Aironet™
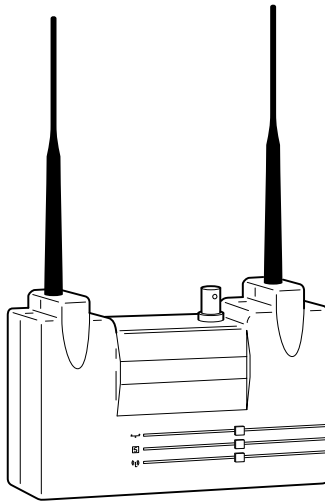
User's Guide
Wireless Access Point
for Ethernet and Token Ring

Products supported:
AP4500 and AP4800

DOC-710-004240-B0

Aironet Wireless Communications, Inc.

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Printed in USA

DOC-710-004240-B0

Table of Contents

Introduction

Purpose of the Manual

The purpose of this User's Guide is to allow you to easily install and configure your Aironet Access Point. This will permit other wireless devices, such as fixed stations, mobile stations, or another Aironet Access Point (acting as a repeater), to be able to associate to it. These will then be able to communicate to each other over the radio network and to the rest of the network via the Ethernet or Token Ring link.

For detailed technical and configuration procedures, see the Technical Reference Manual document number 710-004242.
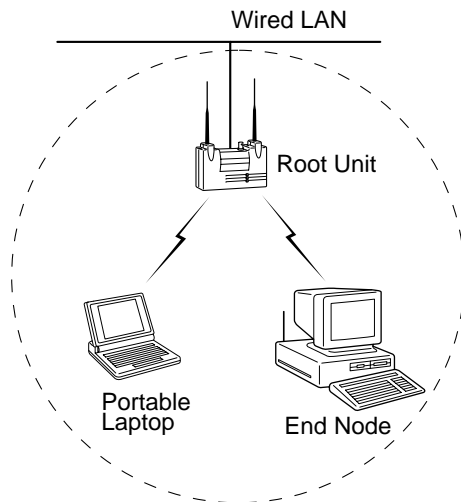
Safety Information

The FCC with its action in ET Docket 96-8 has adopted a safety standard for human exposure to radiated frequency (RF) electromagnetic energy emitted by FCC certified equipment. The Aironet products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper operation of this radio according to the instructions found in this manual will result in the user exposure to be substantially below the FCC recommended limits.
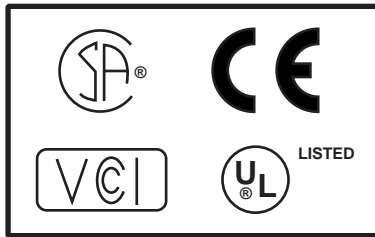
- Do not touch or move antenna(s) while the unit is transmitting or receiving.

- Do not hold any component containing the radio such that the antenna is very close or touching any exposed parts of the body, especially the face or eyes, while transmitting.

- Do not operate a portable transmitter near unshielded blasting caps or in an explosive environment unless it is a type especially qualified for such use.

- Do not operate radio or attempt to transmit data unless the antenna is connected, if not, the radio may be damaged.

Dipole Antenna

Always orient antenna such that it is at least 15 cm (6 inches) away from your body.

High Gain Antennas

High gain wall mount or mast mount antennas are designed to be professionally installed and should be located at a minimum distance of 30 cm (12 inches) or more from your body. Please contact your professional installer, VAR, or antenna manufacturer for proper installation requirements.

Other Devices in the Wireless Network

Refer to the User's Guide and Technical Reference Manual for the Access Point, Universal Client, or Bridge for additional information.

Before You Start

After unpacking the system, make sure the following items are present and in good condition.

- Access Point (Ethernet or Token Ring model)

- Power Pack. The power pack will be either 120VAC/60Hz or 90-264VAC/47-63Hz to 12-18VDC, whichever is appropriate for country of use.

- Two standard 2 dBi dipole antennas

If any item is damaged or missing, contact your Aironet supplier. Save all shipping and packing material in order to repack the unit should service be required.

NOTE: Any remote antennas or associated coaxial cables are ordered and packed separately.

Terminology

When configuring your system, and when reading this manual, keep in mind the following terminology:

Association – Each root unit or repeater in the infrastructure contains an association table that controls the routing of packets between the Access Point and the wireless infrastructure. The association table maintains entries for all the nodes situated below the Aironet Access Point on the infrastructure including repeaters and client nodes.

End Node – A client node that is located at the end of the Network Tree.

Infrastructure – The wireless infrastructure is the communications system that combines Access Points, mobile nodes and fixed nodes. Access Points within the infrastructure can be either root units, which are physically wired to the LAN backbone, or can act as wireless repeaters. Other RF enabled devices serve as fixed nodes or mobile client nodes.

Parent/Child Node – Refers to the relationships between nodes in the wireless infrastructure. The complete set of relationships is sometimes described as a Network Tree. For example, the Access Point (at the top of the tree) would be the parent of the end nodes. Conversely, the end nodes would be the children of the Access Point.

Repeater – A repeater is an Access Point that extends the radio range of the infrastructure. A repeater is not physically attached to the wired LAN, but communicates via radio to another Access Point, which is either a root unit or another repeater.

Root Unit – The root unit is an Access Point that is located at the top, or starting point, of a wireless infrastructure. A root unit provides the physical connection to the wired LAN (such as Ethernet or Token Ring) and contains configuration information in its association table that covers all nodes that access the wired infrastructure. All Access Points directly attached to the wired LAN backbone are root units.

Service Set Identifier – A unique identifier that is attached to selected packets sent out over the radio network. This functions as a password to join the radio network.

Understanding the Infrastructure

The infrastructure is designed like an upside-down tree with a root unit at the top and repeaters, stations, and mobile stations branching down from the root unit as shown below.

The Aironet Access Point can serve as a root unit, providing wireless data communications between the Ethernet or Token Ring based networks and other stations/mobile stations or within the wireless infrastructure.

Wired LAN

Root Unit

Portable
Laptop

End Node
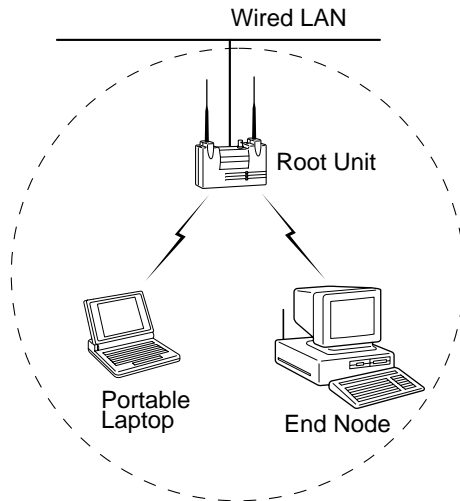
In the example, the Access Point maintains an area of RF coverage (cell). Any radio node within the cell's area can communicate to any other node (via radio or across the wired LAN) using the Access Point.

If a larger area of RF coverage is required, additional Access Points can be added either as root units, attached to the LAN, or as repeaters. Each Access Point adds its own cell, which can be used to provide additional coverage area, greater total bandwidth, or network redundancy.

For information about how to configure the Access Point as a repeater or other networking and system configuration issues, see the Technical Reference Manual document number 710-004242.

Information about optional, long range antennas is available from the Aironet Antenna Guide document number 710-003725 or your Aironet supplier.

Installation

This section describes the procedures for installing the Aironet Access Point.

Installing the Antennas

The Access Point comes with two antennas.

1. With the unit powered off, attach both antennas to the antenna connectors.

Ethernet

Antenna

Token Ring
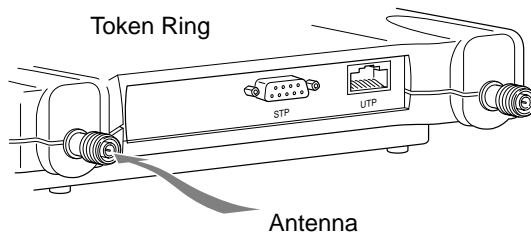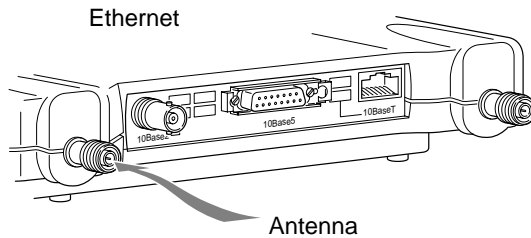
Antenna

NOTE: Do not over-tighten; finger tight is sufficient. Position the antennas vertically for best omni-directional signal reception.

2-1

2. If you are using the Aironet Access Point with a remote antenna, connect the coaxial cable to the antenna connector. Only use antennas and cables supplied by Aironet Wireless Communications.

NOTE: Due to FCC and DOC Regulations, the antenna connectors on the Aironet Access Point are of reverse polarity to the standard TNC connectors.

Installing the Console Port Cable

1. Attach the Console Port cable to the Serial Port. Attach the other cable end to the Serial Port on a terminal or a PC running a terminal emulation program. Use a 9-pin male to 9-pin female straight through cable.

NOTE: This connection is required for setting up initial configuration information. After configuration is completed, this cable may be removed until additional configuration is required via the Serial Port.

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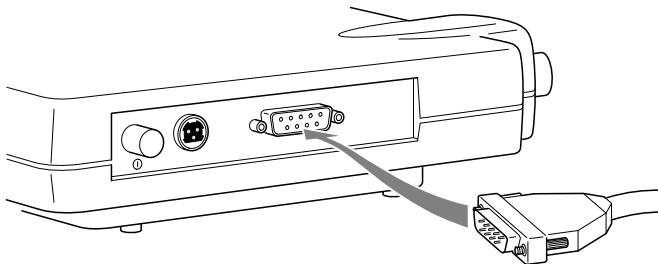
2. Set the terminal to **9600** Baud, **No**-Parity, **8** data bits, **1** Stop bit, and ANSI compatible.

Installing the Ethernet Connection

NOTE: If you are installing a Token Ring Access Point, proceed to page 2-5.

The Aironet Access Point for Ethernet supports three connection types:

- 10Base2 (Thinnet)
- 10Base5 (Thicknet) AUI connector
- 10BaseT (Twisted Pair)

To Attach 10Base2 (Thinnet) Cabling:

1. Make sure the unit is powered off.
2. Attach the Thinnet cabling to each end of a BNC T-connector, if applicable.
3. Attach the T-connector to the 10Base2 BNC. If the unit is at the end of the Ethernet cable, a 50-Ohm terminator must be installed on the open end of the T-connector.
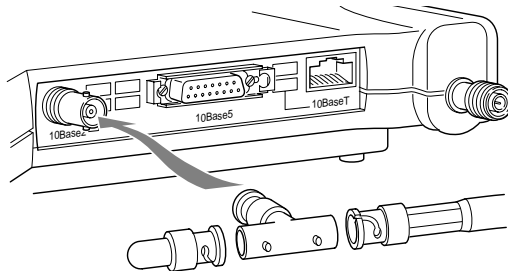
CAUTION: Removing a terminator to install extra cable, or breaking an existing cable to install a T-connector, will cause a disruption in Ethernet traffic. Consult with your LAN administrator before you change any Ethernet cabling connections.

To Attach the 10Base5 (Thicknet) Cabling:

1. Make sure the unit is powered off.
2. Attach the transceiver connector to the 10Base5 AUI port.
3. Slide the locking mechanism in place.
4. Attach the other end of the transceiver drop cabling to an external transceiver.
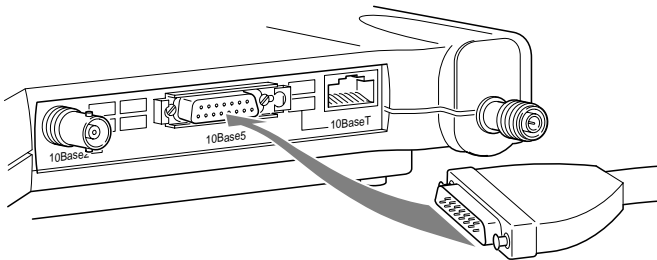
To Attach the 10BaseT (Twisted Pair) cabling:

1. Make sure the unit is powered off.
2. Plug the RJ-45 connector into the 10BaseT port (Twisted Pair).
3. Connect the other end of the Twisted Pair cabling to the LAN connection (such as a hub or concentrator).
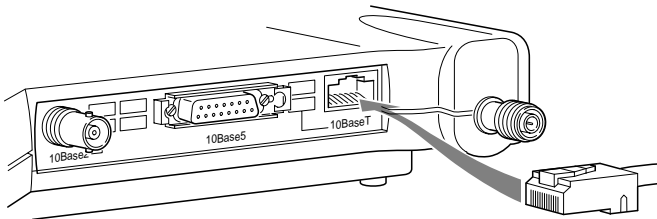
Installing the Token Ring Connection

The Aironet Access Point for Token Ring supports two connection types:

- Shielded Twisted Pair (STP)
- Unshielded Twisted Pair (UTP)

To Attach the STP Cabling:

1. Make sure the unit is powered off.
2. Attach the transceiver connector to the DB-9 port.
3. Attach the other end of the transceiver drop cabling to a Token Ring Multi-Station Access Unit (MAU).
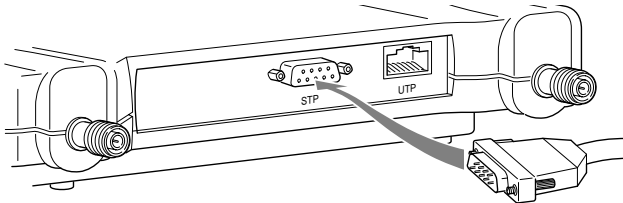
To Attach the UTP Cabling:

1. Make sure the unit is powered off.
2. Plug the RJ-45 connector into the UTP port.
3. Connect the other end of the UTP cabling to a Token Ring Multi-Station Access Unit (MAU).
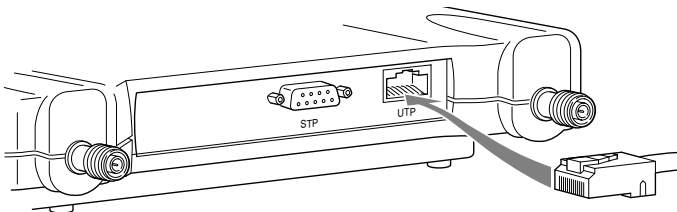
Attaching the AC/DC Power Pack and Powering On the Ethernet or Token Ring Access Point

1. Insert the small plug on the end of the AC/DC power pack cord into the power port.
2. Plug the AC/DC power pack into an electrical outlet (120VAC/60Hz or 90-264VAC/47-63Hz as appropriate).
3. Power on the Aironet Access Point by pushing the On/Off button.

On/Off Button
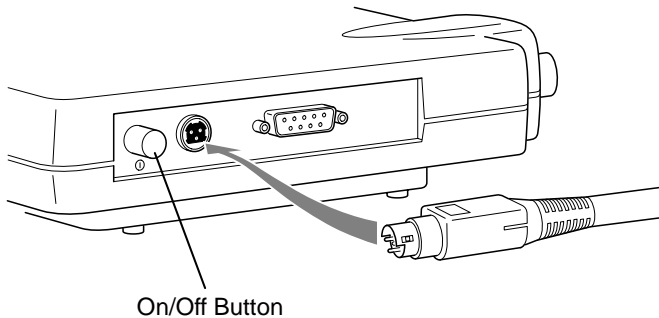
When power is initially applied to the Aironet Access Point, all three indicators will blink in sequence to test the functionality of the indicators.

Viewing the Indicator Displays

Top Panel Indicators

The indicators are a set of displays located on the top panel of the Aironet Access Point unit.

- **Ethernet or Token Ring Indicator** – Used to indicate network traffic activity. The light is normally off, but will blink green whenever a packet is received or transmitted over the Ethernet or Token Ring interface.

- **Status Indicator** – Shows solid green when the Aironet Access Point has accepted a radio association.

- **Radio Indicator** – Used to indicate radio traffic activity. The light is normally off, but will blink green whenever a packet is received or transmitted over the radio.

When the Aironet Access Point is initially powered up, all three displays will blink amber, red and then green, in sequence. If a power-on test fails, the status indicator will go solid red and the unit will stop functioning. See **Table 2.1** for a detailed explanation of the Top Panel indicators.

Ethernet   Status   Radio
or Token Ring
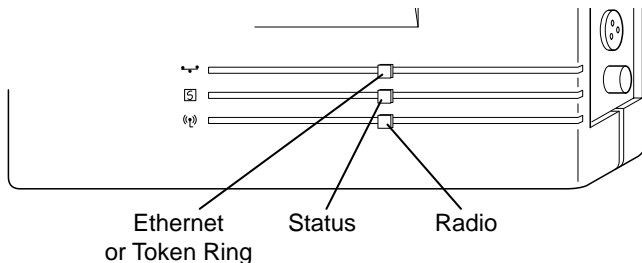
Table 2.1 – Top Panel Indicator Description

Type	Indicator Display			Description
	Ethernet or Token Ring	**Status**	**Radio**	
Nonassociated Node		Blinking Green		No nodes associated
Operational		Green		One or more nodes associated
		Green	Blinking Green	Transmitting/ Receiving Radio packets
	Blinking Green	Green		Transmitting/ Receiving packets
Error/Warning		Green	Blinking Amber	Maximum retries/buffer full occurred on radio*
	Blinking Amber	Green		Transmit/ Receive errors*
		Blinking Amber		General warning, check the logs*
Failure	Red	Red	Red	Software failure*
Firmware Upgrade		Red		Flashing the firmware*

*See the Technical Reference Manual for instructions

Back Panel Indicators (Ethernet Only)

The back panel indicators are:

- **10BaseT polarity**: Solid amber to indicate the 10BaseT polarity is reversed. Check cable connections.

- **10BaseT active**: Solid green to indicate the 10BaseT has been configured as the active port.

- **Ethernet Rx**: Blinks green when an Ethernet packet has been received.

- **Ethernet Tx**: Blinks green when an Ethernet packet has been transmitted.

- **10Base2 active**: Solid green to indicate the 10Base2 has been configured as the active port.

- **Packet Collision**: Blinks amber to indicate a packet collision has occurred.
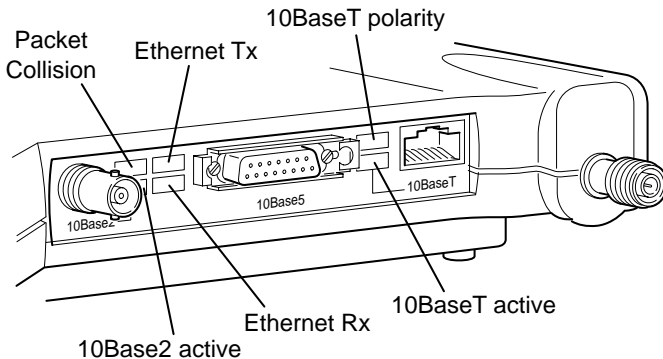
Configuration

This section describes the methods used to access and configure the Console system of the Aironet Access Point. This system contains all commands necessary to initially configure and monitor the operation of the unit.

Accessing the Console System

There are many ways in which you may configure and monitor the Aironet Access Point. When the unit is first powered up, basic configuration must initially be performed by accessing the Console Serial Port.

To gain access through the Serial Port, the Aironet Access Point must be connected to a terminal or a PC running a terminal emulation program. Set the terminal to **9600** Baud, **No**-Parity, **8** data bits, **1** stop bit, and ANSI compatible.

The Console system is organized as a set of menus. Each selection in a menu list may either take you to a sub-menu or display a command that will configure or display information controlling the unit.

Once the Aironet Access Point has been assigned an IP address, you may then access the Console remotely using:

- Telnet protocol from a remote host or PC
- HTML browser, such as Netscape Navigator from a remote host
- Simple Network Management Protocol (SNMP) from a remote network management node

Configuring the Access Point

To configure the Aironet Access Point so it will communicate with other nodes or repeaters, use the Console Port to set the SSID parameter.

If you choose to set an IP address, remote access via telnet or an HTML browser will be possible.

SSID Identifier (SSID)

The SSID (Service Set Identifier) is a unique identifier that is attached to selected packets sent out over the radio network. This functions as a password to join the radio network. Nodes associating to the Access Point must use the same identifier in their configurations, or their association requests will be ignored.

To define an SSID:

1. Select **Configuration** from the Main Menu.
2. Select **Radio** from the Configuration Menu.
3. Select **SSID**.
4. Enter a value for the SSID option. You may use up to 32 characters. All devices in the same radio network must use the same SSID.

Assigning an IP Address

An IP address must be assigned to the unit before it can be accessed by telnet, HTTP, or SNMP. Other detailed internet addressing options (such as gateway address or SNMP routing) can also be defined. Refer to the Technical Reference Manual document number 710-004242 for further details.

To assign an IP address:

1. Select **Configuration** from the Main Menu.
2. Select **Ident** from the Configuration Menu.
3. Use the **INADDR** option to establish an IP address.
4. Use the **INMASK** option to define the internet mask, as appropriate.

Verifying Association

Once you have configured the Aironet Access Point and node devices with the correct parameters, the Radio Indicator will blink green indicating RF data traffic. The Status Indicator will be solid green indicating one or more nodes have associated to the Aironet Access Point.

Appendix A

System Configurations

Aironet Access Points are designed to provide maximum range and throughput enabling high-speed wireless access to different LAN segments within a building. You can use Aironet Access Points in many different network configurations.

Common system configurations:

- Point-to-Point LAN Connections
- Point-to-Multipoint LAN Connections
- Infrastructure Extensions with Repeaters

Point-to-Point LAN Connections

The Point-to-Point Access Point Configuration uses two Access Points to bridge two different LANs. Packets are sent between the file server and Workstation B through the Access Points (root unit and remote node) over the radio link. Data packets sent from the file server to Workstation A go through the wired LAN segment and do not go across the wireless radio link.

File Server

LAN Segment A

Root Unit
(Access Point)

Workstation A

Remote Node
(Access Point)

LAN Segment B

Workstation B
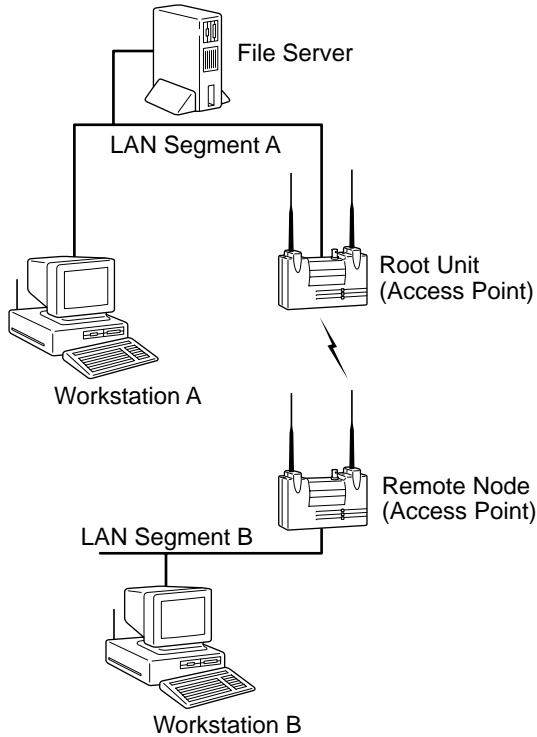
Supporting Mixed Network Topologies

Aironet Access Points can be used to link different LANs in the same building. The example below illustrates a LAN to LAN connection within a building.

File Server

Ethernet LAN

Ethernet
Access Point

Token Ring LAN

File Server

Token Ring
Access Point
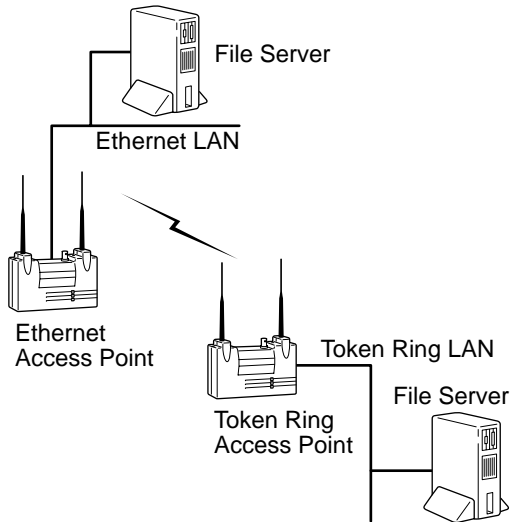
To support mixed topologies, a Token Ring Access Point would be installed to support a local Token Ring network and an Ethernet Access Point would be installed to support a local Ethernet network. In a mixed environment, the Token Ring must be the root unit. The Aironet Ethernet and Token Ring Access Points can then communicate with each other–linking both types of networks into a single LAN.

If the existing network to which you are connecting the Access Point is not Token Ring or Ethernet based, you can install a Token Ring or Ethernet Network Interface Card (NIC) in the file server or third-party Access Point to accommodate other network topologies.

Point-to-Multipoint LAN Connections

When connecting three or more LANs, each building requires an Aironet Access Point and antenna. This is called a Multipoint Access Point Configuration. One Access Point is designated as the central site. Its antenna is configured to transmit and receive signals from Access Points at other locations within the facility. Generally, the central site is equipped with an omni-directional antenna that provides radio signal coverage in all directions. The other Access Points are typically served by directional antennas that direct radio signals toward the central site.

Under a Multipoint Access Point Configuration, workstations on any of the LANs can communicate with other workstations or with any workstations on the remote LANs.

The following example shows a Point-to-Multipoint Configuration. Packets sent between Workstation A and Workstation B are forwarded by their respective Access Points to the root unit. Then the root unit forwards these packets to the appropriate Access Point for routing to the workstations. Packets sent between the file server and the remote workstations are routed through the root unit and the appropriate Access Point.
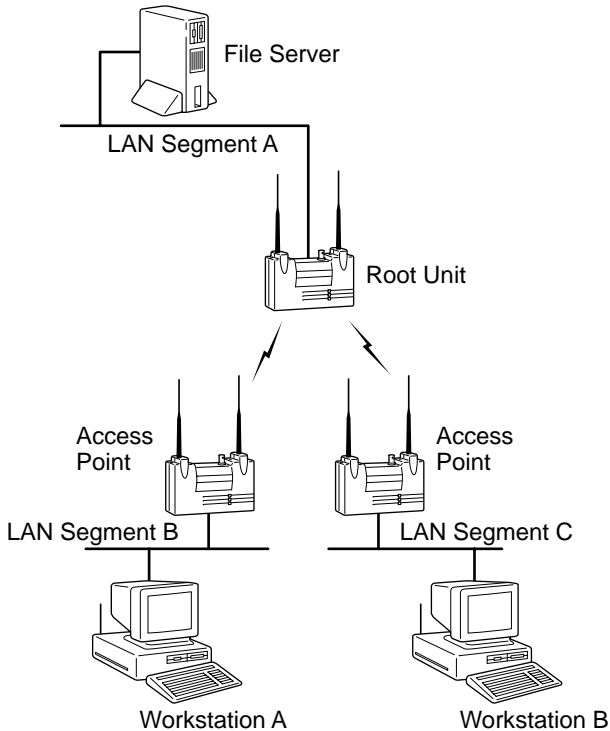
Appendix B

Manufacturers Federal Communication Commission Declaration of Conformity Statement

Models: AP4500-E, AP4800-E

Manufacturer:

FC **Tested To Comply With FCC Standards**
FOR HOME OR OFFICE USE

    Aironet Wireless Communications, Inc.
    3875 Embassy Parkway
    Akron, OH 44333-8357
    330-664-7900

This device complies with Part 15 rules. Operation is subject to the following two conditions:

1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and radiates radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference. However, there is no guarantee that interference will not occur. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from which the receiver is connected.
- Consult the dealer or an experienced radio\TV technician.

User Warning
The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency. Any changes or modification to said product not expressly approved by Aironet could void the user's authority to operate this device.

Professional Installation
Per the recommendation of the FCC, the installation of high gain directional antenna to the system, which are intended to operated solely as a point-to-point system and whose total power exceeds +36dBm EIRP, require professional installation. It is the responsibility of the installer and the end user that the high power systems are operated strictly as a point-to-point system.

Systems operating as a point-to-multipoint system or use non directional antennas cannot exceed +36dBm EIRP power requirement under any circumstances and do not require professional installation.

Manufacturers Federal Communication Commission Declaration of Conformity Statement

Models: AP4500-T, AP4800-T

Manufacturer:

Aironet Wireless Communications, Inc.
3875 Embassy Parkway
Akron, OH 44333-8357
330-664-7900

This device complies with Part 15 rules. Operation is subject to the following two conditions:

1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits of 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 residential environment. This equip-ment generates, uses, and radiates radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference. However, there is no guarantee that interference will not occur. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from which the receiver is connected.
- Consult the dealer or an experienced radio\TV technician.

User Warning

The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency. Any changes or modification to said product not expressly approved by Aironet could void the user's authority to operate this device.

Professional Installation

Per the recommendation of the FCC, the installation of high gain directional antenna to the system, which are intended to operated solely as a point-to-point system and whose total power exceeds +36dBm EIRP, require professional installation. It is the responsibility of the installer and the end user that the high power systems are operated strictly as a point-to-point system.

Systems operating as a point-to-multipoint system or use non directional antennas cannot exceed +36dBm EIRP power requirement under any circumstances and do not require professional installation.

Department of Communications—Canada
Canadian Compliance Statement

This Digital apparatus meets all the requirements of the Canadian Interference - Causing Equipment Regulations.

Cet appareil numerique respecte les exigences du Reglement sur le material broilleur du Canada.

This device complies with RSS-210 of Industry of Canada. Operation is subject to the following two conditions: 1) this device may cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

The device is certified to the requirements of RSS-139-1 for 2.4 GHz spread spectrum devices. The use of this device in a system operating either partially or completely outdoors may require the user to obtain a license for the system according to the Canadian regulations. For further information, contact your local Industry Canada office.

European Telecommunication Standards Institute Statement of Compliance Information to User

This equipment has been tested and found to comply with the European Telecommunications Standard ETS 300.328. This standard covers Wideband Data Transmission Systems referred in CEPT recommendation T/R 10.01.

This type accepted equipment is 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.

Declaration of Conformity

Aironet Model Number:
AP4500-E Series

Models included: AP4500-E

Radio CE Type Certificate Number: BCL/EC/98-0309/B
Radio Type Approval Examiniation Number: CPC/ARLAN/DK/9815

Application of Council Directive: 89/336/EEC
Application of Council Directive: 72/23/EEC

Standards which Conformity is Declared:

EN 55022 (B)
EN 55011 (B)
EN 50082-1
EN 60950

Manufacturer: Aironet Wireless Communication
                              3875 Embassy Parkway
                              Akron, OH 44333

The undersigned hereby declares the above specified equipment
conforms to the above Directives and standards.

Michael Smedley
Director, Manufacturing Engineering
Aironet Wireless Communications, Inc.

Declaration of Conformity

Aironet Model Number:
AP4500-T Series

Models included: AP4500-T

Radio CE Type Certificate Number: BCL/EC/98-0309/A
Radio Type Approval Examiniation Number: CPC/ARLAN/DK/9815

Application of Council Directive: 89/336/EEC
Application of Council Directive: 72/23/EEC

Standards which Conformity is Declared:

      EN 55022 (A)
      EN 55011 (A)
      EN 50082-1
      EN 60950

Manufacturer: Aironet Wireless Communication
                3875 Embassy Parkway
                Akron, OH 44333

The undersigned hereby declares the above specified equipment conforms to the above Directives and standards.

Michael Smedley
Director, Manufacturing Engineering
Aironet Wireless Communications, Inc.

Declaration of Conformity

Aironet Model Number:
AP4800-E Series

Models included: AP4800-E

Radio CE Type Certificate Number:
Radio Type Approval Examiniation Number:

Application of Council Directive: 89/336/EEC
Application of Council Directive: 72/23/EEC

Standards which Conformity is Declared:

EN 55022 (B)
EN 55011 (B)
EN 50082-1
EN 60950

Manufacturer: Aironet Wireless Communication
3875 Embassy Parkway
Akron, OH 44333

*The undersigned hereby declares the above specified equipment
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Michael Smedley
Director, Manufacturing Engineering
Aironet Wireless Communications, Inc.

Declaration of Conformity

Aironet Model Number:
AP4800-T Series

Models included: AP4800-T

Radio CE Type Certificate Number:
Radio Type Approval Examiniation Number:

Application of Council Directive: 89/336/EEC
Application of Council Directive: 72/23/EEC

Standards which Conformity is Declared:

EN 55022 (A)
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                              3875 Embassy Parkway
                              Akron, OH 44333

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Michael Smedley
Director, Manufacturing Engineering
Aironet Wireless Communications, Inc.

Appendix C

Technical Support

Technical Reference Manual

Use the Technical Reference Manual document number 710-004242 to learn more about your Aironet unit.

Communications

Use the following information to contact the Aironet Technical Support group:

Telephone - (330) 664-7903
Fax -   (330) 664-7990
e-mail -   techsupp@aironet.com

Web Site

For additional product information and technical support, including the capability to download new firmware and drivers, use the Aironet web site at:

 http://www.aironet.com