RAD
data communications

Installation and Operation

AirMux-200

Point-to-Point

Wireless TDM/IP Multiplexer

RAD

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Installation and Operation Manual

Notice

Limited Warranty

RAD warrants to DISTRIBUTOR that the hardware in the AirMux-200 to be delivered hereunder shall be free of defects in material and workmanship under normal use and service for a period of twelve (12) months following the date of shipment to DISTRIBUTOR.

If, during the warranty period, any component part of the equipment becomes defective by reason of material or workmanship, and DISTRIBUTOR immediately notifies RAD of such defect, RAD shall have the option to choose the appropriate corrective action: a) supply a replacement part, or b) request return of equipment to its plant for repair, or c) perform necessary repair at the equipment's location. In the event that RAD requests the return of equipment, each party shall pay one-way shipping costs.

RAD shall be released from all obligations under its warranty in the event that the equipment has been subjected to misuse, neglect, accident or improper installation, or if repairs or modifications were made by persons other than RAD's own authorized service personnel, unless such repairs by others were made with the written consent of RAD.

The above warranty is in lieu of all other warranties, expressed or implied. There are no warranties which extend beyond the face hereof, including, but not limited to, warranties of merchantability and fitness for a particular purpose, and in no event shall RAD be liable for consequential damages.

RAD shall not be liable to any person for any special or indirect damages, including, but not limited to, lost profits from any cause whatsoever arising from or in any way connected with the manufacture, sale, handling, repair, maintenance or use of the

AirMux-200, and in no event shall RAD's liability exceed the purchase price of the AirMux-200.

DISTRIBUTOR shall be responsible to its customers for any and all warranties which it makes relating to AirMux-200 and for ensuring that replacements and other adjustments required in connection with the said warranties are satisfactory.

Software components in the AirMux-200 are provided "as is" and without warranty of any kind. RAD disclaims all warranties including the implied warranties of merchantability and fitness for a particular purpose. RAD shall not be liable for any loss of use, interruption of business or indirect, special, incidental or consequential damages of any kind. In spite of the above RAD shall do its best to provide error-free software products and shall offer free Software updates during the warranty period under this Agreement.

RAD's cumulative liability to you or any other party for any loss or damages resulting from any claims, demands, or actions arising out of or relating to this Agreement and the AirMux-200 shall not exceed the sum paid to RAD for the purchase of the AirMux-200. In no event shall RAD be liable for any indirect, incidental, consequential, special, or exemplary damages or lost profits, even if RAD has been advised of the possibility of such damages.

This Agreement shall be construed and governed in accordance with the laws of the State of Israel.

General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

Safety Symbols

⚠ **Warning**	This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.
⚡	Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.
⏚	Protective earth: the marked lug or terminal should be connected to the building protective earth bus.
☀ **Warning**	Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached. Please observe the following precautions: - Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter. - Do not attempt to adjust the laser drive current. - Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam. - The use of optical devices with the equipment will increase eye hazard.

- Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.

ATTENTION: The laser beam may be invisible!

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective earth terminal. If an earth lug is provided on the product, it should be connected to the protective earth at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in earthed racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Connection of AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

Connection of DC Mains

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC mains systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC supply is electrically isolated from any AC source and that the installation complies with the local codes.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Before connecting the DC supply wires, ensure that power is removed form the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

Installing the Radio Terminals (RTs)

The following safety measures apply when installing the radio terminals and masts.

- Mast / pole / towers should comply with local standards such as BS6651.

- Only trained professional installers should install or dismantle radio terminals and masts. The installer is responsible for meeting all building and safety codes.

- Before installing a terminal, make sure it is disconnected from power.

- A safety belt and climbing harness must be used when installing the radio terminals on a mast or tower.

- Masts of height 3 meters or more must be guyed according to required industry standards and be lightning protected.

- If a radio terminal is to be mounted at a height of more than 4 meters above the roof, it is recommended that a climbable tower be installed to give access to the equipment and to prevent antenna movement during strong winds.

- When installing equipment, beware of overhead high-voltage power lines. Never install a mast under power lines.

- The mast structure must be grounded.

- Do not stand in front of a live radio terminal.

- The installer should configure the output power level of antennas according to country regulations and per antenna type.

- The antenna used for this transmitter must be installed to provide a separation distance of at least 200 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

⚠️ *Warning* Outdoor units and antennas should be installed ONLY by experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities. Failure to do so may void the AirMux-200 warranty and may expose the end user or the service provider to legal and financial liabilities. RAD and its resellers or distributors are not liable for injury, damage or violation of regulations associated with the installation of outdoor units or antennas.

Protection Against Lightning Activity

Observe the following safety measures to protect personnel and equipment:

- All outdoor equipment must be attached to a properly grounded structure, and installed masts must be grounded, in order to provide protection against lightening, surges and static buildup. In addition, mast over 3 meters should have a lightning protection rod. Failure to do so creates a safety risk and will void the equipment warranty.

- Do not work on the system or connect or disconnect the cables prior to or during electrical storm activity.

- In case of an electrical storm, do not touch any outdoor electrical equipment and leave the roof as quickly as possible.

Connection of Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

Ports	Safety Status
V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&M	SELV Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.
xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1	TNV-1 Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.
FXS (Foreign Exchange Subscriber)	TNV-2 Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.
FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN	TNV-3 Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.

Note

The signals between the IDU and ODU are TNV-1.

Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.

When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The earthing and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk, there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

| *Caution* | To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords. |

| *Attention* | Pour réduire les risques s'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure. |

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

Electromagnetic Compatibility (EMC)

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good earth connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the earth bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat

cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching earth ground or wear an ESD preventive wrist strap.

FCC-15 User Information

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance (RAD) could void the user's authority to operate the equipment.

⚠ *Warning*	It is the responsibility of the installer to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), only those antennas certified with the product are used. The use of any antenna other than those certified with the product is expressly forbidden in accordance to FCC rules CFR47 part 15.204.

Canadian Emission Requirements for the IDU

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22) for the IDU

Warning	This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.
Avertissement	Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.
Achtung	Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

$C\epsilon$ Statement according to Directive 1999/5/EC

Hereby, RAD Data Communications Ltd. declares that the AirMux-200 system is in compliance with the essential requirements and other relevant provisions of Directive 1995/5/EC.

① The alert sign on the AirMux-200 indicates that the frequency band that is being used by the equipment is not harmonized within the EU and/or the potential restrictions on its use are applicable in one or more EU member states.

Quick Start Guide

Installation of AirMux-200 should be carried out only by a qualified technician. If you are familiar with AirMux-200, use this guide to prepare the units for operation.

1. Installing AirMux-200 Units

ODU Package Contents:

- § ODU
- § Mast/Wall mounting kit
- § Mounting instructions
- § RJ-45 Connector
- § Hermetic Cable Enclosure
- § AIRMUX-200 Manager installation CD

IDU Package Contents:

- § IDU
- § RJ-45 Connector
- § Wall mounting drilling template
- § 110V/220V desk mount adaptor

Equipment Required:

- § RJ-45 Crimp Tool
- § Wall mounting hardware. Ordered separately
  (To wall mount IDU, use screws with head diameter of 6.3mm max)
- § Drill
- § IDU grounding cable
- § 13 mm or 1/2" socket spanner

§   ODU/IDU Cable (Outdoor class, CAT-5e, 4 twisted pairs)

§   UV-rated cable ties

§   Laptop running Windows 2000 or Windows XP

Before the installation

1. Install the AirMux-200 software on the laptop.

2. Verify that all equipment and tools are available

Performing Outdoor Installation

ä   To install the ODU:

1. Route the ODU cable from the ODU location (on the roof) to the IDU location (inside the building).

2. Mount the ODU unit to the mast or wall, using the mounting kit.

3. Connect the RJ-45 connectors to both ends of the cable, use the pinout table below:

	IDU RJ-45	Wire Color	ODU RJ-45	Function
Twisted	1	White/Green	1	Ethernet
	2	Green	2	
Twisted	3	White/Orange	3	
	6	Orange	6	
Twisted	4	Blue	4	Power
	5	White\Blue	5	
Twisted	7	White/Brown	7	
	8	Brown	8	

4. Secure the ODU and ground cables to the mast or brackets using UV-rated cable ties.

5. Repeat the procedure at the remote site.

ä   To align the ODU:

1. Connect power to the IDU.

Warning

Do not stand in front of a live radio terminal.

2. Align the local ODU in the direction of the remote ODU. Turn the ODU slowly using the buzzer beep sequence until optimal alignment is achieved:

3. Repeat step 2 for the remote ODU to complete the alignment procedure.

4. Make sure that the management station is properly connected to the local IDU, and the AirMux Manager application is running.

5. Open the installation wizard and follow the installation steps

6. After selection of the radio channel and the link rate, verify the link quality is at least in the yellow area for Ethernet service and in the green area for TDM service.

Note   *Try to achieve the best possible link quality values. In case of radio link loss, verify the ODU alignment, or change the radio channel in both sides of the link. When the radio link resumes continue the installation process.*

7. Monitor the link quality for about 15 minutes to verify stability.

8. Permanently attach the local and remote ODU to the mast/wall.

Performing Indoor Installation

ä   To connect user equipment to the IDU:

1. Connect user mux or PBX to the IDU rear panel RJ-45 port designated Trunk.

2. Connect user hub/router or any other compatible device to the IDU rear-panel RJ-45 port designated LAN.

2.   Operating AirMux-200

AirMux-200 requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators and statistics data. Intervention is only required when AirMux-200 must be configured to its operational requirements or diagnostic tests are performed.

Normal Indications

Upon turning on AirMux-200, the PWR LED in the front panel lights to indicate that AirMux-200 is on. The table below shows the correct status of the indicators a few seconds after power-up.

Indicator	Status
PWR	ON
RTCB	Green – Blinking slowly
RT	Green – Blinking slowly
Air	Green – Blinking slowly
Service	Green – Blinking slowly

Troubleshooting

1. PWR LED is off – Check that AC adapter is connected to the IDU and the AC power outlet

2. RTCB LED is yellow – Check that the IDU/ODU cable is properly wired and connected

3. RT LED is red – Check that the IDU/ODU cable is properly wired and connected

4. Air LED is yellow – Complete the installation procedure from the management software.

5. Air LED is RED – Check the ODU Antenna alignment. Check that the radio configuration of both local and remote units are the same (channel and SSID)

6. Service LED is off – Check the TDM service configuration in the NMS

7. Service LED is yellow – Check that the system is not in loop-back mode. Check the remote RTCB ports and cables and remote external equipment.

8. Service led is red – check the local IDU ports, cables and external equipment

Chapter 1

Introduction

1.1 Overview

AirMux-200 is a carrier-class, high capacity, low cost Point-to-Point broadband wireless transmission system. AirMux-200 packs Legacy TDM and Ethernet services over 5.725-5.850 GHz license-exempt bands and is suitable for deployment in FCC or ESTI regulated countries over a 48 Mbps wireless link at distances of up 80 km (50 miles).

Application

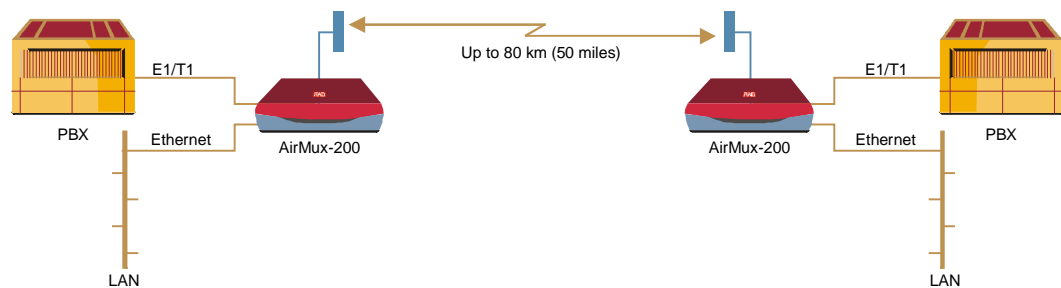*Figure 1-1* illustrates a typical point-to-point application of two AirMux-200 units.

Figure 1-1. Typical Application

Features

Wireless Link

AirMux-200 delivers a 48 Mbps channel for Ethernet traffic, excluding inband (TDMoIP) E1/T1 streams. AirMux-200 operates as a line-of-sight radio system supporting the following frequency bands:

- ANSI Unlicensed National Information Infrastructure (UNII)

- ISM.

AirMux-200 can be configured to operate over several frequency channels with a carrier step resolution of 10 MHz. The number of the frequency channels depends on the selected operating band.

AirMux-200 uses Direct Sequence Spread Spectrum technology combined with powerful forward error correction to ensure high reliability and security over license exempt 5.725–5.850 GHz frequencies. AirMux-200 operation complies with the FCC 15.401&15.407 requirements.
AirMux-200 employs Time Division Duplex (TDD) transmission. This technology simplifies the installation and configuration procedure. There is no need to plan and to allocate separate channels for the uplink and downlink data streams.
Operation over 5.725–5.850 GHz bands is not affected by harsh weather conditions, such as fog, heavy rain etc.

LAN Interface

The AirMux-200 LAN port provides two 10/100BaseT interfaces with autonegotiation and transparent VLAN support. Traffic handling is provided by a MAC-level self-learning bridge.

TDM Interface

The AirMux-200 TDM interface accepts E1 or T1 traffic, supporting the following:

- Framed and unframed operation (E1 and T1)

- ESF and SF framing (T1)

- AMI and B8ZS zero suppression (T1)

- CRC-4 bits generation (E1)

- Flexible timeslot allocation (framed E1 and T1).

Management

AirMux-200 has full local and remote management capabilities. The user-friendly SNMP-based management tool provides full end-to-end configuration and performance monitoring capabilities.

Diagnostics and Performance Monitoring

AirMux-200 supports activating local and remote loopbacks on E1 or T1 links.

AirMux-200 constantly monitors the data transmission process, evaluates received signal strength, signal-to-noise ratio and bit error rate. It also monitors received traffic and frame rate (FPS) for local and remote units.

Optional External Antenna

An optional planar array 28 dBi external antenna increases the operation range of AirMux-200 to 80 km (50 miles).

1.2 Physical Description

AirMux-200 system consists of a radio terminal (ODU) and an indoor unit (IDU). *Figure 1-2* illustrates an AirMux-200 unit assembly.

Figure 1-2. AirMux-200 Unit

The front panel of the indoor unit (IDU) includes five LEDs, which display the status of E1/T1, wireless link, self-test results, ODU-to-IDU link, and power status. For a detailed description of the front panel, see *Chapter 4*.

The rear panel of the indoor unit (IDU) includes the power, user (WAN, LAN and E1 or T1), and radio terminal connectors. The AirMux-200 rear panel is described in detail in *Chapter 3*.

1.3 Technical Specifications

Wireless Link	*Technology*	Spread spectrum
	Frequency Band	5.725–5.850 GHz:
		• ANSI Unlicensed National Information Infrastructure (UNNII)
		• ISM
	Duplexing Method	Time Division Duplex (TDD)
	Capacity	Configurable up to 48 Mbps (See *Table* 1–*1*)
	Modulation	OFDM – BPSK, QPSK, 16QAM, 64QAM
	Channel Bandwidth Resolution	10 MHz
	Transmitter Power	FCC: 21.4 dBm max
		ETSI: 7 dBm max (limited by ETSI regulations)
	Receiver Sensitivity	–90 dBm at BER 1E–8
	Antenna Gain	22 dBi
	Antenna Beam	±9° horizontal and vertical
	Range	80 km (50 miles), including 6 dB fade margin
	ODU Installation Method	Mast or wall mounting
LAN Interface	*PHY IF*	10/100BaseT, auto-sensing
	Framing/Coding	IEEE 802.3/U
	Bridging	Self–learning, up to 2000 MAC addresses
	Line Impedance	100Ω
	VLAN Support	Transparent
	Data Rate	48 Mbps max.
	Connector	RJ–45
E1 Interface	*Framing*	G.703, G.704 with or without CRC
	Data Rate	Unframed (Transparent) 2.048MHz

	Timing	Plesiochronous
	Connector	RJ-45
T1 Interface	*Zero Suppression*	AMI, B8ZS
	Framing	SF, ESF
	Connector	RJ-45

External Antenna	*Type*	Planar array
	Gain	28 dBi min
	VSWR	1.7:1 max
	F/B Ratio	-40 dB max
	Compliance	ETSI EN 302 085 V1.1.2 (2001-02)
	Polarization	Linear (vertical or horizontal)
	Input Impedance	50Ω
	Lightning Protection	DC-grounded
	Connector	N-type, female
	Range	Up to 80 km (50 miles), including 6 dB fade margin
Indicators	*PWR (green)*	Power status
	ODU (green/red)	ODU-to-IDU link status
	IDU (green)	IDU self-test results
	AIR I/F (green/red)	Wireless link status
	Service (green/red)	E1/T1 signal status
Power	*Source*	100–240 VAC via external AC/DC converter
	Power Received by the ODU (PoE)	-48 VDC
	Power Consumption	20W max (ODU and IDU)
	Connector	2-pin
Physical	Outdoor Unit (ODU) with integrated antenna	
	Height	305 mm / 12 in
	Width	305 mm / 12 in
	Depth	58 mm / 2.3 in
	Weight	3.3 kg / 7.2 lb
	Indoor Unit (IDU-E)	

Height	44 mm / 1.7 in (1U)
Width	237 mm / 9.3 in
Depth	170 mm / 6.7 in
Weight	0.58 kg / 1.4 lb

*External Antenna
(Optional)*

Height	600 mm / 23.6 in
Width	600 mm / 23.6 in
Depth	51 mm / 2 in
Weight	5 kg / 11 lb

Environment *Outdoor Unit (ODU)*

Enclosure	All-weather case
Temperature	-35 to 60°C/-31 to 140°F

Indoor Unit (IDU)

Temperature	-5 to 45°C/23 to 113°F
Humidity	Up to 90%, non-condensing

Table 1-1. Throughput/Capacity

Rate (MHz)	Throughput Mbps at 5km full duplex	Capacity E1	T1	Integrated Antenna (km)	External Antenna (km)
12	4.5	1	1	26	40
18	7	2	2	18	40
36	13	2	2	8	26
48	17	2	2	3	9

Chapter ₂

Installation and Setup

This chapter describes installation and setup procedures for AirMux-200 system.

After installing the unit, refer to *Chapter 3* for configuration instructions.

In case a problem is encountered, refer to *Chapter 5* for test and diagnostic instructions.

⚠ *Warning*	Internal settings, adjustment, maintenance, and repairs may be performed only by a skilled technician who is aware of the hazards involved.
	Always observe standard safety precautions during installation, operation, and maintenance of this product.

2.1 AirMux-200 System

AirMux-200 system comprises the following units:

- Outdoor Unit (ODU): An enclosed aluminum frame with a front sealed plastic cover, containing an integrated transceiver with an antenna, RF module, modem and standard interfaces. The ODU stores all the configuration parameters of the AirMux-200 system.

  ODU includes a power connector, which receives -48 VDC, and RJ-45 for Ethernet (including PoE) traffic from the indoor unit (IDU).

  The ODU is attached to a mast using a special mounting kit, which is supplied with the unit.

- Indoor Unit (IDU): The interface unit between the ODU and the user. It converts 220 VAC to -48VDC, and sends it on to the ODU. The IDU does not store any configuration data. Therefore there is no need for additional configuration of the AirMux-200 system when replacing an IDU.

2.2 Site Requirements and Prerequisites

For the IDU, allow at least 90 cm (36 in) of frontal clearance for operating and maintenance accessibility. Allow at least 10 cm (4 in) clearance at the rear of the unit for signal lines and interface cables.

The ambient operating temperature should be –45 to 60°C/-49 to 140°F (ODU), or -5 to 45°C/23 to 113°F (IDU) at a relative humidity of up to 90%, non-condensing.

2.3 Package Contents

The AirMux-200 package includes the following items:

- ODU (Outdoor Unit)

- IDU (Indoor Unit)

- ODU cable pre-cut to length ordered

- Two spare RJ-45 connectors

- AC/DC power converter

- AirMux Manager installation CD

- Technical documentation CD

- ODU mounting kit

- External antenna (if ordered)

2.4 Installation and Setup

Physical installation of the AirMux-200 system includes the following steps:

1. Installing management program on the network management station.

    - Selecting IP address, subnet mask, default gateway and trap destination.

2. Installing Outdoor Unit (ODU) and Indoor Unit (IDU) at the local and remote sites.

3. Installing ODU cable and connecting ODU and IDU at the local and remote sites.

4. Aligning local and remote ODUs.

5. Connecting user equipment to the local and remote IDUs.

6. Connecting power.

Figure 2-1 illustrates a typical installation of AirMux-200 with external antenna.
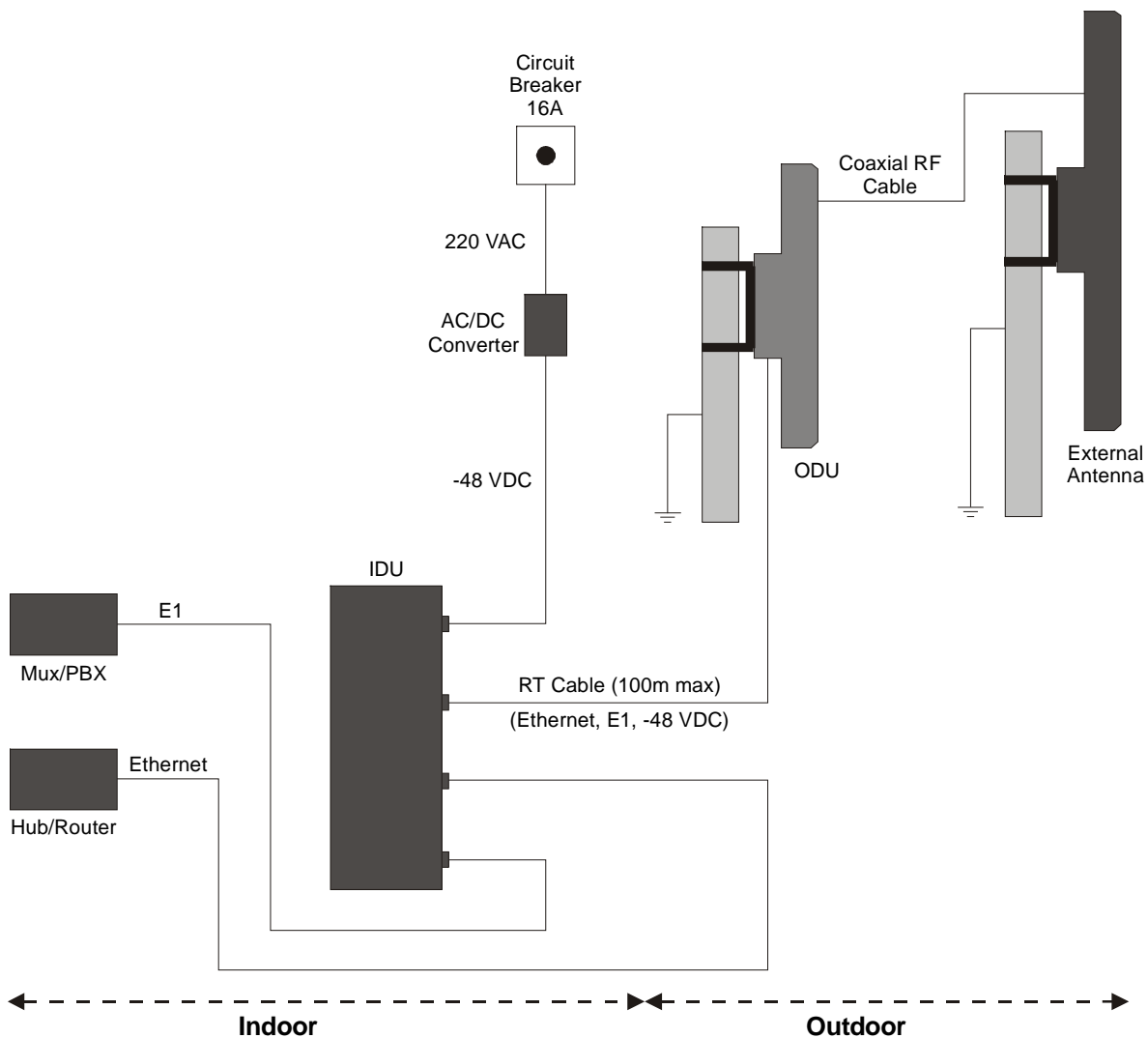
Figure 2-1. Typical Installation Diagram

Installing AirMux-200 Management Software

AirMux-200 management application is distributed on CD-ROM as an executable file. The application operates on a PC under any Windows™ 98/2000/NT/XP operating system.

ä   To install the AirMux-200 management program:

1. Insert the CD-ROM into your CD-ROM drive.

2. Run Airmux.exe from the CD-ROM drive.

3. Follow the onscreen instructions of the installation wizard to complete setup of the AirMux-200 management program in the desired location.

Connecting the ODU to the IDU

The ODU cable conducts all the user traffic between the IDU and the ODU. The ODU cable also provides -48 VDC supply to the ODU. The maximum length for one leg of the ODU cable is 100m (328 ft).

The ODU cable is supplied assembled with RJ-45 connectors, at the length specified when ordering. Spare RJ-45 connectors are supplied for use if necessary.

1. Route the cable from the ODU location into the building, leaving some spare. Secure the cable along its path.

2. Connect the ODU cable to the RJ-45 connector on the IDU rear panel designated WAN. *Figure 2-2* illustrates a typical panel of the IDU.
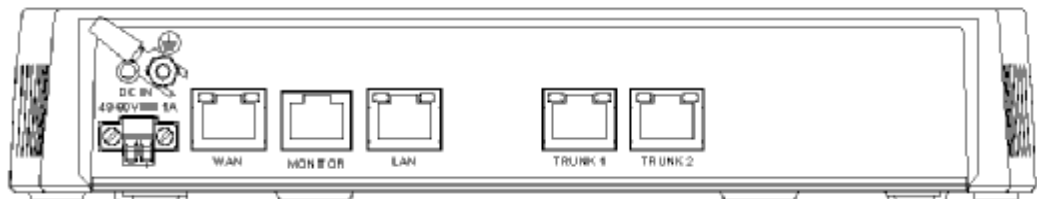
Figure 2-2. IDU Rear Panel

Mounting and Aligning the ODU

The ODU is the transmitting and receiving element of the AirMux-200 system. The ODU can be mounted on a mast or a wall. In both installations, the supplied mounting kit is used to secure the ODU. *Appendix B* describes the mast/wall installation instructions.

An AirMux-200 link operates in pairs of two AirMux-200 systems with the same configuration. Both systems must be installed, and the antennas of the outdoor units must be aligned for maximum throughput.

You can verify that the AirMux-200 ODU units are aligned using a DVM-tool or the Buzzer located inside the ODU. Alternatively, this can be done via the AirMux management software.

⚠ *Warning*

Prior to connecting cables to the ODU, the protective earth terminal (screw) of the ODU must be connected to an external protective ground conductor or to a grounded mast.

Only a qualified person using the proper safety equipment should climb the antenna mast. Only trained professional installers should be used when installing or dismantling ODUs and masts.

ä To install the ODU:

1. Verify that the ODU mounting brackets are properly grounded.

2. Attach the ODU unit to the mast, using the two strap clamps. Refer to *Appendix B* for the ODU mounting instructions.

3. Connect the ground cable to the chassis point on the ODU.

4. Attach the ODU cable to the RJ-45 connector. Refer to *Appendix A* for the connector pinout.

5. Secure the cables to the mast or brackets using provided UV-rated cable ties.

6. Repeat the procedure at the remote site.

Note *Do not tightly secure the ODU to its mounting brackets, if the alignment process of the antenna is not yet complete.*

When installing the ODU, it is important to check that there are no direct obstructions in front of the ODU or interference from man-made obstacles.

ä To align the ODUs via ODU Buzzer:

1. Connect power to the IDUs.

Do not stand in front of a live radio terminal.

⚠
Warning

2. Turn the local ODU in the direction of the remote ODU.

3. At the remote site, turn the ODU to face the local ODU. (Align visually or by using a map and a compass). Use the DVM-tool or Buzzer indication on the ODU to verify link quality (see *Figure 2-3*).

4. Repeat step 3 for the local ODU to complete the installation procedure.

5. Slowly adjust the ODU at both sites until you hear the Best Signal sound.

Buzzer Sequence ▉ =buzzer on ── =buzzer off	Description
▉	Radio is on but no radio link to the remote side
▉ ▉ ▉	Best Signal so far
▉ ▉	Signal better than the last second
▉	Signal same as the last second
▉▉▉▉▉▉▉	Signal worse than the last second

Figure 2-3. Buzzer Sequence for ODU Alignment

ä   To align the ODUs using the AirMux Manager:

1. Connect power to the IDUs.

![Warning triangle symbol]

Warning

Do not stand in front of a live radio terminal.

2. Turn the local ODU in the direction of the remote ODU.

3. At the remote site, turn the ODU to face the local ODU. (Align visually or by using a map and a compass).

4. Repeat step 3 for the local ODU to complete the installation procedure.

5. Make sure that the management station is properly connected to the same LAN as the IDU, and the AirMux Manager application is running.

6. In the Main menu, click Monitor.

    Once the wireless link is established between the local and remote units, the Link Status indication bar in the middle of the Main menu turns green. In addition, Radio Link – Sync message appears in the logger at the bottom of the Main menu.

7. Check the radio signal strength (RSS) and sound-to-noise ratio (SNR) in the Main menu. Rotate the local ODU until the best RSS is found (better than -88 dBm). The SNR should be at least 9 dB. Monitor these parameters for about 15 minutes to verify stability.

Note

Try to achieve the best possible RSS and SNR values.

8. After achieving the best RSS and SNR levels, permanently attach the ODU to the mast. Refer to *Appendix B* for the ODU mounting instructions.

Connecting the User Equipment

The IDU is a standalone desktop, wall-mounted or rack-installed unit. *Figure 2-2* illustrates a typical rear panel of the IDU.

ä   To connect user equipment to the IDU:

1. Connect a user mux or PBX to the IDU rear panel RJ-45 port designated Trunk. Refer to *Appendix A* for the connector pinout.

2. Connect user hub/router or any other compatible device to the IDU rear panel RJ-45 port designated LAN. Refer to *Appendix A* for the connector pinout.

Note   *Use a straight cable for router connection.*

Connecting the Power

⚠️ *Warning*

Before connecting any cable, the protective earth terminals of the AC/DC adapter must be connected to the protective ground conductor of the mains power cord. If you are using an extension cord (power cable) make sure it is grounded as well.

Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective earth terminal can make this unit dangerous. Intentional interruption is prohibited.

Power is supplied to AirMux-200 via an external AC/DC converter, which receives power from 100–240 VAC source and converts it to -48 VDC.

ä To connect the power:

1. Connect the 2-pin plug of the AC/DC converter to the 2-pin DC power connector on the IDU rear panel.

2. Connect the AC/DC converter 3-prong plug to the mains outlet.

   The unit turns on automatically upon connection to the mains.

Chapter ₃

Configuration

This chapter describes configuration procedures, which is performed after the physical installation of the local and remote AirMux-200 units.

3.1 Performing Configuration of AirMux-200

After physical installation of the local and remote AirMux-200 units, perform initial configuration of the system.

ä   To perform initial setup:

1. Power up the local IDU (see *Connecting the Power* in Chapter 2). Wait for about 1 minute.

2. Power up the remote IDU.

3. Connect the management station to the LAN.

Any PC running the AirMux-200 management application can be used to configure AirMux-200 units.

ä   To start AirMux manager:

1. From the Start menu, point to Programs, point to AirMux Manager, and then click AirMux Manager.

    The password/IP request dialog appears.

2. Enter IP + password – *airmux*.

    The AirMux Manager Main menu is displayed (see *Figure 3-1*).

Note   *The system is factory installed with the settings of the system ordered, therefore the Install Link button is disabled.*
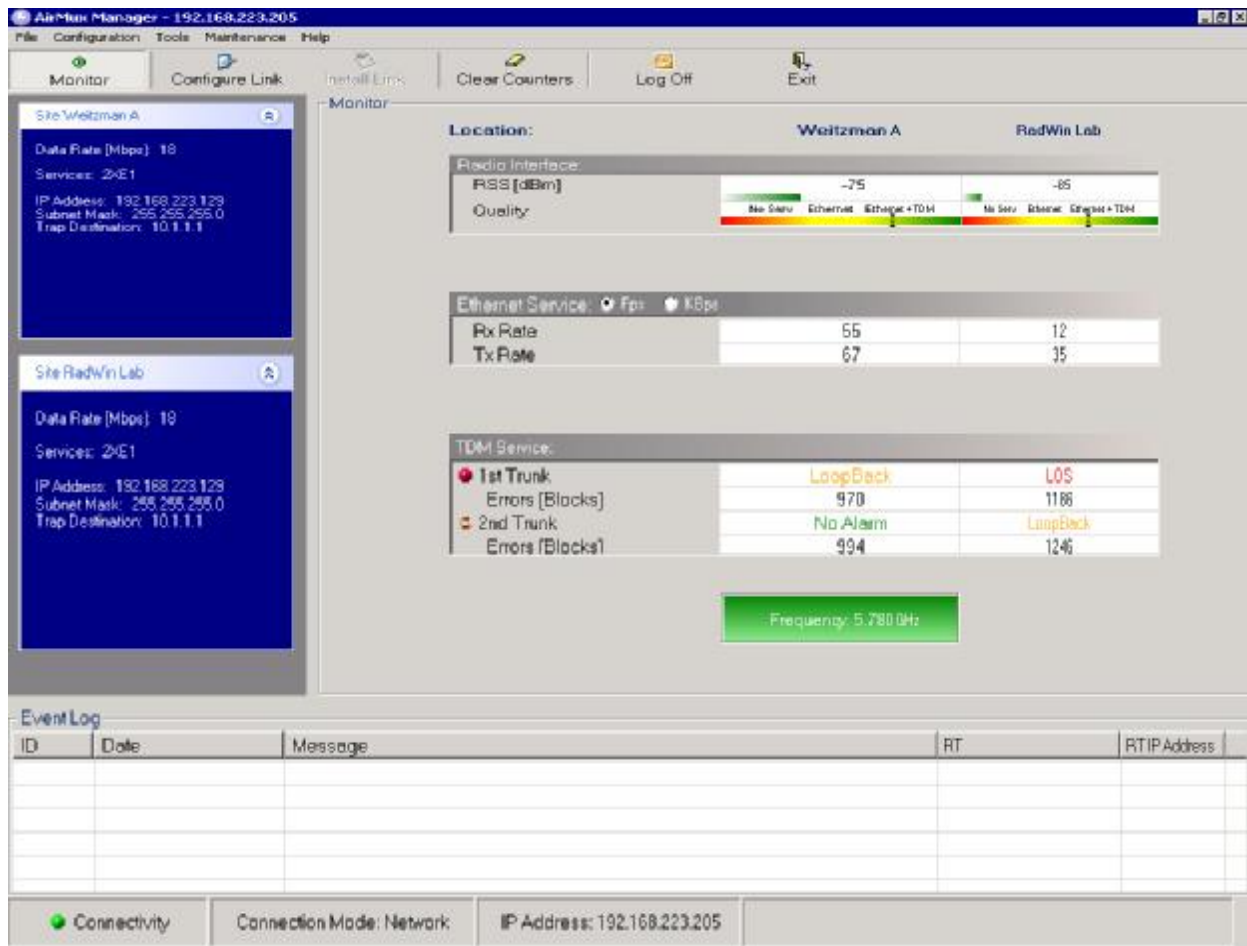
Figure 3-1. AirMux Manager Main Menu

Configuring General Parameters

In order to establish a link between the manager station and AirMux-200 you must configure the link channel and rate parameters.
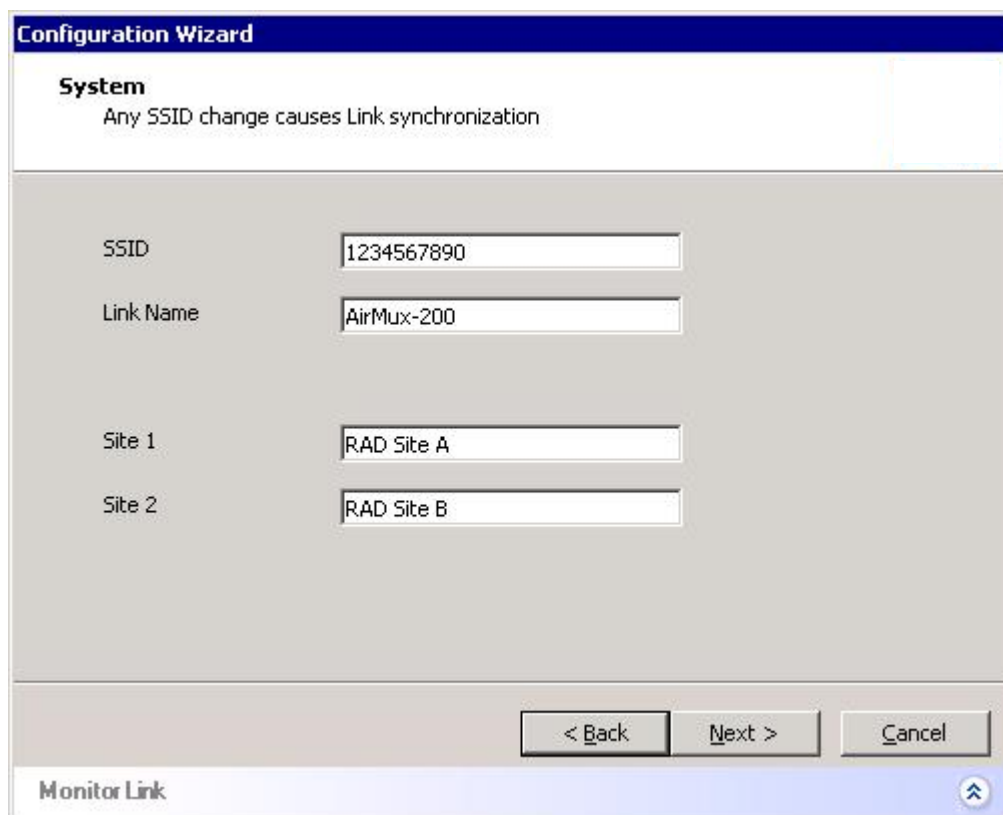
ä   To change general parameters:

1. In the Main menu, click Configure Link.

2. The Configuration Wizard opens.

    The wizard is used to install a link or make configuration changes.

Note   *When the SSID or Channel fields are changed, the link is reset. All changes made in the wizard are reflected in the Link Quality monitor pane.*

3. Click Next.

4. The General Parameters dialog box appears (see *Figure* **3-2**).

Figure **3-2.** *General Parameters Dialog Box*

5. From the General Parameters dialog box, enter data to describe the link:

> § SSID – System ID. This number is initially factory set. It can be user defined, but both local and remote sites must have the same number.
>
> § Link name – enter a name for the link identification.
>
> § Site 1 – enter location name of site 1
>
> § Site 2 – enter location name of site 2

6. Click Next.

   The Channel Select dialog box appears (see *Figure* **3-3**)

7. Select the required operating channel.

   Table **3-1** lists channels and frequencies for ISM and UNII bands.
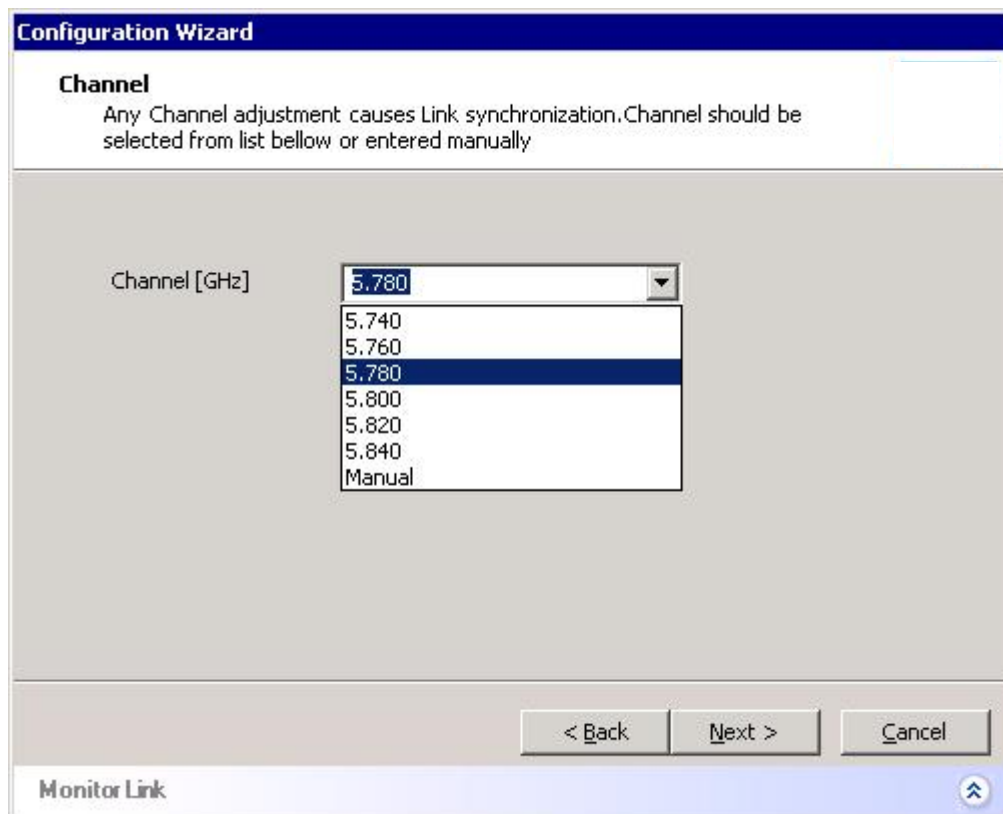
Figure **3-3**. *Channel select Dialog Box*

Table **3-1**. *AirMux-200 Channels and Frequencies*

Channel	ISM Band	UNII Band
1	5740 MHz	5740 MHz
2	5760 MHz	5760 MHz
3	5780 MHz	5780 MHz
4	5800 MHz	5800 MHz

5	5820 MHz	–
6	5840 MHz	–
Manual	User defined channel, within frequency band	

8. Click Next.

> The Rate Select dialog box appears (see *Figure* **3-4**)
>
> *Table 1-1* lists throughput rates and capacities.
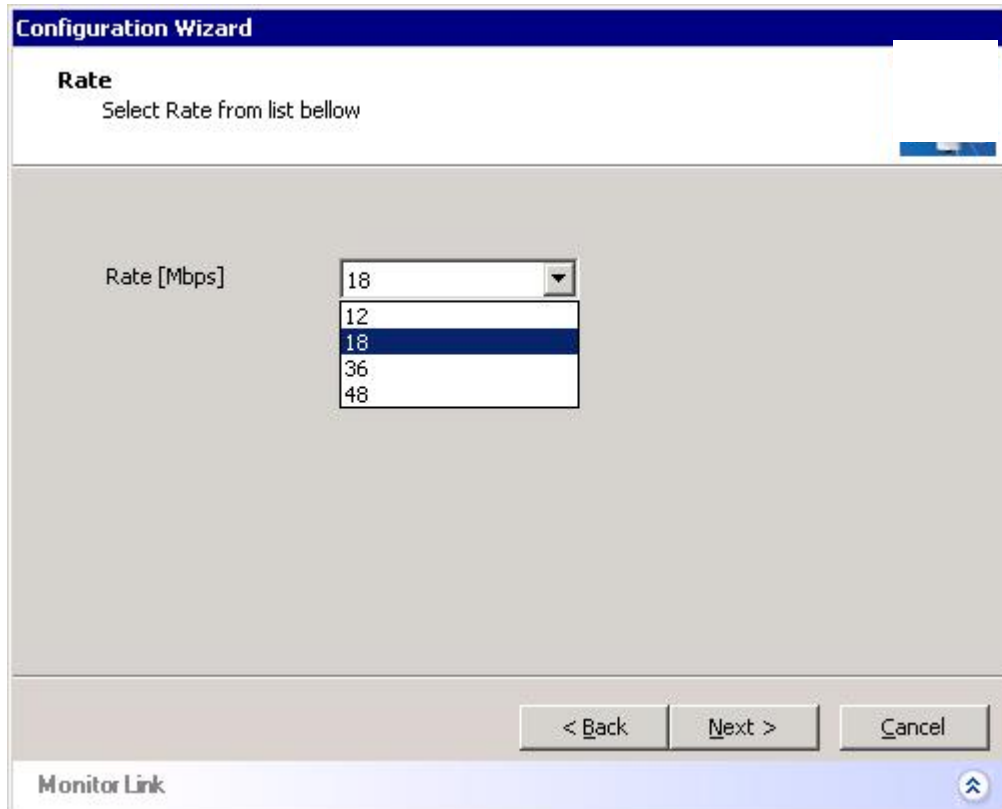
Figure **3-4**. *Rate select Dialog Box*

9. Click Next.

> The Service Parameters dialog box appears (see *Figure* **3-5** and
> *Figure* **3-6**).

Configuring Service Parameters

> In the Service Parameters dialog box configure E1/T1 (x1 or x2) and
> Ethernet parameters.

ä To configure E1/T1 and Ethernet:

1. In the Service dialog box, select one of the following:

§ E1/T1 – Select the E1/T1 field, if you intend to transmit E1/T1
     data and Ethernet data (see *Figure* 3-5).
     The Ethernet BW field shows the remaining bandwidth in Mbps
     available for Ethernet. The available bandwidth depends on the
     number of E1/T1 ports selected.

§ Select the Ethernet field, if you intend to transmit Ethernet data
     only
     (see *Figure* 3-6)

2. Click Next.

   The Finish screen appears (see *Figure* 3-7).
   The Finish screen shows a summary of the link configuration.

3. Click Finish to complete the configuration wizard.
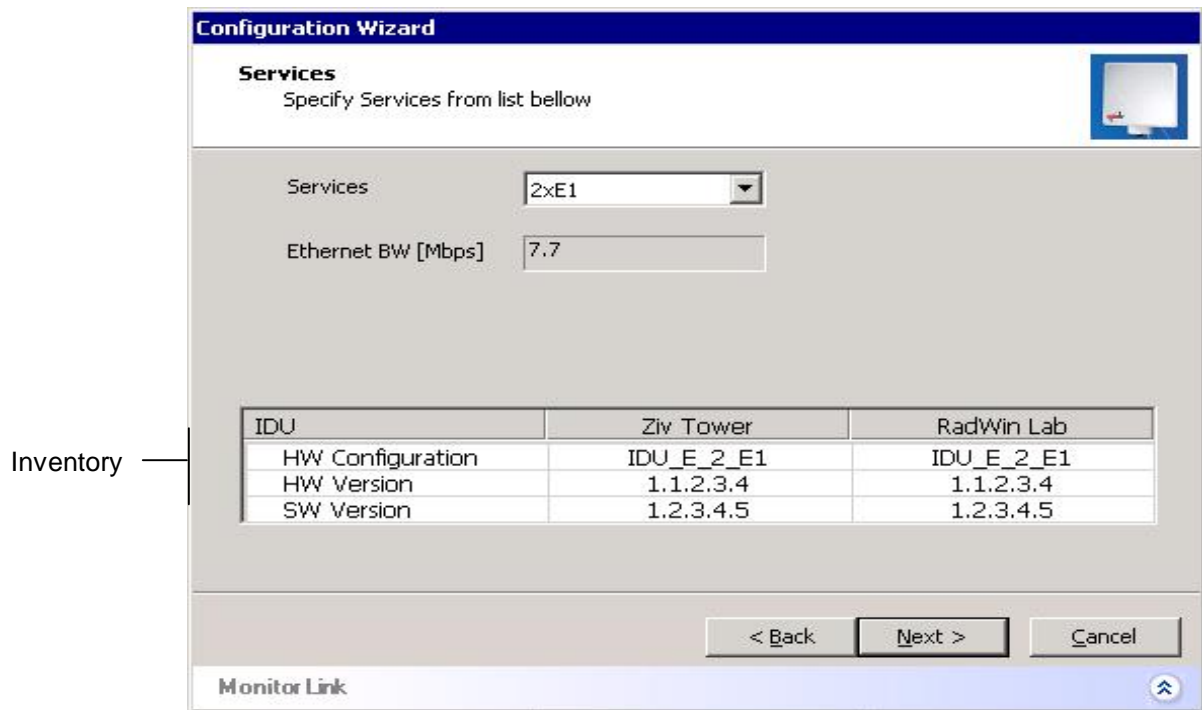
Figure 3-5. *Service Parameters Dialog Box, E1 Interface*
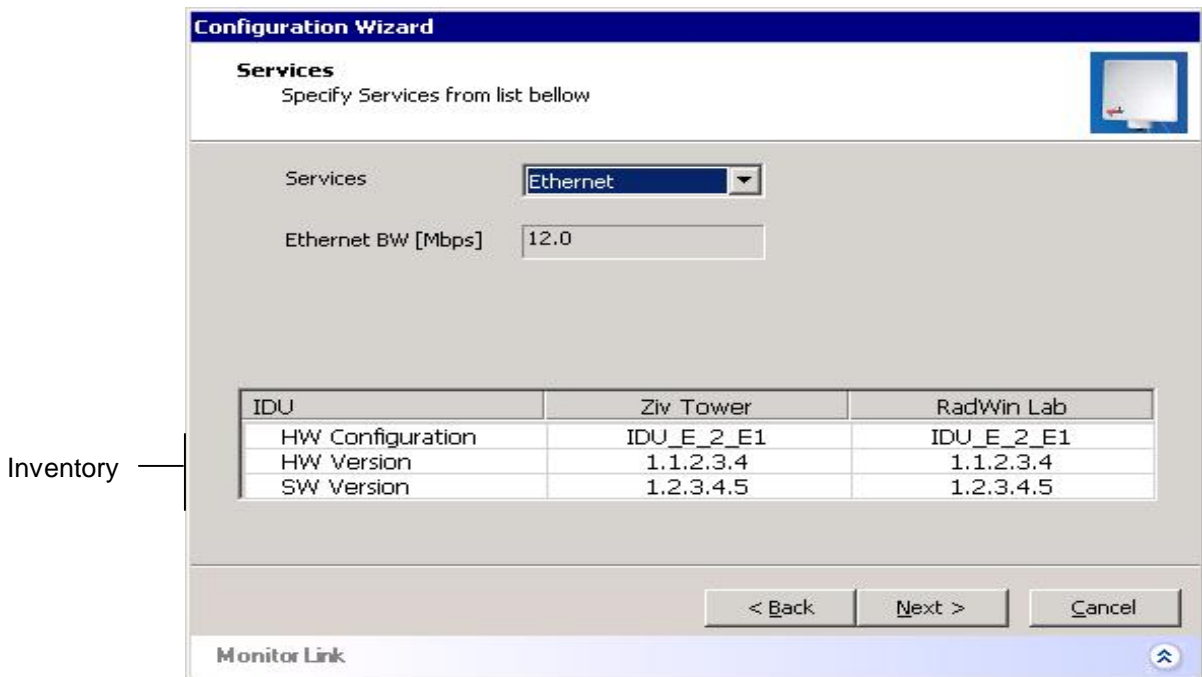
Figure 3-6. Service Parameters Dialog Box, Ethernet only Interface
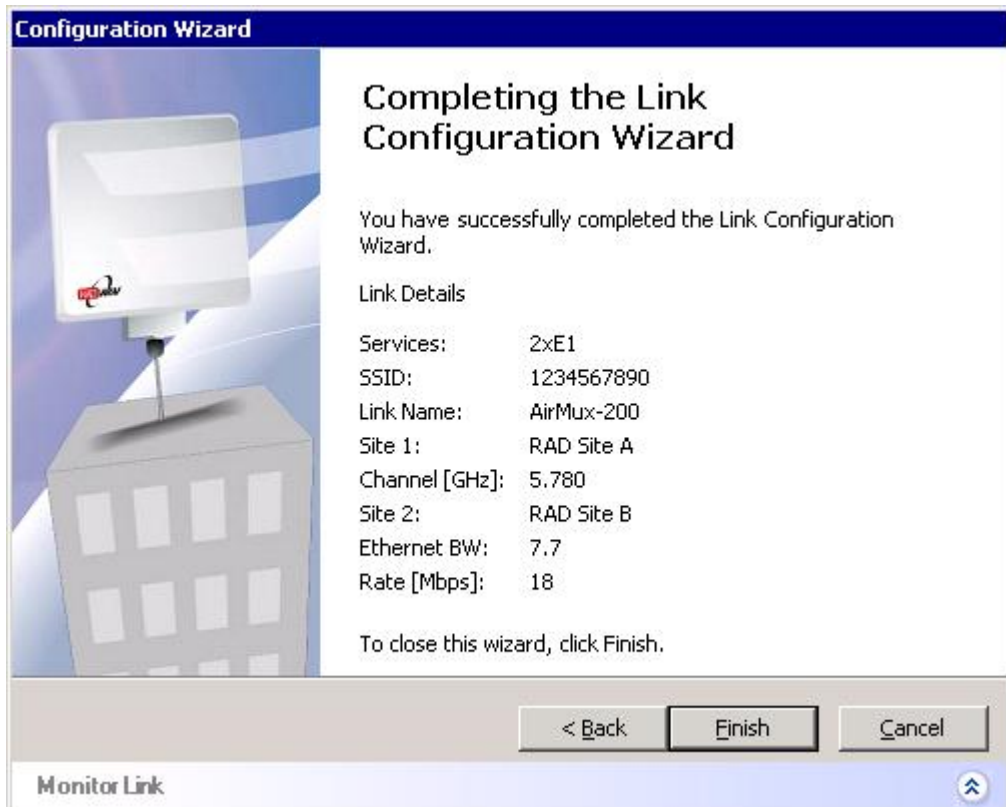
Figure 3-7. Configuration Wizard Finish Screen

Chapter 4

Operation

This chapter provides the following information for AirMux-200:

- AirMux-200 front panel indicators

- Operating procedures (turn-on, front panel indications, performance monitoring and turn-off)

- Procedures for changing AirMux-200 configuration parameters.

4.1 Front Panel Indicators

The front panel of AirMux-200 includes a series of LED indicators that show the current operating status of the unit.

Figure 4-1 shows the front panel of the AirMux-200 unit. *Table 4-1* describes the AirMux-IDU indicators.
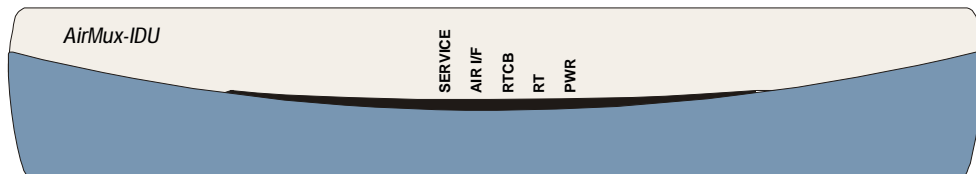
Figure 4-1. Front Panel

Table 4-1. IDU LEDs

Name	Function	Location
SERVICE (green/red)	ON (green) – E1 or T1 line is synchronized	Front panel
	ON (red) – Alarm is detected at the E1 or T1 interface	
AIR I/F (red)	ON (green) – Wireless link is synchronized	Front panel
	ON (red) – Wireless link lost synchronization	
RTCB (green)	ON – IDU self-test was completed successfully	Front panel
RT (green/red)	ON (green) – ODU-to-IDU communication link is operating properly	Front panel
	ON (red) – ODU-to-IDU communication link is disrupted	
PWR (green)	ON – A power supply is ON	Front panel

LINK (green)	ON – Good Ethernet link integrity	Rear panel LAN connector
ACT (yellow)	Blinks according to the Ethernet traffic	Rear panel LAN connector

4.2 Operating AirMux-200

Turning On AirMux-200

ä To turn on AirMux-200:

- Connect the AC/DC converter to the IDU power connector and to the mains.

    The PWR indicator lights up and remains lit as long as the IDU is receiving power.

AirMux-200 requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators and statistics data. Intervention is only required when AirMux-200 must be configured to its operational requirements, or diagnostic tests are performed.

Normal Indications

Upon turning on AirMux-200, the PWR LED in the IDU front panel lights to indicate that AirMux-200 is on. *Table* **4-2** shows the correct status of the indicators a few seconds after power-up.

*Table **4-2**. AirMux-200 Indicator Status*

Indicator	Status
PWR	ON
RTCB	Green – Blinking slowly
RT	Green – Blinking slowly
Air	Green – Blinking slowly
Service	Green – Blinking slowly

If the above LED indications do not appear following initial power turn-on, refer to *Chapter 5* for the diagnostic test instructions.

Note *During normal operation, the PWR led stays ON, all other LEDs blink at a four second cycle.*

Turning Off AirMux-200

ä   To turn off AirMux-200:

* Remove the AC/DC converter power cord from the mains.

4.3 Managing AirMux-200

Before starting a management session, make sure that a communication link between local and remote units exists. The Link Status indication bar in the middle of the Main menu must be green, the *Radio Link - Sync* message appears in the event log (see *Figure* **4-2**).

Figure **4-2.** *Main Menu, Wireless Link is Active*

The AirMux Manager Main menu consists of the following elements:

- Toolbar – includes buttons serving for:

    § Monitoring wireless (radio) link (Monitor button)

    § Changing configuration parameters of operating wireless link, assigning text files for storing alarms, statistics and configuration data (Configure Link button)

    § Performing preliminary configuration of the system (Install Link button). This button is disabled once a link is defined.

    § Clearing error counters (Clear Counters button)

§   Logging off AirMux Manager (Log Off button)

§   Exiting AirMux Manager (Exit button)

•   Menu bar – functions are similar to those of the toolbar.

•   Link Parameters – summarizes information on the radio frequency, IP bandwidth, type of TDM service, number of assigned E1 or T1 timeslots, and IP details of the local and remote AirMux-200 units.

•   Local and Remote Statistics – monitor traffic between local and remote devices and collect following statistics:

   §   Local/remote received traffic rate (in kbps)

   §   Local/remote received frames rate (in fps)

   §   Radio link status

   §   E1 or T1 link status

   §   Radio signal strength (RSS) in dBm

   §   Signal-to-noise ratio (SNR) in dB

   §   Bit error rate.

•   Event log – stores alarms generated by local and remote units.

ä   To change link configuration parameters:

1.   In the Main menu, click Configure Link.

     The Configure Link wizard appears (see *Figure 4-3*). See *Chapter 3* for configuration details.

2.   Click Next.

3.   In the General Parameters dialog box enter a new link name, locations of the local and remote ODUs.

4.   Click Next.

5.   Continue through the configuration wizard and define the Channel, Rate and Services of the link.

6.   Once you finish changing configuration parameters, click Finish.

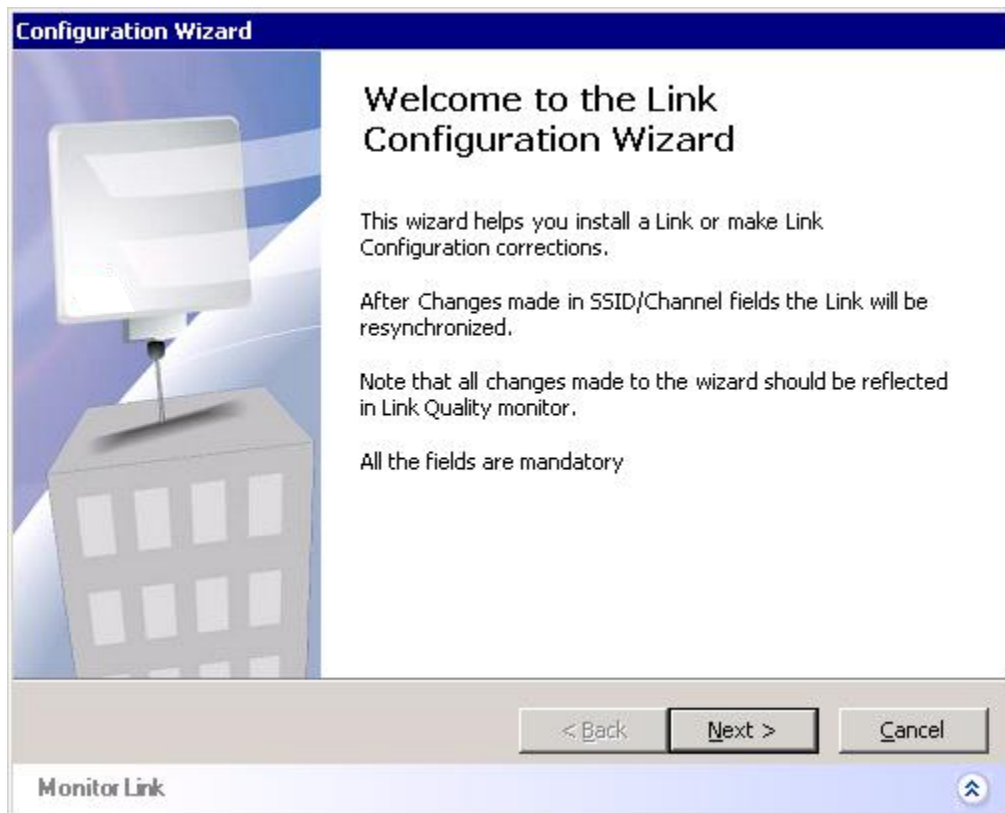   Both AirMux-200 units are reset automatically (initially the remote unit, then the local one).

*Figure **4-3**.   Configure Link Dialog Box*

Resetting AirMux-200

Note   *In order to maintain the communication link, always reset remote AirMux-200 first.*

ä   To reset AirMux-200:

1. Click on maintenance select a local or remote AirMux-200 to reset.

Saving AirMux-200 Configuration in a File

AirMux-200 management software allows you to save configuration parameters of the local and remote units on the management station as an INI file.

ä   To save configuration in a file:

1. From the Configuration menu (see *Figure 4-3*), click Backup.

2. In the Save As dialog box, indicate in which folder and under what name configuration file is to be saved, and click Save.

Uploading Configuration File

Configuration files (*.ini) can be uploaded from the management station, if the AirMux-200 database becomes corrupted. This can also be used to distribute verified configuration files to all other units that use the similar configuration.

ä   To upload configuration file to AirMux-200:

1. From the Configuration menu, select Configure Local ODU.

    The Configure Local ODU menu appears

2. From the Configure Local ODU menu, click Restore.

3. From the Open dialog, select *.ini file to upload and click OK.

4. From the Select ODU by Location menu, select the ODU to which the configuration file will be downloaded (local or remote).

    AirMux Manager displays confirmation message asking your approval to perform the download and restart the ODU.

5. Click Yes to approve.

    The configuration file is downloaded to the ODU and devices are reset.

Displaying the AirMux-200 Inventory

The AirMux-200 inventory includes information on the hardware, firmware and software versions of the local and remote units.

ä   To display inventory:

•   In the Configuration dialog box, click the Inventory tab.

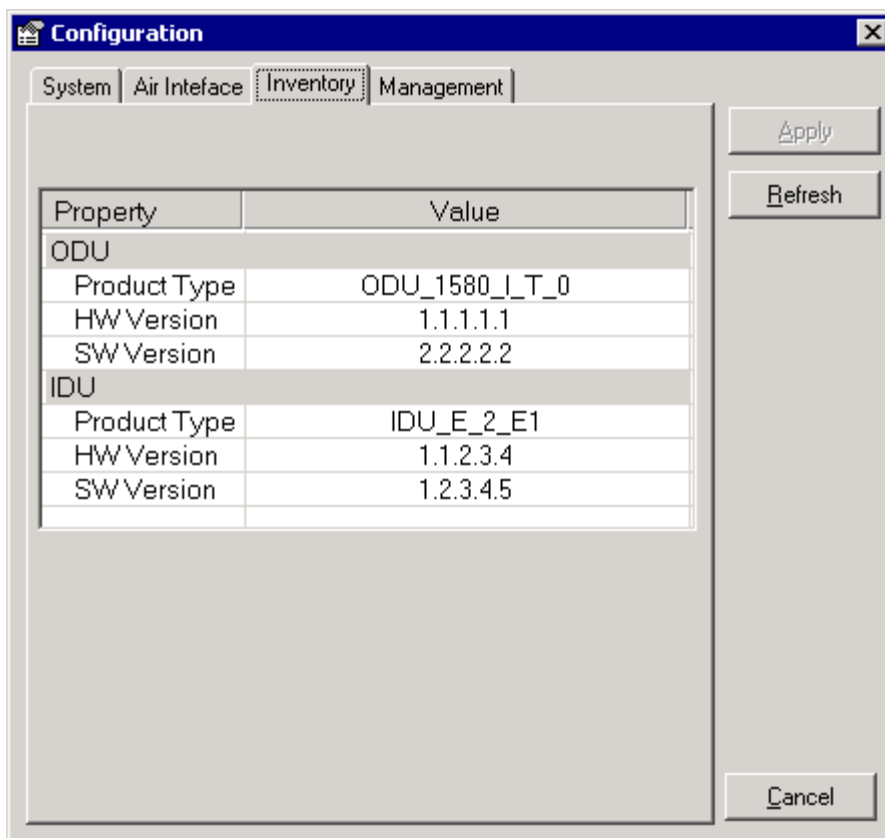   The local and remote inventory information is displayed (see *Figure 4-4*).

Figure 4-4. AirMux-200 Inventory

Chapter 5

Diagnostics and Troubleshooting

This chapter describes the AirMux-200 diagnostic functions, which include:

- Status indications, alarms, power-up self-test

- Statistics collection

- Diagnostic tests (local and remote loopbacks on E1 or T1 link).

5.1 Error Detection

Power-Up Self-Test

AirMux-200 performs a hardware test of the IDU upon turn-on. This self-test checks the critical circuit functions of the unit. The RTCB LED indicates results of the self-test (see *Chapter 4* for LED descriptions).

Alarms

AirMux-200 detects fault conditions of the radio and user links and initiates alarms to alert the user. The user can save the alarm log as a TXT file.

Alarms are displayed in the Event Log (see *Figure 5-1*).

The event log includes the following fields:
- Alarm sequential number
- Date and time stamp
- Message
- Alarm source (local or remote ODU)
- IP address of the ODU that initiated alarm.

*Table **5**-1. AirMux-200 Alarms and Information Messages*

Message	Description
Radio Link – Sync	Radio link is synchronized
Radio Link – Out Of Sync	Radio link lost synchronization
Link Has Been Reset	ODU was reset due to internal problem
TDM Interface – Normal	TDM interface is operating properly
TDM Interface – LOS	Loss of Synchronization is reported by TDM interface

*Table **5**-1. AirMux-200 Alarms and Information Messages (Cont.)*

| Message	Description
TDM Interface – LOF	Loss of Frame alignment is reported by TDM interface
TDM Interface – AIS	Alarm Indication Signal is reported by TDM interface
TDM Interface – RAI	Remote Alarm Indication is reported by TDM interface
TDM Interface – CRC	CRC error was detected at TDM interface
TDM Interface – CRC_E_BIT	CRC E-Bit error was detected at TDM interface
TDM Interface – Loopback	A loopback is active on TDM interface
Failed to download data to the remote ODU	AirMux-200 failed to download configuration data to the remote ODU
Failed to download data to the local ODU	AirMux-200 failed to download configuration data to the local ODU
Link Resetting	Wireless link reset from the management station. This alarm is caused by automatic reset after link configuration.
Local ODU Resetting	The local ODU reset from the management station.
Error loading trap catcher	AirMux Manager detected that the SNMP port 162 of the management station has been previously captured by another application and cannot receive traps.
Monitor was stopped since no connection to the link	No ODU-to-IDU traffic was detected during the last 20 minutes.
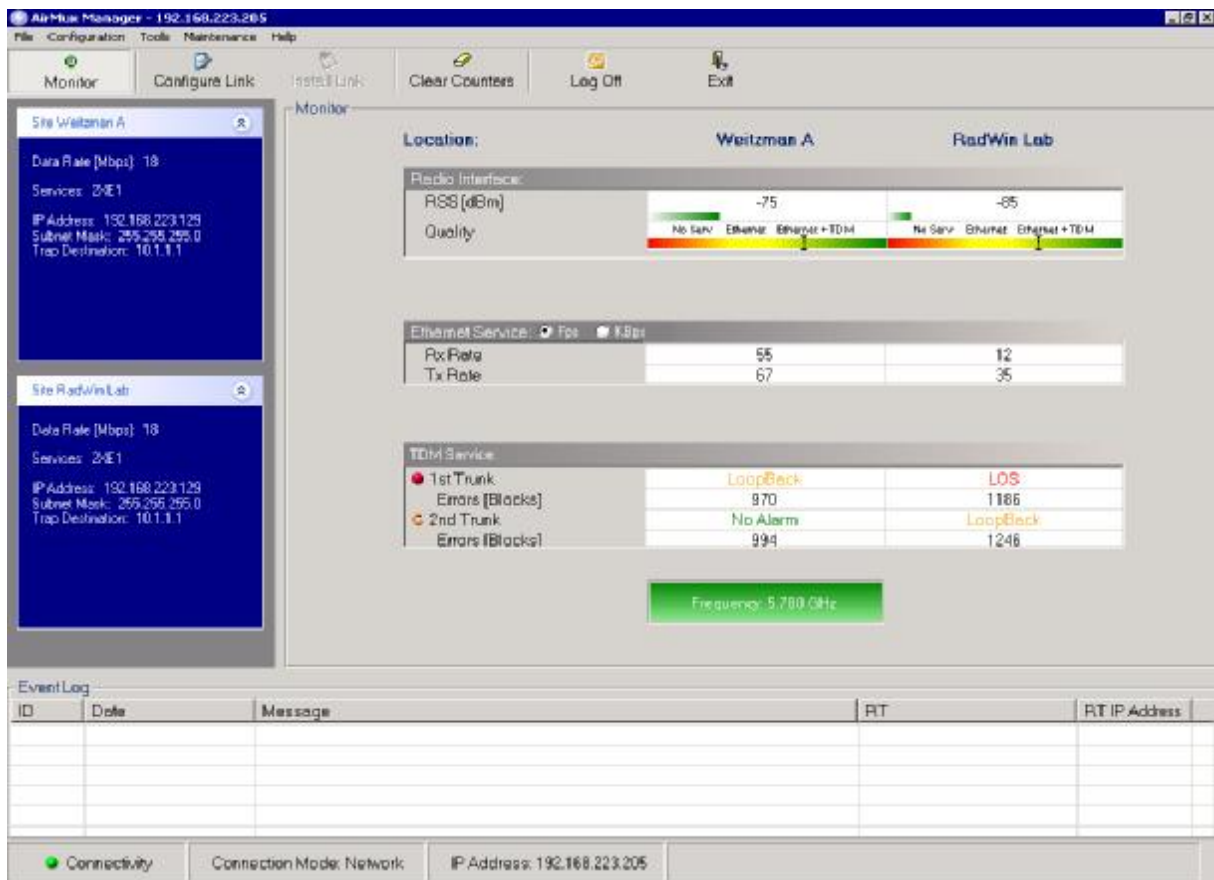
*Figure **5**-1. AirMux-200 Alarms and Status Indications*

Saving Event Log

The event log can be saved as a TXT file. New alarms are automatically added to the text file, as they enter the event log.

ä To save alarm log:

1. From the Tools menu, choose Preferences.

    The Preferences dialog box appears.

2. From the Preferences dialog box, select Event Log tab (see *Figure* **5**-*2*).

3. Click the [...] button and in the Select File dialog box indicate in which folder and under what name the alarm log file is to be saved, and click Save.
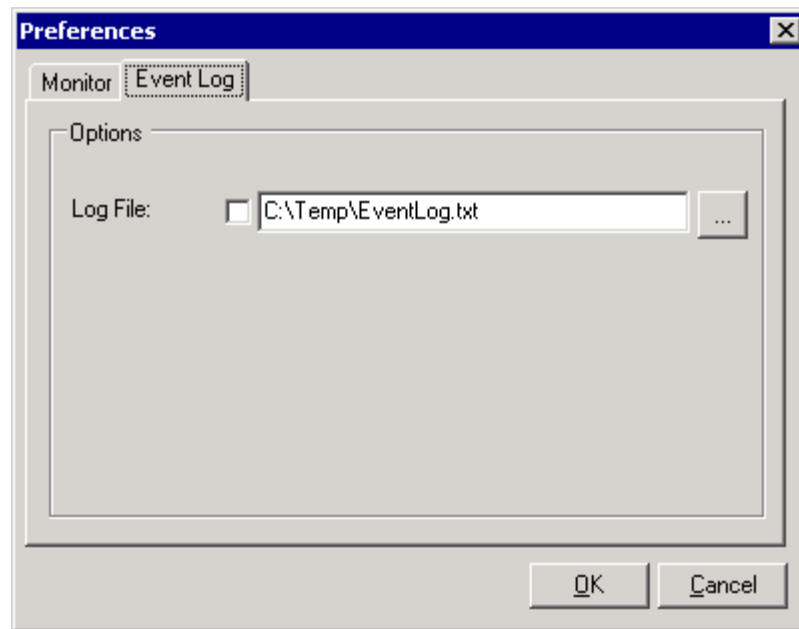
Figure **5**-*2. Preferences Dialog Box, Event Log Tab*

5.2 Collecting Statistics

AirMux-200 constantly monitors traffic over the radio link and collects the following statistics data:

- Local/remote received traffic rate (in kbps)

- Local/remote received frames rate (in fps)

- Radio signal strength (in dBm)

- Signal-to-noise ratio (in dB)

- Bit error rate.

Statistics log can also be saved as a text file.

ä   To save statistics log:

1. From the Tools menu, choose Preferences.

    The Preferences dialog box appears.

2. From the Preferences dialog box, select Monitor tab (see *Figure* **5**-*3*).

3. Click the ⬚ button and in the Select File dialog box indicate in which folder and under what name the statistics log file is to be saved, and click Save.

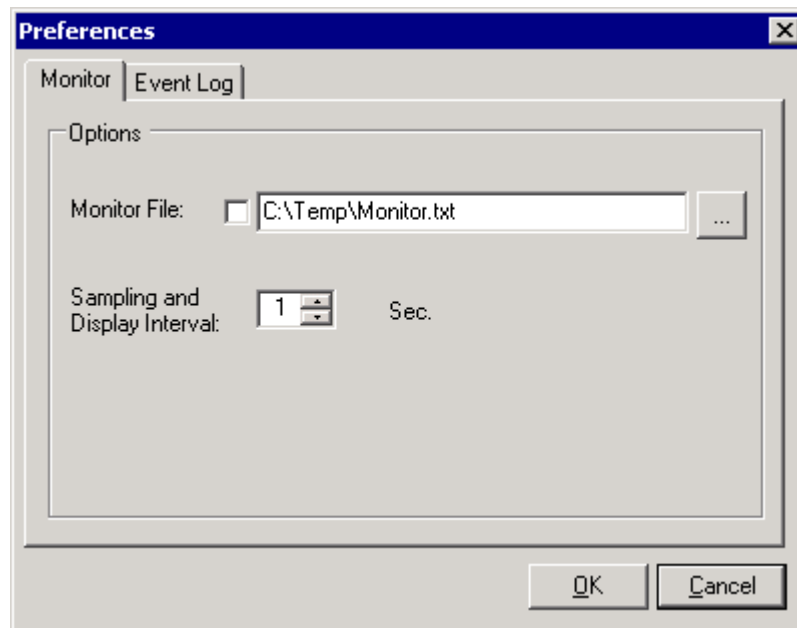4. In the Interval box, type or select statistics refresh interval (in seconds).

Figure 5-3. Preferences Dialog Box, Monitor Tab

5.3 Running Diagnostic Loopbacks

AirMux-200 supports activation of the internal and external loopbacks on the local and remote units.

ä To activate a loopback:

1. From the Maintenance menu, choose Set Loopbacks.

    The Loopbacks dialog box appears (see *Figure 5-4*).

2. From the Local or Remote drop-down box, select a loopback that you intend to run, and click OK.

    A confirmation message appears.

3. Click Yes to activate a loopback.

    AirMux-200 activates selected loopback. A loopback status arrow in the Main menu turns green to indicate an active loopback.

ä To deactivate a loopback:

• From the From the Local or Remote drop-down box of the Loopbacks dialog box, select N/A and confirm your choice.

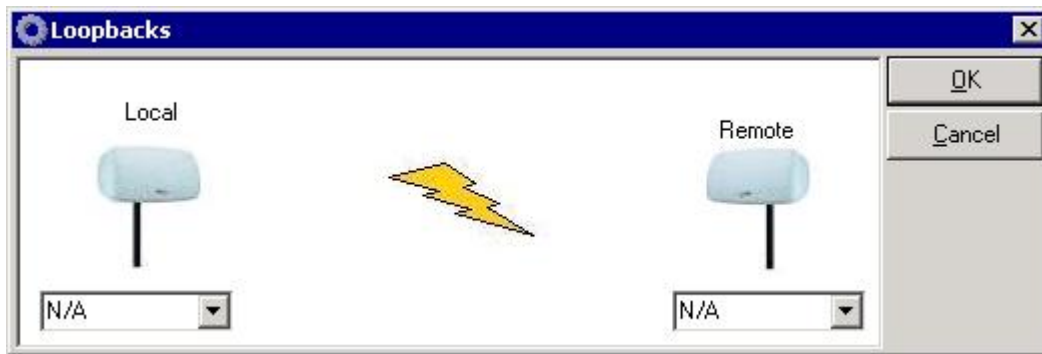A loopback is deactivated and the corresponding status arrow in the Main menu becomes dimmed.

Figure 5-4. Loopbacks Dialog Box

Local External Loopback

Local AirMux-200 can be set to an external loopback to test the local E1/T1 port and its connection to the local side user equipment. In this mode, data coming from the local user equipment is looped back to it (see *Figure 5-5*). This loopback is initiated from a management station connected to the local unit.
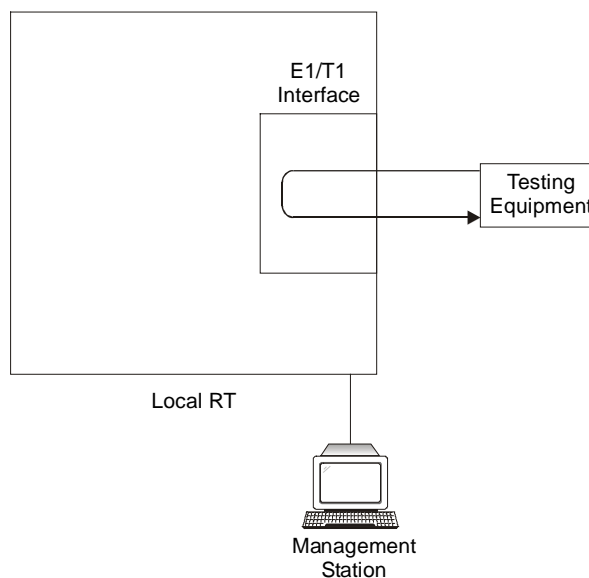

Figure 5-5. Local External Loopback

Remote Internal Loopback

Remote AirMux-200 can be set to an internal loopback to test connection between the local and remote units, the local E1/T1 port and its connection to the local side user equipment. In this mode, data coming from the local AirMux-200 is looped back to it (see *Figure 5-*

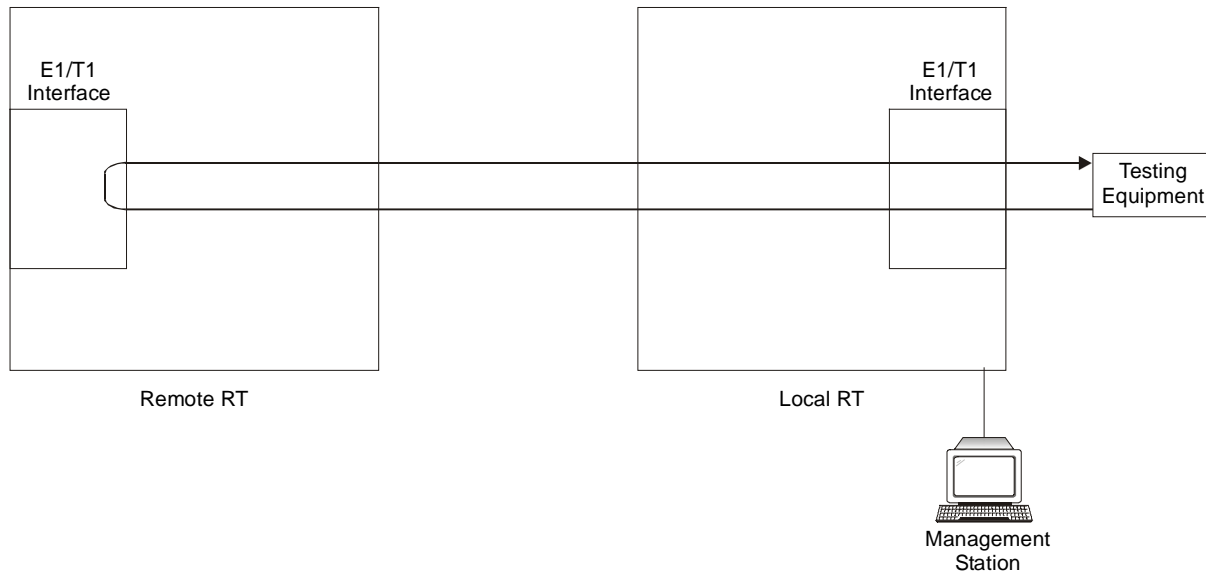*6*). This loopback is initiated from a management station connected to the local unit.

Figure **5**-6. *Remote Internal Loopback*

Remote External Loopback

Remote AirMux-200 can be set to an external loopback to test the remote E1/T1 port and its connection to the remote side user equipment. In this mode, data coming from the remote user equipment is looped back to it (see *Figure* **5**-*7*). This loopback is initiated by an inband command sent from a management station connected to the local unit.
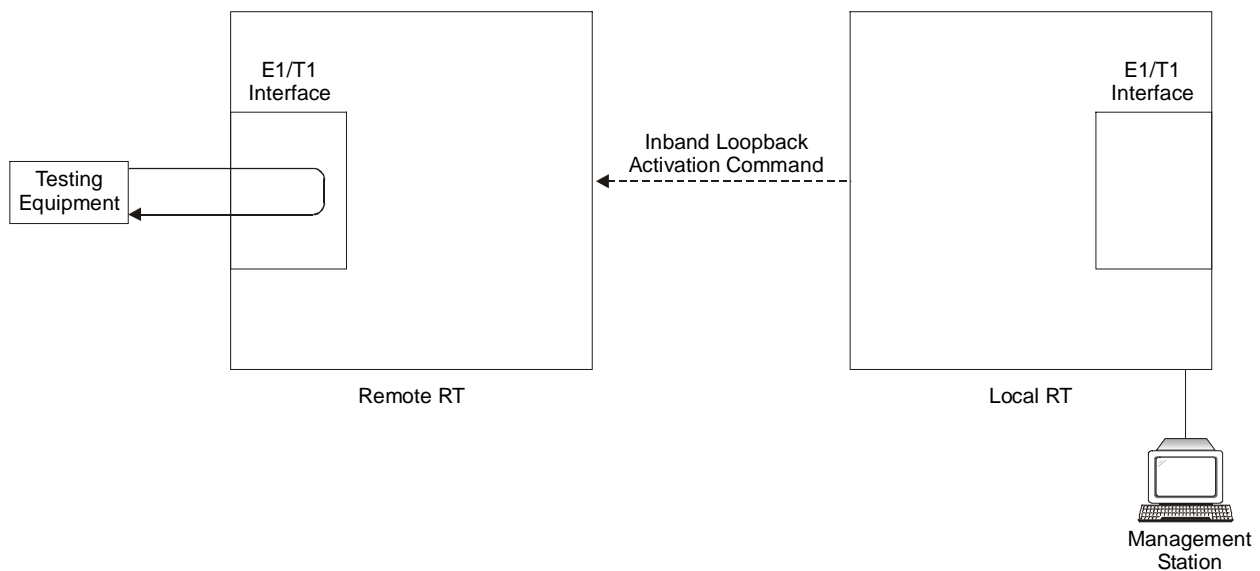

Figure **5**-7. *Remote External Loopback*

Local Internal Loopback

Local AirMux-200 can be set to close an internal loopback to test connection between the local and remote units, remote E1/T1 port and its connection to the remote side user equipment. In this mode, data coming from the remote user equipment is looped back to it (see *Figure 5-8*). This loopback is initiated by an inband command sent from a management station connected to the local unit.
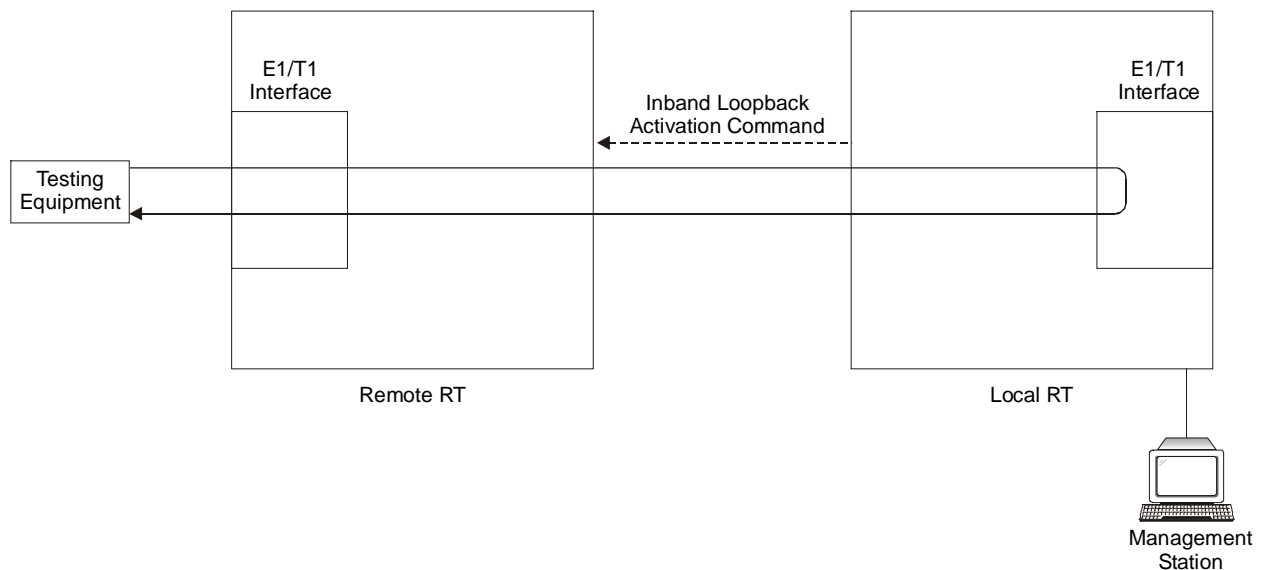

Figure 5-8. Local Internal Loopback

5.4 Troubleshooting

The AirMux-200 LEDs show faults in the system or the link. Use *Table 5-2* to diagnose the fault.

Table 5-2. Troubleshooting with AirMux-200 LEDs

LED status	Action
PWR LED is off	Check that AC adapter is connected to the IDU and the AC power outlet
RTCB LED is yellow	Check that the IDU/ODU cable is properly wired and connected
RT LED is red	Check that the IDU/ODU cable is properly wired and connected
Air LED is yellow	Complete the installation procedure from the

	management software
Air LED is RED	Check the ODU Antenna alignment. Check that the radio configuration of both local and remote units are the same (channel and SSID)
Service LED is off	Check the TDM service configuration in the NMS
Service LED is yellow	Check that the system is not in loopback mode. Check the remote IDU ports and cables and remote external equipment.
Service LED is red	Check the local IDU ports, cables and external equipment

Appendix A

Wiring Specifications

A.1 ODU-IDU Cable

The ODU-IDU cable is standard CAT-5, 4 twisted-pair 24 AWG FTP. The ODU-IDU cable is terminated in RJ-45 connectors on both ends. It is covered by a cable gland on the ODU side for hermetic sealing.

Table A-1 shows the connector pinout.

Table A-1. ODU-IDU Cable Connector Pinout

	IDU RJ45	Wire Color	ODU RJ45	Function
Twisted {	1	White/Green	1	Ethernet
	2	Green	2	
Twisted {	3	White/Orange	3	
	6	Orange	6	
Twisted {	4	Blue	4	Power
	5	White\Blue	5	
Twisted {	7	White/Brown	7	
	8	Brown	8	

A.2 User Port Connectors

The IDU includes ports for connecting E1/T1 and Fast Ethernet user devices.

E1/T1 Port

E1/T1 interface terminates in an 8-pin RJ-45 balanced connector, wired in accordance to *Table A-2*.

Table A-2. E1/T1 Connector Pinout

Pin	Function
4,5	Receive (input)
1,2	Transmit (output)

Fast Ethernet Port

Fast Ethernet interface terminates in an 8-pin RJ-45 connector, wired in accordance to *Table A-3*.

Table A-3. Fast Ethernet Connector Pinout

Pin	Signal	Function
1	TD (+)	Transmit Data (positive)
2	TD (-)	Transmit Data (negative)
3	RD (+)	Receive Data (positive)
6	RD (-)	Receive Data (negative)

Appendix B

Mast and Wall Installation

B.1 Mounting the ODU

The ODU can be mounted on masts and walls.

ODU Mounting Kit Contents

The ODU mounting kit includes the following items:

- One Large Clamp (see figure B-1)

- One Small Clamp (see figure B-2)

- One Arm (see figure B-3)

- Four Screw hex head M8x40

- Two Screw hex head M8x70

- Four Washer flat M8
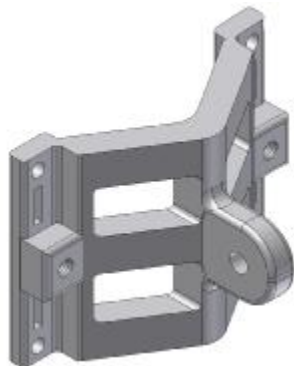
- Three Washer spring M8
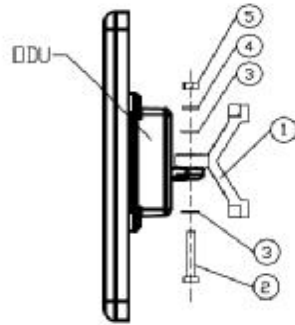
- Two M8 Nuts

Figure B-1. Large Clamp

Figure B-2. Small Clamp

Figure B-3. Arm

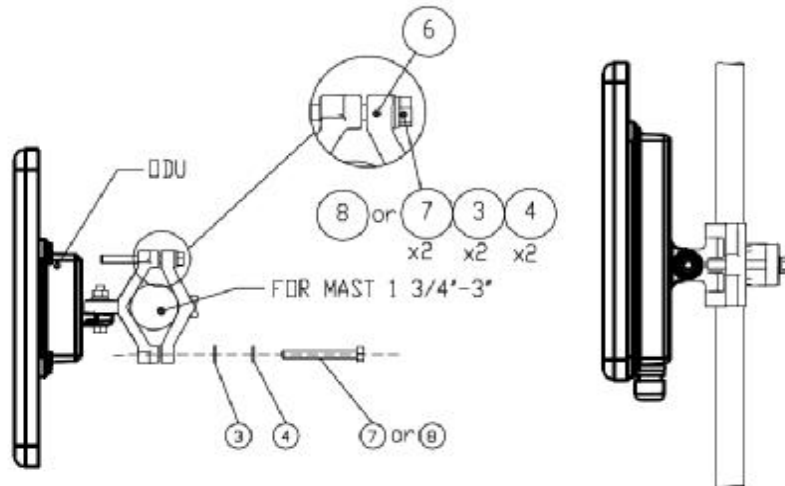## Mounting AirMux-200 on a Mast

INSTALLATION INSTRUCTIONS TO MAST

Installation Kit

ITEM	DESCRIPTION	QTY
1	Clamp	1
2	Screw hex head M8x40	1
3	Washer flat M8	4
4	Washer spring M8	3
5	Nut M8	1
6	Clamp	1
7	Screw hex head M8x40 (for 1 3/4" dia mast)	2
8	Screw hex head M8x70 (for greater size of mast)	2

STEP 1

Attach item 1 to the base
(mate knurled surfaces)
using items 2 ,3 ,4 ,5 as shown
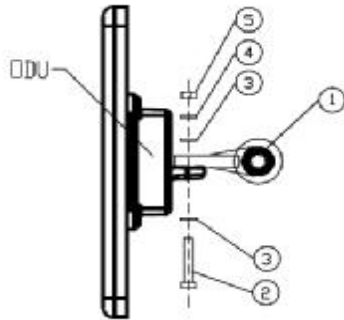Use tightening torque of 24 N/m

STEP 2

Tighten the antenna to the mast , using item 6,
screws, and washers items 7 ,3 ,4 as shown.
Use tightening torque of 14 N/m.
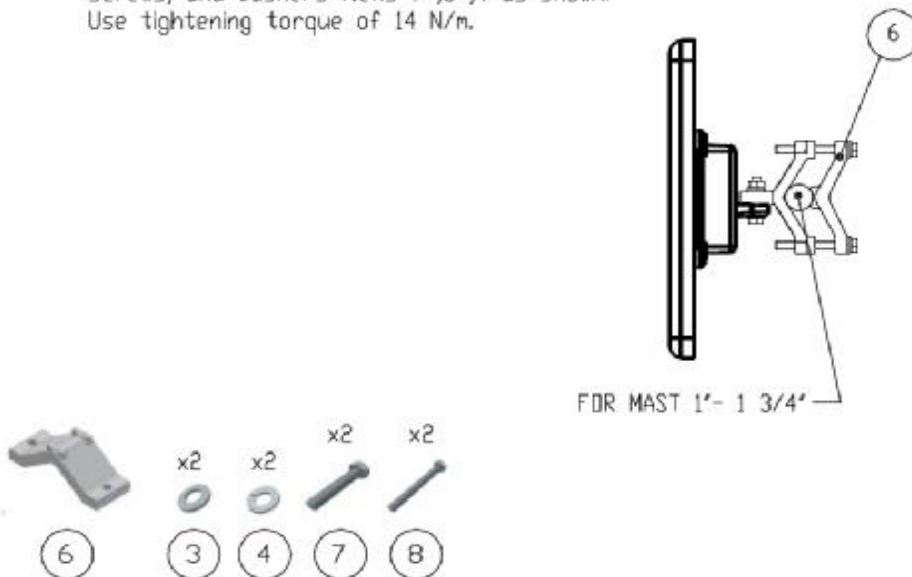
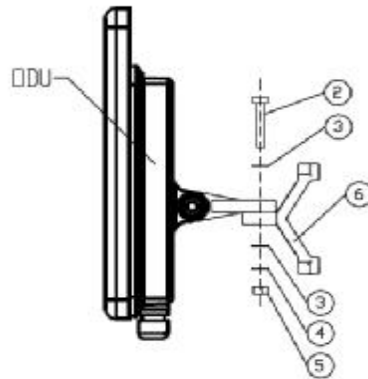## Mounting AirMux-200 on a Wall

INSTALLATION INSTRUCTIONS TO WALL

Installation Kit

ITEM	DESCRIPTION	QTY
1	Arm	1
2	Screw hex head M8x40	2
3	Washer flat M8	4
4	Washer spring M8	2
5	Nut M8	2
6	Base wall	1

ODU

STEP 1
Attach item 1 to the base
(mate knurled surfaces)
using items 2, 3, 4, 5 as shown.
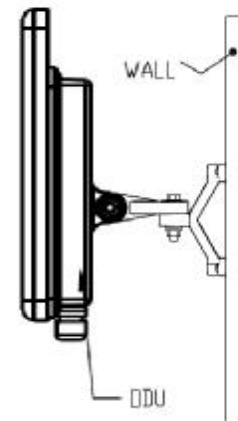Use tightening torque of 24 N/m.

ODU

STEP 2
Attach item 6 to the arm
(mate knurled surfaces)
using items 2 ,3 ,4 ,5 as shown.
Use tightening torque of 24 N/m.

STEP 3
Install ant. to wall
(hardware supplied by customer)

WALL

ODU

B.2 Mounting Optional External Antenna

The optional external antenna can be mounted on masts.

External Antenna Mounting Kit Contents

The external antenna mounting kit includes the following items:

- Twelve flat washers
- Eight spring washers
- Eight hex nuts
- Four bolts
- One U-bracket
- One pivoting bracket
- Two metal strap clamps.

ä To install external antenna on the mast:

1. Attach the U-bracket to the back of the antenna using four flat washers, four spring washers and four hex nuts.

2. Attach the pivoting bracket to the U-bracket using eight flat washers, four spring washers, four hex nuts and four bolts.

3. Pass both strap clamps through the vertical slots in the pivoting bracket.

4. Attach the antenna to the mast using the two strap clamps.

5. Adjust the required tilt using the angular scale and tighten all bolts and nuts at the required position.

Customer Response Form

RAD Data Communications would like your help in improving its product documentation. Please complete and return this form by mail or by fax or send us an e-mail with your comments.

Thank you for your assistance!

Manual Name: AirMux-200

Publication Number xxx-200-05/04

Please grade the manual according to the following factors:

	Excellent	Good	Fair	Poor	Very Poor
Installation instructions	r	r	r	r	r
Operating instructions	r	r	r	r	r
Manual organization	r	r	r	r	r
Illustrations	r	r	r	r	r
The manual as a whole	r	r	r	r	r

What did you like about the manual?

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Error Report

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