Paragon4
(UHF, 700, and 800 MHz)
Data Base Station
User Manual V. 1.00

Preliminary, for FCC & IC Submission

September 2007

Part no.: 120 20195-100

History

Version 1.00: November 2007 – For FCC and IC Submission

- Initial preliminary of Paragon4 base station User Manual for UHF, 700 / 800 MHz radio modem models.

About Dataradio

For over 25 years, Dataradio has been a recognized and innovative supplier of advanced wireless data products and systems for mission-critical applications. Public safety organizations, utilities, local government, water management, and other critical infrastructure operations depend on Dataradio to ensure that vital wireless data reaches the people who need it, when they need it most. From mobile data systems and radio modems, to analog radios and telemetry devices, Dataradio products are found at the heart of private wireless networks around the world.

www.dataradio.com

Dataradio provides product brochures, case studies, software downloads, and product information on our website at http://www.dataradio.com

User Manual Statement

Every effort is taken to provide accurate, timely product information in this user manual.

Product updates may result in differences between the information provided herein and the product shipped. The information in this document is subject to change without notice.

About CalAmp Corp.

CalAmp is a leading provider of wireless equipment, engineering services and software that enable anytime/anywhere access to critical information, data and entertainment content. With comprehensive capabilities ranging from product design and development through volume production, CalAmp delivers cost-effective high quality solutions to a broad array of customers and end markets. CalAmp is the leading supplier of Direct Broadcast Satellite (DBS) outdoor customer premise equipment to the U.S. satellite television market. The Company also provides wireless connectivity solutions for the telemetry and asset tracking markets, public safety communications, the healthcare industry, and digital multimedia delivery applications.

www.CalAmp.com

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Definitions

Access Point	**C**ommunication hub for users to connect to a wired LAN. APs are important for providing heightened wireless security.
ADB	Agile Dual-Band - GeminiG3 radiomodem model that allows 700/800MHz automatic band switching capability during roaming.
AES	Advanced Encryption Standard (AES) - uses 128-bit encryption to secure data.
Airlink	Physical radio frequency connections used for communications between units.
ARP	Address Resolution Protocol – Maps Internet address to physical address.
AAVL	Autonomous Automatic Vehicle Location. Optional feature that involves using GPS (Global Positioning System) signals from the mobile unit by the Host PC.
Backbone	The part of a network that connects most of the systems and networks together, and handles the most data.
Bandwidth	The transmission capacity of a given device or network.
Base	Designates products used as base stations in VIS systems. They currently include the Paragon family of products up to the Paragon4 radiomodems.
Browser	An application program that provides a way to look at and interact with all the information on the World Wide Web.
BSC	Base Station Controller - An async controller-modem designed for the radio base station in mobile systems. A component of Paragon4 radiomodem base stations.
COM Port	RS-232 serial communications ports of the Paragon4 wireless radiomodem.
Cycle Mark	Signal transmitted on an E-DBA network that keeps the network synchronized.
Default Gateway	A device that forwards Internet traffic from your local area network.
DHCP	Dynamic Host Configuration Protocol - A networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time, instead of assigning permanent IP addresses.
DNS	Domain Name Server - The on-line distributed database system used to map human-readable machine names into IP addresses.
Domain	A specific name for a network of computers.
Dynamic IP Addr	A temporary IP address assigned by a DHCP server.
E-DBA	Enhanced Dynamic Bandwidth Allocation – Dataradio proprietary protocol that schedules all inbound and outbound Airlink traffic to minimize contention.
Ethernet	Ethernet is a frame-based computer networking technology for local area networks (LANs). It defines wiring and signaling for the physical layer, and frame formats and protocols for the media access control (MAC)/data link layer of the OSI model. Ethernet is mostly standardized as IEEEs 802.3.
Feature Key	Method used to implement customer's option(s) selected at the time of radiomodem purchase *(factory-installation*) or as add-on *(field-installation)*.
Firewall	A set of related programs located at a network gateway server that protects the resources of a network from users from other networks.
Firmware	The programming code that runs a networking device.
Fragmentation	Breaking a packet into smaller units when transmitting over a network medium that cannot support the original size of the packet.
FTP	File Transfer Protocol - A protocol used to transfer files over a TCP/IP network.

Gateway	A device that interconnects two or more networks with different, incompatible communications protocols and translates among them.
GeminiG3	Third generation of Gemini^{PD} VIS products. High specs dual DSP mobile radio-modem with Dataradio Parallel Decode™ technology
HDX	Half Duplex. Data transmission that can occur in two directions over a single line, using separate Tx and Rx frequencies, but only one direction at a time.
HTTP	HyperText Transport Protocol - The communications protocol used to connect to servers on the World Wide Web.
IPCONFIG	A Windows 2000 and XP utility that displays the IP address for a particular networking device.
MAC ADDRESS	Media Access Control - The unique address that a manufacturer assigns to each networking device.
MIB	Management Information Base (MIB)-a logical, hierarchically organized database of network management information. Used in SNMP.
NAT	Network Address Translation - NAT technology translates IP addresses of a local area network to a different IP address for the Internet.
Network	A series of computers or devices connected for the purpose of data sharing, storage, and/or transmission between users.
Network speed	This is the *bit rate* on the RF link between units.
Node	A network junction or connection point, typically a computer or work station.
OID	An object identifier or OID is an identifier used to name an object and is the numerical equivalent of a path. In SNMP, an OID consists of numbers separated by decimal points. Structurally, an OID consists of a node in a hierarchically assigned namespace.
OIP	Optimized IP – Compresses TCP and UDP headers, and filters unnecessary acknowledgments. This makes the most use of the available bandwidth.
OTA	Over-The-Air - Standard for the transmission and reception of application-related information in a wireless communications system
Palette	Synchronization patterns used to identify the speed and coding of packets transmitted over-the-air in E-DBA.
Paragon4	IP-based data radio base station used in mobile networks and designed specifically to fit the needs of vehicular applications. Runs up to 128 kb/s
Parallel Decode	Technology featuring dual receivers for added data decode sensitivity in multipath and fading environments. *(United States Patent No: 6,853,694 B1)*
PHY	A PHY chip (called PHYceiver) provides interface to the Ethernet transmission medium. Its purpose is digital access of the modulated link (usually used together with an MII-chip). *The PHY defines data rates and transmission method parameters.*
PDU	Protocol Data Unit - A PDU is a message of a given protocol comprising payload and protocol-specific control information, typically contained in a header. PDUs pass over the protocol interfaces that exist between the layers of protocols.
Ping	Packet INternet Groper - An Internet utility used to determine whether a particular IP address is online.
PLC	Programmable Logic Controller. An user-provided intelligent device that can make decisions, gather and report information, and control other devices.
Roaming	Movement of a wireless node (GeminiG3 radiomodems) amongst Multiple Access Points (Paragon4). Paragon4 radiomodems support seamless roaming.
Router	A networking device that connects multiple networks together.

RS-232	Industry–standard interface for data transfer.
Smart Combining	Digital processing method used to combine "Spatial Diversity" signals to optimize performance. (See Parallel Decode)
SNMP	Simple Network Management Protocol - Provides a means to monitor and control network devices, and to manage configurations, statistics collection, performance, and security.
Spatial Diversity	Composite information from independent diversity branches using antennas spaced apart is used with "Smart Combining" to minimize fading and other undesirable effects of multipath propagation. (See Parallel Decode)
SRRCnFSK	Square Root Raised Cosine (n = level) Frequency Shift Keying. Type of frequency modulation of data signals performed by the Paragon4 radiomodem.
Static IP Address	A fixed address assigned to a computer or device that is connected to a network.
Static Routing	Forwarding data in a network via a fixed path.
Subnet Mask	A bit mask used to select the bits from an IP address that correspond to the subnet. Each mask is 32 bits long, with one bits in the portion that identifies a network and zero bits in the portion that identifies a host.
Switch (Ethernet)	Computer-networking device that allows sharing a limited number of ports to connect computing devices to host computers. Replaces network hubs *(layer1),* switches *(layer2),* routers *(layer3)*.
Sync	Data transmitted on a wireless network that keeps the network synchronized.
TCP/IP	Transmission Control Protocol/Internet Protocol - A transport *(layer4)* protocol for transmitting data that requires acknowledgement from the recipient of data sent. Handles retries and flow control.
Telnet	Network (layer5) protocol used on the Internet or on LAN connections.
TFTP	Trivial File Transfer Protocol - A version of the TCP/IP FTP protocol that has no directory or password capability.
Topology	The physical layout of a network.
Transparent	A transparent unit transmits all data without regard to special characters, etc.
UDP	User Datagram Protocol - A transport *(layer4*) protocol for transmitting data that does not require acknowledgement from the recipient of the data that is sent.
Upgrade	To replace existing software or firmware with a newer version.
URL	Universal Resource Locator - The address of a file located on the Internet.
VIS	Vehicular Information Solutions. Dataradio's name for a series of products specially designed for mobile data.
WINIPCFG	A Windows 98 and Me utility that displays the IP address for a particular networking device.
WLAN	Wireless Local Area Network - A group of computers and associated devices that communicate with each other wirelessly.

1. PRODUCT OVERVIEW

This document provides information required for the setting up, operation, testing and trouble-shooting of the Dataradio® Paragon4™ radio-modem base station.

1.1 Intended Audience

This document is intended for engineering, installation, and maintenance personnel.

1.2 General Description

The Paragon4 radio base station is a factory-integrated industrial-grade IP-based data product used in mobile networks and is designed specifically to fit the needs of vehicular applications. It features dual receivers for added data decode sensitivity in multi-path and fading environments.

When used with Dataradio's state-of-the-art GeminiG3 mobile IP data solution, the system delivers unequaled high-speed data performance and unmatched effective throughput.

All Paragon4 models are supplied in a standard 19-inch wide rackmount. The Paragon4 full-duplex radio-modem chassis assembly includes:

- A second generation high-speed Dataradio "Base Station Controller" module (BSC2) that uses an open architecture that simplifies the implementation process. The BSC2 module comes equipped with a built-in IP router with dual Ethernet 10/100 BaseT interfaces.
- Option for 10MHz reference source input
- Dual, independently synthesized Receiver radio module.
- High-performance synthesized 0.2W Exciter radio module.

For all Paragon4 radio modem units:

- One Power Amplifier (PA) module is required for the regular usage.
- Duplexer and backup power units are custom furnished items.
- Wire line modem(s) are optional items.
- Laptop PC and its application software are user-supplied items.
- Optional Router – Add a second router anywhere within your network if you need a fault tolerant network.

1.2.1 Features

- Parallel Decode™ technology featuring dual receivers for added decode sensitivity in multi-path and fading environments.
- Fully IP-based product models, using an optimized IP layer that reduces IP overhead for the RF link
- Sophisticated dual DSP-based modem design provides added system performance, fewer retries and more effective throughput.
- Full duplex mode of operation
- Base Station with an RF Power Amplifier. The Power Amplifier is considered a stand-alone module.
- On-air data speeds and modulation types supported *(dependent on "Feature Key" selected[1])*:

Table 1 - On-air data speeds and modulation

	Channel Type					
	UHF		**700 MHz / 800 MHz**			
Modulation type	**25 kHz**	**12.5 kHz**	**50 kHz**	**25 kHz**	**12.5 kHz**	**NPSPAC**
SRC16FSK	64 kb/s	32 kb/s	128 kb/s	64 kb/s	32kb/s	32kb/s
SRC8FSK	48 kb/s 43.2 kb/s	24 kb/s	96kb/s	48kb/s 43.2kb/s	24kb/s	24kb/s
SRC4FSK	32 kb/s	16 kb/s	64kb/s	32 kb/s	16kb/s	16kb/s

- Uses Dataradio's Next generation high-efficiency Enhanced-DBA (E-DBA) over-the-air protocol
- Over-the-air compatible with GeminiG3.x mobile products
- Out-of-band signaling enables transmission of GPS reports with no effect on system performance.
- Flash programmable firmware, including over-the-air programming capability

1.2.2 Configuration

Paragon4 units are factory-configured. Configuration changes or upgrades are web-based.

[1] Method used to implement customer's option(s) selected at the time of radiomodem purchase *(factory-installation*) or as add-on *(field-installation)*.

1.3 Factory Technical Support

The Technical Support departments of DATARADIO provide customer assistance on technical problems and serve as an interface with factory repair facilities. They can be reached in the following ways:

For Canada and International customers:

DATARADIO Inc.

5500 Royalmount Ave, suite 200
Town of Mount Royal
Quebec, Canada H4P 1H7

Technical support hours: Monday to Friday 9:00 AM to 5:00 PM, Eastern Time

phone: +1 514 737-0020
fax: +1 514 737-7883

Email address: support@dataradio.com

or

For U.S. customers:

DATARADIO Corp.

6160 Peachtree Dunwoody RD., suite C-200
Atlanta, Georgia 30328

Technical support hours: Monday to Friday 9:00 AM to 5:00 PM, Eastern Time

phone: 1 770 392-0002
fax: 1 770 392-9199

Email address: drctech@dataradio.com

1.4 Product Warranty

Warranty information may be obtained by contacting your sales representative.

1.5 Replacement Parts

This product is usually not field-serviceable, except by the replacement of individual radio modules. Specialized equipment and training is required to repair logic, modem boards, and radio modules.

Contact Technical Support for service information before returning equipment. A Technical Support representative may suggest a solution eliminating the need to return equipment.

1.5.1 Factory Repair

When returning equipment for repair, you must request an RMA (Returned Material Authorization) number. The Tech Support representative will ask you several questions to clearly identify the problem. Please give the representative the name of a contact person, who is familiar with the problem, should a question arise during servicing of the unit.

Customers are responsible for shipping charges for returned units. Units in warranty will be repaired free of charge unless there is evidence of abuse or damage beyond the terms of the warranty. Units out of warranty will be subject to service charges. Information about these charges is available from Technical Support.

1.6 Packaging

Each Paragon4 radio-modem base station – UHF, 700 MHz, or 800MHz – normally leaves the factory packaged as follows:

- A Dataradio base station "Radio-modem assembly" with dual power supply assembly, and a BSC.
- Two standard seven-foot 120 VAC power cords.
- Coax cable (16-inch) to connect the Exciter module to the power amplifier.

Frequently, Paragon4 product components are field-assembled prior to customer delivery.
The cabinetry may then be supplied in one of several custom rack-mount configurations that may also include fan, backhaul modems, duplexer/filters/combiners, and ancillary equipment.
If damage has occurred to the equipment during shipment, file a claim with the carrier immediately.

2. Installation

Figure 1 - Front view "Radio Assembly"

2.1 Overview

The cabinet and rack-mount housing the Paragon4's radio-modem and Power Amplifier is generally installed in a sheltered facility. Occasionally located adjacent to the nerve center of the user's network, it is often located near tower sites or at remote locations where it operates unattended.

Furnishings needed include power, cabling, and installation of antenna, landline or microwave modem, and host PC or portable computer. Details of these are outside the scope of this manual. This manual covers the radio-modem assembly. The power amplifier has its own user manual that is incorporated by reference at the moment of the order.

2.2 Location

Be sure to place the Paragon4 unit in such a way that:

- The LEDs can be seen (as an aid in troubleshooting)
- Access to the antenna connector and to the back connectors is possible without removing the unit
- Sufficient air may flow around the unit to provide adequate cooling.

2.3 Rear Views

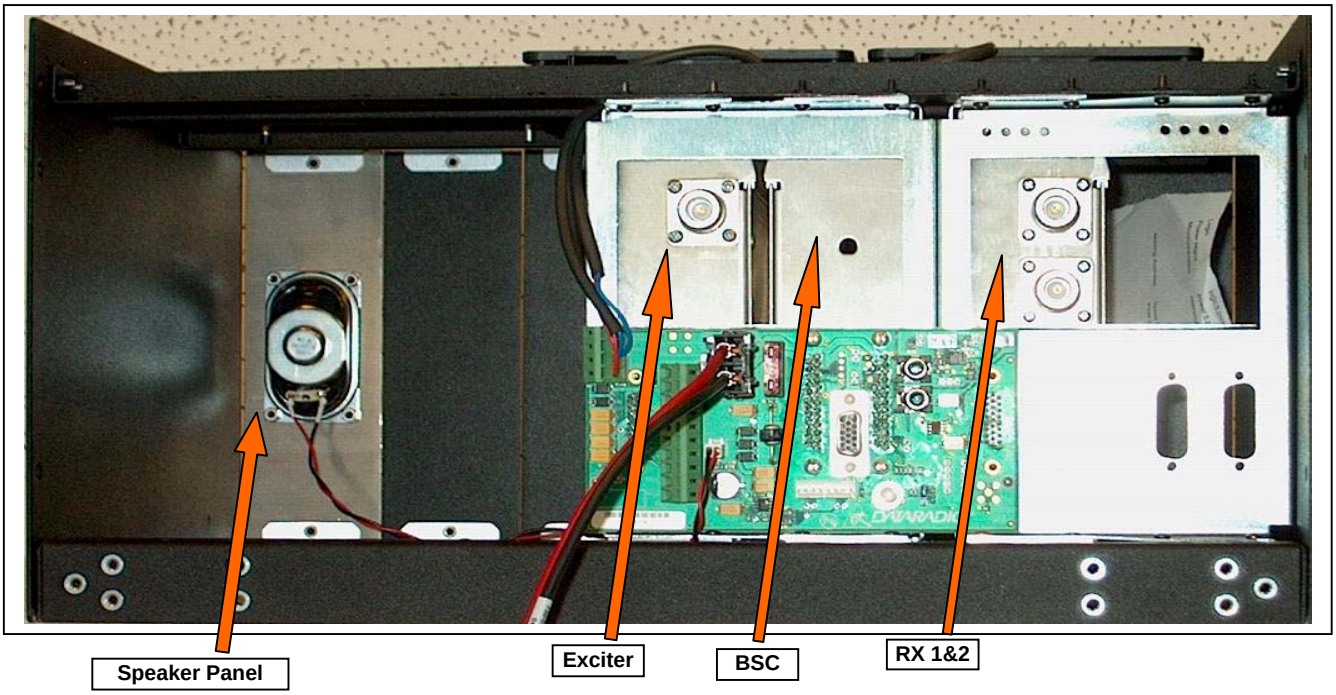


Figure 2 - Paragon4 unit rear view

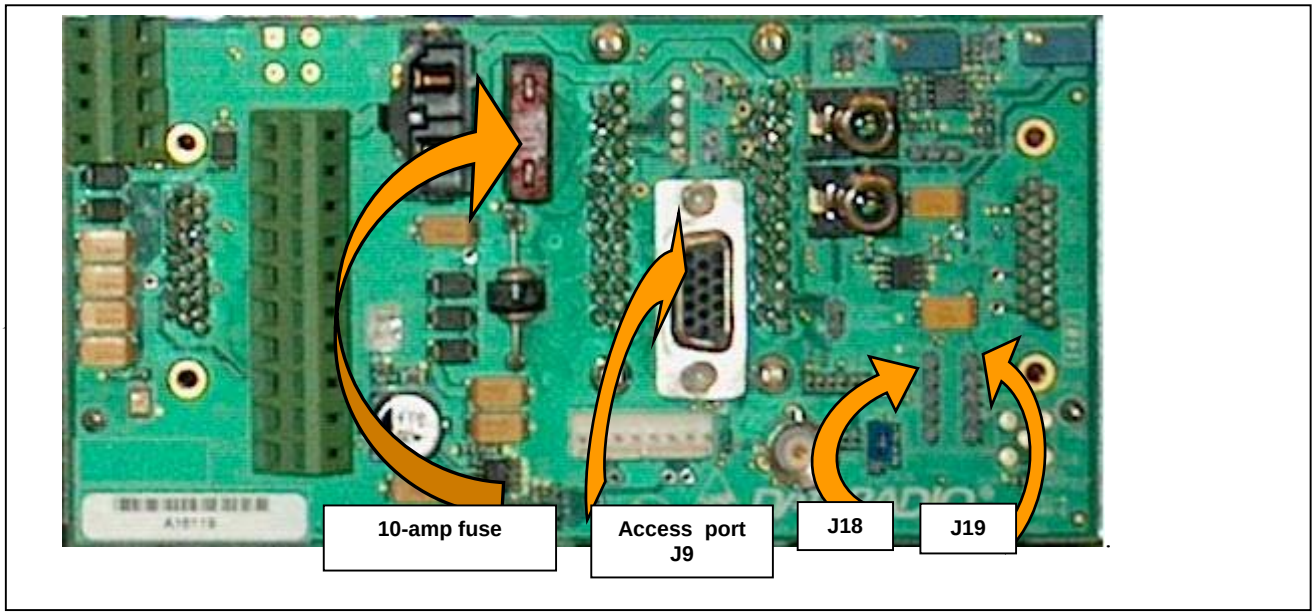


Figure 3 - Backplane

Table 2 - Test Points

Backplane Test Points Rx/Tx			
Test		**J9 Access port**	**Alternate Pinout**
Ground		**Pin 14**	**J18, J19 – Pin 3**
SINAD &Distorsion	**RX1 -Differential**	**1P-3; 1N-8**	**J18- Pins 1,2**
SINAD &Distorsion	**RX2-Differential**	**2P-4; 2N-9**	**J19 – Pins 1,2**
RSSI	**RSSI 1 -Differential**	**1P-1; 1N-6**	**J18 – Pins 4,5**
RSSI	**RSSI 2-Differential**	**2P-2; 2N-7**	**J19 – Pins 4,5**

2.4 Electrical

Standard 120 VAC electrical power is required. It should be capable of providing at least 10A to power Paragon4 unit (<6A) and ancillary equipment.

2.4.1 Standard Power Supply Configuration

Although the T809-10 is a high efficiency switched mode power supply, a considerable amount of heat is generated during normal operation. While in use, ensure that an adequate flow of cooling air is able to circulate around the power supply, and that the air intake vents on the rear and sides of the unit are not inadvertently covered.

Caution:

Do not operate this unit in a completely enclosed cabinet.

The Radio assembly unit receives 13.8 VDC power inputs from two "T809 " power supply modules powered at 120 VAC. Normally used at room ambient temperatures, it can operate within its specifications over a range of –10 to +60 °C.

Note: Internal over-temperature protection shuts down the main transformer above 105° Celsius.

Both power supply modules are internally connected to ground via their individual, rear-connected, seven-foot standard 120 VAC power cords. The Radio Assembly chassis requires a secure ground connection. A threaded grounding binding post fitted with a knurled binding-nut is provided on the chassis next to DC input 2.

- For the Radio Assembly chassis, install the grounding lead's lug over the binding post and firmly hand-tighten the binding-nut.
- If a –DC rail (0V) is installed as part of the system, the grounding leads may alternatively be fitted to the rail terminal.

Caution:

Improper grounding between power supply case and rack frame may result in harmful voltage potentials and/or miscellaneous power supply switching noise problems in both receivers and transmitter.

2.4.1.1 DC Power Supply Connection & Torque Settings

Warning:

Securing the DC Power Supply cable into the DC connector to provide a good electrical connection is essential. Over time, the wires tend to compress in the DC connector resulting in an increasingly poorer connection. Consequently, as high current is drawn, the connector heats up increasing the resistance thereby causing still more heat until the connector eventually burns up.

Although screws securing DC cables to the Power Supply terminals are tightened to the torque settings given below prior to new system delivery, they must be re-tightened as part of the commissioning process and re-tightening is also part of the regular maintenance schedule.

Prior to replacing a Power Supply module into an existing system, inspect the cable and re-terminate the DC wires if the strands have previously been twisted together or show any sign of damage.

Cut the wire at the end of the insulation and then strip approximately .43 inch (11mm) of insulation off the cable. DO NOT TWIST THE WIRE STRANDS. Insert the DC cable into the screw terminal and tighten the screw to secure the cable as per the torque settings given below.

Torque Settings:

The manufacturer recommends torque setting all power supply terminal screws to a minimum of:

- 1.5 Nm (or 13.28 Inlb or to 1.107 ftlb)

  Note: Dataradio uses a Sturtuvan Richmond 29-pieces adjustable torque screwdriver model CAL36/4K.

  After tightening, pull on the cable to check the cable is secured tightly into the screw terminal.

2.4.1.2 Power Indications

Both red-colored translucent power switches located on the front of the power supply modules illuminate when AC power is available. Toggle both to ON to distribute power to the Radio Assembly and to the Power Amplifier. The LED immediately below the switches light green indicating normal DC power operation.

2.4.2 Backplane Fuses

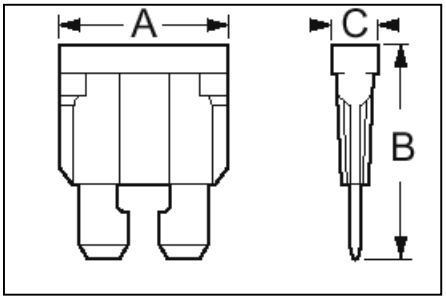
Blade fuses (Maxi-Fuse) are used on the Radio assembly backplane:

Fuse Type	Dimensions – Inch (mm)		
	A	B	C
Maxi-Fuse	1.15 (29.21)	1.35 (34.29)	.35 (8.89)

Fuse #	F1	F2	F3
Values	10A	15A*	15A*

* Always replace the two 15A fuses as a pair.

Figure 4 - Maxi-Fuse



2.5 Antenna

2.5.1 Overview

The Paragon4 unit commonly uses three antennas (one transmit and two receive) unless a duplexer is used with one of the receive antennas; then only two antennas would be needed. If the 10MHz Disciplined Clock option is sought, there is another GPS antenna is adittion to the three already mentioned. They should be mounted according to any guidelines supplied with the antennas. For antennas placement and spacing, consult System Engineering.

2.5.2 Cabling and Connection

1- Route good quality 50-ohm double-shielded coaxial cable(s) (e.g. RG-214 or Heliax) from the selected antenna position(s) to the Paragon4 Radio assembly.

2- Referring to Figure 2 for locating modules, terminate the RX-1 and RX-2 cable-ends at their respective module rear position with N-type connectors.

3- Similarly, terminate the TX cable-end at the rear position of the Power Amp's module with an N-type connector.

Caution:

When terminating RF cables use brand-name crimping tools (such as AMP, Jensen, Crimp-Master, etc…) of the correct size for the cable and type of connector used.

Common pliers are NOT acceptable.

2.6 Completing the physical Installation

Paragon4 products are factory-configured to user's requirements and are shipped ready to run.

After new installations:

- Re-check that all connections are secure on the radio-modem assemblies (antennas, PC, power cords etc.)
- Check that fuses are inserted.
- Turn power supplies ON.

You are now ready to check for normal operation (as per paragraph 2.7) and to run the Dataradio web interface (described in section 4) for testing or trouble-shooting.

Any change(s) to the settings must be done via files saved on diskette and loaded into the unit using the web interface program.

2.7 Checking out Normal Operation

1- Check that power is applied.

2- Check Radio assembly lights for proper operation as per section 3.1

3- Check for proper operation of the BSCs LEDs.

4- Using the web interface program and an in-line wattmeter, check forward & reverse power to confirm main antenna installation.

5- Using the web interface, check the RF Data Link with a mobile that can be heard.

If user application and mobiles are available, test the installation by going through a normal sequence of transmitting and receiving messages.

3. Operating Description

3.1 Radio Assembly

The Radio assembly component of each Paragon4 product – UHF, 700, and 800MHz – is made up of high performance synthesized radio base station designed for single operation. The Radio Assembly's modules are commonly installed in a standard, 19-inch wide rack frame.

The complement of modules is:

- 1 x Receiver module
- 1 x Exciter module
- 1 x BSC (controller-modem)
- 1 x Speaker panel

and mounted on the rack *(normally immediately below the Paragon4 radiomodem)*:

- 1 x Dual Power Supply module

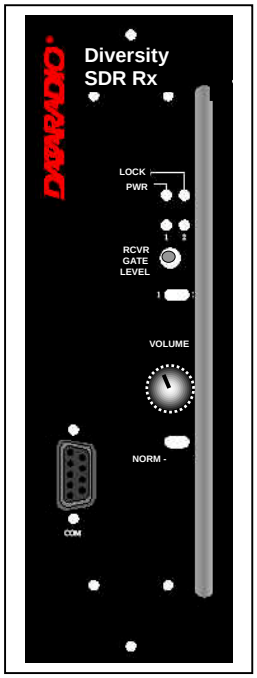
3.1.1 Receiver module

For locating the module, refer to Figure 2 above.

The receiver has several front panel controls and indicators. These are:

- LEDs -Four LEDs as for the SDR-Rx receiver module:

PWR LED	Green	normal operation
	Amber	bootloader program running
	Red	malfunction / reset
LOCK LED	Green	PLL locked
	Red	PLL not locked
1 LED	Green	RF carrier signal on audio channel 1 is above manually adjusted mute threshold
	Off	RF carrier signal on audio channel 1 is below manually adjusted mute threshold
2 LED	Green	RF carrier signal on audio channel 2 is above manually adjusted mute threshold
	Off	RF carrier signal on audio channel 2 is below manually adjusted mute threshold



- RCVR GATE LEVEL - Mute threshold adjustment. It sets the RF signal level required to open the mute gate and allow audio to pass to the speaker[1].
- 1 / 2 Switch – Manual selection of Channel 1 or 2 audio

Figure 5 - Receiver module

- Volume - The audio output delivers up to 1 watt to the speaker. Always set volume knob to minimum when not in use to reduce current consumption.
- NORM-MON Switch – Manual selection between audio unmuted (continuous monitor) or when audio is above the manually adjusted mute threshold

3.1.2 Exciter module

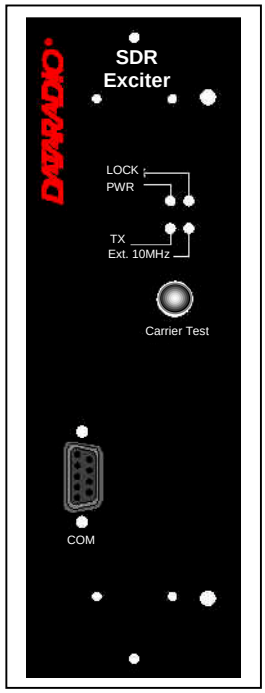


Figure 6 - Exciter module

The Exciter's front panel controls and indicators are:

- Carrier test - momentarily keys the transmitter ON while pressed (used for test purposes only). If the Carrier is pressed for 4 seconds or more the exciter starts the test mode and keeps transmitting until the next press of the button.
- LED indicators, according to the table below.

	Green	***Red***	***flashingAmber***	***Off***
Power	normal	Fault 1 (TBD)	fault 2 (TBD)	
TX		transmit	Test Mode:	idle
10 MHz	10 MHz Locked	10 MHz connection broken, unable to lock	Acquiring 10 MHz Lock	Idle if 10 MHz was never connected.
Lock	normal, Synth lock	Synth unlock Fault	Programming mode	

- one DE-9 RS-232 ports for setup.

3.1.3 BSC module

The BSC2's front panel connectors and indicators are:

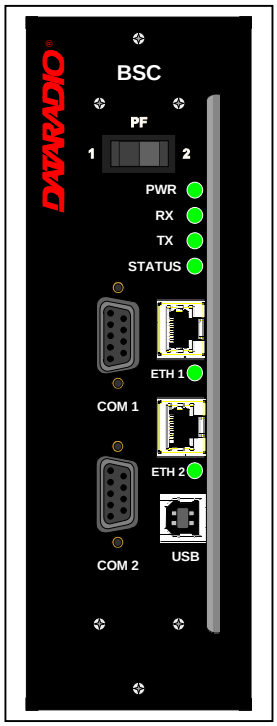


Figure 7 - BSC module

PWR LED	Green	Normal operation
	Amber	Step 2 in uMon boot-up – lights for <1 sec.
	Red	Step 1 in uMon boot-up – lights for <1 sec.
	Red flashing	Hardware error, must check the log files to identify it
RX LED	Green	Flashes for each data packets received
	Red	Discard RX packet (factory-use)
TX LED	Green	Flashes for each data packets transmitted
	Amber	Flashes for each data packets transmitted (check for lost Host connection)
	Red	Continuoulsy ON for TXON test (max. 20 secs.) Flashes ON for CWID key-up event
	Off	Check if in "AirLink down mode"
STATUS	Green	Flashes each time PF1 or PF2 is pressed
	Amber	Flashes each second PF1 is kept pressed *Toggles "AirLink down mode" after 4 seconds*

- 2x DE-9 RS-232 ports for setup and user data
- 1x rocker switch (positions PF 1 and 2) to select various test modes. See paragraph 5.3.2.
- 2x Ethernet ports – for setup and user data

- 2x Ethernet LEDs (status & activity)
- USB port – reserved.

The **option for 10 MHz Disciplined Clock** of the Paragon 4 requires a GPS antenna kit assembly and a board that is to be used as a piggyback on the BSC2 motherboard. The 10 MHz Disciplined Clock board is equipped with a GPS module (Garmin GPS15L-F) and a 10MHz TCVCXO (temperature controlled voltage controlled crystal oscillator). The 10Mhz oscillator is disciplined (or locked to) by the 1 PPS output of the GPS module.

In Lock mode (when synchronized to GPS 1pps signal), the BSC provides a reference signal of 10MHz that has the accuracy better than 1ppb (± 0.010 Hz at 10 MHz).

If the GPS reference is not available, in "unlock" mode the accuracy is only better than 5ppm (±50 Hz at 10 MHz). Anyway, if an external reference of 10MHz is provided, this reference signal is buffered for the other modules of the Paragon 4 base station.

The BSC will not supply the 10MHz reference without the option.

3.1.4 Speaker panel

The speaker panel is fitted with a 4Ω speaker.

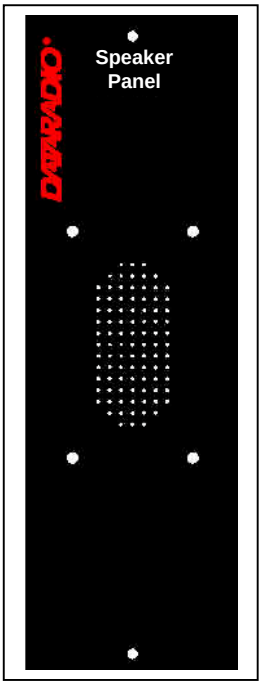


Figure 8 - Speaker module

3.1.5 Power Supply Modules (T809)

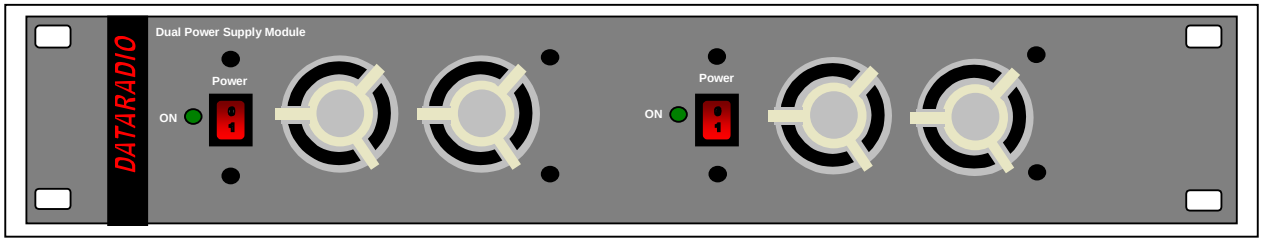


Figure 9 - Dual T809 Power Supply Module (black front plate)

Two horizontally mounted switched-mode pulse-width modulated T809 power supply modules are used but not connected in parallel.

Both power supply units have an ON-OFF switch* and one LED indicator on the front panel plus an output voltage adjust potentiometer (13.8 VDC nominal, 13.5 to 18 VDC) accessed via the back panel.

* To remove voltage from the power supply PCB, disconnect the main power cords.

Their circuit protection features are:

- Inrush current limiting
- Over-current (short-circuit)
  - 37 to 48A constant current limiting
  - Reset = auto recovery
- Over-voltage
  - 18 to 21 VDC = shutdown
  - Reset = Power OFF and ON
- Over-temperature
  - shutdown of output voltage
  - auto recovery with temperature reduction
  - temperature sensed on transistors and diodes

Front Panel Indications	
Power Switch	Illuminates when the unit is connected to AC power and voltage is available
ON LED	- Lights bright green when voltage output is normal - Lights faint green when module has entered over-current mode - Green LED is OFF, but power switch is ON indicates module has shut down due to over-temperature or over-voltage conditions.

3.1.5.1 Power Supply Rear Connections

The rear panel connections are:

- Auxiliary Inputs –

  The DE-9 connector on the T809-10 rear panel provides access to the remote control of the power supply *(reserved for future use)*.

- Output Voltage Adjust –

  The output voltage of the power supply can be increased (up to 18V approximately) to compensate for the voltage drop lost along the cable. Access the trim-pot through a small hole on the rear panel.

  To adjust the output voltage use a trimmer tool with a Phillips head or 3mm blade *(do not use a standard flat blade screwdriver to make the adjustment)*:

  • To increase the output voltage, turn the trim-pot clockwise.

  • To decrease the output voltage, turn the trim-pot counterclockwise.

  If the output voltage is increased on a power supply operating at, or close to, full load, the power supply loading must be reduced accordingly or the module may overheat and shut down.

- Feedthrough Terminal Block –

  The DC Output Terminal block on the rear of the T809-10 is a Phoenix Contact HDFKV 10. This is a screw-type terminal connector that uses a cage mechanism to clamp the conductor(s). *See section 2.4.1.1 for recommended torque settings.*

- Protective Bonding Terminal –

  The Radio Assembly requires a secure ground connection. See section 2.4.1 for connection details.

- 120 VAC Connector –

  Use the supplied 10A-rated IEC type power cord.

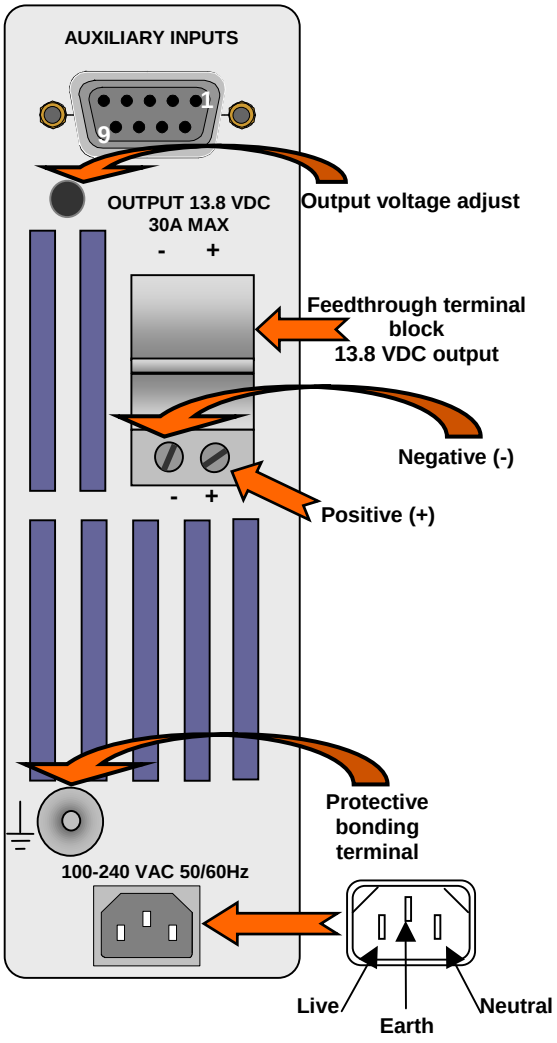


Figure 10 - T809 Rear panel (shown upright)

4. Operation & Configuration

Instructions and examples given in this manual are based on E-DBA operating software version current at the time of writing this document and may not apply to earlier or later software versions. Screen captures used throughout this document may vary from actual screens.

4.1 Browser-Based Interface

A built-in web server makes configuration and status monitoring possible from any browser-equipped computer, either locally or remotely. Status, configuration, and online help are available without requiring special client software. Setup is password-protected to avoid tampering or unauthorized changes.

Both the configuration parameters and operating firmware can be updated remotely, even over the RF network itself, using the standard File Transfer Protocol (FTP).

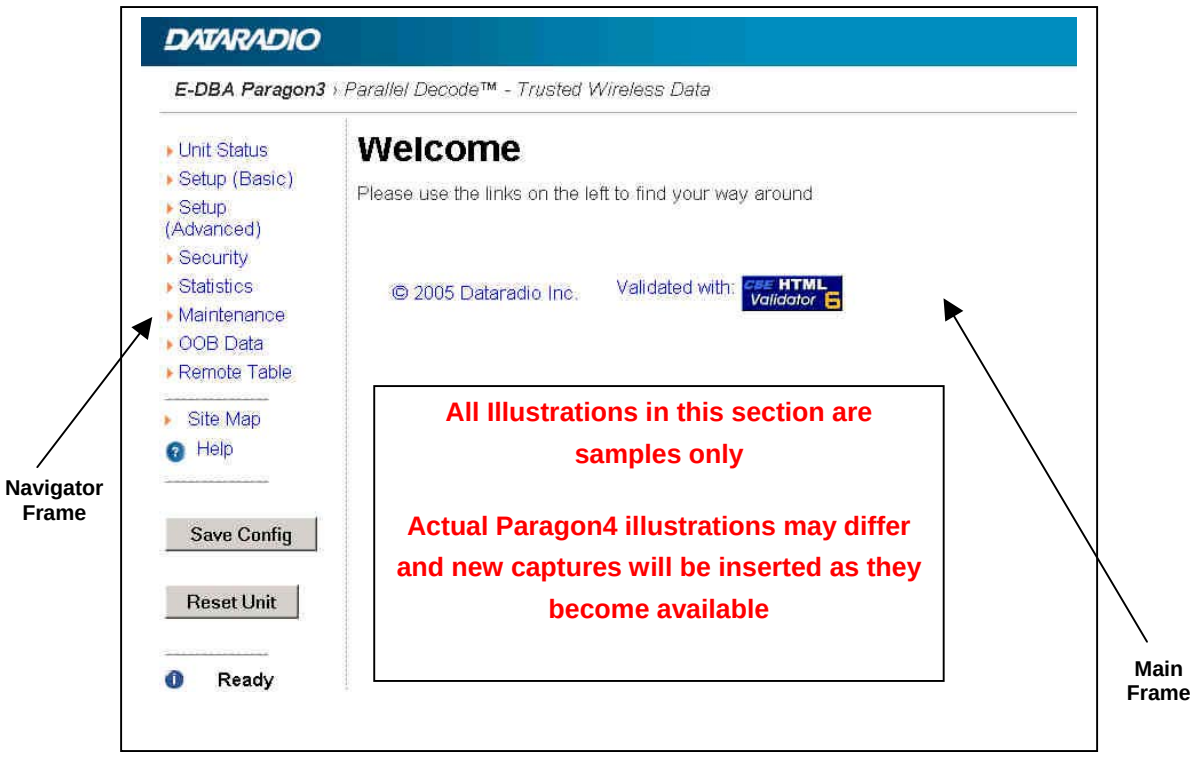


Figure 11 - Web Interface

4.1.1 Interface Setup and Status

The Paragon4 user interface is used to configure and view your network settings. Figure 11 shows the welcome screen of the Web Interface. The screen is subdivided in two frames: the frame on the left allows the user to navigate through the menus, while the main frame on the right displays the selected page. The menu system is two-leveled; some of the top-level menus expand to offer submenus. The *Site Map* link can be found right below the menus on the navigator pane. Help is available for each page displayed in the main frame. It can be accessed at all times by clicking the *Help* icon. The remaining buttons on the bottom of the Navigator frame are used to save your configurations and reset the unit.

4.2 LAN Setup

On a PC running MS-Windows with an existing LAN connection, connect either to the ETH1 (Data) or to ETH2 (Setup) RJ-45 input of the Paragon4 base station.

1. Click Start ➔ Settings ➔ Control Panel ➔ Network and Dial-up Connection
2. Click on the relevant Local Area Connection
3. On the Local Area Connection Status screen, click Properties
4. On the Local Area Connection Properties screen, scroll the List Box until "Internet Protocol (TCP/IP)" is highlighted, click Properties
5. On the Internet Protocol (TCP/IP) Properties screen, follow either method below:
   A) If using ETH2 (Setup LAN), select "Obtain an IP address automatically"
   B) Select "Use the following IP address" ➔ Enter 192.168.202.2 *(if ETH2 enter 192.168.203.2)* in the IP address field ➔ 255.255.255.0 in the Subnet mask ➔ Leave the Default gateway blank.
6. Click the OK button

   Note: On computers running Windows 9X, reboot to complete the connection process.

Steps above specifically apply to MS-Windows 2000. Modify as necessary for the OS you are running

4.3 Default IP Settings

- Paragon4 radio modem supports the Router (IP Forwarding) mode

4.3.1 Ethernet Interface 1 (DATA)

- MAC: 00:0A:99:XX:YY:ZZ
- IP ADDR: 192.168.202.1
- NETMASKS: 255.255.255.0
- Default Gateway: 0.0.0.0
- DHCP Client Disabled
- RIPv2 Disabled

4.3.2 Ethernet Interface 2 (SETUP)

- MAC: 00:0A:99:XX:YY:ZZ + 1
- IP ADDR: 192.168.203.1
- NETMASKS: 255.255.255.0
- DHCP Server Disabled
- NAT Disabled

4.3.3 RF Interface

- MAC: 00:XX:YY:ZZ
- IP ADDR: 10.XX:YY:ZZ
- NETMASK: 255.0.0.0
- Compression Enabled
- Encryption Disabled

4.4 IP Network Settings

4.4.1 IP Network Settings (with Host)

Figure 12 below illustrates Paragon4 base station settings. In Setup (Advanced) ➔ LAN (IP), set the data Interface 1 port (Eth1) IP addresses (set the setup Interface 2 port (Eth2)) and IP netmask of both Base and Mobile(s).

Keep the RF IP setting as is, providing customer is not using the 10.0.0.0 IP network.

Add routes in the Host (route add…)

In the illustration, Host and PC are part of different IP subnet

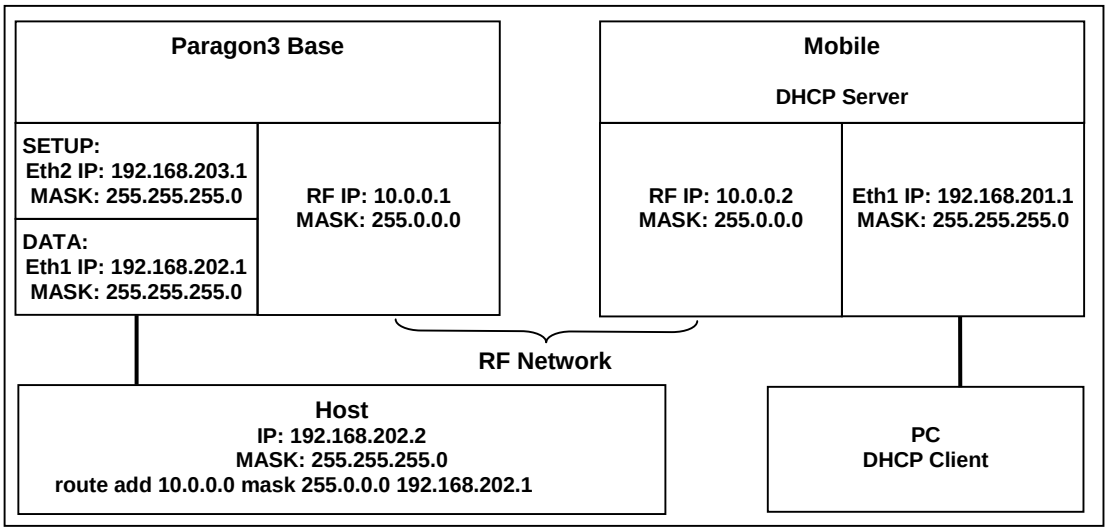


Figure 12 - IP Network Settings in Router Mode (with Host)

4.4.2 IP Network Settings (with Router)

Figure 13 below illustrates Paragon4 base station settings. In Setup (Advanced) ➔ LAN (IP), set the data Interface 1 port (Eth1) IP addresses (set the setup Interface 2 port (Eth2)) and IP netmask of both Base and Mobile(s).

In the illustration, Host and PC are part of different IP subnet.

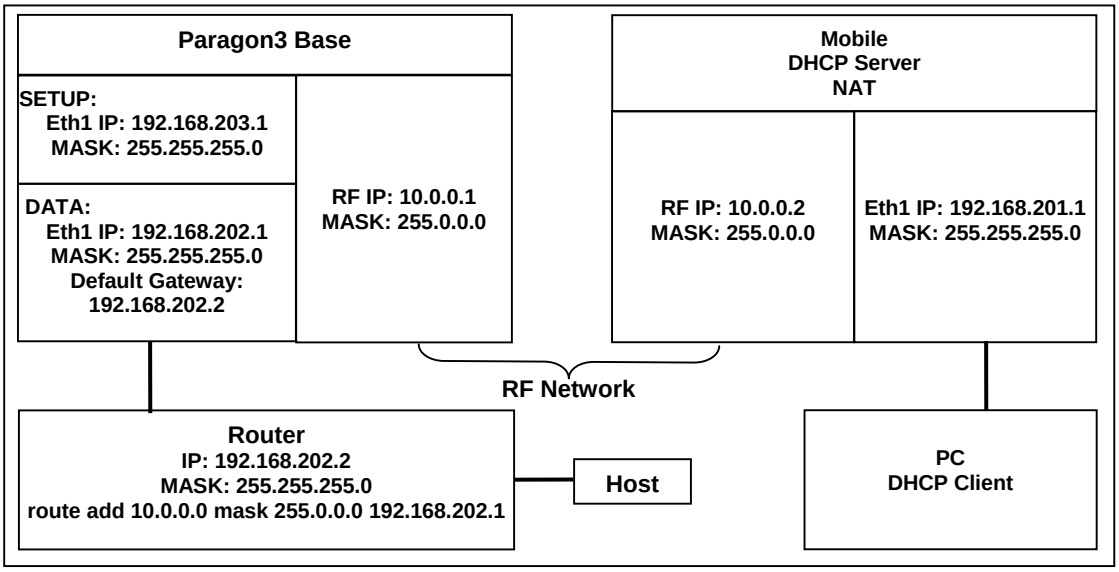


Figure 13 - IP Network Settings in Router Mode (with Router)

Keep the RF IP setting as is, providing customer is not using the 10.0.0.0 IP network.

Enable RIPv2 on Base station.

4.5 Login Screen

On the Address line of the Internet browser of your choice, type the factory-default IP addresses given to all Paragon4 radiomodem units: 192.168.20*x*.1 *(where x is 2 for the ETH1 Data port and 3 for the ETH2 Setup port)*. Press Enter. The Enter Network Password screen opens.

Figure 14 - Enter Network Password screen – ETH1 Data port shown

4.5.1 Initial Installation Login

For an initial installation, enter a User Name of 1 to 15 characters and the default Password ADMINISTRATOR *(upper case letters)*. Click OK. The Web interface "Welcome" screen opens Figure 15.

For subsequent access to the Paragon4 unit, use the User Name and Password that you will have configured.

Notes:

User Name field can be left blank. It only serves to identify the person gaining access.

Password is common and affects all User Name entries.

Figure 15 - Web User Interface – Welcome Screen

4.6 Web Interface

The Paragon4 user interface (Figure 15) is used to configure and view your network settings.

To navigate, use the top-level menus on the left, some of which expand to offer submenus, and display the first submenu in the right-hand frame. Click the current submenu entry to refresh the right-hand frame. The tables list action of each function. The interface main screen lists available selections for the selected menu or presents instructions.

Notes:

At any time, click the Help icon in the navigation pane to open a help text relating to the window being displayed.

4.6.1 Apply, Cancel, Save Config, and Reset Unit Buttons & Help Icon

Several submenus have "Apply" and "Cancel" buttons. 

The navigation area has "Save Config", "Reset Unit" buttons and a Help icon. 

If you "Apply" changes to any parameters marked  you will need to do a "Save Config" and a "Reset Unit".

When making an entry into a dialog box, click on Apply when satisfied to temporarily apply the value(s) entered to the relevant parameter(s). If not satisfied, click on Cancel button to restore to the value(s) present before a change was made.

Note: Cancel command only affects the dialog boxes or option buttons in the opened window.

If needed, go to other submenu(s) and make more entries. Click Apply before leaving each window. When finished, click the Save Config button to make all changed entries permanent.

Notes:

"Apply" writes to RAM, thus failure to use the "Apply" command button before leaving a web page will result in the loss of temporarily entered selections, addresses, and values.

"Save Config" writes in flash, thus failure to use the "Save Config" command button will result in the loss of temporarily entered parameters. A "Reset" is required to make flash changes take effect.

Click on Save Config button:

- If there are changes to be saved, saving occurs automatically.
- If there are no changes to be saved, a sub-window prompts user to confirm saving.

Click on "Reset Unit" button:

- If there are changes to be saved, a window prompts user to confirm resetting.
- If there are no changes to be saved, resetting occurs automatically.

A "Station Reset" 20-second timer counts down while the status reports: "Working…"

When done, the status reports: "Ready".

5. Trouble-Shooting and Testing

The checks described below should be done at time of installation, annual intervals, or whenever deterioration in performance is noted.

5.1 Equipment Required

- In-line RF powermeter –0.5 W range for the 200mW- Exciter module. Consider watmetters in -10W range for the reflected power and –100W range for the forward power of the power amplifier.
- Radio service monitor (IFR-120B with option 03: 30 kHz IF filter or equivalent).
- RG-214 or RG-223 cable with N-Type male connector to connect Paragon4 base station to the service monitor.

Important note: Before proceeding make sure that the service monitor has been calibrated recently and has warmed up for at least the time specified by its manufacturer.

*Some reported frequency and deviation problems have actually been erroneous indications from service monitors that have not adequately warmed up. This is particularly likely when field service is done during winter months***.**

5.2 Recommended Checks

A) After an installation

1. Power-up LED Sequence
2. Transmit power output
3. Reflected power output
4. RF Link test between Paragon4 unit and mobile unit(s) (PING from a PC as per paragraph 5.4.1)

B) For annual maintenance & trouble-shooting

Same checks as A) plus:

5. Carrier frequency error
6. TX Deviation
7. Low frequency balance
8. 12dB SINAD
9. Receiver distortion
10. Main RX and Aux. RX RSSI
11. Verify power supply connections & terminals torque settings (see paragraph 2.4.1.1)

Table 3 - Checklist A (After installation)

CHECKLIST A (**Paragon**4) Recommended Check out after Installation				
Step	**ACTION**	**EXPECTED RESULTS at 25°C**	**MEASURE WITH**	**IF NOT?**
1	**Normal Power-up Sequence** **BSC**	PWR LED lights red for four second, turns amber for one second, and stays green thereafter. TX LED flashes green once about fifteen seconds after power-up then keeps flashing in-tune to the cycle marker RX LED remains OFF STATUS LED remains OFF ETH 1 LED – if connection present – lights green. Flashes amber with activity ETH 2 LED – If connection present – lights green. Flashes amber with activity		
	RX	POWER and LOCK LEDs must remain steady green		
	Transmitter	POWER and LOCK LEDs must remain steady green ON LED lights red for one second, turns OFF for 10 seconds, and stays red thereafter		
For steps below, refer to Radio (RF Tests) WebPage				
2	**Power Amplifier Output Power** Under Test Tone section select ***Unmodulated*** and press "Execute"	**UHF**: 100W (user settable from 50W) **700/800 MHz**: 70 watts (user settable from 35W) Tolerance: +15% -20%	Service monitor set to read power or 150W in-line wattmeter installed as close as possible to the unit antenna connector.	[1]Check for bad connections, damaged coax cable, etc.
3	**Transmitter Reflected Power** Under Test Tone section select ***Unmodulated*** and press "Execute"	< 5% of forward power or as specified by System Engineering.	10W in-line wattmeter	Check for bad connections, damaged coax cable, etc.
4	**RF Link test** between Paragon4 unit(s) and mobile unit(s) (PING from a PC as per paragraph 5.4.1)			

[1] (unless unit has been set a lower value). Note that readings less than 100 watts for UHF or 70 watts for 800 MHz models, may be due to losses in cables used for testing. Check also your wattmeter frequency calibration curve. Do not be too ready to condemn the transmitter or the RF feedline & antenna installation.

Table 4 - Checklist B (General)

CHECKLIST B (**Paragon**4) General Check out (part1 of 2)				
Paragon4 units are set and characterized at the factory to optimize performances. It is **not recommended** to try readjusting units unless it is really required. Misadjusting a unit may result in significant performance losses. **The proposed adjustments in the "IF NOT?" column below, should be tried ONLY if system data performance degradation is noticed combined with out-of-tolerance items.**				
Step	**ACTION**	**Expected Results at 25°C**	**MEASURE WITH**	**IF NOT?**
1	**Normal Power-up Sequence** **BSC**	PWR LED lights red for four seconds, turns amber for one second, and stays green thereafter. TX LED flashes green once about fifteen seconds after power-up then keeps flashing in-tune to the cycle marker RX LED remains OFF STATUS LED remains OFF ETH 1 LED – if connection present – lights green. Flashes amber with activity ETH 2 LED – If connection present – lights green. Flashes amber with activity		
	RX1 and RX2	PWR LED remains steady green		
	Transmitter	PWR LED and LOCK LED remain steady green ON LED lights red after 10 seconds, and stays red thereafter		
For steps below, on the Radio ➔ Set Up Web page, press the "test" button to enable Test Tone function				
2	**Transmitter Output Power** From the Maintenance unit WEB "Test Tone" page, Select ***Unmodulated –*** Press Execute	**UHF**: 100 watts **800 MHz**: 70 watts (user settable from 20W) Tolerance: +15% -20%	Service monitor set to read power or 150W in-line wattmeter installed as close as possible to the unit antenna connector.	Adjust "Power" on the "Power Amp". See Power Amplifier adjustments paragraph in PA's manual.
3	**Transmitter Reflected** Under Test Tone section select ***Unmodulated*** and press "Execute".	< 5% of forward power or as specified by System Engineering.	10 W in-line wattmeter	Check for bad connections, damaged coax cable, etc.
4	**RF Link test** between Paragon4 unit and mobile unit(s) (PING test from the unit Web page as per paragraph **Error! Reference source not found.** or PING from a PC as per paragraph 5.4.1)			
5	**Carrier Frequency Error** Under Test Tone section select ***Unmodulated*** and press "Execute".	< ±300 Hz @ 25°C ambient or < ±1 ppm from –30 to +60 °C < ±0.1[1)] ppm –30 to +60 °C	Service monitor set to read frequency error. *[1)]0.1 ppm requires the 10MHz reference option to be present and instrument's time gate set to 1s*	Adjust frequency offset through the software
6	**TX Deviation (kHz)** Under Test Tone section select ***Unmodulated*** and press "Execute". Carrier will be modulated with a 1 kHz tone.	Refer to 5.3.1 for TX Deviation details. Tolerance is +5%, -10% for all bit rates.	Service monitor set to read deviation. (IF filter set to Mid or 30 kHz position)	If transmitter is re-tuned outside its original factory-calibrated tuning range or where its deviation readings are found to be out-of-specs, please contact Dataradio System Engineering.

CHECKLIST B (Paragon4) cont'd General Check out (part 2 of 2)				
Step	**ACTION**	**Expected Results at 25°C**	**MEASURE WITH**	**IF NOT?**
7	**Low Frequency Balance** Under Test Tone section select ***Random Data*** and press "Execute"/	a) Record deviation level read from step 6 b) Record deviation read from *TX Random test* c) Difference between a) and b) should be: < 2.5 kHz	Service monitor set to read deviation (IF filter set to Mid or 30 kHz position, all audio filtering disabled)	Refer to Section **Error! Reference source not found.**
8	**12 dB SINAD** (Dataradio wide band measurement method: no audio filtering) Set TX deviation to ±3 kHz.	Better than -108 dBm including cable loss (Typically -109 to -110 dBm)	- Backplane corresponding to the receiver being verified: J1 (RX1) or J5 (RX2), Pin 6 (see Figure 3) - Service monitor (IFR) set to SINAD IFR IF filter set to MID position or 30 kHz wide filter.	Refer to section **Error! Reference source not found.**
9	**Receiver distortion** (Dataradio wide band measurement method: no audio filtering) - Set service monitor RF Gen output to –70 dBm Deviation level as per SINAD above.	≤ 5.5 % (Typically < 3.5 %)	- Backplane corresponding to the receiver being verified: J1 (RX1) or J5 (RX2), Pin 6 (see Figure 3) - Service monitor (IFR) set to DISTORTION. - IFR IF filter set to MID position or 30 kHz wide filter.	
10	**RSSI** Apply to each receiver input the following RF level: UHF & 800: -110dBm	**UHF & 800 MHz**: 2.0 VDC (+/- 0.3VDC) BSC must be connected to the radio during the measurements	- Backplane corresponding to the receiver being verified: - J1 (RX1) or J5 (RX2), Pin 5 (see Figure 3) - DC Voltmeter measurement	Refer to section **Error! Reference source not found.** for all models. Refer to factory technical support only if RX data performance degradation is noticed combined with out-of-tolerance RSSI readings.
11	Verify power supply connections & terminals torque settings (see paragraph 2.4.1.1)			

5.3 Additional test details

5.3.1 Carrier Deviations

Table 5 - Carrier Deviations

Carrier Modulation					
SRRC4FSK		**SRRC8FSK**		**SRRC16FSK**	
			Tone		**Tone**
Network Speed (kb/s)	**Typical deviation in kHz** (1000Hz test tone)	**Network Speed** (kb/s)	**Typical deviation in kHz** (1000Hz test tone)	**Network Speed** (kb/s)	**Typical deviation in kHz** (1000Hz test tone)
25 kHz Channel (UHF)					
32.0	± 3.7	**48.0**	± 4.0	**64.0**	± 4.1
		43.2	± 4.2		
25 kHz Channel (800 MHz/700MHz)					
32.0	± 2.4	**48.0**	± 2.7	**64.0**	± 2.9
		43.2	± 3.3		
12.5 kHz Channel (UHF/700MHz/Canada 800MHz)					
16.0	± 1.5	**24.0**	± 1.8	**32.0**	± 1.8
NPSPAC Channel (USA – 800 MHz)					
16.0	± 2.4	**24.0**	± 2.7	**32.0**	± 2.9

5.3.2 PF Switch

Nearly all test "Actions" described in tables 3 and 4 above can be done by selecting the relevant test tone via the "Radio ► Tests" page of the web interface. However, stopping the Airlink for a test is done in a different manner. It requires the use of the BSC's front-mounted PF key rocker switch *(detailed PF operation in the next paragraph*). The PF switch can also be used as an alternate way of selecting Test Tones or if a web connection is unavailable.

5.3.2.1 Stopping the Airlink and Alternate Test Tone Selection Method

Located on the BSC module, the PF key is a horizontally mounted rocker switch with a center detent and spring-loaded positions "1" and "2". Pressing the switch to position "1" causes the "Status" LED to blink green once only followed by amber blinks at one-second intervals as long as it is held pressed. Pressing the switch to position "2" is used to select test tones as shown in Table 6 below.

Figure 16 - PF Switch Rocker Detail (one side pressed)

- If PF is pressed to position “1” for approximately four seconds *(visually count the amber blinks)* and released, it brings the Airlink down, PTT is released, no data traffic is scheduled, and CWID is suppressed. The Airlink will remain down for a maximum of one hour and automatically come back up, unless PF is pressed to position “1” once more for four seconds to force toggle the Airlink to “up” status.
- If PF is pressed to position “1” for approximately one amber blink, PF operation goes into “monitor mode” where “position 2” is monitored and each successive pressing of position “2” results in a different test tone selection as detailed in the table below.
- If PF is pressed to position “1” while a test is in progress, PF “monitor mode” operation is cancelled.

Note:

If PF is not in “monitor mode” pressing to position “2” has no effect.

Table 6 – Test Tones Generation

20-Second Test Tones - PF key generated
For a MODULATED test tone: **Press PF to “1” for approximately 1 amber blink and release. Immediately press PF to “2” one time. Test tone starts.** **To cancel test tone, press PF to “1” and release.**
For an UNMODULATED test tone: **Press PF to “1” for approximately 1 amber blink and release. Immediately press PF to “2” two times. Test tone starts.** **To cancel test tone, press PF to “1” and release.**
For a SQUARE WAVE test tone: **Press PF to “1” for approximately 1 amber blink and release. Immediately press PF to “2” three times. Test tone starts.** **To cancel test tone, press PF to “1” and release.**
For a RANDOM DATA test tone: **Press PF to “1” for approximately 1 amber blink and release. Immediately press PF to “2” four times. Test tone starts.** **To cancel test tone, press PF to “1” and release.**

Each pressing at position “2” must be made within one second.

E.g.: For Unmodulated, press twice within 2 seconds, for Random Data, press four times within 4 seconds.

5.4 Windows/Unix Tools

5.4.1 Network Connectivity

- PING (DOS/WINDOWS)

  The `ping` command determines whether a specific IP address is accessible. It works by sending a packet to the specified address and waiting for a reply. It is useful for troubleshooting "end-to-end" reachability, network connectivity, and network latency.

  The ping test is also convenient to verify more specifically the RF link between a mobile and a known base station

  Available for MS-Windows 9x, ME, NT, 2000, and XP as well as Unix & Free BSD.

  EXAMPLE:

  `ping 192.168.204.1 –w 3000` displays the response with turn around time in milliseconds.

- TRACERT (WINDOWS)

  The `tracert` command is used to visually see a network packet being sent and received and the amount of hops required for that packet to get to its destination.

  Available for MS-DOS 6.2, MS-Windows 9x, ME, NT, 2000, and XP.

  Note:

  Users with MS-Windows 2000 or XP who need additional information on network latency and network loss may also use the `pathping` *command.*

  EXAMPLE

  `tracert www.yahoo.com` at the command prompt displays the intermediate routers between local host to the www.yahoo.com site.

5.4.2 Configuration Information

- WINIPCFG (WIN95/98), IPCONFIG (WIN2K) or IFCONFIG (UNIX)

  `Ipconfig` is a DOS utility which can be used from MS-DOS or a MS-DOS shell to display the network settings currently assigned and given by a network. This command can be utilized to verify a network connection as well as to verify network settings.

  Available for MS-DOS, MS-Windows 9x, ME, NT, 2000, and XP.

  EXAMPLE

  `ipconfig/all` at the command prompt displays the Ethernet MAC address, IP address, IP netmask, default IP gateway, DNS server… information.

- ARP

  View and update the system ARP table

  The Address Resolution Protocol (ARP) is used with the IP protocol for mapping a 32-bit Internet Protocol address to a MAC address that is recognized in the local network specified in RFC 826. Once recognized the server or networking device returns a response containing the required address.

Available for MS-Windows 9x, ME, NT, 2000, and XP.

EXAMPLE

`arp-a` displays all entries in the ARP cache. *Useful in manipulating ARP caches.*

- ROUTE

  View and update the system routing table

  The function and syntax of the Windows ROUTE command is similar to the UNIX or Linux route command. Use the command to manually configure the routes in the routing table.

  Available for MS-Windows 9x, ME, NT, 2000, and XP.

  EXAMPLE

  `route ?` displays help

  `route print` displays the routing table

5.4.3 Statistics Information

- NETSTAT (WINS & UNIX)

  The netstat command symbolically displays the contents of various network-related data structures, i.e. IP, TCP UDP …

  Available for MS-Windows 9x, ME, NT, 2000, and XP.

  EXAMPLE

  `netstat ?` displays help

  `netstat -a` display TCP and UDP connections and listening ports information

For further information on TCP/IP troubleshooting, please visit:
http://www.windowsitlibrary.com/Content/466/14/1.html

5.5 BSC Firmware Upgrading

The Paragon4 radiomodem firmware is field-upgradable using the unit's Ethernet port. The process involves connecting to the IP address of the base from a host PC and transferring the firmware files via an FTP program.

5.5.1 Procedure

1. Using a file decompression program, such as WinZIP™ or WinXP's right-click & select the "Expand to…" option, expand the contents of the firmware upgrade package to a directory of your choice on the host PC.

   Warning:

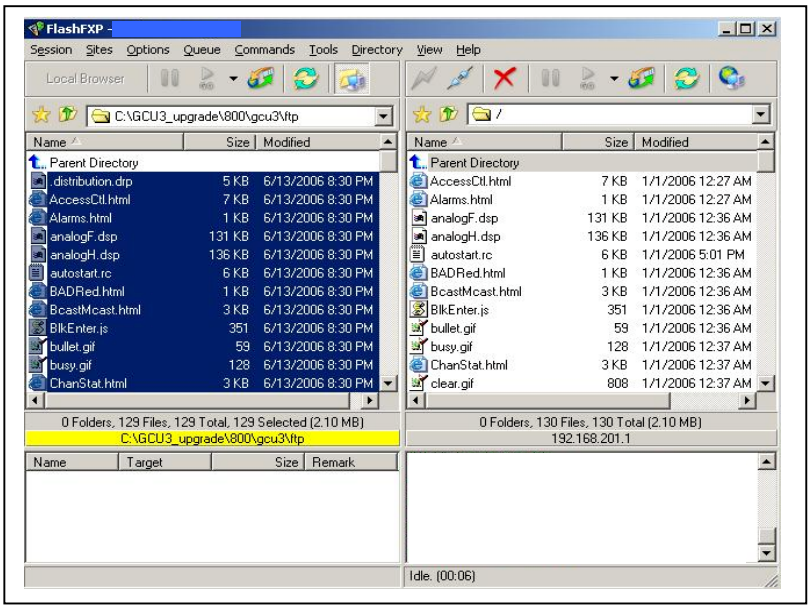
   Be aware that base and mobile's firmware archives are often distributed at the same time. Files intended for the Paragon4 radiomodem are labeled in the form `Paragon4_edba_Vx.x_Rx.xx.zip`. Be careful not to transfer firmware into the wrong unit!
2. Using an FTP client program of your choice, establish a connection to the base IP address.
3. Transfer all the files in the upgrade package. Occasionally, long pauses, on the order of 30 to 45 seconds, are possible when storing the file in the unit's flash file system.

4. Once the file transfer is complete, cycle the base power and allow the unit to boot. The unit should return to the state it was in when the update was started.

   Note:

   After resetting, the PWR LED remaining lit steady amber or red indicates the FTP transfer was not successful or that the firmware is corrupt. Please contact Dataradio system engineering for assistance.

Figure 17 - Sample FTP program



5. Verify the integrity of the newly transferred files.

   a) Connect to the base's IP address using an Internet browser such as IE (5.0 or later) or Mozilla.

   b) Enter the `user name` and `password` *(in the usual manner)* and allow the **Welcome** page to load.

   c) In the left pane, click on **Unit Status**. The **Unit Identification and Status** pane should display the newly upgraded firmware in its **Banner** *(should correspond to the upgrade package version)* and the **H/W Status** should also show **Ok**.

   d) In the left pane, click on **Maintenance**, then on **Package Control**. Wait a few moments for the results to display.

5.5.1.1 File Integrity Failure

If the message in the result screen points out that file(s) failed the integrity check, retry the FTP transfer for the failed files(s) again.

If the problem persists, please have the **Package Control** result screen indications handy and contact Dataradio system engineering for assistance.

6. Specifications

GENERAL	UHF	700MHz	800MHz
Frequency Range (MHz)	FCC = 403 – 512 Rx/Tx IC = 406 – 470 Rx/Tx		FCC = 851 – 869 Tx 809 – 824 Rx IC = 851 – 869 Tx 806 – 824 Rx
	FCC Part 90 / IC RSS-119		
Channel Spacing	12.5 kHz / 25 kHz	25 kHz	25 kHz (NPSPAC)
Mode of Operation	Full Duplex, 100% duty cycle		
Cabinet Size	22.06" W x 75.82" H (without leveling feet) x 27.06" D		
RF/Modem Assembly Size	(Rackmount) 19.0" W x 10.5.0" H x 12.5" D + 2.0" connector allowance		
Power Supply Assembly Size	(Rackmount): 19.0" W x 3.5"H x 11" D		
Frequency Stability	1.0 ppm (-4°F to +140°F / -20°C to +60°C)		
Supply Voltage	120 VAC / 6A max, 60 Hz to 13.8 VDC or 13.8 VDC nominal, negative ground (12.6 to 14.6 VDC range)		
Circuit protection (radio backplane)	Main fuse (F1): Blade fuse (Maxi-Fuse) 10A : Crowbar diodes for reverse polarity protection		
RX Current Consumption @ 13.8 VDC	TBD max. (Receiver with speaker monitoring)		
TX Current Consumption @ 13.8 VDC	24A (22A DC typical @ 450 MHz for 100W)	28A (23A DC typical @ 850 MHz for 70W)	
Operating Temperature Range	-22°F to +140°F / -30°C to +60°C (Deleted power supply, catalog number with 0 in second to last digit) +14°F to +140°F / -10°C to +60°C (with standard Dual Power Supply assy., catalog number with 2 in second to last digit)		

Modem / Network

User Interface	• Dual Ethernet RJ45 Auto MDIX 10-100/T with LED status indicators • Dual RS-232 DB-9F Serial Ports configured as Terminal Servers • USB Port (future use)			
Addressability	Native TCP/IP and built-in router			
Data Encryption	AES 128-bit			
Protocols	• Dataradio Proprietary E-DBA with OOB AAVL support • Ethernet IEEE 802.3, (ICMP, IGMP, TCP, UDP) • IP Fragmentation, Address Resolution Protocol (ARP) • IP directed broadcast, IP limited broadcast, IP multicast relay • DHCP client and server • Network Address Translation (NAT), Dynamic Routing (RIPv2)			
Data rates	12.5 kHz ch.:	25 kHz ch.:	50 kHz ch.:	NPSPAC ch.:
	32 kbps 24 kbps 16 kbps	64 kbps 48 kbps 43.2kbps 32 Kbps	128 kbps 96 kbps 64 Kbps	32 kbps 24 kbps 16 kbps

Radio	UHF 25kHz Channel	700MHz 50 kHz Channel	700MHz 25/12.5 kHz Channel	800MHz Channels
Receiver Sensitivity (For 1% Packet Error Rate (PER) with Parallel Decode at carrier frequency)	TBD	TBD	TBD	TBD
Selectivity (@ 25kHz)	TBD	TBD	TBD	TBD
Spurious Response Rejection	100 dB (Typical)			
Intermodulation Rejection - EIA (25 kHz)	85 dB (Typical)	80 dB (Typical)	80 dB (Typical)	75 dB (Typical)
Receiver Frequency range	403 – 512 MHz	794 - 806 MHz		806 – 824 MHz
Transmitter Frequency range	403 – 512 MHz	764 - 776 MHz		851 – 869 MHz
Power Output (user adjustable)	TBD (50-100W)	TBD (35-70W)		
Spurious Emissions: - transmit	-36 dBm to 1 GHz, -30 dBm to 4 GHz (to 3.2GHz for 800/900 model)			
- standby	-57 dBm to 1 GHz, -47 dBm to 4 GHz ((to 3.2GHz for 800/900 model))			
VSWR Stability	5:1 mismatch			

***** The data sensitivity and selectivity figures for UHF-125 kHz channel are preliminary.

FCC / IC CERTIFICATIONS		FCC (Part 90)	IC (DOC, RSS119)
UHF	400 – 520 MHz	TBD (PA) TBD(0.2W Exciter)	TBD TBD(0.2W Exciter)
800 MHz	850 – 870 MHz	TBD (PA) EOTBDD4-EXT8 (0.2 Watts Exciter)	TBD 773A-BDD4-EXT8 (0.2 Watts Exciter)
700 MHz	764 – 776 MHz	TBD (PA) TBD(0.2 Watts Exciter)	

EMISSION DESIGNATORS

Bit rate	Baud rate	Modulation	UHF	700MHz	800MHz
64000	16000	SRRC16FSK	TBD	TBD	13K6F1D (G)[1]
48000	16000	SRRC8FSK	TBD	TBD	13K6F1D (G)
43200	14400	SRRC8FSK	TBD	TBD	13K4F1D (G)
32000	18000	SRRC16FSK	TBD	TBD	10K0F1D (H)[2] 8K17F1D (D)[3]
24000	8000	SRRC8FSK	TBD	TBD	10K0F1D (H) 8K17F1D (D)
16000	8000	SRRC4FSK	TBD	TBD	10K0F1D (H) 8K17F1D(D)

[1] FCC/IC mask G (800MHz, 25kHz ch.)

[2] FCC mask H (800MHz, NPSPAC ch.)

[3] IC mask D (800MHz, 12.5kHz ch.)