

## Indicators

Use the following primary indicators to determine link status and radio alarm status. Refer to the I&M manual for details on other indicators and troubleshooting information.

LINK	3-color LED	<b>Indicates RF link status:</b> Green Solid = Error-free connection (BER<10e-6) Yellow Solid = Errored connection (10e-3>BER >10e-6) Red Solid = No link (BER>10e-3) Red Flashing = No remote information available (when RMT button is pressed and held) Off = Improperly powered or fatal system failure
STATUS	3-color LED	<b>Indicates system status:</b> Green Solid = No alarm conditions (normal operation) Yellow Solid = Alarm conditions, not traffic effecting Red Solid = Alarm conditions, traffic effecting Red Flashing = No remote information available (when RMT button is pressed and held) Off = Improperly powered or fatal system failure
RADIO A	3-color LED	<b>Indicates radio orientation:</b> Green Solid = Radio is configured as Radio A (source), based on software setting (desired) Green Flashing = Radio is configured as Radio A (source), based on temporary hardware configuration key or DIP switch Off = Radio is configured as Radio B

## Register the Product

Register the product to obtain full benefits of the warranty. 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 manual for the full warranty statement.

## For More Information

Refer to the I&M manual, which can be downloaded from the radio or from the Internet at:

<http://www.exaltcom.com/support/downloads.htm>

user ID: **go\_exalt**; password: **wexmaltux**

If you require support, contact Exalt Customer Care:

Phone: (408) 871-9890

Toll-Free (USA): (877) EXALT-01 (392-5801)

Support email: [support@exaltcom.com](mailto:support@exaltcom.com)

Sales email: [sales@exaltcom.com](mailto:sales@exaltcom.com)

# i-Series Digital Microwave Radios

## Quick Start Guide



**Models:**  
**EX-2.4i**  
**EX-2.4i-16**  
**EX-4.9i**  
**EX-5i**  
**EX-5i-16**  
**EX-5i-DS3**

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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 numérique de la classe B respecte les exigences du Règlement sur le matériel brouilleur du Canada.

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

Antennas 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 manual for details.

**THIS PRODUCT MUST BE PROFESSIONALLY INSTALLED**

Contact Exalt or refer to the Installation & Management manual for a list of supported antennas and regional transmitter power requirements.

**Note:** This reset procedure does not change system configurations and only resets the parameters necessary to assure that login can be successful.

### Mounting Radios

Use the provided rack mount brackets. These brackets can be oriented for front flush mount, front projection mount, rear flush mount, or rear projection mount, as shown below. The rack mount brackets and screws to mount the brackets to the radio are included in the accessory kit. Screws to mount the radio to the existing equipment rack are not included.



### Aligning Antennas

Use the received signal level (RSL) test points on the front panel to assist with antenna alignment. Connect a volt meter directly to the RSL and GND test points during antenna alignment. The DC voltage at the RSL port is related to the RSL level in dBm (for example, a 0.6VDC value is roughly equivalent to an RSL of -60dBm; a 0.75VDC value is roughly equivalent to an RSL of -75dBm). In this manner, voltage is inversely proportional. Align antennas to the highest RSL level, which is the **minimum** voltage possible (0.6VDC is less than 0.7VDC, but represents a higher RSL level of -60dBm compared to -70dBm). The RSL should be roughly equal to the value planned in the link design (within 1–2 dB). Account for all transmission system gains and losses to confirm the designed value.

**Note:** A reading of 0.95 to 1.0VDC indicates no connection between the two radio terminals.

The Monitor>Performance page of the GUI also displays the Current RSL in dBm. If no voltmeter is available, this may be used to aid in antenna alignment. Due to browser refresh timing, there will be a delay between changes made on the antenna alignment and displayed RSL on the GUI. Move the antenna in small increments, wait, and read RSL value, then continue. This same approach should be taken when using a voltmeter, but the RSL reading delay is not as big of a factor.

It is generally easier to align the radio link from the Radio B side first. That is, rough align by site or compass bearings on the Radio A side, secure that antenna for azimuth and elevation settings, and align from Radio B. Once Radio B is aligned to maximum RSL, realign Radio A. Continue aligning one side at a time until target RSL is reached.

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

### Connections

Before making any connections, ensure that power and grounding are properly wired and installed. The grounding hardware included in the accessory kit allows the connection of a grounding lug to the M5 receptacle near the power connector. Place the wave washer next to the head of the screw. Place the flat washers on both sides of the grounding lug.

- Connect the Ethernet and/or T1/E1 (RJ-48C) and/or DS3 services that match the configurations made using the GUI after establishing the radio link.
- Use a ping test to verify connectivity across Ethernet.
- Use T1/E1/DS3 line or test equipment to verify T1/E1/DS3 connectivity.
- Use the **MAIN** connector for primary Ethernet services.
- Depending on the setting of in-band or out-of-band for the **AUX** port, the far-end may be manageable from the near-end of the radio system, and vice versa.
- Connect and configure **ALARMS**, as required.

- Enter any feature License Key purchased. The License Key is unique and tied to the unit's serial number. Press the **UPDATE** button to accept the entry.
- Change the radio's IP address, as desired, on the **Administration Settings** page and press the **UPDATE** button.

**Note:** If the IP address is changed, open a new browser window and navigate the GUI to the new IP address.

At this time, all other configuration parameters can remain at their 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, & key
Configuration>System:	DFS enable/disable (where applicable) Radio Transmit Power Bandwidth Mode RF Frequency Link Distance TDD Frame Size TX/RX Throughput Ratio (opposite)
Configuration>Interface>(all sub groups):	All settings

#### Notes:

- Disable any T1/E1/DS3 interface that is not intended for use. Available throughput is allocated to the Ethernet interface.
- The default setting for the Radio Transmit Power is usually set to the minimum level.

**This product must be professionally installed. The Radio Transmit Power must be configured prior to connection to the antenna system in accordance to all applicable government regulations. The professional installer is responsible for ensuring 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.

**It is highly recommended to upgrade the radio to the latest firmware.** The firmware is available at the website link provided at the start of this document. Use the File Transfer function to upload the latest firmware and the File Activation function to activate the loaded firmware. Always refer to the software release notes for details. The I&M manual and/or the release notes provide a step-by-step instruction for upgrading the firmware.

#### Extracting the I&M Manual

Click the **Manual** navigation link. The browser displays I&M manual PDF file. Click the **Save** button in the PDF toolbar to save the manual on the local system.

#### Reset to Critical Factory Settings

To reset the radio to critical factory settings for IP settings and passwords:

- Remove power.
- Remove connections to the **ALARMS** port.
- Set all DIP switch positions (if any) to the down (zero) setting
- Hold the **RMT** button on the front panel while applying power.. Continue to hold the **RMT** button through the entire boot cycle (this can be up to 2 minutes, in some cases). The front-panel LEDs toggle during the boot cycle.
- Release the **RMT** button when LED behavior stabilizes for at least 10 seconds.

#### Introduction

**Note:** Read this entire document before attempting to install Exalt Digital Microwave Radios.

This quick start guide provides a brief overview of the Exalt i-Series models. It is assumed that the reader has networking and RF experience.

Refer to the I&M manual for model descriptions, **regulatory requirements**, **safety requirements**, warranty, and troubleshooting information. The I&M manual is embedded in the radio's graphical user interface (GUI) and can be saved locally (further described in this document). The I&M manual is also available at:

<http://www.exaltcom.com/support/downloads.htm>

User ID: **go\_exalt**

Password: **wexmaltux**

A browser is required to access the GUI. Microsoft Internet Explorer 5.0 or greater is recommended. Netscape, Mozilla, and Firefox are generally supported.

#### Preparation

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

- Length(s) and type(s) of transmission system cabling/connectors
- Antenna(s) make and model
- Antenna structure requirements
- Antenna mounting heights
- Cable routes and egress location
- Grounding and lightning protection plan, mechanics, power, and wiring
- Radio mounting location
- RF center frequency
- Transmitter output power
- Occupied channel bandwidth
- Mode selection
- TDD frame length
- Link distance setting
- Anticipated RSL
- Number of T1/E1/DS3 circuits enabled (if any)

Perform the following tasks before installing the radio terminals:

- Build antenna structures and egress mechanics
- Mount antennas and transmission line, 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
- AC adapter with power cord
- Accessory kit
- Quick start guide (this document)
- Product registration card

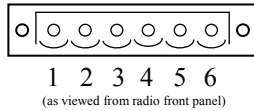
The accessory kit contains the following items:

- Rack mount flanges
- Flange mounting hardware (4 x M4 screws; 4 x M4 wave washers)
- DC power connector (1)
- Grounding hardware (1 x M5 screw; 1 x M5 wave washer; 2 x M5 flat washers)

## Getting Started

**CAUTION!** Terminate the **ANTENNA** port of the radio terminal to a 50-Ohm load before applying power. Place a 50-Ohm termination or  $\geq 20$ dB fixed attenuator onto the **ANTENNA** port. Alternatively, cable the RF port to the antenna system or back-to-back with the other terminal with at least 40dB of total attenuation between the terminals.

Only apply power after terminating the **ANTENNA** port. Use the supplied AC adapters or an external DC source within the indicated voltage range, shown on the front panel of the radio. Use the provided DC connector for direct DC connections. Follow the wiring polarity below. Test voltage and polarity on the DC connector before applying power.



Pin	Function
1	Power Return (-)
2	Ground
3	Power (+)
4	Power (+)
5	Ground
6	Power Return (-)

## Configuration Overview

For proper communication, one radio terminal must be configured as Radio A (radios are configured as Radio B at manufacture). In addition, **for some models, a proper Regulatory Domain Key (RDK) is required before any system configurations are allowed.** Obtain the RDK from your Exalt distributor or reseller, or follow the RDK instructions provided on and in the radio's shipping box. In many cases, the RDK may be found at:

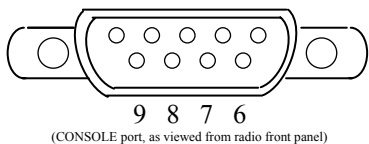
[www.exaltcom.com/activate.htm](http://www.exaltcom.com/activate.htm)

Other configurations may also be necessary before completing installation. Use the browser-based GUI for configuration.

Connect an Ethernet port to the **AUX** connector on the radio using either a straight or crossover cable.

The computer accessing the Exalt GUI must match the IP subnet of the radio (default IP address is **10.0.0.1**). Either change the IP address of the radio(s) to match the computer's subnet or change the computer's IP address to match the radio's subnet. All radios are configured with the same IP address at manufacture. To avoid an IP address conflict, use the following procedures to change the IP address of at least one radio:

- To change the IP address of the computer to match the radio's subnet:
  - Select the Ethernet network adapter, and select TCP/IP properties.
  - Select *for a static IP address*, and change the IP address to 10.0.0.x (where, x does not equal 1 or match any other address planned for either radio).
- To change the IP address of the radio to match the accessing computer, use a 'straight-through' serial cable and the following instructions to connect the computer to the **CONSOLE** port:



Pin	Function
1	Unused
2	Tx (from radio)
3	Rx (into radio)
4	Unused
5	Ground
6	Unused
7	Unused
8	Unused
9	Unused

- Set the serial interface using Hyperterminal (or similar application) as follows:

Bits per second:	9600	Stop bits:	1
Data bits:	8	Flow Control:	None
Parity:	None		

- Connect using a terminal emulation program.

The CLI is now available.

- Press **ENTER** to view the login screen.
- Type *admin* and then press **ENTER**.
- Type *password* in the password field and then press **ENTER**.

After successful login, the CLI menu displays.

- Select **2** to access the Configuration menu.
- Select **3** to access the Set IP address and mask screen.
- Follow the on-screen instructions to enter the desired IP address and IP mask.
- (Optional) Set the IP default gateway (and some other administration settings) in the Configuration menu of the CLI.

Once the subnet of the IP address of the radio matches that of the accessing computer, the GUI is available. Use the Exit command from the root menu to exit the CLI.

## Using the GUI

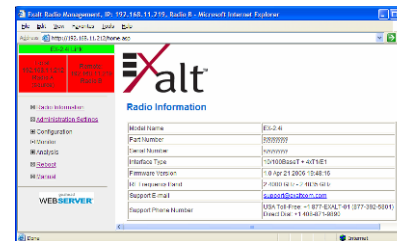
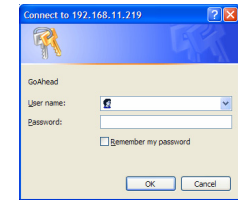
Use the following procedure to access the Exalt GUI.

- Open a browser window, type the IP address of the radio (such as, 10.0.0.1) in the address field, and press the **ENTER** key.

The password dialog box displays.

- Type *admin* in the User name field.
- Type *password* in the Password field.
- Click **OK**.

The Radio Information page displays.



Use the navigation links in the left panel to access the configuration and management tool pages.

To establish a working link:

- For models with the Regulatory Domain Key (RDK) feature, enter the RDK on the **Administration>Settings** GUI page. Each RDK is unique and is tied to the unit's serial number.
- Press the **UPDATE** button on this page to accept the RDK.

**Note:** For models with the RDK feature, system configuration is **impossible** without proper RDK installation.

- On the Configuration>System page, change the **Endpoint Identifier** (Radio A or Radio B) of one terminal to Radio A. Press the **UPDATE** button.

**Note:** Changing the Endpoint Identifier displays a confirmation page and reboots the unit.