ExtendAir® G2™ Series

Digital Microwave Radios

Quick Start Guide

Models:

rc06020 FCC
rc07020 ITU/ETSI
rc08020 ITU/ETSI
rc11020 FCC & ITU/ETSI
rc13020 ITU/ETSI
rc15020 FCC & ITU/ETSI
rc18020 FCC & ITU/ETSI
rc23020 FCC & ITU/ETSI
rc38020 FCC & ITU/ETSI

Part Number: 208880-001
2013-10-31

The information in this document is subject to change without notice. Exalt is not liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this document or equipment supplied with this document. Exalt makes no warranty of any kind with regard to this document.

Changes or modifications not expressly approved in writing by Exalt may void the user's authority to operate this equipment.

The system has been tested and found to comply with the limits of a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- Shielded cables and I/O cords must be used for this equipment to comply with the relevant FCC regulations.

Changes or modifications not expressly approved in writing by Exalt may void the user's authority to operate this equipment.

This Class B Digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numerique de la classe B respecte les exigensces du Reglement sur le material broilleur du Canada.

- this device may not cause interference, and
- this device must accept any interference, including interference that may cause undesired operation of the device.

Antennae associated with these devices must be mounted in a restricted area, at a designated minimum distance away from humans who may be subject to long-term or continuous exposure. Refer to the *Installation & Management Guide* for details.

THIS PRODUCT MUST BE PROFESSIONALLY INSTALLED

Contact Exalt or refer to the Installation & Management Guide (I&M) for a list of supported antennas and regional transmitter power requirements.

Introduction

Note: Read this entire document before attempting to install Exalt digital microwave radios.

You are strongly encouraged to obtain a copy of the I&M guide for the associated radio. The I&M guide is embedded in the radio's graphical user interface (GUI) and can be saved locally, as described in this document. Exalt guides are available at:

http://login.exaltcom.com:
(Create an account for access to documentation.)

This quick start guide (QSG) is intended to provide only a brief overview of the ExtendAir G2 radios. The reader must have experience with networking and RF. Refer to the I&M for full descriptions, **regulatory requirements**, **safety requirements** and troubleshooting information.

Preparation

Complete a path analysis and link design prior to installation. Gather the following information in the design phase:

- Length(s) and type(s) of transmission system cabling and connectors (if any)
- Make and model of antennas
- Antenna structure requirements, antenna and radio mounting locations
- Cable routes and egress location
- Grounding plan, surge protection, grounding mechanics, power and wiring
- Critical radio settings: RF center frequency, transmitter output power, occupied channel bandwidth, and mode (modulation) selection
- Anticipated RSL

Perform the following tasks before installing the radio terminals:

- Build antenna/radio structures and egress mechanics
- Mount antennas and transmission line (if any), lightning arrestor(s) and grounding
- Prepare and test interface and power cables

Shipping Contents

Review the labeling and contents of all boxes and the physical condition of the shipping container and contents. Ensure that items are not damaged, and that part numbers and serial numbers match the original equipment order and shipping information. Each radio terminal box should contain the following:

- Radio terminal
- Quick start guide (this document)

- Product registration card
- Reset plug (BNC)
- Labels and wrench kit for diplexer exchange

Generally, a link installation requires items that are sold separately:

- AC or DC Power-over-Ethernet (PoE) Injector (802.3at compliant)
- PoE and surge protectors
- Direct-mount antenna or standard antenna with flexible waveguide and remote mount kit
- Outdoor-rated CAT5e or CAT6 cable. For Ethernet connections, a maximum length of 100m applies to total length of cable between the radio terminal and the first network-aware connection, such as a switch or router. For the PoE connection, it should be straight wired Ethernet between the PoE injector and the radio.

Getting Started

It is strongly advised to configure the radio system prior to physical installation. This step minimizes total installation time and aids troubleshooting that may be required during commissioning.

CAUTION: The RF connection must be properly terminated into a 50-ohm load (termination or attenuator) at all times. If this is not performed, the radio may be damaged by simply applying power. Also, there are human safety factors to consider regarding potentially harmful RF radiation. Alternatively, cable the port to the antenna system or back-to-back with the other terminal with at least 40dB of total attenuation between the terminals.

The radio requires a DC power source with proper output voltage and current-handling capacity, in accordance with the radio specifications. The DC power is delivered by a Power-over-Ethernet (PoE) injector that is connected with a straight-wired CAT5e or CAT6 cable. This is accomplished through the use of an 802.3at compliant PoE injector (sold separately). Both AC and DC power solutions are available.

It is strongly recommended that the AC mains supply or DC supply be fused or on a separate breaker to ensure against over-voltage and/or over-current and provide protection to the radio electronics and other devices connected to the same supply. Because mains power supplies are subject to significant spikes or variation, power conditioning is recommended. An Uninterruptible Power Source (UPS) or other form of battery-backed system protects against brownout and black-out conditions, and helps to condition the power presented to the adapter.

To apply power:

1. Connect the straight-wired outdoor rated CAT5e or CAT6 cable to the ETH1/PoE connection on the radio side, and then to the DATA+POWER connection of the power injector.

2. Connect the network Ethernet connection to the DATA connection of the power injector.
3. Mount and ground the PoE injector, as necessary.
4. Apply appropriate DC power (with proper current rating) to the AC or DC input connector of the power injector, in accordance with the specifications of the PoE injector.

Configuration Overview

It is strongly advised to configure the radio system prior to physical installation. This step minimizes total installation time and aids troubleshooting that may be required during commissioning.

For proper communication, each terminal needs to be the same frequency band and support the same TR spacing, as labeled on the radio. In addition, the channel plan must match (for example, B1 talks to B1, B2 talks to B2). Finally the Tx/Rx orientation must be opposite – one radio should be HI and the ther radio LOW. Other configurations may also be necessary before completing installation. Use the Exalt browser-based GUI for configuration. Tx/Rx orientation and channel plan can be reconfigured in the field. Refer to “Diplexer (Channel Plan) Configuration” in the I&M. See below instructions for accessing the I&M.

Connect a CAT5e or CAT6 cable to the DATA connector on the power injector using either a straight or crossover cable meant for Ethernet connections. Connect the opposite end of this cable to the management computer’s Ethernet port. Use a browser to launch the Exalt GUI on the radio. The computer accessing the Exalt GUI must match the IP subnet of the radio. For new radios, the IP addresses are 10.0.0.1 (Lo Tx) and 10.0.0.2 (Hi Tx). Use the following procedure:

1. Change the IP address of the accessing computer to match the radio’s subnet.
2. Select the Ethernet network adapter, and then select TCP/IP properties.
3. Select the static IP address option and change the IP address to 10.0.0.x (where, x does not equal 1, 2, or any other address planned for either radio).

Alternatively, these radios support limited DHCP addressing (if enabled). For this feature, the computer’s Ethernet interface must be set to DHCP (listed as ‘Obtain an IP address automatically’ on the Ethernet adapter TCP/IP properties) and the radio and computer are connected during radio boot up. The radio maintains its IP address (10.0.0.1 or 10.0.0.2 default from factory) and temporarily assigns the computer to an address two digits higher (for example, 10.0.0.3 or 10.0.0.4).

Using the GUI

A browser is required to access the GUI. Microsoft Internet Explorer 5.0 or greater is recommended. Netscape, Mozilla, Firefox, Chrome, and Safari are also supported. Use of Internet Explorer 10.0 or higher may require using

Compatibility Mode or changing the administrative setting to version 9. Use the following procedure to access the Exalt GUI:

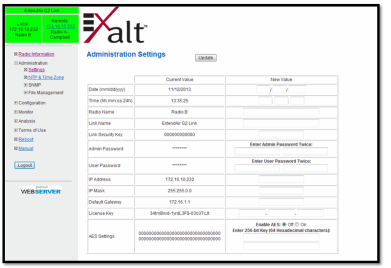
1. Open a browser window and type the IP address of the radio (such as 10.0.0.1 or 10.0.0.2) in the address field, and press **ENTER**.
   A password dialog displays.

2. Type **admin** into the User name field.
3. Type **password** into the Password field.
4. Click **Login**.

The GUI displays the Radio Information page. Use the navigation panel along the left side of the GUI to access the configuration and management tools.

To establish a working link:

1. On the **Administration Settings** page, enter any License Key purchased. The License Key is uniquely tied to the unit's serial number.
   Press the **UPDATE** button to accept the entry.



2. Change the radio's IP address, as desired, on the **Administration Settings** page and click **UPDATE**.

Note: If the IP address is changed, open a new browser window and navigate to the new IP address. When changing the subnet, your computer's IP address must be in the same subnet.

Note: Check the Firmware Revision (on the Radio Information page) to assure that it matches for both terminals in the link. If this doesn't match, follow the instructions in the I&M to upgrade the terminal(s).

At this stage, all other configurations can remain at the factory default settings, and the link operates for back-to-back bench testing. However, for most installations, the following parameters must match the link design (at both ends of the radio link):

Administration Settings:

- Link Security Key
- AES (option) enable/disable and key

Configuration>System:	• Radio Transmit Power • Bandwidth • Mode (Modulation) • RF Frequency Pair (opposite Tx/Rx)
Configuration>Interface>Ethernet:	• All settings

This product must be professionally installed. The Radio Transmit Power must be configured, prior to connection to the antenna system, and be in accordance to all applicable government regulations. The professional installer is responsible to ensure that the implementation is within legal limits.

Configure all parameters on both radio terminals to match the requirements of the system design, and verify that the radio link communicates properly during the back-to-back bench test. It can be extremely challenging, time consuming, and costly to troubleshoot a system that is not properly preconfigured and tested.

Extracting the I&M Guide

1. Click the **Manual** navigation link.
   The browser displays the PDF file.
2. Click the **Save** button in the PDF toolbar to save the manual locally.

Resetting to Critical Factory Defaults

If necessary, the radio terminal may be reset to critical factory settings. This may be necessary if the IP address and/or passwords for the system are not known. All other configurations remain at their current settings.

Use the reset function if the IP address and/or passwords are lost. Use the following steps to perform a reset:

1. Remove power from the radio by disconnecting the power source from the power injector.
2. Remove the RSL/BNC port cover on the radio..
3. Install the RSL/BNC reset tool included with the radio or, using a BNC voltmeter cable, short the ground to the center pin using a jumper.
4. Apply power.
5. Wait until the internal beeper sounds (approximately 1 minute).

   Ping 10.0.0.1 (default IP address) to verify the reset.
6. Remove the RSL/BNC reset mechanism.
7. Replace the RSL/BNC port cover.

The following parameters are reset:

IP Address = 10.0.0.1	Administration password = password
IP Mask = 255.0.0.0	User password = password
IP Gateway = 0.0.0.0	VLAN disabled

All other parameters remain unchanged.

Mounting Kit

The radio is typically mounted directly to the antenna or pole. Only use antennas specified for your model.

Direct-mount installation

1. Inspect the antenna and radio. Ensure that only one device has mylar tape protecting the waveguide port. Mylar tape is not required for proper operation. Remove mylar tape from the antenna, if present on both the radio and antenna.

Direct-mount, horizontal polarization orientation

2. Mount the antenna with the proper polarization alignment, following the manufacturer's instructions.
3. Apply silicon grease to the O-ring of the antenna feed.
4. Align the radio chassis to the antenna feed. Ensure that the waveguide flange orientation matches.
5. Gently slide the radio onto the antenna feed, and secure the mounting clips to the antenna.
6. First align all four clips in their receptacles, then completely secure opposite corner clips, and finally secure the last two clips.

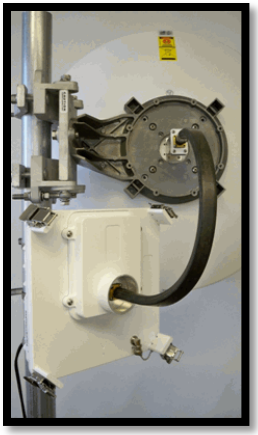
Remote-mount installation

The remote mounting bracket (sold separately) is designed to support pole-mounting on 2–5" (5–13cm) diameter poles for use with antennas that have standard waveguide flange interfaces.

Use the following steps for remote-mount installations:

1. Mount the antenna with the required polarization orientation.
2. Mount the antenna with the required polarization orientation
3. Mount the radio as closely as possible to the antenna, using the remote-mount bracket.
4. Connect and secure the two ends of a flexible waveguide to the antenna feed and to the radio using four (4) threaded screws per end.

Note: Do not over-bend or twist the flexible waveguide.



General remote-mount configuration (Non-ExtendAir G2 radio)

Note: Ensure that all flange types match. Every waveguide transition must use the proper gasket material for weather sealing.

Note: If the waveguide size of the radio does not match that of the antenna, a tapered transition will be needed. Generally, it is advised to mount the tapered transition to the antenna, but it can be mounted to the radio, if necessary.

Cabling

To connect the port connector:

1. Place connector parts on the cable as shown in the following photos.

All connector parts can be placed on a terminated cable– the screw cap and beveled washer allow a RJ-45 connector to pass through, and the rubber seal has a split slot that allows it go over the cable insulation.

2. Insert the RJ-45 connector in the port until it clicks.

Note: Do not use an RJ-45 connector with a boot protected tab.

3. Press the rubber seal into the port receptacle.

4. Align the beveled washer on top of the rubber seal, and snugly hand-tighten the rear section of the connector.
5. Inspect the rubber seal to ensure that there is no deformation and it appears tight.
6. Hand-tighten the screw cap firmly.

Note: The total length of the Ethernet cable, including the cable from the power injector to the connected network equipment must not exceed 100 meters.

The outside radius of cables that connect directly to the radio must be between 0.25 and 0.31 inches to ensure a watertight connection. Use the included connectors. Maintain waterproof spacers on unused connectors. Use UV-rated (outdoor) CAT5e or CAT6 cable, for all connections.

Lightning arrestors are recommended near the radio for surge protection on all cabled interfaces. Use additional lightning arrestors for all cable egress points where cables enter shelters or buildings. These prevent surges from entering connected equipment and/or harming humans or equipment collocated in the shelter or building. For the PoE connection, the following devices are approved:

- PolyPhaser IXG-05 with optional IX-POLE-KIT pole mount
- Transtector ALPU Model 1101-959 with optional 1000-1164 pole mount
- Transtector ALPU-1000BT-R with optional 1000-1164 pole mount
- Citel C2MJ8-POE-A/SE
- Transtector 1101/1030
- Transtector 1101-1080
- For the PoE connection, any 802.3at rated surge suppression supporting 1000BaseT (GbE) can be used

Antenna Alignment

The received signal level (RSL) test point is a BNC connector on the chassis. DC voltage at the RSL port is related to the RSL level in dBm. For example, a value of 0.6VDC is roughly equivalent to an RSL of -60dBm and a value of 0.75VDC is roughly equivalent to an RSL of -75dBm. In this manner, voltage is inversely proportional.

Align antennas to the minimum possible voltage (0.6VDC is less than 0.7VDC, but represents a higher RSL level of -60dBm compared to -70dBm). RSL should be roughly equal to the value planned in the link design (within 1 to 2 dB). Account for all transmission system gains and losses to confirm the designed value.

After the designed RSL is achieved, mechanically secure the antenna for both azimuth and elevation alignment. Carefully monitor the RSL voltage while tightening the mechanics and ensure that the antenna remains in alignment.

Use the integrated alignment buzzer as an alternate or in addition to the RSL test point. On the GUI, set the Buzzer Timeout parameter on the Configuration>System page to 10 or 120 for the buzzer to be active for 10 or 120 minutes. Select OFF to disable the buzzer.

Buzzer pitch relates to RSL: a higher pitch represents better RSL. A continuous tone indicates a successful link to the far end. A chirping (beeping) buzzer indicates that the radio is not locked to the far end. Note also that RSL in dBm displays on the Monitor>Performance GUI page.

Initially mount one antenna by bearing and sight, and attempt initial alignment from the opposite side. Align the antenna until maximum RSL is achieved, secure the antenna, then align the original side antenna until maximum RSL is achieved. Two or three rounds of alignment at each end are typically required to achieve the designed RSL.

Start alignment with a slow steady sweep in azimuth, and then perform an elevation sweep to help identify the antenna center beam while watching for the highest best RSL in both planes. RSL reporting is delayed by approximately 1 second. For fine alignment, make small adjustments, wait, take a measurement, and continue with small adjustments.

Telecommunications Connections

Ensure that power and grounding are properly wired and installed before making additional connections. The included grounding hardware allows connection of a grounding lug to the M5 receptacle near the lower-left corner of the radio. Place the wave washer next to the head of the screw. Place flat washers on both sides of the grounding lug. Another grounding connection is available on the power injector.

After establishing the radio link, connect the Ethernet services matching the configurations made in the GUI. Use a ping test to verify connectivity across Ethernet.

Indicators

On the ETH1/PoE connector, both LEDs blink during power up. After the power cycle completes, the LED in the right corner relative to the tab oriented downward, is solid when Ethernet Link is present and is off otherwise. The LED in the left corner flashes when Ethernet traffic is present. On the ETH2 connector, both LEDs blink during power up. After the power cycle completes, the ETH2 connector LED in the left corner is solid when an Ethernet link is present, and the LED in the right corner blinks when Ethernet traffic is present.

Register the Product

Products registered within 90 days of purchase receive 2 full years of warranty coverage for no extra charge. Unregistered products and products registered after the 90-day period, only receive a 1-year warranty. Register the product according to the instructions on the provided registration card. See the I&M Guide for the full warranty statement.

For More Information

Refer to the I&M guide for the radio, which can also be downloaded from the Internet at:

http://login.exaltcom.com

New users must register before logging into the support section of the Exalt website.

For post-sales support, contact Exalt Customer Care at:

Phone: (408) 688-0202
Toll-Free (USA): (877) EXALT-01 (392-5801)
Support email: **support@exaltcom.com**

Live support is provided from 7am to 4pm Pacific, Monday through Friday except designated holidays.

Sales email: **sales@exaltcom.com**

Exalt Communications, Inc.
254 E. Hacienda Ave.
Campbell, CA 95008 USA
(408) 688-0200