NTXXXXXX

Internet Broadband Wireless Access

Internet BWA System 3200
User guide

Draft   Rel 3.0   October 2000

What's inside...

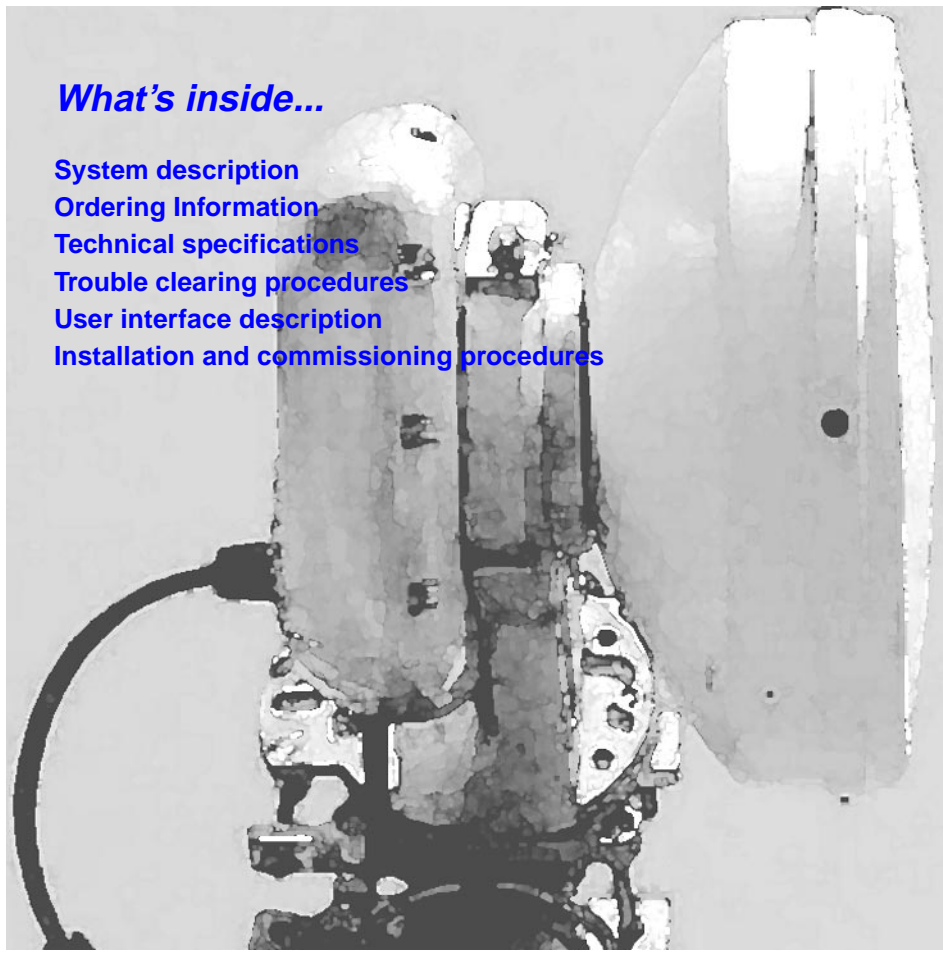**System description**
Ordering Information
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List of procedures

About this document

This section provides an overview of the Internet BWA System 3200 user guide.

Audience

This document is intended for:

*   installers
*   system line-up and test (SLAT) engineers/technicians
*   maintenance engineers

User interface conventions

The following conventions are used in procedures in this document.

bold	Bold entries identify a command or a userID entered by means of the craft interface terminal (CIT).
↵	This symbol means the return key must be pressed.
Bold	Bold entries with initial capital letters identify buttons, fields and menu items as seen on the user interface screen.

System description

This document describes the Internet BWA System 3200.

Overview

The Internet BWA System 3200 establishes high-speed, reliable point-to-point wireless links. The Internet BWA System 3200 uses a 4-FSK modulation scheme and carries up to four E1 (2.048 Mbits/s) or up to four DS1 (1.544 Mbits/s) signals.

Frequency band

The Internet BWA System 3200 operates in the 15, 18, 23, 24/26, 28, 31 and 38 GHz frequency ranges.

Capacity

The capacity upgrade is software programmable from 2xE1 to 4xE1 and from 1xDS1 to 2xDS1 to 4xDS1. The capacity upgrade affects traffic because the upgrade changes the following parameters:

- occupied bandwidth
- receive baseband filters
- data rate of operation

Table 1-1 lists the bandwidths for the radio frequency (RF) channels.

Table 1-1
RF channel bandwidths

Capacity	Channel bandwidth (MHz)
2 x E1	3.5 (for all frequencies)
4 x E1	7.0 (for all frequencies)
1 or 2 x DS1	2.5 (for all frequencies)
4 x DS1	5.0 (for all frequencies)

For systems with a specific capacity (for example, a 4 x E1 capacity), the activation of a new tributary within that capacity is software programmable, either locally or remotely. The activation of a new tributary within an existing capacity does not cause any errors to the existing traffic. Inactive tributaries do not cause alarms.

Frequency plan

Frequency plans are in accordance with:

- current ITU-R recommendations and annexes as applicable for international products
- FCC rules, part 101 (as amended on October 1, 1997, replaces parts 21 and 94)
- Industry Canada (SRSP-314.5, SRSP-318.5, SRSP-321.8) for North American products

Table 1-2 lists the frequency plans.

Table 1-2
Frequency plans

Frequency band	15 GHz	18 GHz	23 GHz	24/26 GHz	28/29 GHz	31 GHz	38 GHz
Frequency range (MHz)	14.4- 15.35	17.7- 19.7	21.2- 23.6	24.25- 26.5	27.5- 29.5	31.0- 31.3	37.0- 40.0

System features

The Internet BWA System 3200 provides:

- scalable channel capacity to precisely match traffic volume
- scalable channel selection (digital synthesizer set in 250 kHz steps)
- selectable AMI or B8ZS line coding for DS1 signals (E1 signals use HDB3 coding only)
- selectable framing type (Unframe, Frame or ESF for DS1 signals)
- hand-held wireless terminal to perform configuration, maintenance, and performance monitoring of the outdoor unit (ODU)
- receive signal strength indicator (RSSI) on the outdoor unit to guide service personnel in antenna alignment
- forward error correction (FEC) and link ID codes
- common ODU and frequency synthesizer to minimize the number of spare units and cost
- simple installation and maintenance from the "twist and lock" design of the outdoor unit.

Equipment layout and main assemblies

The Internet BWA System 3200 includes an outdoor unit (ODU), an antenna and a mounting assembly (see Figure 1-1). A terminal site requires one Internet BWA System 3200 to handle the radio signals for both the east and west directions.

Figure 1-1
Internet BWA System 3200—physical layout

MOP0082t.eps

Outdoor unit

Antenna

Interface cable assembly
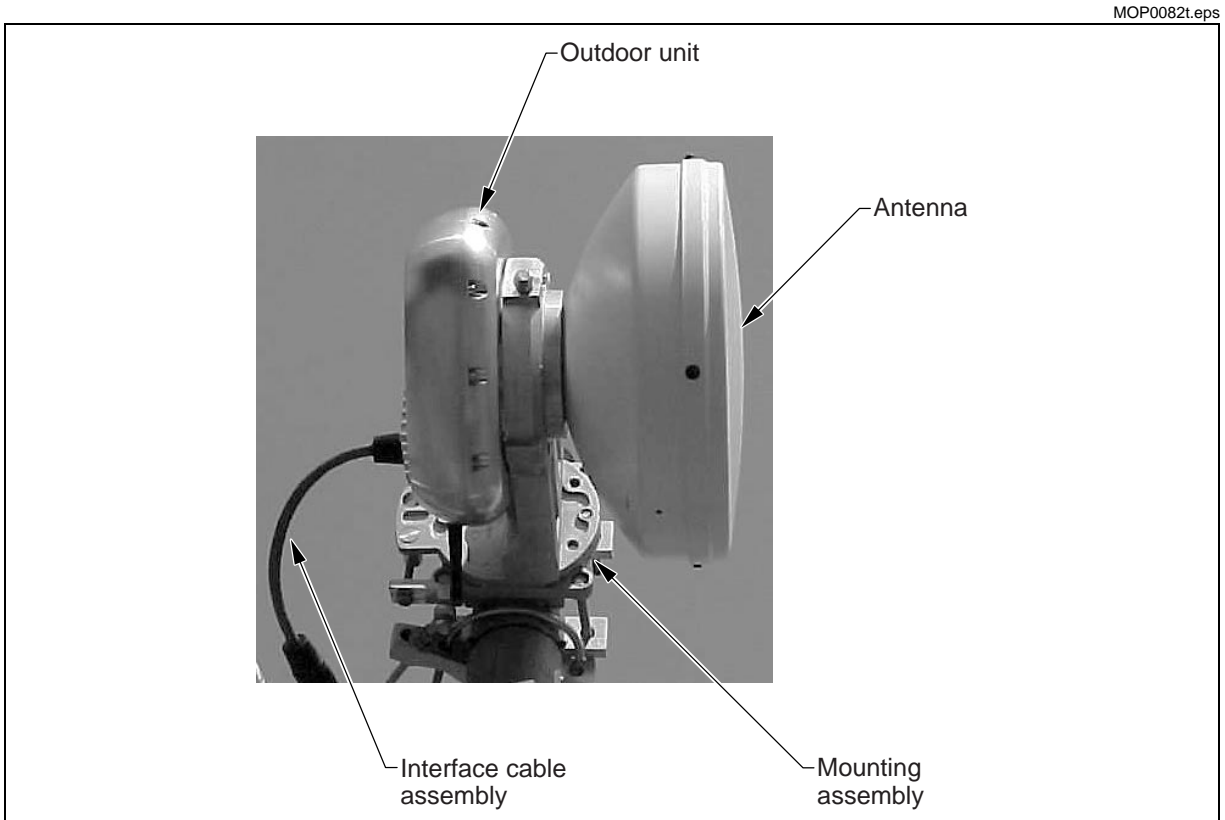
Mounting assembly

Outdoor unit
The outdoor unit contains a Modem, an RF module, a power supply and a remote communication link. Removal of the outdoor unit is possible without the need to realign the antenna.

Mounting assembly
The Internet BWA System 3200 includes a mounting assembly to hold the radio to a pipe mount. The mounting assembly design provides three 30° elevation adjustment increments for a 90° elevation adjustment range. The mounting assembly design also provides two 45° azimuth adjustment increments for a 90° azimut adjustment range.

Terminal signal flow

This description covers the signal flow for a 38 Ghz frequency plan. Figure 1-2 shows a block diagram of the Internet BWA System 3200 components.

Figure 1-2
Internet BWA System 3200 components—block diagram

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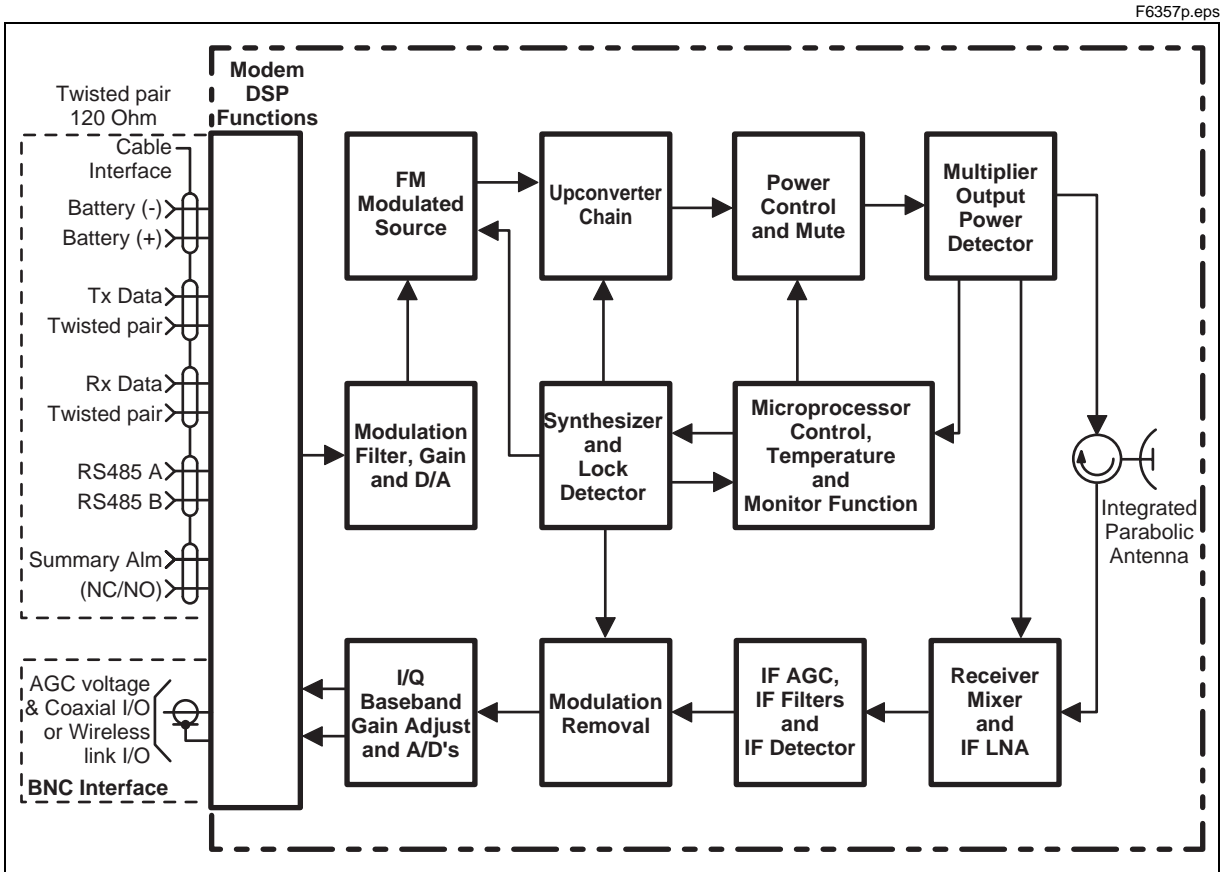
Transmit signal path

The transmitter side of the RF module consists of a frequency modulated source at the T/R spacing frequency of 1260 MHz. The output of the frequency-modulated source is then upconverted to an X-Band frequency by a local oscillator that can be set for low side or high side injection. Next the RF signal is multiplied to a frequency within the operating band of 37.0 to 39.5 GHz.

Harmonic mixing using a local oscillator (LO), at half the output transmit frequency, down-converts the incoming remote site RF input signal to an IF of 1260 MHz. Internal RF frequency settings will determine if the RF input signal frequency is above or below the transmitter RF frequency. NRZ baseband modulation is imparted on and recovered from the 38 GHz carrier via a proprietary scheme that permits using a single multi-channel frequency synthesizer.

Receive signal path
An analog AGC voltage is applied in the IF circuitry under microprocessor control to reduce the dynamic range of the A/D input signal. Both broadband and narrow-band detection is employed. Broadband detection is analog detection at 1.26 GHz. Narrow-band detection is within the DSP. This design enables the receiver to cope with large adjacent channel signal levels and provides excellent A/D dynamic range to recover the desired signal.

System interfaces

Figure 1-2 shows the interfaces on the outdoor unit (ODU).

Figure 1-3
Outdoor unit interfaces

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Ground connection

Polarization indicator (2 places)

Interface cable pins

Port for coaxial I/O and wireless link I/O

Top View

Mounting screw (4 places)

Bottom View
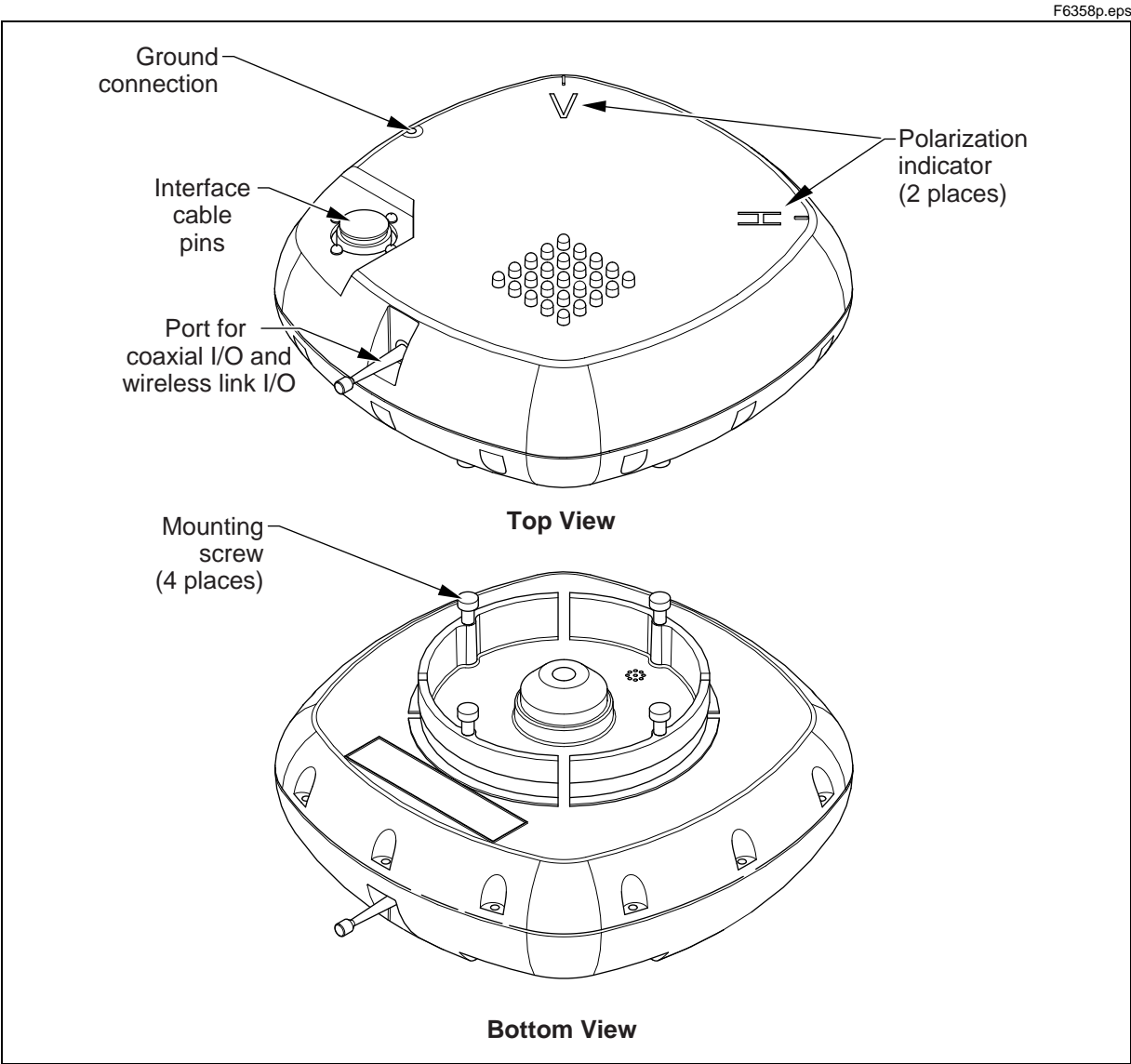
Interface cable pins

The interface cable pins connect:

- Up to four E1 lines (120 Ohm, balanced) or up to four DS1 lines (100 Ohm, balanced)
- DC power
- alarm telemetry information
- two relays for summable and programmable alarms
- two dry-contact (Form-C) relay outputs that report on link performance and critical alarms

Hand-held terminal interface

The Internet BWA System 3200 includes an optional wireless hand-held terminal (HHT) that operates with batteries. The HHT communicates with the Internet BWA System 3200 using an unlicensed 433.92 MHz channel.

To support this channel, both the HHT and the outdoor unit (ODU) have radio 433.92 MHz transceivers and matching whip antennas. You can use the HHT to set and control, and to monitor the following features:

- receive signal strength indicator (RSSI) for antenna alignment
- Transmit Mute
- Transmit Modulation
- Transmitter Frequency
- Receiver Frequency
- radio frequency (RF) Filter Bandwidth
- bit error rate (BER)
- Link ID
- ODU Temperature
- Software Revision
- Fault Alarms

Ordering Information

This chapter describes the ordering information for the Internet BWA System 3200.

Detailed equipment codes

Table 2-1 to Table 2-4 provides information on the different types of equipment and kits. Table 2-5 provides information on rules. These rules correspond to the number in the "Eqpt rule" column in Table 2-1 to Table 2-4.

Table 2-1
18 GHz equipment

Equipment description	PEC	CPC	Eqpt rule
ODU iBAR100 18GHz, A-1,T1	NTHV50DA	A0833177	1.1
ODU iBAR100 18GHz, A-2,T1	NTHV50DB	A0833178	
ODU iBAR100 18GHz, B-1,T1	NTHV50DG	A0833180	
ODU iBAR100 18GHz, B-2,T1	NTHV50DH	A0833181	

Table 2-2
23 GHz equipment

Equipment description	PEC	CPC	Eqpt rule
ODU iBAR100 23GHz, A-1,T1	NTHV50GA	A0833182	1.1
ODU iBAR100 23GHz, A-2,T1	NTHV50GB	A0833183	
ODU iBAR100 23GHz, B-1,T1	NTHV50GG	A0833184	
ODU iBAR100 23GHz, B-2,T1	NTHV50GH	A0833185	

Table 2-3
Antennas

Equipment description	PEC	CPC	Eqpt rule
15GHz 60cm high performance antenna	NTHV30BC	A0832988	1.1
15GHz 120cm high performance antenna	NTHV30BE	A0832975	
18GHz 60cm high performance antenna	NTHV30DC	A0832976	
18GHz 120cm high performance antenna	NTHV30DE	A0832977	
23GHz 60cm high performance antenna	NTHV30GA	A0832974	
23GHz 60cm high performance antenna	NTHV30GB	A0832978	
23GHz 120cm high performance antenna	NTHV30GC	A0832981	
26GHz 30cm high performance antenna	NTHV30KA	A0832980	
26GHz 60cm high performance antenna	NTHV30KC	A0832979	
28GHz 30cm high performance antenna	NTHV30MA	A0832982	
28GHz 45cm high performance antenna	NTHV30MB	A0832984	
28GHz 60cm high performance antenna	NTHV30MC	A0832985	
38GHz 30cm high performance antenna	NTHV30UA	A0832986	
38GHz 60cm high performance antenna	NTHV30UC	A0832987	

Table 2-4
Miscellaneous equipment

Equipment description	PEC	CPC	Eqpt rule
Interface mounting bracket	NTHV??	A	
ODU cable end connector	NT	A	
433 MHz whip antenna (variable length)			
Wireless hand-held unit (with 2x 433 MHz Antenna)			
Multi-conductor interface cable			
Alignment Accessory kit:			
Test cable, 3200-2312 (Female reverse SMA to male BNC)			
Note: Nortel can supply additional cabling as required to support site or job applications. For more information about cabling availability, contact your Nortel Networks sales representative.			

Table 2-5
Equipment rules

Rule No.	Description
1.1	
—**end**—	

Technical specifications

Tables 3-1 to 3-3 contain the technical specifications for the Internet BWA System 3200.

Mechanical and environmental specifications

Table 3-1 provides the mechanical specifications for the Internet BWA System 3200.

Table 3-1
Physical, electrical and environmental specifications

Dimensions	281 mm W x 281 mm H x 83 mm D
	11 in. W x 11 in. H x 3.25 in. D
Weight	5 kg (11 lb)
Input voltage	±20 to ± 60 Vdc
Power consumption	25 W
Operating temperature	-33 to +55°C (-27 to 131°F)
Storage temperature	-40 to +70°C (-40 to 158°F)
Relative humidity	Up to 100% under all weather conditions
ODU-IDU cable length	250 m with a nominal ±48 Vdc supply voltage
Regulatory requirements	FCC Part 101, FCC Part 15, UL, CSA

Equipment interface specifications

Table 3-2 contains the interface specifications for the Internet BWA System 3200.

Table 3-2
Digital interface

Tributary Rate	1.544 Mbps per ITU-T G.703
Line Code	B8ZS or AMI
I/O Impedance	100 ohms balanced and terminated by a connector
Payload (programmable)	1 x DS-1, 2 x DS-1, 4 x DS-1
Channel Bandwidth	2.5 MHz, 2.5 MHz, 5 MHz

Frequency plan specifications

Frequency plans are in accordance with the current ITU-R Recommendations and their Annexes as applicable for International products, and in accordance with FCC rules, Part 101 (as amended on October 1, 1997) (replaces Part 21 and Part 94) and Industry Canada (SRSP-314.5, SRSP-318.5, SRSP-321.8) for North American products.

The following ETSI frequency bands (GHz) are offered

Frequency band (GHz)	FCC	Industry Canada	ITU-R
15	Part 101 (amended on October 1, 1997)	SRSP-314.5, SRSP-318.5, SRSP-321.8	EN 301 128
18			EN 301 128
23			EN 300 198
24/26			ETS 300 431
28			ETS 300 431
38			EN 300 197

System performance specifications

Table 3-3 contains the system performance specifications for the Internet BWA System 3200.

Table 3-3
Frequency plans and reliability

Frequency Band	15GHz	18GHz	23 GHz	24/26 GHz	28/29 GHz	31 GHz	38 GHz
Frequency Range (MHz)	14.4-15.35	17.7-19.7	21.2-23.6	24.25-26.5	27.5-29.5	31.0-31.3	37.0-40.0
Channel Selection Software: set in 250 kHz steps							
Frequency Source: Digital synthesizer							
Frequency Stability: ±10 ppm							
Modulation: 4-level frequency shift keying (FSK)							
Residual BER: ≤ 10							
Forward Error Correction (FEC): Reed Solomon							
System Gain at 10^{-6} BER							
1 x DS-1 (BW=2.5 MHz)	109	109	111	109	107	107	107
2 x DS-1 (BW=2.5 MHz)	106	106	105	105	104	104	103
4 x DS-1 (BW=5 MHz)	103	103	102	102	101	101	100
RF Power Output* (dBm)	+18	+18	+18	+17	+16	+16	+16
Power Control Range (dB)	up to 30	up to 30	up to 30	up to 30	up to 25	up to 25	up to 25
Power Control Range Resolution: -In steps of 1 dB							
Rx Threshold at 10^{-6} BER (dBm)							
1 x DS-1 (BW=2.5 MHz)	-91	-91	-91	-91	-91	-91	-91
2 x DS-1 (BW=2.5 MHz)	-88	-88	-87	-87	-86	-86	-85
4 x DS-1 (BW=5 MHz)	-85	-85	-84	-84	-83	-83	-82

Trouble clearing procedures

This chapter contains information for fault locating, testing, and clearing alarms for the Internet BWA System 3200.

Testing the Radio faults

The Internet BWA System 3200 has three types of loopback tests for fault isolation.

RF Loopback test

This loopback retunes the receiver to the transmit frequency. RF leakage through the diplexer assembly prompts the local receiver to synchronize with the local transmitter. This loopback test provides an unambiguous check of all active circuitry in the Internet BWA System 3200.

Unwanted emissions are squelched by the transmit diplexer (out-of-band of the RF bandpass filter). This loopback test is used for troubleshooting purposes. To use this function, refer to Chapter 5, "User interface description".

Loopback test for the local tributary

Loops the tributary input (data from customer) back onto tributary output (data to customer) at local terminal. This test checks connection to the customer equipment. To use this function, refer to Chapter 5, "User interface description".

Loopback test for the remote tributary

Loops the remote tributary output (data to customer) back into remote tributary input. This test checks the radio link operation. This loopback test does not include the remote tributary line driver or the remote tributary line receiver. To use this function, refer to Chapter 5, "User interface description".

Clearing the Radio alarms

Table 4-1 lists the Internet BWA System 3200 alarms, an explanation of the alarm, the probable cause, and the action required to clear it.

Table 4-1
iBAR-100 system alarms

Alarm	Explanation	Probable cause	Action required
Tributary *N* Tx LOS	The Internet BWA System 3200 cannot detect a signal at the tributary input.	Defective customer equipment connected to Internet BWA System 3200.	Verify customer equipment. Replace if defective.
		Internet BWA System 3200 cable is disconnected.	Connect cable.
		The cable from customer test set to Internet BWA System 3200 is disconnected.	Connect test set cable.
Tx low output power	Far-end radio is reporting that the RSSI from the local radio is too low	Insufficient Tx power setting at the local site.	Increase Tx power setting at the local site.
		Atmospheric problems	Wait for the end of atmospheric problems
Rx Frame Loss (radio)	The receiver has detected a loss of frame condition on the Radio channel.	There is a Tx failure at the far-end site.	Check for other alarms in the system.
		Severe propagation (RSSI is very low).	Check that the Tx power is set correctly at the far-end site.
			Check the RF cables.
			Wait for the end of propagation activity.
Low RSSI	The performance degradation threshold has been crossed.	Minor propagation activity.	If the RSSI is lower than the threshold, wait for the end of propagation activity.
		Waveguide or RF connector is incorrectly installed.	Verify the waveguide and cabling connection.

Table 4-1 (continued)
iBAR-100 system alarms

Alarm	Explanation	Probable cause	Action required
		Equipment failure.	If the RSSI is identical to the expected value, and the alarm remains active for a long period of time, then a component may be defective. If necessary, replace the ODU at the local site or the far-end site.
Tributary N Rx AIS	The Internet BWA System 3200 is receiving an AIS signal from the far-end radio.	Defective customer equipment at tributary N at the far-end. The far-end radio has a Tributary *N* Tx LOS alarm at tributary N.	Verify customer equipment. Replace if defective.
AFC Loop OOL	The automatic frequency control (AFC) loop is out of loop.		
AGC Loop OOL	The automatic gain control (AGC) loop is out of loop.		
TX synthesizer OOL	There is a failure of the Tx synthesizer.	The Tx synthesizer is defective.	Reset the Tx frequency. Replace the ODU.
RX synthesizer OOL	There is a failure of the Rx synthesizer.	The Rx synthesizer is defective.	Reset the Rx frequency or replace the ODU.
Temperature over-range or under-range	The temperature of the unit is above or below the safe operating range.		
Frame-Alignment-Word (FAW) mismatch	The far-end radio is not transmitting the correct FAW (link ID).	The far-end radio was not commissioned with the same FAW as the local radio.	Commission the two radios to have the same FAW.

Alarm interface pins

The alarm interface pins refer to pins 12, 18 and 23 from the 31-pin interface on the ODU (see Table 4-2).

Table 4-2
Pin assignments for the 31-pin interface

Pin	Description	Pin	Description
1	Case Gnd	17	RX Tributary 3 Ring
2	Reserved	18	Summary Alarm relay (NC)
3	TX Tributary 1 Tip	19	TX Tributary 4 Tip
4	TX Tributary 1 Ring	20	TX Tributary 4 Ring
5	RX Tributary 1 Tip	21	RX Tributary 4 Tip
6	RX Tributary 1 Ring	22	RX Tributary 4 Ring
7	RS 485+	23	Alarm relay Common (CC)
8	TX Tributary 2 Tip	24	DC Power Conn#1
9	TX Tributary 2 Ring	25	RS422 RX+
10	RX Tributary 2 Tip	26	RS422 RX-
11	RX Tributary 2 Ring	27	DC Power Conn#2
12	Programmable Alarm Relay (NC)	28	RS422 TX-
13	RS 485-	29	RS422 TX+
14	TX Tributary 3 Tip	30	DC Power Conn#2
15	TX Tributary 3 Ring	31	DC Power Conn#1
16	RX Tributary 3 Tip		

The descriptions of the alarm pins in Table 4-2 on page 4-4 are:

- summary alarm relay (pin 18):
  - activates when any of the alarms in Table 4-1 on page 4-2 are active
  - the relay contact is open in normal condition and closes in alarm condition
- programmable alarm relay (pin 12):
  - activates when a programmed alarm is on. A programmed alarm can be any of the alarms in Table 4-1 on page 4-2 (as provisioned by the customer)
  - The relay contact is closed in normal condition and open in alarm condition
- Alarm relay common (pin 23):
  - common (ground) contact for both pins 12 and 18

Warranty and field support

This section covers warranties and technical support information.

Warranties

Nortel Networks Public Networks Division warrants products to be free from defects in material and workmanship for a period of:

- twelve (12) months from the date of shipment on a "furnish only" basis
- twelve (12) months from the date of acceptance or eighteen (18) months from the date of shipment for material supplied on an engineer, furnish and install (E, F, and I) basis, whichever is the shorter period

Standard return service

A replacement unit is shipped prepaid to the customer. During normal business hours, you can call the repairs and emergencies department and receive authorization to return the defective item.

After marking the item with the assigned repair order number and a description of the fault, ship the item prepaid to:

For customers in Canada:
Nortel Networks
9300 Trans Canada Highway
St. Laurent, QC
H4S 1K5
Att: Repairs and Emergencies, Dept. 4350

Tel: 1-888-594-8474 (English or French)
Select option 3 for Radio

For customers in the United States:
Nortel Networks
917 Air Park Center Drive
Nashville, TN
37217
Att: Repair and Return

Tel.:   1-800-251-1758

For customers in the Caribbean and Latin America:
Nortel Networks (CALA)
1500 Concord Terrace
Sunrise, FL
U.S.A.
33323-2815
Att: Repair Coordinator

Tel.:   (954) 851-8449

For customers in China:
Nortel Networks China Limited
11/F, Nortel Tower, Sun Dong An Plaza
No.138, Wang Fu Jing Street
Beijing 100006, China

Tel: 86-10-6528 8877
Fax: 86-10-6528 0701
        86-10-6528 0702

For customers in Australia:
Nortel Networks Distribution Centre
Unit 2, Parklands Estate
21 South Street
Rydalmere NSW Australia 2116

Tel: 612-9325-5301
Fax: 612-9937-7154

For customers in Singapore:
Nortel Networks Singapore Pte. Ltd.
c/o Emery Worldwide
4, Changi South Lane
Nan Wah Building
Singapore 486127

Tel: (61) 2 8870 5480 (Sydney)
Fax: (61) 2 8870 7154 (Sydney)

For customers in the Philippines:
Nortel Philippines Repair Center
c/o Skyfreight Forwarders Inc.
AEI Liaison Office
Ninoy Aquino Avenue
Paranaque, Metro Manila
Philippines

Tel: (632) 917-4401
Fax: (632) 917-4145

48-hour emergency service

During and after normal business hours, you can call the repairs and emergencies department:

• United States: 1-800-423-9658

• Canada: 1-800-361-2575

Request an emergency replacement and provide:

• your name

• your company name

• your telephone number

• your exact unit code and name

• your shipping address

The repair coordinator assigns a repair order number that must be marked on the unit being returned. Ship the unit prepaid to the same address as the standard repair service. At the same time, Nortel Networks will ship an identical replacement unit prepaid to within 48 hours.

Technical support and information

The support that the service centers provide includes:

• emergency support for a service-affecting problem

• trouble clearing guidance

• product maintenance support

• retrofit procedure inquiries

• support for hardware and software issues

• explanation and clarification of Nortel Technical Publication (NTP) documentation.

Customers can direct requests for additional information to the nearest technical assistance service center (see Table 4-3).

Table 4-3
Technical assistance service centers

For problems that affect service	
For 24-hour emergency recovery or software upgrade support for: • restoration of service for equipment that has been carrying traffic and is out of service • issues that prevent traffic protection-switching • issues that prevent completion of software upgrades • restoration of service for equipment that has been carrying traffic and is experiencing signal degradation	United States: 1-800-275-3827 (1-800-ASK-ETAS)
	Canada: 1-800-361-2465
	International: 770-708-4985
For problems that do not affect service	
For 24-hour support for: • issues that require immediate assistance • technical support and upgrade notification (8 a.m. to 10 p.m. EST only).	United States: 1-800-275-8726 (1-800-ASK-TRAN)
	Canada: 1-800-361-2465
	International: 770-708-4981

Fax-on-demand service
Customers can obtain technical information about selected Nortel Networks TransportNode products through the 24 hour fax-on-demand telephone service. In the United States and Canada, customers can reach this service at the following toll-free number: 1-800-451-1685.

User interface description

This chapter describes how to use wireless hand-held terminal (HHT). The HHT operates on batteries and allows quick and easy monitoring and changes to the system parameters of the Internet BWA System 3200.

Hand-held terminal description

The HHT can operate within 75 meters (225 feet) of the ODU. The LCD display provides visual access to a series of system software menus and parameters on two lines of 16 characters each.

The HHT gives access to a series of menus with provisioning, monitoring, control, maintenance and query commands for the Internet BWA System 3200.

- The HHT remains active until the user logs off or the HHT loses communication with the Internet BWA System 3200.

- When viewing or setting parameters, the HHT powers down 60 seconds after the last entry.

- Under normal operating conditions, normal battery life is 25 hours with the use of industrial-grade alkaline cells, .

- The HHT can lock up when the batteries are weak or not correctly installed. If the HHT locks up, remove and insert the batteries again.

- If you enter incorrect data, "Invalid Value" appears on the LCD.

The circuit is usually in a muted state. The channel opens when the HHT issues a command. The HHT can communicate to the ODU of the Internet BWA System 3200 with the use of either:

- a wireless channel (418 MHz or 433.92 MHz channel with the use the of whip antennas on the ODU and on the HHT)

- a coaxial cable (RG-58U cable) that connects between the ODU and the HHT

Refer to Figure 1-3 on page 1-5 for the location of the wireless link or coaxial I/O port.

Hierarchy of the HHT menus

The HHT user interface is menu driven. The menus allow you to set and view the parameters for the local and the far-end radios. Figure 5-1 shows the hierarchy of the HHT menus.

Figure 5-1
The HHT menus hierarchy
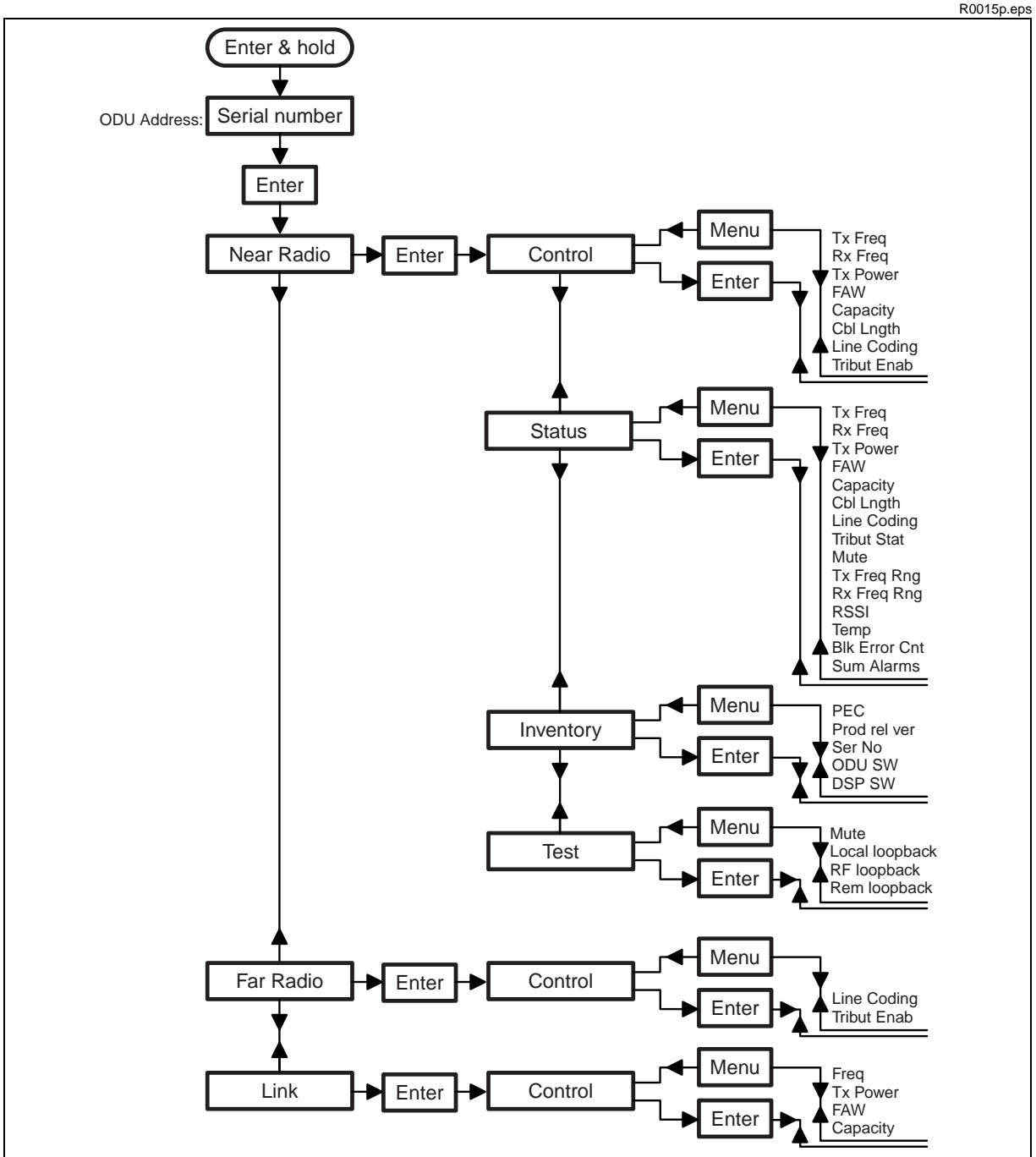
Functions of the HHT keypad keys

As Figure 5-1 shows, the menu items are:

- Near Radio
- Far Radio
- Link

The submenu items are:

- Control
- Inventory
- Status
- Test

After you enter the radio terminal address, the "Near Radio" menu is the default menu item. Table 5-1lists the HHT keypad keys with the keypad key functions.

Table 5-1
HHT keypad keys

Key	Press this key to...
↓	scroll through all the menu or submenu items scroll through all the parameters within a submenu
ENTER	access a submenu within a menu item (see Figure 5-1) access the parameters within a submenu enter new values for the parameters
MENU	return to the previous menu or submenu items
BACK SP	delete a keypad entry

Parameters for the Near Radio menu

This section describes the parameters within the submenus of the "Near Radio" menu item

Control submenu

This section lists the parameters within the "Control" submenu of the "Near Radio" menu. The "Control" submenu allows you to change to the parameters.

Tx Freq
To enter a value to set the transmit RF frequency (in MHz).

Values: see Chapter 3, "Technical specifications" for channel centers

Rx Freq
To enter a value to set the receive RF frequency (in MHz).

Values: see Chapter 3, "Technical specifications" for channel centers

Tx Power
To enter a value to set the transmit power level in dBm.

Values: **18** to **XX** dBm (15/18/23 GHz) Recommended: **20 dBm**
                    17 to **XX** dBm (24/26 GHz) Recommended: **20 dBm**
                    16 to **XX** dBm (28 GHz) Recommended: **20 dBm**
                    16 to **XX** dBm (31/38 GHz)Recommended: **20 dBm**

FAW
To enter a value to select one of eight possible frame alignment words (FAW) in the radio frame. This is also used as the Link ID. Both near end and far end radios must have the same FAW. The Internet BWA System 3200 only processes a frame that contains the correct FAW.

Values: **0** to **7**

Capacity
To enter a value to set the number of tributaries that the radio can multiplex into the main channel. See also the "Tribut Enab" parameter for this submenu.

Values: **2:** include tributaries 1 and 2
                    4: include all tributaries (tributaries 1 to 4)

Cbl Lngth
To enter a value to indicate the length of the cable in meters. This parameter applies for DS1 systems only.

Values: **0** to **40, 41** to **80, 81** to **121, 122** to **162, 163** to **200**

Line Coding
To enter a value to select AMI or B8ZS coding for all tributaries. This
parameter applies for DS1 systems only. For an E1 system, the line coding is
always HDB3.

Values: **0: AMI**
                     1: B8ZS

Tribut Enab
To enter a value to enable or disable tributaries 1 ot 4. A disabled tributary has
no alarms. This parameter has two or four screens (one for each tributary) that
refer to the "capacity" setting for the radio. See also the "Capacity" parameter
in this submenu.

Values: **0: disable**
                     1: enable

Status submenu

This section lists the parameters within the "Status" submenu of the "Near
Radio" menu. The "Status" submenu allows you to only view to the
parameters.

Tx Freq
To view the transmit RF frequency (in MHz).

Rx Freq
To view the receive RF frequency (in MHz).

Tx Pwr
To view the transmit power level in dB.

Values: **40** dB (15/18/23 GHz)
                     30 dB (24/26/28 GHz)
                     25 dB (31/38 GHz)

FAW
To view the assigned frame alignment word (FAW) in the radio frame.
Values: **0** to **7**

Capacity
To view the number of tributaries that the radio can multiplex into the main
channel.

Values: **2:** include tributaries 1 and 2.
                     4: include all tributaries (tributaries 1 to 4)

Cbl Lngth
To view the length of the cable in meters. This parameter applies for DS1
systems only.

| **Values:** | **0** to **40, 41** to **80, 81** to **121, 122** to **162, 163** to **200** |

Line Coding
To view the DS1 line coding parameter (AMI or B8ZS) for all tributaries in the
system. For an E1 system, the line coding is always HDB3.

| **Values:** | **0:** AMI |
| | **1:** B8ZS |

Trib Stat
To view the status of tributaries 1 to 4. This parameter has two or four screens
(one for each tributary) that refer to the number of tributaries that the radio can
receive.

| **Values:** | **0: disable** |
| | **1: enable** |

Mute
To view the status of the transmitter output.

| **Values:** | **0:** the Tx output is enabled |
| | **1:** the Tx output is muted (disabled) |

Tx Freq Rng
To view the transmit frequency range.

| **Values:** | 17.7 & 19.7 (18 GHz) |
| | 21.2 & 23.6 (23 GHz) |

Rx Freq Rng
To view the receive frequency range.

| **Values:** | 17.7 & 19.7 (18 GHz) |
| | 21.2 & 23.6 (23 GHz) |

RSSI
To view the received signal strength indication (RSSI) value in dBm.

| **Values:** | 0 to -86/89 dBm (18 GHz with 4/2 tributaries) |
| | 0 to -85/88 dBm (23 GHz with 4/2 tributaries) |

Temp
View the internal temperature of the ODU.

| **Values:** | -128 to +127 °C |

Blk Error Cnt
To view the cumulative block error count from the FEC decoder. At this parameter, the system first reads the counter and then clears it.
Values:

Sum Alarms
To view all active alarms. You can scroll through each active alarm. Refer to Chapter 4, "Trouble clearing procedures" for the alarm definitions.

Values: **Temperature overrange**
        Temperature underrange
        Tx low output power
        Rx frame loss
        Low RSL
        AFC loop OOL
        AGC loop OOL
        Tx synthesizer OOL
        Rx synthesizer OOL
        FAW error alarm
        Data link alarm
        Tributary 1 Tx LOS
        Tributary 2 Tx LOS
        Tributary 3 Tx LOS
        Tributary 4 Tx LOS
        Tributary 1 Rx AIS
        Tributary 2 Rx AIS
        Tributary 3 Rx AIS
        Tributary 4 Rx AIS

Inventory submenu

This section lists the parameters within the "Inventory" submenu of the "Near Radio" menu.

PEC
Displays the ODU PEC code

Product rel ver
Displays the ODU release version

Serial No.
Displays the ODU serial number

ODU SW
Displays the version number of the ODU controller software . The number has an implied decimal point before the last two digits (for example: 110 = version 1.10)

DSP SW
Displays the serial number of the digital signal processing (DSP) software.
This is the version number in the revision register of the field programmable
gate array (FPGA) .

Values: **0 to 255**

Test submenu

This section lists the parameters within the "Test" submenu of the "Near
Radio" menu. The test menu allows you to disable the transmitter to perform
loopback tests.

Tx Mute
To enable or disable the transmitter.

Values: **0:** enable the Tx output
                     1: disable (mute) the Tx output

local loopbk
To loopback local tributaries 1to 4. Loops the tributary input (data from
customer) back onto tributary output (data to customer) at local terminal. This
test checks connection to the customer equipment. This parameter has two or
four screens that refer to the "capacity" setting for the radio.

Values: **0:** disabled
                     1: enabled

RF loopbk
When you enable the RF loopback, the system changes the Rx frequency to
match the Tx frequency. The system also changes the FAW to a different value
in order to disable reception from the far-end radio. When you disable the RF
loopback, the radio switches back to the original Rx frequency and FAW.

Values: **0:** disable RF loopback
                     1: enable RF loopback

Rem loopbk
To loopback the remote tributaries 1to 4. Loops the remote tributary output
(data to customer) back into remote tributary input. This test checks the radio
link operation.

This loopback test does not include the remote tributary line driver or the
remote tributary line receiver. This parameter has up to four screens that refer
to the "capacity" setting for the radio.

Values: **0:** disabled
                     1: enabled

Parameters for the Far Radio menu

This section describes the parameters within the control submenu of the "Far Radio" menu item.

Control submenu

This section lists the parameters within the "Control" submenu of the "Far Radio" menu. The "Control" submenu allows you to change to the parameters.

Line Coding
To enter the DS1 line coding method (AMI or B8ZS) for all tributaries in the far-end radio. For an E1 system, the line coding is always HDB3.

Values:　　　　**0:** AMI
　　　　　　　　1: B8ZS

Tribut Enab
To modify the status of the the far-end tributaries 1 to 4. A disabled tributary has no alarms. This parameter has two or four screens that refer to the "capacity" setting for the radio.

Values:　　　　**0: disable**
　　　　　　　　1: enable

Parameters for the Link menu

This section describes the parameters within the control submenu of the "Link" menu item.

Control submenu

This section lists the parameters within the "Control" submenu of the "Link" menu. The "Control" submenu allows you to change to the parameters.

Freq
To enter two values to set the frequencies for the near-end and far-end transmitters (in MHz). With inputs to this parameter, the radio coordinates the frequency change with the far-end radio. If the radios lose communication for more than 10 seconds after a change in the parameters, the parameters revert to their previous settings.

This parameter uses one screen to enter Value 1 (the near-end Tx frequency), then another screen to enter Value 2 (the far-end Tx frequency). A third screen (the "Go" screen) launches the global frequency changes.

Value 1:　　　　see Chapter 3, "Technical specifications" for channel centers

Value 2:　　　　see Chapter 3, "Technical specifications" for channel center**s**

Tx Power
To set the transmit power level in dBm. The local radio communicates with the far-end radio to arrange the change in power level. If the radios lose communication for more than 10 seconds after a parameter change, the parameter reverts to its previous setting.

Values: **18** to **XX** dBm (15/18/23 GHz) Recommended: **20 dBm**
                      17 to **XX** dBm (24/26 GHz) Recommended: **20 dBm**
                      16 to **XX** dBm (28 GHz) Recommended: **20 dBm**
                      16 to **XX** dBm (31/38 GHz)Recommended: **20 dBm**

Link FAW
To select one of eight possible frame alignment words (FAW) in the radio frame. The FAW is also used as the Link ID. Both near end and far end radios must have the same FAW. With a change to this parameter, the local radio communicates with the far-end radio to arrange the FAW change. If the radios lose communication for more than 10 seconds after a parameter change, the parameter reverts to its previous setting.

Values: **0** to **7**

Capacity
To set the number of tributaries multiplexed into the main radio channel for both the near and the far-end radios. With a change to this parameter, the local radio communicates with the far-end radio to arrange the capacity change. If the radios lose communication for more than 10 seconds after a parameter change, the parameter reverts to its previous setting.

Values: **2:** include tributaries 1 and 2
                      4: include all tributaries (tributaries 1 to 4)

Installation and commissioning procedures

This chapter includes the procedures for the installation and commissioning of the Internet BWA System 3200.

Chapter task list

Table 6-1 lists the procedures in this chapter.

Table 6-1

Procedure	Details
Unpacking, identifying and matching the system	Procedure 6-1 on page 6-2
Installing the Internet BWA System 3200 on a pole	Procedure 6-2 on page 6-5
Connecting the interface cables	Procedure 6-3 on page 6-13
Setting up the Internet BWA System 3200	Procedure 6-4 on page 6-17
Aligning the antenna of the Internet BWA System 3200	Procedure 6-5 on page 6-20
Commissioning the Internet BWA System 3200	Procedure 6-6 on page 6-24
—end—	

Procedure 6-1
Unpacking, identifying and matching the system

Use this procedure to unpack and handle the Internet BWA System 3200. Use this procedure to also identify and match the Internet BWA System 3200 system (radio-link).

Requirements

Before you start:

• Select an appropriate area to unpack the shipping container. This area must be level, dry and dust-free.

• Identify the frequencies that the radio is to operate in. The bandwidth of the radio (bandpass filters) cannot be changed in the field. The radio must return to the factory if you require a change in bandpass filters.

Action

Step	Action

Unpack and inspect the Internet BWA System 3200 components

> ⚠ **CAUTION**
> **Possible damage to the Internet BWA System 3200**
> Use caution when you unpack the Internet BWA System 3200 terminal from its packaging. The radio terminal and integrated antenna are sensitive to minor changes.

1   Remove all parts and accessories from the container and packing material.

2   Keep the packaging materials for pssible returns.

3   Check the equipment contents with the packing list and report any discrepancies immediately.

4   Inspect the equipment for damage.

5   Locate the two 433.92 MHz whip antennas.

6   Place the 433.92 MHz antennas in a safe area or mount them directly to the RF unit and Hand-held unit to ensure that they are not misplaced.

—continued—

Procedure 6-1 (continued)
Unpacking, identifying and matching the system

Step	**Action**
7	Verify that the equipment includes the components in Table 6-2.

Table 6-2
Internet BWA System 3200 components

Qty	Item	Description
1	38 GHz RF unit	Model Number CA381E1SP or (HP)
1	Whip antenna (433 MHz or 418 MHz)	RF unit: Reverse SMA Female Connector
1	Cable end connector for the RF unit	CONXALL 23280-31SG-350K (TLS) (31-pin)
1	Interface mounting bracket	Includes hardware
Optional items		
1	RS-485 to RS-232 interface kit	Interface between the radio RS-485 communications channel and the user's laptop or PC RS-232 I/O port
1	Wireless hand-held unit	Includes a Whip 433 MHz Antenna
1	Multi-conductor Interface cable	Length based on purchase
1	Coaxial test cable	Female reverse SMA to male BNC

—continued—

Procedure 6-1 (continued)
Unpacking, identifying and matching the system

Step	Action

Identify and match the Radio terminal

8   Match an "A" radio terminal with a "B" radio terminal as shown in Table 6-3.

Table 6-3
Matching options

"A" Terminal	"B" Terminal	System
A-1	B-1	A-1 & B-1
A-2	B-2	A-2 & B-2
B-1	A-1	B-1 & A-1
B-2	A-2	B-2 & A-2

Each RF channel plan contains four sub-bands. Each type of Internet BWA System 3200 (A-1, A-2, B-1 and B-2) equips a specific bandpass filter. A radio link includes two terminals. One terminal has its transmitter frequency 1260 MHz above its duplex receiver. The other radio terminal has its transmitter at 1260 MHz below its duplex receiver. Refer to Table 6-4.

Table 6-4
Options for International (T/R = 1260 MHz)

Group	Transmit (MHz)	Receive (Mhz)
A-1	37050-37650	38310-38910
A-2	37600-38200	38860-39460
B-1	38310-38910	37050-37650
B-2	38860-39460	37600-38200

—end—

Procedure 6-2
Installing the Internet BWA System 3200 on a pole

Use this procedure to install the Internet BWA System 3200 on a pole.

The Internet BWA System 3200 assembly kit contains the outdoor unit (ODU), the main antenna, and the interface mounting bracket. The ODU contains a whip antenna and wave guide flange

DANGER
Risk of personal injury
Incorrect or unsafe installation can result in personal injury

Requirements

The requirements include the lists of tools and materials

Tools

Required tools:

- 11mm / 7/16" open wrench
- 13mm / 1/2" open wrench
- phillips screwdriver (medium)

—continued—

Procedure 6-2 (continued)
Installing the Internet BWA System 3200 on a pole

Equipment

Required equipment (refer to Figure 6-1 and Figure 6-2):

- One azimuth adjustment plate (part 101488-1) that attaches with:
  - One U-bolt, 4.5 pipe, 3/8-16
  - Two 3/8-16 hex nuts, bronze
  - Two 3/8 flat washers
  - Two 3/8 split lock washers
- One azimuth adjustment rod with hardware
- Two pole mount clamps that attach with:
  - Four 3/8-16 x 6.0" bolts, galvanized
  - Four 3/8-16 hex nuts, galvanized
  - Four 3/8 flat washers, galvanized
  - Four 3/8 split lock washers, galvanized
- One antenna mounting plate and hardware
- One elevation adjustment rod with a brass cylinder
- One antenna with a mounting flange
- One outdoor unit (ODU)

Figure 6-1
Mounting equipment for the Internet BWA System 3200
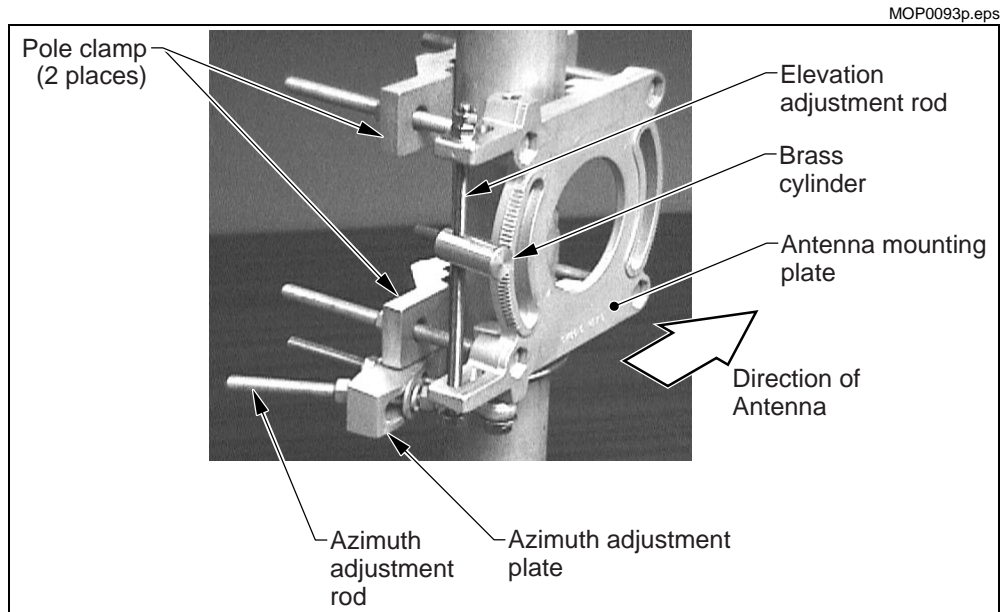
—continued—

Procedure 6-2 (continued)
Installing the Internet BWA System 3200 on a pole

Figure 6-2
Mounting equipment for the Internet BWA System 3200 (2 of 2)

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Antenna mounting bolts

Antenna mounting bolts

Azimuth adjustment plate

Part of U-bolt
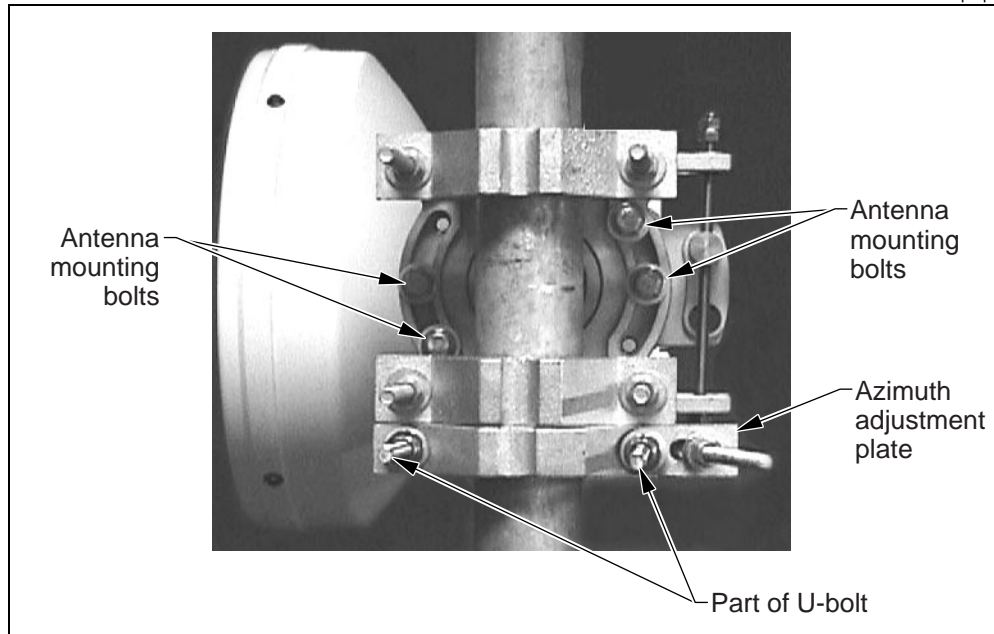
Action

Step	Action

Determine what side of the pole to install the antenna on

1   The antenna mounts to receive the signals from the right side of the pole (see Figure 6-2).

If	Then
you must install the antenna to receive the signals from the left side of the pole	go to step 2
otherwise	go to step 6

2   Place the antenna on a flat surface.

—continued—

Procedure 6-2 (continued)
Installing the Internet BWA System 3200 on a pole

Step	Action
3	Remove the four 1/4-20 screws that attach the antenna mounting flange to the antenna (see Figure 6-3)

Figure 6-3
Antenna mounting flange

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Antenna
flange screws
(4 places)
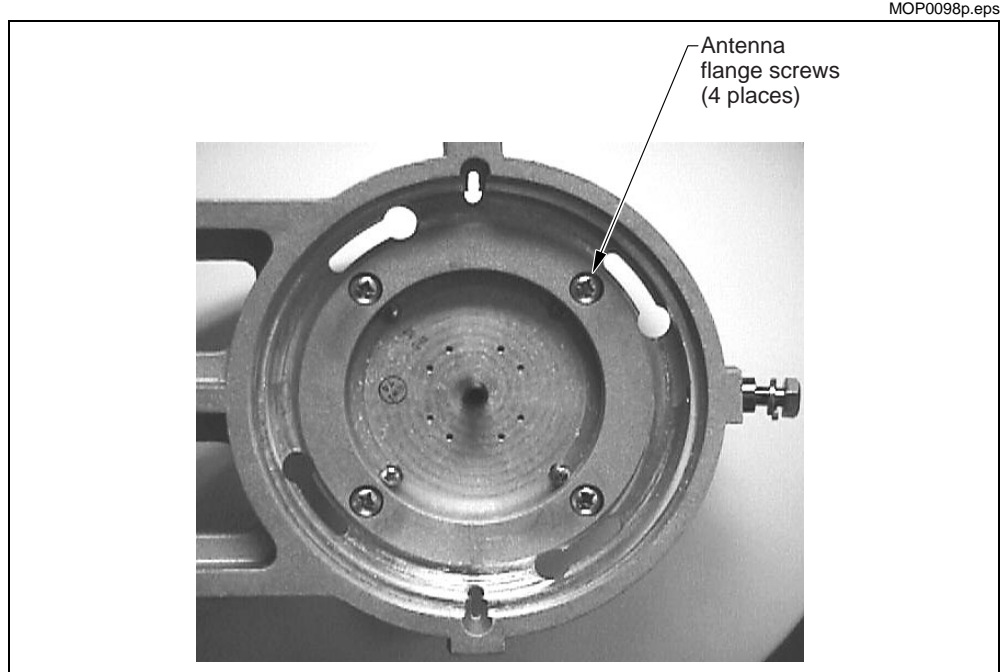
4

⚠ **CAUTION**
When rotating the flange, make sure that you do not remove the feed from the reflector.

Carefully rotate the flange 180° so that the drain hole remains on the bottom.

5 Insert the four 1/4-20 screws that attach the antenna mounting flange to the antenna.

Attach the mounting assembly to the pole

6 Use a carpenter level to level the pole to ensure that the antenna remains flat along the horizontal plane.

—continued—

Procedure 6-2 (continued)
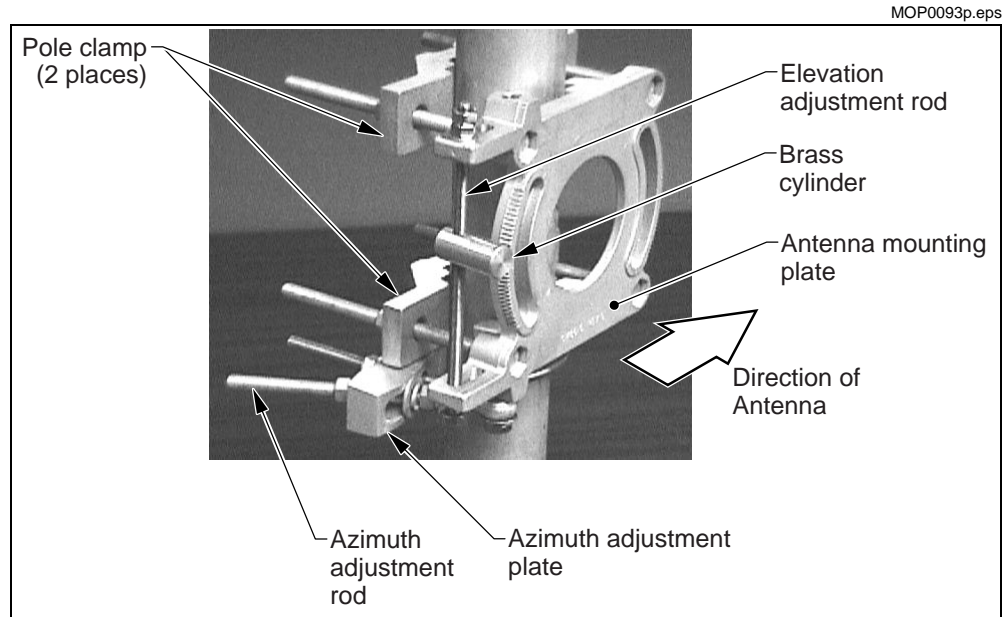**Installing the Internet BWA System 3200 on a pole**

Step	Action

7   Position the azimuth adjustment plate (P/N 101488-1) to the pole in the position that refers to the direction of the antenna as shown in Figure 6-4.

Figure 6-4
Position of the mounting assembly

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8   To attach the azimuth adjustment plate to the pole, use the U-bolt (100441-1), the flat washers, the split lock washers and the the 3/8 x16 bronze nuts (refer to Figure 6-2 on page 6-7).

9   Position the antenna mounting plate on the opposite side of the azimuth adjustment plate as shown in Figure 6-4.

10   The azimuth adjustment rod attaches to the antenna mounting plate at the factory.

- remove the 3/8 hex nut, the flat and the split lock washers from the azimuth adjustment rod

- insert the azimuth adjustment rod into the slot of the azimuth adjustment plate (see Figure 6-4).

11   Replace and tighten the 3/8 hex nut, the flat and split lock washers on the azimuth adjustment rod.

—continued—

Procedure 6-2 (continued)
Installing the Internet BWA System 3200 on a pole

Step	Action
12	Use the pole clamps and hardware to attach the antenna mounting plate to the pole as shown in Figure 6-4 on page 6-9 and Figure 6-2 on page 6-7.
13	Attach the galvanized flat washer, galvanized split lock washer and 3/8-16 galvanized hex nut to the end of the azimuth adjustment rod.

Install the antenna on the mounting assembly

|	
14	Place the brass cylinder in one of the elevation adjustment holes (for the best elevation angle) on the antenna mounting flange (see Figure 6-5).

Figure 6-5
Antenna installation (1 of 2)
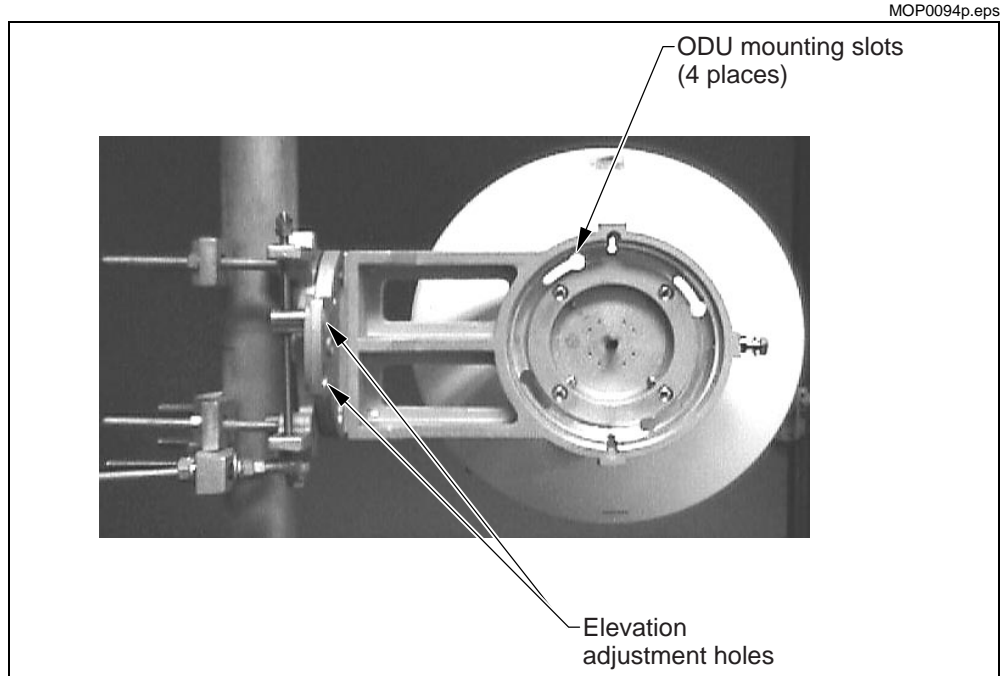
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—**continued**—

Procedure 6-2 (continued)
Installing the Internet BWA System 3200 on a pole

Step	Action
15	Use the antenna mounting bolts in four places to hold the antenna to the mounting assembly (see Figure 6-6). Do not tighten the bolts completely to perfrom the alignment procedures

Figure 6-6
Antenna installation (2 of 2)

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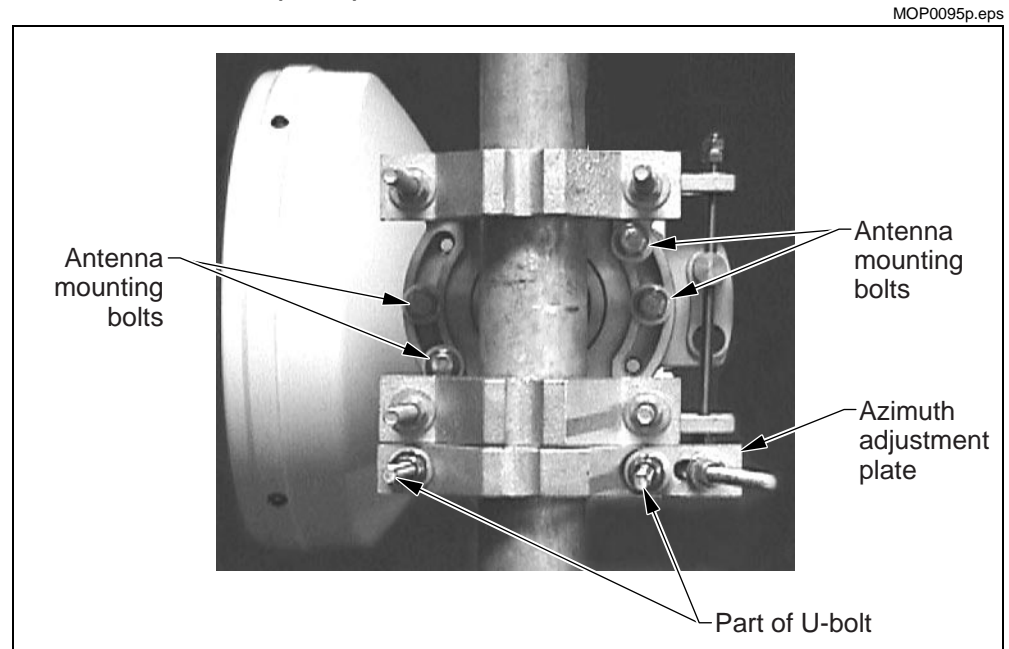
Mount the ODU

| **16** | Insert the ODU screws into the ODU mounting slots and twist the ODU completely counterclockwise (see Figure 6-5 on page 6-10). |

—continued—

Procedure 6-2 (continued)
Installing the Internet BWA System 3200 on a pole

Step	Action
17	Make sure that you mount the ODU with the correct polarization at the top of the ODU (see Figure 6-7). Figure 6-7 shows a vertical polarization.

Figure 6-7
ODU installation

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Polarization indicators

Azimuth adjustment screws
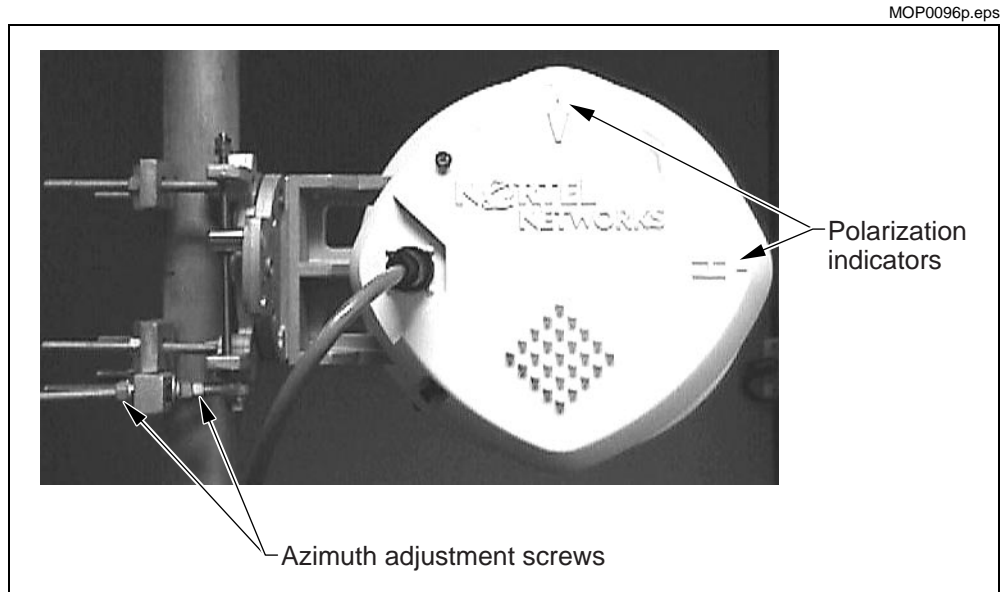
—**end**—

Procedure 6-3
Connecting the interface cables

Use this procedure to connect all interface cables to the ODU of the Internet BWA System 3200 .

> ⚠ **DANGER**
> **Risk of personal injury**
> Incorrect or unsafe installation can result in personal injury

The interface between all user equipment and the Internet BWA System 3200 is a 100-Ohm (DS1) or 120-Ohm (E1) twisted-pair cable assembly. The twisted-pair cable assembly provides conductors for:

- alarm telemetry information
- programmable alarms
- the RS-485 communication link
- DC power source
- transmit and receive data lines (tributaries)

The cable has a drain wire and color-coded solid conductors of 24 AWG. The bundled pairs are wrapped in a foil shield with internal drain wire and covered with a wire braid and insulating jacket. The outer braid and drain wire terminate at pin 1.

Requirements

Before you begin this procedure:

- Route the customer cables to an appropriate customer interface point (for example, a cross-connect panel).

    Note: For continued compliance with applicable regulatory requirements, the DS1/E1 lines of the system cannot directly connect to a DS1/E1 network. They must connect only behind registered terminal equipment.

—continued—

Procedure 6-3 (continued)
Connecting the interface cables

- Additional guidelines before the connection of the interface cable:
  — When cutting the cable length, be sure to add extra length for the service loop.
  — Ensure that a strain relief is added to each cable connection.
  — Ensure that the external connector is sealed and waterproof.
  — Follow standard installation practices.
    – Avoid sharp corners.
    – Attach the interface cable to the tower members or cable runways with the use of hanger kits or tie-wraps at one meter intervals.
  — When routing the interface cable, avoid blocking the wireless antenna pattern.

Tools
- 11mm / 7/16" open wrench
- 13mm / 1/2" open wrench
- phillips screwdriver (medium)
- Cable cutter
- Knife, skinning
- Pliers, long nose
- Cable ties (P0567238)
- Screwdriver, slotted 1/8 inch
- Anti-static kit
- Wire cutter
- Crimper (for coaxial cable)
- Wire wrap tool (for twisted pair cable)
- Soldering iron with solder

Equipment
- one (1) 433.92 MHz antenna with reverse SMA connector
- one (1) optional RG-58U test cable with a reverse SMA female connector fitted at one end and a BNC male connector at the other end.
- one (1) twisted pair interface cable

—continued—

Procedure 6-3 (continued)
Connecting the interface cables

Action

Step	Action

Connect to the customer equipment

1   Connect the twisted-pair wires of the interface cable to the customer equipment as shown in Table 6-5 (use a twisted-pair for each Tx and Rx connection.

Table 6-5
Input pin assignments for twisted-pair interface cable

Pin	Signal Description	Pin	Signal Description
1	Case Gnd	17	RX Tributary 3 Ring
2	Reserved	18	Summary Alarm relay (NC)
3	TX Tributary 1 Tip	19	TX Tributary 4 Tip
4	TX Tributary 1 Ring	20	TX Tributary 4 Ring
5	RX Tributary 1 Tip	21	RX Tributary 4 Tip
6	RX Tributary 1 Ring	22	RX Tributary 4 Ring
7	RS 485+	23	Alarm relay Common (CC)
8	TX Tributary 2 Tip	24	DC Power Conn#1
9	TX Tributary 2 Ring	25	RS422 RX+
10	RX Tributary 2 Tip	26	RS422 RX-
11	RX Tributary 2 Ring	27	DC Power Conn#2
12	Programmable Alarm Relay (NC)	28	RS422 TX-
13	RS 485-	29	RS422 TX+
14	TX Tributary 3 Tip	30	DC Power Conn#2
15	TX Tributary 3 Ring	31	DC Power Conn#1
16	RX Tributary 3 Tip		

2   Record the wire colors for each pin in the columns in Table 6-5 or label the wires for easy identification at the DS1/E1 equipment end.

—continued—

Procedure 6-3 (continued)
Connecting the interface cables

Step	Action
3	If you connect less than 4 DS1 channels or less than 4 E1 channels, insulate the ends of the unused twisted pairs with electrical tape. Then label and fasten the ends for future identification.

4

> ⚠ **CAUTION**
> **Reduced system performance**
> Failure to use the correct cable types significantly reduces system performance.

5 Connect the female end of the interface cable to the 31-pin male connector on the ODU (align the connector guide pins and rotate to set the cable in place and do not force the cable connector into the ODU connector).

Attach the wireless link antenna

6 Remove the 433.92-MHz antenna with reverse SMA connector from the accessory kit.

7 Remove the plastic guard cap from the ODU port for wireless or coaxial I/O (refer Figure 1-3 on page 1-5 for the location of the wireless I/O port).

8 Attach the 433.92-MHz antenna to the ODU port.

Ground and weatherproof the connectors

> ⚠ **CAUTION**
> **Risk of equipment damage**
> Failure to properly ground the Internet BWA System 3200 and mounting structure causes poor performance and a higher risk of damage from lightning.

9 Attach a 6-AWG cable between the grounding post on the rear of the Internet BWA System 3200 to the tower or structure grounding system.

10 Attach a cable grounding kit to the radio unit end of the interface cable.

11 Attach the cable grounding kit to the tower or site ground according to the instructions of the supplier of the grounding kit (attach the grounding kit within three feet of the connection to the radio unit).

12 Repeat step 10 and step 11 at the base of the tower before the entrance to the building or shelter.

13 Apply a weatherproof compound to all outside connections. At the least, apply a water resistant tape to all the outside connectors.

—end—

Procedure 6-4
Setting up the Internet BWA System 3200

Use this procedure to set up and align the Internet BWA System 3200.

On start-up, the Internet BWA System 3200 loads its operating software from its flash memory. During initialization, the radio remains mute until it completes its self-diagnostic tests.

After start-up, you can monitor and control the Internet BWA System 3200 with the use of the hand-held terminal (HHT).

Requirements

Required equipment:

- RG-58 coaxial cable or HHT-to-ODU whip antennas
- HHT

Action

Step	Action
1	Apply DC power to the radio.

Initialize the HHT

2	Stand within 75 meters of the Internet BWA System 3200
3	Press and hold the **ENTER** key of the HHT until the display lights up.
	The HHT default display appears and reads:
	`Enter ODU Addr:`

Enter the near-end terminal address

4	Use the keypad to enter the Internet BWA System 3200 address (the ODU serial number).
5	Press the **ENTER** key.
	The HHT displays the message:
	`Establishing Link`
	*When you establish communication between the HHT and the Internet BWA System 3200, the **Near Radio** menu appears on the display.*

6	**If**	**Then**
	you cannot establish communication between the HHT and the Internet BWA System 3200	go to step 7
	otherwise	go to step 8

—continued—

Procedure 6-4 (continued)
Setting up the Internet BWA System 3200

Step	Action

Trouble clearing the communication between the HHT and the ODU

7 If you cannot establish communication between the HHT and the ODU.

   a. Confirm the address and enter it again.

   b. Check the DC power to the outdoor unit (ODU).

     — Check the cable

     — Check the cable connector on the ODU

     — Check the power source.

   c. Disconnect and inspect both the ODU and the hand-held wireless antennas.

   d. Attach the antennas again

   e. Repeat to step 3 to step 5.

   f. Replace the whip antennas with the RG-58 coaxial cable:

     — connect the coaxial cable between ODU and the HHT

     — repeat step 3 to step 5.

   g. If the communications channel cannot be established, contact Customer Support (see "Warranty and field support" on page 4-5)

Set the transmit mute function to "ON"

8 From the **Near Radio** menu, press the **ENTER** key.

*The HHT displays the **Control** submenu.*

9 From the **Control** submenu, press the **ENTER** key.

*The HHT displays the first parameter in the **Control** submenu (**Tx Freq**) and the following message appears on the display:*

`Set TX`

10 Press the **ARROW** key until the transmit RF power command **Set Pwr** appears on the display.

11 Press the **ENTER** key.

The current transmit RF power setting appears on the display

—**continued**—

Procedure 6-4 (continued)
Setting up the Internet BWA System 3200

Step	Action
12	To change the **Set Pwr** setting,
	a. Use the keypad to enter the required transmit RF power output (Range +2 to +17 dBm). For example, to insert 2dBm, enter: **Set Pwr: 2dBm**
	b. press the **ENTER** key.
13	Press the **MENU** key to return to the **Control** menu.
14	Press the **MENU** key again to return to the **Far End** menu.

Verify and set the link ID

Use the following steps to establish link identification when multiple Radio links are located at the same site.

Use the following steps to set the near-end and far-end terminals to the same Link ID number.

Step	Action
15	Go to the **Near End	Control** menu. *The following message appears on the display:* Set TX
16	Press the **ARROW** key until the **Set Link ID** (**FAW**) command appears on the display.
17	Press the **ENTER** key. *The current setting appears on the display.*
18	To change the **Set Link ID** (**FAW**) setting: **a.** Use the keypad to enter an ID number (Input range 0-7). **b.** Press the **ENTER** key.
19	Press the **MENU** key to return to the **Control** menu.
20	Press the **MENU** key again to return to the **Near End** menu.
21	Repeat step 15 to step 20 for the far-end terminal to make sure that both terminals have the same "Link ID" number.

—end—

Procedure 6-5
Aligning the antenna of the Internet BWA System 3200

Use this procedure to align the antenna of the Internet BWA System 3200 with the next far-end antenna. Perform this alignment procedure for one terminal at a time.

Requirements

Required tools and equipment:

Equipment

- Digital multimeter (optional) to monitor the AGC voltage or HHT to monitor the receive signal strength indication (RSSI)

Tools

- 11mm / 9/16" open wrench
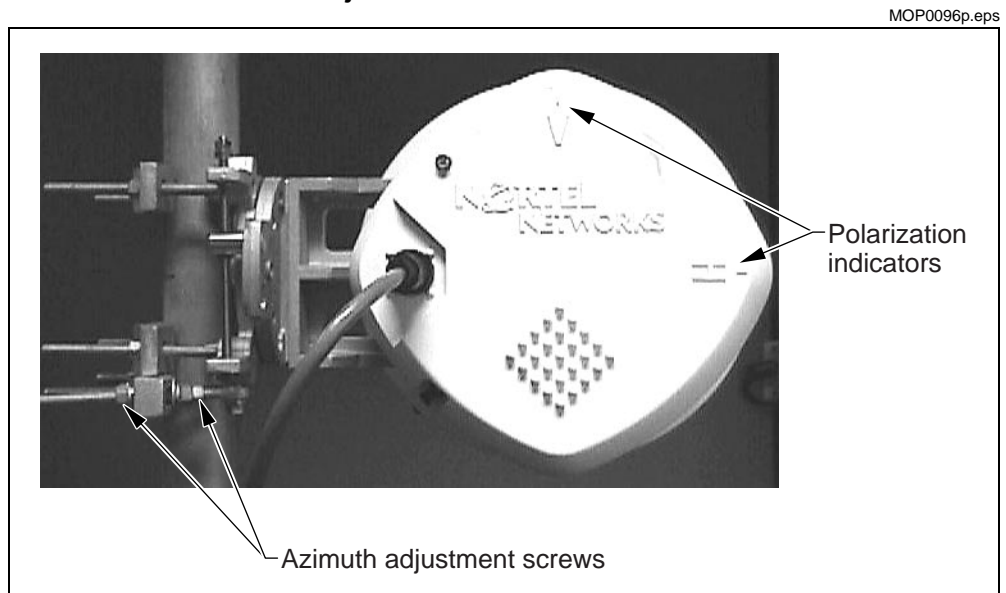- 13mm / 1/2" open wrench
- carpenter level
- compass

—**continued**—

Procedure 6-5 (continued)
Aligning the antenna of the Internet BWA System 3200

Action

Step	Action

Perform the horizontal antenna alignment

1   Establish communication with personnel on the far-end of the link.

2   From the HHT, go to the **Near End | Status** menu.

3   Press the **ENTER** key to access the parameters in the **Status** submenu.

The following message appears on the display:

    Get TX

4   Press the **ARROW** key until the **RSSI** command appears on the display.

5   Press the **ENTER** key.

The current setting appears on the display. The HHT remains ON as you monitor RSSI and BER status.

6   Loosen the azimuth adjustment screws (see Figure 6-8).

Figure 6-8
Location of the azimuth adjustment screws

MOP0096p.eps

Polarization indicators

Azimuth adjustment screws

7   Use a compass and move the antenna horizontally within the direction of the far-end antenna.

8   While you monitor the RSSI on the HHT, slowly move the antenna through the complete horizontal adjustment range.
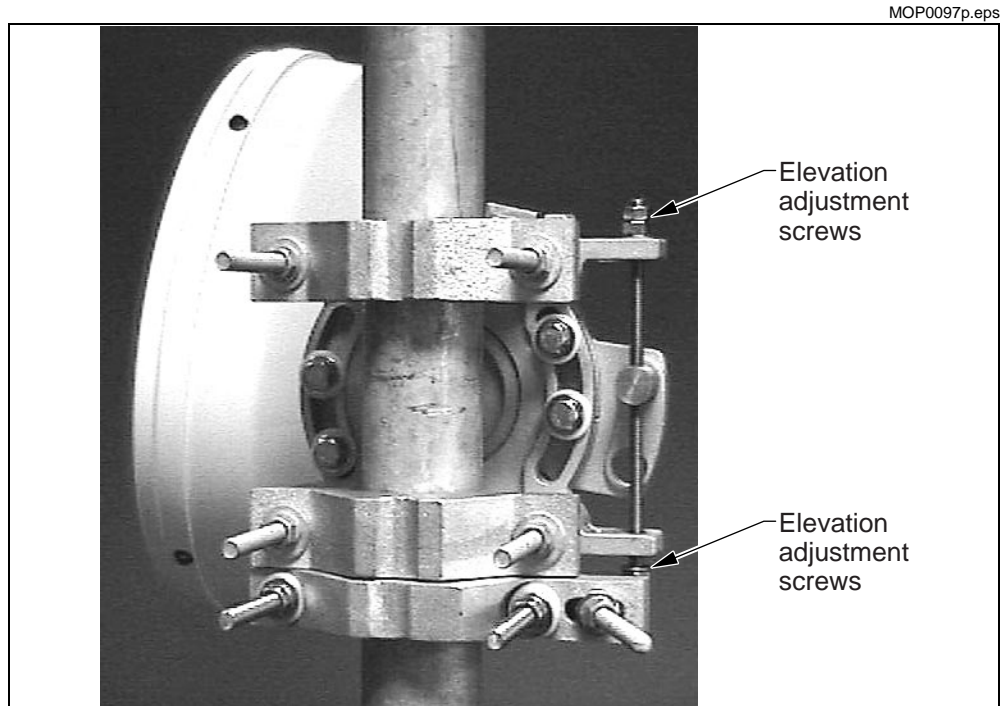
—continued—

Procedure 6-5 (continued)
Aligning the antenna of the Internet BWA System 3200

Step	Action
9	Identify the main and side lobes (the antenna side lobes are normally 12 to 20 dB below the main lobes). *If the antenna peaks at 20 dB below the expected level, you can be on a side lobe or you have cross polarized the antennas.*
10	Place marks on the threads of the azimuth adjustment rod to identify the main and side lobes.
11	After identifying both the main and side lobes, position the antenna assembly to the main lobe mark.
12	Tighten the azimuth adjustment screw by hand.

Perform the vertical antenna alignment

13	Loosen the elevation adjustment screws (see Figure 6-9) and slowly move the antenna through the complete vertical adjustment range.

Figure 6-9
Location of elevation adjustment screws

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Elevation adjustment screws

Elevation adjustment screws

14	While you monitor the RSSI on the HHT, identify the main and side lobes (the antenna side lobes are normally 12 to 20 dB below the main lobes). *If the antenna peaks at 20 dB below the expected level, you can be on a side lobe or you have cross polarized the antennas.*

—**continued**—

Procedure 6-5 (continued)
Aligning the antenna of the Internet BWA System 3200

Step	Action
15	Place marks on the threads of the antenna mounting plate to identify the main and side lobes.
16	After identifying both the main and side lobes, position the antenna assembly to the main lobe mark.
17	Tighten the elevation adjustment screws by hand.

Perform a fine antenna alignment

18	Use a 15mm / 1/2" open wrench to slightly move the azimuth adjustment screws for a maximum RSSI reading.
19	Use a 15mm / 1/2" open wrench to slightly move the elevation adjustment screws for a maximum RSSI reading.
20	Repeat this procedure at the far-end terminal.

—**end**—

Procedure 6-6
Commissioning the Internet BWA System 3200

Use this procedure to commission the local and the far-end Internet BWA
System 3200.

Requirements

Before you start this procedure:

•   Perform all of the procedures in this chapter.

•   Have personnel at both the near end and far end terminals.

Equipment
•   HHT

Tools

•   11mm / 7/16" open wrench

•   13mm / 1/2" open wrench

•   carpenter's level

Action

Step	Action

Commission the radio

Verify and record the Internet BWA System 3200 configuration

List the Internet BWA System 3200 configuration settings and parameters in
Table 6-6. Record the configuration as a permanent site record.

Table 6-6
Internet BWA System 3200 **configuration form**

Customer		
Equipment Station		
Hop Length		Miles/km
Date	Prepared by	

Equipment Parameters

Equipment Type		
Station ID		
Terminal address		
Equipment Rack Number		
System Capacity		Mbit/s
Transmitter Frequency		MHz
Receiver Frequency		MHz
Transmitter RF Output Level		dBm
Threshold Level of the Receiver		dBm
Calculated Fade Margin		dB
AGC Voltage		V
BER Performance		
Antenna Polarization	Vertical (V)	Horizontal (H)

—**end**—

Internet Broadband Wireless Access

Internet BWA System 3200

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