BreezeACCESS® VL

System Manual

PRELIMINARY

SW Version 4.5
May 2007
P/N

Document History

Topic	Description	Version/Date Issued
FIPS 197 Sections: 4.2.5.6.3, 4.2.6.7	Optional support (under license) of FIPS 197 compliant encryption	SW Version 4.0, July 2006
4.9 GHz B&B models Section: 1.4, 1.7.1, 1.7.5.1.1, 1.7.5.4.1	AU/SU with 25dBi antennas for point-to-point links in the 4.9 GHz band	SW Version 4.0, July 2006
AUS functionality change Section: 1.2, 4.2.6.2.12	AUS can support up to 8 SU-3/SU-6 units (increased from 5)	SW Version 4.0, July 2006
IDU-ODU Cable Section 2.1.2	Update of maximum length of IDU-ODU cable	SW Version 4.0, July 2006
Frequency configuration Section 4.2.6.2.3.1, 4.2.6.2.5	Improved mechanism for automatic detection of frequency/bandwidth. Removed parameters: Sub Band select (SU), Frequency Subset Definition (SU). New parameters: User Defined Frequency Subsets.	SW Version 4.0, July 2006
Transmit Power, Maximum Transmit Power Section 4.2.6.2.8	Simplified configuration mechanism: A single parameter instead of per-modulation level parameters.	SW Version 4.0, July 2006
5.3 FCC limitations Section 4.2.6.2.4.1	Update Tx Power limitations for compliance with FCC regulations	SW Version 4.0, July 2006
Per SU Distance Learning Section 4.2.5.6.2, 4.2.6.2.10	New feature	SW Version 4.0, July 2006
ATPC Delta from Minimum SNR Level Section 4.2.6.2.8.3.3	Default values updated	SW Version 4.0, July 2006
Tx Control Section 4.2.6.2.8.5	Added option: Ethernet Status Control	SW Version 4.0, July 2006

Topic	Description	Version/Date Issued
Lost Beacons Transmission Watchdog Threshold Section 4.2.6.2.16	New feature	SW Version 4.0, July 2006
Service Provider Link (VLAN QinQ) Section 4.2.6.4.1	New feature Service Provider Link option added to VLAN Link Type. New parameters: Service Provider VLAN ID, VLAN QinQ Protocol Ethertpe.	SW Version 4.0, July 2006
MAC Address List Section 4.2.6.4.7	Improved functionality. New parameter: MAC Address List Action	SW Version 4.0, July 2006
Concatenation Section 4.2.6.5.10	Improved mechanism. New parameter: Maximum Concatenated Frame Size. Removed: Maximum Number of Frames	SW Version 4.0, July 2006
MIR Table 4-12,	Changes in values of Downlink MIR for SU-3, SU-6	SW Version 4.0, July 2006
IP Precedence Threshold Section 4.2.6.6.3.2.2	Default value updated	SW Version 4.0, July 2006
DSCP Threshold Section 4.2.6.6.3.2.3	Default value updated	SW Version 4.0, July 2006
Low Priority Traffic Minimum Percent Section 4.2.6.6.3.4	New feature	SW Version 4.0, July 2006
DRAP support Section 4.2.6.6.4	New feature	SW Version 4.0, July 2006
Gateways Table Section 4.2.5.4.1	New – display of existing gateways when DRAP is enabled.	SW Version 4.0, July 2006
Wireless Link Prioritization Section 4.2.6.6.3.5	New feature	SW Version 4.0, July 2006
FTP Client IP Address	Changed functionality	SW Version 4.0,

Topic	Description	Version/Date Issued
Sections 4.2.3.6, 4.2.3.7	(read only, set to unit's IP Address)	July 2006
FTP Server IP Address Sections 4.2.3.6, 4.2.3.7, 4.2.3.11.4	Changed default to 10.0.0.253	SW Version 4.0, July 2006
Number of HW Retries Section 4.2.6.5.7	Maximum value was changed from 15 to 14	SW Version 4.0, July 2006
Ethernet packet length Section 4.2.5.1.1	Updated maximum length	SW Version 4.0, July 2006
Basic Parameters Table Table 3-1	Updated according to applicable changes (new/removed parameters)	SW Version 4.0, July 2006
Parameters that are not reset to default value after Set Complete Factory/Operator Defaults Table 4-2	Updated according to applicable changes (new/removed parameters)	SW Version 4.0, July 2006
Parameters that are not reset to default value after Set Partial Factory/Operator Defaults Table 4-3	Updated according to applicable changes (new/removed parameters)	SW Version 4.0, July 2006
Basic Configuration Menu Section 4.2.4	Updated according to applicable changes (new/removed parameters)	SW Version 4.0, July 2006
MIB (Appendix E)	Updated according to applicable changes (new/removed parameters)	SW Version 4.0, July 2006
Parameters Summary (Appendix F)	Updated according to applicable changes (new/removed parameters)	SW Version 4.0, July 2006
Using the Feature License Web Application	Removed (previously Appendix G) – Available as a separate document.	SW Version 4.0, July 2006
New Subscriber Unit: SU-A-ODU	Added New SU-A-ODU and accessories	SW Version 4.0 Rev. B August 2006

Topic	Description	Version/Date Issued
New Subscriber Unit: SU-I	Added new unit – SU-I, and accessories	SW Version 4.0 Rev. C August 2006
SU-A-H removed Sections 1.3.1, 1.7.1, 1.7.5.1.1, 2.1.1.1	SU-A-H (SU with horizonally polarized integrated antenna) was removed from products list)	SW Version 4.0.27 October 2006
IDU PS1036 removed from Manual. Sections 1.7.5.1, 1.7.5.4, 2.4, 3.5.2	Replaced by PS1073	SW Version 4.0.27 October 2006
Q in Q (Service Provider Link) improvements. Sections 4.2.6.4.1.2, 4.2.6.4.1.3.4, 4.2.6.4.1.8, MIB (Appendix E), Parameters Summary (Appendix F)	Improved handling of management frames. Support of Ethertypes 9100, 9200 (hex).	SW Version 4.0.27 October 2006
DRAP UDP Port Section 4.2.6.6.4.2, Parameters Summary (Appendix F)	Default changed to 8171	SW Version 4.0.27 October 2006
MIR/CIR parameters of SU-I Table 4-12, Table 4-13, MIB (Appendix E), Parameters Summary (Appendix F)	Updated	SW Version 4.0.27 February 2007
AUS supports also SU-I Section 1.2	Updated functionality	SW Version 4.0.27 February 2007
Password Recovery Section 4.1.1	New feature – a procedure for password recovery if password was lost/forgotten.	SW Version 4.0.27 February 2007
AP Client IP Address Sections 4.2.6.3.8, Table 4-3, MIB (Appendix E), Parameters Summary (Appendix F)	New feature	SW Version 4.0.27 February 2007

Topic	Description	Version/Date Issued
Noise Immunity Control Sections 4.2.6.2.18, Table 4-3, Parameters Summary (Appendix F)	New feature	SW Version 4.0.27 February 2007

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This device complies with Part 15 of the FCC rules.

Operation is subject to the following two conditions:

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

FCC Radio Frequency Interference Statement

The Subscriber Unit equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules and to ETSI EN 301 489-1 rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment notwithstanding use in commercial, business and industrial environments. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

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To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

FCC Radiation Hazard Warning

To comply with FCC RF exposure requirement, the antenna used for this transmitter must be fixed-mounted on outdoor permanent structures with a separation distance of at least 2 meter from all persons, and must not be co-located or operating in conjunction with any other antenna or transmitter.

Industry Canada Antenna Compliance Information

This device has been designed to operate with the antennas listed below, and having a maximum gain of 23 dBi for 5 GHz unlicensed operation, and up to 27 dBi for 4.9 GHz point-to-point operation. The list of antennas used with this product is found in section 1.7.1 of this manual. Antennas not included in this list or having a gain greater than listed here are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

R&TTE Compliance Statement

This equipment complies with the appropriate essential requirements of Article 3 of the R&TTE Directive 1999/5/EC.

Safety Considerations

For the following safety considerations, "Instrument" means the BreezeACCESS VL units' components and their cables.

Caution

To avoid electrical shock, do not perform any servicing unless you are qualified to do so.

Line Voltage

Before connecting this instrument to the power line, make sure that the voltage of the power source matches the requirements of the instrument.

Radio

The instrument transmits radio energy during normal operation. To avoid possible harmful exposure to this energy, do not stand or work for extended periods of time in front of its antenna. The long-term characteristics or the possible physiological effects of Radio Frequency Electromagnetic fields have not been yet fully investigated.

Outdoor Unit and Antenna Installation and Grounding

Ensure that outdoor units, antennas and supporting structures are properly installed to eliminate any physical hazard to either people or property. Make sure that the installation of the outdoor unit, antenna and cables is performed in accordance with all relevant national and local building and safety codes. Even where grounding is not mandatory according to applicable regulation and national codes, it is highly recommended to ensure that the outdoor unit and the antenna mast (when using external antenna) are grounded and suitable lightning protection devices are used so as to provide protection against voltage surges and static charges. In any event, Alvarion is not liable for any injury, damage or regulation violations associated with or caused by installation, grounding or lightning protection.

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About This Manual

This manual describes the BreezeACCESS VL Broadband Wireless Access System Release 4.0.27 and how to install, operate and manage the system components.

This manual is intended for technicians responsible for installing, setting up and operating the BreezeACCESS VL system, and for system administrators responsible for managing the system.

This manual contains the following chapters and appendices:

- **Chapter 1** – System description: Describes the BreezeAccess VL system and its components.
- **Chapter 2** – Installation: Describes how to install the system components.
- **Chapter 3** – Commissioning: Describes how to configure basic parameters, align the Subscriber Unit antenna and validate unit operation.
- **Chapter 4** – Operation and Administration: Describes how to use the BreezeACCESS VL Monitor application for configuring parameters, checking system status and monitoring performance.
- **Appendix A** – Software Version Loading Using TFTP: Describes how to load a new software version using TFTP.
- **Appendix B** – File Download and Upload Using TFTP: Describes how to download and upload configuration files using TFTP. This procedure is also applicable for uploading country code and feature license files.
- **Appendix C** – Using the Set Factory Defaults Utility: Describes how to use the Set Factory Defaults utility to enable management access to units where wrong or unknown configuration disables regular access to the unit for management purposes.
- **Appendix D** – Preparing the indoor to outdoor SU cable: Provides details on preparation of the indoor to outdoor Ethernet cable.
- **Appendix E** – Supported MIBs and Traps: Provides a brief description of the parameters contained in the private MIB agent incorporated into the

BreezeACCESS VL devices. In addition, a description of all traps relevant to the BreezeACCESS VL devices is provided.

- **Appendix F** – Parameters Summary: Provides an at a glance summary of the configuration parameters, value ranges and default values.

- **Appendix G** – Troubleshooting.

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Tables

Chapter 1 - System Description

In This Chapter:

1.1 Introducing BreezeACCESS VL

BreezeACCESS VL is a high capacity, IP services oriented Broadband Wireless Access system. The system employs wireless packet switched data technology to support high-speed IP services including fast Internet and Virtual Private Networks. BreezeACCESS VL users are provided with a network connection that is always on, supporting immediate access to the Internet and other IP services at high data rates. The system is designed for cellular-like deployment, enabling the system architecture to vary in size and structure. A system can include any number of cells, each containing several Access Units for better coverage of densely populated areas.

BreezeACCESS VL can support sensitive applications through authentication and/or data encryption utilizing WEP or AES algorithm with 128-bit keys. FIPS (Federal Information Processing Standards) 197 certified encryption algorithm is optionally available for Access Units with HW revision C and higher (except to AUS units). The system supports Virtual LANs based on IEEE 802.1Q, enabling secure operation and Virtual Private Network (VPN) services and enabling tele-workers or remote offices to conveniently access their enterprise network. The system supports layer-2 traffic prioritization based on IEEE 802.1p and layer-3 traffic prioritization based on either IP ToS Precedence (RFC791) or DSCP (RFC2474). It also supports traffic prioritization based on UDP and/or TCP port ranges. In addition, it may use the optional Wireless Link Prioritization (WLP) feature to fully support delay sensitive applications, enabling Multimedia Application Prioritization (MAP) for high performance voice and video. The implementation of MAP through the unique WLP protocol revolutionizes the business model by increasing, for example, the number of simultaneous VoIP calls per sector by as much as 500%.

BreezeACCESS VL products operate in unlicensed frequency bands in Time Division Duplex (TDD) mode, using Orthogonal Frequency Division Multiplexing (OFDM) modulation with Forward Error Correction (FEC) coding. Using the enhanced multi-path resistance capabilities of OFDM modem technology, BreezeACCESS VL enables operation in near and non-line-of-sight (NLOS) environments. These qualities enable service providers to reach a previously inaccessible and broader segment of the subscriber population.

BreezeACCESS VL is designed to enable construction of “mixed” cells, where it can be used together with other BreezeACCESS products using GFSK modulation, including BreezeACCESS II, BreezeACCESS MMDS, BreezeACCESS XL and BreezeACCESS V.

BreezeACCESS VL products are currently available in the following frequency bands:

Table 1-1: Frequency Bands	
Band	**Frequencies (GHz)**
4.9	4.900 – 5.100
5.2	5.150 – 5.350
5.3	5.250 – 5.350
5.4	5.470 – 5.725
5.8	5.725 – 5.850

The available frequencies, as well as other parameters, depend on applicable local regulations. The actual operating frequencies used by the system can be configured according to applicable radio regulations and specific deployment considerations.

A BreezeACCESS VL system comprises the following:

- **Customer Premise Equipment (CPE):** BreezeACCESS VL Subscriber Units (SUs).
- **Base Station Equipment (BS):** BreezeACCESS VL Access Units and supporting equipment.
- **Networking Equipment:** Standard Switches/Routers supporting connections to the backbone and/or Internet.
- **Management Systems:** SNMP-based Management, Billing and Customer Care, and other Operation Support Systems.

1.2 Base Station Equipment

The Access Units, installed at the Base Station site, provide all the functionality necessary to communicate with the Subscriber Units and to connect to the backbone of the Service Provider.

There are 2 lines of Access Units with different architectures:

- Modular Base Station Equipment
- Standalone “Micro-Cell” Access Unit

1.2.1 Modular Base Station Equipment

The Base Station Equipment is based on the BS-SH 3U chassis, which is suitable for installation in 19-inch racks. The chassis contains one or two Power Supply modules and has 8 slots that can accommodate BS-AU Network Interface modules. These slots can also accommodate various combinations of other modules, including Network Interface (BS-AU) modules for Access Units operating in any of the bands supported by BreezeACCESS equipment using GFSK modulation, including BreezeACCESS II, BreezeACCESS MMDS, BreezeACCESS XL and BreezeACCESS V. It can also accommodate a BS-GU GPS and Alarms module to support GPS-based synchronization of BreezeACCESS systems using Frequency Hopping radios.

Two different types of power supply modules are available for the BreezeACCESS VL modules: The BS-PS-DC that is powered from a -48 VDC power source, and the BS-PS-AC, powered from the 110/220 VAC mains. The optional use of two power supply modules ensures fail-safe operation through power supply redundancy. When the same chassis is used also for Access Unit modules belonging to other BreezeACCESS families using GFSK modulation, then one BS-PS power supply (AC or DC) should be used to provide power to the BreezeACCESS VL Access Units, and a different power supply module, suitable for GFSK equipment, is required for powering the BreezeACCESS GFSK Access Units.

Each BS-AU module, together with its outdoor AU-D/E-BS-ODU radio unit and an antenna comprise an AU-D/E-BS Access Unit that serves a single sector. There are two types of Access Units, differing in the maximum number of Subscriber Units that they can serve:

- The AU-BS Access Unit can serve up to 512 Subscriber Units (124 when Data Encryption is used).
- The AUS-BS Access Unit can serve up to 8 SU-3 and/or SU-6 and/or SU-I Subscriber Units.

NOTE

For convenience, all references to AU-BS are applicable also for AUS-BS, unless explicitly stated otherwise.

The AU-D/E-BS-ODU outdoor unit contains the processing and radio modules and connects to an external antenna using a short RF cable.

E model units are supplied without an antenna.

D model units are supplied with a detached antenna, where the available antennas are listed in Table 1-2.

This device has been designed to operate with the antennas listed below, and having a maximum gain of 28dBi. Antennas not included in this list or having a gain greater than 28 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

Table 1-2: AU Detached Antennas

Antenna	Band (GHz)	Horizontal Beam Width	Gain (dBi)
AU-Ant-5G-16-60	5.150-5.875	60°	16
AU-Ant-5G-17-90	5.150-5.875	90°	17
AU-Ant-5G-15-120	5.150-5.875	120°	15
AU-Ant-4.9G-15-120	4.900-5.100	120°	15
AU-Ant-4.9G-9-Omni	4.900-5.100	360°	9
AU-Ant-5.8G-8-Omni	5.725-5.875	360°	8
AU-Ant 5.8G-14-120-UK (The antenna pattern complies with Ofcom's IR 2007 EIRP profiles)	5.725-5.850	120°	14

The BS-AU indoor module connects to the network through a standard IEEE 802.3 Ethernet 10/100BaseT (RJ 45) interface. The indoor module is connected to the outdoor unit via a Category 5E Ethernet cable. This cable carries Ethernet

traffic between the indoor module and the outdoor unit, and also transfers power (54 VDC) and control from the indoor module to the outdoor unit.

1.2.2 Standalone "Micro-cell" Access Unit

The standalone AU-D/E-SA Access Unit is very similar to the AU-D/E-BS unit. The AU-D/E-SA-ODU outdoor unit is very similar to the AU-D/E-BS-ODU outdoor unit (identical functionality, but the units are not interchangeable). The available antennas for D model units are the same as those of the AU-D-BS Access Unit. The main difference is in the structure of the indoor part; in the AU-D/E-SA Access Unit the indoor unit is a standalone desktop or wall-mountable unit (the same Universal IDU that is also used in the SU) rather than a 19" module.

There are two types of Standalone Access Units, differing in the maximum number of Subscriber Units that they can serve:

- The AU-SA Access Unit can serve up to 512 Subscriber Units (124 when Data Encryption is used).
- The AUS-SA Access Unit can serve up to 8 SU-3 and/or SU-6 and/or SU-I Subscriber Units.

NOTE

For convenience, all references to AU-SA are applicable also for AUS-SA, unless explicitly stated otherwise.

The IDU connects to the network through a standard IEEE 802.3 Ethernet 10/100BaseT (RJ 45) interfaces and is powered from the 110/220 VAC mains. The indoor unit is connected to the outdoor unit via a Category 5 Ethernet cable. This cable carries Ethernet traffic between the indoor and the outdoor units, and also transfers power (54 VDC) and control from the indoor unit to the outdoor unit.

NOTE

The AU-D/E-SA-ODU and the AU-D/E-BS-ODU are not interchangeable:
The AU-D/E-SA-ODU cannot be used with the BS-AU; the AU-D/E-BS-ODU cannot be used with the standalone IDU.

1.3 Subscriber Unit

The Subscriber Unit (SU) installed at the customer premises enables the customer data connection to the Access Unit. The Subscriber Unit provides an efficient platform for high speed Internet and Intranet services. The use of packet switching technology provides the user with a connection to the network that is always on, enabling immediate access to services.

There are two types of Subscriber Units:

- The SU-A/E series, where each unit comprises an Indoor Unit and an Outdoor Unit (with or without an integrated antenna). These products are intended for installation by a professional installer, enabling long-range connectivity.

- The SU-I series of all-indoor Subscriber Unit, intended for installation by non-professional end users in locations that are close to the Base Station.

In addition, there is a special variant of a Subscriber Unit, the SU-E-BS, where the indoor unit is designed for installation in the Base Station chassis. The SU-E-BS is intended primarily for backhauling or similar applications.

The following sections provides additional details on the various types of Subscriber Units.

1.3.1 SU-A/E Subscriber Units

The SU-A/E Subscriber Unit comprises a desktop or wall-mountable Indoor Unit (IDU) and an outdoor unit that contains the processing and radio modules. Several ODU types are available to support a wide range of requirements, as detailed in Table 1-3:

Table 1-3: Subscriber Unit ODU Types

SU Type	Antenna Description
SU-A-ODU	Vertically polarized high-gain flat antenna integrated on the front panel
New SU-A-ODU	Vertically/horizontally polarized high-gain flat antenna integrated on the front panel. The smaller size new SU-A-ODU is available in the 5.4 GHz and 5.8 GHz bands.
SU-E-ODU	A connection to an external antenna (not included)

SU-A-ODU and IDU

New SU-A-ODU

For each ODU type, several models are available to support various end-users needs and applications, as detailed in Table 1-4:

Table 1-4: SU-A/E Subscriber Unit Types

SU Type	Description
SU-54-BD	A high-rate CPE that supports a full LAN
SU-6-1D	A medium rate CPE that supports a single Ethernet device (one MAC address)
SU-6-BD	A medium rate CPE that supports a full LAN
SU-3-1D	An entry level CPE that supports a single Ethernet device (one MAC address)

NOTE

Although the achievable throughput for SU-3/SU-6 is lower than that of SU-54, these units use all modulation levels and may have bursts at up to 54 Mbps.

The IDU provides the interface to the user's equipment and is powered from the 110/220 VAC mains. The customer's data equipment is connected via a standard IEEE 802.3 Ethernet 10/100BaseT (RJ 45) interface. The indoor unit is connected to the outdoor unit via a Category 5 Ethernet cable. This cable carries Ethernet traffic between the indoor and the outdoor units, and also transfers power (54 VDC) and control from the indoor unit to the outdoor unit.

1.3.2 SU-I Subscriber Units

The SU-I is a compact Subscriber Unit intended for indoor installations by a non-professional user. The SU-I connects to a detached wall/window mountable antenna, and is available in the following configurations:

Table 1-5: SU-I Subscriber Units	
SU-I Configuration	**Description**
SU-I-D	All-indoor medium rate CPE supporting a full LAN, and a wall/window antenna kit
SU-I-E	All-indoor medium rate CPE supporting a full LAN (antenna not included)

The SU-I is currently available in the 5.4 GHz and 5.8 GHz bands.

NOTE

It is recommended to pre-configure the units prior to shipment to end-users.

1.3.3 The SU-E-BS

The SU-E-BS is a special variant of a Subscriber Unit, where the indoor unit is designed for installation in the Base Station chassis. The outdoor unit is an SU-E-ODU, with a connection to an external antenna.

The SU-E-BS is intended primarily for backhauling or similar applications, including applications where it is used in conjunction with a GFSK-based system. The functionality of the LEDs of the module is the same as the LEDS of a regular AU-IDU module (with one minor exception-the W-LNK LED indicates whether the SU is associated with an AU).

1.4 BreezeACCESS VL B&B (4.9 GHz only)

BreezeACCESS VL B&B is available in the 4.9 GHz band to support point-to-point applications. A B&B point-to-point link includes:

- AU-D-SA-4.9-6-VL: A standalone AU with a 25 dBi, 6° high gain directional antenna.
- SU-D-4.9-54-BD-VL: SU-54-BD with a 25 dBi, 6° high gain directional antenna.

1.5 Networking Equipment

The Base Station equipment is connected to the backbone through standard data communication and telecommunication equipment. The 10/100BaseT ports of the AU modules can be connected directly to a multi-port router or to an Ethernet switch connected to a router.

The point-to-point link from the Base Station to the backbone can be either wired or wireless. Data to the Internet is routed to the backbone through standard routers.

1.6 Management Systems

The end-to-end IP-based architecture of the system enables full management of all components, from any point in the system. BreezeACCESS VL components can be managed using standard management tools through SNMP agents that implement standard and proprietary MIBs for remote setting of operational modes and parameters. The same SNMP management tools can also be used to manage other system components including switches, routers and transmission equipment. Security features incorporated in BreezeACCESS VL units restrict access for management purposes to specific IP addresses and/or directions, that is, from the Ethernet and/or wireless link.

In addition, the Ethernet WAN can be used to connect to other Operation Support Systems including servers, Customer Care systems and AAA (Authentication, Authorization and Admission) tools.

1.6.1 BreezeCONFIG™

The BreezeCONFIG for BreezeACCESS VL utility is an SNMP-based application designed to manage BreezeACCESS VL system components and upgrade unit software versions. The system administrator can use the BreezeCONFIG utility to control a large number of units from a single location. In addition, BreezeCONFIG enables you to load an updated configuration file to multiple units simultaneously, thus radically reducing the time spent on unit configuration maintenance.

1.6.2 AlvariSTAR™

AlvariSTAR is a comprehensive Carrier-Class network management system for Alvarion's Broadband Wireless Access products-based Networks. AlvariSTAR is designed for today's most advanced Service Provider network Operation Centers (NOCs), providing the network Operation, Administration and Maintenance (OA&M) staff and managers with all the network surveillance, monitoring and configuration capabilities that they require in order to effectively manage the BWA network while keeping the resources and expenses at a minimum.

AlvariSTAR is designed to offer the network's OA&M staff with a unified, scalable and distributable network management system. The AlvariSTAR system uses a distributed client-server architecture, which provides the service provider with a robust, scalable and fully redundant network management system in which all single points of failure can be avoided.

AlvariSTAR provides the following BWA network management functionality:

- Device Discovery
- Device Inventory
- Topology
- Fault Management
- Configuration Management
- Performance Monitoring
- Device embedded software upgrade
- Security Management
- Northbound interface to other Network Management Systems or OSS.

Embedded with the entire knowledge base of BWA network operations, AlvariSTAR is a unique state-of-the-art power multiplier in the hands of the service provider that enables the provisioning of satisfied customers. AlvariSTAR dramatically extends the abilities of the service provider to provide a rich portfolio of services and to support rapid customer base expansion.

1.7 Specifications

1.7.1 Radio

Table 1-6: Radio Specifications

Item	Description
Frequency[1]	■ 4.9 GHz Family: 4.900 – 5.100 GHz ■ 5.2 GHz Family: 5.150 – 5.350 GHz ■ 5.3 GHz Family: 5.250 – 5.350 GHz ■ 5.4 GHz Family: 5.470 – 5.725 GHz ■ 5.8 GHz Family: 5.725 – 5.850 GHz
Operation Mode	Time Division Duplex (TDD)
Channel Bandwidth[1]	■ 20 MHz ■ 10 MHz (HW Revision C and higher)
Central Frequency Resolution	■ 10 MHz for HW Revision A and B ■ 5 MHz for HW Revision C and higher
Antenna Port	■ AU-D-BS/SA-ODU, SU-E-ODU: N-Type jack, 50 ohm ■ SU-I: SMA jack, 50 ohm
Max. Input Power (at antenna port)	■ HW Revision A: -48 dBm typical ■ HW Revision B and higher: -30 dBm typical
Maximum Output Power[2]	21 dBm
SU-A-ODU Integral Antenna	21 dBi typical in the 5.150-5.875 GHz band, 20 dBi in the 4.9-5.1 GHz band. 10.5° horizontal x 10.5° vertical, vertical polarization, compliant with EN 302 085 V1.1.1 Range 1, Class TS 1, 2, 3, 4, 5
New SU-A-ODU Integral Antenna (5.4/5.8 GHz)	22 +/- 1 dBi typical in the 5.250-5.875 GHz band, 14° horizontal x 14° vertical, vertical/horizontal polarization, compliant with EN 302 085 V1.2.2 (2003-08) Range 1, RoHS [6]
SU-I-D Detached Antenna	15 dBi typical net (excluding cable loss) in the 5.150-5.875 GHz band, 45°~55° horizontal x 10°~12° vertical, vertical polarization, RoHS compliant
AU-D Detached Antennas	■ AU-Ant-5G-16-60: 16 dBi typical, 5.150-5.875 GHz, 60° horizontal x 10° vertical sector antenna, vertical polarization, compliant with EN 302 085 V1.1.2 CS3

Table 1-6: Radio Specifications

Item	Description			
	■ AU-Ant-5G-17-90: 17 dBi typical, 5.150-5.875 GHz, 90° horizontal x 6° vertical sector antenna, vertical polarization, compliant with EN 302 085 V1.1.2 CS3 ■ AU-Ant-5G-15-120: 15 dBi typical, 5.150-5.875 GHz, 120° horizontal x 6° vertical sector antenna, vertical polarization, compliant with EN 302 085 V1.1.2 CS3. ■ AU-Ant-4.9G-15-120: 15 dBi typical, 4.900-5.100 GHz, 124° horizontal x 6.5° vertical sector antenna, vertical polarization, compliant with EN 302 085 V1.1.2 CS3. ■ AU-Ant-4.9G-9-Omni: 9 dB typical i, 4.900-5.100 GHz, 360° horizontal x 8° vertical, vertical polarization. ■ AU-Ant-5.4G-8-Omni: 8 dBi typical, 5.150-5.725 GHz, 360° horizontal x 4.5° vertical, vertical polarization. ■ AU-Ant-5.8G-8-Omni: 8 dBi typical, 5.725-5.875 GHz, 360 ° horizontal x 9° vertical, vertical polarization. ■ AU-Ant-5.8G-14-120-UK: 14dBi typical, 5.725-5.850 GHz, 120° horizontal x 6.5° vertical sector antenna, vertical polarization. The antenna pattern complies with Ofcom's IR 2007 EIRP profiles.			
Sensitivity, Minimum (dBm at antenna port, PER<10%, 20 MHz bandwidth[3])	Modulation Level[4]	Sensitivity (HW Rev. A)	Sensitivity (HW Rev. B and higher)	Minimum SNR
	1	-87 dBm	-89 dBm	6 dB
	2	-86 dBm	-88 dBm	7 dB
	3	-85 dBm	-86 dBm	9 dB
	4	-83 dBm	-84 dBm	11 dB
	5	-80 dBm	-81 dBm	14 dB
	6	-76 dBm	-77 dBm	18 dB
	7	-71 dBm	-73 dBm	22 dB
	8[5]	-69 dBm	-71 dBm	23 dB
Modulation	OFDM modulation, 64 FFT points; BPSK, QPSK, QAM16, QAM64			

[1] The actual available frequency channels and bandwidth are defined by the selected Sub-Band, which reflects the applicable regulatory constraints. For more details refer to section 4.2.2.4).

[2] The actual maximum available output power for each modulation level is defined by the selected Sub-Band, which reflects the applicable regulatory constraints. For some countries the power may also be limited by limitations on the maximum EIRP (also included in the Sub-Band parameters) and the Antenna Gain parameter. For more details refer to section 4.2.2.4 and to section 4.2.6.2.8.1. For information on specific HW and Country Code limitations, see the Country Codes document.

[3] The sensitivity values are for a bandwidth of 20 MHz. When using a 10 MHz bandwidth, the sensitivity for each modulation level is 3 dB lower.

[4] Modulation Level indicates the radio transmission rate and the modulation scheme. Modulation Level 1 is for the lowest radio rate and modulation scheme.

[5] Modulation Level 8 is supported only in units with HW Revision B and above.

[6] FCC ID: LKT-VL-54 IC: 2514A-VL54

Antenna gain dBi	EBW MHz	calculate	Power 7dBm
20	10	FCC: 21-(20-6) IC: 20.2-(20-6)	FCC: 7 IC: 6.2
20	20	FCC: 24-(20-6) IC: 23.2-(20-6)	FCC: 10 IC: 9.2

FCC ID: LKT-VL-53C iC: 2514A-VL53

Antenna gain dBi	EBW MHz	calculate	Power 7dBm
17	10	FCC: 21-(17-6) IC: 20.2-(17-6)	FCC: 10 IC: 9.2
17	20	FCC: 24-(20-6) IC: 23.2-(20-6)	FCC: 13 IC: 12.2
23	20	FCC: 24-(23-6) IC: 23.2-(23-6)	FCC: 7 IC: 6.2
23	40	24-(23-6)	FCC,IC: 7

FCC ID: LKT-VL-4900 IC: 2514A-BA4900

No	Name	Freq (GHz)	Gain dbi	Model	Type
1	Omni (AU)	4.9-5.1	9	AN1298	MT-462002/NV
2	Flat panel	4.9-5.1	27	-----	MT466003/N
3	Sectorial, 120deg AU	4.9-5.1	15	AN1268	MT-444003/NV
4	Flat panel integral	4.9-5.1	21	AN1293	------

1.7.2 Data Communication

Table 1-7: Data Communication	
Item	Description
Standard compliance	IEEE 802.3 CSMA/CD
VLAN Support	Based on IEEE 802.1Q
Layer-2 Traffic Prioritization	Based on IEEE 802.1p
Layer-3 Traffic Prioritization	■ IP Precedence ToS (RFC791) ■ DSCP (RFC2474)
Layer 4 Traffic Prioritization	UDP/TCP destination ports

1.7.3 Configuration and Management

Table 1-8: Configuration and Management	
Item	**Description**
Management	■ Monitor program via Telnet ■ SNMP ■ Configuration upload/download
Management Access	From Wired LAN, Wireless Link
Management access protection	■ Multilevel password ■ Configuration of remote access direction (from Ethernet only, from wireless link only or from both) ■ Configuration of IP addresses of authorized stations
Security	■ Authentication messages encryption option ■ Data encryption option ■ WEP and AES OCB 128-bit encryption algorithms ■ FIPS 197 certified encryption (optional for Access Units with HW revision C or higher (excluding AUS units), under license) ■ ESSID
SNMP Agents	SNMP ver 1 client MIB II, Bridge MIB, Private BreezeACCESS VL MIB
Allocation of IP parameters	Configurable or automatic (DHCP client)
Software upgrade	■ FTP ■ TFTP
Configuration upload/download	■ FTP ■ TFTP

1.7.4 Standards Compliance, General

Table 1-9: Standards Compliance, General

Type	Standard	
EMC	■ FCC Part 15 class B ■ ETSI EN 300 489-1	
Safety	■ UL 1950 ■ EN 60950	
Environmental	Operation	■ ETS 300 019 part 2-3 class 3.2E for indoor ■ ETS 300 019 part 2-4 class 4.1E for outdoor
	Storage	ETS 300 019-2-1 class 1.2E
	Transportation	ETS 300 019-2-2 class 2.3
Lightning protection (AU-ODU Antenna connection)	EN 61000-4-5, Class 3 (2kV)	
Radio	■ FCC Part 15.247 ■ ETSI EN 300 328 ■ ETSI EN 301 893 (2003-04)	

1.7.5 Physical and Electrical

1.7.5.1 SU-A/E Subscriber Unit

NOTE

In the 5.4 and 5.8 GHz band, the equipment may be shipped with a new, smaller size SU-A-ODU that supports both horizontal and vertical polarization.

1.7.5.1.1 Mechanical

Table 1-10: Mechanical Specifications, SU-A/E Subscriber Unit

Unit	Structure	Dimensions (cm)	Weight (kg)
General	An IDU indoor unit and an ODU outdoor unit with an integral antenna or a connection to an external antenna		
IDU PS1073	Plastic box (black), desktop or wall mountable	14 x 6.6 x 3.5	0.3
SU-A-ODU	Metal box plus an integral cut diamond shaped antenna in a plastic enclosure, pole or wall mountable	41.5 x 36.9 x 6.3	2.3
New SU-A-ODU (5.4/5.8 GHz)	Metal box plus an integral diamond shaped antenna in a plastic enclosure, pole or wall mountable	22 x 22 x 7	1.3
SU-E-ODU	Metal box, pole or wall mountable	30.5 x 11.7 x 5.7	1.8

1.7.5.1.2 Connectors

Table 1-11: Connectors, SU-A/E Subscriber Unit		
Unit	**Connector**	**Description**
IDU	ETHERNET	10/100BaseT Ethernet (RJ-45) Cable connection to a PC: crossed Cable connection to a hub: straight
	RADIO	10/100BaseT Ethernet (RJ-45)
	AC IN	3 pin AC power plug
SU-A-ODU	INDOOR	10/100BaseT Ethernet (RJ-45), protected by a waterproof sealing assembly
New SU-A-ODU (5.4/5.8 GHz)	IDU COM	10/100BaseT Ethernet (RJ-45), protected by a sealing cap
SU- E-ODU	INDOOR	10/100BaseT Ethernet (RJ-45), protected by a waterproof sealing assembly
	ANT	N-Type jack, 50 ohm, lightning protected

1.7.5.1.3 Electrical

Table 1-12: Electrical Specifications, SU-A/E Subscriber Unit	
Unit	**Details**
General	Power consumption: 25W
IDU	AC power input: 85-265 VAC, 50-60 Hz
ODU	54 VDC from the IDU over the indoor-outdoor Ethernet cable

1.7.5.2 SU-I Subscriber Unit

1.7.5.2.1 Mechanical and Electrical

Table 1-13: Mechanical and Electrical Specifications, SU-I Subscriber Unit	
Item	**Details**
Dimensions (cm)	11.8 (H) x 20 (L) x 3.1 (W)
Weight (g)	600
Power Consumption	15W maximum
DC Power Input (from Power Supply)	48 VDC
Mains Power Input (to Power Supply)	90-265 VAC, 47-63 Hz

1.7.5.2.2 Connectors

Table 1-14: Connectors, SU-I Subscriber Unit	
Connector	**Description**
ETHERNET	10/100BaseT Ethernet (RJ-45) Cable connection to a PC: straigh Cable connection to a hub: crossed
POWER (48 VDC)	DC Power Plug
RF	SMA jack

1.7.5.3 Modular Base Station Equipment

1.7.5.3.1 Mechanical

Table 1-15: Mechanical Specifications, Modular Base Station Equipment			
Unit	**Structure**	**Dimensions (cm)**	**Weight (kg)**
BS-SH	19" rack (3U) or desktop	13 x 48.2 x 25.6	4.76
BS-PS-DC	DC power supply module	12.9 x 7.0 x 25.3	1.2
BS-PS-AC	AC power supply module	12.9 x 7.0 x 25.3	1.2
BS-AU	Indoor module of the AU-D-BS access unit	12.9 x 3.5 x 25.5	0.15
AU-D-BS-ODU	pole or wall mountable	30.5 x 11.7 x 5.7	1.8
AU-Ant-5G-16-60	2"-3.5" pole mountable	43.6 x 25 x 1.0	2.2
AU-Ant-5G-17-90	2"-3.5" pole mountable	55 x 25 x 1.1	1.5
AU-Ant-5G-15-120	2"-3.5" pole mountable	53 x 26 x 1.1	2.5
AU-Ant-5.4G-8-Omni	2.5"-4.5" pole mountable	70cm high, 6cm base diameter	1.5
AU-Ant-5.8G-8-Omni	Surface or pole mountable	40cm high, 3.2cm base diameter	0.23
AU-Ant-4.9G-15-120	2"-4" pole mountable	55 x 25 x 1.7	1.5
AU-Ant-5.8G-14-120-UK	1"-4" pole mountable	55 x 7.5 x 5	1

1.7.5.3.2 Connectors

Table 1-16: Connectors, Modular Base Station Equipment		
Unit	**Connector**	**Description**
BS-AU	10/100 BaseT	10/100BaseT Ethernet (RJ-45) with 2 embedded LEDs. Cable connection to a PC: crossed Cable connection to a hub: straight
	RADIO	10/100BaseT Ethernet (RJ-45) with 2 embedded LEDs
AU-D-BS-ODU	INDOOR	10/100BaseT Ethernet (RJ-45), protected by a waterproof sealing assembly
	ANT	N-Type jack, 50 ohm, lightning protected
BS-PS-AC	AC-IN	3-PIN AC power plug
BS-PS-DC	-48 VDC	3 pin DC D-Type 3 power pins plug Amphenol 717TWA3W3PHP2V4RRM6
Antenna	RF	N-Type jack (on a 1.5m cable in the Omni-8-5.8)

1.7.5.3.3 Electrical

Table 1-17: Electrical Specifications, Modular Base Station Equipment	
Unit	**Details**
General	240W max. for a fully equipped chassis (1 PS, 6 AU)
BS-PS-AC	AC power input: 85-265 VAC, 47-65 Hz DC power output: 54 V; 3.3 V
BS-PS-DC	DC power input: -48 VDC nominal (-34 to -72), 10 A max DC power output: 54 V; 3.3 V
BS-AU	3.3 VDC, 54 VDC from the power supply module(s) via the back plane
AU-D-BS-ODU	54 VDC from the BS-AU over the indoor-outdoor Ethernet cable
AU-D-BS (IDU+ODU)	Power consumption: 30W

1.7.5.4 Standalone Access Unit

1.7.5.4.1 Mechanical

Table 1-18: Mechanical Specifications, Stand Alone Access Unit			
Unit	**Structure**	**Dimensions (cm)**	**Weight (kg)**
General	An IDU indoor unit and an AU-D-BS-ODU outdoor unit connected to a detached antenna		
IDU PS1073	Plastic box (black), desktop or wall mountable	14 x 6.6 x 3.5	0.3
AU-D-SA-ODU	Poll or wall mountable	30.5 x 11.7 x 5.7	1.8
AU-Ant-5G-16-60	2"-3.5" pole mountable	43.6 x 25 x 1.0	2.2
AU-Ant-5G-17-90	2"-3.5" pole mountable	55 x 25 x 1.1	1.5
AU-Ant-5G-15-120	2"-3.5" pole mountable	53 x 26 x 1.1	2.5
AU-Ant-5.4G-8-Omni	2.5"-4.5" pole mountable	70 cm high, 6 cm base diameter	1.5
AU-Ant-5.8G-8-Omni	Surface or pole mountable	40 cm high, 3.2 cm base diameter	0.23
AU-Ant-4.9G-15-120	2"-4" pole mountable	55 x 25 x 1.7	1.5
AU-Ant-4.9G-9-Omni	1.5”-3” pole mountable	46 cm high, 5.5 cm base diameter	0.6
AU-Ant-5.8G-14-120-UK	1"-4" pole mountable	55 x 7.5 x 5	1

1.7.5.4.2 Connectors

Table 1-19: Connectors, Stand Alone Access Unit		
Unit	**Connector**	**Description**
IDU	ETHERNET	10/100BaseT Ethernet (RJ-45) Cable connection to a PC: crossed Cable connection to a hub: straight
	RADIO	10/100BaseT Ethernet (RJ-45)
	AC IN	3-PIN AC power plug
AU-D-SA-ODU	INDOOR	10/100BaseT Ethernet (RJ-45), protected by a waterproof sealing assembly
	ANT	N-Type jack, 50 ohm, lightning protected
Antenna	RF	N-Type jack (on a 1.5m cable in the Omni-8-5.8)

1.7.5.4.3 Electrical

Table 1-20: Electrical Specifications, Stand Alone Access Unit	
Unit	**Details**
General	Power consumption: 25W
IDU	AC power input: 85-265 VAC, 50-60 Hz
AU-D-SA-ODU	54 VDC from the IDU over the indoor-outdoor Ethernet cable

1.7.5.5 25dBi Antenna (for B&B point-to-point link)

Table 1-21: 25dBi Antenna Specifications	
Item	**Description**
Regulatory Compliance	ETSI EN 302 085 V1.1.2 (2001-02) Range1
Frequency Range	4.900-5.100 GHz
Gain	25dBi min.
Azimuth Beamwidth	6°
Elevation Beamwidth	6°
Polarization	Linear (Vertical/Horizontal)
Dimensions (cm)	45 x 45 x 3
Weight (kg)	3 (max, excluding mounting kit)
Connector	N-Type, Female
Mounting Kit	2.75”-3.5” pole, 0 to -10° tilt, 2.2kg

1.7.5.6 SU-I-D Wall/Window Detached Antenna

Table 1-22: SU-I-D Wall/Window Detached Antenna Specifications	
Item	**Description**
Frequency Range	5.150-5.875 GHz
Gain	15dBi net (excluding cable loss).
Azimuth Beamwidth	45°~55°
Elevation Beamwidth	10°~12°
Polarization	Linear (Vertical)
Dimensions (cm)	33 x 9.3 x 2.1
Weight (g)	190
Connector	SMA jack
Cable	2 meter, 2 x SMA plug, 3.6 dB max insertion loss

1.7.6 Environmental

Table 1-23: Environmental Specifications		
Type	**Unit**	**Details**
Operating temperature	Outdoor units	-40 °C to 55 °C
	Indoor equipment	0 °C to 40 °C
Operating humidity	Outdoor units	5%-95% non condensing, weather protected
	Indoor equipment	5%-95% non condensing

2

Chapter 2 - Installation

In This Chapter:

2.1 Installation Requirements

This section describes all the supplies required to install the BreezeACCESS VL system components and the items included in each installation package.

NOTE

Installation requirements for SU-I are provided in section 2.5 on page 48.

2.1.1 Packing List

2.1.1.1 SU-A/E Subscriber Unit

The SU-A/E installation kit includes the following components:

- IDU indoor unit with a wall mounting kit
- Mains power cord
- Any of the following Outdoor Units:

Table 2-1: Subscriber Unit ODU Types

SU Type	Antenna Description
SU-A-ODU	Vertically polarized high-gain flat antenna integrated on the front panel
New SU-A-ODU	Vertically/horizontally polarized high-gain flat antenna integrated on the front panel. The smaller size new SU-A-ODU is available in the 5.4 GHz and 5.8 GHz bands.
SU-E-ODU	A connection to an external antenna (not included)

NOTE

The SU-A-ODU and SU-E-ODU are supplied without the waterproof sealing assembly for the INDOOR connector. The sealing assembly is supplied with the IDU to ODU cable kit..

- Pole mounting kit for the ODU (the kit for the new, smaller-size ODU is different from the kit for all other ODUs)

- An IDU to ODU cable kit, including 20m Category 5E Ethernet cable with a shielded RJ-45 connector crimped on one end, a waterproof sealing assembly and two shielded RJ-45 connectors (not applicable for the new SU-A-ODU).

2.1.1.2 Modular Base Station Equipment

This section describes the items included in the installation packages for each Modular Base Station system component.

2.1.1.2.1 BS-SH Base Station Chassis

The BS-SH installation kit includes the following components:

- BS-SH chassis with blank panels
- Rubber legs for optional desktop installation

2.1.1.2.2 AU-D/E-BS Access Unit

The AU-D/E-BS and installation kit includes the following components:

- BS-AU Network Interface module
- AU-D/E-BS-ODU outdoor unit
- Pole mounting kit for the AU-D/E-BS-ODU
- In AU-D-BS kits: Antenna, including pole mounting hardware
- RF cable

2.1.1.2.3 BS-PS-AC Power Supply

Up to two BS-PS-AC power supply modules can be included in each Base Station chassis. The BS-PS-AC installation kit includes the following components:

- BS-PS-AC power supply module
- Mains power cord

2.1.1.2.4 BS-PS-DC Power Supply

Up to two BS-PS-DC power supply modules can be included in each Base Station chassis. The BS-PS-DC installation kit includes the following components:

- BS-PS-DC power supply module

- DC power cable

2.1.1.3 AU-D/E-SA Standalone Access Unit

The AU-D/E-SA installation kit includes the following components:

- IDU indoor unit with a wall mounting kit
- Mains power cord
- AU-D/E-SA-ODU outdoor unit
- Pole mounting kit for the AU-D/E-SA-ODU
- In AU-D-SA kits: Antenna, including pole mounting hardware
- RF cable

2.1.1.4 Optional Items Available from Alvarion

- IDU to ODU Category 5 Ethernet cable with a shielded RJ-45 connector crimped on one end and two shielded RJ-45 connectors (available in different lengths. For more details refer to section 2.1.2)
- Tilt Pole Mounting kit for the new SU-A-ODU
- A Y-cable for connecting directly to the IDU COM of the new SU-A-ODU for configuration/performance monitoring using a portable PC.

2.1.1.5 Additional Installation Requirements

The following items are also required to install the BreezeACCESS VL system components:

- Ethernet cable (straight for connecting to a hub/switch etc., crossed for connecting directly to a PC's NIC)
- Crimping tool for RJ-45 connectors
- Antenna, for E model units supplied without an antenna
- Ground cables with an appropriate termination
- Mains plug adapter or termination plug (if the power plug on the supplied AC power cord does not fit local power outlets)

- Portable PC with Ethernet card and Telnet software or BreezeCONFIG for BreezeACCESS VL* application and a crossed Ethernet cable
- Installation tools and materials, including appropriate means (e.g. a pole) for installing the outdoor unit.

2.1.2 Indoor-to-Outdoor Cables

NOTE

The length of the indoor-to-outdoor Ethernet cable should not exceed 90 meters. The length of the Ethernet cable connecting the indoor unit to the user's equipment, together with the length of the Indoor-to-Outdoor cable, should not exceed 100 meters.

Use only Category 5E Ethernet cables from approved manufacturers, listed in Table 2-2. Consult with Alvarion specialists on the suitability of other cables.

Table 2-2: Approved Category 5E Ethernet Cables

Manufacturer	Part Number
Superior Cables Ltd. www.superior-cables.com	612098
HES Cabling Systems www.hescs.com	H5E-00481
Teldor www.teldor.com	8393204101
Southbay Holdings Limited 11th Fl., 15, Lane 347, Jong Jeng Rd. Shin Juang City, Taipei County Taiwan, R.O.C Attn: Eva Lin Tel. 886-2-2832 3339 Fax. 886-2-2206 0081 E-mail: eva@south-bay.com.tw	TSM2404A0D

NOTE

In case of missing information (product specifications, ordering information, etc.) regarding these products on the manufacturer's web site, it is highly recommended to contact the manufacturer's sales representative directly.

2.2 Equipment Positioning Guidelines

This section provides key guidelines for selecting the optimal installation locations for the various BreezeACCESS VL system components.

CAUTION

ONLY experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities should install outdoor units and antennas.

Failure to do so may void the BreezeACCESS VL product warranty and may expose the end user or Service Provider to legal and financial liabilities. Alvarion and its resellers or distributors are not liable for injury, damage or regulation violations associated with the installation of Outdoor Units or antennas.

Select the optimal locations for the equipment using the following guidelines:

- The outdoor unit can be either pole or wall mounted. Its location should enable easy access to the unit for installation and testing.
- The higher the placement of the antenna, the better the achievable link quality.
- AU-ODU units should be installed as close as possible to the antenna.
- The antenna connected to the AU-ODU unit, should be installed so as to provide coverage to all Subscriber Units (SUs) within its service area.

NOTE

The recommended minimum distance between any two antennas serving adjacent sectors is 2 meters. The recommended minimum distance between two antennas serving opposite cells (installed back-to-back) is 5 meters.

- The antenna of the SU (integrated or external)) should be installed to provide a direct, or near line of sight with the Base Station antenna. The antenna should be aligned to face the Base Station.
- In some cases it might be necessary to up/down-tilt the antenna. An optional Tilt accessory for the ODU providing a tilt range of +/-15° is available from Alvarion. The tilt option might be necessary to either improve the link conditions or, if the SU is too close to the Base Station, to reduce the receive signals strength. As a rule of thumb, if the SU is located at a distance of less than 300 meters from the Base Station, it is recommended to up-tilt the antenna by approximately 10° to 15° (especially in line-of-sight conditions) to avoid saturation of the receivers by too strong signals.

- The indoor equipment should be installed as close as possible to the location where the indoor-to-outdoor cable enters the building. The location of the indoor equipment should take into account its connection to a power outlet and the customer's equipment.

2.3 Installing the Outdoor Unit

The following sections describe how to install the outdoor units, including pole mounting the ODU, and connecting the indoor-to-outdoor, grounding and RF cables.

NOTE

Ensure that outdoor units, antennas and supporting structures are properly installed to eliminate any physical hazard to either people or property. Make sure that the installation of the outdoor unit, antenna and cables is performed in accordance with all relevant national and local building and safety codes. Even where grounding is not mandatory according to applicable regulation and national codes, it is highly recommended to ensure that the outdoor unit and the antenna pole (when using external antenna) are grounded and suitable lightning protection devices are used so as to provide protection against voltage surges and static charges. In any event, Alvarion is not liable for any injury, damage or regulation violations associated with or caused by installation, grounding or lightning protection.

2.3.1 Pole Mounting the Outdoor Unit

NOTE

This section is not applicable for the new SU-A-ODU. For details on pole mounting the new SU-A-ODU refer to section 2.3.2.

The Outdoor Unit can be mounted on a pole using one of the following options:

- Special clamps and threaded rods are supplied with each unit. There are two pairs of threaded holes on the back of the unit, enabling to use the special clamps for mountingthe unit on diverse pole diameters.
- Special grooves on the sides of the unit enable the use of metal bands to secure the unit to a pole. The bands must be 9/16 inches wide and at least 12 inches long. The metal bands are not included with the installation package.

NOTE

Be sure to mount the unit with the bottom panel, which includes the LED indicators, facing downward.

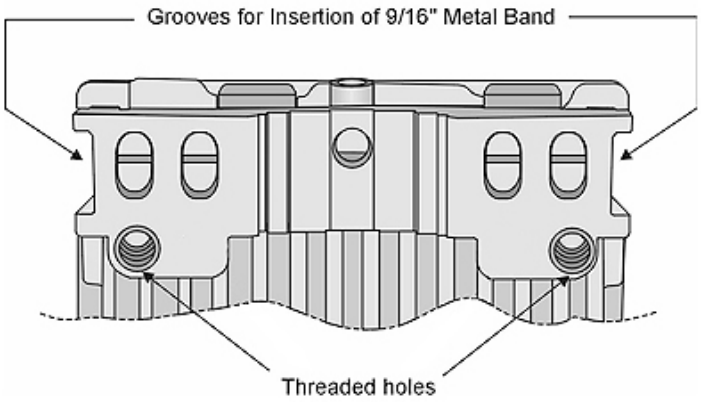


Figure 2-1: Threaded Holes/Grooves

Figure 2-2 illustrates the method of mounting an outdoor unit on a pole, using the clamps and threaded rods.

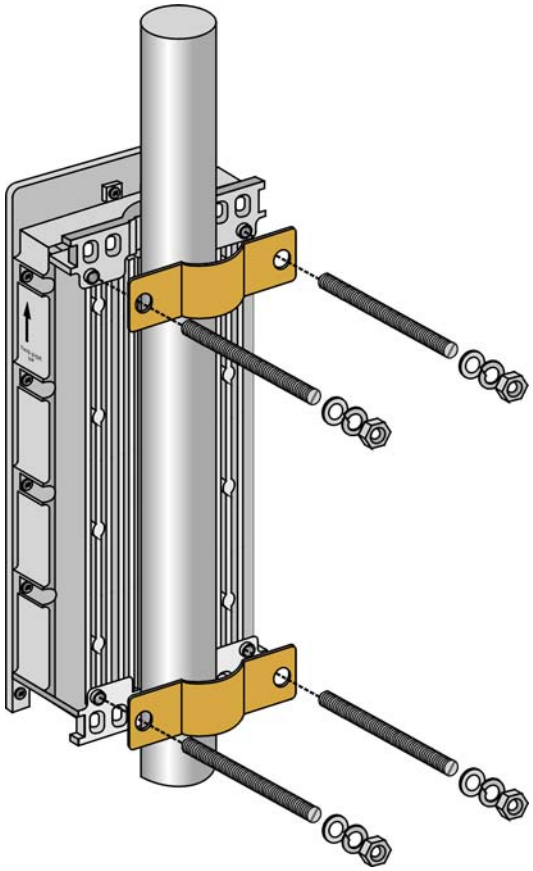


Figure 2-2: 3" Pole Installation Using Special Clamps

NOTE

There is a groove on one end of the threaded rod. Be sure to insert the threaded rods with the grooves pointing outward, as these grooves enable you to use a screwdriver to fasten the rods to the unit.

2.3.2 Pole Mounting the New SU-A-ODU

The new SU-A-ODU can be mounted on a 1" to 4" pole using one of the following options:

- A pole mounting kit is supplied with each unit. The kit includes a special clamp and a pair of threaded rods, flat washers, spring washers and nuts. There are two pairs of threaded holes on the back of the unit, enabling to use the mounting kit for installing the unit using either vertical or horizontal polarization. The clamp enables installing the unit on diverse pole diameters from 1" to 4".

- A Tilt Pole Mounting kit, providing a tilt range of +/-15° is available from Alvarion. The Tilt kit can be attached to the ODU and be mounted on a 1" to 4" pole using two 9/16" wide metal bands.

2.3.2.1 Polarization

The new SU-A-ODU can be pole mounted to provide either vertical or horizontal polarization.

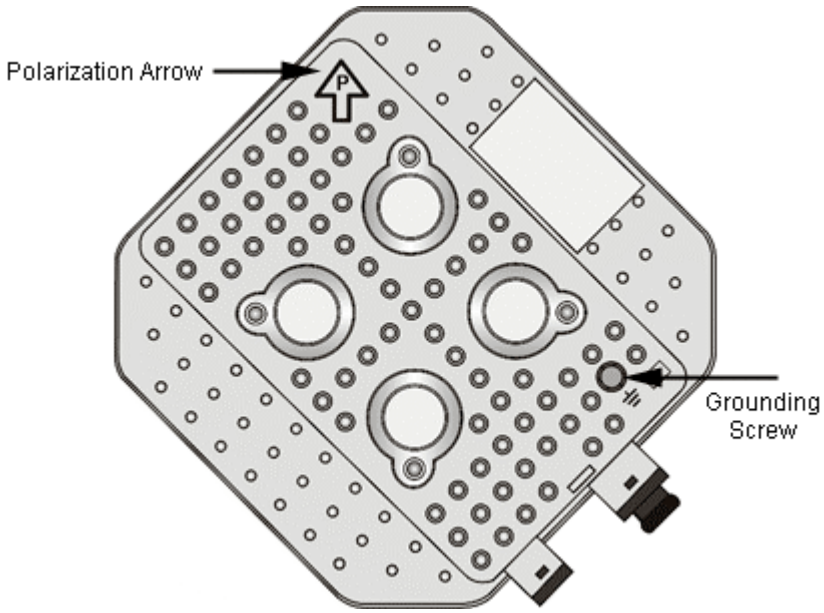


Figure 2-3: Back View of the new SU-A-ODU

The Polarization Arrow on the back of the unit indicates the type of polarization.

- For vertical polarization install the unit with the Polarization Arrow pointing upward (as in the figure above).

- For horizontal polarization install the unit with the Polarization Arrow pointing sideward and the connectors facing downward.

2.3.2.2 Pole Mounting the ODU Using the Clamp

Figure 2-4 and Figure 2-5 illustrate how to mount an ODU on a pole, using the clamp and threaded rods.

NOTE

There is a groove on one end of the threaded rod. Be sure to insert the threaded rods with the grooves pointing outward, and fasten them to the unit using a screwdriver. Install the unit with the bottom panel, which includes the connectors, facing downward.

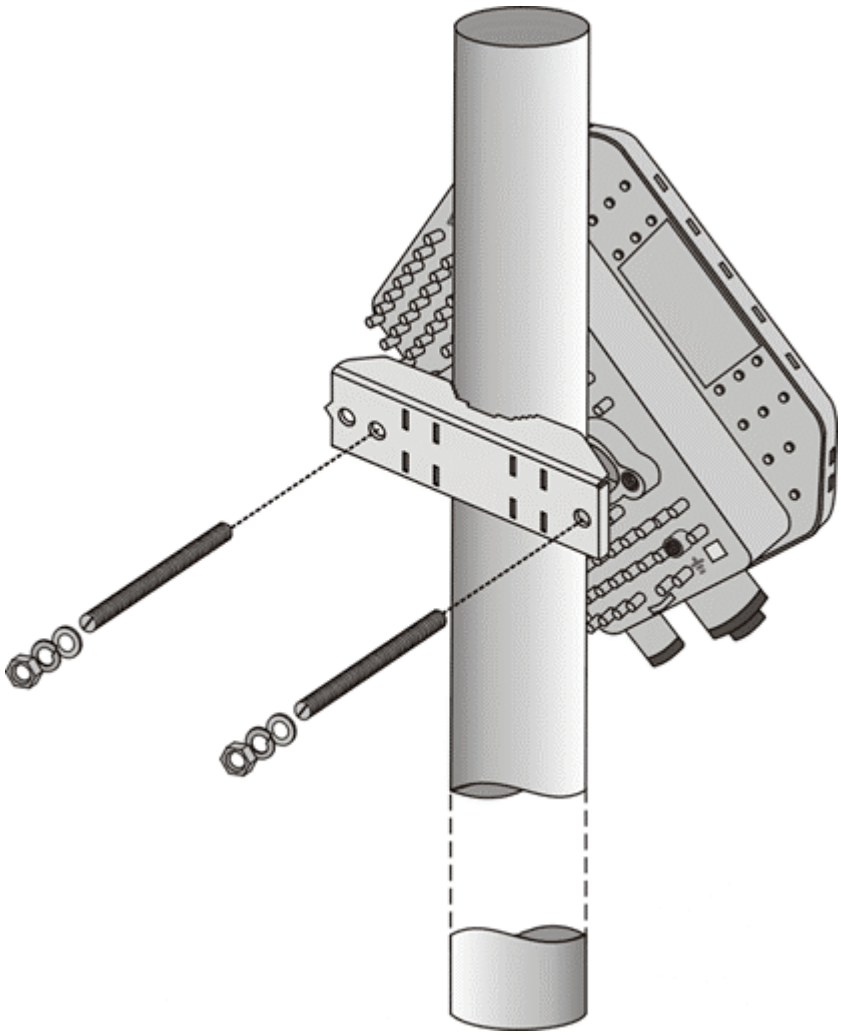


Figure 2-4: New SU-A-ODU Pole Installation Using the Special Clamp, Vertical Polarization

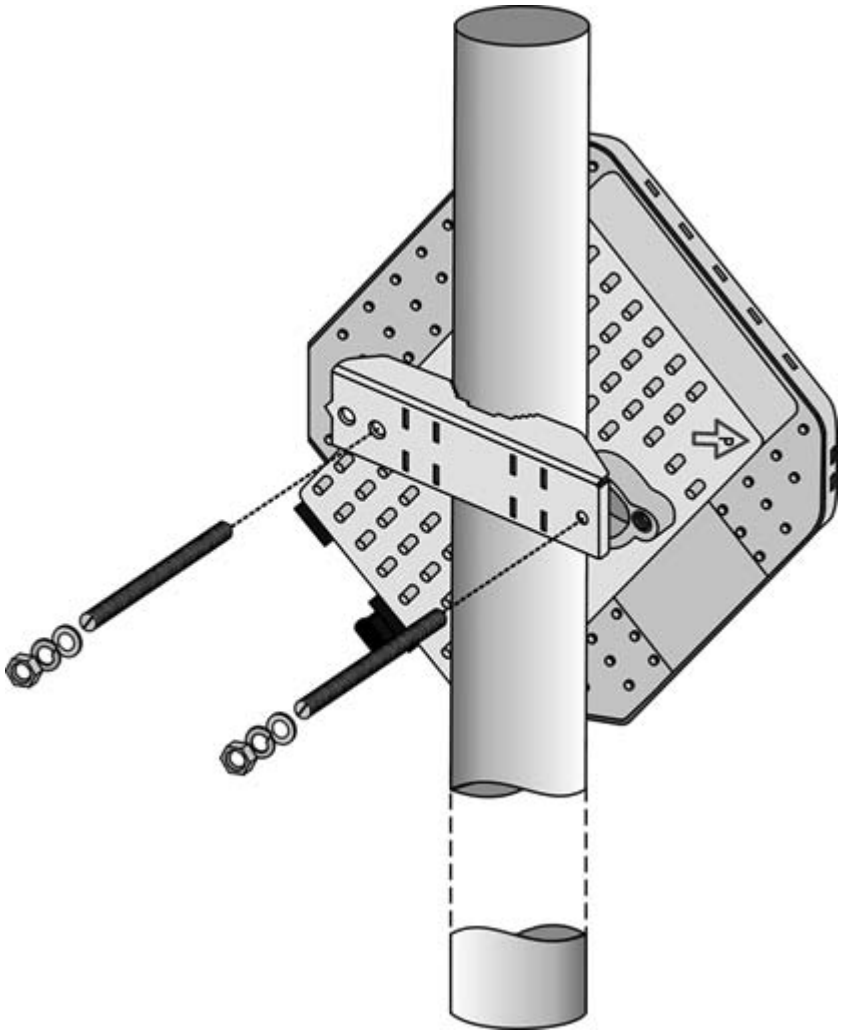


Figure 2-5: New SU-A-ODU Pole Installation Using the Special Clamp, Horizontal Polarization

2.3.2.3 Pole Mounting the ODU with the Tilt Accessory

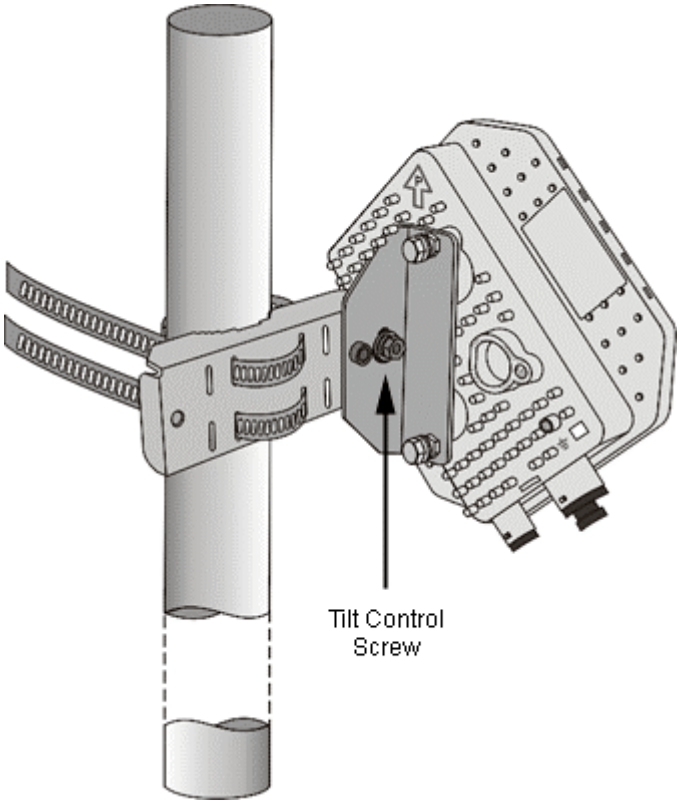


Figure 2-6: New SU-A-ODU Pole Installation Using the Tilt Accessory, Vertical Polarization

To mount the ODU on a pole using the Tilt accessory:

1. Attach the Tilt accessory to the ODU using the two pairs of flat washers, spring washers and nuts supplied in the Tilt kit.
2. Mount the Tilt accessory on a 1" to 4" pole using two 9/16" metal bands.
3. Release slightly the Tilt Control Screw, tilt the ODU downward/upward as required, and re-tighten the screw.

2.3.3 Connecting the Grounding and Antenna Cables

The Grounding screw (marked ⏚) is located on the bottom panel of the outdoor unit (in the new SU-A-ODU it is located on the backside of the unit). The Antenna RF connector (marked ⏃) is located on the top panel of the AU-ODU/SU-E-ODU.

To connect the grounding cable:

1. Connect one end of a grounding cable to the grounding terminal and tighten the grounding screw firmly.
2. Connect the other end of the grounding cable to a good ground (earth) connection.

To connect the RF cable (units with external antenna):

1. Connect one end of the coaxial RF cable to the RF connector on the top panel of the unit
2. Connect the other end of the RF cable to the antenna.
3. The RF connectors should be properly sealed to protect against rain and moisture.

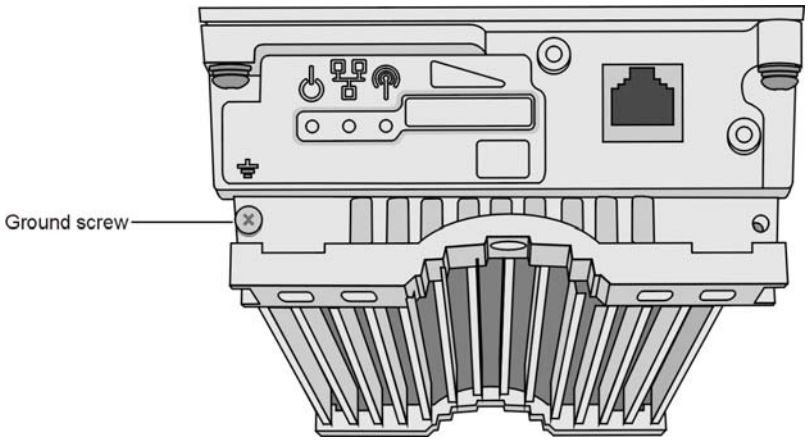


Figure 2-7: Bottom Panel of the ODU
(all ODUs except to new SU-A-ODU, shown without the sealing assembly)

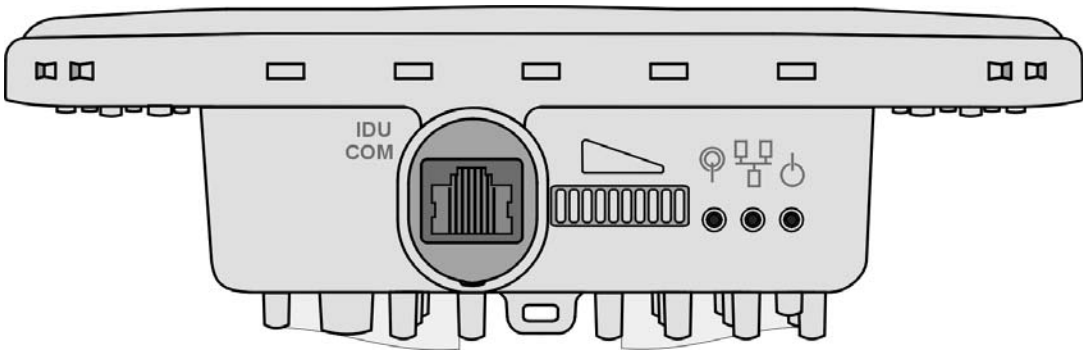


Figure 2-8: Bottom Panel of the New SU-A-ODU (without IDU COM Sealing Cap)

NOTE

The MAC Address of the unit is marked on both the ODU and the indoor unit (on the print side of the BS-AU module or on the bottom side of the Universal IDU). If for any reason the ODU is not used with the IDU with which it was shipped, the MAC Address of the system is in accordance with the marking on the ODU.

2.3.4 Connecting the Indoor-to-Outdoor Cable

2.3.4.1 Units with an Installed Waterproof Seal (not applicable to new SU-A-ODU)

To connect the indoor-to-outdoor cable:

1. Remove the two screws holding the waterproof seal to the outdoor unit and remove the waterproof seal.
2. Unscrew the top nut from the waterproof seal.

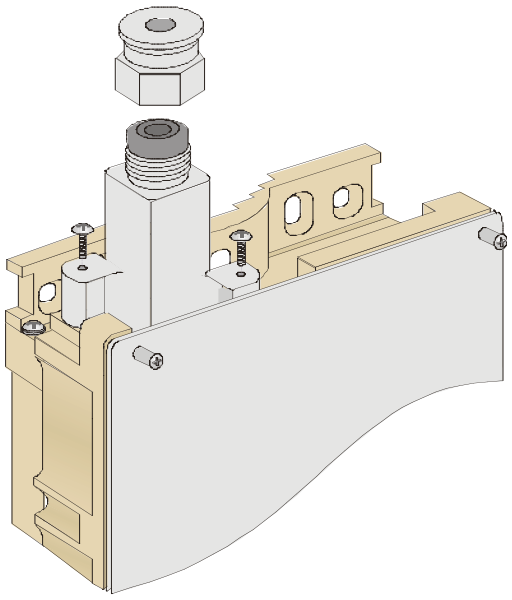


Figure 2-9: The Waterproof Seal

3 Route a straight Category 5E Ethernet cable (8-wire, 24 AWG) through both the top nut and the waterproof seal.

NOTE

Use only Category 5E 4x2x24# FTP outdoor cables from an approved manufacturer. See list of approved cables and length limitations in section 2.1.2.

4 Insert and crimp the RJ-45 connector. Refer to Appendix D for instructions on preparing the cable.

5 Connect the Ethernet cable to the outdoor unit RJ-45 connector.

6 Replace the waterproof seal and then the top nut. Make sure that the external jack of the cable is well inside the waterproof seal to guarantee a good seal.

7 Route the cable to the location selected for the indoor equipment.

8 Assemble an RJ-45 connector with a protective cover on the indoor end of the indoor-to-outdoor cable.

2.3.4.2 Units with a Waterproof Seal Supplied with the Ethernet Cable (not applicable to new SU-A-ODU)

To connect the indoor-to-outdoor cable:

1 Verify that the o-ring supplied with the cable kit is in place.

2 Connect the RJ-45 connector of the Ethernet cable to the outdoor unit.

3 Attach the waterproof seal to the unit. Tighten the top nut.

4 Route the cable to the location selected for the indoor equipment.

5 Assemble an RJ-45 connector with a protective cover on the indoor end of the indoor-to-outdoor cable.
See Appendix D for instructions on preparing the cable.

2.3.4.3 New SU-A-ODU

1 The sealing cap has a special groove allowing to insert an ethernet cable with an already assembled RJ-45 connector through the cap. To expose the groove, lightly squeeze the cap. Carefully insert the cable with the assembled connector through the groove.

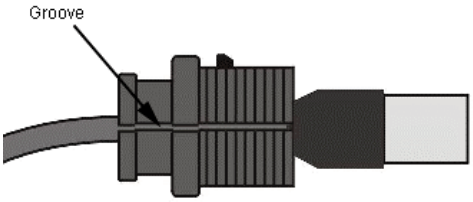


Figure 2-10: Inserting the IDU COM Cable into the Sealing Cap

2 Connect the Ethernet cable to the IDU COM RJ-45 connector.

3 Put the sealing cap back in its place. Make sure that the small protrusion on the side of the cap fits inside the hole on the connector's protective body.

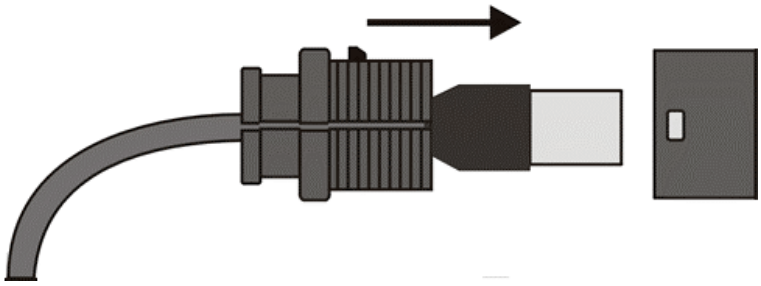


Figure 2-11: Connecting the IDU COM connector and inserting the Sealing Cap

4 Use appropriate sealing material to protect the connection against moisture and humidity. Use removable sealing material to enable future access to the connector.

NOTE

Use high quality sealing material such as Scotch® 130C Linerless Rubber Splicing Tape from 3M to ensure IP-67 compliant protection against dust and water.

5 Route the cable to the location selected for the indoor equipment.

6 Assemble a shielded RJ-45 connector with a protective cover on the indoor end of the IDU-ODU cable. See Appendix D for instructions on preparing the cable.

2.4 Installing the Universal IDU Indoor Unit

The unit can be placed on a desktop or a shelf. Alternatively, it may be wall-mounted using the kit supplied with the unit.

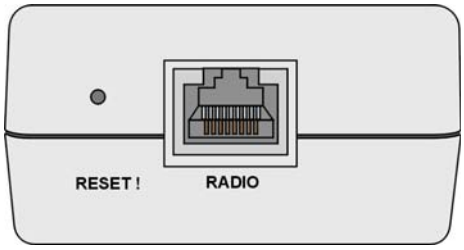


Figure 2-12: IDU PS 1073 Front Panel

The RADIO connector and RESET button are located on the front panel, the ETHERNET connector is located on the side panel and LEDs are located on the top panel.

CAUTION

Do not connect the data equipment to the RADIO port. The RADIO port supplies DC power to the ODU, and this may harm other equipment connected to it.

To install the IDU:

1 Connect the Indoor-to-Outdoor cable to the RADIO connector, located on the front panel of the indoor unit.

2 Connect the power cord to the unit's AC socket, located on the rear panel. Connect the other end of the power cord to the AC mains. The unit can operate with AC mains of 100-240 VAC, 50-60 Hz.

NOTE

The color codes of the power cable are as follows:

Brown	Phase	~
Blue	Neutral	0
Yellow/Green	Ground	⏚

3 Verify that the POWER LED is lit, indicating that power is supplied to the unit.

4 Configure the basic parameters as described in section 3.1.

5 Connect the 10/100 BaseT ETHERNET connector to the network. The cable connection should be a straight Ethernet if connecting the indoor unit to a hub/switch and a crossed cable if connecting it directly to a PC Network Interface Card (NIC).

NOTE

The length of the Ethernet cable connecting the indoor unit to the user's equipment, together with the length of the Indoor-to-Outdoor cable, should not exceed 100 meters.

2.4.1 RESET Button Functionality

Using a sharp object, press the recessed RESET button for a short time to reset the unit and reboot from the Main version.

In units with ODU HW revision C and an IDU PS 1073, the RESET button can be used for setting the unit to its factory defaults. Press the button for at least 5 seconds (until the ETH LED of the IDU stops blinking): the unit will reboot with the factory default configuration.

NOTE

Reset the ODU using the RESET button on the IDU after connecting or reconnecting the indoor and outdoor units with the indoor-to-outdoor cable.

2.5 Installing the SU-I

The following sections describe how to install the SU-I CPE.

2.5.1 Installation Requirements

2.5.1.1 Packing List

- SU-I CPE
- Power Adapter
- 3 meters Ethernet Cable
- Wall/window mountable detached antenna kit, including wall/window mounting accessories and a 2 meters SMA-SMA (M/M) RF cable (only with SU-I-D).

2.5.1.2 Additional/Optional Items

- Wall Mounting Bracket kit for the SU-I CPE*.
- Mains plug adapter or termination plug (if the power plug on the power adapter not fit local power outlets. The Power Adapter is supplied with a North American power plug and an EU power connector adapter).
- Portable PC with an Ethernet card and a straight Ethernet cable for configuring parameters using either Telnet or BreezeCONFIG for BreezeACCESS VL application. TFTP server SW is required for downloading SW versions.
- Other installation tools and materials (means for securing cables to walls, etc.).

NOTE

Items marked with an asterisk (*) are available from Alvarion.

2.5.2 SU-I Connectors and LEDs

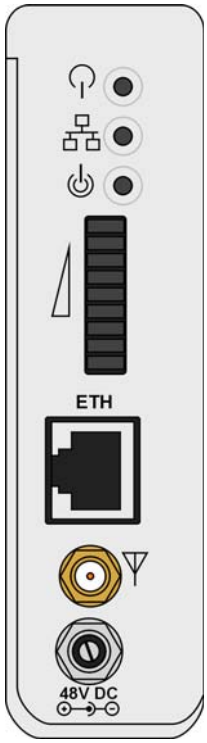


Figure 2-13: SU-I Panel

Table 2-3: SU-I Panel Components

Name		Description	Functionality
	Status	Self-test and power indication	Green: Power is available and self-test passed. Blinking Amber: Testing (not ready for operation) Red: Self-test failed. Fatal error
	Ethernet	Ethernet activity/ connectivity indication	Green: Ethernet link between the SU-I and the data equipment is detected, no activity Blinking Green: Ethernet connectivity is OK, with traffic on the port. Blinking rate proportional to traffic rate. Red: No Ethernet connectivity between the SU-I and the data equipment.
	W-Link	Wireless Link traffic Indication	Green: Unit is associated with an AU, no wireless link activity Blinking Green: Data received or transmitted on the wireless link. Blinking rate is proportional to traffic rate. Off: Wireless link disabled

Name	Description	Functionality
SNR bar	Received signal strength Indication	Red LED: Signal is too low (SNR < 4dB). 8 green LEDs: Quality of the received signal. Orange LED: Signal is too high (SNR > 50dB).
ETH	RJ-45 Connector	Connection to the user's LAN/PC: ■ Cable connection to a hub/switch/router: Crossed ■ Cable connection to a PC: Straight
 RF	SMA Jack	Connection to detached antenna
48V DC	DC Power Jack	Connection to Power Adapter

* After power-up, the SIGNAL LEDs illuminates for a few seconds until self-test is finished.

2.5.3 Installation Guidelines

The unit can be placed on a desktop or a shelf. It can also be wall mounted using the optional bracket available from Alvarion. It uses a detached antenna. Instructions for the available installation options of the detached antenna (included in the SU-I-D package) are provided in the antenna package and in Section 2.5.5.

It is recommended to install the antenna on a window or on a wall according to specific conditions of the location. The antenna should be facing the direction of the Base Station. Use only the RF cable supplied with the antenna (if needed, use a longer Ethernet cable).

Avoid metal obstacles such as metal window frames or metal film anti-glare windows in the transmission path.

Position the antenna away from electrical equipment, including the data equipment, monitor etc., metal furniture, and moving metal objects such as metal fans or doors.

2.5.4 Installing the SU-I

2.5.4.1 Connecting the SU-I

To install the SU-I:

1 Connect the Power Adapter DC cable to the POWER jack. Connect the Power Adapter to the AC mains.

2 Verify that the green Status LED located on the unit's front panel illuminates, indicating that the power supply to the unit is OK and self test passed successfully.

3 Connect the RF cable supplied with the antenna to the SMA jack located on the unit's front panel. Install the antenna using the instructions provided in Section 2.5.5 on page 52, and connect to it the other end of the RF cable. Do not over-tighten the SMA connectors.

4 If parameters are not pre-configured, configure the basic parameters as described in Section 3.1.

5 Align the antenna as described in Section 3.3.

6 Connect the 10/100 Base-T Ethernet connector to the data equipment. The cable connection should be a crossed Ethernet if connecting to a hub/switch and a straight cable if connecting directly to a PC Network Interface Card (NIC).

7 Verify proper operation of the Ethernet link (see Table 2-3 for the Ethernet activity LED indication). To verify data connectivity from the end-user's PC or from a portable PC connected to the unit, ping a known device in the network, or try connecting to the Internet.

2.5.4.2 Wall Mounting the SU-I

The wall mounting kit for the SU-I includes a bracket, 2 screws, and 2 plastic anchors. Refer to Figure 2-14.

1 If anchors are needed (wall-board, plaster board, etc.), drill two holes for the anchors using a 6 mm drill bit and insert anchors. The distance between the two holes should be 86 mm. Use the drilling template supplied with the SU-I.

2 Fasten the two screws provided with the kit directly to the anchors.

3 Use the two hangers on the rear to hang the mounting bracket on the two screws. Make sure the bracket is stable.

4 Insert one side of the SU-I's base diagonally under the designated rail.

5 Gently apply pressure on the opposite side of the SU-I, until a clicking sound is heard and the two bracket studs are locked onto the SU-I's base.

6 To dismount the SU-I, gently push the two bracket studs in the direction of the wall and lift the CPE diagonally. Pull the CPE until free from the rail.

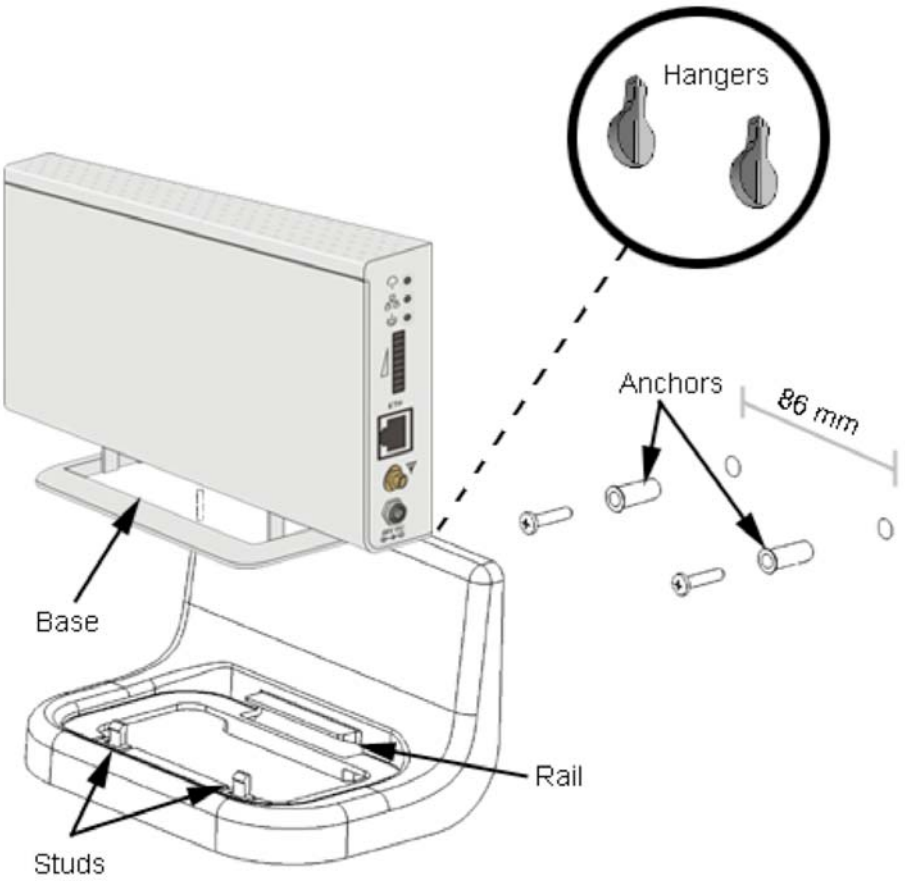


Figure 2-14: SU-I Wall Mount

2.5.5 Installing the Detached Antenna

The detached antenna kit includes the following components:

- ALA04-200160 panel antenna
- 2 meter SMA-SMA (M/M) RF cable
- Simple wall mounting kit, enabling installation on a wall (without any capability for adjusting the direction). For installation instructions see Section 2.5.5.1.
- Wall mounting kit with rotation capability, enabling installation on a wall with capability for adjusting the direction. For installation instructions see Section 2.5.5.2.

- Simple window mounting accessories, enabling installation on a glass window (without any capability for adjusting the direction). For installation instructions see Section 2.5.5.3.

- Window mounting kit with rotation capability, enabling installation on a glass window (with rotation capability for adjusting the direction). For installation instructions see Section 2.5.5.4.

NOTE

Ensure that the antenna is mounted vertical to the floor, with the connector facing downward, and the front of the antenna facing to the exterior of the building, preferably directed towards the Base Station.

2.5.5.1 Wall Mount

The installation kit includes 2 plastic anchors and 2 #8 screws.

7 If anchors are needed (wall-board, plaster board, etc.), drill two holes for the anchors using a 5 mm drill bit and insert anchors. Use a 9/64" drill bit for screwing directly into a solid surface (stud).

8 Fasten the antenna to the wall. Refer to Figure 2-15 for directions. Use the two #8 screws provided with the kit. Do not over tighten.

9 Connect the antenna cable to the connector located on the bottom side of the antenna. Hand tighten, do not use a wrench or a similar tightening tool. Do not over tighten.

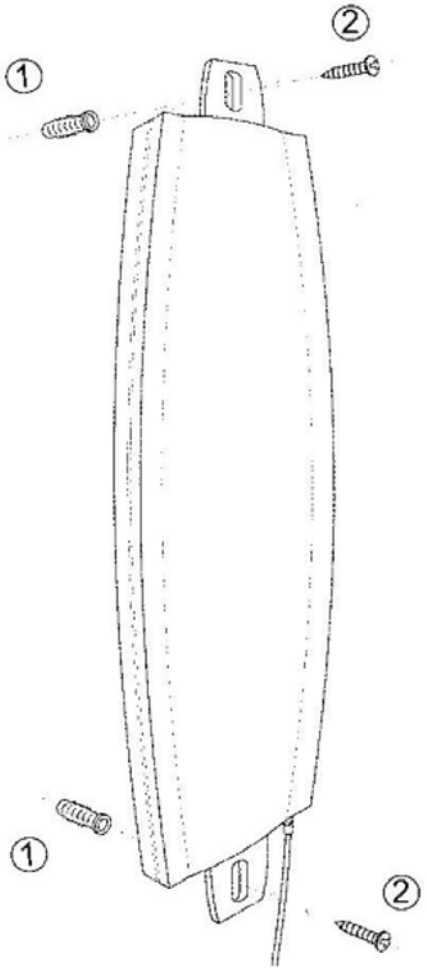


Figure 2-15: Wall Mounting the Antenna

2.5.5.2 Wall Mount with Rotation Capability

The installation kit includes 4 L-type mounting plates (one top, one bottom, one Wall-V and one Wall-H), 6 M5 screws (with washers and spring washers), 2 plastic anchors and 2 #8 screws.

1. If anchors are needed (wall-board, plaster board, etc.), drill two holes (361 mm apart) for the anchors using a 5 mm drill bit and insert anchors. Use a 9/64" drill bit for screwing directly into a solid surface (stud).
2. Assemble the top L-type plate with the Wall-V L-type plate. Note, the Wall-V plate is the one with the vertical ellipse on the short side. Make sure the inscriptions are facing upwards. Use two M5 screws to fasten the plates together. Do not over tighten. See Figure 2-16.
3. Assemble the bottom L-type plate with the Wall-H L-type plate. Note, the Wall-H plate is the one with the horizontal ellipse on the short side. Make sure the inscriptions are facing upwards. Use two M5 screws to fasten the plates together. Do not over tighten.

4 Attach the assembled plates to the flat rear-side of the antenna. Use the two remaining M5 screws to fasten them.

5 Fasten the antenna to the wall. Use the two #8 screws provided with the kit. Do not over tighten.

6 Connect the antenna cable to the connector located on the bottom side of the antenna. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.

7 Rotate the antenna left or right so the domed surface of the antenna is facing the direction of the Base Station. Check the received Signal LEDs to ensure the antenna is aimed correctly.

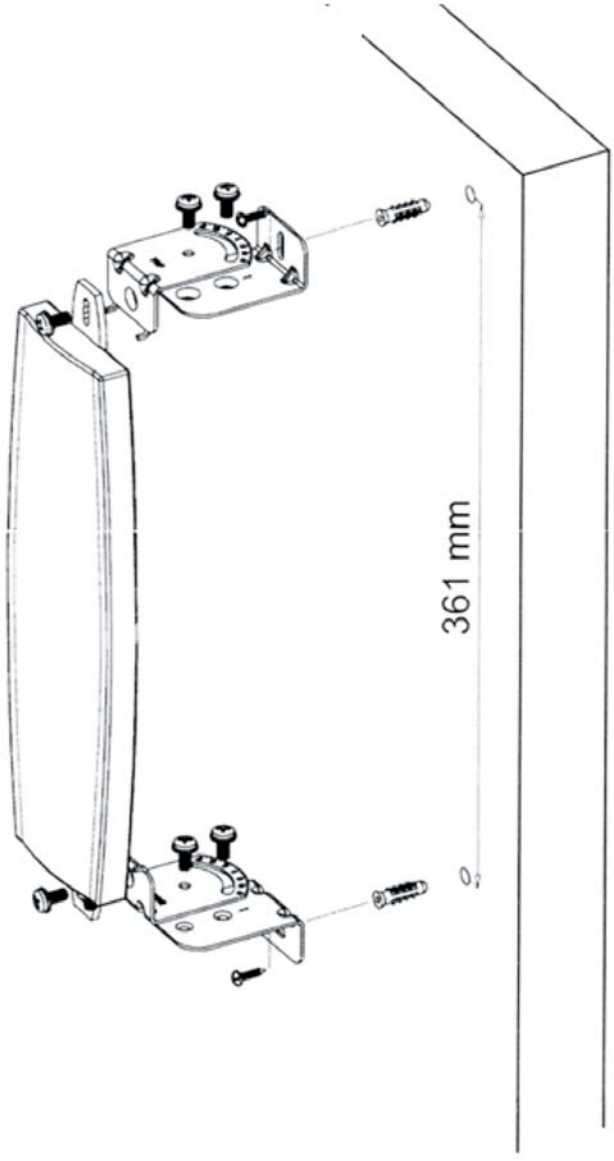


Figure 2-16: Wall Mount with Rotation Capability

2.5.5.3 Window Mount

The installation kit includes 2 suction cups.

1. Attach the suction cups to the antenna. Refer to Figure 2-17 for directions.
2. Determine the location of the antenna on the glass. Attach it to the window by pressing the suction cups onto the glass.
3. Connect the antenna cable to the connector located on the bottom side of the antenna. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.

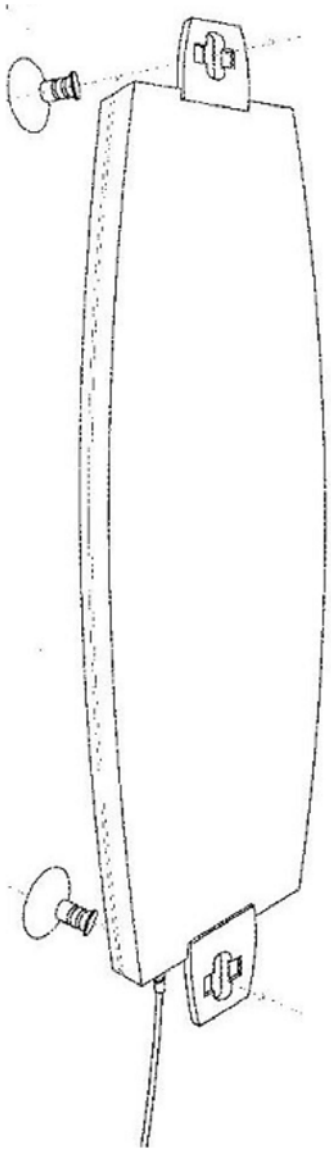


Figure 2-17: Window Mounting the Antenna

2.5.5.4 Window Mount with Rotation Capability

The installation kit includes the following: 4 PHK40*16PT screws (1), 2 M4 washers (2), 2 rotation bars (3) and 2 suction cups (4).

1. Attach the rotation bars to the antenna and the suction cups to the rotation bars. Refer to Figure 2-18 for directions.
2. Determine the location of the antenna on the glass. Attach it to the window by pressing the suction cups onto the glass.
3. Connect the antenna cable to the connector located on the bottom side of the antenna. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.
4. Rotate the antenna left or right so the domed surface of the antenna is facing the direction of the Base Station. Check the received Signal LEDs to ensure the antenna is aimed correctly.

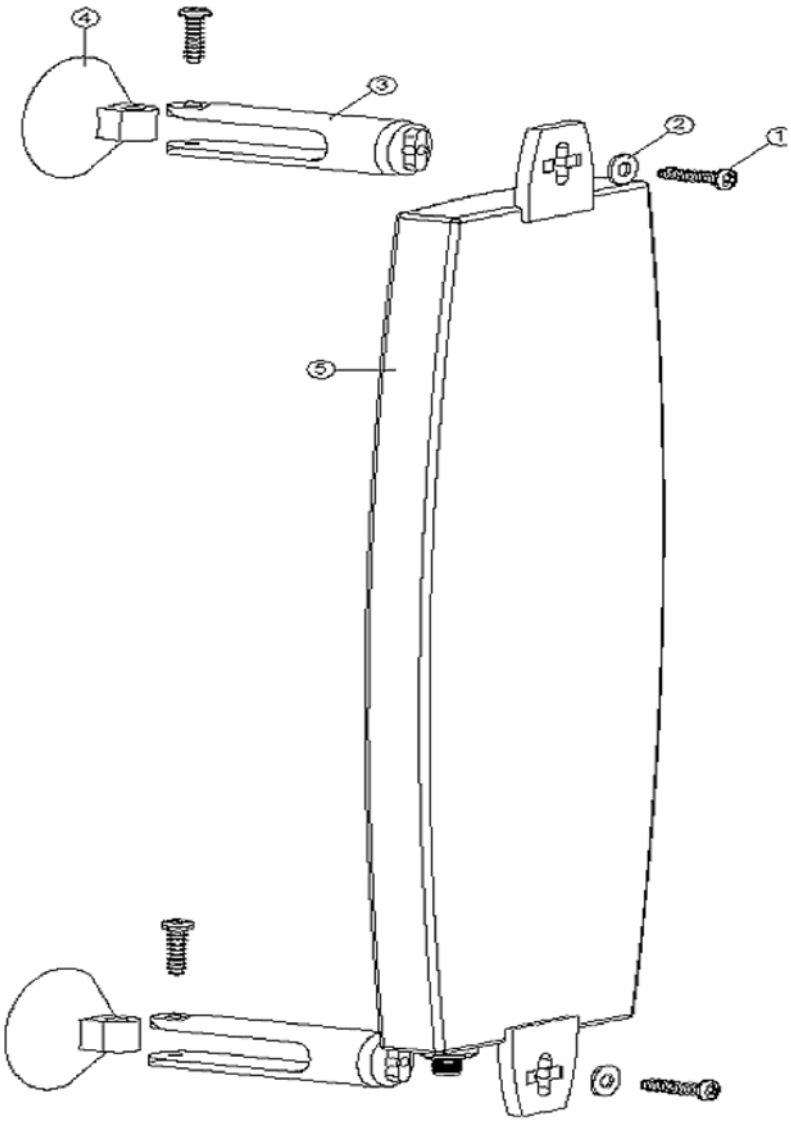


Figure 2-18: Window Mounting with Rotation Capability

2.6 Installing the Modular Base Station Equipment

The following sections describe the slot assignment for the Base Station chassis, provide illustrated descriptions of the power supply modules and Access Unit network interface modules, and describe how to install the Base Station equipment.

2.6.1 BS-SH Slot Assignment

The Base Station chassis comprises ten slots, as shown in Figure 2-19.

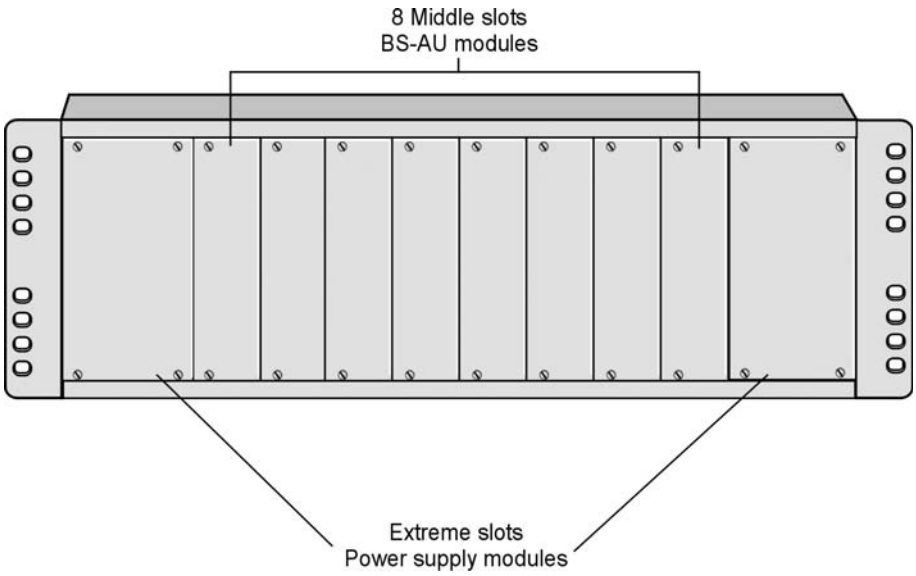


Figure 2-19: BS-SH Chassis Slot Assignment

To enable power supply redundancy, two BS-PS power supply modules can be installed in the wider side slots. If a single power supply module is used, it can be inserted into either one of the two available slots.

The remaining eight slots can hold up to six BS-AU modules. Unused slots should remain covered until required.

The design of the BS-SH supports collocation of BreezeACCESS VL Access Units with Access Units belonging to other BreezeACCESS families using GFSK modulation. It supports any mixture of BS-AU modules with BreezeACCESS GFSK BS-AU modules, including an optional BS-GU-GPS module. If Access Units belonging to other BreezeACCESS families are used, then it is necessary to use two power supply modules: one BS-PS (AC or DC) power supply for the BreezeACCESS VL Access Units and one BS-PS GFSK (AC or DC) for the BreezeACCESS GFSK Access Units.

2.6.2 BS-PS-AC Power Supply Module

The BS-PS-AC is an AC to DC converter that provides power to all the BS-AU modules installed in the BS-SH chassis. Figure 2-20 shows the BS-PS-AC front panel.

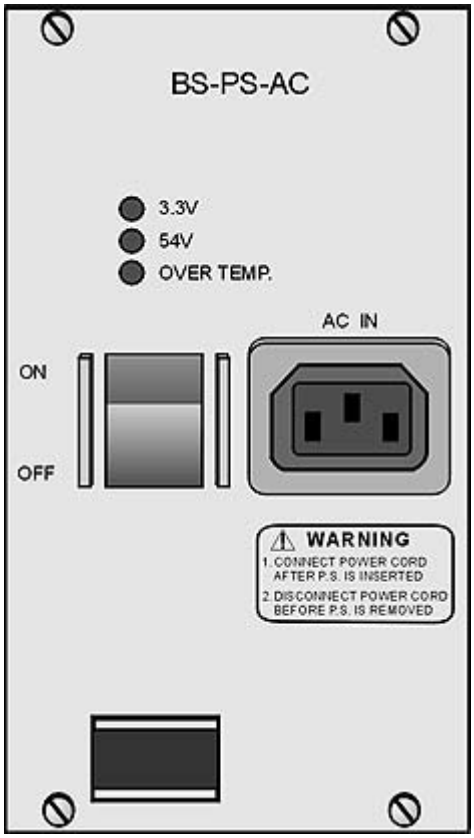


Figure 2-20: BS-PS-AC Front Panel

The BS-PS-AC includes a power input connector, marked AC IN, for connecting the AC power cord to the mains.

The ON/OFF Power Switch controls the flow of mains power to the power supply module.

Table 2-4: BS-PS LED Functionality

Name	Description
54V	Green LED. Indicates that the 54V power supply module is OK
3.3V	Green LED. Indicates that the 3.3V power supply module is OK
OVER TEMP	Red LED. Indicates an over temperature condition in the power supply module

2.6.3 BS-PS-DC Power Supply Module

The BS-PS-DC is a DC-to-DC converter that provides power to all the BS-AU modules installed in the BS-SH chassis. Figure 2-21 shows the BS-PS-DC front panel.

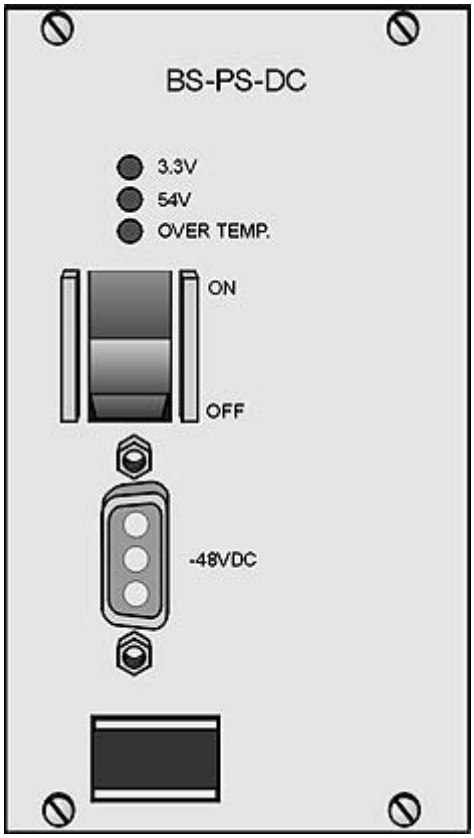


Figure 2-21: BS-PS-DC Front Panel

The BS-PS-DC provides a power input connector, marked -48VDC, for connecting the -48 VDC power source to the module.

The color codes of the cable wires are as follows:

- Black (pin 2): 48 VDC
- White (pin 1): + (Return)
- Shield (pin 3)

The ON/OFF Power Switch controls the flow of mains power to the power supply module.

The functionality of the LEDs is described in Table 2-4.

2.6.4 BS-AU Network Interface Module

Figure 2-22 shows the front panel of the BS-AU Access Unit Network Interface module.

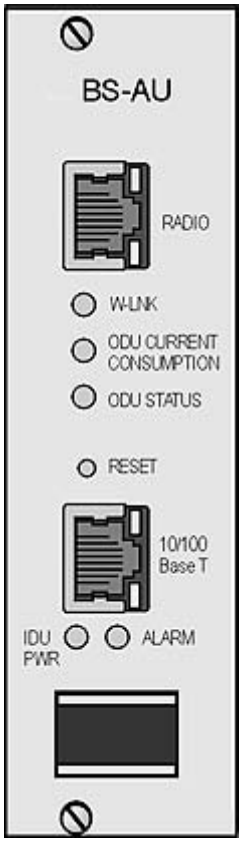


Figure 2-22: BS-AU Front Panel

The BS-AU provides the following interfaces:

- **10/100 BaseT:** A 10/100BaseT Ethernet connector for connecting the BS-AU to the network. A straight Ethernet cable should be used to connect the module to a hub, router or switch.

- **RADIO:** A 10/100BaseT Ethernet connector for connecting the BS-AU to an AU-ODU outdoor unit.

CAUTION

Do not connect the data equipment to the RADIO port. The RADIO port supplies DC power to the ODU, and this may harm other equipment connected to it.

The recessed **RESET** switch on the front panel is for resetting the outdoor unit.

2.6.5 Installing the BS-SH Chassis and Modules

This section describes how to install the power supply and Access Unit network interface modules in the Base Station chassis.

To install the BS SH chassis and modules:

1 Install the BS-SH chassis in a 19" cabinet. To prevent over-heating, leave a free space of at least 1U between the upper/lower covers of the BS-SH chassis and other units in the cabinet.

OR

Place the BS-SH chassis on an appropriate shelf or table. When mounting the BS-SH on a shelf or table, attach the rubber legs supplied with the unit.

2 Connect one end of a grounding cable to the ground terminal located on the rear panel of the BS-SH chassis and firmly tighten the grounding screw.

3 Connect the opposite end of the grounding cable to a ground connection or to the cabinet, if applicable.

4 Carefully insert the BS-PS power supply and the BS-AU modules into the relevant slots and push firmly until they are securely locked. Before insertion, verify that the switches of all BS-PS modules are in the OFF position. Refer to section 2.6.1 for a description of the slot assignment.

5 Close the captive screws attached to each module.

6 Place blank covers over all of the unused slots.

7 Connect the indoor-to outdoor cable(s) to the RADIO connector(s) of the BS-AU module(s).

8 If a BS-PS-DC power supply is used, connect the DC power cord to the -48 VDC IN jack of the BS-PS-DC power supply. If a redundant power supply module is installed, connect a DC power cord also to the second DC power module. Connect the power cord(s) to the -48 VDC power source, as follows:

   a Connect the black wire to the 48 VDC contact of the power source.

   b Connect the white wire to the + (Return) contact.

   c Connect the shield to the ground.

9 If a BS-PS-AC power supply is used, connect the AC power cord to the AC IN jack of the BS-PS-AC power supply. If a redundant power supply module is installed, connect an AC power cord also to the second AC power module. Connect the power cord(s) to the mains outlet.

10 Switch the BS-PS-AC/DC power supplies to ON. Verify that all power indicator LEDs on the BS-PS-AC/DC front panel are ON and that the

OVERTEMP alarm indicator is off. Refer to Table 2-4 for a description of these LEDs.

11 Configure the basic parameters in all BS-AU modules as described in section 3.1.

12 Connect the 10/100 BaseT LAN connector(s) to the network. The cable connection should be straight Ethernet if connecting the indoor unit to a hub/switch and a crossed cable if connecting it directly to a PC Network Interface Card (NIC).

NOTE

- The length of each of the Ethernet cables (the cable connecting the indoor unit to the user's equipment and the Indoor-to-Outdoor cable) should not exceed 100 meters.
- Reset the unit using the RESET button after connecting or reconnecting the indoor and outdoor units with the indoor-to-outdoor cable.

Chapter 3 - Commissioning

About This Chapter:

3.1 Configuring Basic Parameters

After completing the installation process, as described in the preceding chapter, the basic parameters must be configured to ensure that the unit operates correctly. After the basic parameters have been configured, additional parameters can be remotely configured via the Ethernet port or the wireless link using Telnet or SNMP management, or by loading a configuration file.

Refer to section 4.1 for information on how to access the Monitor program using Telnet and how to use it.

The *Basic Configuration* menu includes all the parameters necessary for the initial installation and operation of Subscriber and Access Units. In many installations, most of these parameters should not be changed from their default values. The basic parameters and their default values are listed in Table 3-1.

Refer to Chapter 4 for detailed information on the applicable parameters.

Table 3-1: Basic Parameters

Parameter	Default Value	Comment
Ethernet Port Negotiation Mode (in Unit Control Parameters)	Auto Negotiation	
IP Address	10.0.0.1	
Subnet Mask	255.0.0.0	
Default Gateway Address	0.0.0.0	
DHCP Options	Disable	
Access to DHCP	AU: From Ethernet Only SU: From Wireless Only	
ESSID	ESSID1	
Sub-Band Select (AU)	1	Applicable only if more than one Sub-Band is available
Frequency (AU)	The lowest frequency in the selected Sub-Band	
User Defined Frequency Subsets (SU)	All frequencies	
Transmit Power	Dependent on HW revision, unit type and	Transmit Power in SU cannot be higher than the

Table 3-1: Basic Parameters

Parameter	Default Value	Comment
	Sub-Band	Maximum Tx Power parameter.
Maximum Tx Power (SU)	Dependent on HW revision and Sub-Band	Maximum Tx Power cannot be higher than the upper limit according to the Sub-Band in use.
Tx Power (AU)	On	
Antenna Gain (units with external antenna)	According to the antenna supplied with the unit and the Sub-Band.	If set to “Not Set Yet”, must be configured according to actual value, taking into account cable’s attenuation.
ATPC Option	Enable	
Best AU Support (SU)	Disable	
Preferred AU MAC Address (SU)	00-00-00-00-00-00 (none)	Applicable only when Best AU Support is enabled.
Cell Distance Mode (AU)	Automatic	
Maximum Cell Distance (AU)	0 (No Compensation)	
Fairness Factor (AU)	100 (%)	
Per SU Distance Learning (AU)	Disable	
Maximum Modulation Level (SU)	8 (or the highest value supported according to the country code). No higher than 7 for units with HW revision A.	Refer to section 3.4.
VLAN ID-Management	65535	

Table 3-1: Basic Parameters

Parameter	Default Value	Comment
Authentication Algorithm	Open System	Availability of security parameters depends on support according to the country code.
Data Encryption Option	Disable	
Security Mode	WEP	
Default Multicast Key (AU)	Key 1	
Promiscuous Authentication (AU)	Disable	
Default Key (SU)	Key 1	
Key 1 to Key 4	00……0 (32 zeros, meaning no key)	

NOTE

Some parameters are changed to their new values only after reset (refer to Appendix F for more details). After the basic parameters are configured, the unit should be reset in order to activate the new configuration.

3.2 Using the Optional Y-cable (New SU-A-ODU)

A special Y-cable, available from Alvarion, enables to connect a a portable PC directly to the IDU COM port of the SU-A-ODU. This enables the installer to perform the entire process of configuring basic parameters, aligning the antenna and verifying proper operation of the unit right after completing the installation, minimizing the number of times the installer must climb to the roof. It also enables simpler configuration/performance monitoring during various maintenance/testing actions.

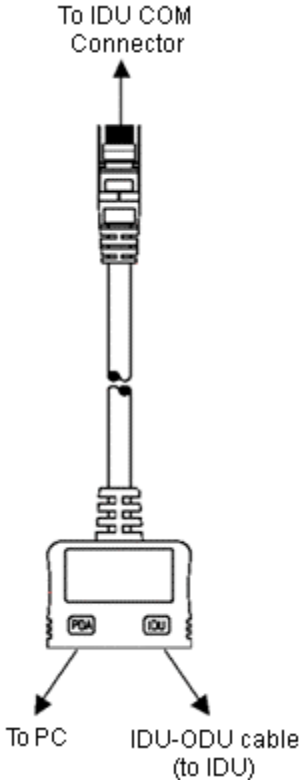


Figure 3-1: Connecting the Y-cable

3.3 Aligning the Subscriber Unit Antenna

NOTE

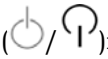
This antenna alignment process described in this section is applicable to both the SU-A-ODU and the SU-I antenna, unless stated otherwise.

The SNR bar display is located on the bottom panel of the SU-A-ODU/front panel of the SU-I indoor unit. The ten LEDs indicate the quality of the received signal. The higher the number of green LEDs indicating On, the higher the quality of the received signal. This section describes how to align the Subscriber Unit antenna using the SNR bar display.

NOTE

Antenna alignment using the SNR bar display is possible only after the Subscriber Unit is associated with an Access Unit. The associated Access Unit must be operational and the basic Subscriber Unit parameters must be correctly configured. Otherwise, the unit will not be able to synchronize with the Access Unit. As the SNR measurement is performed on received frames, its results are meaningless unless the Subscriber Unit is associated with an Access Unit.

To align the Subscriber Unit antenna:

1. Align the antenna by pointing it in the general direction of the Base Station.
2. Verify that the power indication of the unit ()is **On**.
3. Verify that the W-LINK LED () of the ODU is **On**, indicating that the unit is associated with an Access Unit. If the W-LINK LED is **Off**, check that the **ESSID** and **Frequency** parameters are correctly configured. If the SU is still not associated with the AU, increase the transmit power level to its maximum value. If the unit is still not associated with the AU, improve the quality of the link by changing the direction of the antenna or by placing the antenna at a higher or alternate location.
4. Rotate the antenna until the maximum SNR reading is achieved, where at least 1 green LED is on. If you encounter prolonged difficulty in illuminating the minimum required number of green LEDs, try to improve the reception quality by placing the antenna at a higher point or in an alternate location.
5. Ensure that the front of the antenna is always facing the Base Station. However, in certain conditions, such as when the line of site to the Base Station is hampered, better reception may be achieved using a reflected signal. In this case, the antenna is not always directed toward the Base Station.
6. Secure the unit firmly to the pole (SU-A-ODU)/fasten the rotation screws (SU-I antenna).

NOTE

In some cases, the antenna may need to be tilted to ensure that the level at which the SU receives transmissions from the AU (and vice versa) is not too high. As a rule of thumb, if the SU is located at a distance of less than 300 meters from the AU, it is recommended to up-tilt the antenna by approximately 10° to 15°. To guarantee a safety margin from the saturation level (received signal of –40 dBm at the antenna port), the SNR should not be higher than 50 dB. The orange LED of the SNR bar indicates that the SNR is higher than 50 dB.

3.4 Configuring the Subscriber Unit's Maximum Modulation Level

This section describes how to configure the maximum modulation level for Subscriber Units.

NOTE

If the unit is associated with the AU, then the final configuration of the Maximum Modulation Level parameter may be performed remotely, for example, from the site of the AU or from another site.

To configure the Maximum Modulation Level:

1 If the SNR of the SU at the AU is too low, it is recommended that you configure the *Maximum Modulation Level parameter* to a value that is lower than the maximum supported by the unit. This can decrease the number of retransmissions due to attempts to transmit at modulation levels that are too high for the actual quality of the link.

2 Check the SNR of the SU at the AU. You can use Telnet to view the SNR values in *the MAC Address Database*, which can be accessed from the *Site Survey* menu. If the ATPC algorithm is not enabled in both AU and SU, the test should be done with the *Initial Power Level* at the SU configured to its maximum value. If the SNR is lower than the values required for the maximum modulation level according to Table 3-2, it is recommended that you decrease the value of the Maximum Modulation Level.

NOTE

The SNR measurement at the AU is accurate only when receiving transmissions from the applicable SU. If necessary, use the Ping Test utility in the Site Survey menu to verify data transmission.

3 Configure the *Maximum Modulation Level* according to Table 3-2, using the typical SNR values. It is recommended that a 2 dB margin be added to compensate for possible measurement inaccuracy or variance in the quality of the link.

Table 3-2: Recommended Maximum Modulation Level*	
SNR	**Maximum Modulation Level**
SNR > 23 dB	8
21 dB < SNR < 23 dB	7
16 dB < SNR < 21 dB	6
13 dB < SNR < 16 dB	5
10 dB < SNR < 13 dB	4
8 dB < SNR < 10 dB	3
7 dB < SNR < 8 dB	2
6 dB < SNR < 7 dB	1

* The maximum supported value depends on the unit's HW revision and on the Max Modulation Level according to the Sub-Band.

3.5 Operation Verification

The following sections describe how to verify the correct functioning of the Outdoor Unit, Indoor Unit, Ethernet connection and data connectivity.

3.5.1 Outdoor Unit Verification

To verify the correct operation of the Outdoor Unit, examine the LED indicators located on the bottom panel of the outdoor unit.

The following tables list the provided LEDs and their associated indications.

NOTE

Verifying the correct operation of the Outdoor Unit using the LEDs, as described below, is only possible after the configuration and alignment processes are completed.

Table 3-3: AU-ODU LEDs

Name		Description	Functionality
W-LINK		Wireless Link Indictor	■ Green – Unit is associated with one or more SUs ■ Blinking red – No associations ■ Off – Wireless link is disabled
Status		Self-test and power indication	■ Green – Power is available and self-test passed. ■ Blinking Amber – Testing (not ready for operation) ■ Red – Self-test failed – fatal error
ETH		Ethernet activity/ connectivity indication	■ Green –Ethernet link detected. ■ Amber – No Ethernet connectivity between the indoor and outdoor units.