Mobile Network Solutions
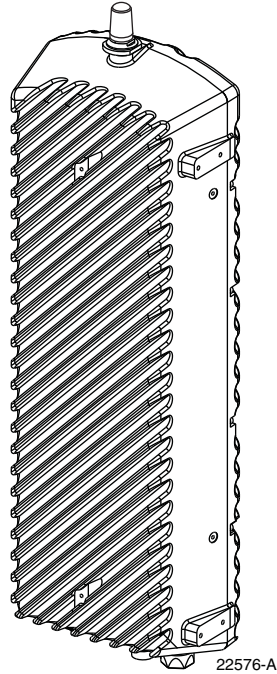# FlexWave microBTS 1 x 1 and 2 x 1
Installation and Commissioning Guide, Release 4.0

22576-A

Mobile Network Solutions
FlexWave microBTS 1 x 1 and 2 x 1
Installation and Commissioning Guide, Release 4.0

Copyright

Revision History

ISSUE	DATE	REASON FOR CHANGE
2	04/2009	Product revisions

List of Changes

The technical changes incorporated into this issue are listed below.

PAGE	IDENTIFIER	DESCRIPTION OF CHANGE
All		New publication
All		Added software commissioning and upgrade procedures

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Declarations of Conformity

Declaration of Conformity
With regard to the R&TTE Directive 1999/5/EC

CE

Manufacturer's Name: ADC Telecommunications, Inc.

Manufacturer's Address: Mailing Address: P.O. Box 1101
Minneapolis, Minnesota 55440-1101 USA

Declares that this product:

Product Name: FlexWave™ 1800 MHz microBTS

Product Description: Wireless Network System

Model Name(s): FWB-MBTS-C20N00

Complies with appropriate essential requirements of the Article 3 of the R&TTE Directive:
Standards to which the conformity is declared:

| Protection to Health and Safety: | Directive: | 2006/95/EC (previously 73/23/EEC) |
| Protection with respect to EMC: | Directive: | 2004/108/EC (previously 89/336/EEC) |

EMC: ETSI EN 301 489-1, 8 V1.4.1 (2002-8)

Health & Safety: IEC 60950-1 (1st Edition): (2001-7)

Radio: ETSI EN 301 502 V8.1.2 (2001-7)

Name of authorized person: Mark Miska
Position: Compliance Engineer

Date of Issue: 7/18/2008   Signature

Mailing Address: P.O. Box 1101, Minneapolis, Minnesota 55440-1101
World Headquarters: Minneapolis, Minnesota USA +1.952.938.8080 www.adc.com

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EC Declaration of Conformity
Under R&TTE Directive 1999/5/EC

Manufacturer Name : ADC Telecommunications, Inc.

Address : 541 E Trimble Road
San Jose, CA 95131, U.S.A.

Declares that the product InterReach PicoBSS

Product Description : Wireless Network System

Model Number : ADCIR-BSS-xxxx
(x = 0-9)

Complies with appropriate essential requirements of the Article 3 of the R&TTE directive.

Standard to which conformity is declared :

| Protection to Health and Safety: | Directive: | 73/23/EEC |
| Protection with respect to EMC: | Directive: | 89/336/EEC |

EMC: ETSI EN 301 489-1, 8 V1.4.1 (2002-8)

Safety: EN 60950-1:2001+A11

Radio: ETSI EN 301 502 V8.1.2 (2001-7)

Name of authorized person; Mark Schutzer
Position: Director, Hardware Engineering

Date: 8/12/2008   Signature

Mailing Address: P.O. Box 1101, Minneapolis, Minnesota 55440-1101
World Headquarters: Minneapolis, Minnesota USA +1.952.938.8080 www.adc.com

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EC Declaration of Conformity
Under R&TTE Directive 1999/5/EC

Manufacturer Name : ADC Telecommunications, Inc.

Address : 541 E Trimble Road
San Jose, CA 95131, U.S.A.

Declares that the product Ultrawave Micro BTS/BSPlus System

Product Description : Wireless Network System

Model Number : MBTS-xxxx/MBSS-xxxx
(x = 0-9)

Complies with appropriate essential requirements of the Article 3 of the R&TTE directive.

Standard to which conformity is declared :

| Protection to Health and Safety: | Directive: | 73/23/EEC |
| Protection with respect to EMC: | Directive: | 89/336/EEC |

EMC: ETSI EN 301 489-1, 8 V1.4.1 (2002-8)

Safety: EN 60950-1:2001+A11

Radio: ETSI EN 301 502 V8.1.2 (2001-7)

Name of authorized person; Mark Schutzer
Position: Director, Hardware Engineering

Date: 8/12/2008   Signature

Mailing Address: P.O. Box 1101, Minneapolis, Minnesota 55440-1101
World Headquarters: Minneapolis, Minnesota USA +1.952.938.8080 www.adc.com

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EC Declaration of Conformity
Under R&TTE Directive 1999/5/EC

Manufacturer Name : ADC Telecommunications, Inc.

Address : 541 E Trimble Road
San Jose, CA 95131, U.S.A.

Declares that the product Ultrawave NIB System

Product Description : Wireless Network System

Model Number : UNIB-xxxx
(x = 0-9)

Complies with appropriate essential requirements of the Article 3 of the R&TTE directive.

Standard to which conformity is declared :

| Protection to Health and Safety: | Directive: | 73/23/EEC |
| Protection with respect to EMC: | Directive: | 89/336/EEC |

EMC: ETSI EN 301 489-1, 8 V1.4.1 (2002-8)

Safety: EN 60950-1:2001+A11

Radio: ETSI EN 301 502 V8.1.2 (2001-7)

Name of authorized person; Mark Schutzer
Position: Director, Hardware Engineering

Date: 8/12/2008   Signature

Mailing Address: P.O. Box 1101, Minneapolis, Minnesota 55440-1101
World Headquarters: Minneapolis, Minnesota USA +1.952.938.8080 www.adc.com

ADC

EC Declaration of Conformity
Under R&TTE Directive 1999/5/EC

Manufacturer Name :   ADC Telecommunications, Inc.

Address :   2495 Leghorn St.
                                   Mountain View, CA 94043, U.S.A.

Declares that the product Ultrawave Base Station Controller System

Product Description : Base Station Controller

Model Number : ASABxxxxxxxxxxxxxxxxxxxxxxxx
                (x = 0-9, A – Z or blank)

Complies with appropriate essential requirements of the Article 3 of the R&TTE directive.

Standard to which conformity is declared :

Protection to Health and Safety: *Directive:*   *73/23/EEC*
Protection with respect to EMC: *Directive:*   *89/336/EEC*

EMC: **ETSI EN 300 386 V1.2.1 (2000-03)**

Safety: **EN 60950-1:2001+A11**

Name of authorized person;   Mark Schutzer
Position: Director, Hardware Engineering

Date: 1/6/2008   Signature

Mailing Address: P.O. Box 1101, Minneapolis, Minnesota 55440-1101
World Headquarters: Minneapolis, Minnesota USA +1.952.938.8080   www.adc.com

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ADC

EC Declaration of Conformity
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Manufacturer Name :   ADC Telecommunications, Inc.

Address :   541 E Trimble Road
                                   San Jose, CA 95131, U.S.A.

Declares that the product Ultrawave BTS/BSPlus System

Product Description : GSM Base Transceiver Station

Model Number : UBTS-xxxx/UBSS-xxxx
                (x = 0-9)

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Standard to which conformity is declared :

Protection to Health and Safety: *Directive:*   *73/23/EEC*
Protection with respect to EMC: *Directive:*   *89/336/EEC*

EMC: **ETSI EN 301 489-1, 8 V1.4.1 (2002-8)**

Safety: **EN 60950-1:2001+A11**

Radio: **ETSI EN 301 502 V8.1.2 (2001-7)**

Name of authorized person;   Mark Schutzer
Position: Director, Hardware Engineering

Date: 8/12/2008   Signature

Mailing Address: P.O. Box 1101, Minneapolis, Minnesota 55440-1101
World Headquarters: Minneapolis, Minnesota USA +1.952.938.8080   www.adc.com

About This Manual

Welcome to the FlexWave microBTS Installation and Commissioning Guide. It describes how to perform local installation and commissioning of the microBTS at the customer's site.

This document is intended for an ADC trained field service engineer (FSE) or operator who performs local installation and commissioning at the customer's site. The FSE or operator should be equipped with the necessary tools for installation and commissioning, and a basic understanding of the GSM cellular network. The FSE or operator should also be familiar with the use of the Craft PC and procedures conducted using the Craft PC.

ADC assumes that pre-installation project planning has occurred, and is documented via a site survey report. This site survey should include items such as the location of antennas, chassis, power connections and other interface accesses and temperature control equipment.

Related Publications

Listed below are related manuals, their content, and their publication numbers. Copies of these publications can be ordered by contacting the Technical Assistance Center at 1-800-366-3891, extension 73476 (in U.S.A. or Canada) or 952-917-3476 (outside U.S.A. and Canada).

Title/Description	ADCP Number
Mobile Network Solutions Documentation Index	**ADCP-76**

United States Federal Communications Commission Required User Information

Located on the equipment is a label that contains, among other information, the FCC registration number. If requested, this information must be provided to the telephone company.

The UltraWAVE BTS Series AUAC series complies with Part 22 of the FCC Rules.

The 1900 MHz WAVEXpress Series M50 complies with Part 24 of the FCC Rules.

The WAVE2000 BS Plus 800 MHz complies with Part 22 of the FCC Rules.

The WAVE2000 Pico BS Plus (800 MHz and 1900 MHz) comply with Part 22 and Part 24 of the FCC Rules and UL 1950 safety certification.

This equipment cannot be used on the telephone company-provided coin service. Connection to Party Line Service is subject to State Tariffs.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, of procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If the trouble is causing harm to the telephone network, the telephone company may request you to remove the equipment from the network until the problem is resolved.

It is recommended that the customer install a surge arrester in the AC outlet to which that device is connected. This is to avoid damaging the equipment caused by local lightning strikes and other electrical surges.

This equipment uses the following USOC jacks and codes:

Model Name	Facility Interface Code	Service Order Code	Jack Type
340122/340133	04DU9-BN	6.ON	RJ-48C
340122/340133	04DU9-DN	6.ON	RJ-48C
340122/340133	04DU9-1KN	6.ON	RJ-48C
340122/340133	04DU9-1SN	6.ON	RJ-48C
340122/340133	04DU9-1ZN	6.ON	RJ-48C

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes of modifications not expressly approved by ADC can void the user's authority to operate the equipment. FCC and IC certification labels denoting the product specific certification numbers may be found on the product.

Industry Canada Required User Information

CP-O1, Issue 8, Part 1, Section 14.1

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The standard connecting arrangement (telephone jack type) for this equipment is CA81A.

CP-01, Issue 8, Part 1, Section 14.2

NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination of an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numerique de la classe A est conforme a la norme NMB-003 du Canada.

This device complies with Industry Canada RSS-133 and SRSP-510 or RS132 & SRPS-503.

Disposal of Electronic and Electrical Waste
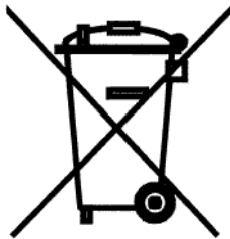
Pursuant to the WEEE EU Directive electronic and electrical waste must not be disposed of with unsorted waste. Please contact your local recycling authority for disposal of this product.

Admonishments

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment. An admonishment identifies a possible hazard and then explains what may happen if the hazard is not avoided. The admonishments — in the form of Dangers, Warnings, and Cautions — must be followed at all times.

These warnings are flagged by use of an alert icon (seen below), and are listed in descending order of severity of injury or damage and likelihood of occurrence.

DANGER: Danger is used to indicate the presence of a hazard that **will** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.

DANGER: Le terme « Danger » signale un danger qui **causera** des blessures physiques graves, la mort ou des dommages matériels substantiels s'il n'est pas évité.

GEFAHR: "Gefahr" weist auf einen Zustand hin, der schwere körperliche Verletzungen, den Tod oder schwere Sachschäden zur Folge haben **wird**, wenn die Gefahrenquelle nicht gemieden wird.

WARNING: Warning is used to indicate the presence of a hazard that **can** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.

AVERTISSEMENT: Le terme « Avertissement » signale un danger qui **peut** provoquer des blessures sérieuses graves, entraîner la mort ou causer des dommages matériels substantiels s'il n'est pas évité.

WARNUNG: "Warnung" weist auf einen Zustand hin, der ernsthafte Verletzungen, den Tod oder schwere Sachschäden verursachen **kann**, wenn die Gefahrenquelle nicht gemieden wird.

Caution: Caution is used to indicate the presence of a hazard that **will** or **can** cause minor personal injury or property damage if the hazard is not avoided.

Attention: Le terme « Attention » signale un danger **susceptible de** causer des blessures mineures ou des dommages matériels mineurs s'il n'est pas évité.

Vorsicht: "Vorsicht" weist auf einen Zustand hin, der leichte Verletzungen bzw. Sachschäden zur Folge haben **wird** oder haben **kann**, wenn die Gefahrenquelle nicht gemieden wird.

Microwave Radio Radiation Warning

Although ADC products do not use microwave radio antennas, the equipment is often mounted in the vicinity of microwave radio antennas. Under normal operating conditions, microwave radio equipment complies with the limits for human exposure to radio frequency (RF) fields adopted by the Federal Communications Commission (FCC). All ADC microwave radio equipment is designed so that under normal working conditions, microwave radiation directly from the radio is negligible when compared with the permissible limit of continuous daily exposure recommended in the United States by ANSI/IEEE C95.1-1991 (R1997), Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

Microwave signal levels that give rise to hazardous radiation levels can exist within transmitter power amplifiers, associated RF multiplexers, and antenna systems.

AVERTISSEMENT: Dans des conditions normales de fonctionnement, le matériel radio ADC Telecommunications est conforme aux limites d'exposition humaine aux champs de radiofréquences adoptées par la FCC (Federal Communications Commission). Tous les appareils d'ADC Telecommunications, Inc. sont conçus pour émettre un niveau de rayonnement de radiofréquences négligeable dans des conditions normales d'utilisation, dans les limites acceptables d'exposition continue quotidienne recommandées aux États-Unis selon la norme ANSI/IEEE C95.1-19991 (R1997) qui définit les niveaux de sécurité pour l'exposition humaine aux champs électromagnétiques radio de 3 kHz à 300 GHz. Les signaux RF émis peuvent engendrer des niveaux de rayonnement dangereux à l'intérieur de l'émetteur, des amplificateurs de puissance, des multiplexeurs RF et des systèmes d'antenne associés. Ne pas débrancher les connecteurs coaxiaux RF sur l'appareil ou les systèmes d'antenne ADC pendant le fonctionnement de l'équipement radio. Éviter tout contact physique avec le connecteur RF et ne pas regarder dans celui-ci lors des transmissions radio.

WARNUNG: Unter normalen Betriebsbedingungen erfüllen ADC Telecommunications Funkanlagen die Schutzanforderungen der amerikanischen Federal Communications Commission (FCC) für Menschen vor HF-Feldern. Alle Funkanlagen der ADC Telecommunications, Inc. sind so konstruiert, dass unter normalen Betriebsbedingungen die HF-Strahlen, die direkt vom Funkgerät abgegeben werden, vernachlässigbar sind, im Vergleich zum zulässigen Höchstwert der permanenten täglichen Strahlenbelastung, die in den USA nach ANSI/IEEE C95.1-19991 (R1997) empfohlen wird: „Sichere elektromagnetische HF-Strahlenbelastung beim Menschen, 3 kHz bis 300 GHz". HF-Signale, die zu gefährlichen Strahlenwerten führen, können innerhalb eines Senders, eines Leistungsverstärkers, eines angeschlossenen HF-Multiplexers oder eines Antennensystems entstehen. HF-Koaxialstecker bei ADC-Anlagen oder. Antennensysteme dürfen nicht bei laufendem Betrieb der Funkanlage abgezogen werden. Man darf nie einen Körperteil vor einem HF-Stecker platzieren bzw. den Stecker beim laufenden Betrieb der Funkanlage angucken.

WARNING: Never look into the open end of a waveguide or any other open RF connection as eyes are particularly vulnerable to radiation. Do not disconnect RF coaxial connectors, open microwave units, or remove any microwave screening while the radio equipment is operating.

AVERTISSEMENT: Ne pas regarder dans l'extrémité ouverte d'un guide d'ondes ou de toute autre connexion RF ouverte, du fait que les yeux sont particulièrement sensibles au rayonnement. Ne pas débrancher les connecteurs coaxiaux RF, ne pas ouvrir les unités à hyperfréquences et ne pas démonter tout émetteur à hyperfréquences au cours du fonctionnement de l'équipement radio.

WARNUNG: Man darf nie in das offene Ende eines Wellenleiters oder einer offenen HF-Verbindung blicken, da die Augen sehr empfindlich gegenüber Strahlenemissionen sind. Niemals HF-Koaxialstecker auftrennen, Mikrowelleneinheiten öffnen, oder Mikrowellenabschirmungen entfernen, während die Funkanlage eingeschaltet ist.

Conventions Used in This Manual

The following type and style conventions are used in this manual:

Conventions Used in This Manual

Convention	Meaning
Body Text	Used for regular body text
Bold	Indicates a menu or button choice
Command	Indicates computer generated text and prompts
User Input	Indicates user input
<hostname>	In command syntax, indicates user-specified command line parameters
<variable>	In body text, indicates user-specified command line parameters
[BRACKETS]	Indicates a key on the keyboard or instrument
▶	**Note:** Provides relevant additional information

Table of Contents

Chapter 4 -
Installation Procedures

Chapter 5 -
microBTS Initial Configuration

Appendix A -
Software Upgrade Procedure

Chapter 1 - Introduction

1.1   Overview of the microBTS 1 x 1 and 2 x 1

The FlexWave microBTS is an environmentally hardened outdoor base station solution that supports GSM/AMR voice traffic and GPRS/EDGE data traffic. The microBTS is available in three versions; 1, 2 and 4 TRX. The 4 x 1 version of the microBTS is covered in ADC publication number ADCP 77-087. An Internet Protocol (IP) back haul provides the interface between the microBTS and the Base Station Controller (BSC). All voice and data traffic and all operation and maintenance functions are transported by the IP back haul. A complete FlexWave Operations and Maintenance Center - Radio (OMC-R) management solution is available that provides total control of the microBTS, BSC, and other FlexWave system elements.

The microBTS, shown in Figure 1-1, consists of an environmentally-sealed enclosure and various electronic modules that are housed within the enclosure. Excess heat is dissipated using a passive cooling system which eliminates the need for external cooling fans. The low profile design of the enclosure requires minimal real estate for installation. The enclosure may be mounted from a wall, pole, or overhead cable (strand). A separate base station antenna (not provided) mounts near the enclosure.
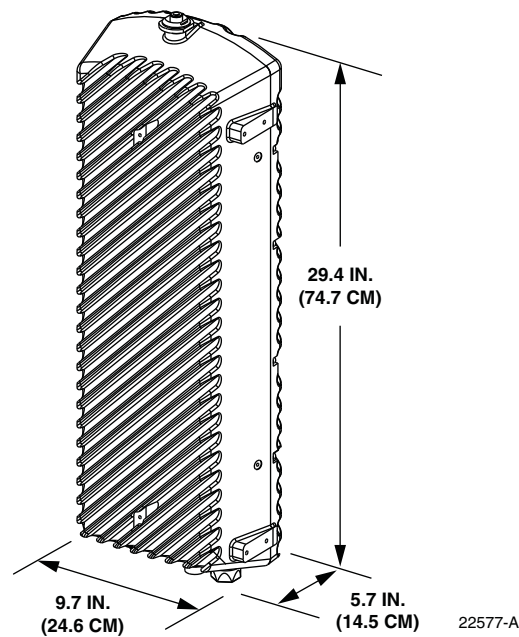

Figure 1-1: microBTS

1.2   microBTS Description

The microBTS, supports or provides the following basic functions:

- Supports GSM/AMR voice traffic and GPRS/EDGE data traffic via four TRX units

- Supports OMC-R functions including provisioning, alarm management, and performance management

- Supports IP back haul for voice and data traffic and OMC-R communications

- Provides Power Over Ethernet (POE) to the IP back haul device

- Provides an RF interface (antenna port) for the base station remote antenna

- Provides an RF interface (antenna port) for the GPS or Network Listen antenna

- Accepts AC power input

- Provides a visual indication of unit status

1.2.1   Primary Components

The microBTS is a fully integrated base station solution that includes the following: radio transceivers, Linear Power Amplifier (LPA), RX Low Noise Amplifier (LNA), duplexer, power supply, IP switches, Network Listen unit, processor board, carrier board, and enclosure. The enclosure houses the electronic assemblies, controls RF emissions, seals out dirt and moisture, and provides passive cooling. The internal components are not user replaceable or accessible. The base station antenna cable connector, IP back haul connector, AC power connector, and the unit status indicator are located on the bottom of the enclosure. The Network Listen antenna connector is located on the top of the enclosure.

1.2.2   Mounting

The microBTS may be mounted on a flat vertical surface (such as the side of a building), on a utility pole, or from a strand. A combination wall/pole mounting bracket is provided with each unit. Wall or pole-mount installation consists of securing the bracket to the mounting surface and then hanging the enclosure from the bracket. The bracket may be attached to a variety of surfaces such as wood, concrete, or masonry. Various fasteners including hex-head capscrews, tee-nuts, and concrete anchors are provided. A separate strand-mount kit (accessory item) is available if it is necessary to mount the microBTS from a cable. The mircroBTS should be mounted in a restricted access location only.

1.2.3   Fault Detection and Alarm Reporting

The microBTS detects and reports fault and alarm information. A single bottom-mounted Light Emitting Diode (LED) indicator turns from off to red if a major fault is detected. The status of the microBTS, the alarm state, and other fault information is summarized and

reported over the IP back haul. Fault and alarm information may be accessed using the FlexWave OMC-R management solution.

1.2.4 IP Backhaul Connection

The IP back haul cable connection is through an Ethernet port that consists of a single bottom-mounted hardened RJ-45 female connector. The IP back haul cable carries the voice and data traffic plus all OMC-R provisioning, alarm, and performance monitoring communications between the microBTS and the BSC. The IP back haul connection also provides DC power (POE) to the IP back haul device with a 15 watt maximum power output at 48 VDC. The maximum drop cable length is 300 feet (91.4 m).

1.2.5 Network Listen Antenna Connection

The Network Listen antenna connection is through a single top-mounted NMO (female) RF connector. The Network Listen antenna attaches directly to the NMO connector.

1.2.6 Base Station Antenna Cable Connection

The base station antenna cable connection is through one 50 Ohm N-type female connector. The microBTS includes an internal duplexer which allows a single antenna cable to carry both forward and reverse path RF signals between the base station antenna and the microBTS.

An externally-mounted lightning protector is available as an accessory. The surge/antenna connector on the lightning protector is an N-type female connector. The microBTS enclosure must be properly grounded for the lighting protector to function properly.

1.2.7 Powering

The microBTS is powered by 90 to 265 VAC (nominal 120 or 240 VAC), 47 to 63 Hz power or as an option -48 VDC. The AC or DC power is supplied through a 20-foot three-wire power cable that is provided with the enclosure. The power cable connects to a mini 3-pin AC or DC power connector mounted on the bottom of the microBTS enclosure. The power cable is rated for indoor or outdoor use and must not be placed within electrical conduit as this will impede the cooling of the cable during usage. Power cables in lengths of 40, 60, or 100 feet are available separately.

The stub end of the power cable must be routed to an external junction box (not provided) for connection to the AC power source. A circuit breaker rated at 15 amps (120 VAC) or 5 amps for 48 VDC applications should be used to provide overcurrent protection for the microBTS power circuit. It is also recommended that an external AC outlet (not provided) be installed near the microBTS enclosure to power test equipment and power tools.

1.2.8 Grounding

A grounding terminal (hex socket capscrew and washer) is provided on the bottom of the enclosure for connecting a grounding cable to the enclosure. A 1.5 meter #6 stranded copper

wire terminated with a ring terminal is provided with the microBTS for linking the enclosure to an earth ground source.

1.2.9 Cooling

Passive cooling of the electronic assemblies is provided by conducting excess heat from the internal electronic components to the aluminum enclosure. The heat is then dissipated to the outside air by radiation and convection air flow over the enclosure's external cooling fins. An alarm is generated if a high temperature condition occurs within the enclosure.

1.2.10 User Interface

The microBTS user interface consists of the connectors, grounding lug, and LED that are provided on the exterior of the enclosure. The microBTS user interface points are indicated in Figure 1-2 and described in Table 1-1.

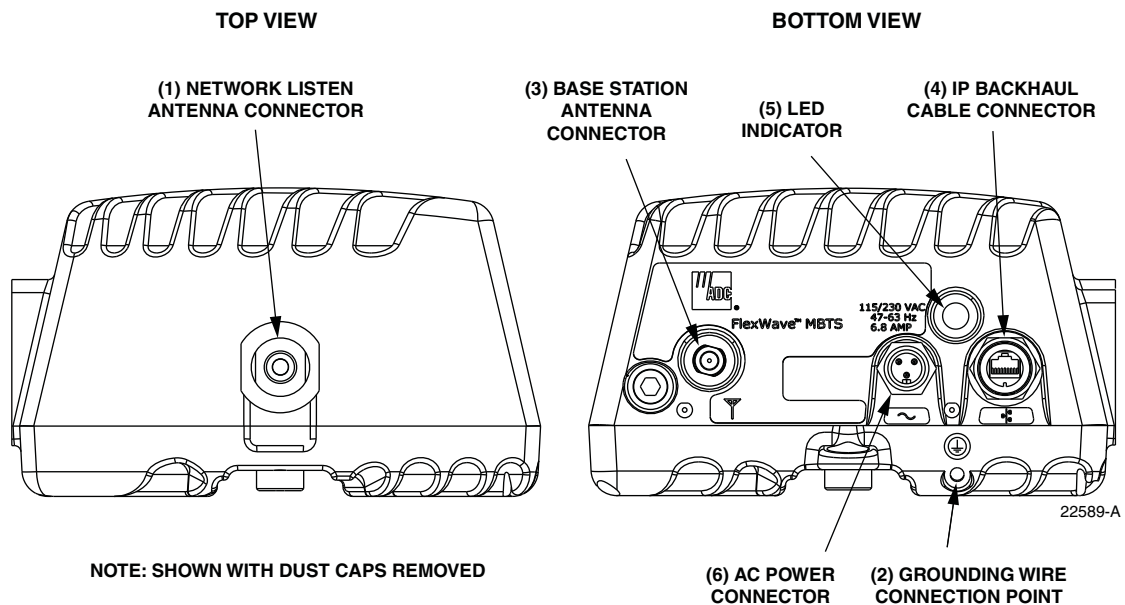**Figure 1-2: microBTS User Interface**

Table 1-1: microBTS User Interface

Ref No	User Interface Designation	Device	Functional Description
1	No designation	NMO female RF connector	Connection point for the Network Listen antenna.
2	Ground symbol	Threaded hole with hex socket screw	Connection point for grounding wire.

Table 1-1: microBTS User Interface

Ref No	User Interface Designation	Device	Functional Description
3	Antenna symbol	N-type female RF coaxial connector	Connection point for the base station antenna.
4	Network symbol	Sealed RJ-45 female connector	Connection point for the IP back haul cable
5	No designation	Red LED (off/red)	Indicates if the microBTS is powered and normal (off) or if a major fault is detected (red).
6	120/240 VAC 47-63 Hz 6.8 amps	Sealed 3-wire AC power connector	Connection point for the AC power cord.

1.2.11 Specifications

The specifications for the microBTS are listed in Table 1-2.

Table 1-2: microBTS Specifications

Parameter	Specification	Remarks
Physical/ Environmental/ Electrical		
Enclosure dimensions (L x W x D)	29.4 x 9.7 x 5.7 inches (747 x 246 x 145 mm)	0.94 cu. ft. (26.6L)
Mounting	Wall, pole, or strand	Strand mounting requires an accessory mounting kit.
Weight	40 lbs (18.2 kg)	Without shields installed
Weather resistance (see note 1)	NEMA-6, IEC IP67	Indoor or outdoor installation
Operating temperature	-30° to +55° C (-22° to +131° F)	
Storage temperature	-40° to +70° C (-40° to +158° F)	
AC/DC power connector	Sealed 3-pin AC/DC power	
Antenna cable connector	50 Ohm N-type (female)	50 Ohms input/ output impedance
IP back haul connector	Sealed RJ-45 (female)	Ethernet port
Power over Ethernet port	48 VDC with 15 watt maximum	
Network Listen antenna	NMO (female)	
Lightning suppression (for antenna cable connector)	20 kA IEC 1000-4-5 8/20 μs waveform	Provided by external lightning protector (accessory)
Voltage input	90 to 265 VAC, 47-63 Hz	
Power consumption maximum	600 VA at 120 VAC	

Table 1-2: microBTS Specifications

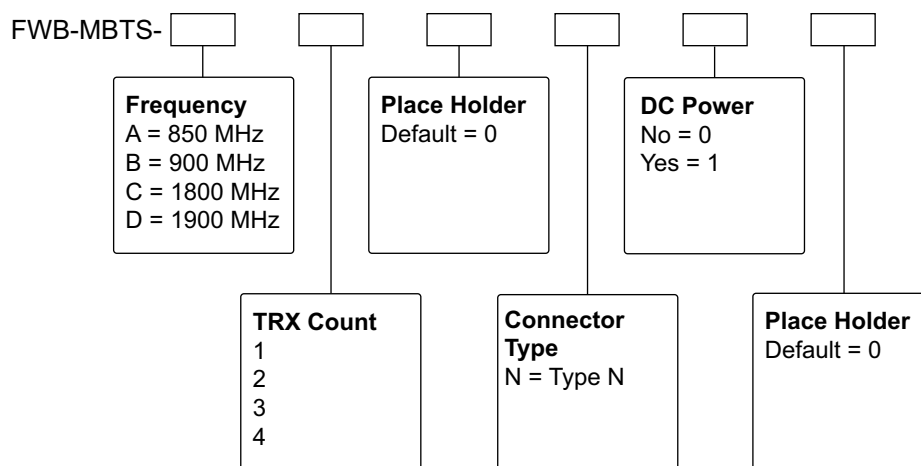| Parameter	Specification	Remarks
Current rating (maximum)	3.5 amps at 120 VAC (2 TRX's on)	Requires 15 amp circuit for 130 VAC operation
Downlink		
Channel spacing	200 kHz	
Frequency range 850 MHz	Transmit: 869 to 894 MHz	Receive: 824 to 849 MHz
Frequency range 900 MHz	Transmit: 925 to 960 MHz	Receive: 880 to 915 MHz
Frequency range 1800 MHz	Transmit: 1805 to 1880 MHz	Receive: 1710 to 1785 MHz
Frequency range1900 MHz	Transmit: 1930 to 1990 MHz	Receive: 1850 to 1910 MHz
Out-of-band emissions	<-13 dBm per 1 MHz bandwidth from 30 MHz to 20 GHz	
Transmitter output power per carrier	33 dBm	
Gain variation	± 3 dB over temperature and unit-to-unit	
Gain flatness	Band flatness ± 1.5 dB across frequency range Channel flatness ± 1.0 db across any 1.25 MHz channel	
Receiver sensitivity (voice)	<-108 dB	

```
Note 1: The microBTS has been tested to assure it meets the dust and water
resistance requirements of IP67 as specified by IEC Publication60529. These tests
were conducted using closure caps attached to the cable ports. To assure the dust
and water resistance level is maintained, it is the responsibility of the user to
select AC power, antenna, and IP backhaul cable assemblies that have a dust and
water resistance level of IP67 or higher. If you are uncertain of cable
manufacturers that meet this requirement, please contact ADC Customer Service.
```

1.3 Accessory Items and Catalog Numbers

This section provides the base catalog numbers for the microBTS product line and a description of the accessory items that are available separately for the microBTS. The accessory items may or may not be required depending on the application. For sales or further information on accessories available for the microBTS refer to the last page of this manual to contact ADC.

1.3.1 Catalog Numbers for the microBTS

Should service or spare parts be required for the microBTS, refer to Figure 1-3 which provides information on the type of microBTS and the options it is equipped with.

FWB-MBTS-

Frequency
A = 850 MHz
B = 900 MHz
C = 1800 MHz
D = 1900 MHz

Place Holder
Default = 0

DC Power
No = 0
Yes = 1

TRX Count
1
2
3
4

Connector Type
N = Type N

Place Holder
Default = 0

Example: A 4 TRX 1800 MHz microBTS With N-Type Connector Operating on AC Power
= FWB-MBTS-C40N00

AD105901

Figure 1-3: microBTS Catalog Numbering Structure

1.3.2 Strand Mount Kit

A strand-mount kit is available if the application requires that the microBTS be mounted from a horizontal cable system. Mounting pads are provided on the side of the enclosure for securing a pair of cable-attachment clips. Screws are used to secure the cable-attachment clips to the enclosure. All fasteners required for installation are provided with the kit. The Strand Mount can be ordered using catalog number DGVC-STRNDKIT.

1.3.3 Lightning Protector

An external lightning protector is available separately for the microBTS. It is recommended that a lightning protector be installed at the base station antenna port to reduce the chance of

damage to electronic components should a lightning strike occur. The lighting protector surge/antenna port is an N-type female connector. Lightning protectors are available in two versions:

1.) Lightning arrestor, N-type male to N-type female, catalog number DGVX-LAP1MS1F1.

2.) Lightning arrestor, N-type male to DIN female, catalog number DGVX-LAP1MS2F1.

1.3.4   Solar Shields

A solar shield kit is available if the microBTS must be mounted in full sunlight for extended periods of time with extremely high ambient temperatures. The solar shields attach to the exterior of the microBTS enclosure and shade the enclosure from direct exposure to the sun. The solar shields are constructed of sheet metal and are painted to match the color of the enclosure. All fasteners and brackets required are provided with the kit. The solar shield kit can be ordered using catalog number DGVC-00000SS2.

1.3.5   Hardened RJ-45 Drop Cables

Hardened RJ-45 drop cables of various lengths can be ordered. Refer to Table 1-3.

Table 1-3: Hardened RJ-45 Cable Options

Cable Length	Catalog Number
20 ft.	FWB-MACC-RJ45020B
60 ft.	FWB-MACC-RJ45060B
100 ft.	FWB-MACC-RJ45100B

1.3.6   AC and DC Power Cords

Power cords suitable for both AC and DC applications are available in various lengths. The microBTS is supplied with one 15 ft. AC/ DC power cable as standard. Refer to Table 1-4 for the optional lengths available.

Table 1-4: AC/DC Power Cable Options

Cable Length	Catalog Number
40 ft.	DGVX-SCSPWR020
60 ft.	DGVX-SCSPWR060
100 ft.	DGVX-SCSPWR100

1.3.7 UPS System with Battery Backup

For systems operating in environments with unreliable mains power, a UPS system with 750 VA, 17 amp-hour capacity is available through ADC. The UPS system can be ordered using catalog number DGVX-UPS07501700. Contact ADC for more details.

Chapter 2 - Unpacking and Inspection

Content	Page

2.1   Unpacking and Inspecting the microBTS

This section provides instructions for opening the shipping boxes, verifying that all parts have been received, and verifying that no shipping damage has occurred. The basic microBTS includes the following items:

- microBTS enclosure

- Network Listen antenna

- Fasteners, cables, strapping, and mounting bracket as specified in Table 3-1, Section 3, and Table 4-1, Section 4.

The following accessories may also be shipped with the microBTS:

- Strand mount kit (optional item)

- Lightning protector (optional item)

- Solar shields (optional item)

Use the following procedure to unpack and inspect the microBTS components:

1   Open the shipping cartons and carefully unpack each component from the protective packing material.

2   Check each component for broken or missing parts. If there are damages, contact ADC (see the last page in this document) for an RMA (Return Material Authorization) and to reorder if replacement is required.

Chapter 3 - Mounting Procedures

3.1 Before Mounting the microBTS

3.1.1 Introduction

This section provides instructions for mounting the FlexWave microBTS. The microBTS may be secured to an interior or exterior wall, attached to a utility pole, or attached to a horizontal cable (strand-mount). Mounting the microBTS from a cable requires an accessory kit not included with the unit. Read this section in its entirety prior to installing the microBTS.

3.1.2 Mounting Considerations

Before mounting the microBTS, verify that the installation site is in conformance with the system design plan (not documented here). If a system design plan has not been prepared, consult the ADC Customer Service for technical assistance. The site chosen must conform to all local codes and any permits required must be obtained prior to the start of mounting. The location must be accessible and provide adequate parking for worker and vehicle safety. The installed unit must not create a visual or physical obstruction to vehicular or pedestrian traffic or block pole-climbing access.

▶ **Note:** The microBTS is intended for restricted access locations only.

The microBTS must be located as specified in the system design plan and must have ready access to the specified AC or DC power source. The site must provide adequate ventilation and must comply with the unit environmental specifications. A minimum of 18 inches of clearance must be provided on all sides (except the back) of the enclosure to allow free air circulation. In addition, the bottom (cable entry end) and either the top, the front, or one of the sides must be open to free air space. Adequate clearance must be allowed at the bottom of the enclosure to provide access for attaching cables and for viewing the LED indicator.

3.1.3 Mounting Hardware Provided With the microBTS

The microBTS is shipped with the mounting hardware required for a typical wall-mount or pole-mount installation. Table 3-1 lists the mounting hardware provided. Additional hardware may have to be provided by the installer depending on the site requirements.

Table 3-1: microBTS Mounting Hardware and Fasteners

Item	Quantity
Hoisting ring assembly	1
Hoisting ring assembly mounting screws	2
Mounting bracket	1
Strapping	2

Table 3-1: microBTS Mounting Hardware and Fasteners

Item	Quantity
3/8 inch concrete anchors	4
3/8 x 1 inch cap screws	4
3/8 x 1.5 inch lag screws	4
3/8 x 1.5 inch flat washers	4
3/8 x 1.5 inch lock washers	4
5/16 x 1.25 inch cap screws	1
5/16 inch flat washer	1
5/16 inch lock washer	1
5/16 inch nut	1

3.1.4   microBTS Dimensions
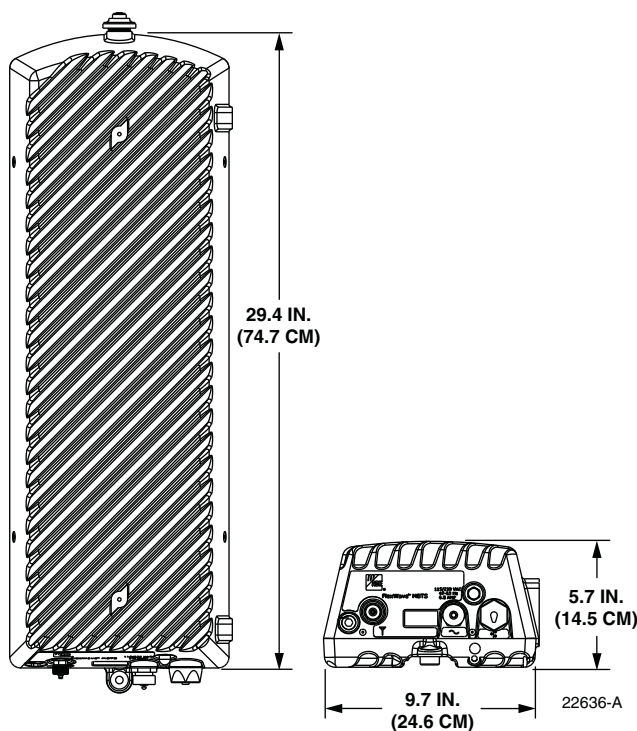
The basic dimensions of the microBTS are shown in Figure 3-1.

Figure 3-1: microBTS Dimensions

3.1.5   Tools and Additional Materials Required For Mounting

The tools and any additional materials required for mounting the microBTS are dependent on the mounting system. The following sections list the tools required for the various mounting systems and are not supplied by ADC.

Wood-Framed Wall Mounting

- 9/16 inch wrench
- 1/2 inch wrench (2)
- Torque wrench with 3/16-inch hex key socket
- Drill
- Pencil or marker
- 4 foot (122 cm) x 2 foot (61 cm) sheet of pressure-treated 3/4 inch (19 mm) plywood
- Fasteners and tools for securing the 3/4 inch (19 mm) plywood to wall
- 3/16 inch standard drill bit

Masonry Wall Mounting

- 9/16 inch wrench
- 1/2 inch wrench (2)
- Torque wrench with 3/16 inch hex key socket
- Drill
- Pencil or marker
- 5/8 inch masonry drill bit

Wooden Utility Pole Mounting

- 9/16 inch wrench
- 1/2 inch wrench (2)
- Torque wrench with 3/16 inch hex key socket
- Drill
- Pencil or marker
- 3/16 inch standard drill bit

Metal Utility Pole Mounting

- Clamp banding tool (BT1HT from Panduit)
- 1/2 inch wrench (2)

- Torque wrench with 3/16 inch hex key socket

3.1.6   Lift Ring Installation

A lift ring is provided with the microBTS. Secure the lift ring to the side of the enclosure as shown in Figure 3-2 using the two 5/8 inch long 1/4-20 socket head screws and two 1/4 inch split washers provided. Use a torque wrench with a 3/16-inch hex key socket to tighten the cap screws to 40 – 45 lbs/force-inches (4.5 to 5.1 Nm) of torque. Do not overtighten. If the threads show signs of damage, yielding, or stripping when tightening the cap screws, discontinue lift ring installation and remove the lift ring. Always use appropriate lifting equipment when hoisting the enclosure into position for mounting. Remove the lift ring after the enclosure has been mounted.
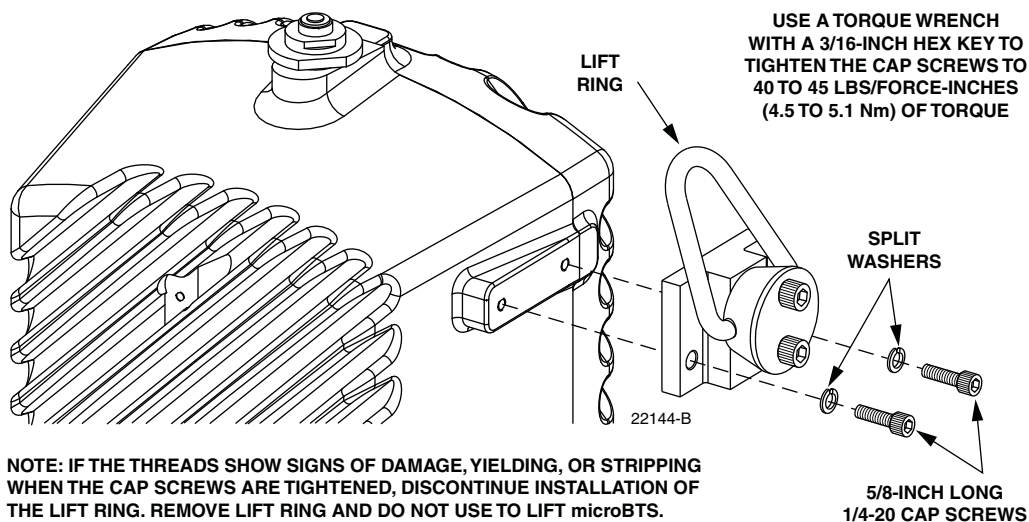
Figure 3-2: Hoist Ring Installation

3.1.7   Standard Mounting Bracket Installation

A standard mounting bracket is provided with each enclosure. The standard mounting bracket may be mounted vertically or horizontally. If mounted horizontally, it is recommended that the bracket be oriented so the enclosure cooling fins will face upward or to the side with respect to the ground. The following sections provide instructions for installing the standard mounting bracket on a wood-framed wall, masonry wall, wooden utility pole, or metal pole. Refer to the procedure that applies to the installation.

3.1.7.1   Wood-Framed Wall Mounting

When mounting the enclosure on a wood-framed wall, it is recommended that pressure-treated plywood with a minimum thickness of 0.75-inch (19.0 cm) be used as a backer board. The backer must be firmly secured to the interior framing of the wall. Use the following procedure to install the standard mounting bracket on a wood-framed wall:

1   Mount the plywood backer (not-provided) on the wall and firmly secure it to the wall's interior studs.

2   Hold the enclosure mounting bracket in position for installation on the plywood backer as shown in Figure 3-3. The end with the V-notch should be at the top.
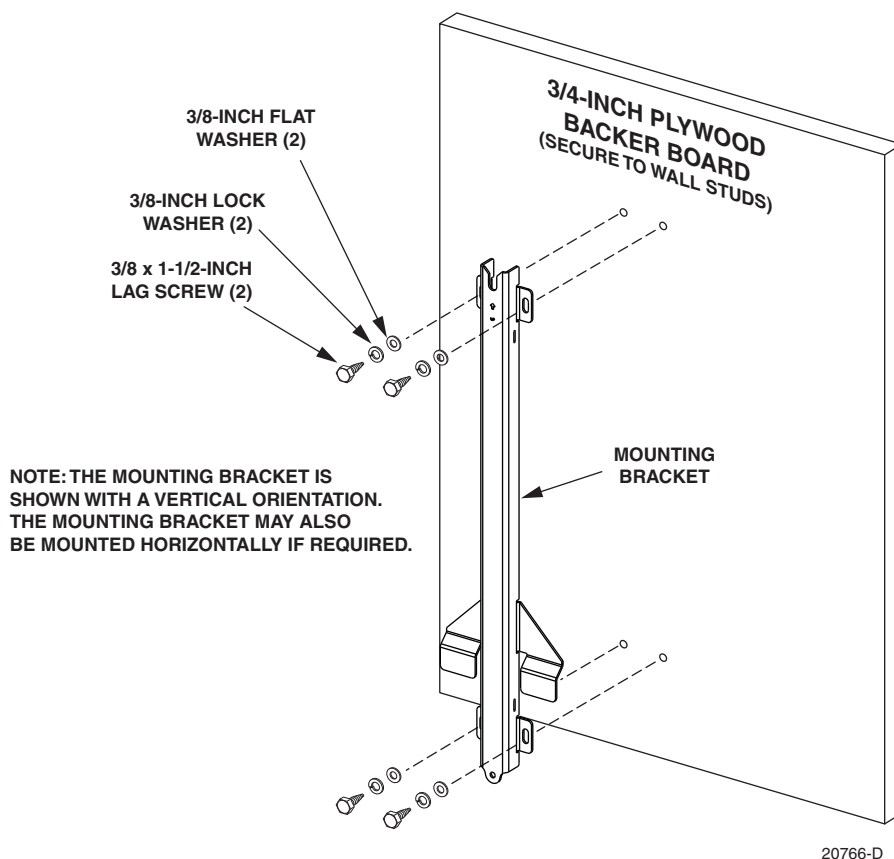
Figure 3-3: Secure Standard Mounting Bracket To Plywood Backer

3   Mark the location of the mounting bracket's two mounting holes on the plywood backer.

4   Drill a 3/16inch hole in the backer board at each of the locations marked in step 3.

5   Locate the two 3/8 x 1-1/2-inch lag screws (provided with the enclosure) and place a 3/8 inch lock washer and 3/8 inch flat washer on each screw.

6   Secure the mounting bracket to the plywood using the screws and washers prepared in step 5. Tighten screws until bracket is securely attached to the plywood.

7   Hang the enclosure from the mounting bracket as described in Section 5.4.

3.1.7.2   Masonry Wall Mounting

When mounting the enclosure on a masonry surface, locate the mounting anchors as close as possible to the center of any bricks or blocks, especially the upper anchors. Use the following procedure to install the standard mounting bracket on a masonry wall:

1   Hold the enclosure mounting bracket in position for installation on the masonry wall as shown in Figure 3-4. The end with the V-notch should be at the top.

2   Using a pencil, mark the location of the mounting bracket's two mounting holes on the wall.

3   Drill holes in the wall (at the locations marked in step 2) that are the correct diameter for the type of anchors being used. The recommended hole size for the ADC-provided concrete anchors is 5/8 inch .
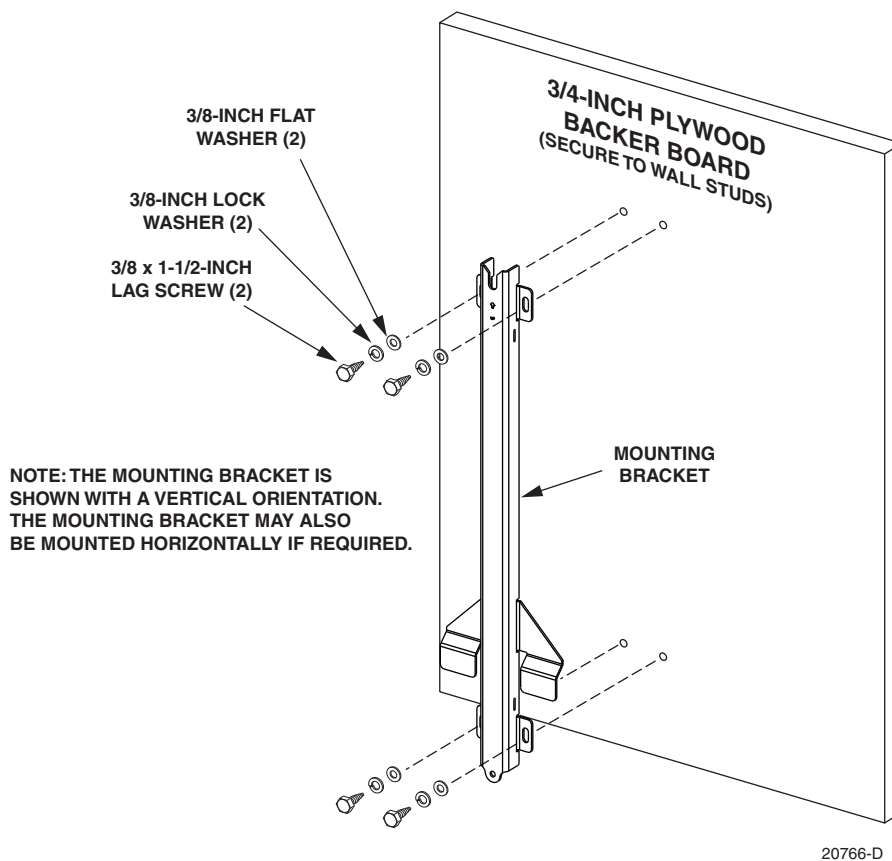
4   Set the anchors in the wall.

Figure 3-4: Secure Standard Mounting Bracket To a Masonry Wall

5   Locate the two 3/8 x 1-inch cap screws (provided with enclosure) and place a 3/8 inch lock washer and 3/8 inch flat washer on each screw.

6   Place the mounting bracket in position for mounting on the wall and then thread the 3/8 x 1 inch cap screws (with installed washers) into the two anchors. Tighten cap screws until secure.

7   Hang the enclosure from the mounting bracket as shown in Section 5.4.

3.1.7.3   Wooden Utility Pole Mounting

When mounting the enclosure from a wooden utility pole, make sure the pole is sound and has not been damaged or weakened by decay. Use the following procedure to install the standard mounting bracket on a wooden utility pole:

1   Hold the enclosure mounting bracket in position for installation on the wooden pole as shown in Figure 3-5. The end with the V-notch should be at the top.

2   Using a pencil, mark the location of the mounting bracket's two mounting holes on the pole.

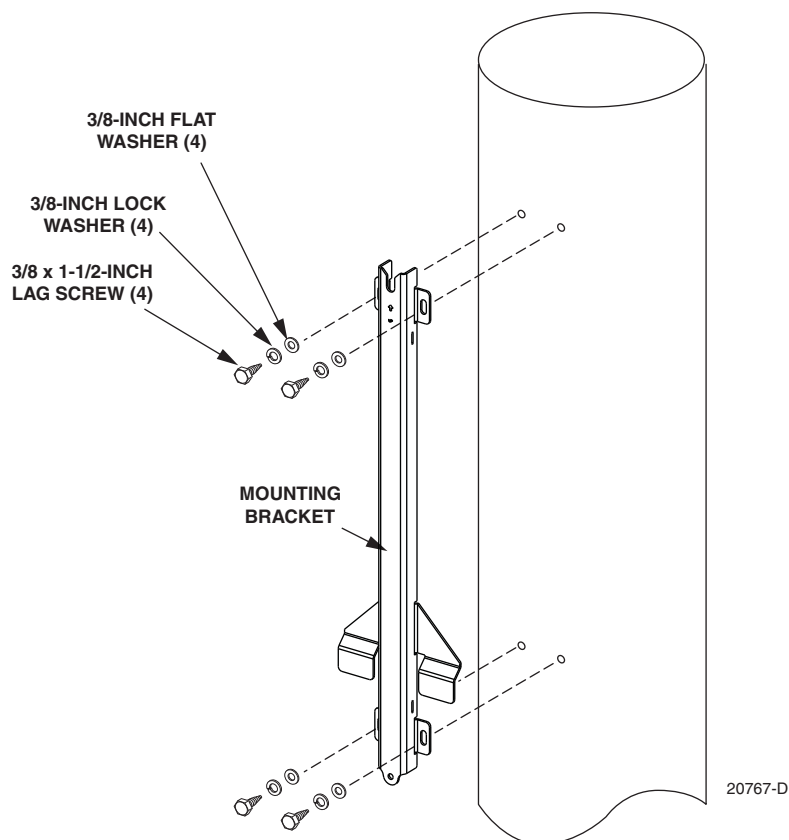3   Mark the location of the mounting bracket's two mounting holes on the wooden pole.

Figure 3-5: Secure Standard Mounting Bracket To a Wooden Pole

4   Drill a 3/16-inch hole in the utility pole at each of the locations marked in step 3.

5   Locate the two 3/8 x 1-1/2-inch lag screws (provided with the enclosure) and place a 3/8 inch lock washer and 3/8-inch flat washer on each screw.

6   Secure the mounting bracket to the pole using the screws and washers prepared in step 5. Tighten screws until bracket is securely attached to the plywood.

7   Hang the enclosure from the mounting bracket as shown in Section 5.4.

3.1.7.4   Metal Utility Pole Mounting

Stainless steel strapping is provided for securing the mounting bracket to a cylindrical object (such as a metal utility pole) that cannot be pierced with a screw or bolt. A special tool (Panduit BT1HT) is required to properly secure and tension the strapping. Use the following procedure to install the mounting bracket on a metal utility pole:

1   Insert the two sections of stainless steel metal strapping (provided with the enclosure) through the slots in the mounting bracket and place in position for mounting as shown in Figure 3-6. The end with the V-notch should be at the top.

Note: Two sections of stainless steel metal strapping are provided with the enclosure. If additional strapping is required, use 5/8 inch wide 304 AISI stainless steel strapping with a minimum tensile strength of 700 lbs force.
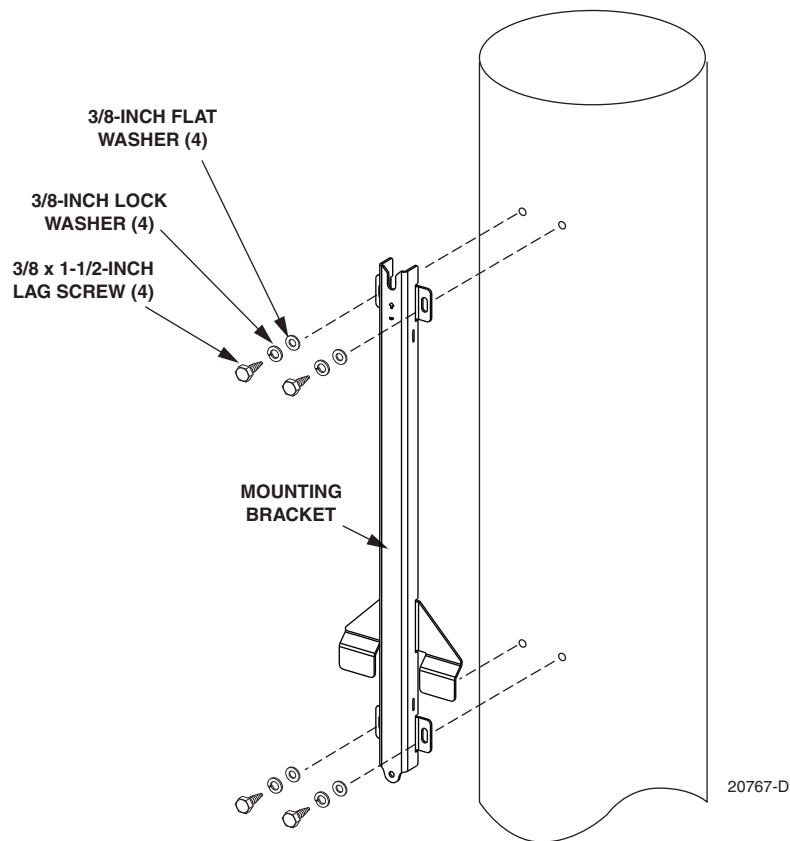
**3/8-INCH FLAT
WASHER (4)**

**3/8-INCH LOCK
WASHER (4)**

**3/8 x 1-1/2-INCH
LAG SCREW (4)**

**MOUNTING
BRACKET**

20767-D

Figure 3-6: Secure Standard Mounting Bracket To a Metal Pole

2   Wrap the top section of strapping around the pole and secure using Panduit tool # BT1HT.
Adjust the tool tension setting to #7. Follow the instructions provided with the tool by the
tool manufacturer (see MS Strapping Tool Operation Instructions PA24808A01).

3   Repeat step 2 for the bottom section of strapping.

4   Hang the enclosure from the mounting bracket as shown in Section 5.4.

3.1.7.5   Installing the Enclosure on the Standard Mounting Bracket

Use the following procedure to install the microBTS on the standard mounting bracket.

1   Hang the enclosure from the mounting bracket as shown in Figure 3-7. The shoulder
    screw in the rear side of the enclosure fits into the notch at the top of the mounting bracket.
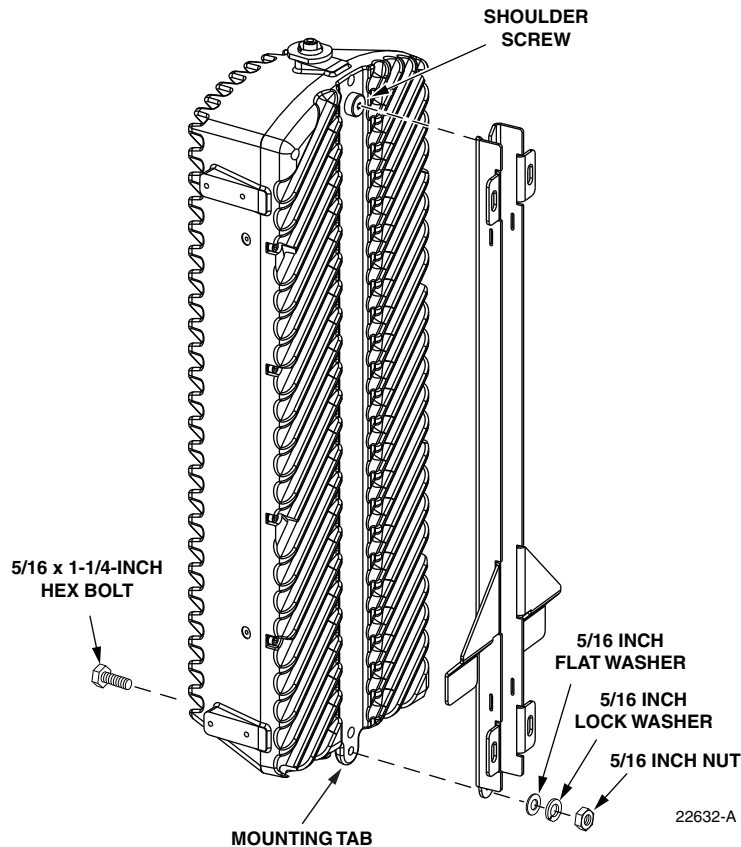

Figure 3-7: Secure Standard Mounting Bracket

2   Insert a 5/16 x 1-1/4-inch hex bolt through the hole in the mounting tab located at the
    bottom of the enclosure.

3   Place a 5/16-inch flat washer and 5/16-inch flat washer on the hex bolt.

4   Thread a 5/16-inch nut onto the hex bolt and tighten securely.

3.1.7.6   Strand-Mount Installation

An accessory kit is available for mounting the microBTS enclosure from an overhead wire or
strand. The strand-mount kit can accommodate wire cable that ranges in size from 0.25 to
0.625 inches in diameter. A minimum break strength of 4400 lbs. is recommended. Stainless
steel cable is preferred.

Blank

Chapter 4 - Installation Procedures

This section provides procedures for installing the Network Listen antenna; connecting the grounding, base station antenna, IP backhaul, and AC/DC power cables; and installing the optional solar shields. Installation of the microBTS may be done separately from the installation of the BSC. When the installation of the microBTS is completed, refer to chapter 5 for the system turn-up and test procedures.

DANGER: Wet conditions increase the potential for receiving an electrical shock when installing or using electrically-powered equipment. To prevent electrical shock, never install or use electrical equipment in a wet location or during a lightning storm.

4.1   Installation Overview

Installation of the microBTS consists of the following basic steps:

▶ **Note:** To insure that all connectors and ports remain dust-free during installation, leave all dust caps and dust protectors in place until directed to remove them.

▶ **Note:** If the microBTS will be horizontally mounted, provide drip loops for all cables that connect to the enclosure.

1   Connecting a grounding cable to the microBTS grounding point.

2   Installing Network Listen antenna.

3   Connecting the IP backhaul cable.

4   Connecting the base station antenna coaxial cable to the microBTS antenna port.

5   Installing the AC/DC power cable and connecting it to the microBTS power port.

6   Installing the optional solar shields.

4.1.1   Installation Hardware Provided with microBTS Enclosure

The installation hardware that is provided with the microBTS is listed in Table 4-1.

Table 4-1: microBTS Installation Hardware

Item	Quantity
M8 x 10 hex socket capscrew (for grounding cable)	1
M8 washer (for grounding screw)	1
Grounding cable (1.5 m)	1
AC Power Cable (20 feet)	1
Network Listen antenna	1
Front shield1 (option)	1
Side shield2 (option)	2
3/8-inch hex standoff	7
3/8-inch 10-32 screw with T25 TORX drive	7
#10 split washer	7

4.1.2   Tools and Materials Required

The following tools are required in order to complete the procedures in this instruction:

- #6 metric socket key or 7/32-inch hex key wrench

- Wire cutters

- Wire stripper

- Compression pliers for splicing grounding cable

- Tools for installing exterior AC circuit

- Tool kit for attaching N-type connectors to coaxial cable

The following materials are required in order to complete the installation procedures:

- #6 AWG (4 mm) copper wire and splice

- Connector for attaching #6 grounding wire to approved earth ground source

- Junction box, conduit, fasteners, connectors, and wire to install a 120/240 volt, 15 amp, exterior AC circuit.

- N-type male connector

4.1.3   Ground Wire Installation

A hexagon socket-head capscrew is provided on the underside of the cabinet for attaching a #6 copper grounding wire to the enclosure. A 1.5 meter long #6 AWG copper wire terminated with a ring terminal is provided for connecting the enclosure to an approved grounding source. Use the following procedure to install the grounding wire:

Caution: For proper and safe equipment operation, an approved earth ground connection must be provided. The recommended minimum wire size is #6 AWG copper wire.

1   Locate the 1.5 m #6 AWG (4 mm) copper grounding wire provided with the microBTS enclosure.

2   Locate the grounding point provided on the underside of the enclosure as shown in Figure 4-1.

3   Remove the socket-head capscrew and flat washer from the enclosure using a #6 metric key or a 7/32-inch hex key wrench.

4   Secure the ring terminal end of the grounding wire to the enclosure using the screw and washer removed in step 3. Tighten securely.

5   Route the free end of the grounding wire to an approved earth ground source.

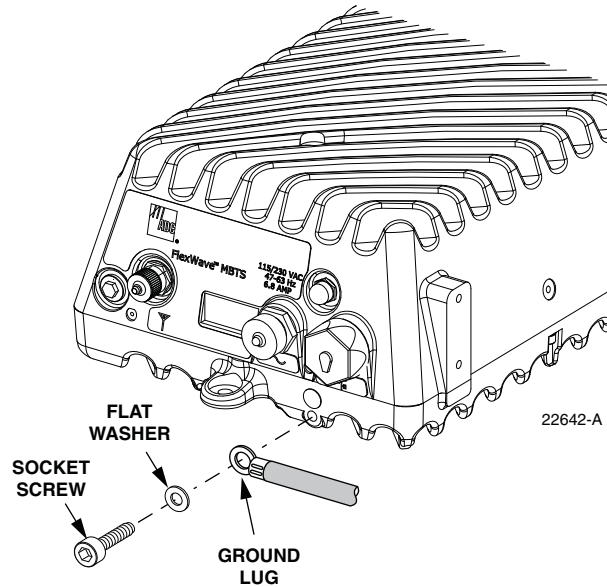6   Cut the ground wire to length and connect it to the earth ground source as specified by local code or practice.

Figure 4-1: Connecting the Grounding Cable to the Enclosure

4.1.4   Network Listen Antenna Installation

The microBTS is shipped with a Network Listen antenna. A temporary dust proof cap is installed at the factory for protection during shipment. Remove the temporary cap and install the Network Listen antenna (included with the microBTS accessories) by threading it onto the NMO connector located on the top of the microBTS as shown in Figure 4-2. Tighten antenna by hand until secure.
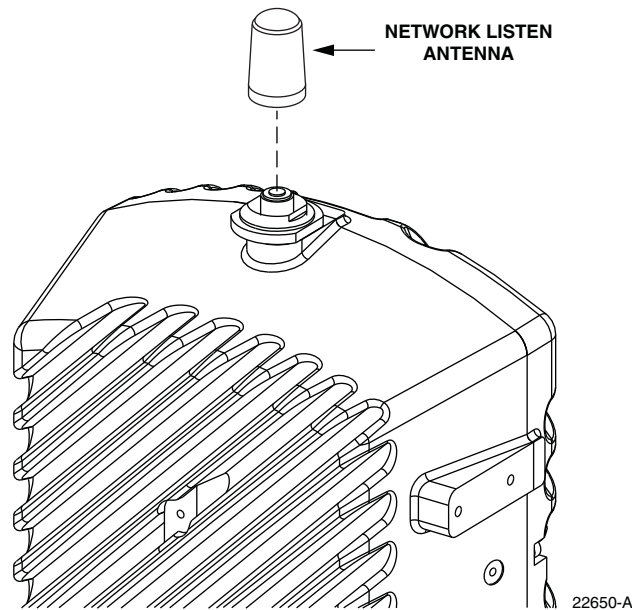
Figure 4-2: Network Listen antenna Installation

4.1.5   IP Backhaul Cable Installation

A backhaul cable must be routed from the backhaul device to the microBTS enclosure. The backhaul cable must be terminated with a hardened RJ-45 male connector for connection to the microBTS backhaul port. The maximum cable length is 300 feet (91.4 m).

Use the following procedure to install the backhaul cable:

1   Remove the dust cap from the RJ-45 connector located at the bottom of the enclosure as shown in Figure 4-3.

2   Route the backhaul cable from the backhaul device to the underside of the enclosure.

3   Align the plug end of the RJ-45 cable connector with the RJ-45 port receptacle and then insert the cable plug into the port receptacle.

4   Slide the connector nut up to the port until it engages the connector locking mechanism.

5   Tighten the connector nut in a clockwise direction (if necessary, use a wrench or pliers to grip the connector nut) until it snaps past the detent position and locks into place.

▶   **Note:** It may be necessary to apply 30 to 50 lbs/force-inches (3.4 to 5.6 Nm) of torque to the connector nut in order to turn it past the detent position
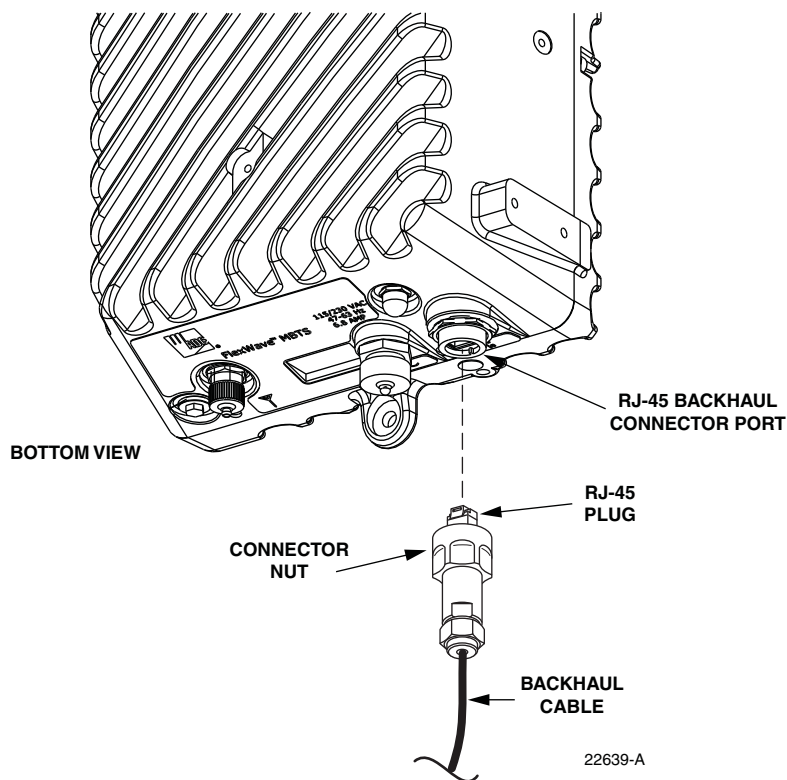
Figure 4-3: IP backhaul Cable Installation

4.1.6   Base Station Antenna Cable Installation

A coaxial antenna cable must be routed from the base station antenna to the microBTS enclosure. The cable must be terminated with an N-type male connector for connection to the microBTS antenna port or the lightning protector (accessory).

▶   **Note:** To comply with Maximum Permissible Exposure (MPE) requirements, the maximum composite output from the antenna cannot exceed 1640 watts EIRP and the antenna must be permanently installed in a fixed location that provides at least 6 meters (20 feet) of separation from all persons.

Use the following procedure to install the antenna cable(s):

1   Remove the dust cap from the N-type female connector located on the underside of the enclosure as shown in Figure 4-4.

2   If specified, connect a lightning protector (accessory) to the antenna port.

3   Route the coaxial antenna cable from the base station antenna to the underside of the enclosure.

4   Cut the antenna cable to the required length and terminate with an N-type male connector.

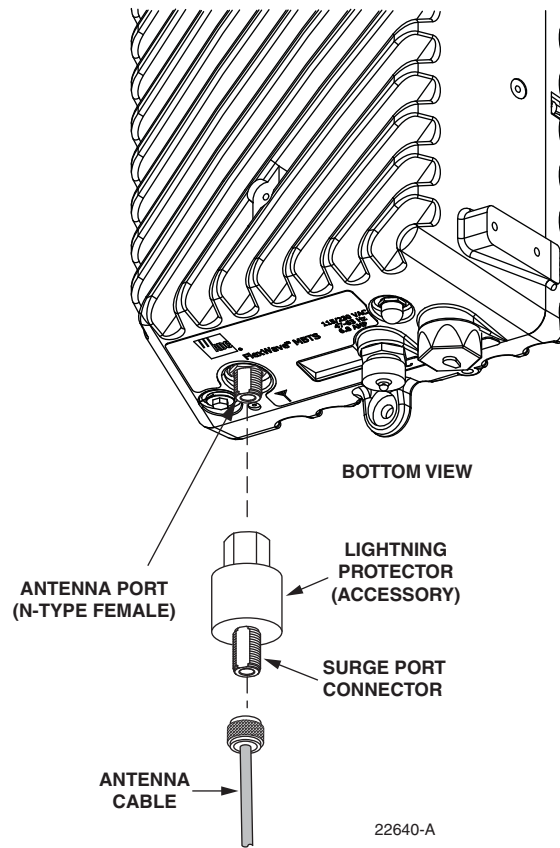5   Connect the antenna cable to the lightning protector or to the antenna port.

Figure 4-4: Connecting Base Station Antenna Cable to Antenna Port

4.1.7   AC Power Wiring Installation

A 20-foot connectorized 3-wire cable (also available in lengths of 40, 60, or 100 feet) is provided for the AC power connections. The connectorized end of the cable connects to the AC power port located on the bottom of the enclosure. The stub end of the cable must be routed to an external junction box (not provided) for permanent connection to the AC power system wiring.

▶   **Note:** It is recommended that an AC outlet be installed near the enclosure for powering tools and test equipment. This outlet must include a GFCI device for protection.

The AC power source must supply 120 or 240 VAC, 50 or 60 Hz, single-phase power through a 15 amp circuit breaker. The AC power cable provides three wire leads for line, neutral, and ground connections. The power cable is rated for indoor or outdoor use and must not be placed within electrical conduit as this will impede the cooling of the cable during usage. The electrical junction box and any conduit, wire, and fittings required must be provided by the installer.

Note: All electrical work must comply with local codes and requirements. A locally licensed electrical contractor is best qualified to perform this work. For additional information, consult with the ADC Customer Service.

DANGER: Use extreme caution when working with high voltage AC power. Ensure all power is disconnected before working on power circuits.

Use the following procedure to install the AC power wiring:

1   Locate the AC power cable that is provided separately with the enclosure.

2   Route the power cable between the AC power port, located on the underside of the enclosure and the nearest AC power junction box as shown in Figure 4-5. It may be necessary to install a new junction box if an existing junction box is not available.
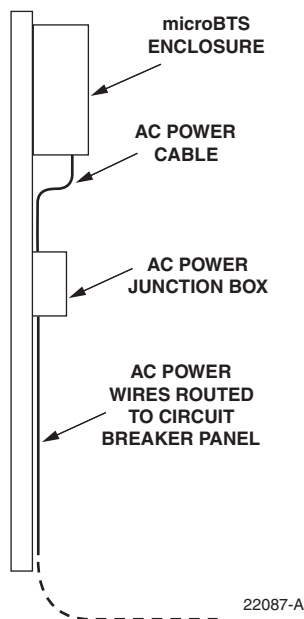
Figure 4-5: Typical AC Power Cable Routing

3   Secure the cable between the AC power port and the AC power junction box per local practice. Leave sufficient slack in the cable to allow it to be easily connected and disconnected from the AC power port.

▶ **Note:** The power cable is rated for indoor or outdoor use and must not be placed within electrical conduit as this will impede the cooling of the cable during usage. The cable run distance to the AC power source must not exceed 100 feet.

4   Install any AC power supply wires that may be required between the AC junction box and the AC circuit breaker box.

▶ **Note:** It is recommended that an AC outlet be installed near the enclosure for powering tools and test equipment. This outlet must include a GFCI device for protection.

5   Connect the AC power cable wires to the AC power supply wires. Refer to Figure 4-6 to identify the color code and wire designations.

120 VAC CONNECTIONS

AC POWER CORD
PROVIDED WITH ENCLOSURE

BLACK   LINE   120 VAC POWER WIRING

GREEN/YELLOW   GROUND

WHITE   NEUTRAL

240 VAC CONNECTIONS

AC POWER CORD
PROVIDED WITH ENCLOSURE

BLACK   LINE 1   240 VAC POWER WIRING

GREEN/YELLOW   GROUND

WHITE   LINE 2   20778-A

CONNECTOR PIN DESIGNATIONS

PIN 1 - GREEN/YELLOW
PIN 2 - WHITE
PIN 3 - BLACK

END VIEW OF CONNECTOR

1
2
3
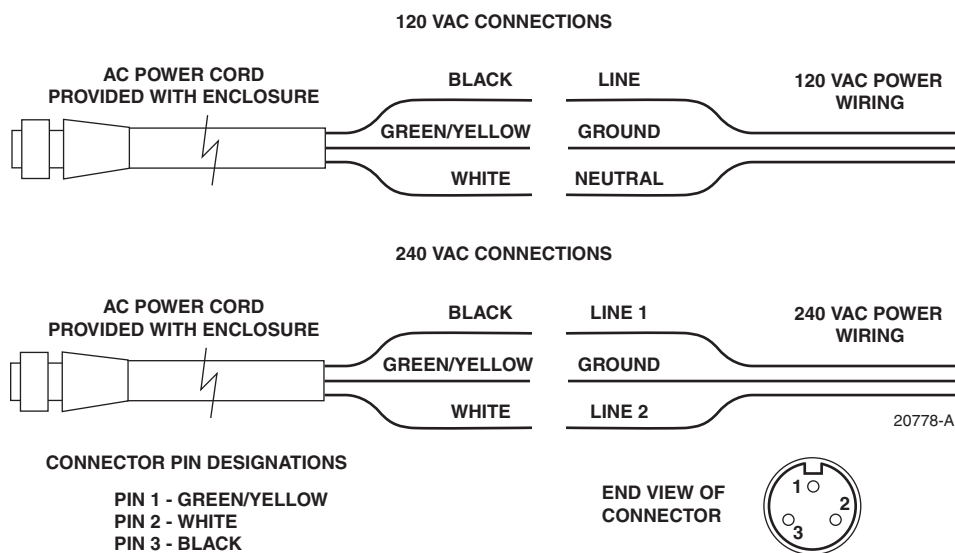
Figure 4-6: AC Power Cable Connections

6   At the AC circuit breaker box, connect the AC power supply load wires to a 15 amp circuit breaker.

7   Place the circuit breaker in the ON position and then test the connectorized end of the AC power cable for proper voltage levels and correct polarity.

8   When testing is complete, place the circuit breaker in the OFF position.

9   Remove the dust cap from the AC power port located on the bottom of the enclosure as shown in Figure 4-7.

DANGER: While trying to connect the AC power cable to the remote unit AC power port, it is possible for the line terminal on the cable connector to contact the ground pin on the power port. If the AC cable is energized, this will result in a direct short to ground for the AC power. To avoid possible personal injury and equipment damage, always turn the AC power off before connecting the AC power cable to the AC power port.
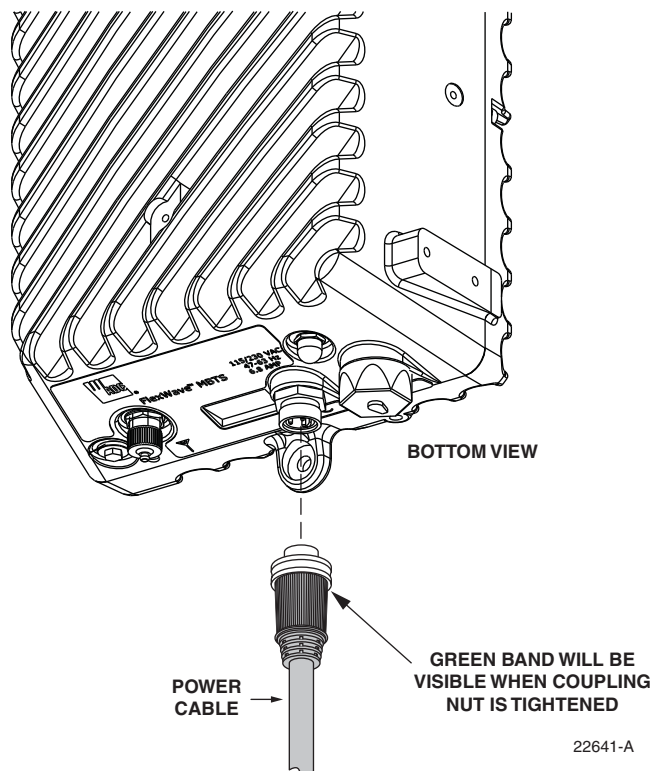

Figure 4-7: Connecting AC Power Cable to Enclosure

10 Connect the power cable connector to the AC power port.

11 Tighten coupling nut until the green band at the top of the connector body is visible.

4.1.8   DC Power Wiring Installation

A 15-foot connectorized 3-wire cable (also available in lengths of 40, 60, or 100 feet) is provided for the DC power connections. The connectorized end of the cable connects to the DC power port located on the bottom of the enclosure. The stub end of the cable must be routed to an external junction box (not provided) for permanent connection to the DC power system wiring. The DC power source must supply 5 amps at -48 VDC through a 5 amp circuit breaker. The DC power cable provides three wire leads for positive, negative, and ground connections. The power cable is rated for indoor or outdoor use and must not be placed within electrical conduit as this will impede the cooling of the cable during usage. The electrical junction box and any conduit, wire, and fittings required must be provided by the installer.
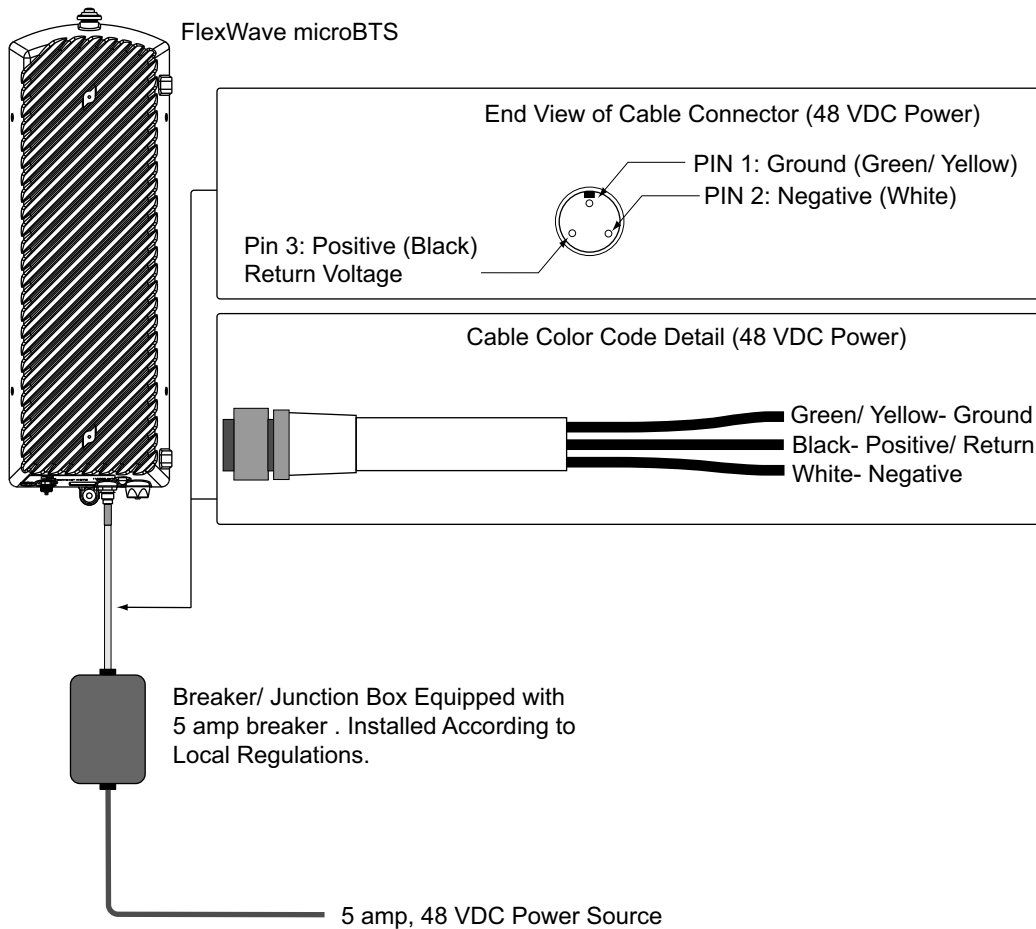
▶ **Note:** All electrical work must comply with local codes and requirements. A locally licensed electrical contractor is best qualified to perform this work. For additional information, consult with the ADC Customer Service.

DANGER: Use extreme caution when working with DC power. Ensure all power is disconnected before working on power circuits.

Use the following procedure to install the DC power wiring:

1 Locate the DC power cable that is provided separately with the enclosure.

2 Route the power cable between the DC power port, located on the underside of the enclosure and the DC power supply as shown in Figure 4-8. It may be necessary to install a new junction box for the 5 amp breaker if an existing junction box is not available.

FlexWave microBTS

End View of Cable Connector (48 VDC Power)

PIN 1: Ground (Green/ Yellow)
PIN 2: Negative (White)
Pin 3: Positive (Black)
Return Voltage

Cable Color Code Detail (48 VDC Power)

Green/ Yellow- Ground
Black- Positive/ Return
White- Negative

Breaker/ Junction Box Equipped with
5 amp breaker . Installed According to
Local Regulations.

5 amp, 48 VDC Power Source

AD078901

Figure 4-8: Typical DC Power Cable Routing Detail

3   Secure the cable between the DC power port and the DC power breaker box per local prac-
tice. Leave sufficient slack in the cable to allow it to be easily connected and disconnected
from the DC supply.

▶   **Note:** The power cable is rated for indoor or outdoor use and must not be placed within electrical
conduit as this will impede the cooling of the cable during usage. The cable run distance to the DC
power source must not exceed 100 feet.

4   Install any DC power supply wires that may be required between the DC breaker box and
the DC supply.

5   Connect the DC power cable wires to the DC power supply. Refer to Figure 4-8 and
Table 4-1 shown below to identify the color code and wire designations.

Table 4-2: microBTS Installation Hardware

Wiring color Code	DC Connection
Black	**+** (positive) 48 VDC return
White	**-** (negative) 48 VDC
Green/ Yellow	Ground

6   At the DC circuit breaker box, connect the DC power supply.

7   Place the circuit breaker in the ON position and then test the connectorized end of the DC power cable for proper voltage levels and correct polarity using a volt-ohm-meter.

8   When testing is complete, place the circuit breaker in the OFF position.

9   Remove the dust cap from the AC/DC power port located on the bottom of the enclosure as shown in Figure 4-7.

DANGER: While trying to connect the DC power cable to the remote unit DC power port, it is possible for the positive or negative terminal on the cable connector to contact the ground pin on the power port. If the DC cable is energized, this will result in a direct short to ground for the DC power. To avoid possible personal injury and equipment damage, always turn the DC power off before connecting the DC power cable to the DC power port.

4.1.9   Touch-Up Painting

An aerosol container of paint (Cardinal manufacturing part number A-2008-E10559, Gloss Beige) is available for touching-up nicks and scratches in the factory coat of paint. Lightly sand the area to be painted and then clean it thoroughly to remove and dirt, dust, or foreign matter. Shake the paint container until thoroughly mixed and then apply a light coat of paint to the damaged area. Wait until the paint is dry and apply a second coat if necessary.

4.1.10   Shield Installation (option)

A set of shields is provided with the microBTS as an option (part number DGVC-00000SS2). The shields primarily reduce the effects of solar loading on the aluminum enclosure. The shields also prevent accidental contact with surface areas of the enclosure that under extreme service conditions may become hot enough to cause burns. Install the seven 3/8-inch hex standoffs as shown in Figure 4-9. Secure the two side shields and the top shield to the standoffs using the seven 3/8-inch 10-32 TORX drive screws and seven #10 split washers provided. A T25 TORX drive bit is provided for tightening the screws.
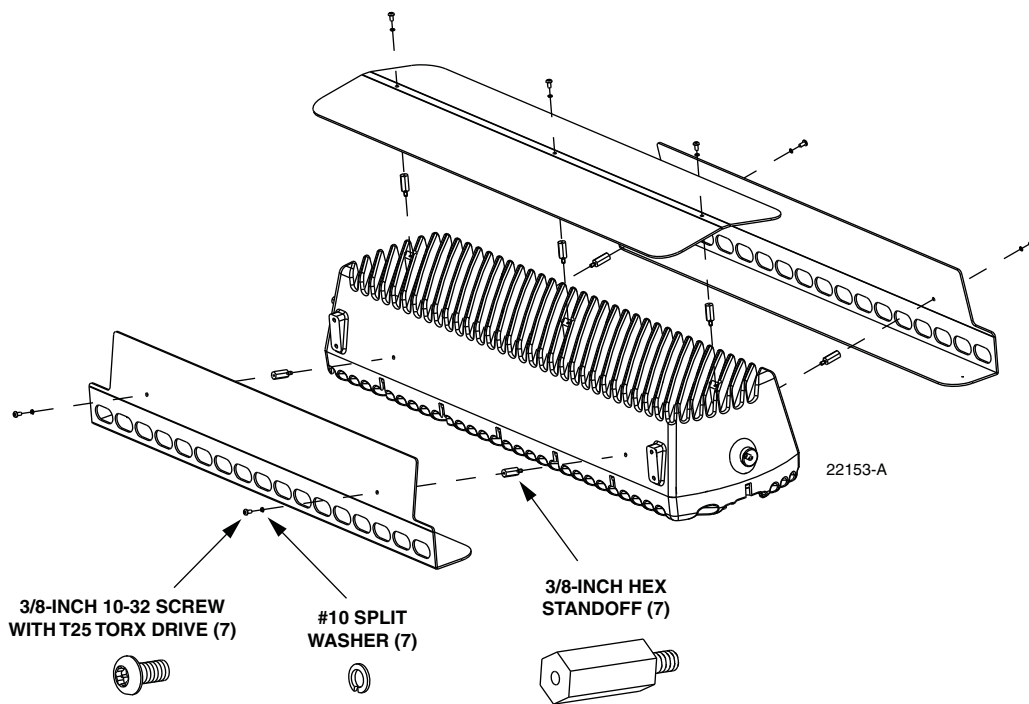
3/8-INCH 10-32 SCREW WITH T25 TORX DRIVE (7)

#10 SPLIT WASHER (7)

3/8-INCH HEX STANDOFF (7)

22153-A

Figure 4-9: Solar shield Installation

4.2   MICROBTS REPLACEMENT

The microBTS enclosure contains no user-serviceable or field-serviceable components. Failure of any internal component will require replacement of the entire unit. The enclosure mounting hardware, the various cables, and any attached items may be reused with the replacement unit. Opening the microBTS enclosure for any reason may cause the product warranty to be voided.

Service to be conducted by qualified ADC service personnel only.

Caution; Risk of explosion if the battery is replaced by an incorrect type. Dispose of used batteries according to manufactures instructions.

Chapter 5 - microBTS Initial Configuration

After installation of the microBTS is complete, it must be initialized with an IP Address to allow it to communicate with the BSC over the OML/ Abis link.

Initializing the microBTS with an IP address is accomplished by performing the following basic tasks:

1 Assemble all the tools, equipment and administrative information needed (request IP addresses for the microBTS, and Abis link from the system administrator).

2 Connect the equipment.

3 Configure your PC to communicate with the microBTS.

4 Turn-up the equipment and assign a DHCP generated address to the microBTS.

5 Use the DHCP generated IP address to enable the microBTS web browser and set static IP addresses for the microBTS and each of the TRX units.

6 Request the system administrator to provision the site using the BSC Configuration Manager utility.

7 The system administrator will verify the microBTS is communicating with the BSC.

8 Verify that the microBTS is functioning correctly by making a phone call.

The following procedures will guide you through this process.

◢ **Note:** Further information regarding set up of the TRX's contained within the microBTS can be found in the nanoBTS Installer User Guide (ADCP-75-310). Further information regarding setup and configuration of the BSC can be found in the BSC Configuration Manager User Guide (ADCP-75-317).

◢ **Note:** Verify the BTS Installer utility and the BSC Configuration Manager utility is the latest version or the version appropriate to your system.

◆ **Note:** When setting the RF output power levels as described in BSC Configuration Manager (ADCP-75-317) paragraph 6.44 "Radio Carrier." The maximum settings are: No less than level 4 for 900 MHz products and no less than level 5 for 1800 MHz products. Failure to observe this precaution may result in over driving the microBTS power amplifier which may require power cycling the equipment to reset the Power Amplifier.

5.1 Equipment and Information Required for Initialization

The following equipment and information will be needed to initialize the microBTS:

- Windows XP based PC loaded with BTS Installer and BSC Configuration Manager utilities.

- Four port Ethernet router or switch.

- Quantity 2 each, RJ-48 Cat 5 patch cables (length according to site requirements).

- RF termination (dummy load), 0-2 GHz, 50 Ohm, 20 watt capacity if no antenna system is connected.

- Static IP addresses for the microBTS assigned by your network administrator (2 addresses will be needed for 1 x 1 configurations. 3 addresses for 2 x 1 configurations).

- OML (operations and maintenance link) link address assigned by your network administrator.

- Subnet mask and default gateway IP addresses assigned by your system administrator.

5.2   Configuring the Equipment for IP Connection

5.2.1   Introduction

In order to initialize, test, and operate the microBTS it must be connected to an IP network. By connecting the microBTS, Router, and PC to the IP network as shown in the following proce-dure, the microBTS can be provisioned with a static or DHCP IP address and can be configured for correct operation using the BTS Installer and BSC Configuration Manager Utilities.

1   Connect the microBTS, PC, four port Ethernet router/switch and, RF termination (if no antenna system is installed) as shown in Figure 5-1.
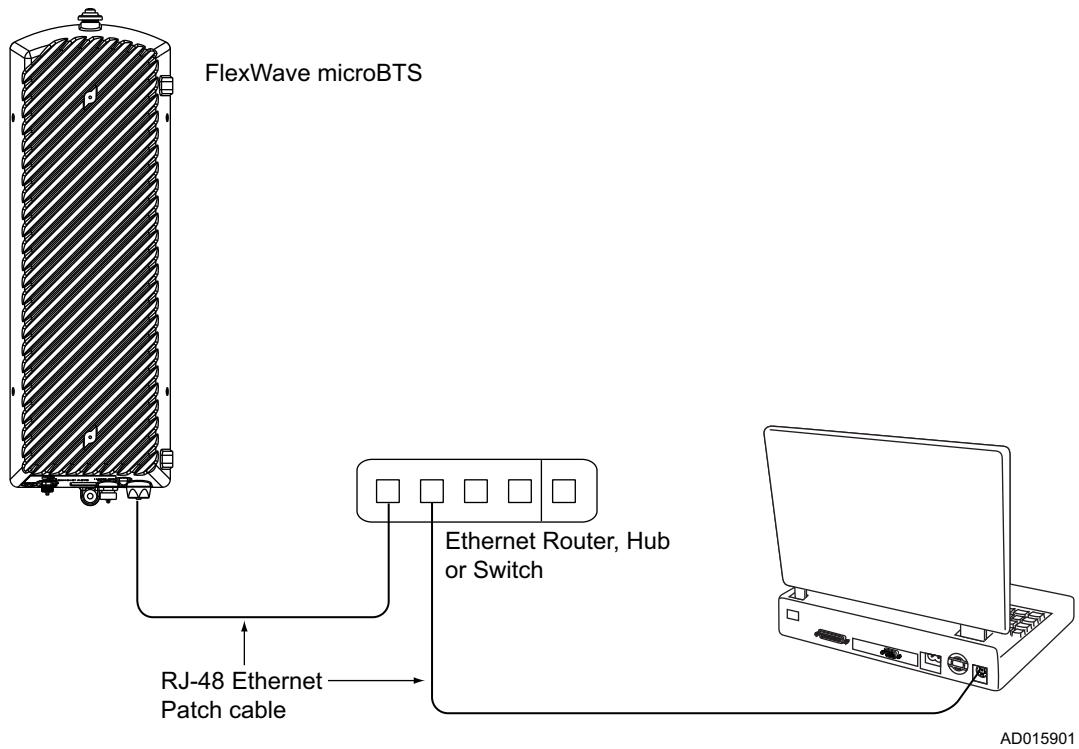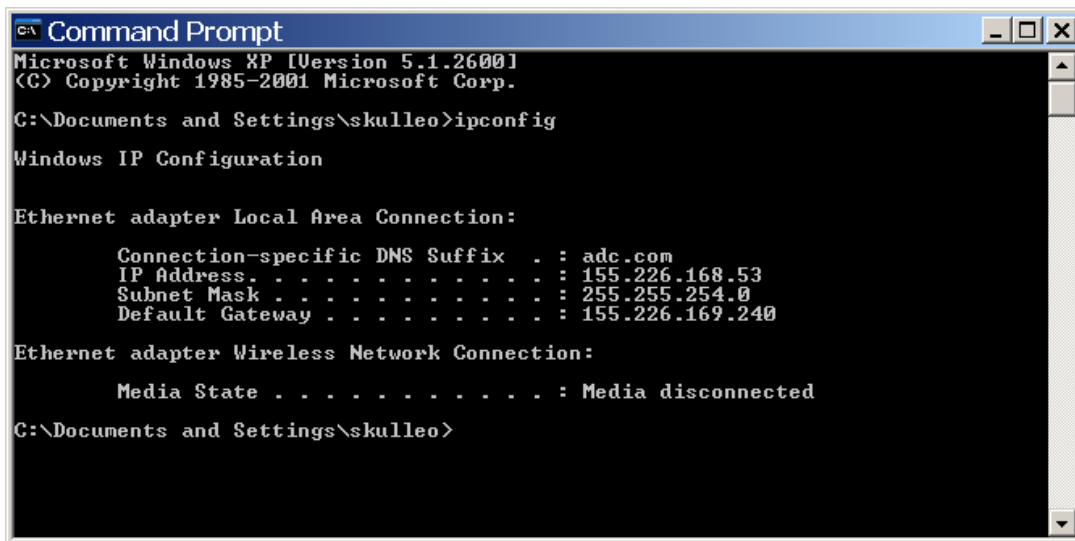
Figure 5-1: Connection Details for Initialization of the microBTS Terminal

5.3   Configure PC to Communicate with the microBTS

1   To allow the PC to communicate with the configuration shown in Figure 5-1, the PC network card must be configured with the correct IP address. If the microBTS is already connected to the BSC via an Abis link use the Abis IP address. If the microBTS is not connected to the BSC, determine the IP address of your PC by opening the Command Prompt and type in "ipconfig" and use this address. The IP address shown is that of your PC. Refer to Figure 5-2.

AD077914

Figure 5-2: The Command Prompt Screen Showing the IP Address of the PC

2   Open the Internet Protocol Properties screen of your PC network interface card and assign the IP address discovered in the previous step as shown in Figure 5-2. If you are already connected to the BSC via an Abis link select the **Obtain an IP address automatically** button also shown in Figure 5-3.
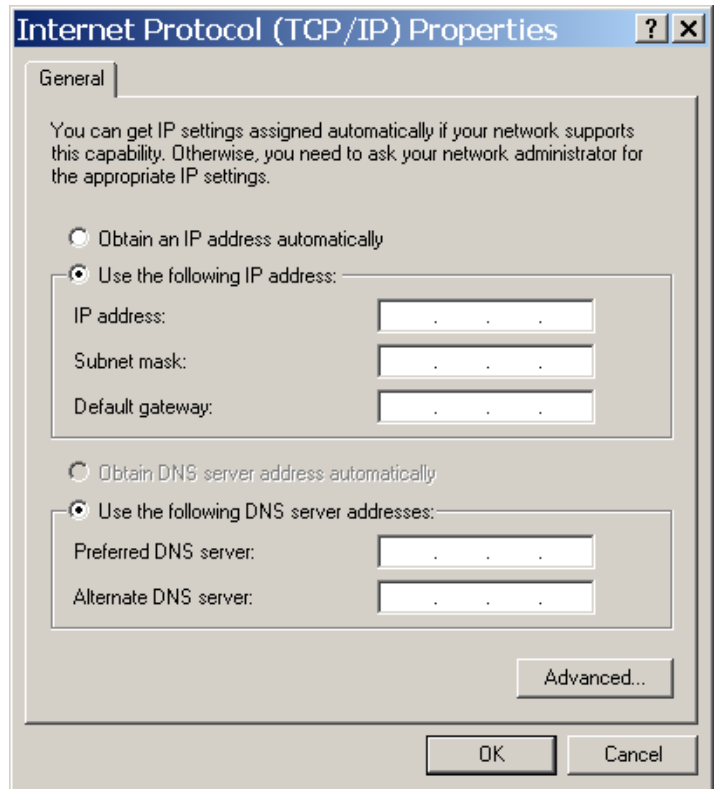
AD077913
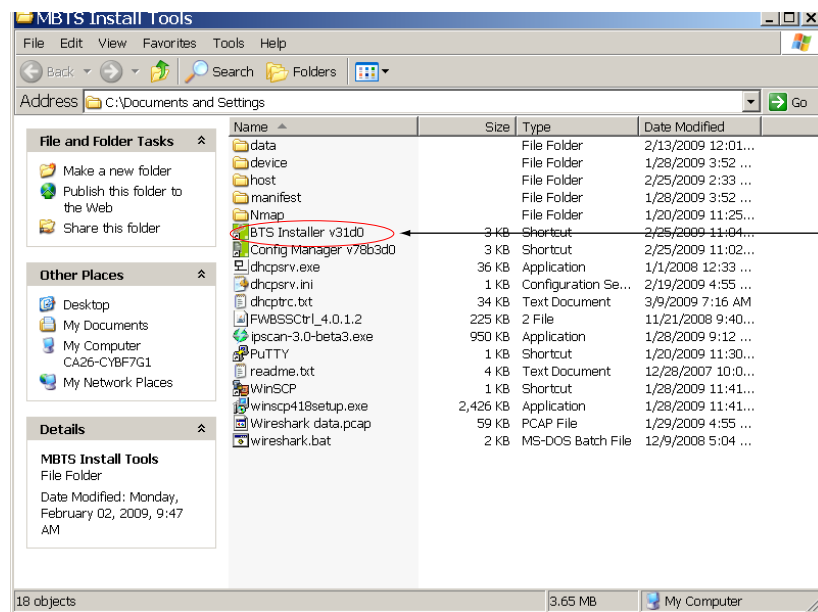
Figure 5-3: Internet Protocol (TCP/IP) Properties

5.4 Determining the MAC Address of the microBTS and Assigning DHCP IP Addresses

Use the following step-by-step procedure to assign an IP address to the microBTS terminal.

1   Connect the microBTS terminal to the AC/DC power source. The red LED alarm indication will illuminate for about 5 minutes and extinguish once the terminal has completed its start cycle.

2   Power on the Ethernet router/switch and PC.

3   Launch the BTS Installer utility from the PC desktop or folder as shown in Figure 5-4.

AD068901

Figure 5-4: Launching the BTS Installer

4   Once the BTS Installer is launched, the main configuration screen will appear as shown in Figure 5-5.
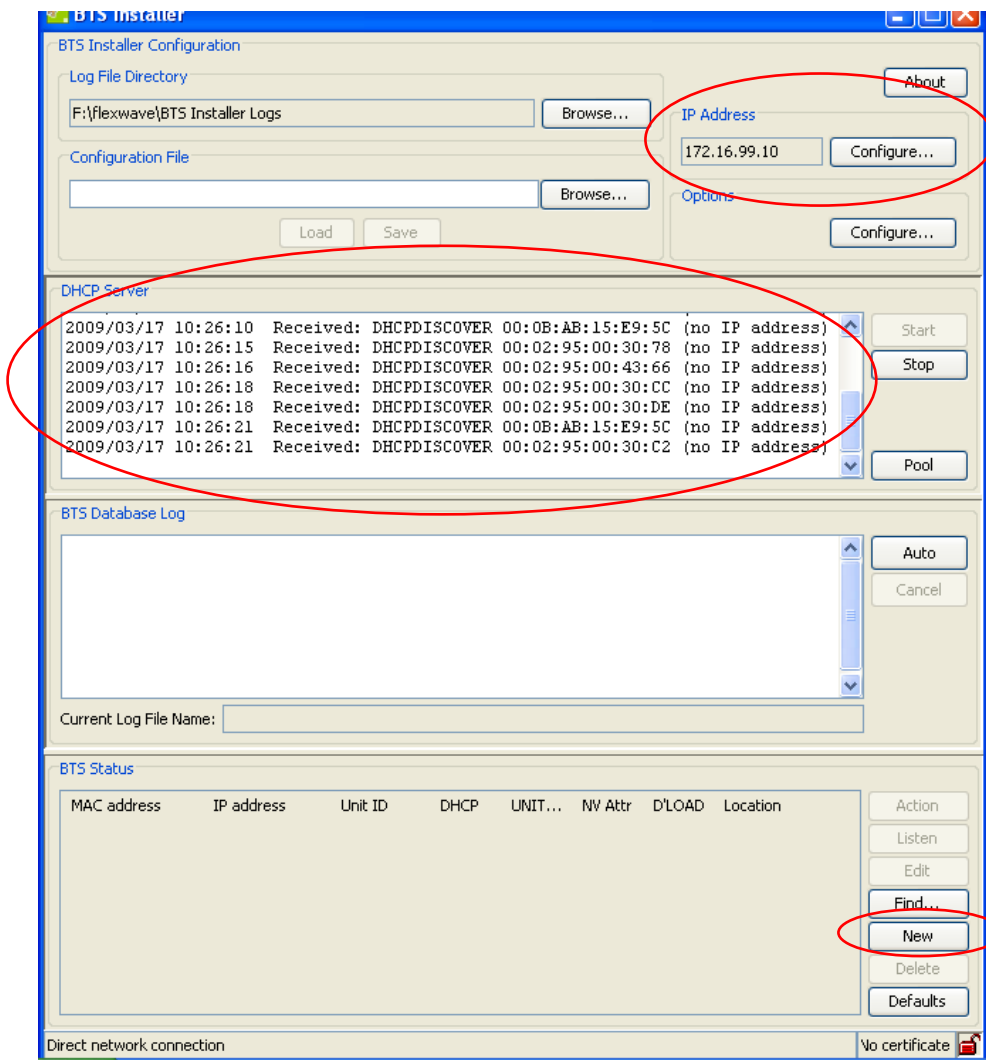
AD077904

Figure 5-5: The Main Configuration Screen Showing the MAC Address of Each microBTS and TRX

5   Referring to Figure 5-5 click on the IP Address **Configure** button.

6   A **Configure BTS Installer** screen will appear as shown in Figure 5-6.

7   A list of Network Adaptors and IP addresses will be shown.

8   Click on the **+** (plus) symbol to view the detail of the network adaptor card in your PC.
     The IP address which was set in the previous steps will appear.

9   Highlight this address and it will appear in the **DHCP Server IP Address** dialog box.

10   Leave the **Listen Only on This Address** check box unchecked.
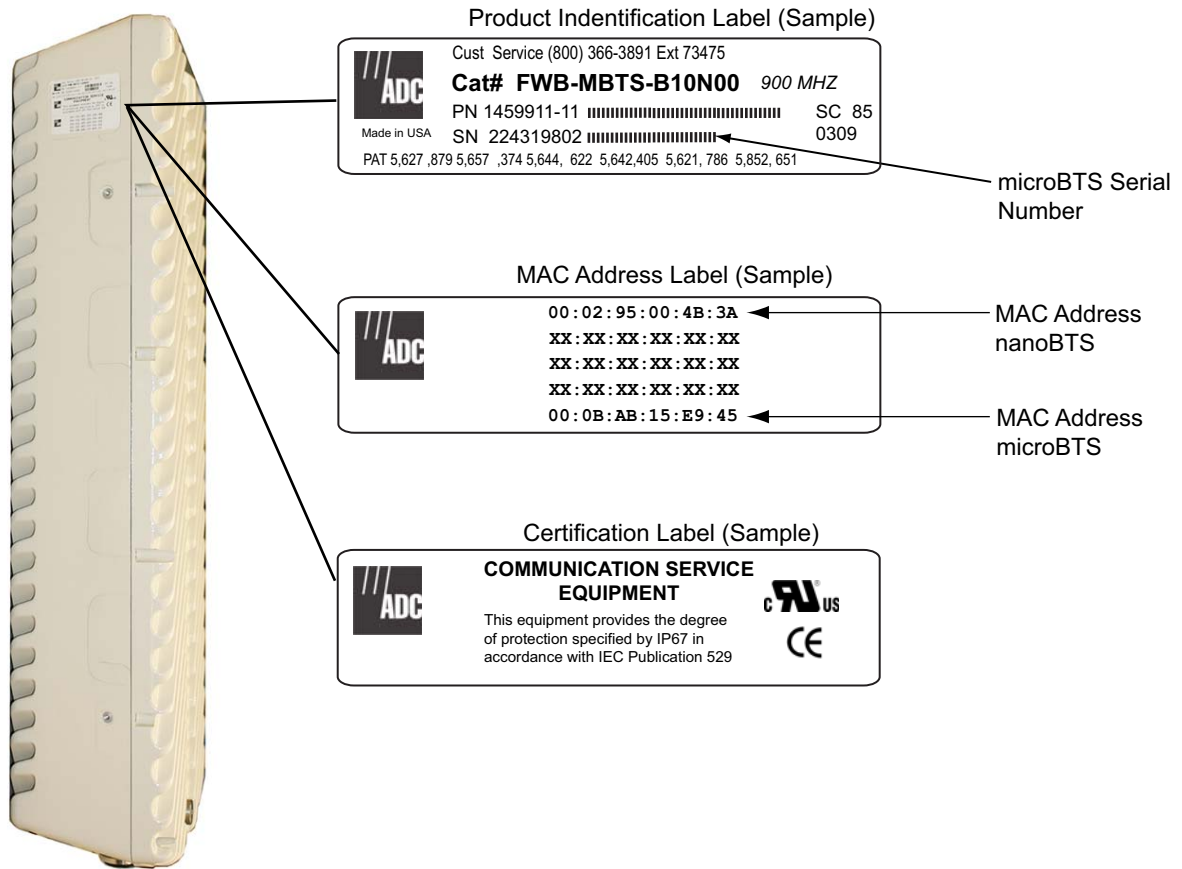
11   Click on the **OK** button.
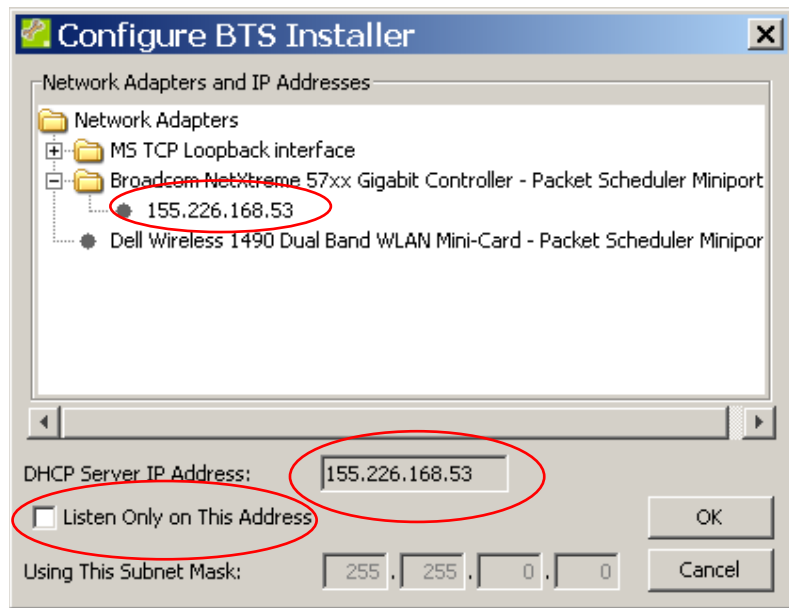
AD090901

Figure 5-6: The Configure BTS Screen Used to Set the DHCP Server Address

12 Verify that the MAC address for the microBTS matches the information provided in the list shown in Figure 5-5. Verify these MAC addresses match the equipment label shown in Figure 5-7.

The TRX's on the label will be listed first. The last address will be the microBTS terminal. This address will be used to access the web browser when setting a static IP address. Record these numbers for future reference.

Product Indentification Label (Sample)

Cust Service (800) 366-3891 Ext 73475
Cat# FWB-MBTS-B10N00 *900 MHZ*
PN 1459911-11 ||||||||||||||||||||||||||||||||||| SC 85
Made in USA SN 224319802 ||||||||||||||||||||||||||| 0309
PAT 5,627 ,879 5,657 ,374 5,644, 622 5,642,405 5,621, 786 5,852, 651

microBTS Serial Number

MAC Address Label (Sample)

00:02:95:00:4B:3A
XX:XX:XX:XX:XX:XX
XX:XX:XX:XX:XX:XX
XX:XX:XX:XX:XX:XX
00:0B:AB:15:E9:45

MAC Address nanoBTS

MAC Address microBTS

Certification Label (Sample)

COMMUNICATION SERVICE EQUIPMENT
This equipment provides the degree of protection specified by IP67 in accordance with IEC Publication 529

AD019904

Figure 5-7: Exterior Model Label Showing the MAC Addresses for the microBTS and Each TRX

13 Select the **Pool** command icon as shown in Figure 5-8.

Select the POOL
Command
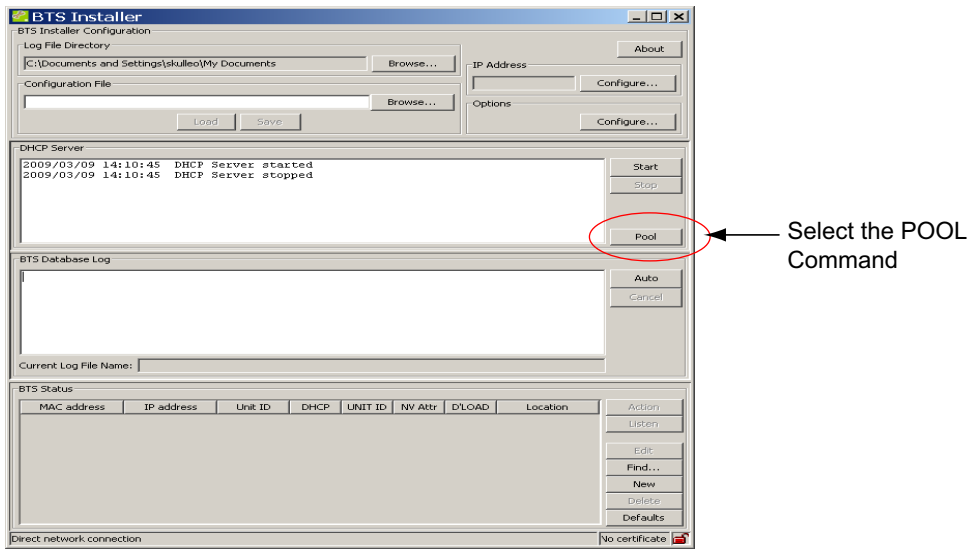
AD068903

Figure 5-8: Selecting the Pool Command Using the BTS Installer Utility

14 Select the **Add** command as shown in Figure 5-9.

Select the
Add Command
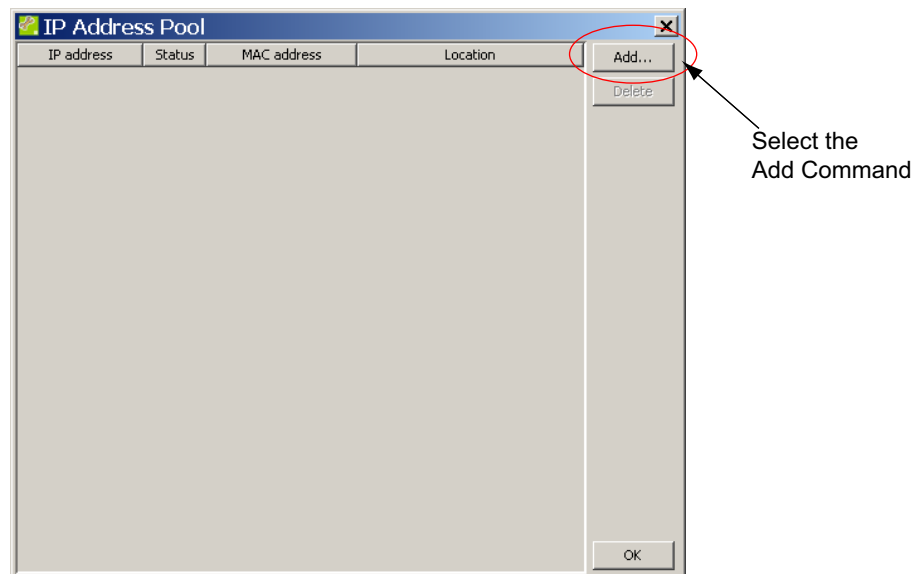
AD068904

Figure 5-9: Selecting the Add Command Using the BTS Installer Utility

15 Input a base IP number within the range of the OML Link IP address.

The number of addresses needed (1 x 1 configurations will need two addresses where as the 2 x 1 will require 3). Click on **OK**. Refer to Figure 5-10.
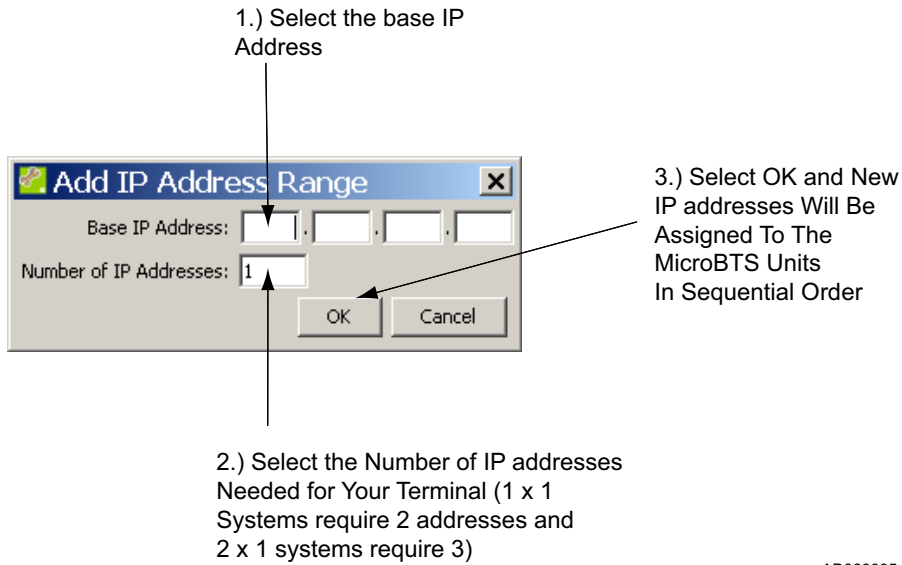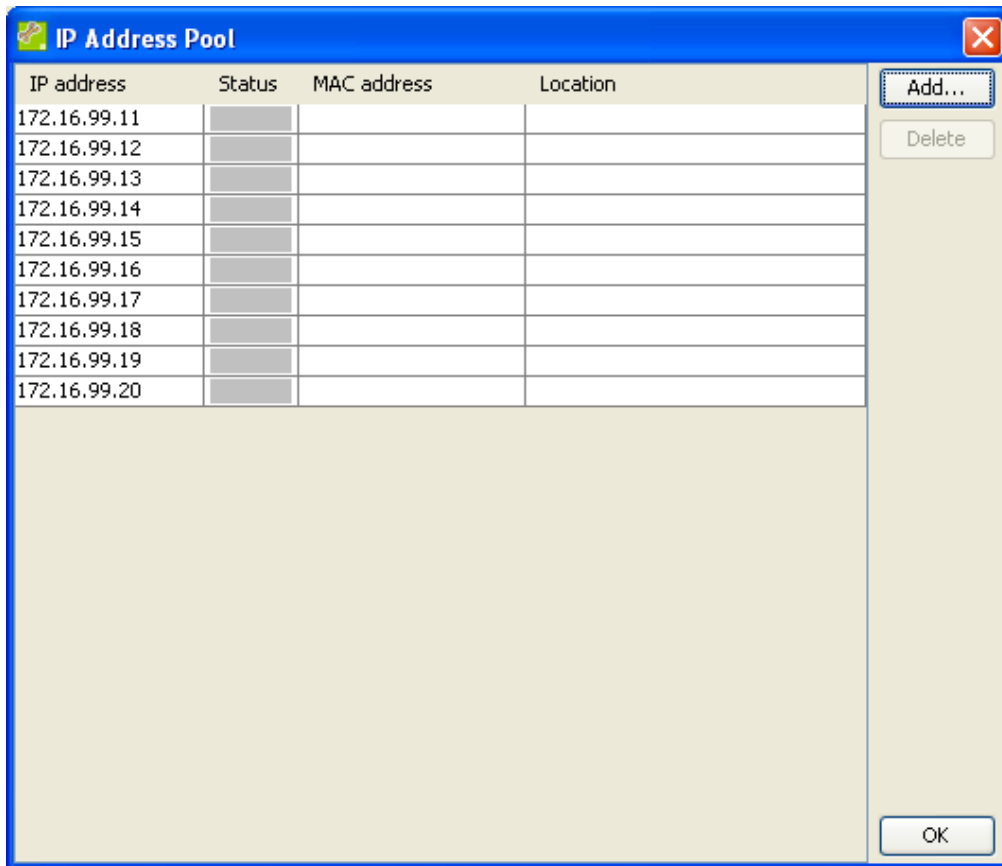
Figure 5-10: Adding an IP Address Range

Note: When setting the address range in the IP Pool, the range must be in the same range as the OML/Abis link IP address. For example, if the OML Link IP address is 172.16.99.1, use a range close to this, such as 172.16.99.11 through 172.16.99.15.

16 An address pool will be assigned according to the number and range of IP addresses selected in the previous step. Refer to Figure 5-11. Click **OK** and return to the main menu.
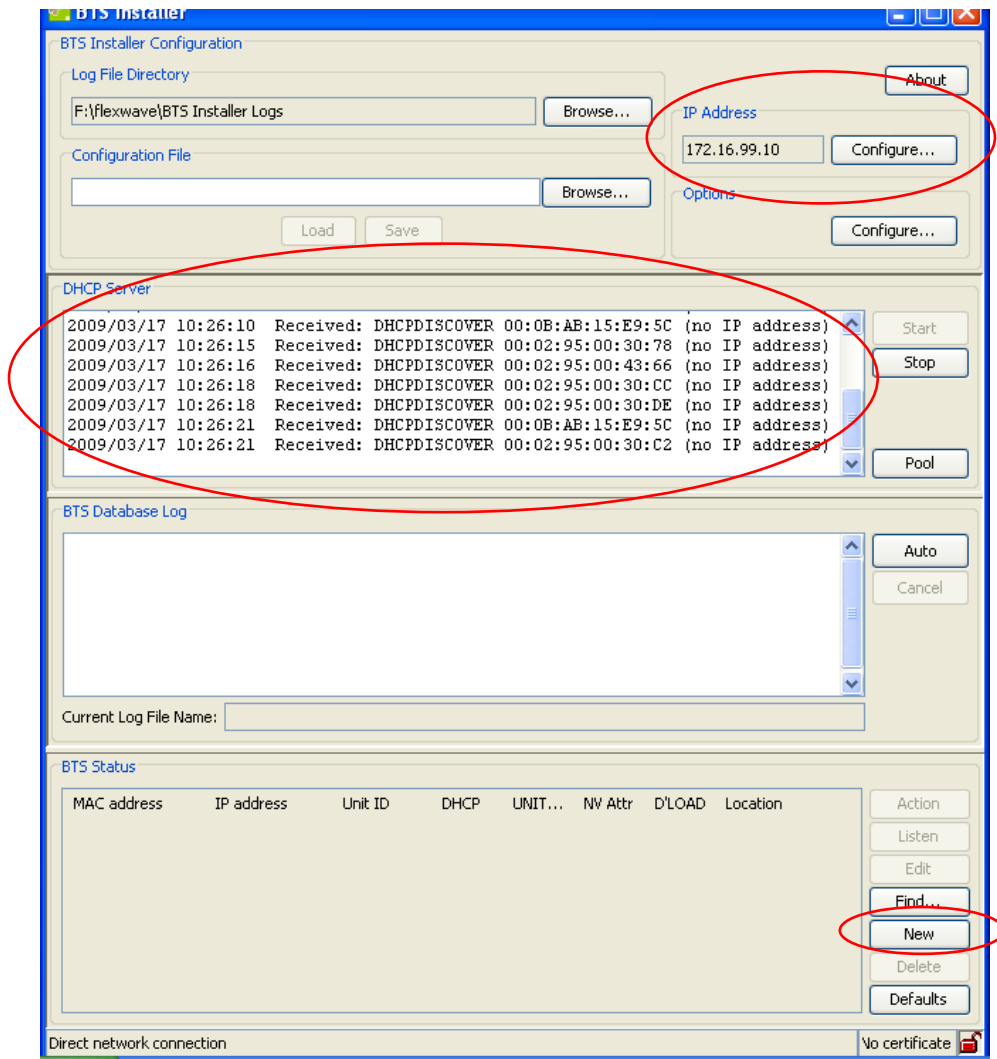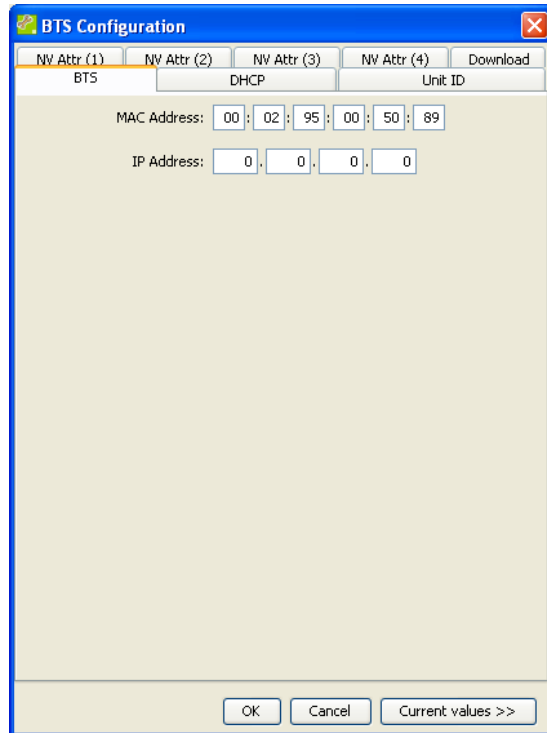

AD077903

Figure 5-11: IP Address Pool

17 Using the main menu screen, click on **New**. Refer to Figure 5-12.

Figure 5-12: Selecting New On the Main Configuration Screen

18 A BTS Configuration screen will appear. Select the BTS tab and set the MAC address for each of the units as described in Step 12 of this procedure. Refer to Figure 5-13.
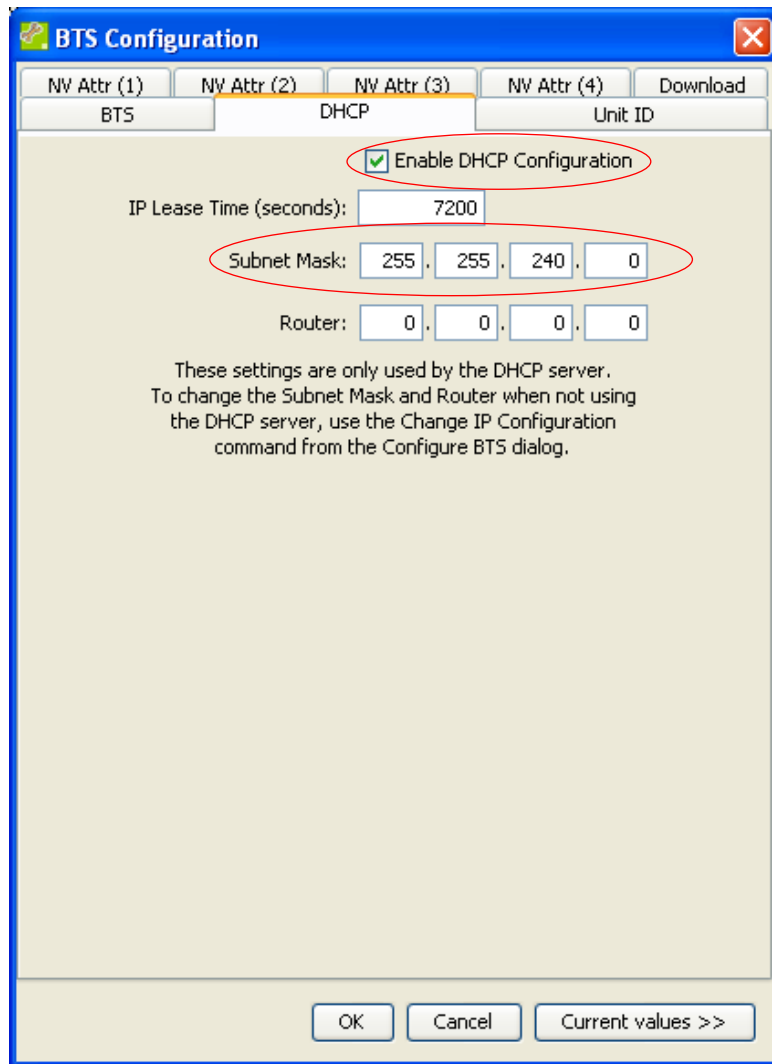

AD077905

Figure 5-13: Setting MAC Addresses Using the BTS Tab on the BTS Configuration Screen

19 Select the **DHCP** tab on the **BTS Configuration** screen.

Enable DHCP Configuration and set the Subnet Mask in a range of your network settings. for example: 255. 255. 240. 0. Refer to Figure 5-14. Click **OK** when complete.

AD077906

Figure 5-14: Enabling DHCP and Setting the Subnet Mask Using the DHCP Tab

20 Repeat Step 18 through Step 19 in this procedure for each of MAC addresses in the microBTS being installed.

21 The DHCP server will assign addresses to each unit within the microBTS. This can be verified by reviewing the main menu screen or the DHCP Pool screen as shown in Figure 5-11.