

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	Indicates RF link status: 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	Indicates system status: 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
ODU	3-color LED	Indicates ODU status: Green Solid = Proper IDU-to-ODU communications established and ODU not in alarm. Red Solid = ODU is not communicating to the IDU due to lack of appropriate cable and/or faulty ODU Off = Improperly powered or fatal system failure

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> (account creation is required)

If you require support, contact Exalt Customer Care:

Phone: (408) 871-9890

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

(standard phone support hours are 7am to 4pm Pacific, Monday through Friday)

Support email: support@exaltcom.com

Sales email: sales@exaltcom.com

EX-s Series Digital Microwave Radios

Quick Start Guide



- Models:**
- 100F IDUs (100BaseT, FCC)
 - 1000F IDUs (GigE, FCC)
 - 1000E IDUs (GigE, ITU/ETSI)

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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 REQUIRES A LICENSE FROM THE LOCAL OR FEDERAL AUTHORITY AND MUST BE PROFESSIONALLY INSTALLED

Contact Exalt or refer to the Installation & Management manual for a list of supported antennas.

Aligning Antennas

Using a volt meter, connect to the BNC received signal level (RSL) connector on the ODU to assist with antenna alignment.

The ODU provides a DC Voltage which is proportional to RSL. The higher the voltage, the stronger the RSL. For the 'circular' shaped ODUs, this voltage ranges from 0 to 5V and can be converted using the following formula:

$$\text{RSL (dBm)} = 15.77V - 91.88$$

Note: The RSL target voltage is provided in the ExaltCalc link planning tool.

For the 'elliptical' shaped and 'rectangular' ODUs, use the following formula:

$$\text{RSL (dBm)} = 15.97V - 91.88$$

Alternatively, the RSL test point from the IDU may be used. For the ODU, connect a voltmeter directly to the RSL test point (with a return to Ground or the GND test point, if provided) during antenna alignment. The DC voltage at the IDU RSL port is calibrated 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 **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 transmission system gains and losses (if any) to confirm the designed value.

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.

Mounting the IDU

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.



Connections

Connect the coaxial IDU/ODU cable while power is NOT applied to the IDU.

Before making any power or data 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 TDM services that match the configurations made using the GUI after establishing the radio link.
- Use a ping test to verify connectivity across Ethernet.
- Use TDM line or test equipment to verify TDM connectivity.
- For models with MAIN and AUX connectors, 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.
- For models with ETH1/ETH2 and/or SFP ports, each connector can be configured for Traffic, Management or Traffic+Management from the Configuration>Interfaces>Ethernet screen.
- Connect and configure **ALARMS**, as required.

At this time, all other configuration parameters can remain at their factory-default settings, and the link operates for short-distance field 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
Configuration>System:	Radio Transmit Power Bandwidth Mode/Modulation RF Frequency (pair, opposite at each end)
Configuration>Interface>Ethernet:	All settings
Configuration>Interface>T1/E1:	All settings

Notes:

- Disable any TDM (T1, E1, DS3, etc.) 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 short-distance field 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 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 factory settings:

1. Remove power.
2. Hold the **RMT** or **RESET** button on the front panel while applying power – if there is no **RMT** button, the **RESET** button is unmarked and recessed near the power connector: Continue to hold the **RMT** or **RESET** button through the entire boot cycle (can be as long as 2 minutes). The front-panel LEDs toggle during the boot cycle.
3. Release the **RMT** or **RESET** button when LED behavior stabilizes.

Note: Some previous configuration information is overwritten with default settings, including the IP address setting (**10.0.0.1**) and the password (to *password*).

Mounting the ODU

The ODU is intended to mount directly to the antenna, using the integrated snap-on clips. Exalt specifies the proper antennas from several vendors. When using this type of antenna, be careful to align the ODU waveguide slot to match the waveguide slot of the antenna. Then, orient the antenna (with ODU attached) to determine vertical or horizontal polarization. Mount the antenna using the antenna mounting hardware that came with the antenna, following the manufacturer's instructions.

If an antenna is used that does not have the proper mechanical interface, a remote mount (sold separately) can be used to mount the ODU to the pole, near the antenna. Use separate waveguide to connect the remote mount's waveguide flange to the waveguide flange of the antenna.

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 EX-s 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/>. User account registration is required.

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:

- Antenna(s) make and model
- Antenna structure requirements
- Antenna mounting heights
- Outdoor Unit (ODU) mounting requirements and waveguide (if any)
- Coaxial cable type/length for connecting ODU to Indoor Unit (IDU)
- Cable routes and egress location
- Grounding plan, lightning protection, mechanics, power, and wiring
- IDU mounting location
- RF center frequency (generally in accordance with license granted)
- Transmitter output power (generally in accordance with license granted)
- Occupied channel bandwidth (generally in accordance with license granted)
- Mode selection (generally in accordance with license granted)
- Anticipated RSL
- Number of TDM (T1, E1, DS3, etc.) 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 containers and contents. Ensure that items are not damaged, and that part numbers and serial numbers match the original equipment order and shipping information. A link is made up of 4 boxes. Two boxes with identical IDUs, and two boxes with ODUs, one as the LOW frequency transmitter, and the other as the HIGH frequency transmitter. Each IDU box should contain the following:

- Indoor Unit
- AC adapter with power cord (100BaseT models only)
- 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! The N-type connector labeled **TO ODU** on the IDU has DC voltage potential between the center pin and ground. Do not connect to this coaxial connection while power is applied to the IDU. Disengage power first, connect both ends of this connection, then apply power.

Use an external DC source with proper current capacity and voltage range (as indicated on the radio front and/or rear panel). Use the provided DC mating connector for direct DC connections. Test the input voltage and polarity on the DC connector before applying power:

- The 6-pin and 3-pin versions are marked as either ± 24 to 48VDC or ± 20 to 60VDC and power is wired across the PLUS and MINUS terminals in accordance with the power supply polarity. If one side of the power supply is referenced to ground, a jumper may be added from either side to the ground pin. In most cases, the ground jumper is not necessary. AC adapters with proper voltage and current rating may be used.
- The 2-pin version is -48VDC only, and shall only be connected to an isolated DC power source (one which does not reference the return to ground). Generally, AC adapters should not be used.

Configuration Overview

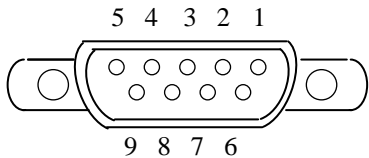
A proper link uses two different ODUs – one is TX HIGH and the other TX LOW. The IDUs are interchangeable at each end of the link or to different frequency band ODUs within the regulatory domain (such as FCC or ITU/ETSI). The IDU will self-configure to the ODU's frequency range. In most cases, Exalt s-Series radios are licensed by the local government authority – a license needs to be obtained before deployment, and the radio configuration (frequency, bandwidth, modulation, output power) must match the parameters of the license.

Connect an Ethernet port to the **AUX** or **ETH1** connector on the IDU 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



(CONSOLE or AUX port, as viewed from radio front panel)

- 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.

Note: 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 entry menu displays.

- Follow the menu to access the *Configuration* selection.
- Follow the menu to access the *Set IP Parameters* screen.
- Follow the on-screen instructions to enter the desired IP parameters.

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.

A 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 along the left side of the GUI to access the configuration and management tool pages.

To establish a working link:

- On the Administration>Settings page, 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.

- On the Configuration>System page, change the frequency pair, bandwidth, output power, and Mode (modulation) per the licensing requirements or link design. Press the **UPDATE** button.

Note: The frequency pair will be opposite at each end. One side of the link will be TX LOW and the other side TX HIGH.