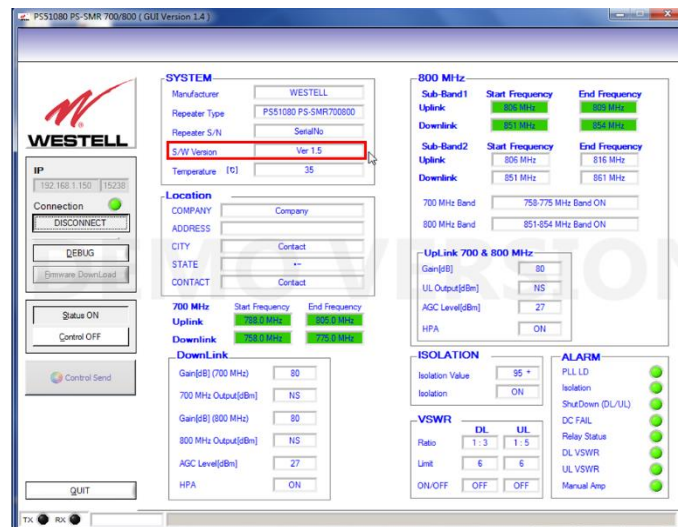


Figure 7-11: Verify New Software Version

Appendix A Important Product Information

A.1 Registration Number

FCC – NVRCSIT51080SP78

A.2 Internal Power Supply

The internal power supply for this device carries a UL complaint rating.



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

