ADAPTIVE BROADBAND

AB-ACCESS

SYSTEM

U-NII PRODUCT INSTALLATION MANUAL

for Subscriber Units, Base Stations, Access Points and AB-Access 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. Adaptive Broadband's wireless point-to-multipoint and point-to-point solutions (AB-Access 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.

Adaptive 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.

This manual explains how to install the U-NII AB-NetAccess software and perform network management tasks using GUI-based applications (the AB-NetAccess client software). This software can run on any IP client on your network and is controlled by the main Element Management System (EMS) application, the AB-NetAccess server software, which resides on a single server on your IP network.

The main tasks covered in this manual are configuring and managing network elements, such as Base Stations, Subscriber Units, Access Points, AB-Access 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.

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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-Access Extender should be professionally qualified to install radio equipment.

Related Documentation

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

- *AB-Access U-NII Configuration & User's Guide* – Covers AB-Access components, architectures, configuration, and troubleshooting
- *AB-Access U-NII System Functional Specification* – Lists the specifications of the various components of an AB-Access network
- *AB-Access U-NII Product Installation Manual* – Explains how to install AB-Access Subscriber Units and Base Stations
- *AB-Access Command Line Interface (CLI) Manual* – Describes configuration, operational, and diagnostic capabilities for Subscriber Units and Base Stations.
- *AB-Access Software Release Notes* – Describes updates and changes to the latest software and known product issues.

Customer Documentation Questions/Comments

Adaptive Broadband's Technical Publications Department is constantly reviewing its AB-Access System(s) documentation to make the information as clear, accurate, and user-friendly as possible. We would like to receive any comments or questions you have about this manual. Please send an e-mail to: techpubs@adaptivebroadband.com with your views on anything in this manual that you think needs to be clarified or structured differently. Additionally, please let us know if you found this manual useful and its information easy to understand.

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In addition, documentation updates can often be found on our Web site at: www.adaptivebroadband.com.

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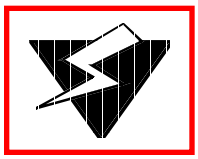
PLEASE READ THESE SAFETY PRECAUTIONS!

RF Energy Health Hazard

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. **Do not allow people to come in close proximity to the front of the antenna while the transmitter is operating.**

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 Subscriber Unit complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received including interference that may cause undesired operation.

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 Adaptive Broadband Corporation 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-Access Extender:

AB-Access 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 1.5 meters 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 Adaptive Broadband Corporation may also void the user's authority to operate this device.

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SECTION 1

AB-Access Product Overview

1 AB-Access Product Overview

1.1 AB-Access System

The Adaptive 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-Access 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-Access 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 five 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-Access Extender (EX)** - The AB-Access 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.

- **Anchor Switch (AS)** - An ATM (or Ethernet) Anchor Switch in each Base Station is used to multiplex the traffic from all APs onto a Backhaul port.

- **Control Server (CS)** - The Control Server is a reliable server running the Linux OS. It provides a number of functions including: configuration, authentication, set-up of management PVCs, and support of the Element Management System (EMS).

- **Element Management System (EMS)** – A GUI based application suite that allows administrators to configure, control, and monitor all components of the system.

1.3.1 AB-Access System Architecture

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

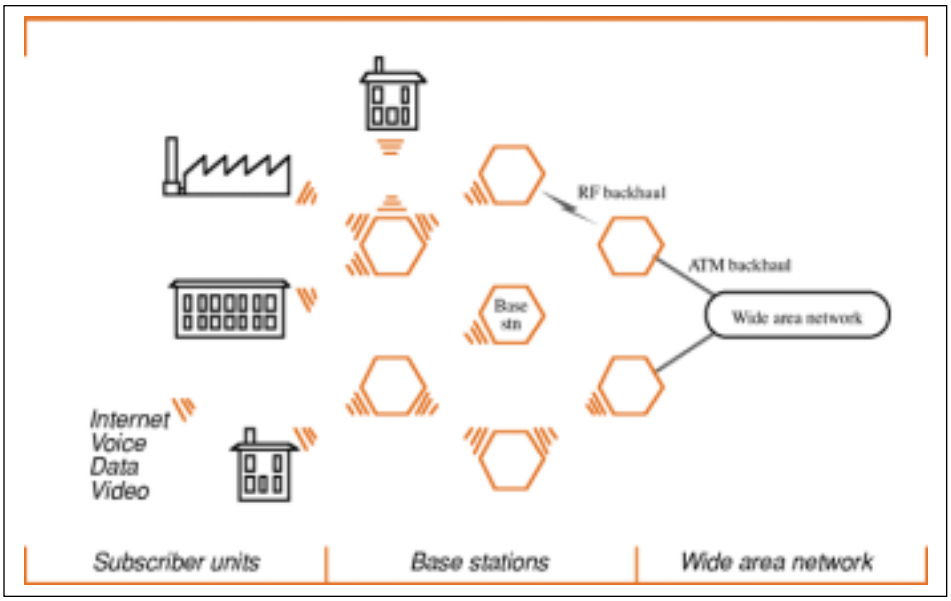

Figure 1-1 AB-Access Typical Deployment

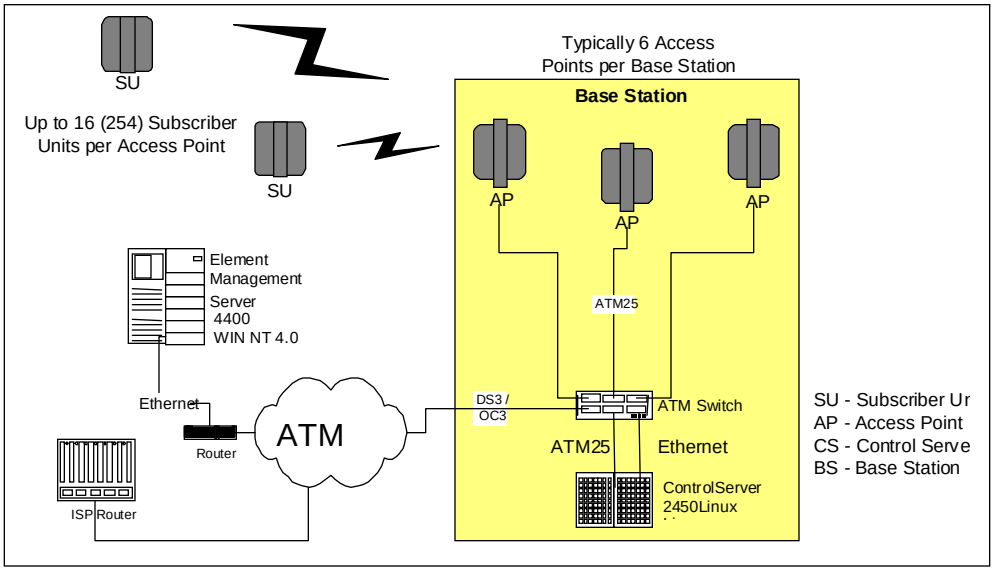

Figure 1-2 AB-Access Typical Network Architecture

TBD: Add AB-Access Extender to this diagram

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 include:

- Access Point
- AB-Access Extender
- Access Panel (same function as Junction Box)
- Anchor Switch
- Control Server
- 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 standard IP over Ethernet, via 25 Mbps ATM, wireless communications with the Base Station. Subscriber Unit elements include:

- Antenna
- Radio/Transceiver
- Modem
- MAC (Media Access Controller)
- Network Interface
- Internal Junction Box

- Cabling.

1.3.4 EMS Function

The central Element Management System (EMS), which system administrators access via a GUI-based application suite (the AB-NetAccess client software), is run on a Pentium class computer under Windows NT. The EMS allows the user to configure, control, and monitor all components of the AB-Access System. EMS software elements include:

- SQL Database
- Java GUI Interface
- CORBA Object Infrastructure.

1.3.5 System Configuration Selection

Before installing a new unit or upgrading a unit, the network manager must know what configuration option to use. This is important for both static and dynamic installations. 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.

Contained in each system software release is a file that lists the possible configuration options. The file is called “configurations” and looks ***similar*** to Tables 1-1 and 1-2. This file is split into two tables, one for the AP and one for the SU configurations. These tables are used to determine which configuration the unit will be programmed in after upgrade.

For the purposes of network and software configuration, the AB-Access Extender units appear as static point-to-point SU units. They support Ethernet or ATM wired interfaces. CLIP, RFC1483 and native ATM are supported static configuration for these units. An AB-Access Extender point-to-point link consists of two Extender units, a Head End Unit (“AP”) and an Upstream Subscriber Unit (“SU”).

Table 1-1 Supported AB-Access SU Configurations

Configuration	*Protocol*	*AP role*	*System Mode*	*Interface*
1	*CLIP*	*terminated*	*static*	*Ethernet*
2	*CLIP*	*terminated*	*interactive*	*Ethernet*
2	*RFC1483*	*terminated*	*interactive*	*Ethernet*
2	*RFC1483*	*switched*	*interactive*	*Ethernet*
4	*PPP*	*switched*	*interactive*	*Ethernet*
3	*CLIP*	*terminated*	*installation*	*Ethernet*
3	*RFC1483*	*terminated*	*installation*	*Ethernet*
3	*RFC1483*	*switched*	*installation*	*Ethernet*
5	*PPP*	*switched*	*installation*	*Ethernet*

Table 1-2 Supported AB-Access AP Configurations

Configuration	*Protocol*	*AP Role*	*System Mode*	*Interface*
1	*CLIP*	*terminated*	*static*	*ATM*
2	*CLIP*	*terminated*	*interactive*	*ATM*
3	*RFC1483*	*terminated*	*interactive*	*Ethernet*
2	*RFC1483*	*switched*	*interactive*	*ATM*
2	*PPP*	*switched*	*interactive*	*ATM*
4	*CLIP*	*terminated*	*static*	*Ethernet*

The first column in the Tables above refers to a configuration number. This number will be used as a parameter to the upgrade process. The second column identifies the protocol or network topology. Routed topologies will use the CLIP protocol, bridged will use the RFC1483 protocol,

and PPP topologies will use the PPP protocol. The column titled "AP Role" is used to specify whether the AP will terminate PVCs from the SU or switch them through to another termination point. This is only pertinent to the AP upgrade. The fourth column, "System Mode", refers to how the unit will act in the network. A unit in static mode will not try to register with the Element Management System but will instead use the configuration files found in the Flash file system. A unit in interactive mode will automatically try to register with EMS (dynamically) via the AP with the strongest RF signal it can detect. Installation mode, used for SUs only, places the SU is a mode which will ultimately allow it to register dynamically, but upon first boot, the unit requires manual intervention to complete its RF alignment. The last column, "Interface" defines the type of terrestrial interface the unit will use after reboot. This is important to note since improper configuration selection will change the terrestrial interface type. This may make the unit appear unreachable after reboot.

With every release, be sure to carefully look over the configuration option file, as new options are occasionally added. To reset a unit to factory defaults, an AP should be upgraded to configuration #4 and an SU to configuration #1(reference Tables 1-1 and 1-2).

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

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

SECTION 2

Getting Started

2 Getting Started

2.1 Skills Required

The AB-Access U-NII 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 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 if you are not using a standard length cable interconnect cable kit between the outdoor transceiver and the indoor junction box.)
- 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, via your local AB-Access System provider.

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 your Subscriber Unit.
- IP address and subnet mask, which you need 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.
- Any required static configuration for AB-Access Extender units e.g. IP addresses, channels to be used etc.

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

TBD: add tool requirement for AB-Access Extender

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 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.**

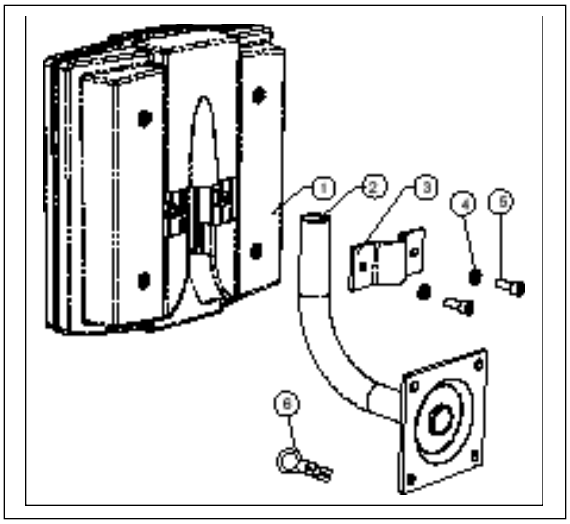

Figure 2-1 Outdoor Subscriber Unit Components

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
CAT-5 interconnect cable	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:

1. Determine which Access Points you can communicate with.
2. Determine the direction of available Access Points from the house or building.
3. 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:

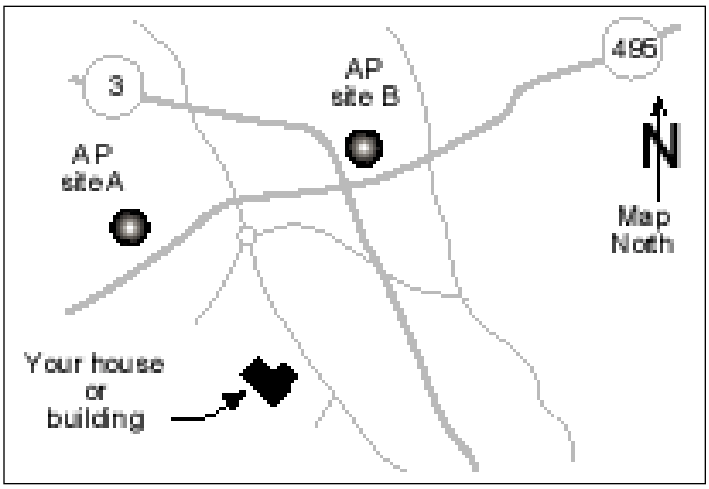

Figure 2-2 Access Point Locations

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).

Move the compass over your location on the map and read off the bearing to the AP.

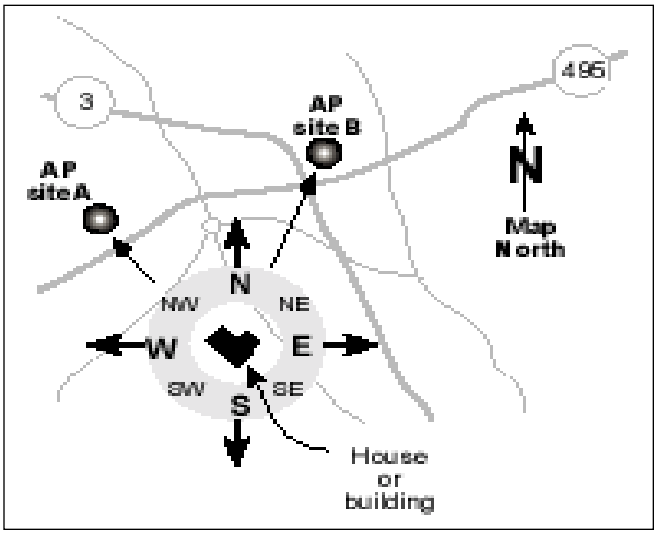

Figure 2-3 Aligning the Compass and Map

6. 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.

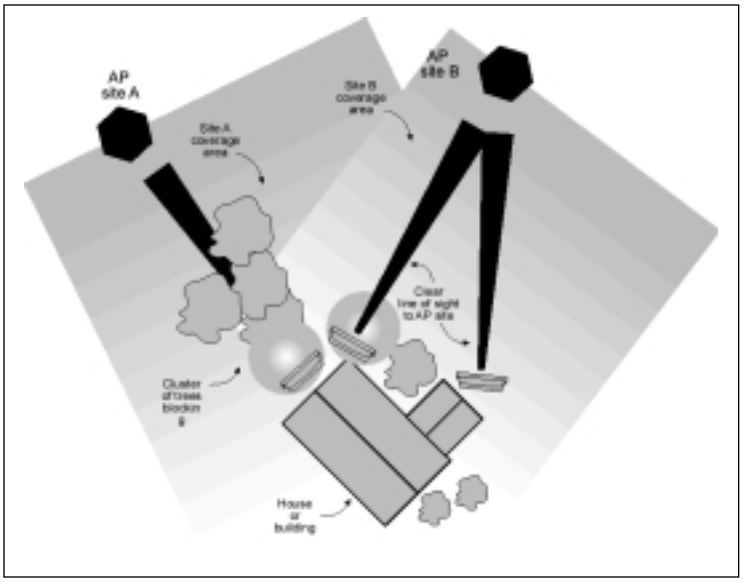

Figure 2-4 Selecting an Access Point

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-Access Extender Locations

In order for your AB-Access 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).

TBD: Additional instructions for AB-Access Extender

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.

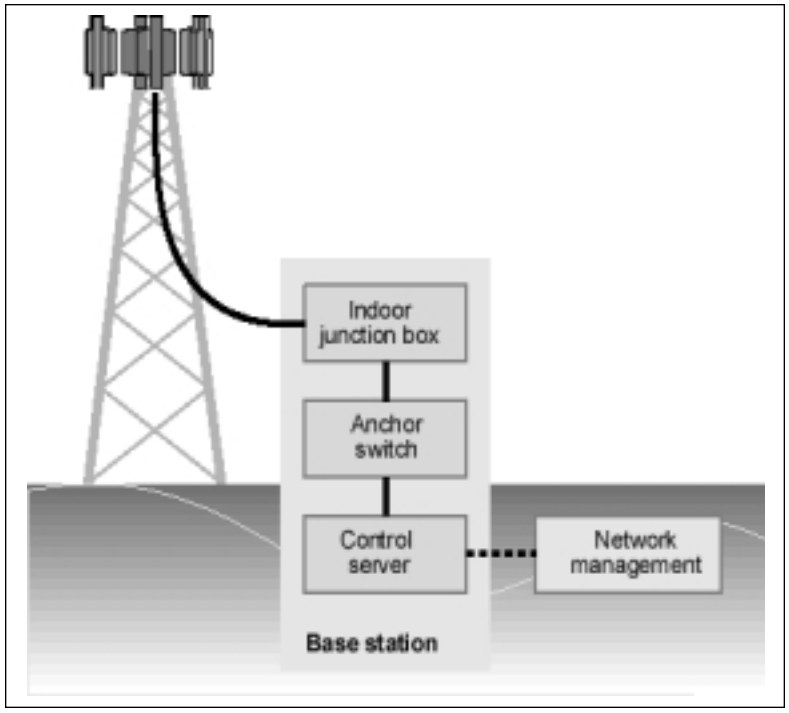

Figure 3-1 Base Station Overview

3.2 Access Points

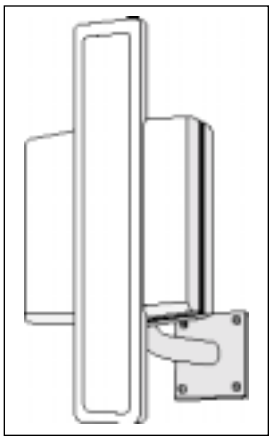

Figure 3-2 Outdoor Access Point and Mounting Pole

A Base Station can have up to six Access Points. Each AP consists of an outdoor transceiver – the antenna and associated electronics that transmit and receive broadband wireless signals to and from Subscriber Units.

3.3 AB-Access Extender Units

A Base Station may have a number of AB-Access Extender units. Each EX consists of an outdoor transceiver – the antenna and associated electronics that transmit and receive broadband wireless signals to and from the EX at the other end of the backhaul link.

3.4 Anchor Switch

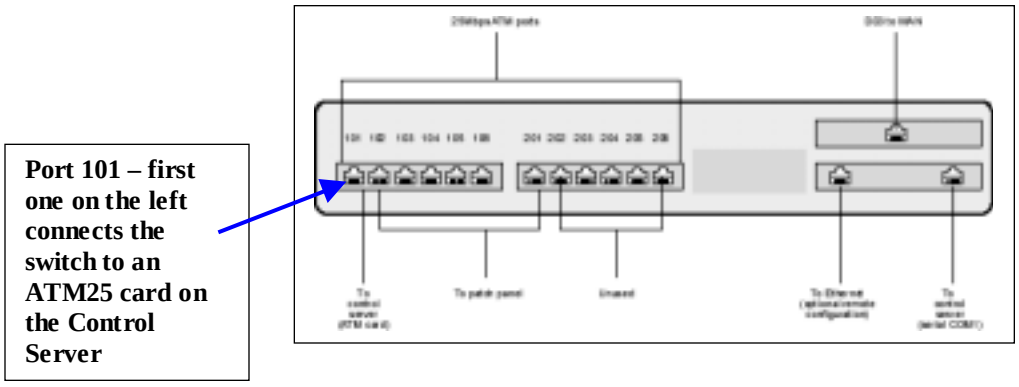

Figure 3-3 Anchor Switch Front Panel

This is typically an Access NGI WAN Access Switch, model VSW 200E, from FVC.COM.

The Anchor Switch has the following connections:

- Typically, six or 12 ATM25 ports:

- Port 101 – connects the switch to an ATM25 card on the Control Server using an ATM cross-over cable.
- The other ATM25 ports connect to each AP via the indoor junction box or access panel, using ATM cross-over cable.

- Switch configuration ports:
  - Console Port – Connects to the COM2 port on the Control Server. This is the usual method for monitoring and configuring the switch. Standard serial port settings are 8,n,1 no flow control.
  - Ethernet Port – Optionally, this can also be used to access the switch remotely. You will need to give the switch an IP address, and then configure it via a machine with an Ethernet card.

Please see the *V-Switch User's Guide* (supplied with the switch) for detailed information on configuring the switch.

- (Optional) Backhaul connection – This can be via:
  - OC3
  - DS3
  - Multiple T1s.
  - AB-Access Extender

3.5 Control Server

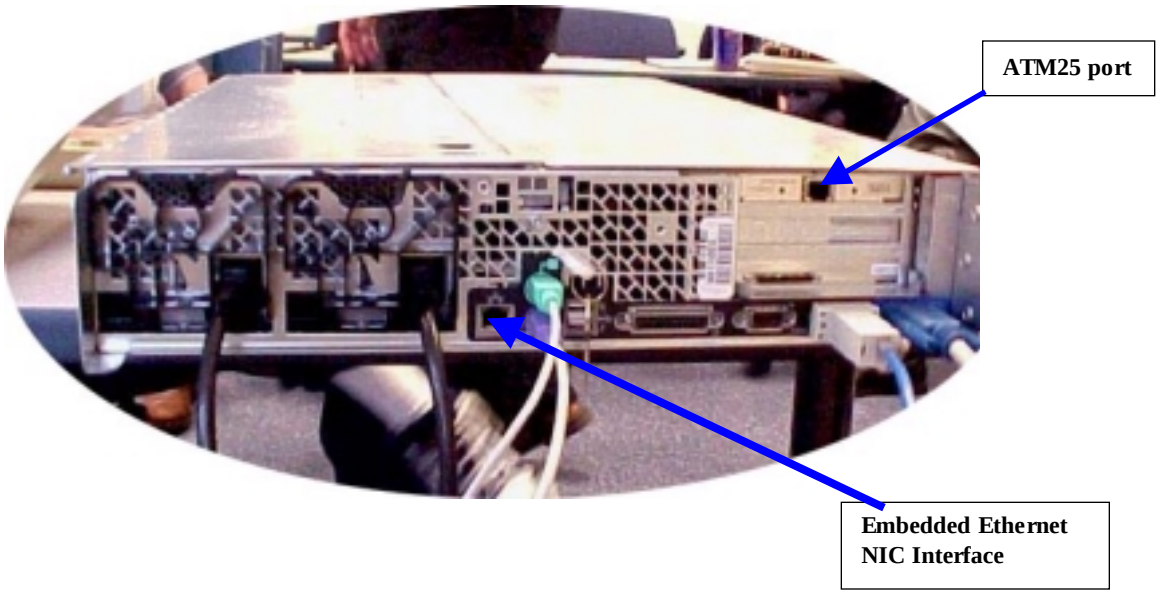

Figure 3-4 Dell 2450 Control Server Rear Panel

Shown in Figure 3-4 is the rear of a Dell PowerEdge 2450 Control Server. It comes pre-installed with the necessary hardware to get a Base Station up and running. It provides an interface

between the anchor switch and the network management software. The ports on the rear panel are as follows:

- ATM25 port – Connects to port 101 on the anchor switch.
- COM2 port – Connects to the Console port on the anchor switch. Used for monitoring and configuring the switch.

Attention! This is a DB-9 connector. First, plug the DB-9 to RJ-45 adapter (supplied with FVC switch) into this port, then plug a straight through patch cable from the switch into the adapter. It is important to note that the user must use the FVC supplied serial adapter, as other adapters may not operate correctly!

Please see the *V-Switch User's Guide* (supplied with the switch) for detailed information on configuring the switch.

- Mouse port
- Keyboard port
- Monitor port
- Power connector – There may be one or three of these, depending on your model Control Server.

3.6 Access Panel

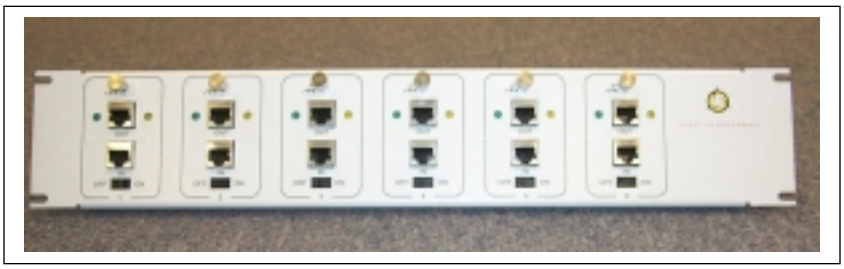

Figure 3-5 Access Panel

The Access Panel provides an interface between the Anchor Switch (AS), a 48V power supply, and the APs. It includes:

- Rack-mounted unit that can handle up to six APs
- Connects to a redundant 48V DC power supply
- RJ-45 connectors to take interconnect cables from APs
- RJ-45 connectors to take ATM cross-over cables to the AS
- Grounding points

- LEDs to indicate AP status
- Separate on/off switches for each AP / AB-Access Extender.

3.7 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 cross-over cable (from the junction box to the anchor switch) and the interconnect cable must be less than 100 meters.

3.8 Software Consideration

As an installer, you need to know how to use a serial console to:

- Configure the Permanent Virtual Circuits (PVCs) on the AS.
- Check the status of communications between the AS and CS.
- Check the backhaul connection.

You will use a Command Line Interface (CLI) to perform any necessary configuration. For additional information, please see the *U-NII Configuration and User's Guide*.

SECTION 4

Server and Switch Installation

4 Server and Switch Installation

4.1 Before You Start

This part of the manual is aimed at experienced network installers. It explains how to install and configure a Control Server(CS) and Anchor Switch (AS), and how to get an AB-Access Base Station up-and-running.

It does not tell you how to manage an AB-Access network. This section lists the information you will need to know before you can install a Base Station.

4.1.1 Information Required

Before you perform the installation, you will need to know which outdoor transceivers are connected to which port on the indoor junction box (the Access Point (AP) installer should have made a note of this).

4.1.2 Extra Equipment Required

Before you perform the installation, you will need the following equipment shown in Table 4-1:

Table 4-1 Required Tools and Equipment

Tools Required	**Extra Equipment Required**
Crimping tool (must be specifically matched for the RJ-45 connector used)	RJ-45 connectors
Wire stripper	Roll of CAT-5 cable
Small wire cutters	Monitor and cables

4.1.3 Optional Equipment

In case of power outages, an Uninterruptible Power Supply (UPS) is optional equipment that is available ***and highly recommended*** for purchase, but it is not covered in this guide.

4.2 Unpacking The Equipment

Carefully unpack the equipment and check the items against the following lists. You should have the following items (you may also have purchased a monitor, but as this is optional and it is not included below).

4.2.1 Anchor Switch

The Anchor Switch is an Access NGI WAN Access Switch, model VSW 200E, from FVC>COM. The box should contain:

- Anchor Switch
- *V-Switch User's Guide*
- Power cord
- Serial port adapter.

4.2.2 Control Server

The Control Server is a Dell PowerEdge 2450. The box should contain:

- Control Server.
- Mouse.
- Keyboard
- Software installation CD-ROMs (note that all necessary software has been preinstalled)
- Two power cords
- Keys for accessing drive bays and internal upgrade options (see below for key locations).
- Manuals, including the *Dell 1 x 8 Backplane Option* leaflet.

4.2.2.1 Key Locations

The keys supplied with the Control Server are located as follows:

- 4300 – Behind the "4300" label on the front panel; press the label to open the hidden compartment.
- 4350 – On a hanger on the rear panel
- 2450 – On a hanger on the rear panel.

4.3 Installing The Equipment

This section explains how to connect up the anchor switch, Control Server and outdoor transceivers.

4.3.1 Position The Equipment

After unpacking all the equipment, position the anchor switch and Control Server so as to minimize the distances between them, the indoor junction box, and your power outlets. You may want to rack mount the anchor switch and Control Server. Please see the *V-Switch User's Guide*.

4.3.2 Making Up Connecting Cables

The following Table 4-2 shows the various types and lengths of cable.

Table 4-2 Required Cables

Cable Run	Cable Type	No. Required	Connectors
AS port 101 to CS ATM port	CAT5	1	RJ-45
AS Console port to CS COM (via DB-9 to RJ-45 adapter)	CAT5	1	RJ-45
AS ports 102, 103 etc. to indoor junction box	ATM Cross-over	Same as number of transceivers	RJ-45 – see below for pinout

4.3.2.1 ATM Cross-Over Cable

The pin connections for making up an ATM cross-over cable are as follows:

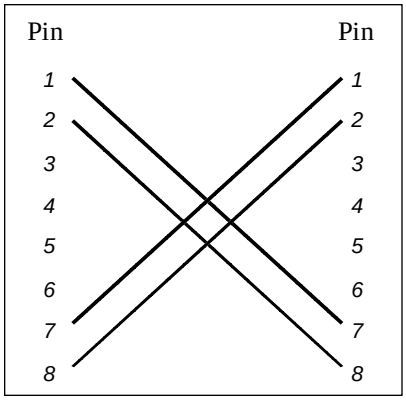

Figure 4-1 ATM Cross-Over Cable

4.3.3 Connecting The Equipment

To connect the equipment, proceed as follows:

1. Connect from port 101 on the anchor switch to the ATM port on the rear panel of the Control Server. Use a standard CAT5 cable with an RJ-45 connector on each end.
2. Connect from port 102 on the anchor switch to the appropriate port on the access panel. Use an ATM cross-over cable with an RJ-45 connector on each end.
3. Repeat step 2, using ports 103, 104, 201, 202, 203 and 204, until you have connected to all the 'live' ports on the access panel.

4. Insert the DB-9 to RJ-45 adapter into the COM2 port on the Control Server. Connect from the Console port on the anchor switch to the DB-9 to RJ-45 adapter on the COM2 port of the Control Server.
5. Connect the mouse and keyboard to the Control Server.
6. Connect your monitor's signal cable to the monitor port on the Control Server.
7. Connect the power cords for the Control Server, anchor switch, indoor junction box and monitor to AC wall outlets, but **do not switch on**.

4.4 Base Station Access Panel Installation

The following steps cover installing the indoor Access Panel installation. Table 4-3 gives a description of the Access Panel and Figure 4-2 shows a photo of it. As designed, these Access Panels exactly duplicate the circuitry of the existing wall boxes. Installation follows the same directions. However, no punch down of the STP cable is needed on the radio side of the panel. Straight through CAT5 STP cables are used to connect the panel to the radio.

The patch panel is designed to replace six wall boxes in a Base Station. The Artesyn power supplies are to be replaced by power supplies such as Kepco's (part #PS-RM0101-1000953) rack mounted power supply operating at 48 V - 3.6 A DC.

Table 4-3 Base Station Access Panel Description

Name	Description	Model #	Revision #	CLEI code
Base Station Access Panel	Access Panel Rack Mount 6 AP/EX Interfaces	WB-05001	v1.00	NA

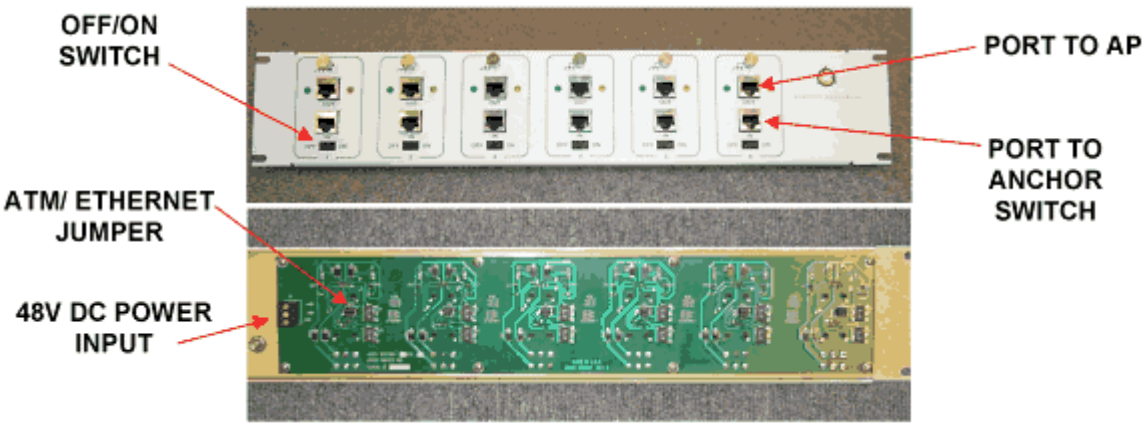

Figure 4-2 Access Panel Ports

4.4.1 Access Panel Installation Steps

1. At the Access Panel, be sure all power switches are set to **OFF**.

2 Determine ports to be used on the Access Panel, and set jumpers on rear of panel to desired setting (either Ethernet or ATM). Reference the following Figure 4-3.

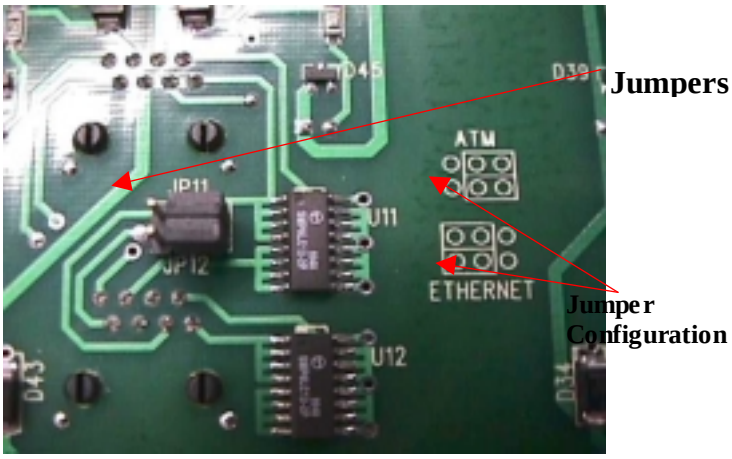

Figure 4-3 Access Panel Jumpers

3. Position Access Panel

4. Plug in power supply and turn on.

5. Adjust to +48VDC and turn off.

6. Obtain red, black, and green 18 gauge wire. Measure and cut enough of each color to connect the Access Panel to the power supply.

7. Using wire strippers, strip approximately 1/4" from one end of all three leads.

8. Insert the red lead into the +48V connection and tighten with precision flat tip screwdriver.

8. Insert black lead into the -48V connection and tighten with precision flat tip screwdriver.

9. Insert the green lead into the ground connection and tighten with precision flat tip screwdriver.

Reference the following Figure 4-4.

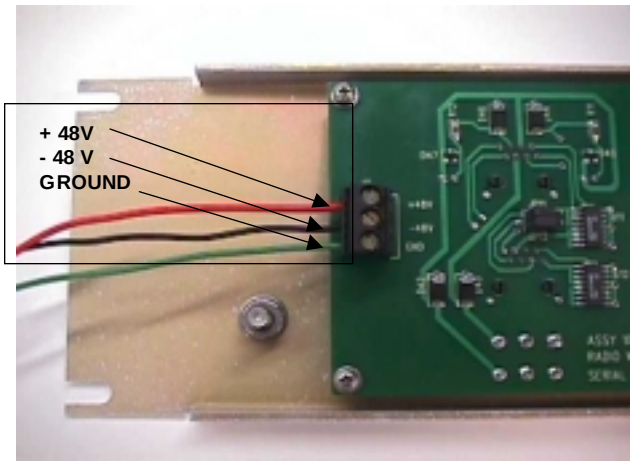

Figure 4-4 Access Panel Power Connection Wires

11. Using wire strippers, strip approximately 1/2" off the other end of all three leads.

12. Connect the red lead to the +48V on power supply.

13. Connect the black lead to the -48V on power supply.

14. Connect the green lead to ground on power supply.

4.4.2 Powering On The Equipment

Power on the equipment as follows:

1. Power on the anchor switch. (It will go through its startup procedure, which can take up to three minutes.)

2. Power on the monitor.

3. Power on the Control Server.

4. When the server has finished its startup procedure, you will see a login prompt.

5. Enter the user login (**root**) and the system password (**letmein**) and press Enter. (Note text is all lower-case.)

6. Turn ON the power supply.

7. If any of the six-transceiver power switches are OFF, turn them ON.

8. For each live transceiver, check that the yellow LED on the junction box is ON.

5 Access Point Installation

5.1 Before You Start

This section lists the information you need on-hand before you can install a Base Station.

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 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 5-1.

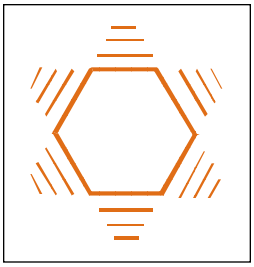

Figure 5-1 Diagram of Six Access Points for 360 degree Coverage

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

5.2.1 Equipment Required

Table 5-1 lists the tools and equipment you will need to install Access Points.

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 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 Access Points

Table 5-2 lists the main components of an Access Point.

Table 5-2 AP Components

Item	Quantity	Notes
Outdoor transceiver	1	See item 1 in Figure 5-2
Mounting pole	1	See item 2 in Figure 5-2
Pole clamp	1	See item 3 in Figure 5-2
M6 washer	2	See item 4 in Figure 5-2
M3 x M10 machine thread screws	2	See item 5 in Figure 5-2
Grounding lug	2	See item 6 in Figure 5-2
Indoor junction box	1	6-way rack-mounted unit
Power supply and cord	1	

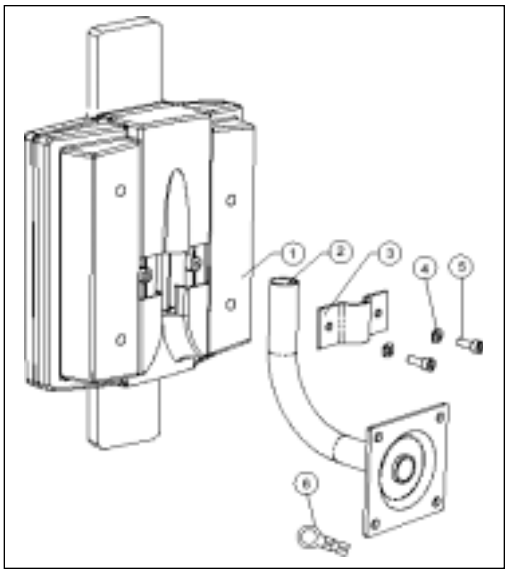

Figure 5-2 Outdoor Access Point Components

5.4 Indoor Patch Panel

Figure 5-3 shows the Base Station Access Panel used as an indoor patch panel.

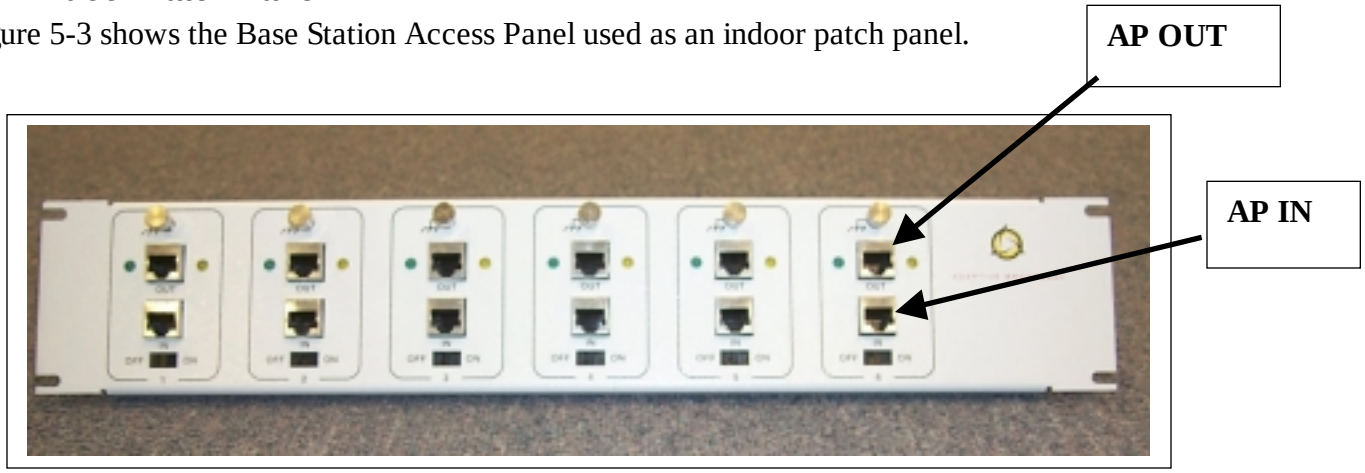

Figure 5-3 Access Panel used as Patch Panel

5.5 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.

5.5.1 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.

5.5.2 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.

5.5.3 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.

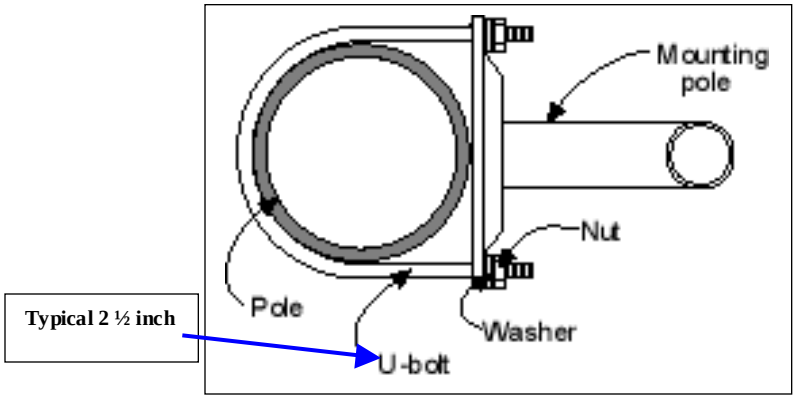

Figure 5-4 Mounting Pole Installed on Pole or Antenna Mast

5.5.4 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.

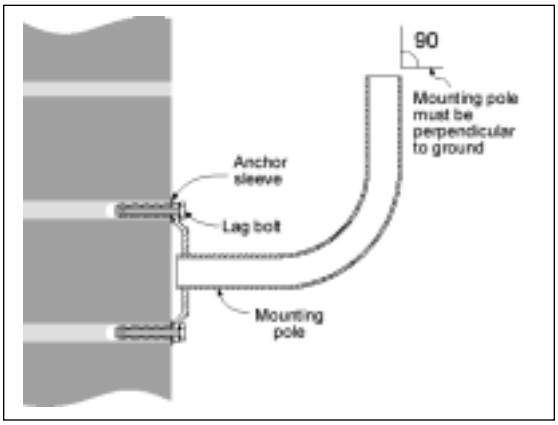

Figure 5-5 Mounting Pole Installation

5.5.5 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 5-6.
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.

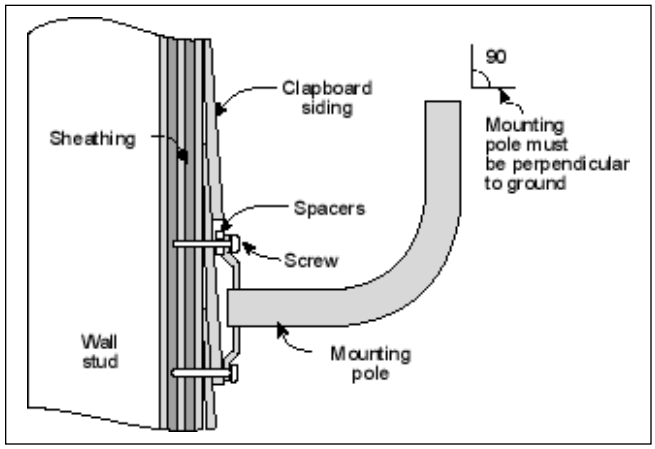

Figure 5-6 Mounting Pole on Clapboard Siding

5.6 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 5-7 through 5-10.

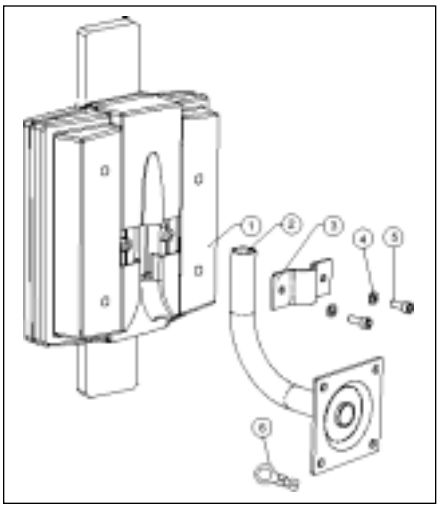

Figure 5-7 Mounting Parts for an Outdoor Access Point

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.

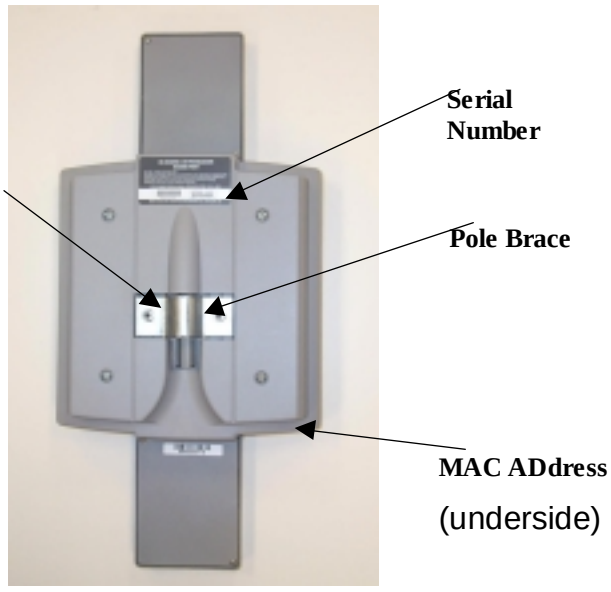

Figure 5-8 Access Point Rear View

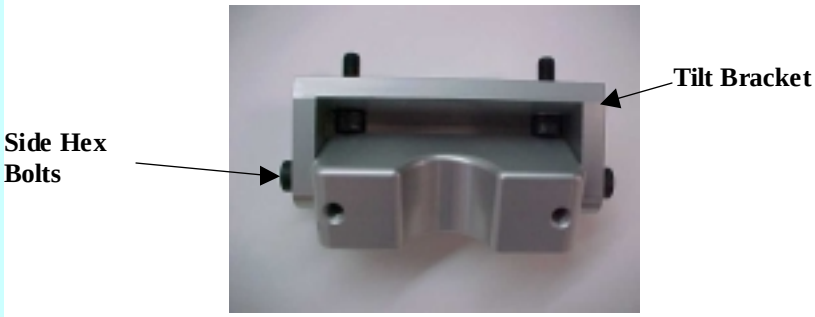

Figure 5-9 Tilt Bracket

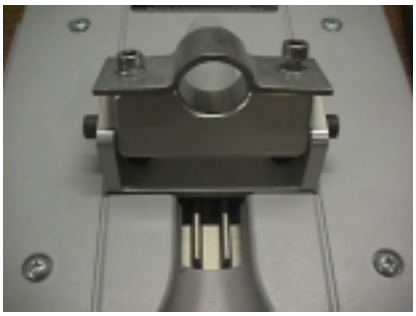

Figure 5-10 Access Point with Mounted Tilt Bracket

5.6.1 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).

5.6.2 Installing The Interconnect Cables

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

5.6.2.1 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.

5.6.2.2 Install the Interconnect Cables (Transceiver End)

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

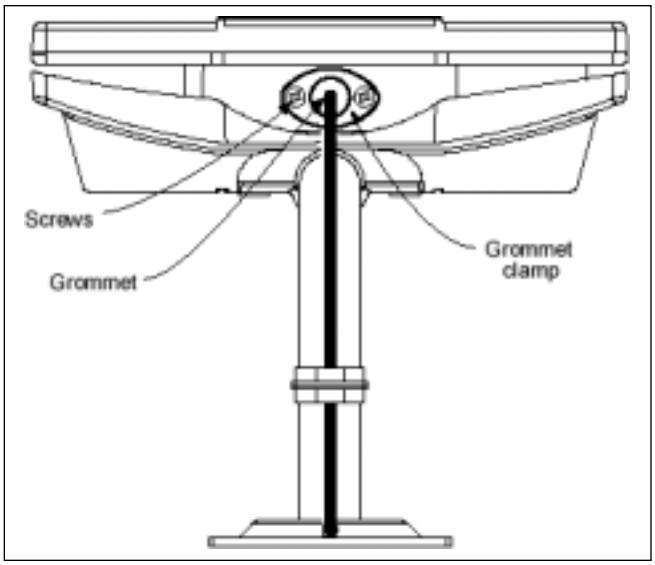

Figure 5-11 Grommet Location - Underside of Access Point

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 5-11)
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 Figures 5-12 and 5-13.

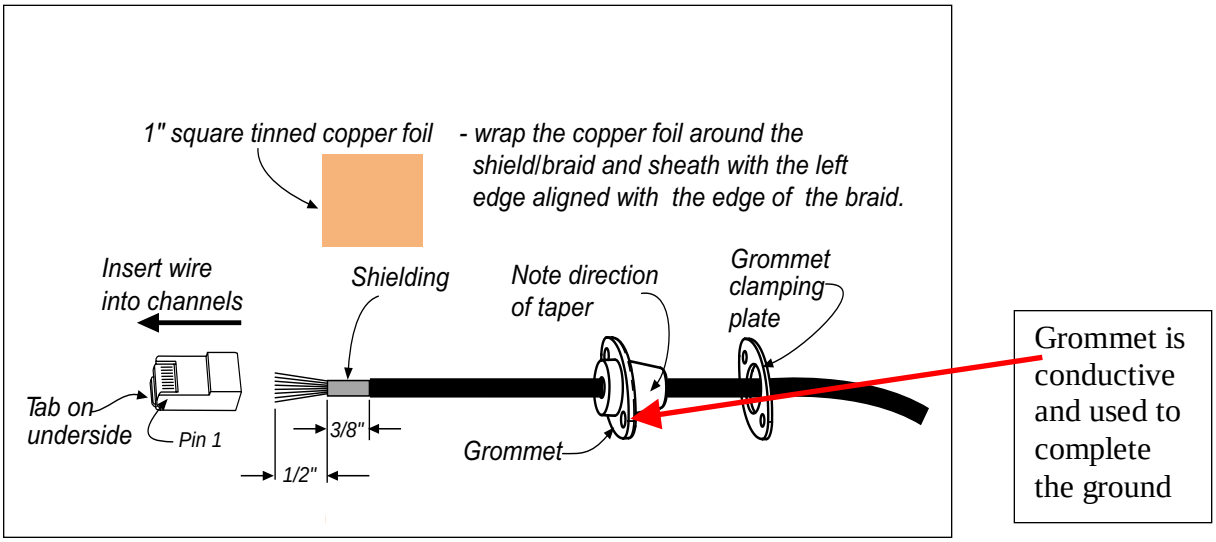

Figure 5-12 Outdoor Transceiver End of the Interconnect Cable with Cable Preparation

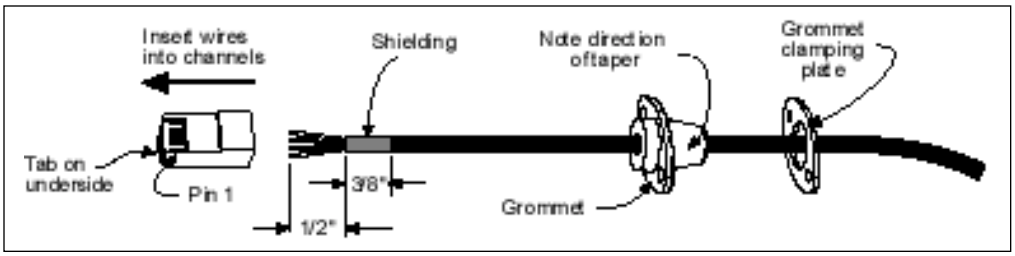

Figure 5-13 Outdoor Transceiver End of the Interconnect Cable with Shielding

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. 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.
9. Slide the grommet up the cable and press it into the bottom of the outdoor AP.
10. Slide the grommet clamp up the cable and align the holes with the mounting holes on the bottom of the outdoor transceiver.
11. 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.
12. Secure the interconnect cable to the mounting pole with the cable clip as shown in Figure 5-14.

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.

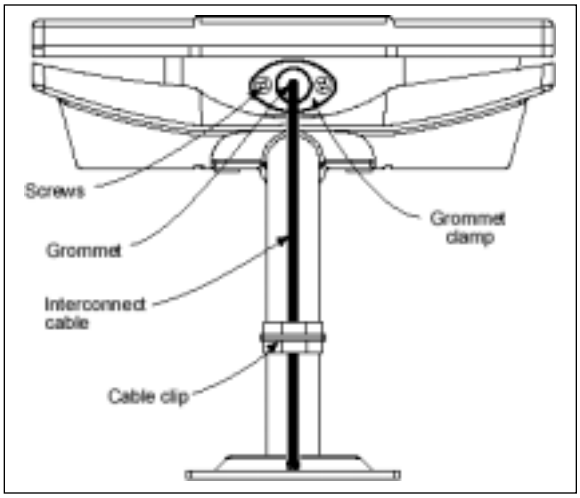

Figure 5-14 Interconnect Cable Installation to Outdoor Access Point - Bottom View

5.6.2.3 Installing The Interconnect Cables to Access Panel

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

1. Install an RJ-45 connector to the junction box end of the cable, following the previous steps 6 through 12.
2. Plug the RJ-45 into one of the upper ports in the Access Panel junction box.

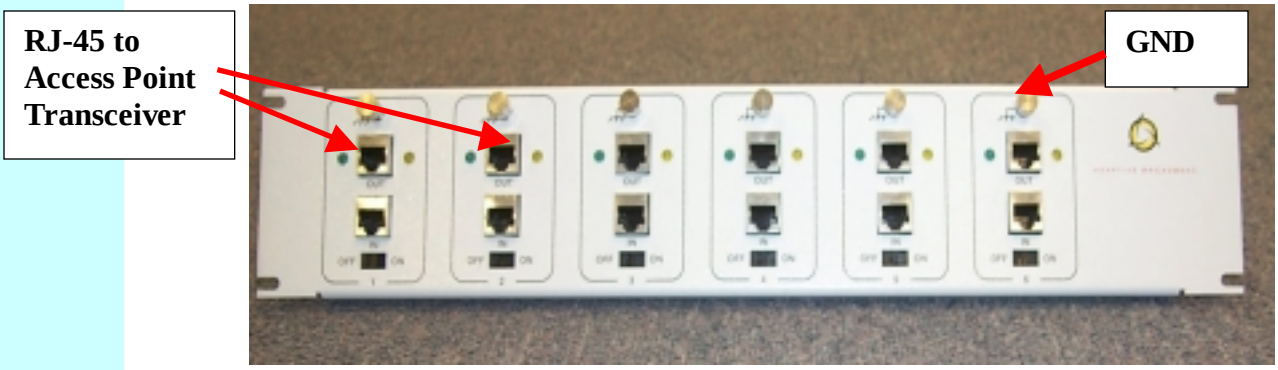

Figure 5-15 Access Panel showing Connections to Access Point

5.6.2.4 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.

5.6.3 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 5-14.
2. Grounding the Access Panel to the rack.

5.6.3.1 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 5-16.

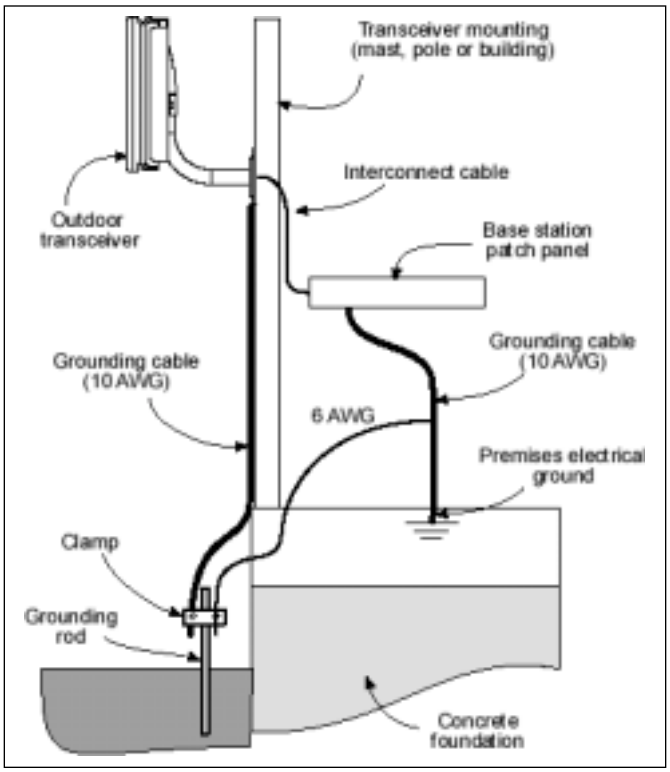

Figure 5-16 Ground Connections to Access Point Transceiver

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 5-17. If necessary, use wire staples to secure the grounding wire to the outside wall.

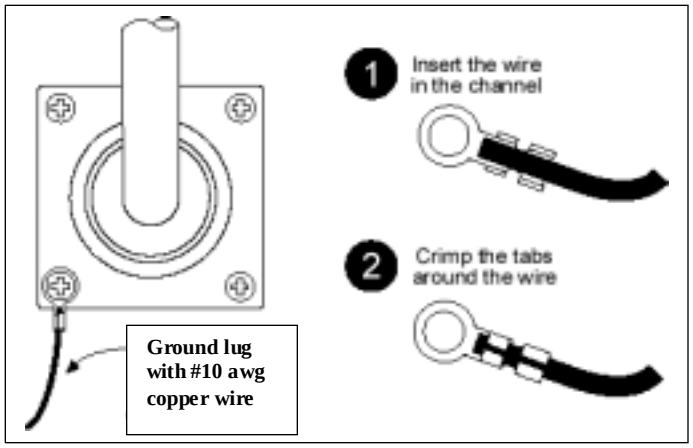

Figure 5-17 Mounting Pole with Ground Lug

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

SECTION 6

AB-Access Extender Installation

6 AB-Access Extender Installation

6.1 Before You Start

This section lists the information you need on-hand before you can install a Base Station.

6.2 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 for future reference the MAC address found on the EX unit BEFORE you install it.

6.2.1 Equipment Required

Table 6-1 lists the tools and equipment you will need to install AB-Access Extender units.

Table 6-1 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	

TBD: Update this section for AB-Access Extender

6.3 AB-Access Extender

Table 6-2 lists the main components of an AB-Access Extender.

Table 6-2 EX Components

Item	Quantity	Notes
Outdoor transceiver	1	See item 1 in Figure 6-2
Mounting pole	1	See item 2 in Figure 6-2
Pole clamp	1	See item 3 in Figure 6-2
M6 washer	2	See item 4 in Figure 6-2
M3 x M10 machine thread screws	2	See item 5 in Figure 6-2
Grounding lug	2	See item 6 in Figure 6-2
Indoor junction box	1	6-way rack-mounted unit
Power supply and cord	1	

TBD: Update this section for AB-Access Extender

TBD: Update this section for AB-Access Extender – need image of Extender

Figure 6-1 Outdoor AB-Access Extender Components

6.4 Indoor Patch Panel

Figure 6-2 shows the Base Station Access Panel used as an indoor patch panel.

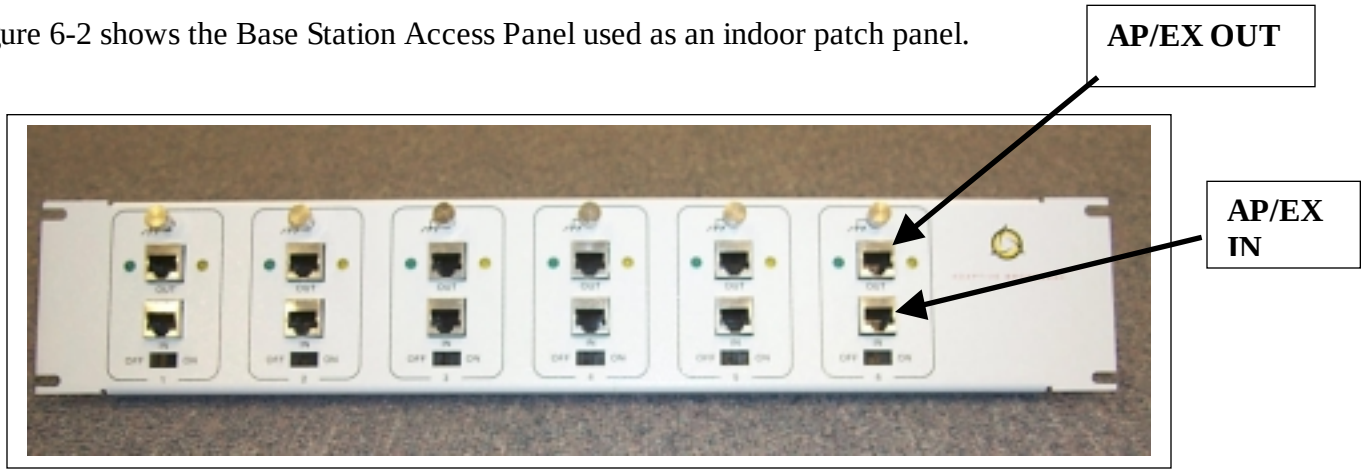

Figure 6-2 Access Panel used as Patch Panel

6.5 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.

6.5.1 Overview

Following are the installation steps you will perform:

6. Install the mounting poles.
7. Mount the outdoor transceivers.
8. Mount the access panel.
9. Ground the outdoor transceivers and access panel
10. Connect the interconnect cables.

6.5.2 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 6.6.3.

6.5.3 Installing On An Antenna Mast

TBD: Update this section for AB-Access Extender

4. Position the mounting pole on the antenna mast.
5. 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.
6. Tighten nuts equally until mounting pole is secure and cannot rotate.

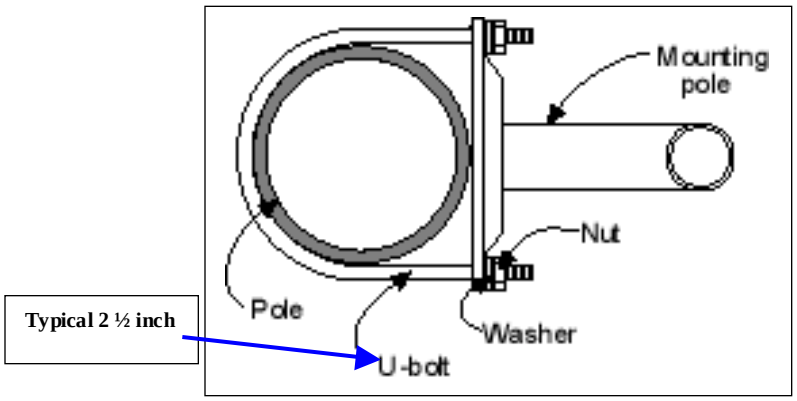

Figure 6-3 Mounting Pole Installed on Pole or Antenna Mast

6.5.4 Installing On Brick Or Masonry

7. Place the mounting plate against the wall. Use a level or plumb line to set the mounting pole perpendicular to the ground.
8. Mark the hole locations.
9. Set the pole aside.
10. Drill ¼ inch holes at the marked locations. Drill the holes approximately ½ inch deep.
11. Insert the expansion shields into the drilled holes and tap them home.
12. Align the mounting pole with the drilled holes and fix with the lag bolts.

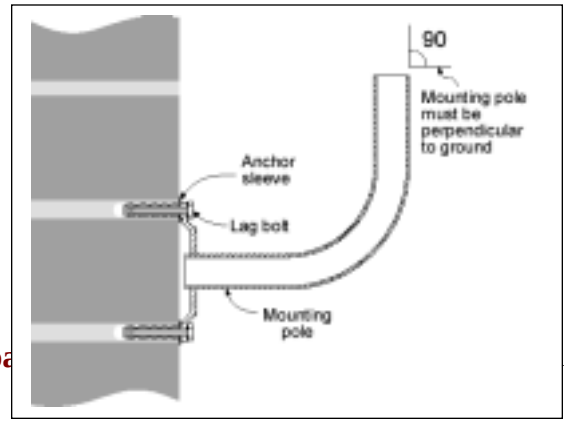

Figure 6-4 Mounting Pole Installation

6.5.5 Installing On A Wall With Wood Siding

6. Place the mounting plate against the wall.
7. Using a level, be sure that the mounting pole is perpendicular to the ground. You may need to use spacers, as shown in Figure 6-6.
8. Mark the hole locations for the drilled hole locations. Remove the mounting pole and set aside.
9. Drill 1/8-inch holes in the places marked.
10. Use #10 or #12 wood screws to secure the mounting pole to the wall and tighten.

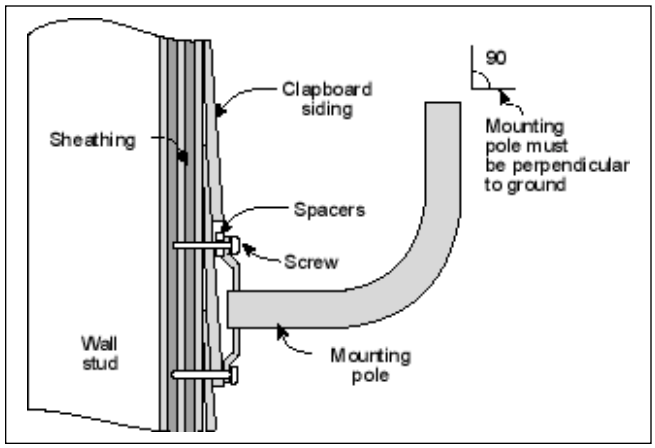

Figure 6-5 Mounting Pole on Clapboard Siding

6.6 Mounting The Outdoor AB-Access Extender

Now that you have installed the mounting pole, you are ready to install the AB-Access Extender onto the mounting poles. Reference Figures 6-7 through 6-10.

TBD: Update this section for AB-Access Extender – image of extender on mounting

Figure 6-6 Mounting Parts for an Outdoor AB-Access Extender

6. Place the outdoor AB-Access Extender on the mounting pole.
7. Align the pole clamp with the mounting holes.
8. Insert the mounting screws and hand tighten.
9. Rotate the outdoor AB-Access Extender so it is pointing in the correct direction.
10. Tighten the mounting screws.

TBD: Update this section for AB-Access Extender – photo of rear of Extender

Figure 6-7 AB-Access Extender Rear View

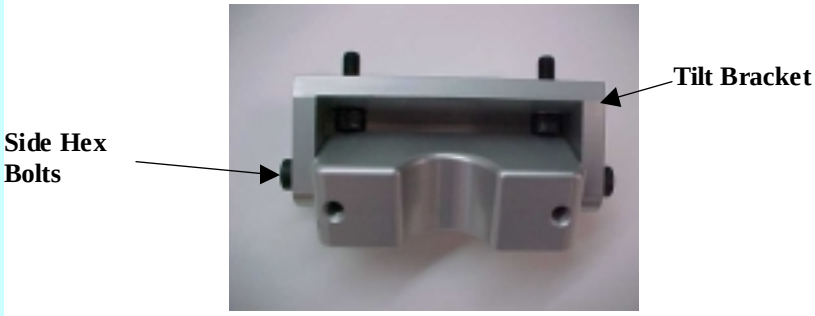

Figure 6-8 Tilt Bracket

TBD: Update this section for AB-Access Extender – insert photo of correct tilt bracket for Extender

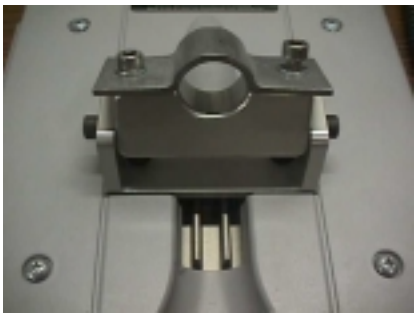

Figure 6-9 AB-Access Extender with Mounted Tilt Bracket

TBD: Update this section for AB-Access Extender – insert photo of correct tilt bracket connected to Extender

6.6.1 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).

6.6.2 Installing The Interconnect Cables

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

6.6.2.1 Route The Cables

4. Select where the cable will enter the building from the outside.
5. 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.
6. Route the cable.

6.6.2.2 Install the Interconnect Cables (Transceiver End)

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

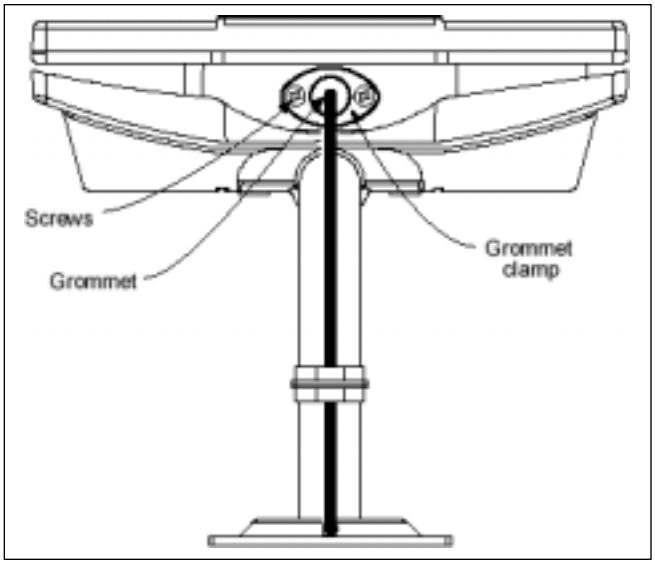

Figure 6-10 Grommet Location - Underside of AB-Access Extender

TBD: Update this section for AB-Access Extender – insert graphic of underside of Extender showing cable routing

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

4. Insert the cable end through the grommet clamping plate (Figure 6-11)
5. Insert the cable end through the grommet. The tapered end of the grommet should be opposite the cable end.
6. 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.
7. 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 Figures 6-12 and 6-13.

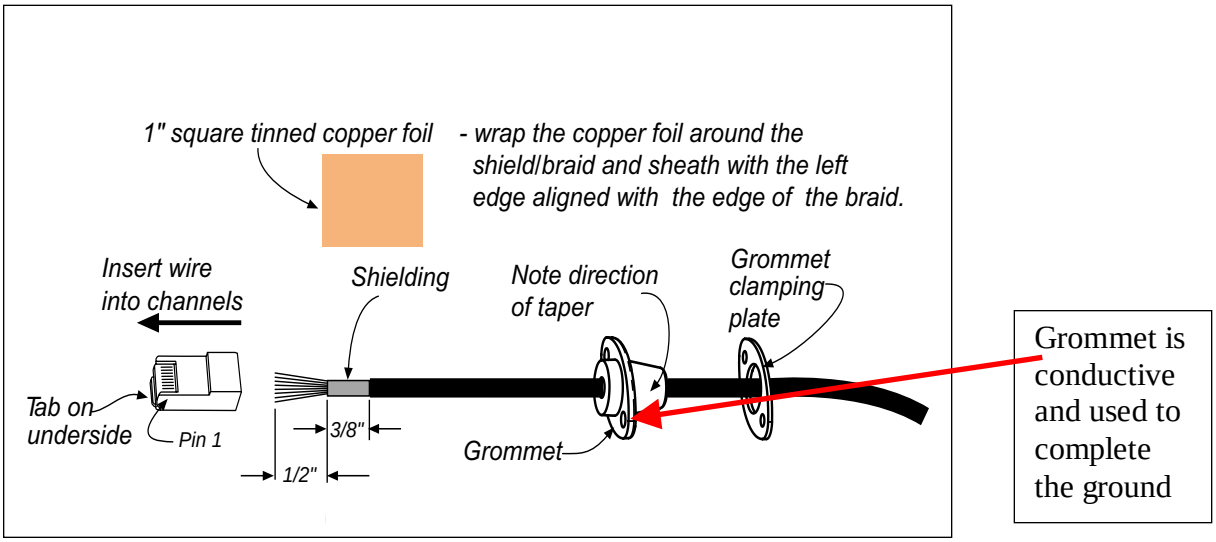

Figure 6-11 Outdoor Transceiver End of the Interconnect Cable with Cable Preparation

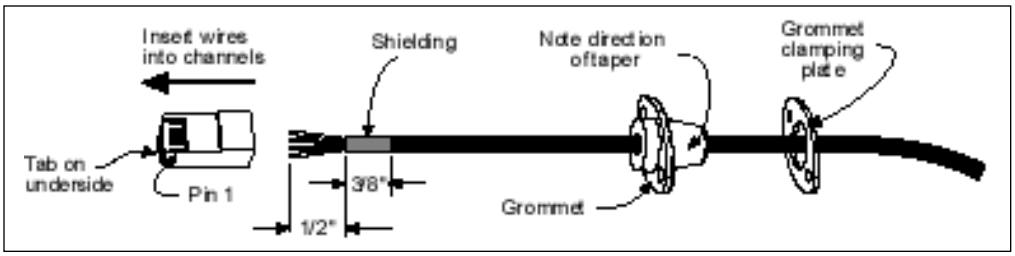

Figure 6-12 Outdoor Transceiver End of the Interconnect Cable with Shielding

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

Table 6-3 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. 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.
13. Slide the grommet up the cable and press it into the bottom of the outdoor EX.
14. Slide the grommet clamp up the cable and align the holes with the mounting holes on the bottom of the outdoor transceiver.
15. 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.
16. Secure the interconnect cable to the mounting pole with the cable clip as shown in Figure 6-14.

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.

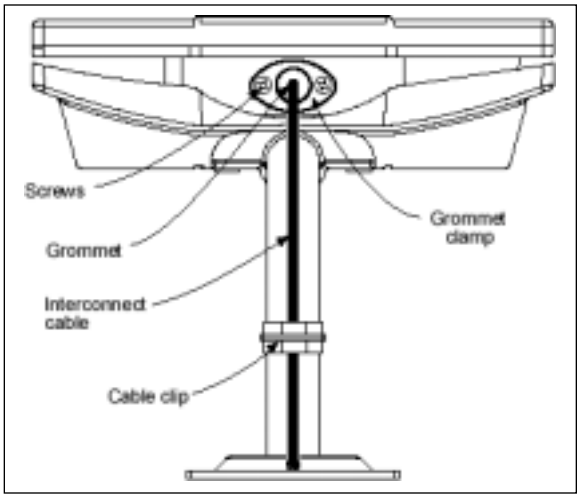

Figure 6-13 Interconnect Cable Installation to Outdoor AB-Access Extender - Bottom View

TBD: Update this section for AB-Access Extender – insert graphic for AB-Access Extender bottom view with cable routing

6.6.2.3 Installing The Interconnect Cables to Access Panel

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

3. Install an RJ-45 connector to the junction box end of the cable, following the previous steps 6 through 12.
4. Plug the RJ-45 into one of the upper ports in the Access Panel junction box.

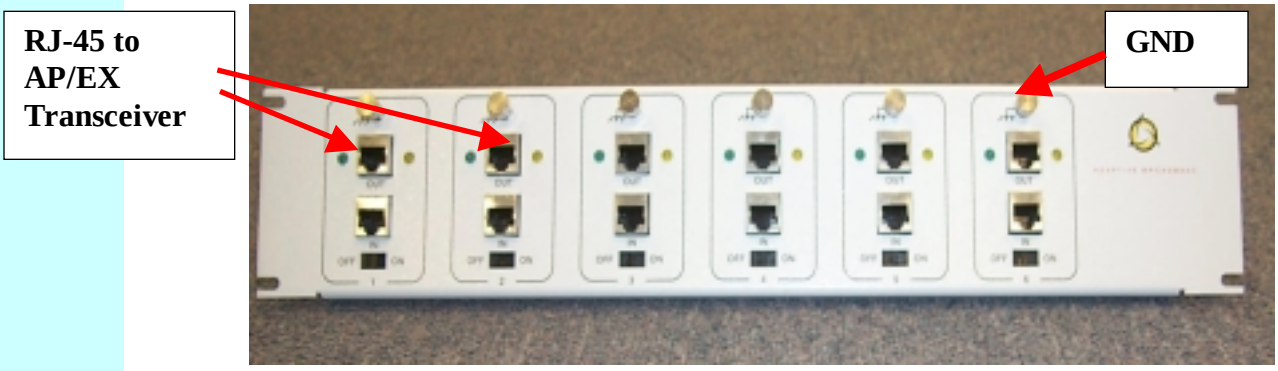

Figure 6-14 Access Panel showing Connections to AP/EX

6.6.2.4 Mark the AB-Access Extender Cables

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

2. 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.

6.6.3 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:

8. Grounding all the outdoor transceivers as shown in Figure 6-14.
9. Grounding the Access Panel to the rack.

6.6.3.1 Grounding the Outdoor AB-Access Extender

8. Place the grounding rod so as to allow for the shortest possible path from the grounding cable to the outdoor AB-Access Extender.
9. Drive the grounding rod into the ground at least eight inches from the ground surface.
10. 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 6-16.

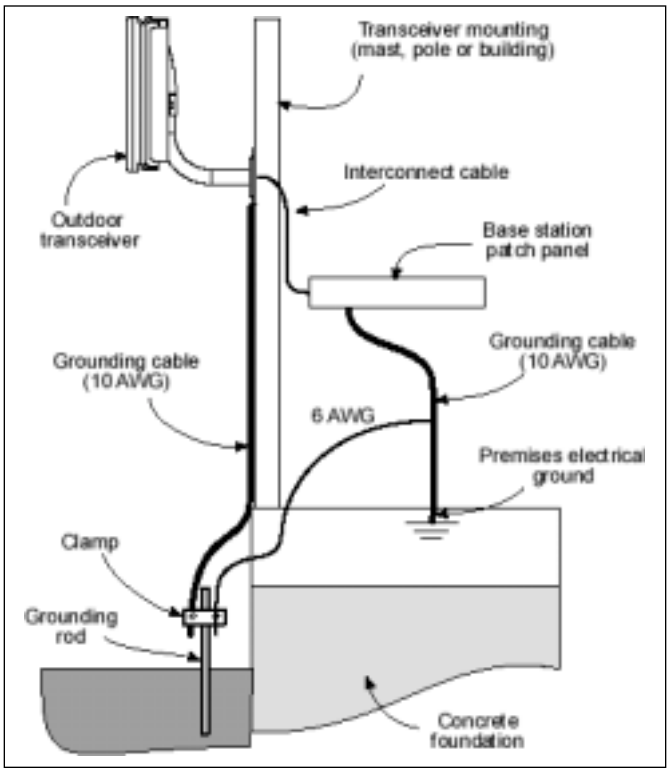

Figure 6-15 Ground Connections to AB-Access Extender Transceiver

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.

11. Connect a ground lug to one end of the grounding wire.
12. 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.
13. Attach the grounding wire to the clamp on the grounding rod, reference Figure 6-17. If necessary, use wire staples to secure the grounding wire to the outside wall.

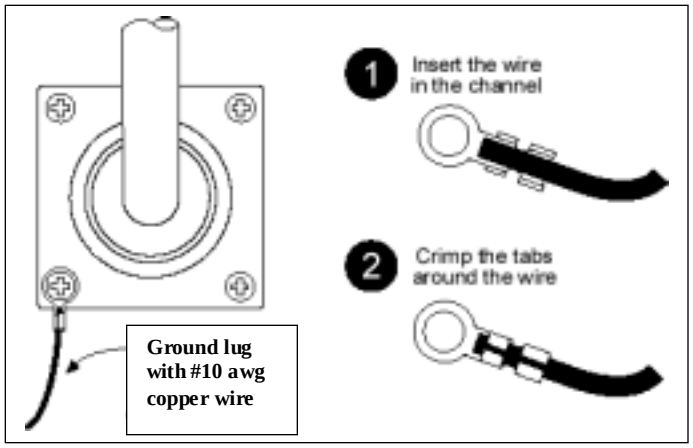

Figure 6-16 Mounting Pole with Ground Lug

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