PRODUCT INSTALLATION MANUAL

for Subscriber Units, Base Stations, Access Points
and AB-Extender Units

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Preface

AB-Access™ System technology enables high-speed, broadband Internet access for fast data transmission, full streaming video, real-time video conferencing, and web surfing. Axxcelera Broadband's wireless point-to-multipoint and point-to-point solutions (AB-Extender) for fixed networks enables our customers to easily leap-over existing infrastructure, making the initial investment significantly lower than that required for ***wired*** alternatives.

Axxcelera Broadband's, patent pending, ***Packet-on-Demand*** technology delivers up to 10 times the effective Internet data throughput of existing network configurations. Our technology provides a ***last-mile*** solution, when deployed between networks and business/residential Internet users. AB-Access System's low-cost, wireless infrastructure means that a complete network can be installed ***in days or weeks***, instead of the typical months or years. Since AB-Access architecture is highly scalable, our customers' wireless network can grow as quickly as their business grows or as bandwidth needs evolve.

The main tasks covered in this manual are configuring and managing network elements, such as Base Stations, Subscriber Units, Access Points, AB-Extender Units, Anchor Switches, and Control Servers. Definitions of all the terms and abbreviations used in this manual can be found in the ***Glossary*** at the end of this manual.

Proprietary Notice

Intended Audience

This guide is aimed at qualified AB-Access System installers. Installers should have experience in radio equipment installations and aspects of hardware and software networks. Installers for AB-Extender should be professionally qualified to install radio equipment.

Related Documentation

For more information, refer to one or more of the following documents:

- *U-NII Config & User Manual* – Covers AB-Access components, architectures, configuration, and troubleshooting
- *CLI Manual* – Describes configuration, operational, and diagnostic capabilities of the radios.
- *AB-Access Software Release Notes* – Describes updates and changes to the latest software and known product issues.

Notice

While every reasonable effort has been made to ensure the accuracy of this manual, product improvements may result in minor differences between the manual and the product shipped to you. If you have any questions or need an exact specification for a product, please contact Axxcelera Broadband's Customer Service Team at support@axxcelera.com

Axxcelera Broadband Wireless
175 Science Parkway
Rochester, New York 14620
USA

Tel: (585) 242-9600
Tel: (877) 557-4001
FAX: (585) 242-9620

PLEASE READ THESE SAFETY PRECAUTIONS!

RF Energy Health Hazard

Professional installation required. The radio equipment described in this guide uses radio frequency transmitters. Although the power level is low, the concentrated energy from a directional antenna may pose a health hazard.

Use the following chart for determining the minimum safe distance. Do not allow people to come within the minimum safe distance of the antenna while the transmitter is operating.

Peak Gain of Antenna	Minimum Safe Distance
18 dBi	20 cm
20 dBi	20 cm
23 dBi	25 cm
25 dBi	32 cm
30 dBi	56 cm
37.6 dBi	135 cm

Protection from Lightning

Article 810 of the US National Electric Department of Energy Handbook 1996 specifies that radio and television lead-in cables must have adequate surge protection at or near the point of entry to the building. The code specifies that any shielded cable from an external antenna must have the shield directly connected to a 10 AWG wire that connects to the building ground electrode.

FCC Notice, USA

The AB-Access units comply with Part 15 of the FCC rules. Operation is subject to the following three conditions:

- This device may not cause harmful interference.
- This device must accept any interference received including interference that may cause undesired operation.
- Units with support for an external antenna must be professionally installed.

This device is specifically designed to be used under Part 15, Subpart E of the FCC Rules and Regulations. Any unauthorized modification or changes to this device without the express approval of Axxcelera Broadband may void the user's authority to operate this device. Furthermore, this device is intended to be used only when installed in accordance with the instructions outlined in this manual. Failure to comply with these instructions may also void the user's authority to operate this device and/or the manufacturer's warranty

Conditions specific to AB-Extender:

AB-Extender complies with Part 15 of the FCC rules. The device is specifically designed to be used under Part 15, Sub-part E of the FCC rules and regulations. Operation is subject to following conditions:

- The device to utilize a fixed mount antenna, for use on a permanent outdoor structure.
- The device to be installed by qualified installation/deployment personnel, and a minimum of 25 centimeters of separation must exist between the device and persons, when the device is operating.
- The device installers and operators should be aware of the transmitter operating conditions, specified in the AB-Extender installation manual and other associated user documentation, as well as the antenna co-location requirements of Part 1.1307 (b) (3), of FCC rules, pertaining to RF exposure.
- The device may not cause harmful interference.
- The device must accept interference received, including interference that may cause undesired operation.

The device is intended to be used only when installed in accordance with instructions outlined in this manual. Failure to comply with these instructions may void the user's authority to operate this device and/or the manufacturer's warranty. Furthermore, any unauthorized modification or changes to this device without the express approval of Axxcelera Broadband may also void the user's authority to operate this device.

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Section 1

1 AB-Access Product Overview

1.1 AB-Access System

The Axxcelera Broadband AB-Access System is a broadband, fixed, wireless access network for Internet, data, video, and voice applications. AB-Access can enhance or replace existing networks, wired or wireless, or be used to develop new networks. The AB-Access System offers:

- Point-to-Multipoint (PMP) Wireless Access Network
- Point-to-Point (PTP) Wireless Access Network [AB-Extender]
- End-to-End Connectivity
- Spectrum Efficiency per Offered Load
- Powerful, Flexible Elements.

1.2 AB-Access Network

The AB-Access network consists of wireless 25 Mbps cells similar in topology to the cellular networks of today. AB-Access networks are designed for rapid and easy deployment, and constructed from a number of Base Stations deployed in a conventional cellular pattern. Deployment can vary from a number of small island sites to complete coverage of a chosen geographical area. AB-Extender allows these cell sites to be linked together with high-speed, long range, point-to-point connections.

1.3 System Components

The AB-Access System is comprised of the following major components:

- **Subscriber Unit (SU)** – Located at customer premises and provides either ATM or standard IP over Ethernet connectivity.
- **Access Point (AP)** - The Access Point is the cornerstone component of the Base Station. The AP is the interface between the Service Provider's terrestrial network and the wireless fabric. Each AP has the capability to provide network service at the Physical, Data Link, and Network Layers of the OSI reference model.
- **AB-Extender (EX)** - The AB-Extender is the inter-Base Station linking component. The EX is the interface between the Service Provider's terrestrial network and the wireless PMP fabric. Each EX has the capability to provide network service at the Physical, Data Link, and Network Layers of the OSI reference model. Each EX can provide ATM or Ethernet backhaul.

1.3.1 AB-Access System Architecture

Figures 1-1 and 1-2 show an AB-Access System's typical deployment and network architecture.

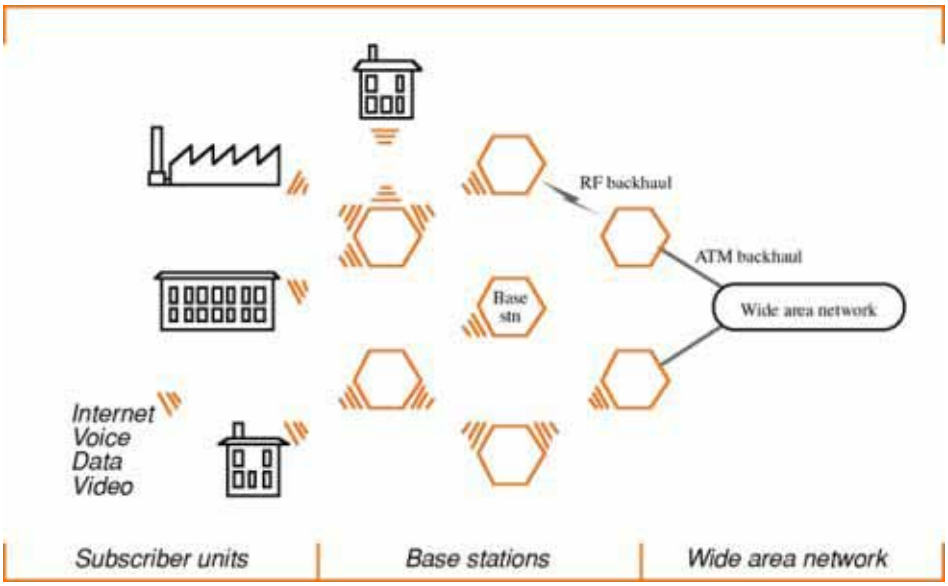

Figure 1-1 AB-Access Typical Deployment

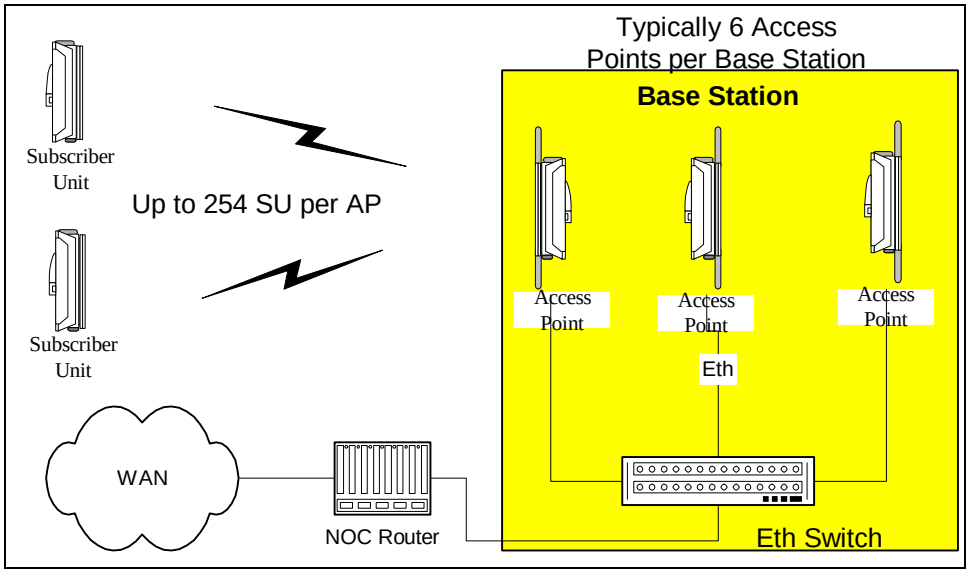

Figure 1-2 AB-Access Typical Network Architecture

1.3.2 Base Station Function

The Base Station enables wireless communications between the Subscriber Units and the Wide Area Network (WAN). Base Station elements may include:

- Access Point
- AB-Extender
- Switch

- Termination Point and Lightning Arrestor
- 48 VDC Power Supply
- Uninterruptible Power Supply (UPS) (optional).

1.3.3 Subscriber Unit Function

The Subscriber Unit is an integrated device that mounts externally at the customer site. This device provides either ATM or Ethernet communications via the 25Mbps ATM wireless connection with the Base Station. Subscriber Unit elements may include:

- Internal Junction Box
- Cabling.
- Switch, hub or router

1.3.4 System Configuration Selection

Before installing a new unit or upgrading a unit, the network manager must know what configuration option to use. The upgrade process will place a unit in a certain state. The state of this unit will be very important depending upon whether the unit is already being used in production or about to be put into use. Units in production will need to be upgraded and placed back into production using the configuration currently in place. New units will require the proper configuration in order to come online fast and efficiently. This whole process relies on the fact that the units are programmed properly.

Units operating in static mode will want to retain this mode. Selecting the wrong configuration may result in a static unit being placed in a dynamic registration mode, making it potentially unmanageable remotely. Similarly, upgrading a unit running in a routed topology to a bridge topology will have a significant impact on functionality.

For more information about configuring your AB-Access System, reference the AB-Access Configuration and User's Guide.

Following are instructions for setting up Subscriber Units, Base Stations, AB-Extender and Access Points. A Glossary of definitions and acronyms is at the end of this manual.

Section 2

2 Getting Started

2.1 Skills Required

The AB-Access Product Installation procedures require some construction-related experience using both power and hand tools. Answer the following questions to determine whether you have the skills to attempt the installation.

- Are you comfortable working at heights?
- (The installation may require you to climb a ladder and work at heights depending on where you need to install your outdoor transceiver. Keep in mind, you will also carry tools and equipment with you to the installation site.)
- Have you ever installed an RJ-45 connector to an Ethernet cable?
- (This is required to connect the outdoor transceiver and the indoor junction box or access panel.)
- Have you run telephone cable, wired a telephone jack, or connected telephone wire connections to a punch down block?
- Have you ever installed expansion shields into brick or masonry walls?
- (This requires drilling holes in masonry using masonry drill bits.)
- Have you ever wired an electrical outlet?
- Although you won't wire an outlet, you will be required to run ground wires and clamp them to an earth grounding rod or a cold water pipe.

If you can perform all the above tasks, then you should be able to install the AB-Access System. If you are unsure of your ability to perform these tasks, contact a more qualified installer.

2.2 Information Needed From Your Service Provider

Your service provider should have supplied you with the following information. Please contact your service provider before commencing installation, if you do not have all of this information:

- Locations of any local Access Points, which you should be able to connect to.
- The IP address of the radio being installed.
- An IP address and subnet mask needed to configure a Test PC. This is so you can check to see if your SU is working, align your outdoor transceiver correctly, and confirm that you can connect to your service provider.

2.3 Required Tools and Equipment

This section lists all the extra tools and equipment mentioned in this guide that you will need to perform the installation. None of the items listed in Table 2-1 are supplied with the kit, so make sure you gather everything you need before you start. Use the table below to check exactly what you will need (this will depend on where you are going to install the outdoor transceiver).

Table 2-1 Required Tools and Extra Equipment

Tools Required	Extra Equipment Required
Compass	¼ inch grounding rod
Area map with an accurate direction legend showing magnetic north	Grounding clamp
Phillips-head screwdriver	Grounding wire
Flat-head screwdriver	Roll of UTP CAT 5 cable
Hammer or mallet	#6 wood screws
Power drill	Cable clip
1/8 inch drill bit	Anchor sleeves
¼ inch masonry drill bit	RJ-45 connectors (plastic bodied)
3/16 inch, 4mm hex (Allen) wrench	1 inch copper tape
Bubble level or plumb line	Ethernet Hub (10BaseT)
Adjustable wrench	
Wire snake (if routing cable through interior walls)	Recommend a 19” rack to hold the monitor, Element Management System, Anchor Switch, and Control Server.
Crimping tool (must be specifically matched for the RJ-45 connector used)	
Wire stripper	
Small wire cutters	
Punch down tool	

2.4 Unpacking the Equipment

Table 2-2 lists all the standard parts that are supplied in your AB-Access Subscriber Unit Installation Package. Please take the time to unpack the package and check its contents against this list.

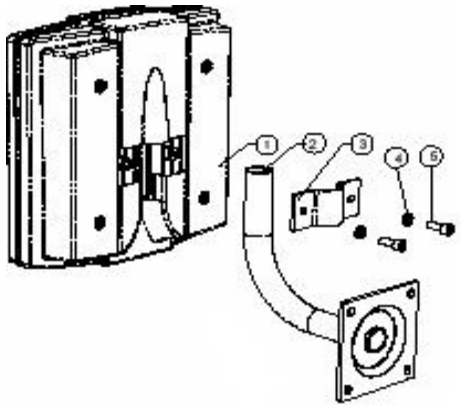

Figure 2-1 Outdoor Subscriber Unit Components

Table 2-2 Packing List

Item	Quantity	Notes
Outdoor Subscriber Unit	1	See item 1 in Figure 2-1
Mounting pole	1	See item 2 in Figure 2-1
Pole clamp	1	See item 3 in Figure 2-1
M6 washer	2	See item 4 in Figure 2-1
M3 x M10 machine thread screws	2	See item 5 in Figure 2-1
Power supply	1	
Power cord	1	
Indoor junction box	1	

2.5 Performing a Site Survey

This section explains how to select the best location for mounting the outdoor transceiver. The steps you will perform are:

- Determine which Access Points you can communicate with.
- Determine the direction of available Access Points from the house or building.
- Select an Access Point with an unobstructed Line of Sight (LOS).

Attention! It is very important that you choose a CLEAR LINE OF SIGHT for the placement of your Access Point Units and Subscriber Units.

2.5.1 What You Need

- Compass (or protractor).

- Area map with an accurate direction legend showing magnetic north.
- Access Point locations – these should be provided by your service provider.

2.5.2 Access Point Locations

If you are installing the unit without the aid of a qualified installer, you need to determine the general direction of any Access Points from your house or building. You may be able to 'see' several APs, depending on your coverage area.

Attention! The following method uses a compass to find the bearing of any APs from your site. An alternative method is to use a protractor to measure the angle between North and a line to the AP from your site. This tells you the compass bearing to use when aligning your outdoor transceiver.

1. On your map, mark the location of your house or building
2. Mark the locations of any Access Points – these should have been supplied by your service provider:

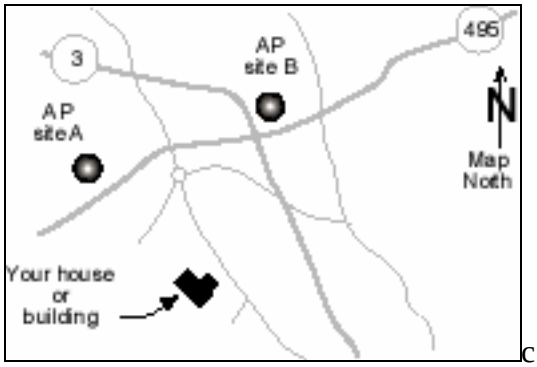

Figure 2-2 Access Point Locations

3. Place the compass on the map on or near the magnetic north indicator.
4. Turn the compass so that the magnetic north indicator needle aligns with the **N** or **North** indicator on the compass body.
5. Rotate the map, keeping the compass stationary, so the map's North Indicator aligns with the North Indicator of the compass (see Figure 2-3).
6. Move the compass over your location on the map and read off the bearing to the AP.

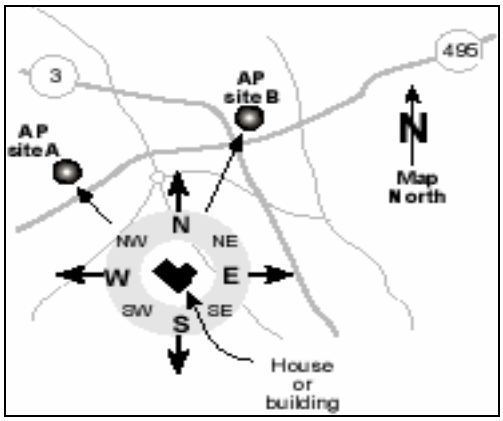

Figure 2-3 Aligning the Compass and Map

7. Write down the directions (compass bearings) of your Access Points. For example, in Figure 2-3, Access Point A is located northwest of the building and Access Point B is located between north and northeast. (If you can be more accurate than this, you will get better reception when you install your outdoor transceiver.)

2.5.3 Selecting an Access Point

In order for your AB-Access System to work correctly, you MUST establish a clear line of sight to one or more of the Access Points recommended by your AB-Access System provider.

1. Using the compass bearings you wrote down in the previous section, walk around your building to find a suitable line of sight path to mount your outdoor transceiver – see Figure 2-4.

Attention! A clear line of sight means a path unobstructed by trees, dense foliage, or other buildings.

If necessary, move to an upstairs window or rooftop location to better view the surrounding area for possible blockages in the path. Also, be sure to consider seasonal changes. A location that is unobstructed in the winter may be obstructed by foliage in the spring, summer, and autumn.

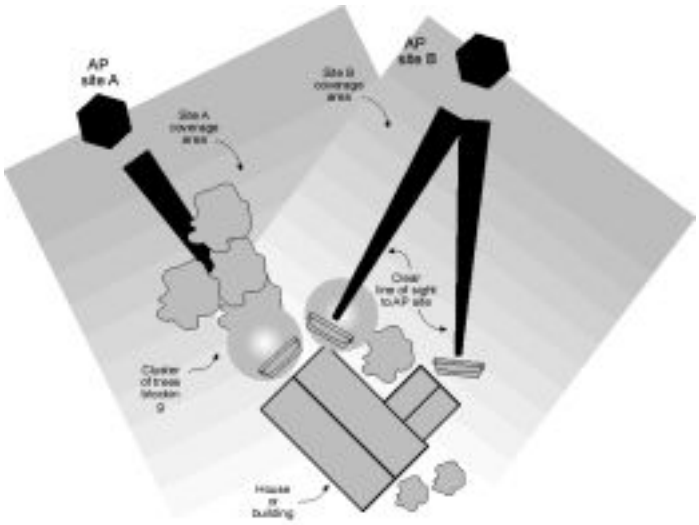

Figure 2-4 Selecting an Access Point

You should mount your outdoor Subscriber Unit as high as possible on your building, and align it to the compass reading you have just taken. For example, the previous Figure 2-4 shows the path to Access Point A obstructed by a cluster of trees. However, there are two possible mounting locations for the outdoor Subscriber Unit giving a clear line of sight to Access Point B.

Attention! Your outdoor transceiver has a beam width of approximately 20 degrees. You will need to be fairly accurate when aligning your transceiver to the compass bearing you wrote down earlier (the more accurate your compass readings, the better).

2. If you do come up with two or more suitable locations for the outdoor Subscriber Unit, choose the one that is easiest for you to reach, when it comes to installing!

2.5.4 AB-Extender Locations

In order for your AB-Extender link to work correctly, you MUST establish a clear line of sight between the Extender AP and Extender SU.

Attention! A clear line of sight means a path unobstructed by trees, dense foliage, or other buildings.

Attention! Your outdoor transceiver has a beam width of approximately 10 degrees. You will need to be fairly accurate when aligning your transceiver to the compass bearing you wrote down earlier (the more accurate your compass readings, the better).

Follow the same instructions for aligning and locating the AB-Extender units as for the standard AP and SU. Note: the difference in beam width will make alignment more difficult but has the advantage of lower susceptibility to interference.

Section 3

3 Base Station Installation

3.1 System Overview

This section briefly describes the AB-Access hardware and software system components that comprise a Base Station.

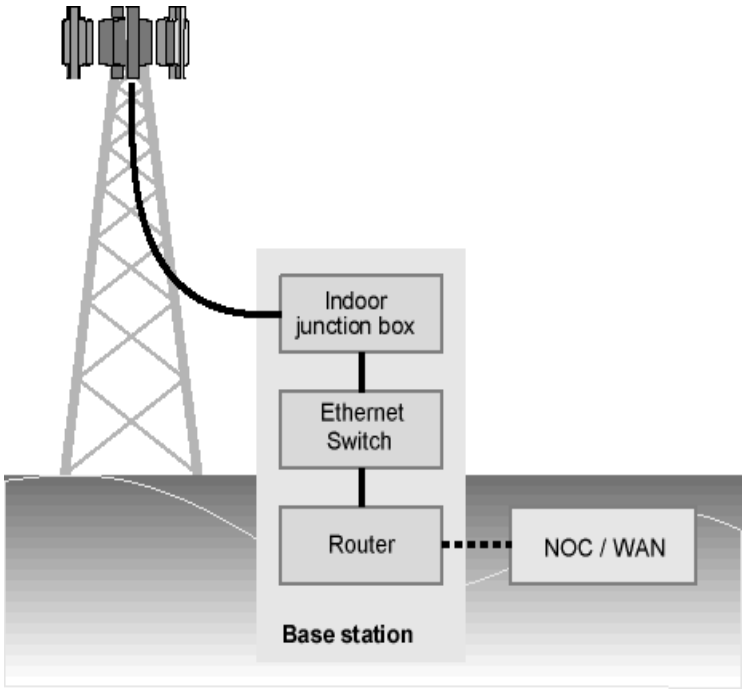

Figure 3-1 Base Station Overview

3.2 Access Points

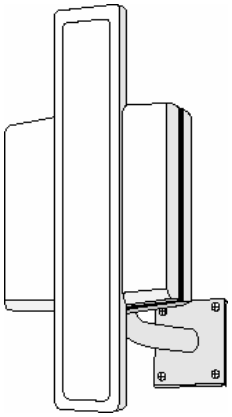

Figure 3-2 Outdoor Access Point and Mounting Pole

A Base Station can have up to six Access Points. Each AP consists of an outdoor transceiver (which contains the antenna and associated electronics that transmit and receive broadband wireless signals to and from Subscriber Units) and an indoor wallbox or access panel.

3.3 AB-Extender Units

A Base Station may have a number of AB-Extender units. Each EX consists of an outdoor transceiver and an indoor wallbox or access panel.

3.4 A Note On Cabling

Attention! Most of the cabling used in the AB-Access System is CAT5. You will need to be aware of the following limits on CAT5 cable lengths:

- The interconnect cable from the indoor junction box to an outdoor transceiver must be less than 60 meters. This is due to DC resistance loss over the distance of the cable run.
- The combined length of ATM or Ethernet interconnect cable (from the radio to the switch) must be less than 100 meters.

Section 4

4 Access Point Installation

4.1 Before You Start

This section lists the information needed to install an AP.

4.2 Information Required

Before you perform the installation, a site survey should have been performed by the service provider. From this, you will need to know:

- Number of APs to install
- Where the outdoor transceivers will be mounted (antenna mast, pole or building)
- Heights at which the outdoor transceivers will be mounted.
- Transceiver directional information (azimuth and elevation).

You will probably be installing six APs on a mast or pole, giving 360 degree coverage in 60 degree sectors, as shown in Figure 4-1.

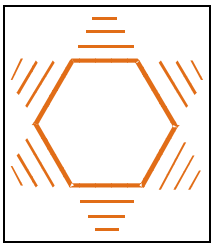

Figure 4-1 Diagram of Six Access Points for 360 degree Coverage

IMPORTANT – Be sure to record the MAC address found on the AP unit BEFORE you install it for future reference.

4.2.1 Equipment Required

Table 4-1 lists the tools and equipment you will need to install Access Points.

Table 4-1 Required Tools and Equipment

Tools Required	Equipment Required
Compass and protractor	¼ inch grounding rod
Area map	Grounding clamp
Phillips-head screwdriver	Grounding wire
Flat-head screwdriver	CAT5 cable
Hammer or mallet	#6 wood screws

Power drill	Cable clips
1/8 inch drill bit	Anchor sleeves
¼ inch masonry drill bit	RJ-45 connectors (plastic bodied)
3/16 inch hex (Allen) wrench or 10 mm	
Bubble level or plumb line	
Adjustable wrench	
Wire snake (if routing cable through interior walls)	
Crimping tool (must be specifically matched for the RJ-45 connector used)	
Wire stripper	
Small wire cutters	
Punch down tool	

4.3 Access Points

Table 4-2 lists the main components of an Access Point.

Table 4-2 AP Components

Item	**Quantity**	**Notes**
Outdoor transceiver	1	See item 1 in Figure 4-2
Mounting pole	1	See item 2 in Figure 4-2
Pole clamp	1	See item 3 in Figure 4-2
M6 washer	2	See item 4 in Figure 4-2
M3 x M10 machine thread screws	2	See item 5 in Figure 4-2
Indoor junction box	1	white wall box
Power supply and cord	1	

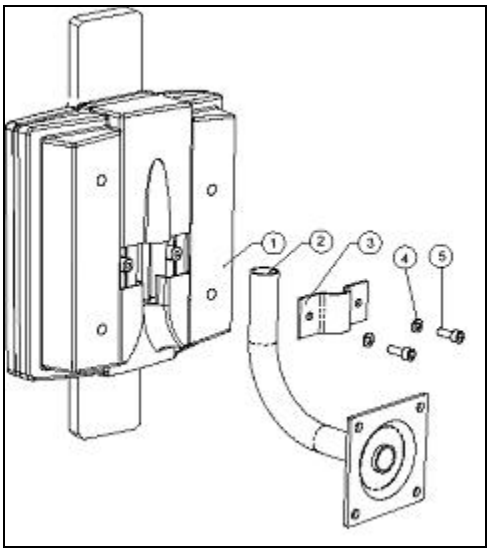

Figure 4-2 Outdoor Access Point Components

4.4 Installing the Equipment

This section explains how to install an AP transceiver onto a variety of surfaces, connect them to the indoor junction box, and ground the system. The most likely scenario is to install six transceivers on a single tower or mast 60 degrees apart.

4.4.1 Overview

Following are the installation steps you will perform:

1. Install the mounting poles.
2. Mount the outdoor transceivers.
3. Mount the access panel.
4. Ground the outdoor transceivers and access panel
5. Connect the interconnect cables.

4.4.2 Installing the Mounting Poles

First install the mounting poles, on which you will mount the outdoor transceivers.
Bear in mind the direction in which the transceivers will point.

Attention! The mounting pole must be mounted in a vertical position. Failure to do so may result in improper alignment of the outdoor transceiver. If you need to tilt the transceiver down to avoid self-interference in a cellular-style deployment, you should use an (optional) tilt bracket.

Warning! The mounting pole must be grounded. See Grounding The System in Section 5.6.3.

4.4.3 Installing On an Antenna Mast

1. Position the mounting pole on the antenna mast.
2. Insert the U-bolts around the mast and through the holes in the mounting pole. Install a washer and nut to each side of the threaded U-bolt and hand tighten. Repeat this step for the second U-bolt.
3. Tighten nuts equally until mounting pole is secure and cannot rotate.

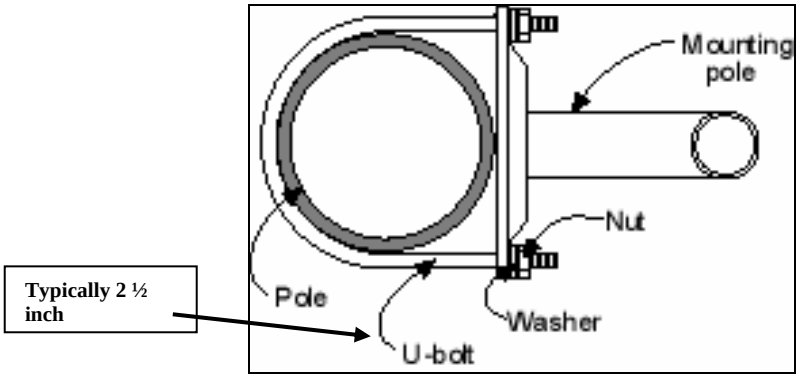

Figure 4-3 Mounting Pole Installed on Pole or Antenna Mast

4.4.4 Installing On Brick or Masonry

1. Place the mounting plate against the wall. Use a level or plumb line to set the mounting pole perpendicular to the ground.
2. Mark the hole locations.
3. Set the pole aside.
4. Drill ¼ inch holes at the marked locations. Drill the holes approximately ½ inch deep.
5. Insert the expansion shields into the drilled holes and tap them home.
6. Align the mounting pole with the drilled holes and fix with the lag bolts.

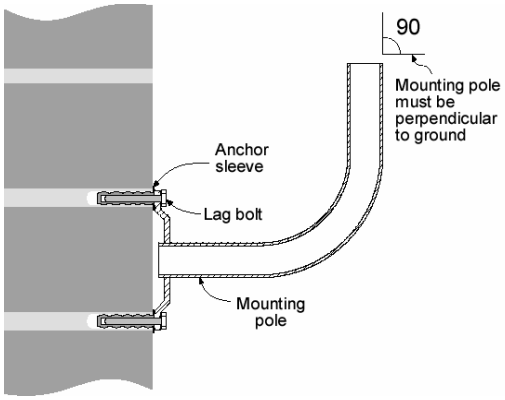

Figure 4-4 Mounting Pole Installation

4.4.5 Installing On a Wall with Wood Siding

1. Place the mounting plate against the wall.

2. Using a level, be sure that the mounting pole is perpendicular to the ground. You may need to use spacers, as shown in Figure 4-5.
3. Mark the hole locations for the drilled hole locations. Remove the mounting pole and set aside.
4. Drill 1/8-inch holes in the places marked.
5. Use #10 or #12 wood screws to secure the mounting pole to the wall and tighten.

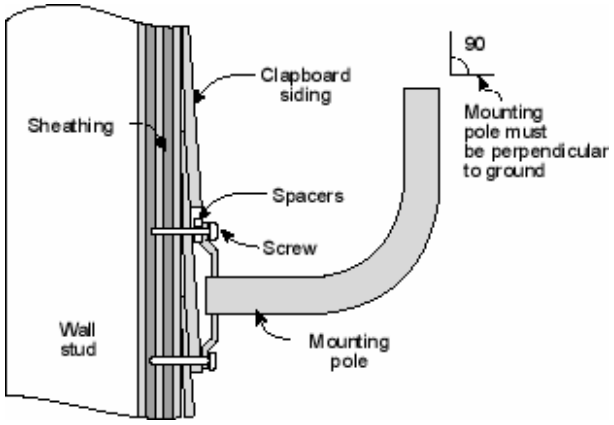

Figure 4-5 Mounting Pole on Clapboard Siding

4.5 Mounting the Outdoor Access Points

Now that you have installed the mounting pole, you are ready to install the Access Points onto the mounting poles. Reference Figures 4-6 through 4-9.

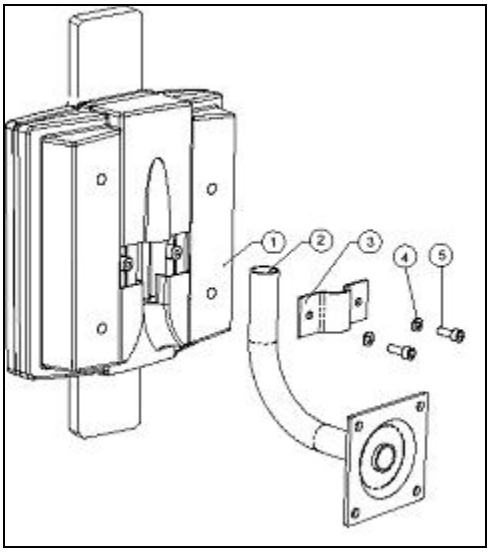

Figure 4-6 Mounting Parts for an Outdoor Access Point

1. Place the outdoor Access Point on the mounting pole.
2. Align the pole clamp with the mounting holes.
3. Insert the mounting screws and hand tighten.
4. Rotate the outdoor Access Point so it is pointing in the correct direction.

5. Tighten the mounting screws.

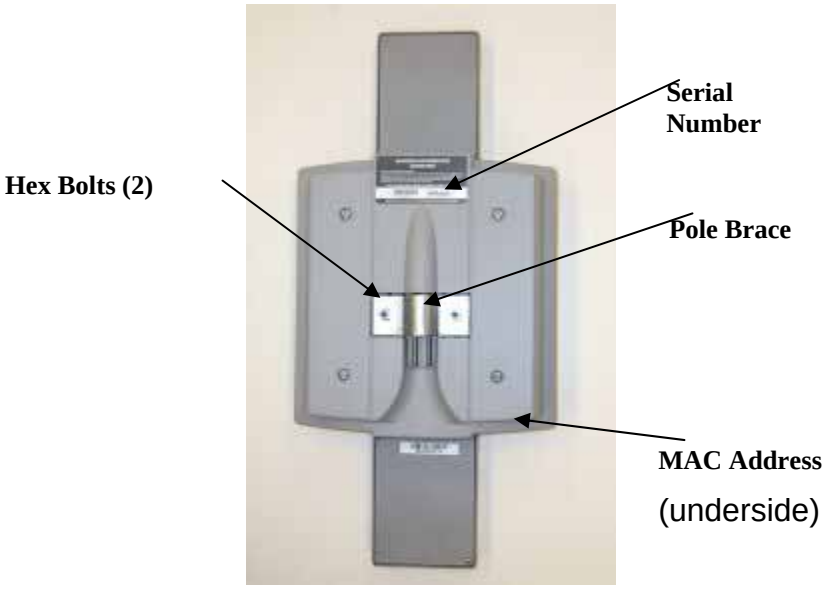

Figure 4-7 Access Point Rear View

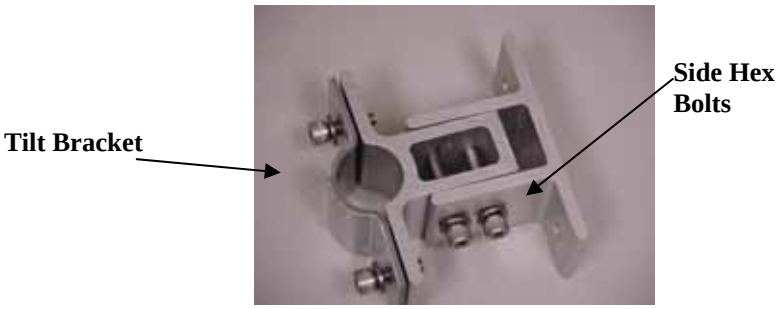

Figure 4-8 Tilt Bracket

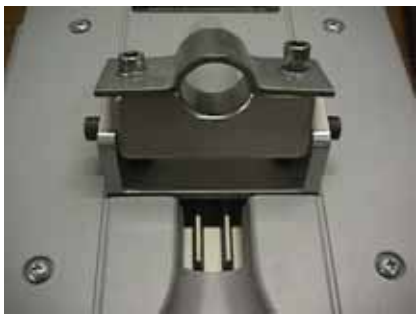

Figure 4-9 Access Point with Mounted Tilt Bracket

4.5.1 Installing the Access Panel

You will probably install the Access Panel in a rack, along with the anchor switch and other associated equipment. However, keep in mind that the access panel should be:

- Located where you can easily connect to a power supply.
- Close to the anchor switch.
- Accessible for service and troubleshooting.
- Protected from rain and extremes of temperature (it is designed for indoor use).

4.5.2 Installing the Interconnect Cables

For each interconnect cable, you will need to perform the following steps.

4.5.2.1 Route the Cables

1. Select where the cable will enter the building from the outside.
2. Determine the length of cable required. Allow three extra feet on each end to allow for strain relief, as well as any bends and turns.
3. Route the cable.

4.5.2.2 Install the Interconnect Cables (Transceiver End)

1. Remove the grommet and clamping plate from the outdoor transceiver by removing the two screws.

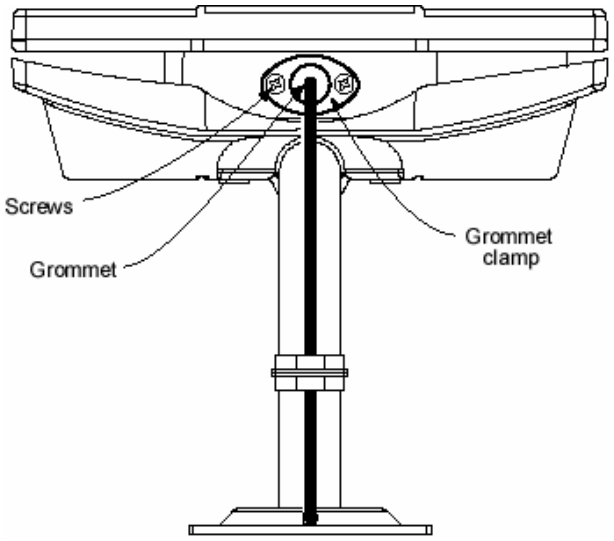

Figure 4-10 Grommet Location - Underside of Access Point

NOTE: The Grommet is made of a special conductive material used to complete the ground between the Access Point and Access Panel.

2. Insert the cable end through the grommet clamping plate (Figure 4-10)
3. Insert the cable end through the grommet. The tapered end of the grommet should be opposite the cable end.
4. Strip 1 inch of insulation off the cable end. Leave 3/8 inch of shielding showing and trim the wire ends flat ½ inch from there.
5. Using a piece of 1 inch squared tinned copper foil, wrap the foil around the shield/braid and sheath with the left edge aligned with the edge of the braid, as shown in Figures 4-11.

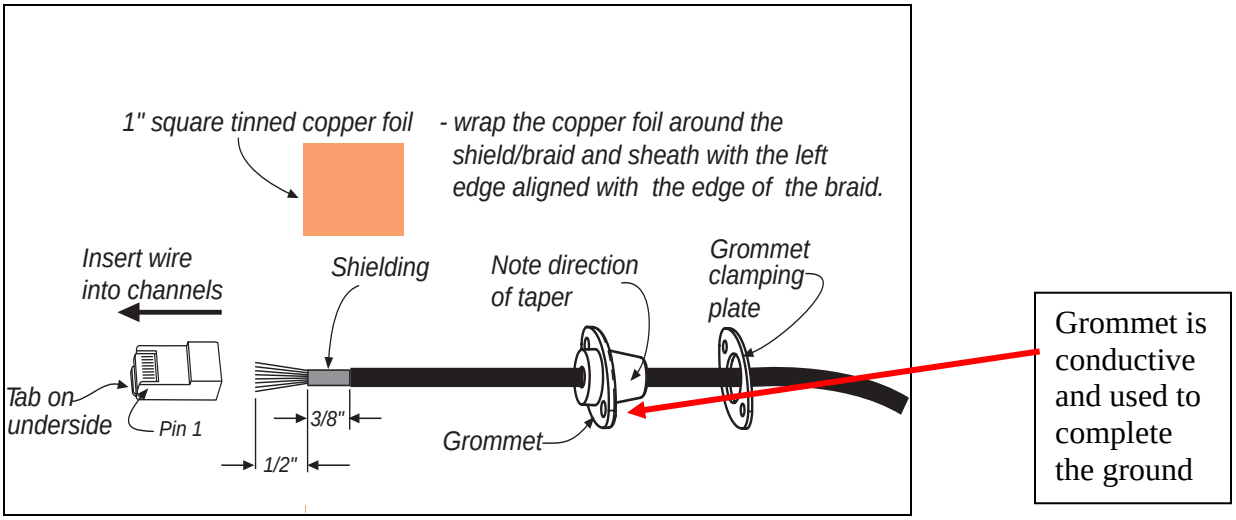

Figure 4-11 Outdoor Transceiver End of the Interconnect Cable with Cable Preparation

6. Separate the twisted pair wires and align by color code in the order listed in the following Table 4-3.

Table 4-3 Cable Legend for Interconnect Cable

Pin	Color Code
1	White / Orange
2	Orange
3	White / Green
4	Blue
5	White / Blue
6	Green
7	White / Brown
8	Brown

7. Using pin 1 as a reference, insert the individual wires into the channels of the RJ-45 connector. Each wire should penetrate the channels until flush with the connector end. The

copper foil tape should extend past the casing of the RJ-45 connector by approximately ½ inch.

8. When all wires are inserted into the channels in their correct order, use the crimping tool to permanently crimp the wires to the connector.

Attention! Carefully read the instructions for the crimping tool you are using. Use the correct crimping tool for the RJ-45 connector you are using. Incorrect installation of the RJ-45 connector may result in a bad connection between the outdoor transceiver and the indoor junction box.

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9. Insert the RJ-45 connector into the receptacle located underneath the outdoor AP. Make sure that the connector tab engages the slot in the receptacle.
10. Slide the grommet up the cable and press it into the bottom of the outdoor AP.
11. Slide the grommet clamp up the cable and align the holes with the mounting holes on the bottom of the outdoor transceiver.
12. Insert the two screws in the mounting holes and tighten until the grommet has a slight bulge. Be sure to tighten both screws equally so that the grommet is seated correctly.
13. Secure the interconnect cable to the mounting pole with the cable clip as shown in Figure 5-13.

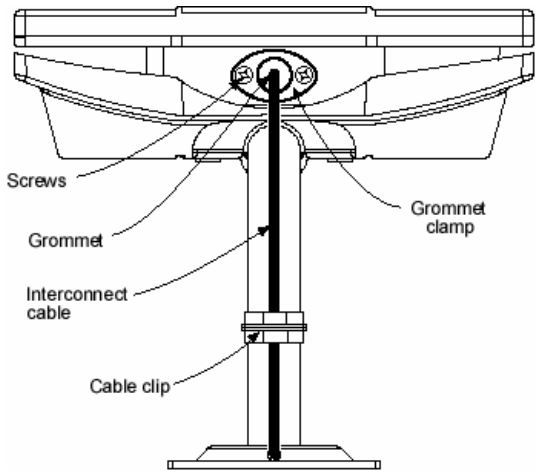

Figure 4-12 Interconnect Cable Installation to Outdoor Access Point - Bottom View

4.5.2.3 Installing the Interconnect Cables to Junction Box

Note that the junction box should still be disassembled and not screwed to the wall at this point.

1. Strip 2 inches of insulation off the junction box end of the interconnect cable.

Attention! Don't cut off the shield from the cable – you will need it to ground the system later.

---

2. Insert the cable end through the notched out section of the junction box.

3. Reinstall the PCB into the junction box using the two screws, allowing enough of the interconnect cable to be able to reach the punch down block and wrap around the mounts of the cover plate for strain relief.
4. Using Figure 4-13 as a guide, use the 110 punch down tool to punch down each wire into the slot on the punch down block.

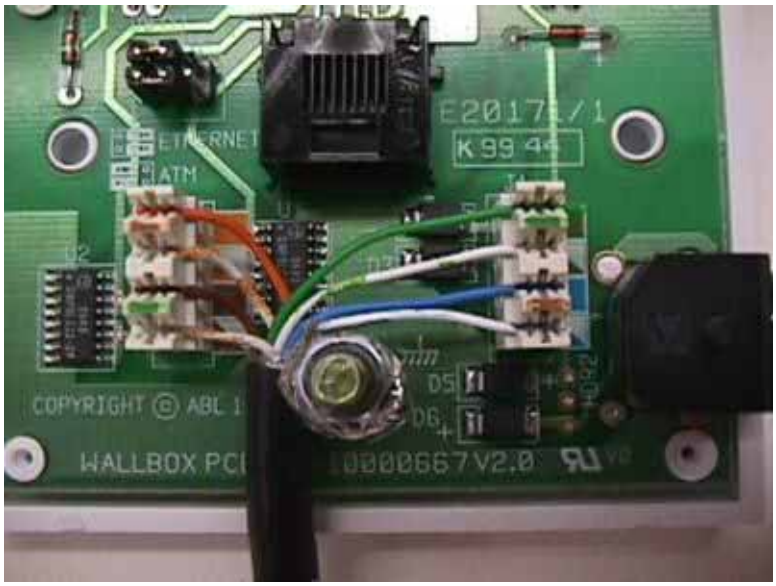

Figure 4-13 Interconnect Cable Connections to Indoor Junction Box

5. Snip off excess wire ends, if necessary.

Attention! Avoid excessive wire loops when connecting the wire to the punch down block.

For now, set the junction box to one side leaving it disassembled. You will reassemble it and mount it on the wall when you have grounded the system.

4.5.2.4 Mark the Access Point Cables

Attention! Step 1 is important, and will enable the network installer to configure the system easily.

1. Mark the cable with a permanent label and make a note so that the network installer knows which outdoor AP transceiver is connected to which port on the Access Panel junction box.

4.6 Grounding the System

The AB-Access System must be properly grounded in order to protect it and the structure it is installed on from lightning damage. This requires:

1. Grounding all the outdoor transceivers as shown in Figure 4-12.
2. Grounding the Access Panel to the rack.

4.6.1 Grounding the Outdoor Access Points

1. Place the grounding rod so as to allow for the shortest possible path from the grounding cable to the outdoor Access Points.
2. Drive the grounding rod into the ground at least eight inches from the ground surface.
3. Attach a grounding clamp to the grounding rod. You will use this clamp to attach grounding wires for both the outdoor transceiver and indoor junction box, reference Figure 4-14.

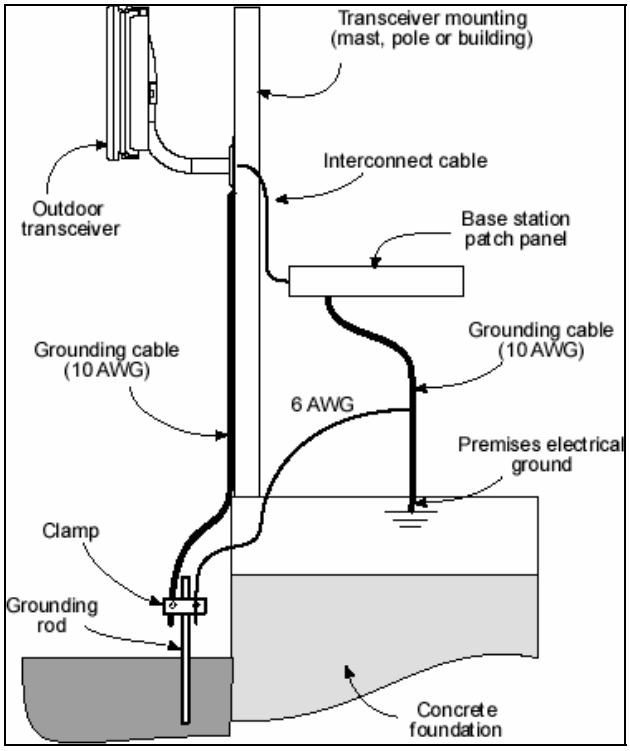

Figure 4-14 Ground Connections to Access Point Transceiver

Attention! The grounding wire should be long enough to reach from the mounting pole to the grounding rod with 3 to 6 extra feet allowed for strain relief.

4. Connect a ground lug to one end of the grounding wire.
5. Remove one of the lower mounting screws of the mounting pole. Insert a screw through the grounding lug terminal and re-install it to the mounting pole.
6. Attach the grounding wire to the clamp on the grounding rod, reference Figure 4-15. If necessary, use wire staples to secure the grounding wire to the outside wall.

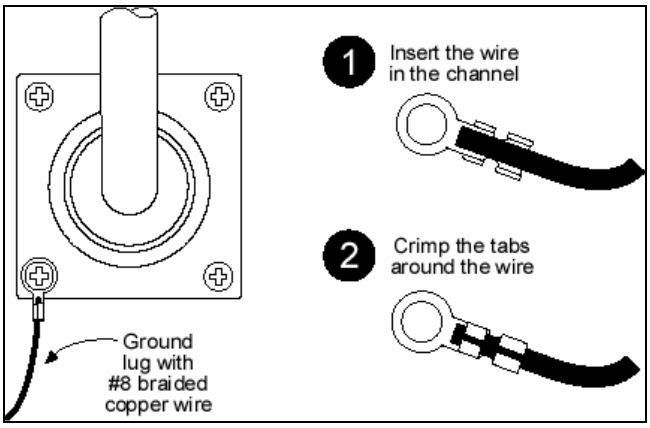

Figure 4-15 Mounting Pole with Ground Lug

7. Install a grounding wire from the junction box to the grounding rod.

4.6.2 Grounding the Indoor Junction Box

To ground the indoor junction box, you will need to install a grounding wire from the junction box to the grounding rod. The wire should be long enough to reach from the junction box to the grounding rod with 3 to 6 extra feet to allow for strain relief.

1. Feed the grounding cable through the broken out section of the wall cover (alongside the interconnect cable).
2. Connect a ground lug to the grounding cable by crimping the lug to the wire, as shown in Figure 4-16.
3. Remove the hex nut on the grounding post, as shown in Figure 4-16.
4. Install the grounding lug terminal onto the grounding post.
5. Attach the wire shield of the interconnect cable to the ground post. You may need to crimp or solder an extra length of wire to the shield in order to attach it to the grounding post.
6. Re-install the hex nut to the grounding post and tighten.
7. Attach the grounding wire to the clamp on the grounding rod.
8. Use the provided small wire tie to firmly attach the interconnect cable to the ground lug. This will provide strain relief for the cable and prevent the data and power leads from being disturbed during installation.

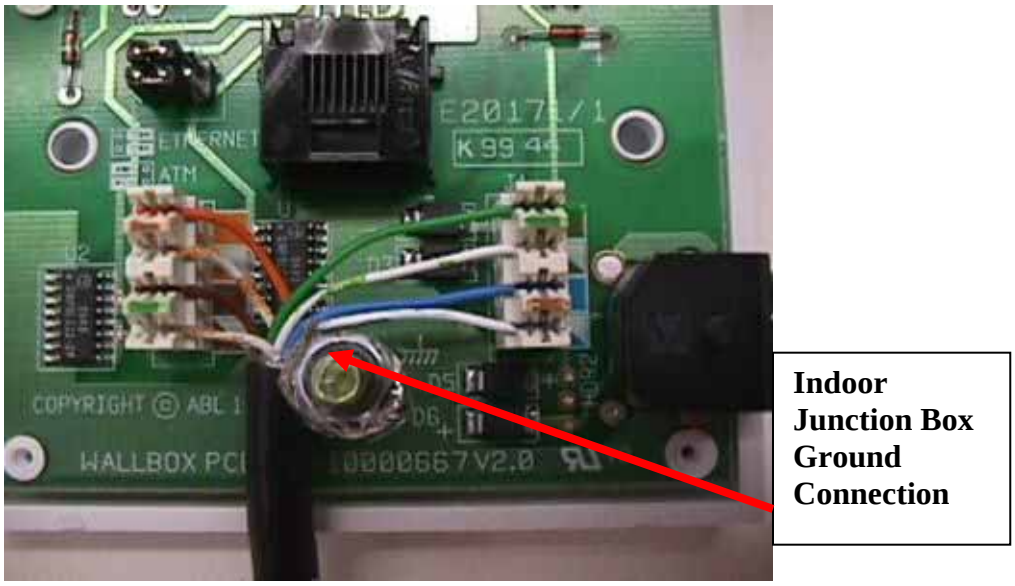

Figure 4-16 Indoor Junction Box Ground Connection

4.6.3 Assembling and Mounting the Junction Box

1. Place the junction box wall mount over the drilled holes.
2. Insert the screws and tighten.
3. Reinstall the faceplate onto the junction box using the two screws.

Section 5

5 AB-Extender Installation

5.1 Before You Start

This section lists the information you will need to install an AB-Extender unit.

5.2 Information Required

Before you perform the installation, a site survey should have been performed by the service provider. From this, you will need to know:

- Number of EXs to install
- Where the outdoor transceivers will be mounted (antenna mast, pole or building)
- Heights at which the outdoor transceivers will be mounted.
- Transceiver directional information (azimuth and elevation).

IMPORTANT – Be sure to record the MAC address found on the EX unit BEFORE you install it for future reference.

5.2.1 Equipment Required

Table 5-1 lists the tools and equipment you will need to install AB-Extender units.

Table 5-1 Required Tools and Equipment

Tools Required	Equipment Required
Compass and protractor	¼ inch grounding rod
Area map	Grounding clamp
Phillips-head screwdriver	Grounding wire
Flat-head screwdriver	CAT5 cable
Hammer or mallet	#6 wood screws
Power drill	Cable clips
1/8 inch drill bit	Anchor sleeves
¼ inch masonry drill bit	RJ-45 connectors (plastic bodied)
3/16 inch, 4mm hex (Allen) wrench or 10 mm	
Bubble level or plumb line	
Adjustable wrench	
Wire snake (if routing cable through interior walls)	
Crimping tool (must be specifically matched for the	

RJ-45 connector used)	
Wire stripper	
Small wire cutters	
Punch down tool	

5.3 AB-Extender

Table 5-2 lists the main components of an AB-Extender.

Table 5-2 EX Components

Item	Quantity	Notes
Outdoor transceiver	1	
Unit/pole bracket	1	Blue and Grey bracket in Figure 5-1
M10 U Bolts	2	Green bolts in Figure 5-1
M10 Washers	4	
M10 Nyloc Nuts	4	Yellow nuts in Figure 5-1
Grommet Kit	1	includes grommet, clamp, and screws
Indoor junction box	1	White wallbox
Power supply and cord	1	

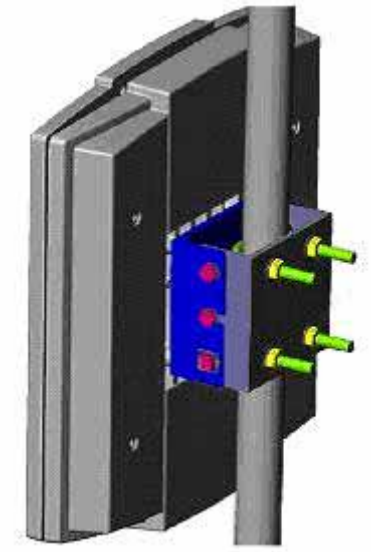

Figure 5-1 Outdoor AB-Extender Components

5.4 Installing the Equipment

This section explains how to install an EX transceiver onto a variety of surfaces, connect them to the indoor junction box, and ground the system.

5.4.1 Overview

Following are the installation steps you will perform:

1. Install the mounting poles.
2. Mount the outdoor transceivers.
3. Mount the access panel.
4. Ground the outdoor transceivers and access panel
5. Connect the interconnect cables.

5.4.2 Installing the Mounting Poles

First install the mounting poles, on which you will mount the outdoor transceivers.
Bear in mind the direction in which the transceivers will point.

Attention! The mounting pole must be mounted in a vertical position. Failure to do so may result in improper alignment of the outdoor transceiver. If you need to tilt the transceiver down to avoid self-interference, you should use an (optional) tilt bracket.

Warning! The mounting pole must be grounded. See Grounding The System in Section 4.5.3.

5.4.3 Installing On an Antenna Mast

1. Position the mounting pole on the antenna mast.
2. Insert the U-bolts around the mast and through the holes in the mounting pole. Install a washer and nut to each side of the threaded U-bolt and hand tighten. Repeat this step for the second U-bolt.
3. Tighten nuts equally until mounting pole is secure and cannot rotate.

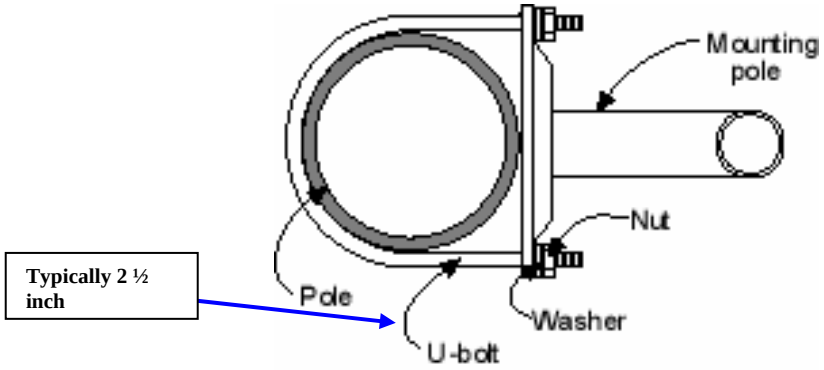

Figure 5-2 Mounting Pole Installed on Pole or Antenna Mast

5.4.4 Installing On Brick or Masonry

1. Place the mounting plate against the wall. Use a level or plumb line to set the mounting pole perpendicular to the ground.
2. Mark the hole locations.

3. Set the pole aside.
4. Drill ¼ inch holes at the marked locations. Drill the holes approximately ½ inch deep.
5. Insert the expansion shields into the drilled holes and tap them home.
6. Align the mounting pole with the drilled holes and fix with the lag bolts.

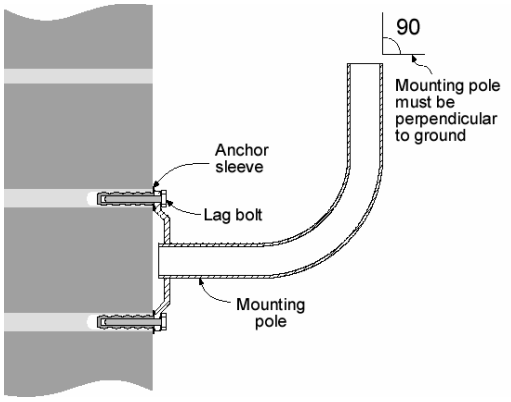

Figure 5-3 Mounting Pole Installation

5.4.5 Installing On a Wall with Wood Siding

1. Place the mounting plate against the wall.
2. Using a level, be sure that the mounting pole is perpendicular to the ground. You may need to use spacers, as shown in Figure 5-4.
3. Mark the hole locations for the drilled hole locations. Remove the mounting pole and set aside.
4. Drill 1/8-inch holes in the places marked.
5. Use #10 or #12 wood screws to secure the mounting pole to the wall and tighten.

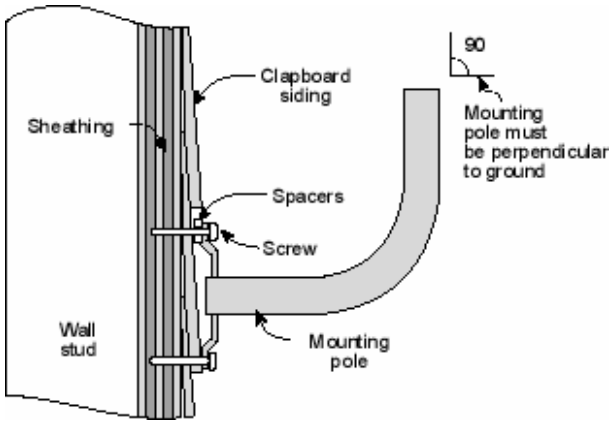

Figure 5-4 Mounting Pole on Clapboard Siding

5.5 Mounting the Outdoor AB-Extender

Now that you have installed the mounting pole, you are ready to install the AB-Extender onto the mounting poles. Reference Figures 5-5 through 5-8.

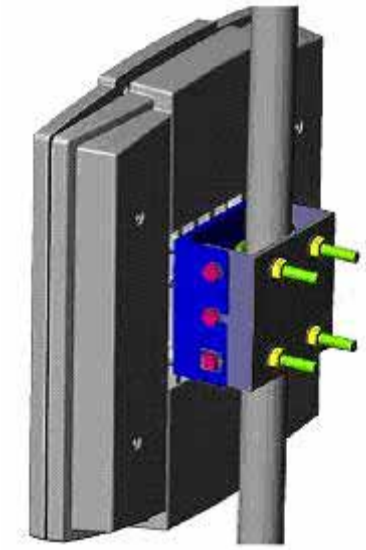

Figure 5-5 Mounting Parts for an Outdoor AB-Extender

1. Place the outdoor AB-Extender on the mounting pole.
2. Align the pole clamp with the mounting holes.
3. Insert the mounting screws and hand tighten.
4. Rotate the outdoor AB-Extender so it is pointing in the correct direction.
5. Tighten the mounting screws.

Figure 5-6 AB-Extender Rear View

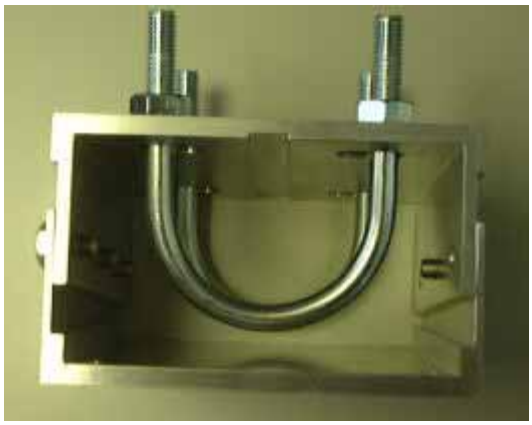

Figure 5-7 Tilt Bracket

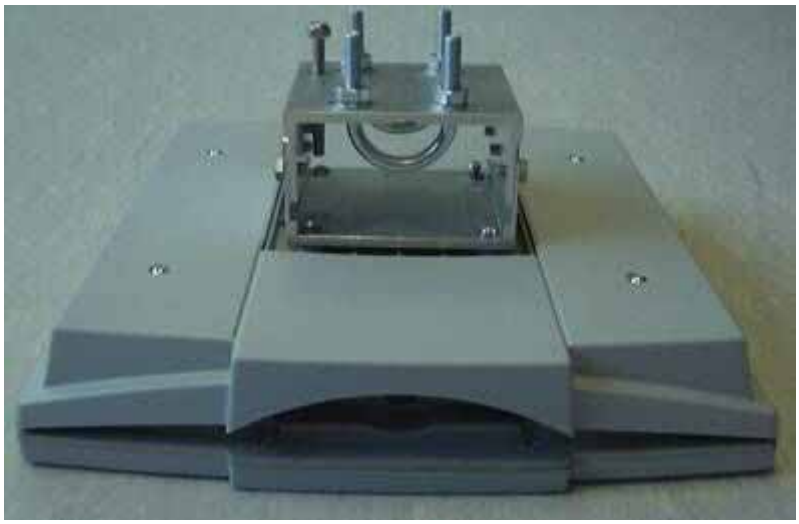

Figure 5-8 AB-Extender with Mounted Tilt Bracket

5.5.1 Installing the Interconnect Cables

For each interconnect cable, you will need to perform the following steps.

5.5.1.1 Route the Cables

1. Select where the cable will enter the building from the outside.
2. Determine the length of cable required. Allow three extra feet on each end to allow for strain relief, as well as any bends and turns.
3. Route the cable.

5.5.1.2 Install the Interconnect Cables (Transceiver End)

1. Remove the grommet and clamping plate from the outdoor transceiver by removing the two screws.

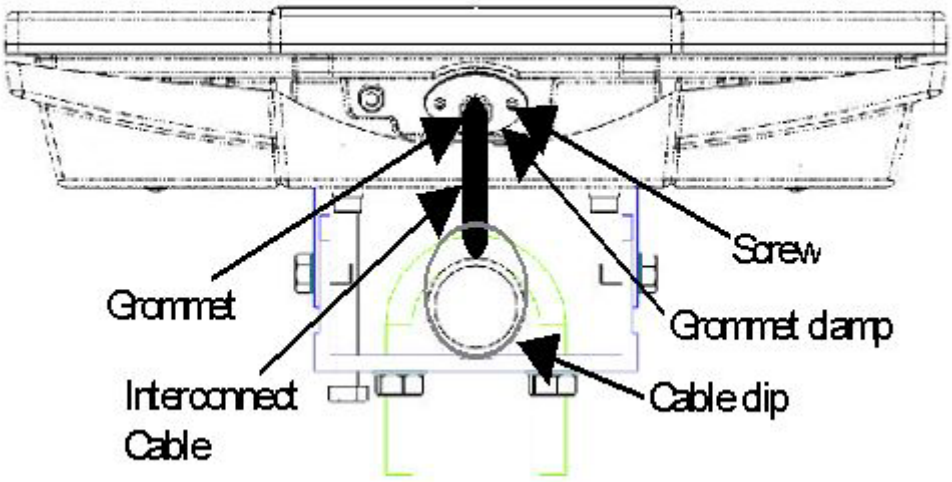

Figure 5-9 Grommet Location - Underside of AB-Extender

NOTE: The Grommet is made of a special conductive material used to complete the ground between the AB-Extender and Access Panel.

2. Insert the cable end through the grommet clamping plate (Figure 5-10)
3. Insert the cable end through the grommet. The tapered end of the grommet should be opposite the cable end.
4. Strip 1 inch of insulation off the cable end. Leave 3/8 inch of shielding showing and trim the wire ends flat ½ inch from there.
5. Using a piece of 1 inch squared tinned copper foil, wrap the foil around the shield/braid and sheath with the left edge aligned with the edge of the braid, as shown in the following Figure 5-10.

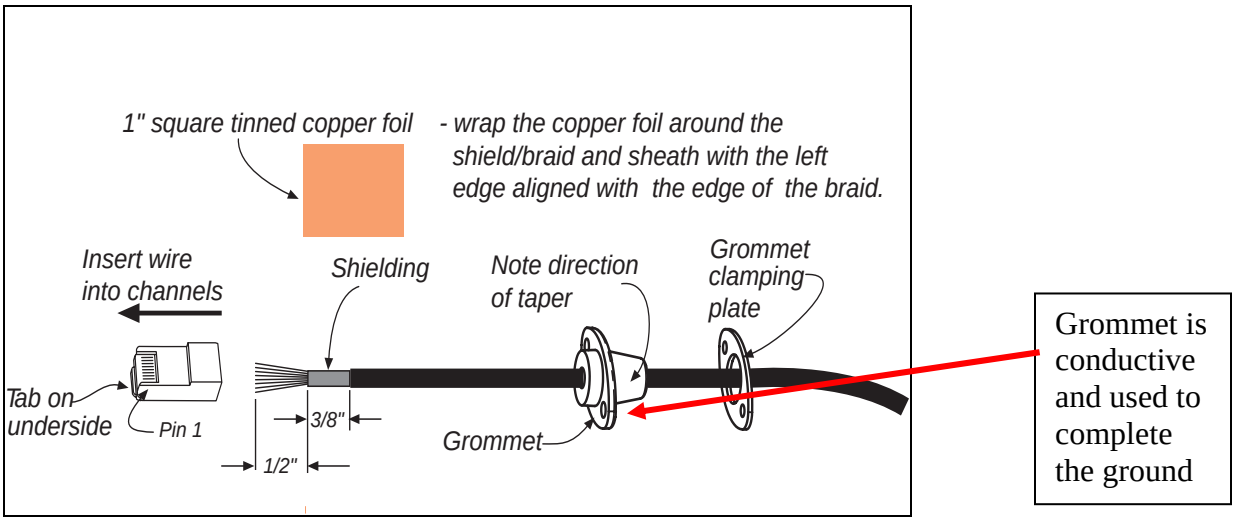

Figure 5-10 Outdoor Transceiver End of the Interconnect Cable with Cable Preparation

6. Separate the twisted pair wires and align by color code in the order listed in the following Table 5-3.

Table 5-3 Cable Legend for Interconnect Cable

Pin	Color Code
1	White / Orange
2	Orange
3	White / Green
4	Blue
5	White / Blue
6	Green
7	White / Brown
8	Brown

7. Using pin 1 as a reference, insert the individual wires into the channels of the RJ-45 connector. Each wire should penetrate the channels until flush with the connector end. The copper foil tape should extend past the casing of the RJ-45 connector by approximately ½ inch.
8. When all wires are inserted into the channels in their correct order, use the crimping tool to permanently crimp the wires to the connector.

Attention! Carefully read the instructions for the crimping tool you are using. Use the correct crimping tool for the RJ-45 connector you are using. Incorrect installation of the RJ-45 connector may result in a bad connection between the outdoor transceiver and the indoor junction box.

9. Insert the RJ-45 connector into the receptacle located underneath the outdoor EX. Make sure that the connector tab engages the slot in the receptacle.

10. Slide the grommet up the cable and press it into the bottom of the outdoor EX.
11. Slide the grommet clamp up the cable and align the holes with the mounting holes on the bottom of the outdoor transceiver.
12. Insert the two screws in the mounting holes and tighten until the grommet has a slight bulge. Be sure to tighten both screws equally so that the grommet is seated correctly.
13. Secure the interconnect cable to the mounting pole with the cable clip as shown in Figure 5-11.

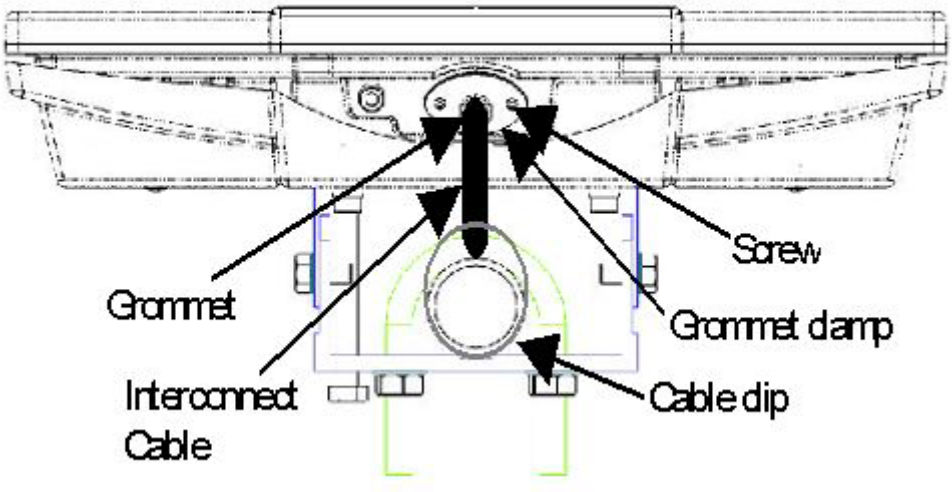

Figure 5-11 Interconnect Cable Installation to Outdoor AB-Extender - Bottom View

5.5.1.3 Installing The Interconnect Cables to Junction Box

Note that the junction box should still be disassembled and not screwed to the wall at this point.

6. Strip 2 inches of insulation off the junction box end of the interconnect cable.

Attention! Don't cut off the shield from the cable – you will need it to ground the system later.

7. Insert the cable end through the notched out section of the junction box.
8. Reinstall the PCB into the junction box using the two screws, allowing enough of the interconnect cable to be able to reach the punch down block and wrap around the mounts of the cover plate for strain relief.
9. Using Figure 5-12 as a guide, use the 110 punch down tool to punch down each wire into the slot on the punch down block.

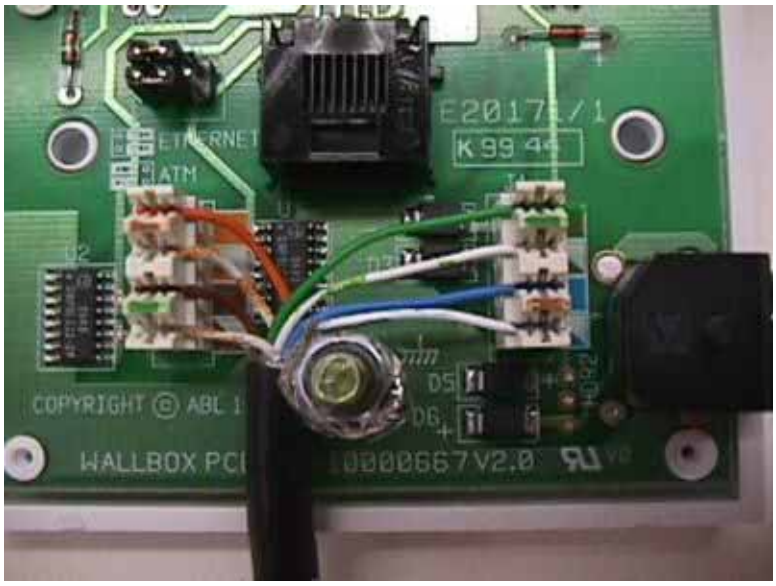

Figure 5-12 Interconnect Cable Connections to Indoor Junction Box

10. Snip off excess wire ends, if necessary.

Attention! Avoid excessive wire loops when connecting the wire to the punch down block.

For now, set the junction box to one side leaving it disassembled. You will reassemble it and mount it on the wall when you have grounded the system.

5.5.1.4 Mark the AB-Extender Cables

Attention! Step 1 is important, and will enable the network installer to configure the system easily.

1. Mark the cable with a permanent label and make a note so that the network installer knows which outdoor EX transceiver is connected to which port on the Access Panel junction box.

5.6 Grounding the System

The AB-Access System must be properly grounded in order to protect it and the structure it is installed on from lightning damage. This requires:

1. Grounding all the outdoor transceivers as shown in Figure 5-11.
2. Grounding the Access Panel to the rack.

5.6.1 Grounding the Outdoor AB-Extender

1. Place the grounding rod so as to allow for the shortest possible path from the grounding cable to the outdoor AB-Extender.
2. Drive the grounding rod into the ground at least eight inches from the ground surface.
3. Attach a grounding clamp to the grounding rod. You will use this clamp to attach grounding wires for both the outdoor transceiver and indoor junction box, reference Figure 5-13.

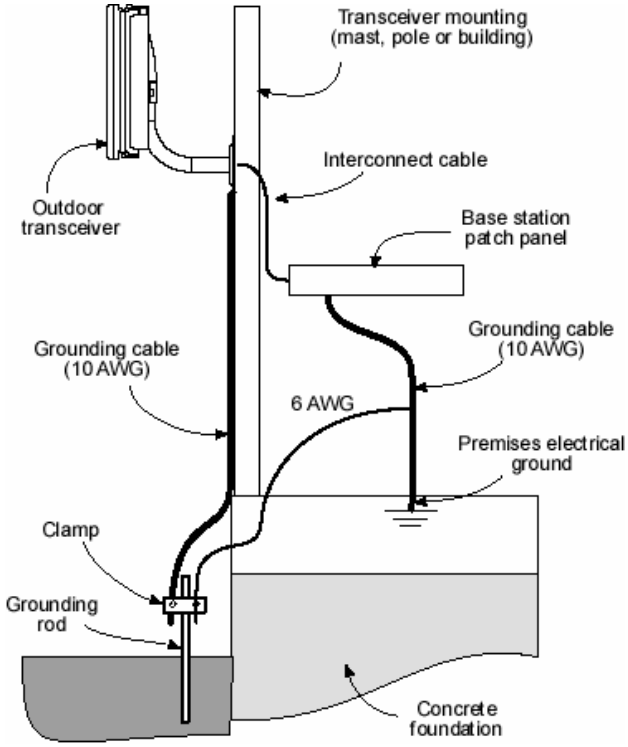

Figure 5-13 Ground Connections to AB-Extender Transceiver

Attention! The grounding wire should be long enough to reach from the mounting pole to the grounding rod with 3 to 6 extra feet allowed for strain relief.

4. Connect a ground lug to one end of the grounding wire.
5. Remove one of the lower mounting screws of the mounting pole. Insert a screw through the grounding lug terminal and re-install it to the mounting pole.
6. Attach the grounding wire to the clamp on the grounding rod, reference Figure 5-14. If necessary, use wire staples to secure the grounding wire to the outside wall.

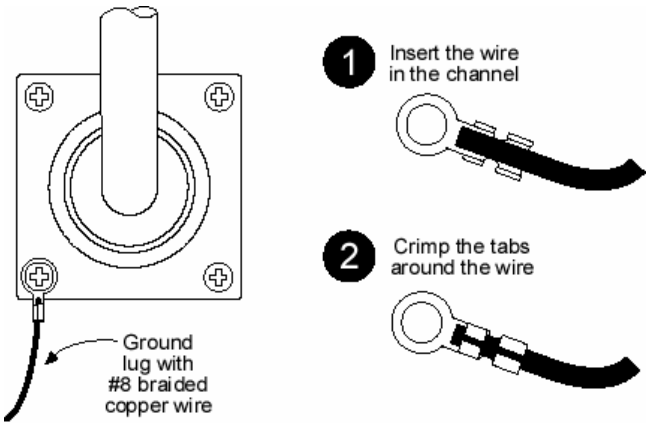

Figure 5-14 Mounting Pole with Ground Lug

7. Install a grounding wire from the junction box to the grounding rod.

5.6.2 Grounding the Indoor Junction Box

To ground the indoor junction box, you will need to install a grounding wire from the junction box to the grounding rod. The wire should be long enough to reach from the junction box to the grounding rod with 3 to 6 extra feet to allow for strain relief.

9. Feed the grounding cable through the broken out section of the wall cover (alongside the interconnect cable).
10. Connect a ground lug to the grounding cable by crimping the lug to the wire, as shown in Figure 5-15.
11. Remove the hex nut on the grounding post, as shown in Figure 5-15.
12. Install the grounding lug terminal onto the grounding post.
13. Attach the wire shield of the interconnect cable to the ground post. You may need to crimp or solder an extra length of wire to the shield in order to attach it to the grounding post.
14. Re-install the hex nut to the grounding post and tighten.
15. Attach the grounding wire to the clamp on the grounding rod.
16. Use the provided small wire tie to firmly attach the interconnect cable to the ground lug. This will provide strain relief for the cable and prevent the data and power leads from being disturbed during installation.

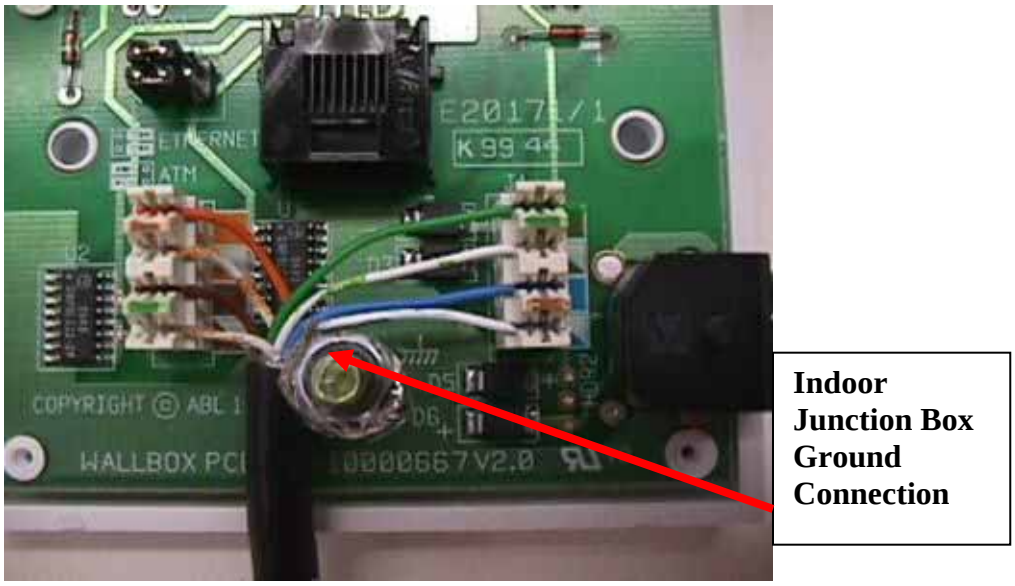

Figure 5-15 Indoor Junction Box Ground Connection

5.6.3 Assembling and Mounting the Junction Box

4. Place the junction box wall mount over the drilled holes.
5. Insert the screws and tighten.
6. Reinstall the faceplate onto the junction box using the two screws.

Section 6

6 Subscriber Unit Installation

6.1 Installation Overview

The Subscriber Unit installation steps are as follows:

1. Install the mounting pole and mount the outdoor Subscriber Unit (see Figure 6-1).
2. Install the indoor junction box.
3. Route the interconnect cable. Connect it to the outdoor Subscriber Unit and the indoor junction box.
4. Ground both the outdoor Subscriber Unit and indoor junction box.
5. Perform initial startup and testing.

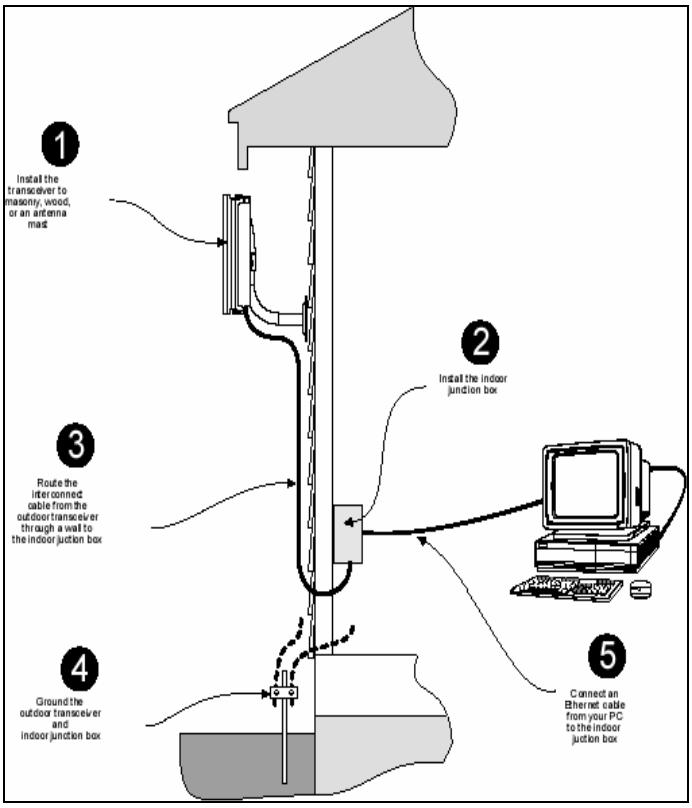

Figure 6-1 AB-Access Subscriber Unit Installation Overview

6.2 Installing Mounting Pole

Once you have selected a site for installing the outdoor transceiver/Subscriber Unit, determine what type of surface you will use for your installation. Select from the following list:

- Installing on a Brick Or Masonry Wall
- Installing on a Wall With Wood Siding

- Installing on an Antenna Mast

The following sections describe the installation procedure for each of the above.

6.2.1 Installing on a Brick or Masonry Wall

Table 6-1 describes the tools and equipment needed when installing on a brick or masonry wall.

Table 6-1 Required Tools And Equipment

Tools	Equipment	Quantity
Power drill	Mounting pole	1
¼ inch masonry drill bit	Anchor sleeves	4
A bubble level or plumb line	Lag bolts	4
Phillips head screwdriver or power drill		1
Hammer or mallet		1
Adjustable wrench		1

1. Place the mounting plate against the wall.
2. Using a level, be sure that the mounting pole is perpendicular to the ground.
3. Using a pencil, mark the hole locations for the drilled hole locations (Figure 6-2).

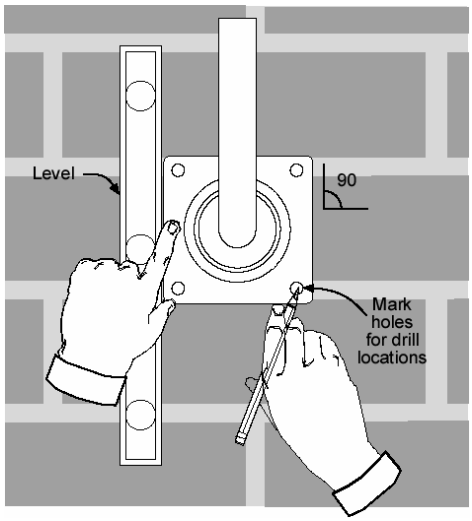

Figure 6-2 Mounting Pole Drill Locations

4. Set the mounting pole aside.
5. Using a ¼ inch masonry drill bit, drill holes approximately ½ inch deep at the marked locations.
6. Insert the anchor sleeves into the drilled holes. Using a small hammer, gently tap the anchor sleeves into the masonry until tight. Check that the anchor sleeves are flush with the wall. (Figure 6-3)
7. Align the mounting pole with the drilled holes.

8. Insert a lag bolt in each of the holes and hand tighten.
9. Tighten all lag bolts with a wrench, being careful not to over tighten.

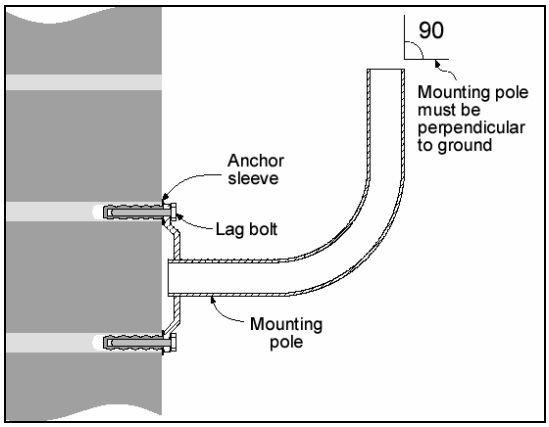

Figure 6-3 Mounting Pole Installation Using Expansion Sleeves and Lag Bolts

Attention! The mounting pole must be mounted in a vertical position. Failure to do so may result in improper alignment of the outdoor transceiver.

IMPORTANT – Before you install the SU, be sure to record the MAC address found on the SU for future reference.

6.2.2 Installing on a Wall with Wood Siding

Table 6-2 describes the tools and equipment needed when installing on a wall with wood siding.

Table 6-2 Required Tools and Equipment

Tools	Equipment	Quantity
Power Drill	Mounting pole	1
1/8 inch drill bit	#6 wood screws	4
Bubble level or plumb line	Spacers	1
Phillips head screwdriver or power drill		1

1. Place the mounting plate against the wall. Using a level, be sure that the mounting pole is perpendicular to the ground.

This procedure is similar to that shown previously in Figure 6-2.
Note that when mounting on clapboard siding, you may need to use spacers to make sure that the mounting pole is perpendicular, as shown in Figure 6-4.

Attention! The mounting pole must be in a vertical position for proper alignment of the outdoor transceiver.

2. Mark the locations for the drilled holes.

3. Remove the mounting pole and set it aside.
4. Drill 1/8 inch diameter in the places marked.
5. Use #10 or #12 wood screws to secure the mounting pole to the wall and hand tighten.
6. Using the level, check that the mounting plate is perpendicular to the ground. Readjust if necessary (you might need to add or remove spacers) and then tighten all screws with a screwdriver or power drill, being careful not to over tighten.

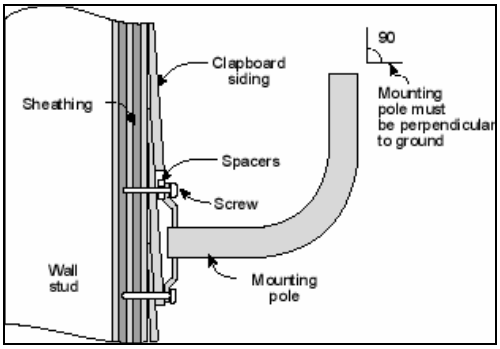

Figure 6-4 Mounting Pole on Clapboard Siding

6.2.3 Installing on an Antenna Mast

Table 6-3 describes the tools and equipment needed when installing on an antenna mast.

Table 6-3 Required Tools and Equipment

Tools	Equipment	Quantity
Adjustable wrench	U-bolts	2
	Washers	4
	Hex nuts	4

1. Position the mounting pole on the pole or antenna mast (Figure 6-5).
2. Insert the U-bolts around the pole and through the holes in the mounting pole.
3. Install a washer and nut to each side of the threaded U-bolts and hand tighten.

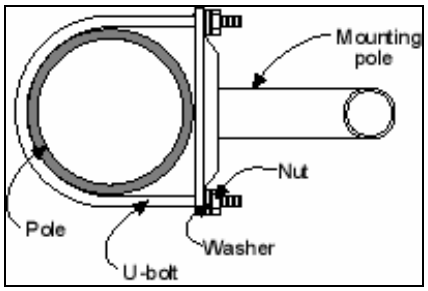

Figure 6-5 Mounting Pole Installed on Pole or Antenna Mast

4. Tighten nuts equally until mounting pole is secure and cannot rotate.

Attention! The mounting pole must be mounted in a vertical position. Failure to do so may result in improper alignment of the outdoor transceiver.

Warning! The mounting pole must be grounded. See Grounding the System in Section 6.6.

6.3 Installing the Outdoor Subscriber Unit

Now that you have installed the mounting pole, you are now ready to install the outdoor Subscriber Unit (SU) to the mounting pole. Table 6-4 describes the tools and equipment needed to install the SU.

Table 6-4 Required Tools and Equipment

Tools	Equipment	Quantity
Phillips-head screwdriver	Pole clamp	2
3/16” hex wrench	Washers	2
	Mounting screws	2

1. Loosen the mounting screws and place the outdoor Subscriber Unit on the mounting pole, as shown in Figure 6-6.
2. Hand tighten the mounting screws.
3. Rotate the outdoor transceiver in the direction of the Access Point.
4. Tighten the mounting screws.

Figure 6-6 Outdoor Subscriber Unit Mounted on Wall

6.4 Preparing the Indoor Junction Box

This section explains how to prepare the indoor junction box for installation. You will drill the mounting holes, but leave the box uninstalled, as it is easier to route the interconnect cable. Table 6-5 describes the tools and equipment you will need.

Table 6-5 Required Tools and Equipment

Tools Required	Equipment Required	Quantity
Phillips-head screwdriver	Screws	2
Flat head screwdriver	Wallboard inserts	2
Power drill		1
1/8 inch drill bit		1

1. Select a location for the junction box. This should be:
   - Somewhere you can easily connect to your PC and a power outlet.
   - Somewhere that is accessible for service and troubleshooting (not too close to the floor).
2. Remove the two screws which attach the junction box faceplate to the wall mount.
3. Set aside the faceplate with PCB and jack.

Attention! Be careful not to damage the two LEDs when removing the PCB.

4. On the Wall Mount portion of the Wall Box, use a flat head screwdriver, or a pair of thin-nosed pliers, to break out the pre-scored section of casing wall along the bottom edge of the junction box (see Figure 6-7). This is where later on you will route the interconnect cable.

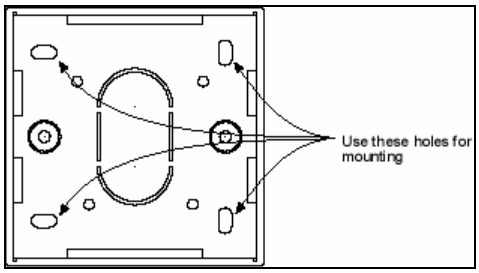

Figure 6-7 Junction Box Wall Mount (Face Plate and PCB Removed)

5. Using the wall plate as a template, mark the mounting hole locations, as shown in Figure 6-7.
6. Drill 1/8 inch diameter holes at the marked locations.
7. Insert the wallboard inserts.

For now, set the junction box to one side, leaving it disassembled. You will reassemble it and mount it on the wall when you have prepared and routed the interconnect cable and grounded the system.

6.5 Installing the Interconnect Cable

6.5.1 Routing the Interconnect Cable

Now that you have installed the outdoor Subscriber Unit and indoor junction box, you are ready to route the interconnect cable.

1. Select where the cable will enter the building from the outside (Figure 6-8).

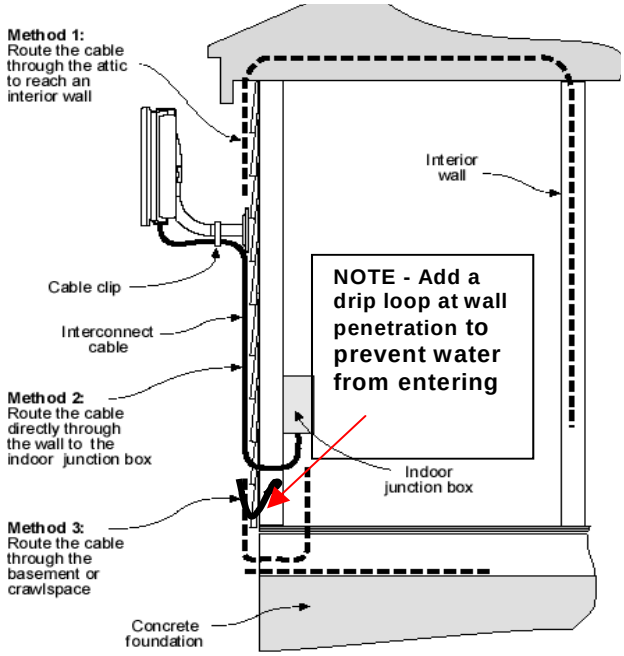

Figure 6-8 Interconnect Cable Routing Solutions

2. Once you have chosen the route, determine the length of cable required. Allow three extra feet on each end to allow for strain relief as well as any bends and turns.
3. Install the cable, leaving the ends free and ready to fit the RJ-45 connector (transceiver end), and install to the indoor junction box.
4. Remember to form a drip loop on the exterior of the building where the cable enters the penetration. This will help prevent water from entering.

6.5.2 Preparing the Interconnect Cable

Table 6-6 shows the tools you need to install an RJ-45 connector on the outdoor subscriber end of the interconnect cable.

Table 6-6 Required Tools and Equipment

Tools	Equipment	Quantity
Crimping tool (specific to RJ-45 used)	RJ-45 connector (metal bodied)	1
Wire stripper		
Small wire cutters		

1. Remove the grommet (Figure 6-9) and clamping plate from the Subscriber Unit by undoing the two screws. Be careful not to lose them if you are working on a ladder.

NOTE: The Grommet is made of a special conductive material used to complete the ground between the Subscriber Unit and indoor junction box.

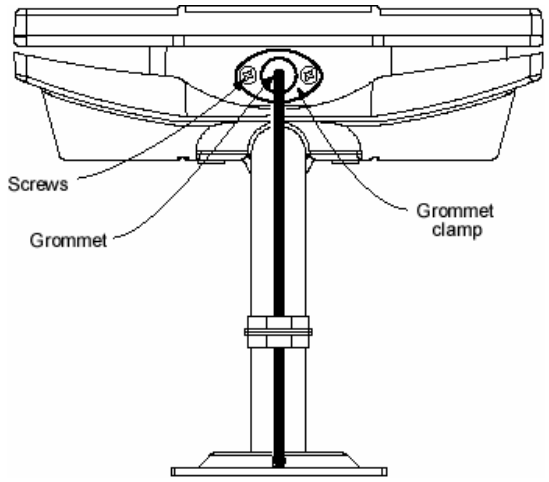

Figure 6-9 Grommet Location -- Underside of Subscriber Unit

2. Insert the cable end through the grommet clamping plate (Figure 6-10).
3. Insert the cable end through the grommet. The tapered end of the grommet should be opposite the cable end.
4. Strip 1 inch of insulation off the cable end. Leave 3/8 inch of shielding showing, and trim the wire ends flat ½ inch from there.
5. Using a piece of 1inch squared tinned copper foil, wrap the foil around the shield/braid and sheath with the left edge aligned with the edge of the braid, as shown in the following Figure 6-10.

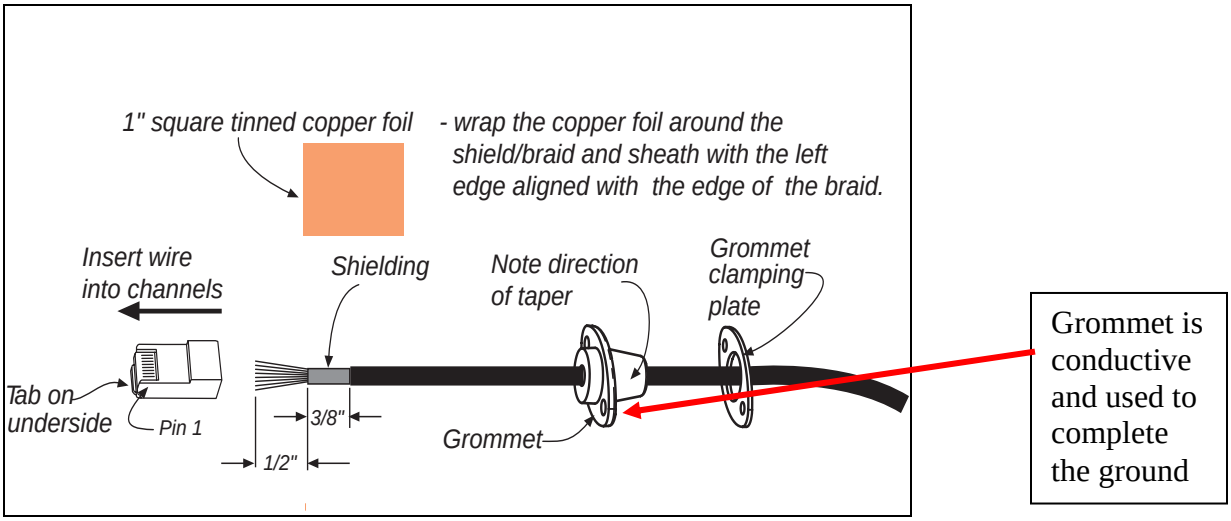

Figure 6-10 Outdoor Subscriber Unit of the Interconnect Cable with Cable Preparation

6. Separate the twisted pair wires and align by color code in the order listed in the following Table 6-7.

Table 6-7 Cable Legend for Interconnect Cable

Pin	Color Code
1	White / Orange
2	Orange
3	White / Green
4	Blue
5	White / Blue
6	Green
7	White / Brown
8	Brown

7. Using pin 1 as a reference, insert the individual wires into the channels of the RJ-45 connector. Each wire should penetrate the channels until flush with the connector end. The copper foil tape should extend past the casing of the RJ-45 connector by approximately ½ inch.
8. When all wires are inserted into the channels in their correct order, use the crimping tool to permanently crimp the wires to the connector.

Attention! Carefully read the instructions for the crimping tool you are using. Use the correct crimping tool for the RJ-45 connector you are using. Incorrect installation of the RJ-45 connector may result in a bad connection between the outdoor transceiver and the indoor junction box.

6.5.3 Connecting to the Outdoor Subscriber Unit Transceiver

Now that you have prepared the interconnect cable, you are ready to connect the cable to the outdoor Subscriber Unit.

Attention! Always Disconnect Power from wall box BEFORE inserting RJ-45 connector into transceiver. This prevents arcing damage from occurring.

1. Insert the RJ-45 connector into the receptacle located underneath the outdoor Subscriber Unit (refer to Figure 6-12). Make sure that the connector tab engages the slot in the receptacle.
2. Slide the grommet up the cable and press it into the bottom of the outdoor transceiver.
3. Slide the grommet clamp up the cable and align the holes with the mounting holes on the bottom of the outdoor transceiver.
4. Insert the two screws in the mounting holes and tighten until the grommet has a slight bulge. Be sure to tighten both screws equally so that the grommet is seated correctly.
5. Secure the interconnect cable to the mounting pole with the cable clip, as shown in Figure 6-11.

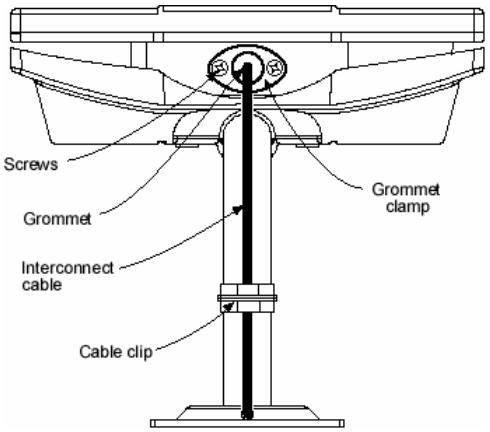

Figure 6-11 Interconnect Cable Installation to Subscriber Unit -- Bottom View

6.5.4 Connecting to the Indoor Junction Box

Note that the junction box should still be disassembled and not screwed to the wall at this point.

11. Strip 2 inches of insulation off the junction box end of the interconnect cable.

Attention! Don't cut off the shield from the cable – you will need it to ground the system later.

12. Insert the cable end through the notched out section of the junction box.
13. Reinstall the PCB into the junction box using the two screws, allowing enough of the interconnect cable to be able to reach the punch down block and wrap around the mounts of the cover plate for strain relief.
14. Using Figure 6-12 as a guide, use the 110 punch down tool to punch down each wire into the slot on the punch down block.

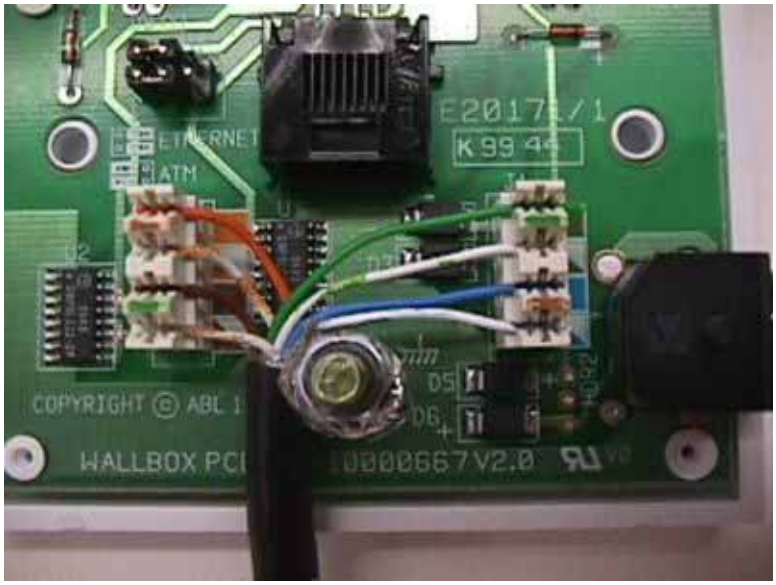

Figure 6-12 Interconnect Cable Connections to Indoor Junction Box

15. Snip off excess wire ends, if necessary.

Attention! Avoid excessive wire loops when connecting the wire to the punch down block.

For now, set the junction box to one side leaving it disassembled. You will reassemble it and mount it on the wall when you have grounded the system.

6.6 Grounding the System

The AB-Access System must be properly grounded in order to protect it and the building it is installed on from lightning damage. This requires grounding both the outdoor transceiver and indoor junction box. The following Table 6-8 describes the tools you will need to ground the system.

Table 6-8 Required Tools and Equipment

Tools	Equipment	Quantity
Mallet	Grounding rod	1
Wire stripper	#8 braided copper wire	
Wire cutters	Grounding lugs	2
Hex wrench	Grounding clamp	1

6.6.1 Installing a Grounding Rod

1. Place the grounding rod to allow for the shortest possible path from the grounding cable to the outdoor Subscriber Units.
2. Drive the grounding rod into the ground at least eight inches from the ground surface.
3. Attach a grounding clamp on the grounding rod. You will use this clamp to attach grounding wires for both the outdoor Subscriber Unit and indoor junction box.

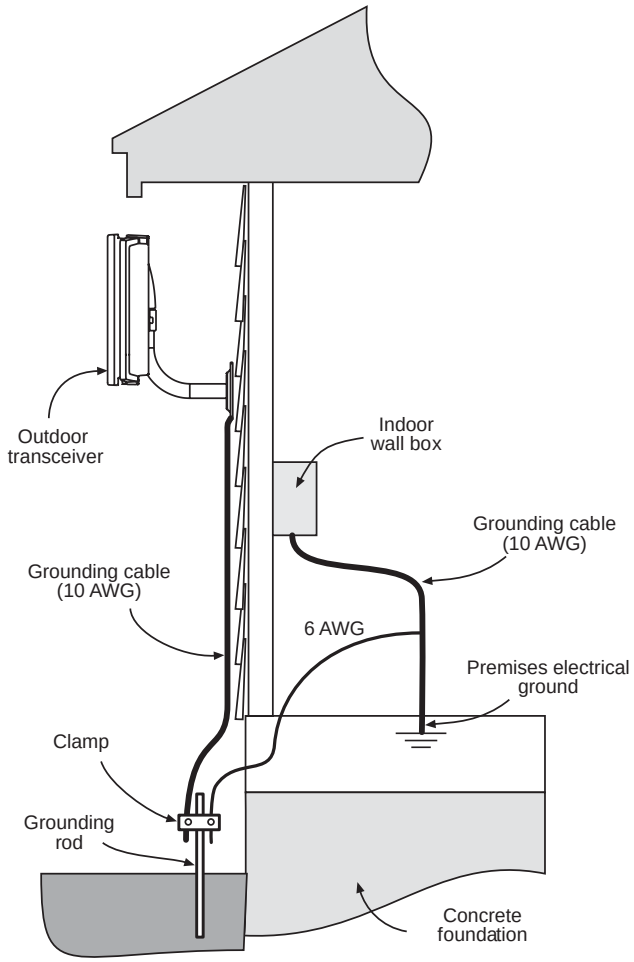

Figure 6-13 Ground Connections for Subscriber Unit

6.6.2 Grounding the Outdoor Subscriber Unit

1. To ground the outdoor Subscriber Unit, you will need to install a grounding wire from the mounting pole to the grounding rod. The wire should be long enough to reach from the mounting pole to the grounding rod with 3 to 6 feet extra to allow for strain relief.
2. Connect a ground lug to one end of a measured length of copper braided wire by crimping the lug to the wire, as shown in Figure 7-14.
3. Remove one of the lower mounting screws of the mounting pole. Insert a screw through the grounding lug terminal and re-install it to the mounting pole.
4. Attach the grounding wire to the clamp on the grounding rod. If necessary, use wire staples to secure the grounding wire to the outside wall.

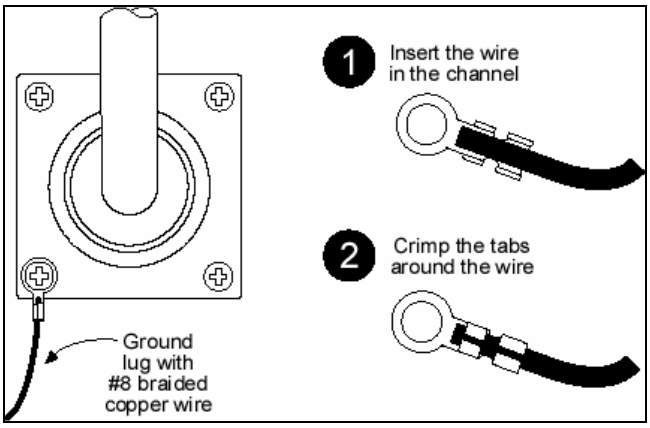

Figure 6-14 Mounting Pole with Ground Lug

6.6.3 Grounding the Indoor Junction Box

To ground the indoor junction box, you will need to install a grounding wire from the junction box to the grounding rod. The wire should be long enough to reach from the junction box to the grounding rod with 3 to 6 extra feet to allow for strain relief.

17. Feed the grounding cable through the broken out section of the wall cover (alongside the interconnect cable).
18. Connect a ground lug to the grounding cable by crimping the lug to the wire, as shown in Figure 6-15.
19. Remove the hex nut on the grounding post, as shown in Figure 6-15.
20. Install the grounding lug terminal onto the grounding post.
21. Attach the wire shield of the interconnect cable to the ground post. You may need to crimp or solder an extra length of wire to the shield in order to attach it to the grounding post.
22. Re-install the hex nut to the grounding post and tighten.
23. Attach the grounding wire to the clamp on the grounding rod.
24. Use the provided small wire tie to firmly attach the interconnect cable to the ground lug. This will provide strain relief for the cable and prevent the data and power leads from being disturbed during installation.

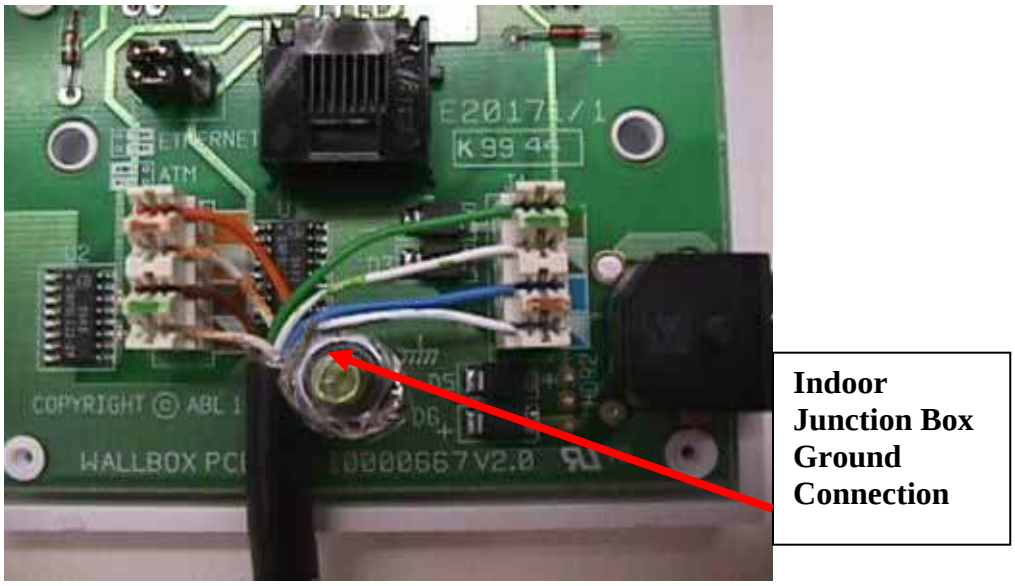

Figure 6-15 Indoor Junction Box Ground Connection

6.6.4 Assembling and Mounting the Junction Box

7. Place the junction box wall mount over the drilled holes.
8. Insert the screws and tighten.
9. Reinstall the faceplate onto the junction box using the two screws.

Section 7

7 Indoor Junction Box

The indoor junction box/wall box consists of a PCB that inserts power into the CAT-5 cable and provides secondary lightening protection. Photos of the indoor Junction Box are shown in Figures 7-1 and 7-2.

Figure 7-1 Indoor Junction Box (Wall Plate Enclosure)

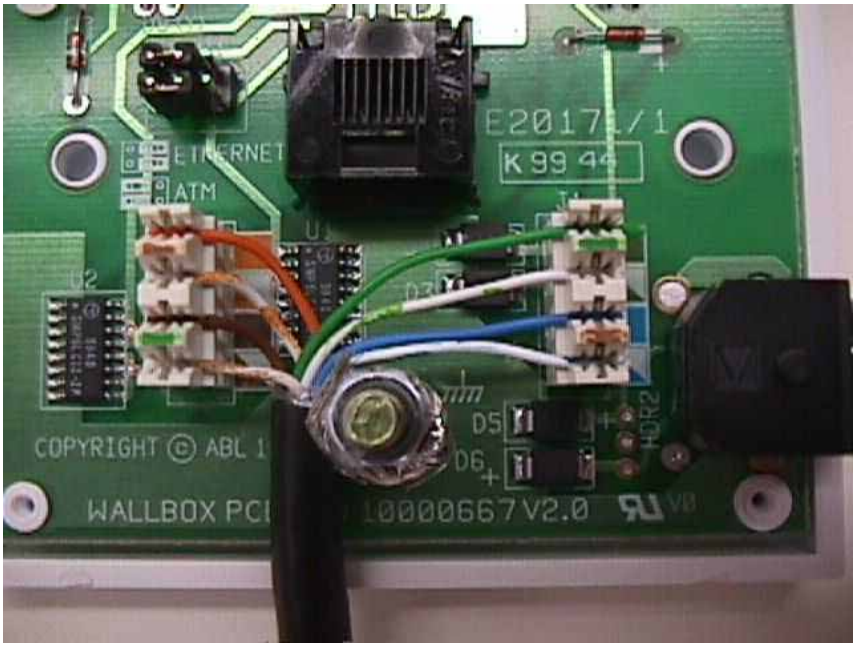

Figure 7-2 Indoor Junction Box Inside

The indoor junction box can be wired for ATM25 or Ethernet interfaces. Note that the PCBs may be housed in separate plastic boxes or mounted in a card cage. Table 7-1 describes the cable legend to follow.

Table 7-1 Cable Legend - Junction Box Interconnect Cable

Pin	Signal	Color Code
1	Transmit High (+)	White / Orange
2	Transmit Low (-)	Orange
3	LED2	White / Green
4	Supply Minus	Blue
5	Supply Plus	White / Blue
6	LED1	Green
7	Receive High (+)	White / Brown
8	Receive Low (-)	Brown

7.1 ATM Cross-Over Cable

Figure 7-3 shows how to wire an ATM cross-over cable:

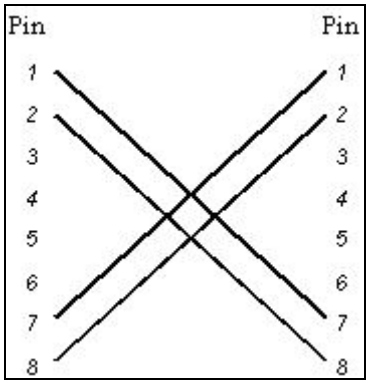

Figure 7-3 ATM Cross-Over Cable

7.2 FVC DB-9 to RJ-45 Converter

Figure 7-4 shows a DB-9 to RJ-45 converter.

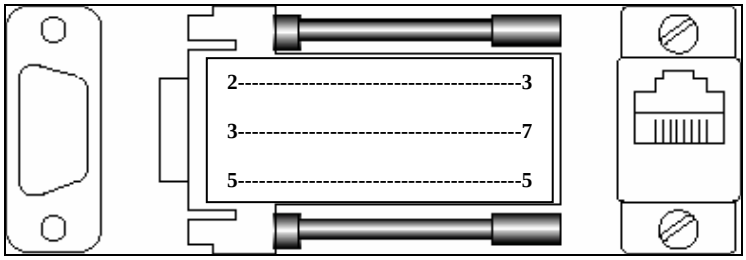

Figure 7-4 DB-9 To RJ-45 Converter

Glossary

TERM	DEFINED
Access Point	An Access Point (AP) is a component of a Base Station (BS) that contains the antenna used to communicate with a Subscriber Unit (SU).
Anchor Switch	The Anchor Switch (AS) is an ATM access switch that is a component of a Base Station (BS).
Antenna	A device for transmitting and/or receiving radio waves.
Asynchronous	A data transmission method in which data may be sent at irregular intervals (without reference to clock signals).
ATM	Asynchronous Transfer Mode is a high-performance, cell-oriented switching and multiplexing technology, which utilizes fixed-length packets to carry different types of traffic. It integrates the multiplexing and switching functions, is well suited for bursty traffic, and allows communications between devices that operate at different speeds.
ATM Switch	The ATM switch provides layer 2 switching of ATM cells through virtual circuits. An ATM switch is contained in the SU, the AP, and the AS.
Available Bit Rate (ABR)	Service that provides rate-based flow control and is aimed at data traffic such as file transfer and e-mail.
Azimuth	The angle along the horizon usually referenced to north.
Bandwidth	The data carrying capacity of a communications channel, measured in Hertz as the difference between the highest and lowest frequencies of the channel.
Base Station	The Base Station is the part of the AB-Access System that sends signals to and receives signals from the Subscriber Units (SUs) to enable communication with the WAN.
Baud	A measure of data transmission speed. The baud rate denotes the number of symbols per second.
Bit Error Rate	The Bit Error Rate (BER) is the fraction of transmitted bits that are received in error.
Cell	A 53-Byte packet of data used in ATM networks. Also used to refer to the coverage area of one Base Station.
Constant Bit Rate (CBR)	Service that operates on a connection basis and offers consistent delay predictability; used for applications such as circuit emulation, voice, and video.
Control Server	The Control Server (typically one per BS) is a computer responsible for management of the BS, its APs, and the associated SUs.
DS1	A data transmission rate of 1.544 Mbps, also referred to as a T-1.
DS3	A data transmission rate of 45 Mbps

TERM	DEFINED
Element Management System	The Element Management System (EMS), located on a workstation at an appropriate point in the network, allows you to configure, control, and monitor all components of the AB-Access System.
MIB	Management information base allows external management system access.
Multiplexer	A multiplexer is device or system capable of combining elementary streams into one aggregate transport stream.
Network	A network is an interconnection of computer systems, terminals, or data communications facilities.
OC3	A data transmission rate of 155 Mbps
Packet	A packet is a sequence of data, with associated control information, that is switched and transmitted as a whole.
Packet Switching	Packet switching is the data transmission method that divides messages into standard-sized packets for greater efficiency of routing and transport through a network.
Parsing	Parsing is the process of analyzing a data stream and breaking it down into more easily processed components.
Permanent Virtual Circuit	Provides end-to-end connectivity for transmission in a network.
Point-to-Point	A single communication circuit connecting two locations.
Point-to-Multipoint	A communications circuit connecting one location to many locations.
Radio Frequency	Radio frequency (RF) is a portion of the electromagnetic spectrum in the frequency range of 100 kHz to 20 GHz.
Subscriber Unit	The Subscriber Unit (SU) is the part of the AB-Access System that is installed at the customer premises and provides communication with the Base Station (BS).
Synchronous	A data transmission method in which data transfer is at a fixed rate. The transmitter and receiver are both controlled by clock pulses.
TCP/IP	Transmission Control Protocol/Internet Protocol, a layered set of protocols that allows sharing of applications among PCs, hosts, or workstations in a high-speed communications environment. The suite of protocols is designed to allow communication between networks regardless of the technologies implemented in each network.
TDD	Time Division Duplex, the transmission method where a single channel is used to alternately carry data in each direction of a link.
Time-Division Multiplexing	A form of multiplexing used with digital signals. A device scans individual channels in rotation, takes bits from each channel, transmits the bits in a string (according to a predetermined sequence), and repeats the process.

TERM	DEFINED
Transmitter	A transmitter is an electronic device, consisting of oscillator, modulator, and other circuits, that produce a radio or television electromagnetic wave signal for radiation into the atmosphere by an antenna.
Unspecified Bit Rate	Service that operates on a connection basis and allows for raw cell or best effort transport by the network. In this service, cells are transported by the network whenever bandwidth is available and traffic is presented by the user. Data using UBR service is more apt to be discarded during peak traffic times in deference to data using other classes of service.
Uninterruptible Power Supply	An optional BS element used to provide power in the event of an AC power failure.
Variable Bit Rate-Real Time (VBR-RT)	Service that operates on a connection basis and offers very low delay variance but requires access to a variable amount of network bandwidth; used for such applications as packet video and voice.
Variable Bit Rate-Non-Real Time (VBR-NRT)	Service that operates on both a connection and connectionless basis and allows delay variance between the delivery of cells; used for data applications which have potentially bursty traffic characteristics, including LAN interconnect, CAD/CAM, and multimedia.
Virtual Circuit	A logical connection, not a physical connection, provides multiple connections that can be defined simultaneously across a single network facility, with each connection having flexible bandwidth.

Acronyms/Abbreviations

The following is a list of acronyms and abbreviations associated with the AB-Access System, some of which may appear in this guide.

ACRONYM	DEFINED
AAL	ATM Adaptation Layer
ADC	Analog to Digital Converter
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
ALG	Application Layer Gateway
AP	Access Point
ARP	Address Resolution Protocol
ARPAnet	Advanced Research Projects Agency Network
ARQ	Automatic Repeat Request
AS	Anchor Switch
ASIC	Applications Specific Integrated Circuit
ATM	Asynchronous Transfer Mode
ATMOS	ATM Operating System
AWGN	Additive White Gaussian Noise
BER	Bit Error Rate
BOOTP	Bootstrap Protocol
BS	Base Station
CBR	Constant Bit Rate
CCIR	Comite Consultatif International des Radiocommunications
CHAP	Challenge-Handshake Authentication Protocol
CIDR	Classless Interdomain Routing
CLIP	Classical Internet Protocol
CNR	Carrier To Noise Ratio
COTS	Commercial Off The Shelf
CPE	Customer Premise Equipment
CS	Control Server
dB	Decibel
dBm	Decibel over 1mW
DBS	Direct Broadcast Satellite
DC	Direct Current
DES	Data Encryption Standard
DFE	Decision Feedback Equalizer
DHCP	Dynamic Host Configuration Protocol
DS1,2,3	Digital Signal 1,2,3
E1	2.048 Mbps circuit supporting (30) 64 Kbps digital channels for voice or data calls
EIRP	Effective Isotropic Radiated Power
EMS	Element Management System

ACRONYM	DEFINED
FCC	Federal Communications Commission
FDD	Frequency Division Duplex
FPMS	Fault and Performance Management System
Gbps	Gigabits per second
GFC	Generic Flow Control
GHz	Gigahertz
GUI	Graphical User Interface
I&Q	In Phase and Quadrature
IETF	Internet Engineering Task Force
IF	Intermediate Frequency
IP	Internet Protocol
ISI	Inter-Symbol Interference
ITFS	Instructional Television Fixed Service
Kbps	kilobits per second
LAN	Local Area Network
LLC	Logical Link Control
LOS	Line of Sight
MAC	Media Access Control
Mbps	Megabits per second
MDS	Multipoint Distribution Service
MIB	Management Information Base
MID	Mobile ID
MMDS	Multichannel Multipoint Distribution System
MSE	Mean Square Error
NAT	Network Address Translation
NMS	Network Management System
NOC	Network Operations Center
OAM	Operations, Administration, and Maintenance
OC3	Optical Carrier 3
OSI	Open Systems Interconnection
PAT	Port Address Translation
PCB	Printed Circuit Board
PHY	Physical Layer
POTS	Plain Old Telephone System
PPP	Point-to-Point Protocol
PTMP	Point to Multipoint
PVC	Permanent Virtual Circuit
QOS	Quality of Service
RAID	Redundant Array of Inexpensive Disks
RF	Radio Frequency
RFC	Request For Comment
RISC	Reduced Instruction Set Computer
RSSI	Receiver Signal Strength Indication

ACRONYM	DEFINED
RT-VBR	Real Time Variable Bit Rate
RX	Receiver
SAR	Segmentation And Reassembly
SCSI	Small Computer System Interface
SNMP	Simple Network Management Protocol
SNR	Signal to Noise Ratio
SO/HO	Small Office/Home Office
SONET	Synchronous Optical Network
STP	Shielded Twisted Pair
SU	Subscriber Unit
SUMP	Subscriber Unit Management Protocol
SVC	Switched Virtual Circuit
T1	1.544 Mbps circuit supporting (24) 56/64 Kbps voice-grade channels
TCP/IP	Transmission Control Protocol/Internet Protocol
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
Telnet	Terminal-remote host protocol developed for ARPAnet
TMS	Topology Management System
TX	Transmit
UBR	Unspecified Bit Rate
UDP	User Datagram Protocol
UNI	User-Network Interface
UPS	Uninterruptible Power Supply
UTP	Unshielded Twisted Pair
VBR-RT	Variable Bit Rate-Real Time
VBR-NRT	Variable Bit Rate-Non-Real Time
VCC	Virtual Circuit Connection
VPC	Virtual Path Connection
VPI	Virtual Path Identifier
WAN	Wide Area Network
WLL	Wireless Local Loop