BreezeACCESS VL

System Manual

Trade Names

BreezeACCESS®, BreezeNET®, BreezeLINK®, BreezeVIEW™, BreezeMANAGE™, BreezeCONFIG™, BreezeWIZARD™, BreezeSECURE™, AlvariBASE™, AlvariSTAR™, AlvariX™, WALKair® and WALKnet® are trade names or trademarks of Alvarion Ltd. Other brand and product names are trade names or trade marks of their respective owners.

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Electronic Emission Notices

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 EN300385 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.

The Base Station equipment has been tested and found to comply with the limits for a class A digital device, pursuant to EN300385 rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

IMPORTANT NOTE:

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.

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

Be sure that the outdoor unit, the antenna and the supporting structure are properly installed to eliminate any physical hazard to either people or property. Verify that the outdoor unit and the antenna mast (when using external antenna) are grounded so as to provide protection against voltage surges and static charges. 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.

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♦ Some of the equipment provided by Alvarion and specified in this manual, is manufactured and warranted by third parties. All such equipment must be installed and handled in full compliance with the instructions provided by such manufacturers as attached to this manual or provided thereafter by Alvarion or the manufacturers. Non-compliance with such instructions may result in serious damage and/or bodily harm and/or void the user's authority to operate the equipment and/or revoke the warranty provided by such manufacturer.

Table of Contents

Table of Figures

Table of Tables

Chapter 1

About this Guide

Scope of the Manual

This manual describes the BreezeACCESS VL Broadband Wireless Access System Release 1.0 and how to install, operate and manage the system components.

This guide 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:

- ♦ **Chapter 1, About This Guide:** Explains how to use the manual.
- ♦ **Chapter 2, Introduction:** Describes the BreezeACCESS VL system and its components.
- ♦ **Chapter 3, Installation:** Describes how to install BreezeACCESS VL system components.
- ♦ **Chapter 4, Commissioning:** Describes how to configure basic parameters, align the Subscriber Unit antenna and validate unit operation.
- ♦ **Chapter 5, Operation and Administration:** Describes how to use the BreezeACCESS VL Monitor application for configuring parameters, checking system status and monitoring performance. In addition, this chapter describes how to upload new software versions and how to upload and download configuration files.
- ♦ **Appendix A, Software Version Loading Using TFTP:** Describe how to load a new software version using TFTP.
- ♦ **Appendix B, Configuration Download and Upload Using TFTP**: Describe how to download and upload configuration files using TFTP.
- ♦ **Appendix C, Preparing the indoor to outdoor cable:** Provides details on preparation of the indoor to outdoor Ethernet cable.
- ♦ **Appendix D, Supported MIBs and Traps:** Provides a brief description of the parameters contained in the MIBs supported by the BreezeACCESS VL devices. In addition, a description of all traps relevant to the Breeze ACCESS VL devices, is provided.
- ♦ **Appendix E, Parameters Summary:** Provides an at-a-glance summary of the configuration parameters, value ranges and default values.

♦ **Appendix F, Index to Menus and Parameters:** Provides an index for all the menus and parameters in the BreezeACCESS VL Monitor application.

Chapter 2

Introduction

About This Chapter

This chapter is comprised of the following sections:

♦ **Introducing BreezeACCESS OFDM**, page 2-2, provides a general introduction of the BreezeACCESS VL system.

♦ **Subscriber Unit (Customer Premises Equipment)**, page 2-4, describes the highlights of the BreezeACCESS VL Subscriber Unit.

♦ **Base Station Equipment**, page 2-5, describes the features of the BreezeACCESS VL Access Units.

♦ **Networking Equipment**, page 2-7, describes the standard network connections used by the BreezeACCESS VL system.

♦ **Management Systems**, page 2-7, introduces the various options for managing and monitoring the BreezeACCESS VL system components.

♦ **Specifications**, page 2-9, provides system specifications for the BreezeACCESS VL system components.

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 users are provided with a network connection that is always on, supporting immediate access to the Internet and other IP services at data rates of up to 54Mbps. 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.

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 IP ToS (RFC791).

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 and Time Division Multiple Access (TDMA) radios. 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 unlicensed BreezeACCESS products using GFSK modulation, including BreezeACCESS II that operates in the 2.4 GHz band and BreezeACCESS V systems in the 5.7 GHz band.

BreezeACCESS VL products are currently available in the 5 GHz frequency band, as shown in table Table 2-1.

Table 2-1: BreezeACCESS VL Frequency Bands

Series	Frequency Band (GHz)
BreezeACCESS VL 5.4	5.725-5.850
BreezeACCESS VL 5.4	5.470 – 5.725

The actual operating frequencies used by the system can be configured according to applicable radio regulations and specific deployment considerations.

A BreezeACCESS VL system is comprised of the following:

♦ **Customer Premise Equipment (CPE):** BreezeACCESS VL Subscriber Units.

♦ **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.

Subscriber Unit

The Subscriber Unit (SU) installed at the customer premises enables the customer data connection to the Access Unit, providing bridge functionality and supporting a full LAN.

The Subscriber Unit provides an efficient platform for high speed Internet and Intranet services. The system delivers fast access to IP-based services at a data burst rate of up to 54Mbps. The use of packet switching technology provides the user with a connection to the network that is always on, enabling immediate access to services.

The SU-A-24-VL Subscriber Unit supports a radio data rate of up to 24 Mbps. The SU-A-54-VL supports a radio data rate of up to 54 Mbps.

The SU-A-24/54-VL Subscriber Unit is comprised of an indoor unit (SU-NI-VL) and an outdoor unit (SU-RA-VL).

The SU-RA-VL outdoor unit contains the processing and radio modules and an integrated high-gain flat antenna.

The SU-NI-VL indoor unit 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 Cat.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.

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

Modular Base Station Equipment

The Base Station Equipment is based on the BS-SH-VL 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 various combinations of modules, including Network Interface (BS-AU) modules for Access Units operating in any of the bands supported by BreezeACCESS equipment, including BreezeACCESS VL, BreezeACCESS II and BreezeACCESS V. It can also accommodate a BS-GU GPS and Alarms module to support GPS-based synchronization of BreezeACCESS II or BreezeACCESS V Frequency Hopping radios.

Two different types of power supply modules are available for the BreezeACCESS VL modules: The BS-PS-DC-VL which is powered from a -48 VDC power source, and the BS-PS-AC-VL, 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 BreezeACCESS II or BreezeACCESS V Access Unit modules, one BS-PS-VL 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 II/V Access Units.

Each BS-AU-VL module, together with its outdoor AU-RD-VL radio unit and an antenna comprise an AU-D-BS-VL Access Unit that serves a single sector.

The AU-RD-VL outdoor unit contains the processing and radio modules and connects to an external antenna using a short RF cable.

Currently available AU antennas include the following:

Table 2-2: AU Antennas

Antenna	Band (GHz)	Horizontal Beam width	Gain
MFB58008	5.725-5.875	11° vertical	8 dB
AU-Ant-5G-16-90	5.725-5.875	90°	16 dB
AU-Ant-5G-15-120	5.725-5.875	120°	15 dB

The BS-AU-VL 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 Cat.5 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.

Standalone "Micro-Cell" Access Unit

The standalone AU-D-NI-VL Access Unit is very similar to the AU-D-BS-VL unit. The AU-RD-VL outdoor unit and the antenna are the same as in the AU-D-BS-VL Access Unit. The difference is in the structure of the indoor part; in the AU-D-NI-VL Access Unit the AU-NI-VL indoor unit is a standalone desktop or wall-mountable unit rather than a 19" module.

The AU-NI-VL indoor unit 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 Cat.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.

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.

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, which means 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.

BreezeCONFIG VL

The BreezeCONFIG 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 VL utility to control a large number of units from a single location. In addition, BreezeCONFIG VL enables you to load an updated configuration file to multiple units simultaneously, thus radically reducing the time spent on unit configuration maintenance.

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 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. 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 point of failures 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 all the knowledge base of BWA networks operations, AlvariSTAR is a unique state-of-the-art power multiplier at 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.

Specifications

Radio

Frequency	Series	Frequency Band (GHz)
	BreezeACCESS VL 5.4	5.470 – 5.725
	BreezeACCESS VL 5.7	5.725 – 5.850
Operation Mode	Time Division Duplex (TDD)	
Radio Access Method	Time Division Multiple Access (TDMA)	
Channel Bandwidth	20 MHz	
Central Frequency Resolution	5 MHz	
SU-RA integral antenna	21dBi, 5.725-5.855 GHz, 10.5^o Horizontal x 10.5^o vertical, vertical polarization, compliant with EN 302 085 V1.1.1 Range 1, Class TS 1, 2, 3, 4, 5	
AU Antennas	❖ AU-Ant-5G-16-90: 16 dBi, 5.725-5.855 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, 5.725-5.855 GHz, 120° Horizontal x 6° vertical sector antenna, vertical polarization, compliant with EN 302 085 V1.1.2 CS3	
Antenna Port (AU-RE)	N-Type, 50 ohm	
Output Power (at antenna port)	-6 to 29 dBm, adjustable in 1 dB steps	
Maximum Input Power (at antenna port)		
Gross Data Rate	6, 9, 12, 18, 24, 36, 48, 54 Mbps (6, 9, 12, 18, 24 Mbps in SU-A-24 VL)	

Sensitivity, typical (dBm at antenna port, PER<10%)	Data Rate	Sensitivity	Min. SNR
	6 Mbps	-82 dBm	6 dB
	9 Mbps	-81 dBm	7 dB
	12 Mbps	-79 dBm	9 dB
	18 Mbps	-77 dBm	11 dB
	24 Mbps	-74 dBm	14 dB
	36 Mbps	-70 dBm	18 dB
	48 Mbps	-66 dBm	22 dB
	54 Mbps	-65 dBm	23 dB

Modulation	OFDM modulation, 64 FFT points;	
	Data Rate	Modulation Scheme
	6 Mbps	BPSK
	9 Mbps	BPSK
	12 Mbps	QPSK
	18 Mbps	QPSK
	24 Mbps	QAM16
	36 Mbps	QAM16
	48 Mbps	QAM64
	54 Mbps	QAM64
Error Correction		

Data Communication

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 ToS according to RFC791

Configuration and Management

Management	a. Monitor program via Telnet b. SNMP c. Configuration upload/download
Management Access	From Wired LAN, Wireless Link
Management access protection	a. Multilevel password b. Configuration of remote access direction (from Ethernet only, from wireless link only or from both sides) c. Configuration of IP addresses of authorized stations
SNMP Agents	SNMP ver 1 client. MIB II, Bridge MIB, Private BreezeACCESS VL MIB
Security	RC4 Authentication and filtering
Allocation of IP parameters	Configurable or automatic (DHCP client)
Software upgrade	a. FTP b. TFTP
Configuration upload/download	a. FTP b. TFTP

Standards Compliance, General

Type	Standard	
EMC	FCC part 15 class B, CE EN55022 class B	
Safety	UL 1950, EN 60950	
Environmental	Operation	ETS 300 019 part 2-3 class 3.2E for indoor units ETS 300 019 part 2-4 class 4.1E for outdoor units
	Storage	ETS 300 019-2-1 class 1.2E
	Transportation	ETS 300 019-2-2 class 2.3
Lightning protection (AU-RE Antenna connection)	EN 61000-4-5, Class 3 (2kV)	
Radio	FCC part 15, ETS 301 253	

Physical and Electrical

Subscriber Unit

Mechanical

Unit	Structure	Dimensions (cm)	Weight (kg)
General	An indoor SU-NI unit and an outdoor SU-RA unit		
SU-NI	Metal box, desktop or wall mountable.	16 x 9 x 6	
SU-RA	Metal box plus an integral antenna in a cut diamond shape in a plastic enclosure, poll or wall mountable	43.2 x 30.2 x 5.9	

Connectors

Unit	Connector	Description
SU-NI	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).
	AC IN	3 pin AC power plug
SU-RA	INDDOR	10/100BaseT Ethernet (RJ-45), protected by a waterproof sealing assembly

Electrical

Unit	Details
General	Power consumption: 25W
SU-NI	AC power input: 85-265 VAC, 47-63 Hz,
SU-RA	54VDC from the indoor unit over the indoor-outdoor Ethernet cable

Modular Base Station Equipment

Mechanical

Unit	Structure	Dimensions (cm)	Weight (kg)
BS-SH-VL	19" rack (3U) or desktop installation	13 x 48.2 x 25.6	4.76
BS-PS-AC-VL	AC power supply module	12.9 x 7.0 x 25.3	
BS-PS-DC-VL	AC power supply module	12.9 x 7.0 x 25.3	
BS-AU-VL	Indoor module of the AU-BS access unit	12.9 x 3.5 x 25.5	
AU-RD	Metal box, pole or wall mountable	30.6 x 12.0 x 4.7	
AU-Ant-5G-16-90	Metal box, 2"-4" pole mountable	54.8 x 26.3 x 3.0	1.2
AU-Ant-5G-15-120	Metal box, pole mountable	54.8 x 26.3 x 3.0	1.2

Connectors

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-RD	INDDOR	10/100BaseT Ethernet (RJ-45), protected by a waterproof sealing assembly
	ANT	N-Type jack, 50 ohm, lightning protected
BS-PS-AC-VL	AC IN	3 pin AC power plug
BS-PS-DC-VL	-48 VDC	3 pin DC D-Type 3 Power pins plug Amphenol 717TWA3W3PHP2V4RRM6

Electrical

Unit	Details
General	240W max. for a fully equipped chassis (1 PS, 6 AU)
BS-PS-AC-VL	AC power input: 85-265 VAC, 47-65 Hz, DC power output: 54 V; 3.3 V
BS-PS-DC-VL	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-RD	54V DC from the BS-AU over the indoor-outdoor Ethernet cable
AU-BS (BS-AU module plus AU-RD outdoor unit)	Power consumption: 30W

Standalone Access Unit

Mechanical

Unit	Structure	Dimensions (cm)	Weight (kg)
General	An indoor SU-NI unit and an outdoor SU-RA unit		
AU-NI	Metal box, desktop or wall mountable.	16 x 9 x 6	
AU-RD	Metal box, poll or wall mountable	30.6 x 12 x 4.7	
AU-Ant-5.7G-17-90	Metal box, pole mountable		
AU-Ant-5.7G-14-120	Metal box, pole mountable		

Connectors

Unit	Connector	Description
AU-NI	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).
	AC IN	3 pin AC power plug
AU-RD	INDDOR	10/100BaseT Ethernet (RJ-45), protected by a waterproof sealing assembly
	ANT	N-Type jack, 50 ohm, lightning protected

Electrical

Unit	Details
General	Power consumption: 25W
AU-NI	AC power input: 85-265 VAC, 47-63 Hz,
AU-RD	54VDC from the indoor unit over the indoor-outdoor Ethernet cable

Environmental

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

Chapter 3

Installation

About This Chapter

This chapter is comprised of the following sections:

♦ **Installation Requirements**, page 3-2, provides the list of supplies and materials required to install each BreezeACCESS VL system component.

♦ **Equipment Location Guidelines**, page 3-5, provides information on the best locations to deploy the BreezeACCESS VL components in order to achieve the optimal reception and transmission quality.

♦ **Installing the Outdoor Unit**, page 3-6, describes how to mount the outdoor unit, connect the antenna, indoor-to-outdoor and ground cables. In addition, a description of the outdoor unit LEDs is provided.

♦ **Installing the SU-NI and AU-NI Indoor Unit**, page 3-9, describes how to install the SU-NI and AU-NI indoor units and provides a description of the units' LEDs.

♦ **Installing the Modular Base Station Equipment**, page 3-12, provides an illustrated description of the slot assignments, power supply modules and network interface modules and describes how to install the Base Station chassis.

Installation Requirements

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

Packing List

SU-A-VL Subscriber Unit

The SU-A-VL installation kit includes the following components:

♦ SU-NI-24-VL or SU-NI-54-VL Indoor Unit with a wall mounting kit

♦ Mains power cord

♦ SU-RA Outdoor Unit with an integrated antenna

♦ Pole mounting kit for the Outdoor Unit, comprising two brackets, four sets of screws, nuts and washers

♦ 20 meter Cat.5 indoor-to-outdoor Ethernet cable

♦ 3 shielded RJ-45 connectors

Modular Base Station Equipment

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

BS-SH-VL-AC Base Station Chassis with AC Power Supply

The BS-SH-VL-AC installation kit includes the following components:

♦ BS-SH-VL chassis with blank panels

♦ Rubber legs for optional desktop installation

♦ BS-PS-AC-VL power supply module

♦ Mains power cord

BS-SH-VL-DC Base Station Chassis with DC Power Supply

The BS-SH-VL-DC installation kit includes the following components:

♦ BS-SH-VL chassis with blank panels

♦ Rubber legs for optional desktop installation

♦ BS-PS-DC-VL power supply module

♦ DC power cable

AU-D-BS-VL Access Unit

The AU- D-BS-VL installation kit includes the following components:

♦ BS-AU-VL Network Interface module

♦ SU-RD-VL Outdoor Unit

♦ Pole mounting kit for the Outdoor Unit, comprising two brackets, four sets of screws, nuts and washers

♦ 20 meter Cat.5 indoor-to-outdoor Ethernet cable

♦ 3 shielded RJ-45 connectors

♦ Antenna, including pole mounting hardware

♦ RF cable

BS-PS-AC-VL Power Supply

Up to two BS-PS-AC-VL power supply modules can be included in each Base Station chassis.

The BS-PS-AC-VL installation kit includes the following components:

♦ BS-PS-AC-VL power supply module

♦ Mains power cord

BS-PS-CD-VL Power Supply

Up to two BS-PS-DC-VL power supply modules can be included in each Base Station chassis.

The BS-PS-DC-VL installation kit includes the following components:

♦ BS-PS-DC-VL power supply module

♦ DC power cable

AU-D-VL Standalone Access Unit

The AU-D-VL installation kit includes the following components:

♦ AU-NI-VL Indoor Unit with a wall mounting kit

♦ Mains power cord

♦ SU-RD Outdoor Unit

♦ Pole mounting kit for the Outdoor Unit, comprising two brackets, four sets of screws, nuts and washers

♦ 20 meter Cat.5 indoor-to-outdoor Ethernet cable

♦ 3 shielded RJ-45 connectors

♦ Antenna, including pole mounting hardware

♦ RF cable

Additional Installation Requirements

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

♦ Indoor-to-outdoor cable* (available in different lengths, if the required length is different from that of the cable supplied with the unit)

♦ Ground cable with an appropriate termination

♦ Mains plug adapter or termination plug (if the power plug on the supplied power cord does not fit local power outlets)

♦ Crossed Ethernet cable

♦ Portable PC with Ethernet card and Telnet software

♦ Installation tools and materials, including appropriate means (e.g. a pole) for installing the outdoor unit.

♦ Crimping tool for RJ-45 connectors

NOTE:

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

Equipment Location Guidelines

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

NOTE:

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

Failure to do so may void the BreezeACCESS 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.

♦ SU-RE units should be installed as close as possible to the antenna.

♦ The external antenna connected to the AU-RD unit, should be installed so as to provide coverage to all Subscriber Units within its service area.

NOTE:

The distance between any two antennas must exceed 40cm.

♦ It is recommended that the SU-RA outdoor unit with its integrated antenna be installed to provide a direct, or near line of sight with the Base Station antenna. The antenna (integrated on the front side of the SU-RA Outdoor Unit) should be aligned to face the Base Station.

♦ 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 CPE.

NOTE:

The system complies with the ETS 300 385 standard and is protected against secondary lightning strikes when the Outdoor Unit is properly grounded according to the relevant country-specific industry standards for protection of structures against lightning. The system complies with EN 61000-4-5 test level 3 (2kV).

Installing the Outdoor Unit

The following sections describe how to install the outdoor equipment, including pole mounting the outdoor unit and the antenna of the SU-RE, and connecting the indoor-to-outdoor, grounding and RF cables.

Pole Mounting the Outdoor Unit

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

♦ Special brackets and open-ended bolts are supplied with each unit. There are two pairs of threaded holes on the back of the unit, enabling the special brackets to be mounted on diverse pole widths.

♦ 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.

Figure 3-1 shows the locations of the holes and band grooves on the back, top and bottom of the Outdoor Unit.

NOTE:
Be sure to install the unit with the bottom panel, which includes the LED indicators, facing downward.
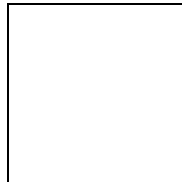
Figure 3-1: Threaded Holes/Grooves

Figure 3-2 illustrates the method of installing an outdoor unit on a pole, using the brackets and open-ended bolts.
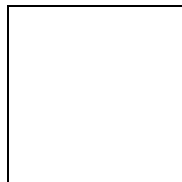
Figure 3-2: 3" Pole Installation Using the Special Brackets

NOTE:

Be sure to insert the open-ended bolts with the grooves pointing outward, since these grooves enable you to use a screwdriver to fasten the bolts to the unit.

Connecting the Ground and Antenna Cables

The Ground terminal (marked ⬜) is located on the bottom panel of the outdoor unit. The Antenna RF connector (marked

⬜) is located on the top panel of the AU-RD outdoor unit.
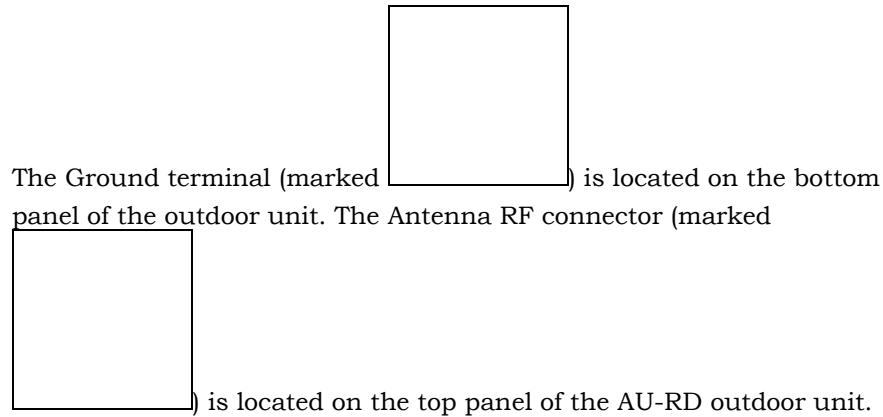
➢ **To connect the ground cable:**

1. Connect one end of a grounding cable to the ground terminal and tighten the ground screw firmly.

2. Connect the other end of the ground cable to a ground connection.

➢ **To connect the RF cable (AU-RD):**

3. Connect one end of the coaxial RF cable to the RF connector on the top panel of the unit

4. Connect the other end of the RF cable to the antenna.

5. The RF connectors should be sealed properly to protect against rain and moisture.
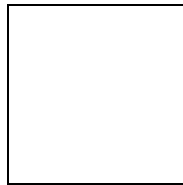
Figure 3-3: Bottom Panel of the Outdoor Unit (without the seal assembly)

Connecting the Indoor-to-Outdoor Cable

6. Remove the two screws holding the waterproof seal to the outdoor unit and remove the waterproof seal.

7. Unscrew the top nut from the waterproof seal
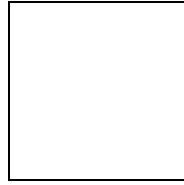
Figure 3-4: The Waterproof Seal

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

NOTE:

The 8-wire cable should be shielded.

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

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

11. 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.

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

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

Installing the SU-NI/AU-NI Indoor Unit

1. The unit can be placed on a desktop or a shelf. Alternatively, it may be wall-mounted. The drilling template included with the unit can be used to simplify the wall installation process.

2. Connect the Indoor-to-Outdoor cable to the RADIO connector, located on the front panel of the indoor unit shown in Figure 3-5 on page 3-10.
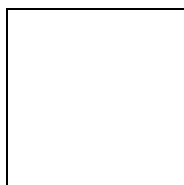
Figure 3-5: Indoor Unit Front Panel

3. Connect the power cord to the unit's AC socket, located on the rear panel shown in Figure 3-6 on page 3-10. Connect the other end of the power cord to the AC mains after verifying that the unit is rated for the voltage in the country of use; the AC rating is indicated on the rear panel of the Indoor unit.

NOTE:

The color codes of the power cable are:

brown
phase   ~

blue
neutral   0

yellow/green

grounding
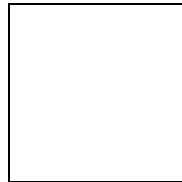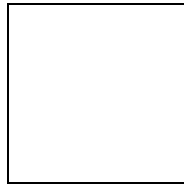
Figure 3-6: Indoor Unit Rear Panel

4. Verify that the yellow POWER LED located on the front panel is lit, indicating that the unit is supplying power to the radio port.

5. Configure the basic parameters as described in Configuring Basic Parameters on page 4-2.

6. Connect the 10/100 BaseT connector located on the front panel of the unit 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 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.

NOTE:

Reset the unit using the RESET push button after connecting or reconnecting the indoor and outdoor units with the indoor-to-outdoor cable.

Installing the Modular Base Station Equipment

The following sections describe the slot assignments 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.

BS-SH-VL Slot Assignments

The Base Station chassis comprises ten slots, as shown in Figure 3-7.
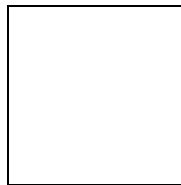
Figure 3-7: BS-SH-VL Chassis Slot Assignments

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 eight BS-AU-VL modules. Unused slots should remain covered until required.

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

WARNING:

If two power supply modules are used in the same chassis, both power supply modules must be of the same type. Do not use a mix of AC and DC power supply modules in the same chassis.

BS-PS-AC-VL Power Supply Module

The BS-PS-AC-VL is an AC to DC converter that provides power to all the BS-AU-VL modules installed in the BS-SH-VL chassis. The BS-PS-AC-VL front panel is shown in Figure 3-8.
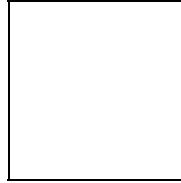
Figure 3-8: BS-PS-AC-VL Front Panel

The BS-PS-AC-VL provides 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 3-1: 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

BS-PS-DC-VL Power Supply Module

The BS-PS-DC-VL is a DC to DC converter that provides power to all the BS-AU-VL modules installed in the BS-SH-VL chassis. The BS-PS-DC-VL front panel is shown in Figure 3-9.

Figure 3-9: BS-PS-DC-VL Front Panel

The BS-PS-DC-VL 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):** -48VDC

♦ **Red (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 3-1 on page 3-13.

BS-AU-VL Network Interface Module

The front panel of the BS-AU-VL Access Unit Network Interface module is shown in Figure 3-10.
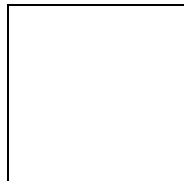
Figure 3-10: BS-AU-VL Front Panel

The BS-AU-VL provides the following interfaces:

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

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

Installing the BS-SH-VL Chassis and Modules

This section describes how to install the 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-VL chassis in a 19 inch cabinet. To prevent over-heating, leave a fee space of at least 1U between the upper/lower covers of the BS-SH-VL chassis and other units in the cabinet.
or
Place the BS-SH-VL chassis on an appropriate shelf or table. When mounting the BS-SH-VL 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 back panel of the BS-SH-VL chassis and firmly tighten the ground screw.

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

4. Carefully insert the BS-PS-VL power supply and the BS-AU-VL modules into the relevant slots and push firmly until they are securely locked. Before insertion, verify that the switches of all BS-PS-VL modules are in the OFF position. Refer to *BS-SH Slot Assignments* on page 3-12 for a description of the slot assignments.

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 AU-NI-BS module(s).

8. If a BS-PS-DC-VL power supply is used, connect the DC power cord to the –48 VDC In jack of the BS-PS-DC-VL 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 -48VDC power source, as follows.

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

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

    c.   Connect the shield to the ground.

9. If a BS-PS-AC-VL power supply is used, connect the AC power cord to the AC In jack of the BS-PS-AC-VL 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-VL power supplies to **ON**. Verify that all power indicator LEDs on the BS-PS-AC/DC-VL front panel are **ON** and that the **OVERTEMP** alarm indicator is off. Refer to Table 3-1 on page 3-13 for a description of these LEDs.

11. Configure the basic parameters in all BS-AU-VL modules as described in Configuring Basic Parameters on page 4-2.

12. Connect the 10/100 BaseT 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.

13.

NOTE:

Reset the unit using the RESET push button after connecting or reconnecting the indoor and outdoor units with the indoor-to-outdoor cable.
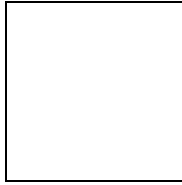
Chapter 4

Commissioning

About This Chapter

This chapter is comprised of the following sections:

♦ **Preliminary Configuration**, page Error! Bookmark not defined., describes how to configure basic unit parameters.

♦ **Aligning the Subscriber Unit Antenna**, page **4-4**, describes how to locate and position the antenna for optimal communication and assess the quality of the link between the Subscriber and Access Units.

♦ **Configuring the Subscriber Unit's Transmit Power Level and Maximum Data Rate**, page **4-6**, describes how to measure the quality of the link between the Subscriber and Access Units and how to configure the transmit power level and the maximum data rate.

♦ **Operation Verification**, page **4-10**, describes how to assess the correct functioning of the outdoor and indoor Units, the Ethernet connection and data connectivity.

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. Once 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 Working with on page 5-2 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 BreezeACCESS VL 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 4-1.

Refer to *Chapter 5*, *Operation and Administration*, for detailed information on the applicable parameters.

Table 4-1: Basic Parameters

Parameter	Default Value	Comment
IP Address	10.0.0.1	
Subnet Mask	255.255.255.0	
Default Gateway Address	0.0.0.0	
DHCP Option	Disable	
Access to DHCP	AU: From Ethernet Only SU: From Wireless Only	
ESSID	ESSID1	
Frequency (AU)	5.7 GHz series: 5780 MHz 5.4 GHz series: 5600 MHz	
Sub Band Lower Frequency (SU)	5.7 GHz series: 5740 MHz 5.4 GHz series: 5485 MHz	
Sub Band Upper Frequency (SU)	5.7 GHz series: 5835 MHz 5.4 GHz series: 5710 MHz	
Scanning Step (SU)	5 MHz	
Frequency Subset Definition (SU)	A (All)	
Transmit Power (AU)		MAX Pout = (36-GdBi) dBm* *FCC EIRP limit for BS

Parameter	Default Value	Comment
Initial Transmit Power (SU)		For setting the Initial Transmit Power at the SU, refer to Configuring the Initial Transmit Power Level on page 4-6.
ATPC Option	AU: Disable SU: Enable	
Best AU Support (SU)	Disable	
Preferred AU MAC Address (SU)	00-00-00-00-00-00	Applicable only when Best AU Support is enabled
Maximum Data Rate (SU)	54 Mbps	For configuring the Maximum Data Rate at the SU, refer to Configuring the Maximum Data Rate on page 4-8.
Multi Rate Support		
VLAN Link Type	Hybrid	
VLAN ID-Management	65535	
Authentication Algorithm	Open System	In the SU, can be changed to Shared Key only after configuring the WEP Key and the applicable Default Key ID. In the AU, at least one WEP Key must be configured
Default Key ID (SU)	1	
WEP Key	0000000000 (none)	

NOTE:
Once the basic parameters are configured, the unit must be reset in order to activate the new configuration.

Aligning the Subscriber Unit Antenna

The RSSI bar display is located on the bottom panel of the outdoor unit. The ten green RSSI LEDs are used for reading the Received Signal Strength Indication. The higher the number of green LEDs indicating **On**, the higher the level of the received signal. This section describes how to align the Subscriber Unit antenna using the RSSI bar display.

> **NOTE:**
>
> Antenna alignment using the RSSI 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. If not, the unit will not be able to synchronize with the Access Unit. As the RSSI 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, which is integrated into the front side of the SU-RA unit, 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 WLNK orange LED of the unit is **On**, indicating that the unit is associated with an Access Unit. If the WLNK LED is **Off**, check that the *ESSID*, *Frequency* and *Security* 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 RSSI 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.

NOTE:

In some cases, the antenna may need to be tilted to ensure that it is directed toward the Base Station antenna. For example, if the Subscriber Unit is located very close to the Base Station.

Configuring the Subscriber Unit's Transmit Power Level and Maximum Data Rate

The following sections describe how to configure the transmit power level and maximum data rate for Subscriber Units. The ***Initial Transmit Power*** level should be configured only when the ***Transmit Power Control Algorithm*** is disabled.

Configuring the Initial Transmit Power Level

If the ***Transmit Power Control Algorithm*** is enabled you can retain the default configuration of the ***Initial Transmit Power*** parameter, since the algorithm automatically sets the optimal level of the output power.

If the ***Transmit Power Control Algorithm*** is disabled, it is recommended that the ***Initial Transmit Power*** parameter for each SU be set to achieve an SNR of 26 dB at the AU. Refer to Table 4-2 for the list of optimal transmit power levels at various distances, assuming a free line of sight between SU and AU.

Table 4-2: Recommended SU Initial Transmit Power Level Vs. Distance

Distance (m)	SU Transmit Power (dBm)	Distance (m)	SU Transmit Power (dBm)
50	-22	700	1
75	-18.5	800	2.25
100	-16	900	3.25
150	-12.5	1000	4
200	-10	1250	6
250	-8	1500	7.5
300	-6.25	2000	10
350	-5	2500	12
400	-3.75	3000	13.75
450	-2.75	4000	16.25
500	-2	5000	18
550	-1	6000	19.75
600	-0.25	>6000	Pmax (20dBm)

➢ **To verify optimal configuration of the initial transmit power level:**

1. If the SU does not associate with the AU, check the configuration of the *ESSID*, *Frequency* and *Security* parameters. If the parameters are properly configured, verify the antenna alignment. If the unit is still not associated with the AU, set the *Initial Transmit Power* parameter to its maximum value.

2. After the SU is associated with the AU, check the SNR of the SU at the applicable AU. For example, you can access the AU's Monitor program via Telnet to view the SNR values in the **MAC Address Database**, which can be accessed from the *Site Survey* menu.

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. If the SNR measurement of the relevant SU at the AU is lower than 26 dB, increase the value of the *Initial Transmit Power* parameter for the SU until an SNR measurement of 26 dB is achieved or until the *Initial Transmit Power* parameter is set to its maximum value.

Configuring the Maximum Data Rate

This section describes how to configure the maximum data rate for BreezeACCESS VL Subscriber Units.

➢ **To configure the maximum data rate:**

1. If, after the SU is configured to its optimal *Transmit Power* level, the SNR at the AU is too low, it is recommended that you configure the *Maximum Data Rate* parameter to a value that is lower than the maximum. This can decrease the number of retransmissions due to attempts to transmit at rates 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 SNR is lower than the values required for the maximum data rate according to Table 4-3, it is recommended that you decrease the maximum data rate.

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 Data Rate* according to Table 4-3, using the typical sensitivity 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.

4. Reset the unit to activate the new configuration.

NOTE:
If the unit is associated with the AU, then the final configuration of the *Maximum Data Rate* parameter may be performed remotely, for example, from the site of the AU or from another site.

Table 4-3: Recommended Maximum Data Rate

SNR	Maximum Data Rate
SNR> 23 dB	54 Mbps
22dB < SNR< 23 dB	48 Mbps
18 dB< SNR < 22 dB	36 Mbps
14 dB < SNR < 18 dB	24 Mbps
11 dB < SNR < 14 dB	18 Mbps
9 dB < SNR < 11 dB	12 Mbps
7 dB < SNR < 9 dB	9 Mbps
6 dB<SNR < 7 dB	6 Mbps

Operation Verification

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

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.

Table 4-4: Outdoor Unit LEDs
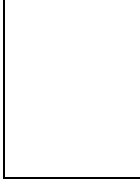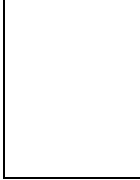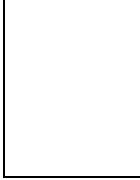
Name	Description	Functionality
W-LINK	Wireless Link Indicator	Blinking Green – Data received or transmitted on the wireless link. Blinking rate is slower when there is less wireless traffic.
DC Power	Self Test and Power indication	Green – Power is available and self test passed. Red – Self test failed. Firmware did not load successfully.
ETH	Ethernet activity/ connectivity indication	Off –Ethernet connectivity is OK. No traffic activity detected on the port. Blinking Green –Ethernet connectivity is OK, with traffic on the port. Red – No Ethernet connectivity between the ondoor and outdoor units.
SNR BAR (SU-RA)	Received signal strength Indication	10 green LEDs bar display indicating the level of the received signal

Table 4-5: SU SNR Bar LED Functionality

SNR bar LEDs	SNR
LED 1 is **On**	SNR > 6dB
LEDs 1-2 are **On**	SNR > 12 dB
LEDs 1-3 are **On**	SNR > 18 dB
LED 1-4 are **On**	SNR > 24 dB
LED 1-5 are **On**	SNR > 30 dB
LED 1-6 are **On**	SNR > 36 dB
LED 1-7 are **On**	SNR > 42 dB
LED 1-8 are **On**	SNR > 48 dB
LED 1-9 are **On**	SNR > 54 dB
LED 1-10 are **On**	SNR > 60 dB

NOTE:

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

Indoor Unit Verification

To verify the correct operation of the indoor equipment, examine the LED indicators located on the top panel of the SU-NI and AU-NI indoor units, or on the front panel of the BS-AU-VL module.

Table 4-6 lists the LEDs of the SU-NI-VL and AU-NI-VL and their associated indications. Table 4-7 provides similar information for the BS-AU-VL LEDs.

Table 4-6: SU-NI / AU-NI Indoor Unit LEDs

Name	Description	Functionality
POWER	Power indication	Green - 48VDC is present on the RADIO port.
		Off - No power is supplied to the RADIO port.

| LINK | Self test and end-to-end Ethernet connectivity | Off – No Ethernet connectivity has been detected between the outdoor unit and the device connected to the indoor unit. |
| | | Orange– Self-test passed and Ethernet connection is confirmed by the outdoor unit (Ethernet integrity check passed). |

Table 4-7: BS-AU-VL LEDs

Name	Description	Functionality
W-LINK	Wireless link activity	Green – At least one SU is associated.
		Blinking Red – No SU is associated.
		Off – Wireless link disabled.
ODU CURRENT CONSUMPTION	Current Consumption of the Outdoor Unit	Red – over current.
		Blinking Red – open circuit or below anticipated current consumption.
		Green – within tolerance.
ODU STATUS	Outdoor Unit Self-test	Green – Self test passed and ODU ready for operation.
		Blinking Amber – Testing (not ready for operation)
		Red - fatal failure.
IDU PWR	Power indication for the Indoor Unit	Green – IDU power OK.
		Off – no power is supplied to the IDU.
ALARM	Indoor Unit Alarm Indication	Red – a fatal failure indication.
		Off – IDU is functioning properly.

Verifying the Ethernet Connection

Once you have connected the unit to an Ethernet outlet, verify that the Ethernet Integrity Indicator, which is the yellow LED embedded in the **10/100 BaseT** connector, is **On**. This indicates that the unit is connected to an Ethernet segment. The Ethernet Activity Indicator, which is the green embedded LED, should blink whenever the unit receives or transmits traffic on the **10/100 BaseT** port.

Verifying the Indoor-to-Outdoor Connection (Modular Base Station)

Once you have connected the unit to an Ethernet outlet, verify that the Ethernet Integrity Indicator, which is the yellow LED embedded in the **RADIO** connector, is **On**. This indicates that the unit has detected an Ethernet link connection. The Ethernet Activity Indicator, which is the green embedded LED, should blink whenever the unit receives or transmits traffic on the **RADIO** port.

Verifying Data Connectivity

To verify data connectivity, from the end-user's PC or from a portable PC connected to the unit, ping the Access Unit, or try to connect to the Internet.

Chapter 5
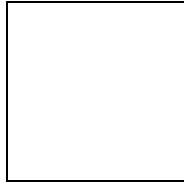
Operation and Administration

About This Chapter

This chapter describes how to access the Monitor program and how to use it to setup, configure, and manage BreezeACCESS VL units.

This chapter is comprised of the following sections:

♦ **Working with the Monitor Program**, page **5-2**, describes how to access the Monitor program and describes the common operations required to work with the Monitor program.

♦ **Menus and Parameters**, page **5-5**, starting at the *Main Menu*, this section describes each menu and parameter provided by the Monitor program.

Working with the Monitor Program

Accessing the Monitor Program Using Telnet

1. Connect a PC to the Ethernet port, using a crossed cable.

2. Configure the PC's IP parameters to enable connectivity with the unit. The default IP address is 10.0.0.1.

3. Run the Telnet program. The *Select Access Level* menu is displayed.

Select the required access level, depending on your specific access rights. A password entry request is displayed. Table 5-1 lists the default passwords for each of the access levels.

Table 5-1: Default Passwords

Access Rights	Password
Read Only	Public
Installer	User
Administrator	Private

NOTE:

Following three unsuccessful login attempts (using incorrect passwords), the monitor program is blocked for several minutes. To enable access to the monitor program during that time, the unit must be reset via SNMP or by disconnecting/reconnecting power.

4. Enter your password and press ***Enter***. The *Main Menu* is displayed as shown in Figure 5-1. The unit type, SW version number and SW release date displayed in the *Main Menu* vary according to the selected unit and SW version.

NOTE:

If the Telnet session is not terminated properly, for example, if you simply close the window, the monitor program is blocked for several minutes. To enable access to the monitor program during that time, the unit must be reset via SNMP or by disconnecting/reconnecting power.

```
BreezeACCESS-VL/SU

Official Release Version – 1.0.3

Release Date: Mon Jul 22 15:00:36 2002

Main Menu

=========

1 - Info Screens

2 - Unit Control

3 - Basic Configuration

4 - Site Survey

5 - Advanced Configuration

x - Exit

>>>
```

Figure 5-1: Main Menu (Administrator Level)

The appearance of the *Main Menu* varies depending on the user's access level, as follows.

♦ For users with read only access rights, only the *Info Screens* option is displayed. Users with this access level are not able to access the *Unit Control*, *Basic Configuration*, *Site Survey* and *Advanced Configuration* menus.

♦ For users with Installer access rights, the first four menu items, *Info Screens*, *Unit Control*, *Basic Configuration* and *Site Survey,* are displayed. Users with this access level are not able to access the *Advanced Configuration* menu.

♦ For users with Administrator access rights, the full *Main Menu* is displayed. These users can access all the menu items.

Common Operations

The following describes the standard operations that are used when working with the Monitor program.

♦ Type an option number to open or activate the option. In certain cases you may need to click ***Enter***.

♦ Click ***Esc*** to exit a menu or option.

NOTE:

The program is automatically terminated following a determined period of inactivity. The default time-out is 5 minutes and is configured with the **Log-Out Timer** parameter.

In most cases, to activate any configuration changes, you must reset the unit. Certain settings are automatically activated without the need to reset the unit. Refer to *Appendix E, Parameters Summary* for information on which parameters are run-time configurable, which means that the unit need not be reset for the parameter to take effect, and which parameters do require that the unit be reset.

Menus and Parameters

The following sections describe the menus and parameters provided by the Monitor program.

Main Menu

The *Main Menu* enables you to access the following menus, depending on your access level, as described in Working with the Monitor Program, on page 5-2.

♦ **Info Screens:** Provides a read-only display of current parameter values. Available at all access levels.

♦ **Unit Control:** Enables you to access general operations such as resetting the unit, reverting to factory default parameters, changing passwords and switching between software versions. Available at the Installer and Administrator access levels.

♦ **Basic Configuration:** Enables you to access the set of parameters that are configured during the installation process. These parameters are also available in the *Advanced Configuration* menu. Available at the Installer and Administrator access levels.

♦ **Site Survey:** Enables you to activate certain tests and view various system counters. Available at the Installer and Administrator access levels.

♦ **Advanced Configuration:** Enables you to access all system parameters, including the *Basic Configuration* parameters. Available only at the Administrator access level.

Info Screens Menu

The *Info Screens* menu enables you to view the current values of various parameter sets. The parameter sets are identical to the main parameter groups in the configuration menus. You can view a specific parameter set or choose to view all parameters at once. While this menu is available at all access levels, the **ESSID, Operator ESSID** and **WEP Keys** are only displayed to users with Administrator access rights.

Show Unit Status

The *Show Unit Status* menu is a read-only menu that displays the current values of the following parameters:

♦ **Unit Name**: As defined in Unit Control menu.

♦ **Unit Type:** Identifies the unit's function as either an **Access Unit** or **Subscriber Unit**.

♦ **Unit MAC Address:** The unit's unique IEEE MAC address.

♦ **Number of Associations Since Last Reset:** In SUs - displays the total number of associations with any AU since the last reset, including duplicate associations with the same AU. In AUs - displays the number of SUs that have associated with the AU since the last reset, including duplicate associations with the same SU.

♦ **Unit Hardware Version:** The version of the outdoor unit hardware.

♦ **Unit BOOT Version:** The version of the BOOT SW

♦ **Flash Type and Size:** The type and size of the Flash memory.

♦ **Flash Versions**:

  ❖ **Running from:** Shows whether the unit is running from the Main or from the Shadow Version.

  ❖ **Main Version**: The software version currently defined as the main version.

  ❖ **Shadow Version**: The software version currently defined as the shadow (backup) version.

♦ **Radio Band:** The radio band of the unit (5.7 GHz or 5.4 GHz)

♦ **Log Out Timer:** The value of the Log Out Timer as defined in Unit Control menu.

♦ **Ethernet Port Negotiation Mode:** The Ethernet port negotiation mode as defined in Unit Control menu.

♦ **SW Version Download Parameters:** The parameters for SW download using FTP, as defined in Unit Control menu.

  ❖ **FTP Source Dir**

- ❖ **FTP File Name**
- ❖ **FTP Host IP Address**
- ❖ **FTP Client IP Address**
- ❖ **FTP User Name**
- ❖ **FTP Password**

♦ **Configuration File Upload Download Parameters:** The parameters for Configuration file upload/download using FTP, as defined in Unit Control menu.

- ❖ **FTP Source Dir**
- ❖ **Configuration File Name**
- ❖ **Operator Defaults File Name**
- ❖ **FTP Host IP Address**
- ❖ **FTP Client IP Address**
- ❖ **FTP User Name**
- ❖ **FTP Password**

The following parameters are displayed for Subscriber Units only:

♦ **Unit Status:** The current status of the SU. There are two status options:

- ❖ **SCANNING:** The SU is searching for an AU with which to associate.
- ❖ **ASSOCIATED:** The SU is associated with an AU.

♦ **AU MAC Address:** The MAC address of the AU with which the unit is currently associated. If the unit is not associated with any AU, the address defaults to the IEEE broadcast address, which is FF-FF-FF-FF-FF-FF.

The following parameters are displayed for Access Units only:

♦ **Current Number of Associations:** The total number of SUs associated with this AU. This number may include units that are not currently active since there is no aging algorithm for associated SUs.

NOTE:

An SU is only removed from the list of associated SUs under the following conditions:

a. A SNAP frame is received from another AU indicating that the SU is now associated with the other AU.

b. The SU failed to respond to a certain number of consecutive frames transmitted by the AU and is considered to have "aged out".

Show Basic Configuration

The *Show Basic Configuration* menu is a read-only menu that displays the current values of the parameters included in the *Basic Configuration* menu.

Show Advanced Configuration

The *Show Advanced Configuration* menu enables you to access the read-only sub-menus that display the current values of the parameters included in the applicable sub-menus of the *Advanced Configuration* menu.

Show All Parameters

The *Show All Parameters* menu is a read-only menu that displays the current values of all status and configuration parameters.

NOTE:

The values of **ESSID, Operator ESSID** and **WEP Keys** are available only under Administrator access rights.

Unit Control Menu

The *Unit Control* menu enables configuring control parameters for the unit. The *Unit Control* menu includes the following options:

Reset Unit

The Reset Unit option enables resetting the unit. After reset, any modifications made to the system parameters are applied.

Set Defaults

The Set defaults submenu enables resetting the system parameters to a predefined set of default or saving the current configuration as the set of Operator Defaults. The available options are:

Set Defaults:

The Set Defaults submenu enables reverting the system parameters to a predefined set of defaults. There are two sets of default configurations:

a. **Factory Defaults**: This is the standard default configuration.

b. **Operator Defaults**: Operator Defaults configuration can be defined by the Administrator using the **Save Current Configuration As Operator Defaults** option in this menu. It may also be defined at the factory according to specific operator's definition. The default Operator Defaults configuration is the Factory Defaults configuration.

The current configuration file and the Operator Defaults configuration file can be uploaded/downloaded by the unit using FTP. For more information see **Configuration File Upload/Download** option on page 5-13. These files can also be uploaded/downloaded remotely using TFTP (see Appendix B).

The available options in the **Set Defaults** submenu are:

♦ **Set Complete Factory Defaults**: Available only with Administrator access rights. Resets the unit to the standard Factory Defaults configuration, excluding the Administrator Password.

♦ **Set Partial Factory defaults**: Resets the unit to the standard Factory Default configuration, excluding the parameters that are required to maintain connectivity and management access. These parameters are listed in Table 5-2.

Table 5-2: Parameters that are not reset after Set Partial Factory/Operator Defaults

Unit Control Parameters
Administrator Password
IP Parameters
IP Address
Subnet Mask
Default Gateway Address
DHCP Option
Access to DHCP
Air Interface Parameters
ESSID
Operator ESSID Option (AU)
Operator ESSID (AU)
Frequency (AU)
Sub Band Lower Frequency (SU)
Sub Band Upper Frequency (SU)
Scanning Step (SU)
Frequency Subset definition (SU)
ATPC Option
Transmit Power (AU)
Initial Transmit Power (SU)
Best AU Support (SU)
Preferred AU MAC Address (SU)
Performance Parameters
Maximum Data Rate (SU)
Multi Rate Support
Bridge Parameters
VLAN ID – Data (SU)
VLAN ID – Management
VLAN Link Type
VLAN Relaying Support (AU)
VLAN Relaying ID (1-20) (AU)
VLAN Forwarding Support
VLAN Forwarding ID (1-20)
VLAN Priority – Data (SU)
VLAN Priority – Management
Security Parameters
Authentication Algorithm
Default Key ID (SU)
WEP Key 1 to WEP Key 4

♦ **Set Complete Operators Defaults:** Available only with Administrator access rights. Resets the unit to the Operator Defaults configuration, excluding the Administrator Password.

♦ **Set Partial Factory defaults:** Resets the unit to the Operator Defaults configuration, excluding the parameters that are required to maintain connectivity and management access. These parameters are listed in Table 5-2.

Save Current Configuration As Operator Defaults

The Save Current Configuration As Operator Defaults option is available only under Administrator access rights. It enables defining the current configuration of the unit as the Operator Defaults configuration.

Change Unit Name

The Change Unit Name option enables changing the name of the unit, which is also the system's name in the MIB2. The name of the unit is also used as the prompt at the bottom of each Monitor window.
Valid values: A string of up to 32 printable ASCII characters.
The default unit name is an empty string.

Change Password

The Change Password submenu enables changing the access password(s). A user with Installer access rights can view and change the passwords for Read Only and Installer levels. A user with Administrator access rights can view and change the passwords for all levels.
Valid values: A string of up to 8 printable ASCII characters
Refer to Working with the Monitor Program on page 5-2 for a list of the default passwords for each of the access levels.

Flash Memory Control

The Flash Memory Control submenu enables selecting the active software version for the unit.

The flash memory can store two software versions. One version is called Main and the other is called Shadow. New software versions are loaded as the shadow version. You can select the shadow version as the new active version by selecting **Reset and Boot from Shadow Version**. However, after the next reset, the main version is re-activated. To continue using the currently active version after the next reset, select **Use Current Version After Reset**: The previous shadow version will be the new main version, and vice versa.

The parameters configured in the unit are not changed as a result of loading new software versions unless the new version includes additional parameters or additional changes in the list of parameters. New parameters are loaded with their default values.

Select from the following options:

♦ **Reset and Boot from Shadow Version:** Activates the shadow (backup) software version. The unit is reset automatically. Following the next reset the unit will switch to the main version.

♦ **Use Current Version After Reset:** Defines the current version as the new main version. This version will also be used following the next reset.

SW Version Download

The SW Version Download submenu enables downloading a SW Version file from a remote FTP server. The SW Version Download submenu includes the following options:

♦ **Execute FTP GET SW Version:** The Execute FTP GET SW Version option executes the SW Version FTP download according to the parameters defined below.

♦ **FTP Source Dir:** The FTP Source Dir option enables defining **t**he source directory of the SW version file.

Valid values: A string of up to 80 printable ASCII characters. To clear the field press ".".

The default is an empty string.

♦ **SW Version FTP File Name:** The SW Version FTP File Name option enables defining the name of the SW version file in the FTP server.

Valid values: A string of up to 80 printable ASCII characters.

The default is an empty string.

♦ **FTP Client IP Address:** The FTP Client IP Address option enables defining the IP address of the FTP client in the unit. This secondary IP address is required only to support the optional FTP process.

The default is:

♦ **FTP Host IP Address:** The FTP Host IP Address option enables defining the IP address of the FTP server that is hosting the SW Version file.

The default is:

♦ **FTP User Name:** The FTP User Name option enables defining the user name to be used for accessing the FTP server that is hosting the SW Version file.

Valid values: A string of up to 20 printable ASCII characters.

The default is:

♦ **FTP Password:** The FTP Password option enables defining the password to be used for accessing the FTP server that is hosting the SW Version file.

Valid values: A string of up to 20 printable ASCII characters.

The default is:

♦ **Show SW Version Download Parameters and Status:** Displays the current values of the SW Version Download parameters, the current SW version and the SW versions stored in the Flash memory.

NOTE:

There is one set of general FTP parameters (FTP Source Dir, FTP Host IP Address, FTP Client IP Address, FTP User Name and FTP Password). This set serves both the SW Download Procedure and the Configuration File Upload/Download procedure. Changing any of these parameters in the menu for either procedure will automatically change its value in the menu for the other procedure.

Configuration File Upload/Download

The Configuration File Upload/Download submenu enables uploading or downloading a configuration or an Operator Defaults file from a remote FTP server. The Configuration File Upload/Download submenu includes the following options:

♦ **Execute FTP GET/PUT Configuration File** The Execute FTP GET/PUT Configuration File executes the upload/download of a Configuration file or an Operator Defaults file according to the parameters defined below. The following options are available:

❖ Execute FTP Get Configuration File (cfg)

❖ Execute FTP Put Configuration File (cfg)

❖ Execute FTP Get Operator Defaults File (cmr)

❖ Execute FTP Get Operator Defaults File (cmr)

♦ **FTP Source Dir:** The FTP Source Dir option enables defining the source directory of the configuration/Operator Defaults file.

Valid values: A string of up to 80 printable ASCII characters. To clear the field press ".".

The default is an empty string.

♦ **Configuration File FTP File Name:** The Configuration File FTP File Name option enables defining the name of the configuration file to be uploaded/downloaded.

Valid values: A string of up to 80 printable ASCII characters. To clear the field press ".".

The default is **config.cfg**.

♦ **Operator Defaults FTP File Name:** The Operator Defaults File Name option enables defining the name of the Operator Defaults file to be uploaded/downloaded.

Valid values: A string of up to 80 printable ASCII characters. Enter "." to clear the field.

The default is **operator.cmr**.

♦ **FTP Client IP Address:** The FTP Client IP Address option enables defining the IP address of the FTP client in the unit. This secondary IP address is required only to support the optional FTP process.
The default is:

♦ **FTP Host IP Address:** The FTP Host IP Address option enables defining the IP address of the FTP server that is hosting the file.

The default is:

♦ **FTP User Name:** The FTP User Name option enables defining the user name to be used for accessing the FTP server that is hosting the file.

Valid values: A string of up to 20 printable ASCII characters.

The default is:

♦ **FTP Password:** The FTP Password option enables defining the password to be used for accessing the FTP server that is hosting the file.

Valid values: A string of up to 20 printable ASCII characters.

The default is:

♦ **Show Configuration File Upload/Download Parameters:** Displays the current values of the Configuration File Upload/Download parameters.

NOTE:

There is one set of general FTP parameters (FTP Source Dir, FTP Host IP Address, FTP Client IP Address, FTP User Name and FTP Password). This set serves both the SW Download Procedure and the Configuration File Upload/Download procedure. Changing any of these parameters in the menu for either procedure will automatically change its value in the menu for the other procedure.

Log Out Timer

The Log Out Timer parameter determines the amount of inactive time following which the unit automatically exits the Monitor program.

The time-out duration can range from 1 to 999 minutes.
The default value is 5 minutes.

Ethernet Port Negotiation Mode

The Ethernet Port Negotiation Mode submenu displays the current Ethernet port state and enables defining the negotiation mode of the Ethernet port. The available options are:

♦ Force 10 Mbps & Half-Duplex

♦ Force 10 Mbps & Full-Duplex

♦ Force 100 Mbps & Half-Duplex

♦ Force 100 Mbps & Full-Duplex

♦ Auto Negotiation (10/100 Mbps and Half/Full Duplex)

The default is **Auto Negotiation (10/100 Mbps and Half/Full Duplex)**

Basic Configuration Menu

The Basic Configuration menu includes all parameters required for the initial installation and operation of the unit. Once the unit is properly installed and operational, additional parameters can be configured either locally or remotely using Telnet or SNMP management.

NOTE:
All parameters in the *Basic Configuration* menu are also available in the relevant sub-menus of the *Advanced Configuration* menu.

The *Basic Configuration* menu enables to access the following parameter sets:

IP Parameters

- ♦ IP Address
- ♦ Subnet Mask
- ♦ Default Gateway Address
- ♦ DHCP Client
  - ❖ DHCP Option
  - ❖ Access ton DHCP

Refer to IP Parameters, on page 5-26, for a description of these parameters.

Air Interface Parameters

- ♦ ESSID
- ♦ Operator ESSID Parameters (AU)
  - ❖ Operator ESSID Option
  - ❖ Operator ESSID
- ♦ Frequency Definition
  - ❖ Frequency (AU)
  - ❖ Sub Band Lower Frequency (SU)
  - ❖ Sub Band Lower Frequency (SU)
  - ❖ Scanning Step (SU)
  - ❖ Frequency Subset Definition (SU)
- ♦ Best AU Parameters (SU)
  - ❖ Best AU Support
  - ❖ Number of Scanning Attempts

❖ Preferred AU MAC Address

♦ ATPC Option

♦ Initial Transmit Power (SU)

♦ Transmit Power (AU)

Refer to Air Interface Parameters, on page 5-28, for a description of these parameters.

Performance Parameters

♦ Maximum Data Rate (SU)

♦ Multi Rate Support

Refer to Performance Parameters on page 5-52, for a description of these parameters.

Bridge Parameters

♦ VLAN Support

❖ VLAN ID - Management

❖ VLAN Link Type

Refer to VLAN Support, on page 5-41, for a description of these parameters.

Security Parameters

♦ Authentication Algorithm

♦ Default Key ID (SU)

♦ WEP Key # 1 to WEP Key # 4

Refer to Security Parameters, on page 5-60, for a description of these parameters.

Site Survey Menu

The *Site Survey* menu displays the results of various tests and counters for verifying the quality of the wireless link. These tests can be used to help determine where to position the units for optimal coverage, antenna alignment and troubleshooting. The counters can serve for evaluating performance and identify potential problems. In the AU, there is also an extensive data base for all SUs served by it.

The following sections describe each option of the *Site Survey* menu.

Traffic Statistics

The traffic statistics are used to monitor, interpret and analyze the performance of the wired and wireless links. The counters display statistics relating to wireless link and Ethernet frames. The *Traffic Statistics* menu includes the following options:

♦ **Display Counters:** Select this option to display the current value of the Ethernet and wireless link counters.

♦ **Reset Counters:** Select this option to reset the counters.

Ethernet Counters

The unit receives Ethernet frames from its Ethernet port and forwards the frames to its internal bridge, which determines whether each frame should be transmitted to the wireless media. Frames discarded by the unit's hardware filter are not counted by the Ethernet counters.

The unit transmits valid data frames received from the wireless media to the Ethernet port, as well internally generated frames, such as responses to management queries and pings received via the Ethernet port. The Ethernet Counters include the following statistics:

♦ **Total received frames via Ethernet:** The total number of frames received from the Ethernet port. This counter includes both invalid frames (with errors) and valid frames (without errors).

♦ **Transmitted wireless to Ethernet:** The number of frames transmitted by the unit to the Ethernet port. These are generally frames received from the wireless side, but also include frames generated by the unit itself.

Wireless Link Counters

The unit submits data frames received from the Ethernet port to the internal bridge, as well as self-generated control and wireless management frames. After a unicast data data frame is transmitted, the unit waits for an acknowledgement (ACK) message from the receiving unit. Some control and wireless management frames, as well as broadcast and multicast frames sent to more than one unit, are not acknowledged. If an ACK is not received after a predefined time, which is determined by the **Acknowledge Time Limit** parameter, the unit retransmits the frame until an ACK is received. If an ACK is not received before the number of retransmissions has reached a maximum predefined number, which is determined by the **Number of Retransmissions** parameter, the frames are dropped.

The Wireless Link Counters include the following statistics:

♦ **Total transmitted frames to wireless:** The number of frames transmitted to the wireless media. The total includes one count for each successfully transmitted unicast frame (excluding retransmissions), and the number of transmitted multicast and broadcast frames, including control and wireless management frames. There are also separate counters for the following:

❖ Beacons (AU only)

❖ Other Management frames (excluding Beacons in AU)

❖ Data frames, including multicast/broadcast data frames and successfully transmitted unicast data frames (excluding retransmissions).

❖ Total Transmitted Unicasts, including all unicast frames successfully transmitted to the wireless media, excluding retransmissions. This count is useful for calculating the rates of retransmissions or dropped frames, since only unicast frames are retransmitted if not acknowledged.

♦ **Total submitted frames (bridge):** The total number of data frames submitted to the internal bridge for transmission to the wireless media. The count does not include control and wireless management frames, or retransmissions. There are also separate counts for each priority queue to which the frames were routed, which are Low, Mid and High (currently the High queue is not used for data frames).

♦ **Frames dropped (too many retries):** The number of dropped frames, which are the frames unsuccessfully retransmitted until the maximum permitted number of retransmissions without being acknowledged. This count includes dropped data frames as well as dropped control and wireless management frames.

♦ **Total retransmitted frames:** The total number of retransmissions, including all unsuccessful transmissions and retransmissions.

♦ **Total Tx errors:** The total number of transmit errors. The following additional counters are displayed to indicate the reason for the failure:

❖ **Excessive Retries (Exces RTx):** The number of dropped frames, which are the frames unsuccessfully retransmitted until the maximum permitted number of retransmissions without being acknowledged.

❖ **Filtered:** .

❖ **Underrun:** The number of frames that were aborted because the rate of submitting frames for transmission exceeds the available transmission capability.

❖ **Other:** The number of frames that were not transmitted due to a problem other than those represented by the other counters.

♦ **Total received frames from wireless:** The total number of frames received from the wireless media. The count includes data frames as well as control and wireless management frames. The count does not include bad frames and duplicate frames. For a description of these frames, refer to **Bad frames received** and **Duplicate frames discarded** below.

♦ **Total received data frames:** The total number of data data frames received from the wireless media, including duplicate frames. Refer to **Duplicate frames discarded** below.

♦ **Total Rx errors:** The total number of frames that were not received properly. The following additional counters are displayed to indicate the reason for the failure:

❖ **Phy:** The number of frames that were not received properly due to a hardware problem.

❖ **CRC:** The number of frames received from the wireless media containing CRC errors.

❖ **Overrun:** The number of frames that were discarded because the receive rate exceeded the processing capability or the capacity of the Ethernet port.

❖ **Other:** The number of frames that were not received properly due to a problem other than those represented by the other counters.

♦ **Bad frames received:** The number of frames received from the wireless media containing CRC errors.

♦ **Duplicate frames discarded:** The number of data frames discarded because multiple copies were received. If an acknowledgement message is not received by the originating unit, the same data frame can be received more than once. Although duplicate frames are included in all counters that include data frames, only the first copy is forwarded to the Ethernet port.

Ping Test

The *Ping Test* submenu is used to control pinging from the unit and includes the following options:

- ♦ **Destination IP Address:** Displays the destination IP address of the device being pinged. Enter an IP address of 4 x 3 digit octets, separated by dots. The default IP address is **192. 0.0. 1**.

- ♦ **No. of Pings:** Enter the number of ping attempts per session. The available range is from 0 to 9999. The default value is **1**. Select 0 for continuous pinging.

- ♦ **Ping Frame Length:** Enter the ping packet size. The available range is from 60 to 1472 bytes. The default value is **64** bytes.

- ♦ **Ping Frame Timeout:** Enter the ping frame timeout, which is the amount of time (in ms) between ping attempts. The available range is from 200 to 2000 ms, in increments of 200 milliseconds. For example, 200, 400, 600...2000. The default value is **200** ms.

- ♦ **Start Sending:** Starts the transmission of ping frames.

- ♦ **Stop Sending:** Stops the transmission of ping frames. The test is automatically ended once the number of pings has reached the value specified in the *No. of Pings* parameter, described above. The *Stop Sending* option can be used to end the test before completing the specified number of pings, or if continuous pinging is selected.

- ♦ **Show Ping Test Values:** Displays the current values of the ping test parameters, the transmission status, which means whether it is currently sending or not sending pings, the number of pings sent, and the number of pings received, which means the number of acknowledged frames.

Continuous Link Quality Display (SU only)

The **Continuous Link Quality Display** option displays continuously updated information regarding the quality of the received signal using Signal to Noise Ratio (SNR) measurements.

Click any key to abort the test.

MAC Address Database

MAC Address Database in AU

The *MAC Address Database* option in the AU displays information regarding the Subscriber Units associated with the AU as well as bridging (forwarding) information. The following options are available:

♦ **Display Bridging and Association Info:** The Display Bridging and Association Info option displays a list of all the Subscriber Units and stations in the AU's Forwarding Database. For stations behind an SU, the SU's MAC address is also displayed (SU Address).

Each MAC address entry is followed by a description, which may include the following:

❖ **Et (Ethernet):** An address learned from the Ethernet port.

❖ **Vp (Virtual port):** An address of a node behind an associated SU. For these addresses, learned from the wireless port, the address of the applicable SU is also displayed (in parenthesis).

❖ **St (Static):** An associated SU. For these entries, the SW version of the SU is also displayed.

❖ **Sp (Special):** 5 addresses that are always present, which include:

♦ The MAC address of the AU, which appears twice as it is learned from both the Ethernet and wireless ports.

♦ Alvarion's Multicast address (01:20:D6:00:00:01, which also appears twice. The system treats this address as a Broadcast address.

♦ The Ethernet Broadcast address (FF-FF-FF-FF-FF-FF).

In addition, a summary table displays information about the Forwarding Database (Bridging Info) and the Associated Subscriber Units Database (Association Info). Each database includes the following information:

❖ The current number of entries. For Bridging Info this includes the *Et* (Ethernet) and the *Vp* (Virtual ports) entries. For Association Info this is the number of currently associated SUs.

NOTE:

There is no aging algorithm for associated SUs. An SU is only removed from the list of associated SUs under the following conditions:

a. A SNAP frame is received from another AU indicating that the SU is now associated with the other AU.

b. The SU failed to respond to a certain number of consecutive frames transmitted by the AU and is considered to have "aged out".

❖ The aging time specified for entries in these tables. The aging time for Bridging Info is as specified by the **Bridge Aging Time** parameter. The default is **300** seconds. There is no aging time for Association Info entries.

❖ The maximum number of entries permitted for these tables, which are **1019** for Bridging Info and as specified by the **Maximum Number of Associations** parameter for Association Info. The default value of the **Maximum Number of Associations** parameter is **512**.

♦ **Display Association Info:** Displays information regarding the Subscriber Units associated with the AU. Each list entry includes the following information:

❖ The MAC Address of the associated Subscriber Unit

❖ The value configured for the Maximum Data Rate parameter of the Subscriber Unit

❖ The Status of the Subscriber Unit. There are three options:

   a. **Associated**

   b. **Authenticated**

   c. **Not Authenticated** (a temporary status)

Message	Direction	Status in AU
SU Status: Scanning		
A Beacon with correct ESSID	AU → SU	-
SU Status: Synchronized		
Authentication Request	SU → AU	Not Authenticated
Challenge Text	AU → SU	Not Authenticated
Challenge Text Encrypted	SU → AU	Not Authenticated
Authentication Successful	AU → SU	Authenticated
SU Status: Authenticated		
Association Request	SU → AU	Authenticated
Association Successful	AU → SU	Associated
SU Status: Associated		
ACK	SU → AU	Associated
Data Traffic	SU ↔ AU	Associated

❖ The SNR measured at the SU

❖ The SW version of the SU.

In addition, a summary table displays information about the
Forwarding Database (Bridging Info). The database includes the
following information:

❖ The current number of entries. This is the number of currently
    associated SUs.

❖

NOTE:

There is no aging algorithm for associated SUs. An SU is only removed from the list of
associated SUs under the following conditions:

a. A SNAP frame is received from another AU indicating that the SU is now
    associated with the other AU.

b. The SU failed to respond to a certain number of consecutive frames transmitted by
    the AU and is considered to have "aged out".

❖ The aging time specified for entries in these table. There is no aging
    time for Association Info entries.

❖ The maximum number of entries permitted for this table, which is
    specified by the **Maximum Number of Associations** parameter. The
    default value of the **Maximum Number of Associations** parameter
    is **512**.

MAC Address Database in SU

The *MAC Address Database* option in the SU displays information
regarding the Subscriber Units bridging (forwarding) information. The
following option is available:

♦ **Display Bridging Info:** The Display Bridging Info option displays a list
    of all the stations in the SU's Forwarding Database.

Each MAC address entry is followed by a description, which may
include the following:

❖ **Et (Ethernet):** An address learned from the Ethernet port.

❖ **Wl (Wireless):** An address of a node behind the associated AU,
    learned via the wireless port.

❖ **Sp (Special):** 5 addresses that are always present, which include:

    ♦ The MAC address of the SU, which appears twice as it is
        learned from both the Ethernet and wireless ports.

    ♦ Alvarion's Multicast address (01:20:D6:00:00:01, which also
        appears twice. The system treats this address as a Broadcast
        address.

    ♦ The Ethernet Broadcast address (FF-FF-FF-FF-FF-FF).

In addition, a summary table displays information about the Forwarding Database (Bridging Info). The summary table includes the current number of entries, the aging time specified by the Bridge Aging Time parameter and the maximum number of entries permitted for this table, which is 1019.

ATPC Counter

The ATPC Counter display information related to the number of ATPC power-up/power-down messages sent or received by the unit since last reset.

♦ **Display Counter:** Displays the current value of the ATPC Counter:

❖ **ATPC Transmitted Messages** (AU only) – The number of ATPC power-up/power-down messages that were sent by the AU since last reset.

❖ **ATPC Received Messages** (SU only) - The number of ATPC power-up/power-down messages that were received by the SU since last reset. This counter is displayed also in units that do not use ATPC, since the AU sends ATPC messages to all SUs, including SUs in which the ATPC Option is disabled.

♦ **Reset Counter** – Resets the ATPC Counter.

Advanced Configuration Menu

The Advanced Configuration menu provides access to all parameters, including the parameters available through the *Basic Configuration* menu.

The Advanced Configuration menu enables accessing the following menus:

♦ IP Parameters

♦ Air Interface Parameters

♦ Network Management Parameters

♦ Bridge Parameters

♦ Performance Parameters

♦ Service Parameters (SU only)

♦ Security Parameters

IP Parameters

The IP Parameters menu enables defining IP parameters for the selected unit and determining its method of IP parameter acquisition.

The IP Parameters menu enables configuring the following parameters:

IP Address

The IP Address parameter defines the IP address of the unit.
The default IP address is **10.0.0.1**.

Subnet Mask:

The Subnet Mask parameter defines the subnet mask for the IP addres of the unit.
The default mask is **255.255.255.0**.

Default Gateway Address

The Default Gateway Address parameter defines the IP address of the unit's default gateway.
The default value for the default gateway address is **0.0.0.0**.

DHCP Client

The DHCP Client submenu includes parameters that define the method of IP parameters acquisition.

The DHCP Client submenu includes the following options:

DHCP Option

The DHCP Option displays the current status of the DHCP support, and allows selecting a new operation mode. Select from the following options:

♦ Select **Disable** to configure the IP parameters manually. If this option is selected, configure the static IP parameters as described in *IP Parameters*, on page 5-26.

♦ Select **DHCP Only** to cause the unit to search for and acquire its IP parameters, including the IP address, subnet mask and default gateway, from a DHCP (Dynamic Host Configuration Protocol) server only. If this option is selected, you must select the port(s) through which the unit searches for and communicates with the DHCP server, as described in the following parameter, **Access to DHCP**, on page 5-27. You do not have to configure static IP parameters for the unit. DHCP messages are handled by the units as management frames.

♦ Select **Automatic** to cause the unit to search for a DHCP server and acquire its IP parameters from the server. If a DCHP server is not located within approximately 40 seconds, the currently configured parameters are used. If this option is selected, you must configure the static IP parameters as described in *IP Parameters*, on page 5-26. In addition, you must select the port(s) through which the unit searches for and communicates with the DHCP server, as described in the following parameter, **Access to DHCP**, on page 5-27.

The default is **Disable**.

Access to DHCP

The Access to DHCP option enables defining the port through which the unit searched for and communicate with a DHCP server. Select from the following options:

♦ From Wireless Link Only

♦ From Ethernet Only

♦ From Both Ethernet and Wireless Link

The default for Access Units is **From Ethernet Only**. The default for Subscriber Units is **From Wireless Link Only**.

Show IP Parameters

The Show IP Parameters option displays the current values of the IP parameters, including the **Run Time IP Address**, **Run Time Subnet Mask** and **Run Time Default Gateway Address.**

Air Interface Parameters

The Air Interface Parameters menu enables viewing the current Air Interface parameters defined for the unit and configuring new values for each of the relevant parameters.

ESSID Parameters

The ESSID (Extended Service Set ID) is a string used to identify a wireless network and to prevent the unintentional merging of two wireless network or two sectors in the same network. Typically, a different ESSID is defined for each AU. To facilitate easy addition of SUs to an existing network without a prior knowledge of which specific AU will serve it, and to support the Best AU feature, a secondary "global" ESSID, namely "Operator ESSID", can be configured in the AU. If the Operator ESSID Option is enabled at the AU, both the ESSID and Operator ESSID will be included by the Beacon frames transmitted by it. The SU shall regard such frames if either the ESSID or the Operator ESSID matches it own ESSID. The ESSID of the AU with which the SU is eventually associated is defined as the Run-Time ESSID of the SU. Typically, the initial ESSID of the SU is configured to the value of the Operator ESSID. Once the SU has become associated with a specific AU, its ESSID can be reconfigured to the value of the ESSID of the AU.

ESSID

The ESSID parameter defines the ESSID of the unit.
Valid values: A string of up to 31 printable ASCII characters.
The default value is ESSID1.

> **NOTE:**
> The ESSID string is case-sensitive.

Operator ESSID Parameters (AU only)

The Operator ESSID Parameters submenu includes the following parameters:

Operator ESSID Option

The Operator ESSID Option enables or disables the use of Operator ESSID for establishing association with SUs.
The default is **Enable**.

Operator ESSID

The Operator ESSID parameter defines the Operator ESSID.
Valid values: A string of up to 31 printable ASCII characters.
The default value is ESSID1.

NOTE:
The Operator ESSID string is case-sensitive.

Frequency Definition Parameters

Frequency Definition Submenu in AU

The Frequency Definition submenu in AU includes a single parameter for setting the transmit/receive frequency:

Frequency

The Frequency parameter defines the transmit/receive frequency. The minimum distance between frequencies used by two neighboring AUs is the Channel bandwidth, which is 20 MHz.

The range and default value depend on the radio band, as shown in Table 5-3. The frequency setting resolution is 5 MHz.

Table 5-3: Frequency Ranges and Defaults

Band	Range	Default
5.7 GHz	5740 – 5835 MHz	5780 MHz
5.4 MHz	5485 – 5710 MHz	5600 MHz

Frequency Definition Submenu in SU

To simplify the installation process the SU scans a definable frequencies subset after power-up. If the Best AU feature is enabled, the SU will scan the defined subset and the operating frequency will be determined by the Best AU mechanism (including the optional use of the Preferred AU feature). Otherwise the SU will try to associate with the first AU it finds.

The Frequency Definition submenu in SU includes the following parameters:

Sub Band Lower Frequency

The Sub Band Lower Frequency parameter defines the lowest frequency to be used during the scanning process.

The range depends on the radio band of the unit, as shown in Table 5-4. The resolution is 5 MHz.

Table 5-4: Ranges and Defaults for Sub Band Lower Frequency

Band	Range	Default
5.7 GHz	5740 – 5835 MHz	5740 MHz
5.4 MHz	5485 – 5710 MHz	5485 MHz

Sub Band Upper Frequency

The Sub Band Upper Frequency parameter defines the highest frequency to be used during the scanning process.

The range depends on the radio band of the unit, as shown in Table 5-5. The resolution is 5 MHz.

Table 5-5: Ranges and Defaults for Sub Band Upper Frequency

Band	Range	Default
5.7 GHz	5740 – 5835 MHz	5835 MHz
5.4 MHz	5485 – 5710 MHz	5710 MHz

Scanning Step

The Scanning Step parameter defines the resolution used for selecting frequencies in the sub band defined by the **Sub Band Lower Frequency** and the **Sub Band Upper Frequency**.

Valid values: 5, 10, 20 MHz.

Default value: **5** MHz.

Frequency Subset Definition

The previous parameters define a sub band of frequencies between the **Sub Band Lower Frequency** and the **Sub Band Upper Frequency** using the **Scanning Step** resolution. The Frequency Subset Definition option enables defining a specific subset of frequencies within this sub band to be used during scanning. When selected, a list of all valid frequencies in the band is displayed, and an index is given to each frequency. The current defined subset is also displayed. The defined subset can be modified by entering a list of desired indexes, separated by commas (no spaces). Enter A to select all frequency in the subset.

The default is **A**, which is the list that includes all indexes of frequencies defined by the previous parameters.

Best AU Parameters (SU)

An SU that can communicate with more than one AU using the same ESSID may become associated with the first AU it "finds", not necessarily the best choice in terms of quality of communication or other factors such as number of SUs serviced by each AU. The same limitation also exists if only one AU in the neighborhood has an ESSID identical to the one used by the SU, since it is not always necessarily the best choice.

The topology of a fixed access network is constantly changing. Changes in base station deployment and subscriber density can accumulate to create substantial changes in SU performance. The quest for load sharing together with the desire to create best throughput conditions for the SU created the need for the Best AU feature, to enable a SU to connect to the best AU in its neighborhood.

When the Best AU feature is used, each of the AUs are given a quality mark based on the level at which it is received by the SU. The SU scans for a configured number of cycles, gathering information from all the AUs it can communicate with. At the end of the scanning period, the SU reachs a Best AU decision according to the information gathered. The AU with the highest quality mark is selected as the Best AU, and the SU will immediately try to associate with it. The quality mark given to each AU depends on the level at which it is received by the SU.

The Best AU selection mechanism can be overridden by defining a specific AU as the preferred AU.

NOTE:

Although the SU selects the Best AU based on long-term conditions prior to the decision time, it may not always be connected to the instantaneous Best AU at any given time. Note also that the decision is done only once during the scanning interval. The decision may not remain the optimal one for ever. If there are significant changes in deployment of neighboring AUs and the SUs served by them, overall performance may be improved if the applicable SUs are reset intentionally so as to re-initiate the Best AU decision process.

The Best AU Parameters menu includes the following options:

Best AU Support

The Best AU Support option enables or disables the Best AU selection feature.

The default is **Disable**.

NOTE:
If the Best AU feature is not used, the SU associates with the first AU it finds whose ESSID or Operator ESSID is identical to its own ESSID.

Number Of Scanning Attempts

When the Best AU option is enabled, the SU gathers information on neighboring AUs for 640 milliseconds on each of the scanned frequencies. The Number of Scanning Attempts parameter defines the number of times that the process will be repeated for all relevant frequencies. A higher number may result in a better decision at the cost of an increased scanning time during which the SU is not operational.

Valid values: 1 - 255.

Default value: 10.

The total scanning time can be calculated based on the following formula:

Scanning Time (secs) = N * F * 0.64

N = Number of scanning attempts.

F = Number of frequencies in the Frequency Subset defined in the **Frequency Definition** submenu.

0.64 seconds is the time spent on each frequency while in scanning mode.

Preferred AU MAC Address

The Preferred AU MAC Address parameter defines a specific AU with which the SU should associate. Gaining control of the SUs association is a powerful tool in network management. The Preferred AU MAC Address parameter is intended for applications where there is a need to dictate the preferred AU with whom the SU should associate. To prevent the SU from associating with the first viable AU it finds, the Best AU Support mechanism should be enabled. Once the SU has identified the preferred AU based on its MAC address, it will associate with it and terminate the scanning process. If the preferred AU is not found, the SU will associate with an AU according to the decision reached using the best AU algorithm.

Valid values: A MAC address string.

The default value for the Preferred AU MAC Address is 00-00-00-00-00-00 (12 zeros), meaning that there is no preferred AU.

Show Best AU Parameters and Data

The Show Best AU Parameters and Data option displays the applicable information:

The **Neighboring AU Data table** displays for each AU that the unit can communicate with the following details:

♦ **MAC Address**

♦ **SNR** of the received signal

♦ **Mark –** The computed quality mark for the AU.

♦ **Full –** The association load status of the AU. It is defined as full if the number of SUs associated with the AU has reached the maximum allowed according to the value of the **Maximum Number of Associations** parameter. An AU whose associations load status is full cannot be selected as the Best AU, even if its' computed mark is the highest.

♦ **ESSID –** The ESSID of the AU**.**

In addition to the neighboring AU data table, the following information is displayed:

♦ **Best AU Support**

♦ **Preferred AU MAC Address**

♦ **Number of Scanning Attempts**

♦ **Associated AU MAC Address** (the MAC address of the selected AU)

♦ **Run Time ESSID** (the ESSID of the selected AU)

Power Control Parameters

 The Automatic Transmit Power Control (ATPC) algorithm simplifies the installation process and ensures optimal performance while minimizing interference to other units. This is achieved by automatically adjusting the power level transmitted by each SU according to the actual level at which it is received by the AU. To support proper operation of the system with optimal performance and minimum interference between neighboring sectors, the ATPC algorithm should be enabled in all units.

The algorithm is controlled by the AU that calculates for each received frame the average SNR at which it receives transmissions from the specific SU. The average calculation takes into account the previous calculated average, thus reducing the effect of short temporary changes in link conditions. The weight of history (the previous value) in the formula used for calculating the average SNR is determined by a configurable parameter. In addition, the higher the time that has passed since last calculation, the

lower is the impact of history on the calculated average. If the average SNR is not in the configured target range, the AU transmits to the SU a power-up or a power-down message. The target is that each SU will be received at an optimal level, or as high (or low) as possible if the optimal range cannot be reached because of specific link conditions.

Each time that the SU tries to associate with the AU (following either a reset or loss of synchronization), it will initiate transmissions using the **Current Transmit Power**, which is the last value that was previously used by the ATPC mechanism. If after a certain configurable time the SU did not succeed to synchronize with the AU, it will start transmitting using the level configured for the **Initial Transmit Power** parameter. (If this is the first time that the SU is powered up, or if the ATPC algorithm was not used, the **Current Transmit Power** equals the value of **Initial Transmit Power**).

The **Initial Transmit Power** parameter is used to determine the fixed transmit power level of the SU if the ATPC algorithm is not enabled.

In an AU typically the maximum supported transmit power is used to enable maximum coverage. However, there may be a need to decrease the transmitted power level in order to support relatively small cells and to minimize the interference with the operation of neighboring cells.

Transmit Power (AU)

The Transmit Power parameter defines the transmit power level of the AU. This parameter is not part of the ATPC algorithm.

Valid range: 4 to 28 (dBm), using a 1 dBm resolution.

The default is **11** (dBm).

Initial Transmit Power (SU)

The Initial Transmit Power parameter defines the fixed transmit power level when the ATPC algorithm is disabled. If the ATPC Option is enabled this parameter serves for setting the initial value to be used by the ATPC algorithm after the first time of powering-up the unit. It will also be used by the algorithm as an initial value in the following cases:

a. If the unit does not succeed to associate with the AU after reset.

b. If the unit does not succeed to re-synchronize with the AU after losing synchronization.

c. If the SU is associated with the AU but there are too many successive dropped frames, indicating that it transmits at a level that may be too low.

The actual run-time value that is used to control the transmit power level is determined by the ATPC process.

The allowed range is from -11 to 29 (dBm), using a 1 dBm resolution.

The default value is **4** (dBm).

ATPC Parameters in AU

ATPC Option

The ATPC Option enables or disables the Automatic Transmit Power Control (ATPC) algorithm.

The default is **Enable**.

Minimum SNR Level

The Minimum SNR Level defines the lowest SNR at which you want each SU to be received at the AU (the lower limit of the optimal reception level range).

Available values: 15 to 40 (dB).

Default value: **25** (dB).

Maximum SNR Level

The Maximum SNR Level defines the highest SNR at which you want each SU to be received at the AU (the higher limit of the optimal reception level range).

Available values: 15 to 40 (dB).

Default value: **30** (dB).

SNR Memory Factor

The SNR Memory Factor defines the weight of history (value of last calculated average SNR) in the formula used for calculating the average SNR. The higher the value of this parameter, the higher is the weight of history in the formula.

Available values: -1 to 32. -1 is for no weight for history, meaning that average SNR equals the last measured SNR.

Default value: **5**

Minimum Interval Between ATPC Messages

The Minimum Interval Between ATPC Messages parameter sets the minimal time between consecutive power-up/power-down messages to a specific SU. Setting a low value for this parameter may lead to a higher

overhead and an excessive rate of power level changes at the SUs. High values for this parameter increase the time it will take until the SUs reach optimal transmit power level.

Available values: 0 to 3600 seconds.

Default value: **120** seconds.

ATPC Power Level Step

The ATPC Power Level Step parameter defines the step size to be used by the SUs for incrementing/decrementing the **Current Transmit Power** after receiving a power-up/power-down message. If the distance between the value of the **Current Transmit Power** and the desired range is smaller than the step size, the power-up/power-down message will include the specific step value required for this condition.

Valid range: 1-10 (dB)

Default value: **1** (dB)

ATPC Parameters in SU

ATPC Option

The ATPC Option enables or disable the Automatic Transmit Power Control (ATPC) algorithm. The parameter takes effect immediately. However, when changed from Enable to Disable, the transmit power level shall remain at the last **Current Transmit Power** determined by the ATPC algorithm before it was disabled. It will change to the value configured for the **Initial Transmit Power** parameter only after the next reset.

The default is **Enable**.

Acknowledge Time Out

The Acknowledge Time Out parameter enables augmenting the range of the system by increasing the time that the unit can wait for a response. This includes several scenarios where the unit expects a response, such as a handshake during the association process, an acknowledgement after transmitting a data frame and CTS after RTS. Increasing the range may decrease the overall performance and achievable network throughput. It should be increased only to support ranges of over 10Km. To support a link distance higher than 10Km, the delay should be increased at both the applicable SU and the AU.

The Acknowledge Time Out is defined in Clock Cycles, where each Clock Cycle equals 25 nano-seconds.

The valid range is from 256 (6.4 milliseconds) to 8191(205 milliseconds)

The default is

Maximum Number of Associations (AU only)

The Maximum Number of Associations parameter defines the maximum number of Subscriber Units that can be associated with the selected AU, while still guaranteeing the required quality of service to customers. Available values range from 0-512.

Default value: 512.

NOTE:

There is no aging time for SUs. An SU is only removed from the list of associated SUs under the following conditions:

a. A SNAP frame is received from another AU indicating that the SU is now associated with the other AU.

b. The SU failed to respond to a certain number of consecutive frames transmitted by the AU and is considered to have "aged out".

Therefore, the database of associated SUs may include units no longer associated with the AU. If the number of associated SUs has reached the value of the **Maximum Number of Associations** parameter, the selected AU cannot serve additional SUs. To view the current number of associated SUs, use the **Display Association Info** option in the **MAC Address Database** menu (see page 5-22). To delete inactive SUs from the database you must reset the AU.

Network Management Parameters

The Network Management Parameters menu enables protecting the Unit from unauthorized access by defining a set of IP addresses from which the unit can be managed via Telnet, TFTP, SNMP, or ICMP. This excludes messages generated in the unit, such as Traps or Ping Test frames, which are not filtered. You can also determine the direction from which management access is permitted, which means from the wireless media or the wired Ethernet or both.

The Network Management Parameters menu includes the following options:

Access to Network Management

The Access to Network Management option defines the port through which the unit can be managed. The following options are available:

♦ **From Wireless Link Only**

♦ **From Ethernet Only**

♦ **From Both Ethernet & Wireless Link**

The default selection is From Both Ethernet & Wireless Link.

WARNING:

Be careful not to block your access to the unit. For example, if you manage an SU via the wireless link, setting the **Access to Network Management** parameter to **From Ethernet Only** completely blocks your management access to the unit. In this case, a technician may be required to change the settings at the user's site.

Network Management Filtering

The Network Management Filtering option enables or disables the IP address-based management filtering. If management filtering is enabled, the unit can only be managed by stations with IP addresses matching one of the entries in the **Set Network Management IP Addresses** option, described below, and that are connected to the unit via the defined port(s). The following options are available:

♦ **Disable**: No IP address-based filtering is configured.

♦ **Enable Management IP Filtering on Ethernet Port**: Applicable only if the Access to Network Management parameter is configured to either From Ethernet Only or From Both Ethernet & Wireless Link. The unit can be managed from the Ethernet port only by stations with IP addresses matching one of the entries in the Set Network Management IP Addresses parameter. If the Access to Network Management parameter is configured to From Both Ethernet & Wireless Link then no IP address-based filtering is configured for the wireless port.

♦ **Enable Management IP Filtering on Wireless Link Port**: Applicable only if the Access to Network Management parameter is configured to either From Wireless Link Only or From Both Ethernet & Wireless Link. The unit can be managed from the wireless port only by stations with IP addresses matching one of the entries in the Set Network Management IP Addresses parameter. If the Access to Network Management parameter is configured to From Both Ethernet & Wireless Link then no IP address-based filtering is configured for the Ethernet port.

♦ **Enable Management IP filtering on Both Ethernet & Wireless Link Port**: Applicable to all options of the Access to Network Management parameter. The unit can be managed from the port(s) defined by the Access to Network Management parameter only by stations with IP addresses matching one of the entries in the Set Network Management IP Addresses parameter.

The default selection is **Disable**.

Set Network Management IP Addresses

The Set Network Management IP Addresses option enables defining up to 3 IP addresses of devices that can manage the unit if the Network Management Filtering option is enabled.

Delete a Network Management IP Address

The Delete Network Management IP Address option enables deleting IP address entries from the Network Management IP Addresses list.

Delete All Network Management IP Addresses

The Delete All Network Management IP Addresses option enables deleting all entries from the Network Management IP Addresses list.

SNMP Traps

The SNMP submenu enables or disables the transmission of SNMP Traps. If this option is enabled, up to 3 IP addresses of stations to which SNMP traps are sent can be defined.

Send SNMP Traps

The Send SNMP Traps option enables or disables the sending of SNMP traps. The following options are available:

♦ **Enable Traps Sending**

♦ **Disable Traps Sending**

The default selection is **Disable Traps Sending**.

SNMP Traps IP Destination

The SNMP Traps IP Destination option enables defining up to 3 IP addresses of devices to which the SNMP Traps are to be sent.
The default of all three SNMP Traps IP destinations is **0.0.0.0**.

SNMP Traps Community

The SNMP Traps Community option enables defining the Community name for each IP address to which SNMP Trap messages are to be sent.
Valid strings: Up to 8 ASCII characters.
The default for all 3 addresses is **public**, which is the default Read community.

Bridge Parameters

The Bridge Parameters menu provides a series of parameter sets that enables configuring parameters such as control and filtering options for broadcast transmissions, VLAN support, and Type of Service prioritization.

VLAN Support

The VLAN Support menu enables defining the parameters related to the IEEE 802.1Q compliant VLAN-aware (Virtual LAN-aware) feature of the BreezeACCESS VL units. Each VLAN includes stations that can communicate with each other, but cannot communicate with stations belonging to different VLANs. The VLAN feature also provides the ability to set traffic priorities for transmission of certain frames. The information related to the VLAN is included in the VLAN Tag Header, which is inserted in each frame between the MAC header and the data. VLAN implementation in BreezeACCESS VL units supports frame routing by port information, whereby each port is connected to only one VLAN.

The VLAN Support menu enables configuring the following parameters:

VLAN ID-Data (SU only)

The VLAN-ID Data is applicable for Access Links only. It enables defining the VLAN ID for data frames, which identifies the VLAN to which the unit belongs.
Valid values range from 1 to 4094.
Default value: **1**.

The **VLAN ID-Data** affects frames received from the wireless link port, as follows:

♦ Only tagged frames with a VLAN ID (VID) equal to the **VLAN ID - Data** defined in the unit are forwarded to the Ethernet port.

♦ The tag headers are removed from the data frames received from the wireless link before they are transmitted on the Ethernet port.

The VLAN ID-Data affects frames received from the Ethernet port, as follows:

♦ A VLAN Data Tag is inserted in all untagged frames received from the Ethernet port before transmission on the wireless link. The tag includes the values of the **VLAN ID - Data** and the **VLAN Priority - Data** parameters.

♦ Tagged frames received on Ethernet port, which are meant to be forwarded to the wireless link port, are discarded. This includes frames with tagging for prioritization purpose only.

VLAN ID-Management

The VLAN-ID Management is applicable for all link types. It enables defining the VLAN ID for management frames, which identifies remote stations for management purposes. This applies to all management applications using protocols such as SNMP, TFTP, ICMP (ping) and Telnet. All servers/stations using these protocols must tag the management frames sent to the unit with the value of the VLAN ID - Management parameter.

Valid values: 1 to 4094 or 65535 (No VLAN).

The default value is **65535**.

If the VLAN ID – Management is other than 65535:

♦ Only tagged management frames with a matching VLAN ID received on either the Ethernet or wireless link ports are forwarded to the unit.

♦ A VLAN Management Tag is inserted in all management frames generated by the unit before transmission on either the Ethernet or wireless link port. The tag includes the values of the **VLAN ID - Management** and the **VLAN Priority - Management** parameters.

If the VLAN ID - Management is 65535 (No VLAN):

♦ Only untagged management frames received on either the Ethernet or wireless link ports are forwarded to the unit.

♦ Management frames generated by the unit are not tagged.

The following table summarizes the functionality of the internal management port in accordance with the value of the VLAN ID - Management parameter. The table is valid for all link types. Refer to the VLAN Link Type – Access Link and Trunk Link options for some restrictions when configuring this parameter.

Table 5-6: VLAN Management Port Functionality

Action	Management Port – Internal
Receive from Ethernet	Tagged frames, matching VID-M Untagged frames when VID-M=65535
Receive from Wireless	Tagged frames, matching VID-M Untagged frames when VID-M=65535
Transmit	Insert VID-M, PID-M

Table Legend:

♦ **VID-M:** VLAN ID-Management

♦ **PID-M:** VLAN Priority-Management

VLAN Link Type

The VLAN Link Type parameter enables defining the functionality of the VLAN-aware capability of the unit.
The available options are Hybrid Link, Trunk Link and Access Link (Access Link option is available only in SUs).
The default selection is **Hybrid Link**.

Access Link (SU only)

Access Link transfers frames while tagging/untagging them since all devices connected to the unit are VLAN-unaware. Thus, the unit cannot transfer tagged frames.

Table 5-7 summarizes the functionality of the data port for an Access link.

Table 5-7: VLAN Data Port Functionality – Access Link

Action	Data Port (SU)
Accept from Ethernet	Untagged frames
Accept from Wireless	Tagged frames, matching VID-D
Tag Insert	VID-D, PID-D (to wireless)
Tag Remove	Yes (to Ethernet)

Table Legend:

♦ **VID-D: VLAN ID-Data**

♦ **PID-D: VLAN Priority-Data**

Trunk Link

Trunk Link transfers only tagged frames, since all devices connected to the unit are VLAN-aware: Only tagged data frames received on the Ethernet or wireless link ports are forwarded.

WARNING

It is not recommended that you configure a unit as a Trunk Link with the
VLAN ID - Management parameter set at **65535**, as it does not forward any 'NO VLAN' management frames to its other port making it impossible to manage devices connected behind the unit that are also configured with 'NO VLAN'.

If the VLAN Forwarding option is enabled, a data frame received with a VLAN ID that is not a member of the unit's VLAN Forwarding List is discarded.

NOTE

If the **VLAN Forwarding** option is enabled, be sure to include the **VLAN ID - Management** value of all units that should be managed via the wireless port of the unit, in the Forwarding List.

If the VLAN Relaying option is enabled in an AU, a data frame relayed with a VLAN ID that is not a member of the unit's VLAN Relaying List is discarded.

NOTE

If the **VLAN Relaying** option is enabled and you manage your devices from behind an SU unit, be sure to include the **VLAN ID - Management** value of all units to be managed when relaying via the wireless port of the AU unit, in the Relaying List. If the **VLAN Forwarding** option is also enabled in the AU, these VLAN IDs should also be included in the Forwarding List.

Table 5-8 summarizes the functionality of the data port for a Trunk link.

Table 5-8: VLAN Data Port Functionality – Trunk Link

Action	Data Port (SU and AU)
Accept from Ethernet	Tagged frames. If Forwarding is enabled, only frames with VLAN ID values which are included in the Forwarding list
Accept from Wireless	Tagged frames. If Forwarding is enabled, only frames with VLAN ID values which are included in the Forwarding list
Tag Insert	No
Tag Remove	No

Hybrid Link

Hybrid Link transfers both tagged and untagged frames, since the devices connected to the unit can be either VLAN-aware or VLAN-unaware. This is equivalent to defining no VLAN support, as the unit is transparent to VLAN.

Table 5-9 summarizes the functionality of the data port for a Hybrid link.

Table 5-9: VLAN Data Port Functionality – Hybrid Link

Action	Data Port (SU and AU)
Accept from Ethernet	All
Accept from Wireless	All
Tag Insert	No
Tag Remove	No

VLAN Forwarding (AU and SU)

The VLAN Forwarding feature is applicable for Trunk Links only. It enables defining the VLAN ID values to be included in the VLAN Forwarding List. If the Link Type is defined as a Trunk Link and the VLAN Forwarding option is enabled, a data frame received with a VLAN ID that is not a member of the unit's VLAN Forwarding List is discarded.

The VLAN Forwarding submenu provides the following options:

VLAN Forwarding Support

The VLAN Forwarding Support option enables or disables the VLAN Forwarding feature.
Available selections are **Disable** and **Enable**.
The default selection is **Disable**.

Add Forwarding VLAN ID

The Add Forwarding VLAN ID option enables adding a VLAN ID to the VLAN Forwarding List. One VLAN ID can be entered at a time. The maximum number of VLAN IDs in the VLAN Forwarding List is 20.
Valid values are 1 to 4094.

Remove Forwarding VLAN ID

The Remove Forwarding VLAN ID option enables removing a VLAN ID from the VLAN ID Forwarding List.
Valid values are VID values (from 1 to 4094) that are included in the VLAN Forwarding List.

Show VLAN ID Forwarding List

The Show VLAN Forwarding List option displays the values of the VLAN IDs included in the VLAN Forwarding List.

NOTE:
If the VLAN ID Forwarding List is empty and the **VLAN Forwarding Support** is set to **Enable**, then all data frames are discarded.

VLAN Relaying (AU only)

The VLAN Relaying feature is applicable for Trunk Links only. It defining the VLAN ID values to be included in the VLAN Relaying List. If the Link Type is defined as Trunk Link and the VLAN Relaying Support option is enabled, a frame relayed from the wireless link, which is a frame received from the wireless link that should be transmitted back through the wireless link, with a VLAN ID that is not a member of the unit's VLAN Relaying List, is discarded. If VLAN Forwarding Support is also enabled, it is necessary to configure all the VLAN IDs in the Relaying List also in the Forwarding List to enable the relaying operation.

The VLAN Relaying menu provides the following options:

VLAN Relaying Support

The VLAN Relaying Support option enables or disables the VLAN Relaying feature.
Available selections are **Disable** and **Enable**.
The default selection is **Disable**.

Add Relaying VLAN ID

The Add Relaying VLAN ID option enables adding a VLAN ID to the VLAN Relaying List. One VLAN ID can be entered at a time. The maximum number of VLAN IDs in the VLAN Relaying List is 20.
Valid values are 1 to 4094.

Remove Relaying VLAN ID

The Remove Relaying VLAN ID option enables removing a VLAN ID from the VLAN ID Relaying List. Valid values are VID values (from 1 to 4094)) that are included in the VLAN Relaying List.

Show VLAN ID Relaying List

The Show VLAN Relaying option displays the values of the VLAN IDs included in the VLAN Relaying List.

NOTES:

If the VLAN ID Relaying List is empty and the VLAN Relaying Support is Enabled, then all data frames relayed from the wireless link are discarded.

If VLAN Relaying Support and VLAN Forwarding Support are both enabled, then all VLAN IDs configured in the Relaying List must also be configured in the Forwarding List.

VLAN Traffic Priority

Each packet to be transmitted to the wireless link is transferred to one of three queues: Low, Mid and High. Packets in the High queue have the highest priority for transmission, and those in the Low queue have the lowest priority.

BreezeACCESS Subscriber and Access units support layer 2 traffic prioritization according to the IEEE 802.1p standard. The priority field in the 802.1Q header tag can have a value in the range 0-7. This value determines the relative priority of the packet.

Packets received from the Ethernet port that have a Priority higher than the value of the VLAN Priority Threshold are routed to the Mid queue.

Since the system also supports layer 3 prioritization, based on ToS, packets with precedence in the ToS field higher than the value of the ToS Precedence Threshold parameter are also routed to the Mid queue. This is applicable to both tagged and untagged frames.

All other packets received from the Ethernet port are routed to the Low queue.

Control and wireless management frames generated in the unit are routed to the High queue.

Any frame coming from the Ethernet port, which is meant to reach another BreezeACCESS unit via the wireless port, is sent to the High queue, regardless of the priority configuration.

The VLAN Traffic Priority menu provides the following parameters:

VLAN Priority – Data (SU only)

The VLAN Priority – Data is applicable for Access Links only. It enables configuring the value of the VLAN Priority field for data frames transmitted to the wireless link. All data frames are routed to the Low queue. This parameter only impacts the way that other VLAN-aware devices handle the packet.

Valid values range from 0 to 7.

The default value is 0.

> **NOTE:**
> Packets Received from the Ethernet port with a ToS Precedence value higher than the defined **ToS Precedence Threshold** are routed to the Mid queue.

VLAN Priority – Management

The VLAN Priority – Management enables defining the value of the VLAN Priority field for management frames in units with VLAN ID - Management that is other than **65535**. All management frames are routed to the High queue. This parameter only impacts the way other VLAN-aware devices handle the packet.

Valid values range from 0 to 7.

The default value is 4 for SUs and 0 for AUs.

VLAN Priority Threshold

The VLAN Priority Threshold is applicable for Trunk and Hybrid Links only. It enables defining the value of the VLAN Priority Threshold. This parameter impacts the way the unit handles tagged packets received from the Ethernet port.

Since the system supports both layer 2 and layer 3 prioritization, a frame is routed to the Mid queue if either of the following conditions are met:

♦ The precedence in the ToS field is higher than the value of the ToS Precedence Threshold parameter. This is applicable to both tagged and untagged frames.

♦ The VLAN Priority field in a tagged frame is higher than the value of the VLAN Priority Threshold parameter.

Valid values range from 0 to 7.

The default value is 3.

Show VLAN Parameters

The Show VLAN Parameters option displays the current values of the VLAN support parameters.

ToS Priority

The ToS Priority menu enables configuring voice priority parameters to support end-to-end IPv4 Type of Service (ToS) layer 3 prioritization according to RFC 791.

The ToS Priority menu includes the following parameter:

ToS Precedence Threshold

The ToS Precedence Threshold parameter enables defining ToS-based prioritization in accordance with the precedence bits of the ToS field in the IP header. An IP packet received from the Ethernet port is routed to the Mid queue if any one of the following conditions is met:

♦   The precedence in the ToS field is higher than the value of the ToS Precedence Threshold parameter. This is applicable to both tagged and untagged frames.

♦   The VLAN Priority field in a tagged frame (Hybrid or Trunk Link) is higher than the value of the VLAN Priority Threshold parameter.

All other packets received from the Ethernet port are routed to the Low queue.
Valid values are 0 to 7.
The default value is 3.

Ethernet Broadcast Filtering (SU only)

The Ethernet Broadcast Filtering menu enables defining the layer 2 (Ethernet) broadcast and multicast filtering capabilities for the selected SU. Filtering the Ethernet broadcasts enhances the security of the system and saves bandwidth on the wireless media by blocking protocols that are typically used in the customer's LAN but are not relevant for other customers, such as NetBios, which is used by the Microsoft Network Neighborhood. Enabling this feature blocks Ethernet broadcasts and multicasts by setting the I/G bit at the destination address to 1. This feature should not be enabled when there is a router behind the SU.

The Ethernet Broadcasting Filtering menu enables configuring the following parameters:

Filter Options

The Filter Options enables defining the Ethernet Broadcast filtering functionality of the unit. Select from the following options:

♦   **Disable**, which means no Ethernet Broadcast Filtering.

♦   **From Ethernet Only**, which filters broadcast messages received from the Ethernet port.

♦ **From Wireless Link Only**, which filters broadcast messages received from the wireless link port.

♦ **Both From Ethernet & Wireless Link**, which filters broadcast messages received from both the Ethernet and wireless link ports.

The default selection is **Disable**.

DHCP Broadcast Override Filter

The DHCP Broadcast Override Filter option enables or disables the broadcasting of DHCP messages. Even if according to the selected option in the Filter Options parameter, broadcast messages should be filtered, DHCP broadcasts are transmitted if this parameter is set to Enable. Select from the following options:

♦ **Disable**, which means that DHCP Broadcast messages are filtered or transmitted according to the general filtering criteria in the Filter Options parameter.

♦ **Enable**, which means that DHCP Broadcast messages are transmitted regardless of the selected value of the Filter Options parameter.

The default selection is **Disable**.

PPPoE Broadcast Override Filter

The PPPoE Broadcast Override Filter option enables or disables the broadcasting of PPPoE (Point to Point Protocol over Ethernet) messages. Even if according to the selected option in the Filter Options parameter, broadcast messages should be filtered, PPPoE broadcasts are transmitted if this parameter is set to Enable. Select from the following options:

♦ **Disable**, which means that PPPoE Broadcast messages are filtered or transmitted according to the general filtering criteria in the Filter Options parameter.

♦ **Enable**, which means that PPPoE Broadcast messages are transmitted regardless of the selected value of the Filter Options parameter.

The default selection is **Disable**.

ARP Broadcast Override Filter

The ARP Broadcast Override Filter option enables or disables the broadcasting of ARP messages. Even if according to the selected option in the Filter Options parameter, broadcast messages should be filtered, ARP broadcasts are transmitted if this parameter is set to Enable. Select from the following options:

♦ **Disable**, which means that ARP messages are filtered or transmitted according to the general filtering criteria in the Filter Options parameter.

♦ **Enable**, which means that ARP messages are transmitted regardless of the selected value of the Filter Options parameter.

The default selection is **Enable**.

Bridge Aging Time

The Bridge Aging Time parameter enables selecting the bridge aging time for learned addresses of devices on both the wired and wireless sides, not including BreezeACCESS VL units.
The available range is 100 to 2000 seconds.
The default value is **300** seconds.

Broadcast Relaying (AU only)

The Broadcast Relaying option enables selecting whether the unit performs broadcast relaying. When the Broadcast Relaying parameter is enabled, broadcast packets originating from devices on the wireless link are transmitted by the AU back to the wireless link devices, as well as to the wired LAN. If disabled, these packets are sent only to the local wired LAN and are not sent back to the wireless link. Disable the broadcast relaying only if all broadcast messages from the wireless link are certain to be directed to the wired LAN.
The default selection is **Enable**.

Unicast Relaying (AU only)

The Unicast Relaying option enables selecting whether the unit performs unicast relaying. When the Unicast Relaying parameter is enabled, unicast packets originating from devices on the wireless link can be transmitted back to the wireless link devices. If disabled, these packets are not sent to the wireless link even if they are intended for devices on the wireless link. Disable the Unicast Relaying parameter only if all unicast messages from the wireless link are certain to be directed to the local wired LAN.
The default selection is **Enable**.

Show Bridge Parameters

The Show Bridge Parameters option displays the current values of the Bridge parameters.

Performance Parameters

The Performance Parameters menu enables defining a series of parameters that control the method by which traffic is transmitted through the BreezeACCESS VL wireless access network.

The Performance Parameters menu provides the following parameters:

RTS Threshold:

The RTS Threshold parameter defines the minimum frame size that requires an RTS/CTS (Request To Send/Clear To Send) handshake. Frames whose size is smaller than the RTS Threshold value are transmitted directly to the wireless link without being preceded with RTS frames. Setting this parameter to a value larger than the maximum frame size eliminates the RTS/CTS handshake for frames transmitted by this unit.
The available values range from 20 to 1600 bytes.
The default value is **60** bytes for SUs and **1600** for AUs. It is recommended that these values be used to ensure that RTS/CTS is never used in the AU.

Minimum Contention Window

The Minimum Contention Window parameter determines the time that a unit waits from the time it has concluded that there are no detectable transmissions by other units until it attempts to transmit. The BreezeACCESS VL system uses a special mechanism based on detecting the presence of a carrier signal and analyzing the information contained in the transmissions of the AU to estimate the activity of other SUs served by the AU. The target is to minimize collisions in the wireless media resulting from attempts of more than one unit to transmit at the same time.

The system uses an exponential Back-off algorithm to resolve contention between several units that want to access the wireless media. The method requires each station to choose a random number N between 0 and a given number C, and wait for this number of time slots before accessing the media, always checking if a different unit has access the media before. Each time the unit tried to transmit and a collision happened, the maximum number C used for the random number selection will be increased to the next available value. The available values are 7, 15, 31, 63, 127, 255, 511 and 1023.

The Minimum Contention Window parameter is the first maximum number C used in the back-off algorithm. The higher the number of SUs served by the same AU, the higher the Minimum Contention Window for each SU should be.

The available values are 7, 15, 31, 63, 127, 255, 511 and 1023.

The default value is **15**.

Maximum Contention Window

The Maximum Contention Window parameter defines the upper limit for the maximum number C used in the back-off algorithm as described in Minimum Contention Window above.

The available values are 7, 15, 31, 63, 127, 255, 511 and 1023.

The default value is **1023**.

Short Frame Multicast Rate (AU only)

The Short Frame Multicast Rate parameter defines the rate of transmitting multicast and broadcast frames that are shorter than 500 bytes. Multicast and broadcast transmissions are not acknowledged; therefore if a multicast or broadcast transmission is not properly received there is no possibility of retransmitting. It is recommended that you set a lower rate for broadcast and multicast frame transmissions to increase the probability that they are received without errors.

The available values for SU-A-54-VL are 6, 9, 12, 18, 24, 36, 48 and 54 Mbps. For SU-A-24-VL the available rates are 6, 9, 12, 18 and 24 Mbps.

The default value is the lowest available rate, **6** Mbps.

Long Frame Multicast Rate (AU only)

The Long Frame Multicast Rate parameter defines the rate of transmitting multicast and broadcast frames with at least 500 bytes. Multicast and broadcast transmissions are not acknowledged; therefore if a multicast or broadcast transmission is not properly received there is no possibility of retransmitting. It is recommended that you set a lower rate for broadcast and multicast frame transmissions to increase the probability that they are received without errors.

The available values for SU-A-54-VL are 6, 9, 12, 18, 24, 36, 48 and 54 Mbps. For SU-A-24-VL the available rates are 6, 9, 12, 18 and 24 Mbps.

The default value is the lowest available rate, **6** Mbps.

Maximum Data Rate

When the Rate Adaptation Algorithm is enabled, it changes the data rate dynamically according to link conditions to increase the probability of using the maximum possible rate at any given moment. Although the algorithm will avoid using rates that are too high for the prevailing link conditions, it might be desired under certain conditions to limit the use of higher rates. If the link quality is not sufficient, it is recommended that the maximum data rate be decreased, since higher data rate elevates the error rate. In such conditions, a higher data rate increases the number or retransmissions before the data rate is being reduced by the Rate Adaptation Algorithm. A high number of retransmissions reduce the overall throughput of the applicable SU as well as all other SUs associated with the same AU.

The link quality can be estimated based on the SNR measurement of the SU at the AU, which can be viewed in the MAC Address Database option in the Site Survey menu. If the measured SNR is less than a certain threshold, it is recommended that the maximum data rate of the SU be decreased in accordance with Table 5-10, using the values of typical sensitivity. It is recommended to add a 2 dB safety margin to compensate for possible measurement inaccuracy or variance in the link quality.

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.

When the Rate Adaptation Algorithm is disabled, this parameter will serve to determine Fixed Data Rate for transmissions.

Table 5-10: Recommended Maximum Data Rate

SNR	Maximum Data Rate
SNR> 23 dB	54 Mbps
22dB < SNR< 23 dB	48 Mbps
18 dB< SNR < 22 dB	36 Mbps
14 dB < SNR < 18 dB	24 Mbps
11 dB < SNR < 14 dB	18 Mbps
9 dB < SNR < 11 dB	12 Mbps
7 dB < SNR < 9 dB	9 Mbps
6 dB<SNR < 7 dB	6 Mbps

For SU-A-54-VL the available rates are 6, 9, 12, 18, 24, 26, 48 and 54 Mbps. The default is 54 Mbps.

For SU-A-24 VL the available rates are 6, 9, 12, 18 and 24 Mbps, and the default is 24 Mbps.

Number of HW Retries

The Number of HW Retries parameter defines the maximum number of times that an unacknowledged packet is retransmitted. When the Multi Rate Support algorithm is disabled, or when the Multi Rate Support algorithm is enabled but the Software retry Support is disabled, a frame will be dropped when the number of unsuccessful retransmissions reaches this value. For details on the effect of this parameter when both the Multi Rate Support algorithm and the Software Retry Support feature are enabled, refer to Multi-Rate on page 5-55.

The available values range from 0, which means no retransmissions to 10.

The default value is **4**.

Multi-Rate

The Multi Rate algorithm enables to adapt the transmission rate to the prevailing conditions of the applicable radio link. The algorithm provides Access Units with simultaneous, adaptive support for multiple Subscriber Units at different rates, as transmission rate decisions are made separately for each associated SU.

Link quality fluctuates due to various environmental conditions. Dynamically switching between the possible transmission rates increases the probability of using the maximum rate suitable for the current radio link quality at any given moment.

The decisions made by the Multi Rate algorithm relate to the transmission rate for new frames (first trial attempt) as well as the rate for retransmissions. The decisions are based on multiple parameters, including the RSSI of received acknowledgements from the relevant unit, the time that has passed since last transmission to the relevant unit, and the recent history of successful and unsuccessful transmissions/retransmissions. In the AU the decision algorithm is performed separately for each SU.

The transmission/retransmission mechanism operates as follows:

    a. Each new frame (first transmission attempt) will be transmitted at a rate selected by the Multi Rate algorithm.

b. If first transmission trial has failed, the frame will be retransmitted at the same rate up to the maximum number of retransmission attempts defined by the Number of HW Retries parameter.

c. If the frame was not acknowledged and the Software Retry Support option is disabled, the frame will be dropped. If the Software Retry Option is enabled, the frame will be moved to the end of the queue. All other frames in the queue that are intended to the same destination will be moved as well, to preserve the original order. This process is referred to as a Software Retry.

d. The frame will be retransmitted at the rate selected by the algorithm for the new retrials sequence. Each retrial sequence comprises a number of attempts defined by the Number of HW Retries.

e. The process will be repeated up to a maximum number of Software Retries defined by the Number of SW Retries parameter.

The Multi-Rate Parameters menu includes the following parameters:

Multi-Rate Support

The Multi Rate Support option enables or disables the Multi-Rate decision algorithm. When enabled, the algorithm supports decrease/increase of transmission rates between the lowest possible data rate which is 6 Mbps to the current value of the Maximum Data Rate parameter. If the Maximum Data Rate is set at 6 Mbps which is the lowest possible data rate, the Multi Rate Support has no effect.

The default selection is **Enable**.

Software Retry Support

The Software Retry Support option enables or disables the software retry mechanism in the Multi Rate algorithm. When enabled, the algorithm supports decrease/increase of transmission rates between the lowest possible data rate which is 6 Mbps to the current value of the Maximum Data Rate parameter. If the Maximum Data Rate is set at 6 Mbps which is the lowest possible data rate, the Multi Rate Support has no effect.

The default selection is **Enable**.

Number of SW Retries

The Number of SW Retries parameter enables defines maximum number of times to use the software retrial mechanism when the Software Retry Support option is enabled.

The available values range from 1 100.

The default value is 3.

Service Parameters (SU Only)

The Service Parameters menu enables defining user filtering parameters.

The Service Parameters menu is only available to Subscriber Units and includes the following parameters:

User Filtering Parameters

The User Filtering Parameters submenu enables defining the IP addresses of user devices authorized to access the wireless media for security and/or control purposes. In addition, it can be used to enable the transmission and reception of specific protocol frames. These filtering options do not affect management frames sent to or generated by the unit.

The User Filtering Parameters menu provides the following options:

User Filtering Option

The User Filtering Option disables or enables the User Filtering feature. The following options are available:

♦ **Disable**, which means no filtering.

♦ **IP only**, which means only IP Protocol packets pass.

♦ **User Defined Addresses Only**, which means only IP frames from/to IP addresses included in the User Filter Addresses list pass.

♦ **PPPoE Protocol Only**, which means only PPPoE messages pass (Ethernet type 0x8863 and 0x8864).

The default selection is Disable.

Set User Filter Address

The Set User Filter Address option enables entering up to 8 IP addresses from/to which IP frames are to pass if the User Defined Addresses Only option is selected in the User Filtering Option parameter.
The default for all addresses is **0.0.0.0**.

Set User Filter Mask

The Set User Filtering Mask option enables entering subnet masks for each of the User Filter IP Address entries.
The default for all subnet masks is **255.255.255.255**.

Set User Filter Range

The Set User Filter Range option enables defining a range of addresses for each of the User Filter IP Address entries The range includes the base address.
Available values range from 0 to 255.
The default value is **0** (not used).

NOTES:

You can enter either a mask or range, but not both, to define a group of user filter addresses.

If IP broadcast packets are supposed to reach a device behind an SU unit, the broadcast IP address must be included in the list of user filter addresses.

Delete a User Filtering Entry

The Delete a User Filtering Entry option enables deleting a selected entry from the User Filtering list. The entry is replaced by the default value.

Delete All User Filtering Entries

The Delete All User Filtering Entries option enables deleting all entries from the User Filtering list. .The list entries are replaced by the default values.

Show All User Filtering Parameters

The Show All User Filtering Parameters option displays the current value of the User Filtering Option and the list of User Filtering addresses, subnet masks and ranges.

Security Parameters

Unauthorized wireless connection is prevented using the Wired Equivalent Privacy (WEP) algorithm defined in the IEEE 802.11 Wireless LAN standard. The WEP is based on the RSA's RC4 encryption algorithm.

The following parameters are available through the Security Parameters menu:

Authentication Algorithm

The Authentication Algorithm option determines the operation mode of the selected unit. The two options are Open System and Shared Key:

Open System

An SU configured to **Open System** can only associate with an AU also configured to **Open System**. In this case, the WEP algorithm is not used.

Shared Key

In this mode the authentication messages are encrypted. An SU configured to use a **Shared Key** can only be authenticated by an AU configured to use a **Shared Key**, provided the applicable WEP Key (which means both the key number and its content) in the AU is identical to the key selected as the Default Key in the SU.

The default is **Open System**.

> **NOTE:**
> The **Shared Key** option cannot be selected before at least one WEP Key is defined. In the SU, a Default Key ID that refers to a valid WEP Key must be selected.

Default Key ID (SU only)

The Default Key ID defines the ID of the key to be used for encrypting/decrypting the authentication messages.
Available values range from 1 to 4.
The default is **WEP KEY # 1**.

WEP KEY 1 through WEP KEY # 4

These options enable entering the encryption key to be used for initializing the pseudo-random number generator. Subscriber Units must use the same WEP Key as the Access Unit.
The WEP Key is a string of 10 hexadecimal numbers.
The default for all 4 keys is a string of 10 zeros, which means no key.

Appendix A

Software Version Loading Using TFTP
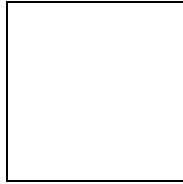
Firmware upgrades to the unit's FLASH memory can be performed by a simple loading procedure using a TFTP application. Before performing an upgrade procedure, be sure you have the correct files and most recent instructions.

Upgrade packages can be obtained from the Technical Support section of Alvarion's web site, www.alvarion.com.

NOTE:
Shutting down power to the unit before completion of the loading procedure may cause the unit to be inoperable.

➢ **To load software versions:**

1. Verify that IP connectivity to the required unit is established.

2. Ensure that the IP address of the PC from which the upgrade is to be performed belongs to the same subnet as the unit to be upgraded, unless the unit is behind a router. If the unit is behind a router, verify that the unit is configured with the correct ***Default Gateway Address***.

3. To view the current IP parameters of the unit, use the Monitor program by connecting the PC to the unit either directly or via Telnet. To access the IP parameters via the Monitor program:

    a.   From the *Main Menu* select *1 – **Info Screens***.

    b.   From the *Info Screen* menu select ***2 – Show Basic Configuration***. The current basic configuration is displayed, including the run-time values for the IP Address, Subnet Mask and Default Gateway Address parameters.

4. To modify any of the IP parameters:

    a.   From the *Main Menu*, select ***3 – Basic Configuration***.

    b.   To configure the IP address, select: ***1 – IP Address***.

   c.   To configure the subnet mask, select ***2 – Subnet Mask***.

    d.   To configure the default gateway address, select *3* - ***Default Gateway Address***.

5. To verify the connection, PING the unit's IP address and verify that PING replies are being received.

6. Use the TFTP utility, with the following syntax, to perform the upgrade:
tftp –i hostaddress put sourcefile [destinationfile]
where *-i* is for binary mode and *hostaddress* is the IP address of the unit to be upgraded. *put* causes the PC client to send a file to the hostaddress. *destinationfile* is the name of the file to be loaded.

7. Use the SNMP write community <SnmpWriteCommunity>.dwn to define the destination filename. The default write community is **private**. For example, to load the upgrade file au1_0_6.bz to an AU whose IP address is 206.25.63.65*:*
tftp –i 206.25.63.65 put au1_0_6.bz private.dwn

8. When the loading is complete, the following message is displayed:

```
Download operation has been completed successfully
```

9. The FLASH memory can store two software versions. One version is called *Current* and the second version is called *Shadow*. The new version is loaded into the Shadow (backup) FLASH memory. To check that the new firmware was properly downloaded, view the firmware versions stored in the FLASH, as follows:

    a.   From the Main Menu, select *2 – **Unit Control***.

    b.   From the Unit Control menu, select *5 – **Flash Memory Control***.

    c.   From the *Flash Memory Control* menu, select *S – **Show Flash Versions***. The following information is displayed:

```
Flash Versions
===========

Running from            :main version
Main Version            :au1_0_5.bz
Shadow Version          :au1_0_6.bz
```

Appendix B

Configuration Download and Upload Using TFTP
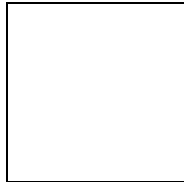
The BreezeACCESS OFDM Configuration Download/Upload feature simplifies the task of remotely configuring a large number of units using TFTP protocol. By downloading the configuration file to a PC it is possible to view all the parameters configured for the unit, as a plain ASCII text file. It is necessary to edit the file using a simple editor and remove certain parameters or change their values prior to uploading the configuration to another unit.

When multiple configurations are being done simultaneously, which means that the file is being uploaded to several units, it is recommended that the file only include the required parameters.

In the configuration file, each parameter is represented by three fields:

1. A symbolic string similar to the name of the parameter in the Monitor program, followed by "=".

2. The value of the parameters, which uses the same values as the Monitor program.

3. An optional comment. If used, the comment should start with a ";" character.

An unknown parameter will be ignored. A known parameter with a value that is invalid or out-of-range will be set by the unit to its default value.

Use the SNMP write community string (the default is private) to define both the uploaded file (put) and the downloaded file (get). Use the extension cfg for a configuration file. Use the extension cmr for the Operator Defaults file. The file should be transferred in ASCII mode.

For Example:
To upload the configuration file using a DOS based TFTP Client to an SU whose IP address is 206.25.63.65, enter:
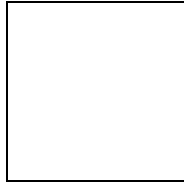tftp 206.25.63.65 put Suconf private.cfg

To download the Operator Defaults file from the same unit, enter:
tftp 206.25.63.65 get private.cmr Suconf

Appendix C

Preparing the Indoor to Outdoor SU Cable

The Indoor-to-Outdoor SU cable provides pin-to-pin connection on both sides. It is supplied open-ended at both sides, to allow the installer to conveniently route the cable into the waterproof seal off the Outdoor unit and through holes in walls.

Figure C-1 shows the wire pair connections required for the Indoor-to-Outdoor cable.
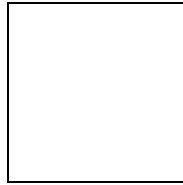
Figure C-1: Ethernet Connector Pin Assignments

Use a crimp tool for RJ-45 connectors to prepare the wires, insert them into the appropriate pins and use the crimp tool to crimp the connector. Make sure to do the following:

1. Remove as small a length as possible of the external jacket. Verify that the external jacket is well inside the service box to ensure good sealing.

2. Take back the shield drain wire before inserting the cable into the RJ-45 connector, to ensure a good connection with the connector's shield after crimping.
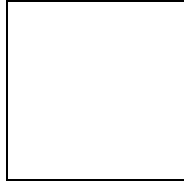
Appendix D
Supported MIBs and Traps

About This Chapter

BreezeACCESS agents support the following MIBs:

♦   MIB-II (RFC1213)

♦   BRIDGE-MIB (RFC1286)

♦   BreezeACCESS OFDM Private MIB (brzAccessMib)

This appendix is comprised of the following sections:

♦   **BreezeACCESS OFDM System Object Identifiers**, page A-2.

♦   **brzOfdmMIB**, page A-3.

♦   **Supported Traps**, page A-19.

BreezeACCESS VL System Object Identifiers

Path:

alvarion   OBJECT IDENTIFIER =1.3.6.1.4.1.12394
{(iso(1) org(3) dod(6) internet(1) private(4) enterprises(1) alvarion(12394)}

products   OBJECT IDENTIFIER = 1.3.6.1.4.1.12394.1
{alvarion 1}

breezeAccessVLMib   OBJECT IDENTIFIER = 1.3.6.1.4.1.12394.1.1
{products 1}

alvarionOID   OBJECT IDENTIFIER = 1.3.6.1.4.1.12394.10.4
{alvarion 4}

brzAccessVLOID   OBJECT IDENTIFIER = 1.3.6.1.4.1.12394.10.4.1
{alvarionOID 1}

brzAccessVLAU   OBJECT IDENTIFIER = 1.3.6.1.4.1.12394.10.4.1.1
{brzAccessVLOID 1}

brzAccessVLSU   OBJECT IDENTIFIER = 1.3.6.1.4.1.12394.10.4.1.2
{brzAccessVLOID 2}

brzAccessVLProducts OBJECT IDENTIFIER = 1.3.6.1.4.1.12394.10.4.1.3
{brzAccessVLOID 3}

breezAccessVLMib

OBJECT IDENTIFIER = 1.3.6.1.4.1.12394.1.1

> **NOTE:**
> An * is used instead of the brzaccVL prefix.

System Information Parameters

MIB Parameter	Description	Values/Range
*SysInfo (breezeAccessVLMib 1)	System Information Parameters	
*UnitHwVersion (*SysInfo 1)	Applicable to AU and SU. Read-only: Hardware platform version.	DisplayString (SIZE(0..32))
*RunningSoftwareVersion (*SysInfo 2)	Applicable to AU and SU. Read-only: Running software version.	DisplayString (SIZE(0..32))
*RunningFrom (*SysInfo 3)	Applicable to AU and SU. Read-only: The memory (main or shadow) from which the current version is running from.	Integer mainVersion (1) shadowVersion (2)
*MainVersion (*SysInfo 4)	Applicable to AU and SU. Read-only: Main software version.	DisplayString (SIZE(0..32))
*ShadowVersion (*SysInfo 5)	Applicable to AU and SU. Read-only: Shadow software version.	DisplayString (SIZE(0..32))
*UnitMacAddress (*SysInfo 6)	Applicable to AU and SU. Read-only, Unit hardware MAC address.	MAC address
*UnitType (*SysInfo 7)	Applicable to AU and SU. Read-only: Unit type.	DisplayString (SIZE(0..32)) AU or SU
*AssociatedAU (*SysInfo 8)	Applicable to SU only. Read-only: Associated AU MAC address.	MAC address
*NumOfAssociationsSinceLastReset (*SysInfo 9)	Applicable to AU and SU. Read-only: The number of associations since last reset, including duplicate associations (re-associations).	Integer
*FlashType (*SysInfo 10)	Applicable to AU and SU. Read-only: Flash memory type. Type S - Strata Flash. Type F – all other Flash types.	DisplayString (SIZE(0..31))
*FlashSize (*SysInfo 11)	Applicable to AU and SU. Read-only: Flash size in Mb.	Integer

MIB Parameter	Description	Values/Range
*MaxPowerOutput (*SysInfo 12)	Applicable to AU and SU. Read-only: The maximum output power in dBm to the antenna port supported by the unit.	Integer na (255)
*CurrentNumOfAssociations (*SysInfo 13)	Applicable to AU only. Read-only. The number of subscriber units currently associated with the AU.	Integer
*UnitBootVersion (*SysInfo 14)	Applicable to AU and SU. Read-only: The Boot software version.	DisplayString (SIZE(0..32))
*RadioBand (*SysInfo 15)	Applicable to AU and SU. Read-only: The radio band of the unit.	Integer band_5_7GHz (1) band_5_4GHz (2)

Unit Control Parameters

MIB Parameter	Description	Values/Range
*UnitControl (breezeAccessVLMib 2)		
*ResetUnit (*UnitControl 1)	Applicable to AU and SU. Resets the unit and applies new parameter values.	Integer cancel (1) resetSystemNow (2)
*SetDefaults (*UnitControl 2)	Applicable to AU and SU. Sets unit configuration to Defaults values after the next reset. completeFactory: All parameters revert to Factory Defaults values partialFactory: All parameters revert to Factory Defaults values, except the parameters required for maintaining wireless connectivity. completeOperator: All parameters revert to Operator Defaults values partialOperator: All parameters revert to Operator Defaults values, except the parameters required for maintaining wireless connectivity.	Integer completeFactory (1) partialFactory (2) completeOperator (3) partialOperator (4) cancel (5)
*UnitName (*UnitControl 3)	Applicable to AU and SU. The unit name.	DisplayString (SIZE(32)) A string of up to 32 printable ASCII characters.
*FlashMemoryControl (*UnitControl 4)	Applicable to AU and SU. Reset And Boot From Shadow Version: Activates the shadow version. Use Current Version After Reset: The currently active version will become the main version and will be activated after next reset.	Integer resetAndBootFrom ShadowVersion (1) useCurrentVersion AfterReset (2) cancel (3)
*TelnetLogoutTimer (*UnitControl 5)	Applicable to AU and SU. Time-out of management via Telnet. Automatic exit if the program is inactive for the defined time.	Integer 1-999 (minutes)

*SaveCurrentConfigurationAs OperatorDefaults (*UnitControl 6)	Applicable to AU and SU. Saves the current configuration as Operator Defaults.	Integer saveAsDefaults (1) cancel (2)
*ExitTelnet (*UnitControl 7)	Applicable to AU and SU. Exit the Telnet Monitor session.	Integer cancelOperation (1) exit (2)
*UnitPasswords (*UnitControl 8)	Applicable to AU and SU. Unit passwords.	
*ReadOnlyPassword (*UnitPasswords 1)	Applicable to AU and SU. The User (read only) password.	DisplayString (SIZE(8)). Up to 8 printable ASCII characters.
*InstallerPassword (*UnitPasswords 2)	Applicable to AU and SU. The Installer password.	DisplayString (SIZE(8)). Up to 8 printable ASCII characters.
*AdminPassword (*UnitPasswords 3)	Applicable to AU and SU. The Administrator password. This is also the SNMP Write Community String.	DisplayString (SIZE(8)). Up to 8 printable ASCII characters.
*EthernetNegotiationMode (*UnitControl 9)	Applicable to AU and SU. Ethernet port mode of operation.	Integer force10MbpsAnd HalfDuplex (1) force10MbpsAnd FullDuplex (2) force100MbpsAnd HalfDuplex (3) force100MbpsAnd FullDuplex (4) autoNegotiationMode (5)
*FTPParameters (*UnitControl 10)	Applicable to AU and SU. FTP parameters	
*FTPServerParams (*FTPParameters 1)	Applicable to AU and SU. General FTP server parameters.	
*FTPServerUserName (*FTPServerParams 1)	Applicable to AU and SU. The user name to be used for access to the FTP server	DisplayString (SIZE(20)). Up to 20 printable ASCII characters.
*FTPServerUserPassword (*FTPServerParams 2)	Applicable to AU and SU. The password to be used for access to the FTP server	DisplayString (SIZE(20)). Up to 20 printable ASCII characters.
*FTPClientIpAddress (*FTPParameters 3)	Applicable to AU and SU. The IP address of the FTP stack in the unit.	IP address
*FTPHostIpaddress (*FTPServerParams 4)	Applicable to AU and SU. The IP address of the FTP server	IP address
*FtpSourceDir (*FTPServerParams 5)	Applicable to AU and SU. The source directory of the required file in the FTP server	DisplayString (SIZE(80)). Up to 80 printable ASCII characters. Use "." To clear field.
*FTPSwDownload (*FTPParameters 2)	Applicable to AU and SU. SW download parameters.	

*FTPSwFileName (*FTPSwDownload 1)	Applicable to AU and SU. The name of the SW file to be downloaded.	DisplayString (SIZE(80)). Up to 80 printable ASCII characters.
*DownloadSwFile (*FTPSwDownload 2)	Applicable to AU and SU. Execurion of the SW download operation.	Integer downloadFile (1) cancel (2)
*ConfigurationFileLoading (*FTPParameters 3)	Applicable to AU and SU. Configuration file and Operator Defaults file download/upload parameters.	
*ConfigurationFileName (*ConfigurationFileLoading 1)	Applicable to AU and SU. The name of the configuration file to be downloaded/uploaded.	DisplayString (SIZE(80)). Up to 80 printable ASCII characters.
*OperatorDefaultsFileName (*ConfigurationFileLoading 2)	Applicable to AU and SU. The name of the Operator Defaults file to be downloaded/uploaded.	DisplayString (SIZE(80)). Up to 80 printable ASCII characters.
*ExecuteFTPConfigurationFileLoading (*ConfigurationFileLoading 3)	Applicable to AU and SU. Execution of the file download/upload operation.	Integer executeFTPGetConfiguration File (1) executeFTPPutConfiguration File (2) executeFTPGetOperator Defaults (3) executeFTPPutOperator Defaults (4) cancel (5)

Network Management Parameters

MIB Parameter	Description	Values/Range
*NwMngParameters (breezeAccessVLMib 3)	Network management parameters.	
*AccessToNwMng (*NwMngParameters 1)	Applicable to AU and SU. The port to be used for remote management.	Integer fromwirelessOnly (1) fromEthernetOnly (2) fromBothWirelessnAndEthernet (3) na (255)
*NwMngFilter (*NwMngParameters 2)	Applicable to AU and SU. Disables or enable IP address based filtering of management messages on one or both ports.	Integer disable (1) activateOnEthernetPort (2) activateOnWirelessPort (3) activateOnBothWirelessAndEthernet (4) na (255)
mngIpFilterTable (*NwMngParameters 3)	Applicable to AU and SU. A table of up to 3 IP addresses of stations that are authorized to access the unit for management purposes. Not accessible.	
mngIpFilterEntry (mngIpFilterTable 1)	Applicable to AU and SU. A Management IP Filter Table entry. Not accessible.	

MIB Parameter	Description	Values/Range
*NwMngIpAddress (mngIpFilterEntry 1)	Applicable to AU and SU. An IP address in the Management IP Filter Table entry.	IP address
*NwMngIpTableIdx (mngIpFilterEntry 2)	Applicable to AU and SU. Read-only. A table index for an entry in the Management IP Filter Table.	Integer 1-3
*DeleteOneNwIpAddr (*NwMngParameters 4)	Applicable to AU and SU. Deletes a single selected entry from the Management IP Filter Table.	Integer deletefirstEntry (1) deletesecondEntry (2) deletethirdEntry (3) cancelOperation (4) na (255)
*DeleteAllNwIpAddrs (*NwMngParameters 5)	Applicable to AU and SU. Deletes all entries from the Management IP Filter Table.	Integer deleteAll (1) cancelOperation (2) na (255)
*AccessToNwTrap (*NwMngParameters 6)	Applicable to AU and SU. Enables or disables the sending of SNMP traps.	Integer disable (1) enable (2)
mngTrapTable (*NwMngParameters 7)	Applicable to AU and SU. A table of up to 3 IP addresses of stations to which to send SNMP traps. Not accessible.	
mngTrapEntry (mngTrapTable 1)	Applicable to AU and SU. A Management Trap Table entry. Not accessible.	
*NwMngTrapCommunity (mngTrapEntry 1)	Applicable to AU and SU. The trap community associated with the applicable entry in the Management Trap Table.	DisplayString (SIZE(14)) Up to 14 printable ASCII characters.
*NwMngTrapAddress (mngTrapEntry 2)	Applicable to AU and SU. An IP address in the Management Trap Table.	IP address
*NwMngTrapTableIdx (mngTrapEntry 3)	Applicable to AU and SU. Read only. Index for an entry in the Management Trap Table.	Integer 1-3
*DeleteOneTrapAddr (*NwMngParameters 8)	Applicable to AU and SU. Deletes a single selected entry from the Management Trap Table.	Integer deletefirstEntry (1) deletesecondEntry (2) deletethirdEntry (3) cancelOperation (4) na (255)
*DeleteAllTrapAddrs (*NwMngParameters 9)	Applicable to AU and SU. Deletes all entries from the Management Trap Table.	Integer deleteAll (1) cancelOperation (2) na (255)

IP Parameters

MIB Parameter	Description	Values/Range
*IpParams (breezeAccessVLMib 4)		
*UnitIpAddress (*IpParams 1)	Applicable to SU and AU. IP address of the unit.	IP address
*SubNetMask (*IpParams 2)	Applicable to SU and AU. Subnet mask of the unit.	IP address
*DefaultGWAddress (*IpParams 3)	Applicable to SU and AU. Default gateway IP address of the unit.	IP address
*UseDhcp (*IpParams 4)	Applicable to SU and AU. DHCP client mode of operation. disable: Use regular (manual) methods to configure IP parameters. DHCP Only: Use DHCP server to configure IP parameters. automatic: Use DHCP server to configure IP parameters. If a DHCP server is not available, use manually configured values for *UnitIpAdress, *SubnetMask and *DefaultGWAdress.	Integer disable (1) dHCPOnly (2) automatic (3)
*AccessToDHCP (*IpParams 5)	Applicable to SU and AU. The port to be used for communicating with a DHCP server.	Integer fromWirelessOnly (1) fromEthernetOnly (2) fromBothWirelessAndEthernet (3)
*RunTimeIPaddr (*IpParams 6)	Applicable to SU and AU. Read-only: The run-time IP address. If DHCP is used, the run-time IP address is the address given to the unit by the server. Alternatively the static IP address is used.	IP address
*RunTimeSubNetMask (*IpParams 7)	Applicable to SU and AU. Read-only: The run-time subnet mask. If DHCP is used, the run-time subnet mask is the mask given to the unit by the server. Alternatively the static subnet mask value is used.	IP address
*RunTimeDefaultIPGateway (*IpParams 8)	Applicable to SU and AU. Read-only: The run-time Gateway IP address. If DHCP is used, the Run Time Gateway IP Address is the address given to the unit by the server. Alternatively, the static default gateway is used.	IP address

Bridge Parameters

MIB Parameter	Description	Values/Range
*BridgeParameters (breezeAccessVLMib 5)	Bridge parameters.	
*VLANSupport (*BridgeParameters 1)	Applicable to AU and SU. VLAN support parameters. Applicable to Access Link only.	
*VlanID (*VLANSupport 1)	Applicable to SU only. VLAN ID for data frame tagging.	Integer 1-4094. 0 –na (no VLAN ID)

MIB Parameter	Description	Values/Range
*EthernetLinkType (*VLANSupport 2)	Applicable to AU and SU. VLAN support mode (Link Type). The accessLink option is not available for AU.	Integer accessLink (1) trunkLink (2) hybridLink (3)
*ManagementVID (*VLANSupport 3)	Applicable to AU and SU. VLAN ID for management frame tagging.	Integer 1-4094 65535 - no VLAN tagging.
*VLANForwarding (*VLANSupport 4)	VLAN forwarding feature parameters.	
*VlanForwardingSupport (*VLANForwarding 1)	Applicable to AU and SU. Enables or disables the VLAN forwarding feature. Applicable to Trunk links only.	Integer disable (1) enable (2) na (255)
*VlanForwardingTable (*VLANForwarding 2)	Applicable to AU and SU. A table of up to 20 VLAN IDs of devices to which data frames are forwarded when the VLAN Forwarding feature is Enabled. Applicable to Trunk links only. Not accessible.	
*VlanForwardingEntry (*VlanForwardingTable 1)	Applicable to AU and SU. A VLAN Forwarding Table entry. Applicable to Trunk links only. Not accessible.	
*VlanForwardingTableIdx (*VlanForwardingEntry 1)	Applicable to AU and SU. A read only table index for a VLAN entry in the VLAN Forwarding Table.	Integer 1-20
*VlanIdForwarding (*VlanForwardingEntry 2)	Applicable to AU and SU. The list of VLAN ID's in the VLAN ID Forwarding Table. To remove a VLAN ID - SET the corresponding entry to 0. To add a new VLAN ID SET an entry which is now 0.	Integer 1-4094 0-remove entry.
*VLANRelaying (*VLANSupport 5)	VLAN Relaying feature parameters.	
*VlanRelayingSupport (*VLANRelaying 1)	Applicable to AU only. Enables or disables the VLAN Relaying feature. Applicable to Trunk links only.	Integer disable (1) enable (2) na (255)
*VlanRelayingTable (*VLANRelaying 2)	Applicable to AU only. A table of up to 20 VLAN IDs of devices to which data frames are relayed when the VLAN Relaying feature is Enabled. Applicable to Trunk links only. Not accessible.	
*VlanRelayingEntry (*VlanRelayingTable 1)	Applicable to AU only. A VLAN Relaying Table entry. Applicable to Trunk links only. Not accessible.	
*VlanRelayingTableIdx (*VlanRelayingEntry) 1	Applicable to AU only. A read only table index for a VLAN entry in the VLAN Relaying Table.	Integer 1-20
*VlanIdRelaying (*VlanRelayingEntry 2)	Applicable to AU only. The list of VLAN ID's in the VLAN ID Relaying Table. To remove a VLAN ID - SET the corresponding entry to 0. To add a new VLAN ID SET an entry which is now 0.	Integer 1-4094 0-remove entry.
*VLANTrafficPriority (*VLANSupport 6)	VLAN traffic priority parameters.	

MIB Parameter	Description	Values/Range
*VlanDataPriority (*VLANTrafficPriority 1)	Applicable to SU only. Priority tagging for data frames. Applicable to Access Link only.	Integer 0 – 7 255-na
*VlanManagementPriority (*VLANTrafficPriority 3)	Applicable to AU and SU. Priority tagging for management frames. Applicable to Access Link and Trunk Link only.	Integer 0 – 7 255-na
*VlanPriorityThreshold (*VLANTrafficPriority 4)	Applicable to AU and SU. Priority threshold for tagged frames received from Ethernet port. Applicable to Hybrid Link and Trunk Link only.	Integer 0 – 7 255-na
*BridgeAgingTime (*BridgeParameters 2)	Applicable to AU and SU. Bridge aging time for devices learned from both the Ethernet and wireless link ports.	Integer 100 – 2000 (seconds)
*BroadcastRelaying (*BridgeParameters 4)	Applicable to AU only. Enables or disables the relaying of broadcast messages to the wireless link.	Integer disable (1) enable (2) na (255)
*UnicastRelaying (*BridgeParameters 5)	Applicable to AU only. Enables or disables the relaying of unicast messages to the wireless link.	Integer disable (1) enable (2) na (255)
*EthBroadcastFiltering (*BridgeParameters 6)	Applicable to SU only. Enables or disables the filtering of Ethernet (layer2) broadcasts. disable: No filtering. onEthrnetOnly: Filters broadcasts received on the Ethernet port only. onWirelessOnly: Filters broadcasts received on the wireless port only. onBothWirelessAndEthernet: Filters broadcasts received on both ports.	Integer disable (1) onEthernetOnly (2) onwirelessOnly (3) onBothWirelessAndEthernet (4) na (255)
*EthBroadcastingParameters (*BridgeParameters 7)		
*DHCPBroadcastOverrideFilter (*EthBroadcastingParameters 1)	Applicable to SU only. Enables or disables the broadcasting of DHCP messages, overriding the general *EthBroadcastFiltering Ethernet broadcast filtering option.	Integer disable (1) enable (2) na (255)
*PPPoEBroadcastOverrideFilter 710.3.5. 5.7.2 (*EthBroadcastingParameters 2)	Applicable to SU only. Enables or disables the broadcasting of PPPoE messages, overriding the general *EthBroadcastFiltering Ethernet broadcast filtering option.	Integer disable (1) enable (2) na (255)
*ARPBroadcastOverrideFilter 710.3.5. 5.7.3 (*EthBroadcastingParameters 3)	Applicable to SU only. Enables or disables the broadcasting of ARP messages, overriding the general *EthBroadcastFiltering Ethernet broadcast filtering option.	Integer disable (1) enable (2) na (255)
*ToSPriorityParameters (*BridgeParameters 8)		
*ToSPrecedenceThreshold (*ToSPriorityParameters 1)	Applicable to SU and AU. Priority threshold (based on the ToS) for frames received from Ethernet port.	Integer 0-7

Air Interface Parameters

User Filtering Parameters

MIB Parameter	Description	Values/Range
*UserFilterParams (breezeAccessVLMib 8)	Applicable to SU only. User filtering parameters.	
*UserFilterOption (*UserFilterParams 1)	Applicable to SU only. Defines user-filtering options. disable: No filtering. iPOnly: Only IP protocol packets pass. userDefinedAddrOnly: Only IP frames from/to user defined IP addresses pass. pPPoE Only: Only PPPoE frames pass.	Integer disable (1) iPOnly (2) userDefinedAddrOnly (3) pPPoEOnly (4) na (255)
*IpFilterTable (*UserFilterParams 2)	Applicable to SU only. A table of up to 8 user defined addresses, or address groups, to be used if the User Filtering Option (*UserFilterOption) is userDefinedAddrOnly. Not accessible.	
*IpFilterEntry (*IpFilterTable 1)	Applicable to SU only. An IP Filter table entry. Not accessible.	
*IpID (*IpFilterEntry 1)	Applicable to SU only. An IP address in the IP Filter table.	IP Address
*MaskID (*IpFilterEntry 2)	Applicable to SU only. An IP mask for the IP Filter entry. Either a mask or a range, but not both can be used to define an address group. If the range is other than 0, than the mask is ignored and only the range value is used to define the address group.	IP Address
*IpFilterRange (*IpFilterEntry 3)	Applicable to SU only. An address range for the IP Filter entry. The first address in the range is the IP address (*iPID). Either a mask or a range, but not both can be used to define an address group. If the range is other than 0, than the mask is ignored and only the range value is used to define the address group.	Integer 0 - 255
*IpFilterIdx (*IpFilterEntry 4)	Applicable to SU only. Read-only. A table index for the IP Filter entry.	Integer 1-8
*DeleteOneUserFilter (*UserFilterParams 3)	Applicable to SU only. Deletes a single selected entry from the IP Filter table.	Integer deletefirstEntry (1) deletesecondEntry (2) deletethirdEntry (3) deletefourthEntry (4) deletefifthEntry (5) deletesixthEntry (6) deleteseventhEntry (7) deleteeighthEntry (8) cancelOperation (9) na (255)

MIB Parameter	Description	Values/Range
*DeleteAllUserFilters (*UserFilterParams 4)	Applicable to SU only. Deletes all entries from the IP Filter table.	Integer deleteAll (1) cancelOperation (2) na (255)

Security Parameters

MIB Parameter	Description	Values/Range
*SecurityParameters (breezeAccessVLMib 9)		
*AuthenticationAlgorithm (*SecurityParameters 1)	Applicable to SU and AU. Enables or disables the authentication option. openSystem: Authentication messages are not encrypted. sharedKey: Authentication messages are encrypted.	Integer openSystem (1) sharedKey (2)
*DefaultKeyID (*SecurityParameters 2)	Applicable to SU. The ID of the key to be used for encrypting/decrypting the authentication messages.	Integer 1-4
*WEPKey1 (*SecurityParameters 3)	Applicable to SU and AU. WEP Key # 1. Accessible only with SNMP Write Community String (administrator password).	DisplayString (SIZE(10)) Ten hexadecimal digits
*WEPKey2 (*SecurityParameters 4)	Applicable to SU and AU. WEP Key # 2. Accessible only with SNMP Write Community String (administrator password).	DisplayString (SIZE(10)) Ten hexadecimal digits
*WEPKey3 (*SecurityParameters 4)	Applicable to SU and AU. WEP Key # 3. Accessible only with SNMP Write Community String (administrator password).	DisplayString (SIZE(10)) Ten hexadecimal digits
*WEPKey4 (*SecurityParameters 6)	Applicable to SU and AU. WEP Key # 4. Accessible only with SNMP Write Community String (administrator password).	DisplayString (SIZE(10)) Ten hexadecimal digits.

Performance Parameters

MIB Parameter	Description	Values/Range
*PerformanceParams (breezeAccessVLMib 10)		
*RTSThreshold (*PerformanceParams 1)	Applicable to SU and AU. The minimum frame size that requires an RTS/CTS handshake.	Integer 20-1600 (bytes)
*MinContentionWindow (*PerformanceParams 3)	Applicable to SU and AU. The initial value to be used by the contention window calculation algorithm.	Integer 7, 15, 31, 63, 127, 255, 511, 1023
*MaxContentionWindow (*PerformanceParams 4)	Applicable to SU and AU. The maximum value to be used by the contention window calculation algorithm.	Integer 7, 15, 31, 63, 127, 255, 511, 1023

MIB Parameter	Description	Values/Range
*MaximumDataRate (*PerformanceParams 5)	Applicable to SU and AU. If the Multi Rate algorithm is enabled, it set the Maximum Data Rate to be used. If The Multi Rate algorithm is disabled, it set the Fixed Data Rate to be used. For SU-A-54-VL the available rates are 6, 9, 12, 18, 24, 36, 48 and 54 Mbps. For SU-A-24-VL the available rates are 6, 9, 12, 18 and 24 Mbps.	Integer max6Mbps (6) max9Mbps (9) max12Mbps (12) max18Mbps (18) max24Mbps (24) max36Mbps (36) max48Mbps (48) max54Mbps (54)
*ShortFrameMulticastRate (*PerformanceParams 6)	Applicable to AU only. The transmission rate for multicast and broadcast frames shorter than 500 bytes. For SU-A-54-VL the available rates are 6, 9, 12, 18, 24, 36, 48 and 54 Mbps. For SU-A-24-VL the available rates are 6, 9, 12, 18 and 24 Mbps.	Integer max6Mbps (6) max9Mbps (9) max12Mbps (12) max18Mbps (18) max24Mbps (24) max36Mbps (36) max48Mbps (48) max54Mbps (54) na (255(
*LongFrameMulticastRate (*PerformanceParams 7)	Applicable to AU only. The transmission rate for multicast and broadcast frames with at least 500 bytes. For SU-A-54-VL the available rates are 6, 9, 12, 18, 24, 36, 48 and 54 Mbps. For SU-A-24-VL the available rates are 6, 9, 12, 18 and 24 Mbps.	Integer max6Mbps (6) max9Mbps (9) max12Mbps (12) max18Mbps (18) max24Mbps (24) max36Mbps (36) max48Mbps (48) max54Mbps (54) na (255(
*HardwareRetries (*PerformanceParams 8)	Applicable to SU and AU. The maximum number of trials to transmit an unacknowledged frame in each Hardware Retrials phase.	Integer 0-10
*MultiRateParams (*PerformanceParams 9)	Multi Rate Parameters	
*MultiRateSupport (*MultiRateParams 1)	Applicable to SU and AU. Enabling/disabling the Multi Rate algorithm.	Integer disable (1) enable (2)
*SoftwareRetrySupport (*MultiRateParams 2)	Applicable to SU and AU. Enabling/disabling the Software Retry mechanism when the Multi Rate algorithm is enabled.	Integer disable (1) enable (2) na (255)
*NumberOfSoftwareRetries (*MultiRateParams 3)	Applicable to SU and AU. The maximum number of times to use the Software Retry mechanism when it is enabled.	Integer 1-100

Site Survey Parameters

MIB Parameter	Description	Values/Range
*SiteSurvey (breezeAccessVLMib 11)		
*AverageReceiveSNR (*SiteSurvey 1)	Applicable to SU only. Read-only. The average Signal to Noise Ratio of received frames.	Integer
*TrafficStatistics (*SiteSurvey 2)	Applicable to SU and AU. Traffic statistics parameters.	
*ResetTrafficCounters (*TrafficStatistics 1)	Applicable to SU and AU. Resets the traffic counters.	Integer reset (1) cancel (2)
*EthCounters (*TrafficStatistics 2)	Applicable to SU and AU. Ethernet counters.	
*TotalRxFramesViaEthernet (*EthCounters 1)	Applicable to SU and AU. Read-only. Total number of frames received via the Ethernet port.	Counter 32
*TxWirelessToEthernet (*EthCounters 2)	Applicable to SU and AU. Read-only. Total number of frames transmitted to the Ethernet port.	Counter 32
*WirelessLinkCounters (*TrafficStatistics 3)	Applicable to SU and AU. Wireless link counters.	
*TxFramesToWireless (*WirelessLinkCounters 1)	Transmitted frames counters	
*AUBeaconsToWireless (*TxFramesToWireless 1)	Applicable to AU only. Read-only. The number of Beacon frames transmitted to the wireless media.	Counter 32
*OtherMngFramesToWireless (*TxFramesToWireless 2)	Applicable to SU and AU. Read-only. The number of management frames transmitted to the wireless media. In AU, this count does not include Beacons.	Counter 32
*DataFramesToWireless (*TxFramesToWireless 3)	Applicable to SU and AU. Read-only. The number of data frames transmitted to the wireless media. The count includes one count for each data frame transmitted successfully (excluding retransmissions).	Counter 32
*TotalTxFramesToWireless (*TxFramesToWireless 4)	Applicable to SU and AU. Read-only. The number of frames transmitted to the wireless media. The count includes one count for each data frame transmitted successfully (excluding retransmissions), and the number of transmitted control and wireless management frames.	Counter 32
*TotalTransmitted Unicasts (*TxFramesToWireless 5)	Applicable to SU and AU. Read-only. The total number of unicast frames successfully transmitted to the wireless media, excluding retransmissions.	Counter 32

MIB Parameter	Description	Values/Range
*TotalRxFramesFromWireless (*WirelessLinkCounters 2)	Applicable to SU and AU. Read-only. The total number of frames received from the wireless media. The count includes data and control and wireless management frames, including beacons received from the AU. The count does not include frames discarded internally, bad frames and duplicate frames.	Counter 32
*TotalRetransmittedFrames (*WirelessLinkCounters 3)	Applicable to SU and AU. Read-only. The total number of retransmissions of data frames (counts all unsuccessful transmissions/retransmissions).	Counter 32
*FramesDropped (*WirelessLinkCounters 4)	Applicable to SU and AU. Read-only. The number of dropped frames. The frames retransmitted to the maximum allowed number of retransmissions without being acknowledged.	Counter 32
*DataFramesSubmittedToBridge (*WirelessLinkCounters 5)	Submitted frames counters	
*DataFramesSubmittedViaHighQueue (*DataFramesSubmittedToBridge 1)	Applicable to SU and AU. Read-only. The number of data frames submitted to the internal bridge via the high priority queue for transmission to the wireless media.	Counter 32
*DataFramesSubmittedViaMidQueue (*DataFramesSubmittedToBridge 2)	Applicable to SU and AU. Read-only. The number of data frames submitted to the internal bridge via the mid priority queue for transmission to the wireless media.	Counter 32
*DataFramesSubmittedViaLowQueue (*DataFramesSubmittedToBridge 3)	Applicable to SU and AU. Read-only. The number of data frames submitted to the internal bridge via the low priority queue for transmission to the wireless media.	Counter 32
*TotalNoOfDataFramesSubmitted (*DataFramesSubmittedToBridge 4)	Applicable to SU and AU. Read-only. The total number of data frames submitted to the internal bridge for transmission to the wireless media.	Counter 32
*TotalRecievedDataFrames (*WirelessLinkCounters 6)	Applicable to SU and AU. Read-only. The total number of data frames received from the wireless media, including duplicate frames.	Counter 32
*RecievedBadFrames (*WirelessLinkCounters 7)	Applicable to SU and AU. Read-only. The number of frames received from the wireless media with errors (CRC errors).	Counter 32
*NoOfDuplicateFramesDiscarded (*WirelessLinkCounters 8)	Applicable to SU and AU. Read-only. The number of frames discarded due to receiving multiple copies.	Counter 32
*WirelessLinkErrors (*TrafficStatistics 4)	Applicable to SU and AU. Wireless link error counters.	
*TxErrors (*WirelessLinkErrors 1)	Applicable to SU and AU. Read-only. Tx errors counters.	

MIB Parameter	Description	Values/Range
*DroppedFrameErrors (*TxErrors 1)	Applicable to SU and AU. The number of Tx errors due to frames that were dropped because they were retransmitted to the maximum allowed number of retransmissions without being acknowledged.	Counter 32
*FilteredFrameErrors (*TxErrors 2)	Applicable to SU and AU. The number of Tx errors due to frames that were filtered.	Counter 32
*UnderrunErrors (*TxErrors 3)	Applicable to SU and AU. The number of Tx errors due to frames that were aborted because the rate of submitting frames for transmission exceeds the available transmission capability.	Counter 32
*OtherTxErrors (*TxErrors 4)	Applicable to SU and AU. The number of Tx errors due to errors other than those represented by the other Tx Errors counters.	Counter 32
*TotalTxErrors (*TxErrors 5)	Applicable to SU and AU. The total number of Tx errors.	Counter 32
*RxErrors (*WirelessLinkErrors 2)	Applicable to SU and AU. Read-only. Rx errors counters.	
*PhyErrors (*RxErrors 1)	Applicable to SU and AU. Read-only. The number of frames that were not received properly due to a hardware problem.	Counter 32
*CRCErrors (*RxErrors 2)	Applicable to SU and AU. Read-only. The number of frames received from the wireless media containing CRC errors.	Counter 32
*OverrunErrors (*RxErrors 3)	Applicable to SU and AU. Read-only. The number of frames that were discarded because the receive rate exceeded the processing capability or the capacity of the Ethernet port.	Counter 32
*OtherRxErrors (*RxErrors 4)	Applicable to SU and AU. Read-only. The number of Rx errors due to errors other than those represented by the other Rx Errors counters.	Counter 32
*TotalRxErrors (*RxErrors 5)	Applicable to SU and AU. Read-only. The total number of Rx errors.	Counter 32
*Mac AddressDatabase (*SiteSurvey 5)	AU MAC Address Database	
*AUMac AddressDatabase (*Mac AddressDatabase 1)	AU MAC Address Database	
*AdbResetAllCounters (*AUMac AddressDatabase 1)	Applicable to AU only. Resets all the counters for all SUs in the MAC Address Database.	Integer reset (1) noReset (2)
*AdbTable (*AUMac AddressDatabase 2)	Applicable to AU only. Not accessible. The AU MAC Address Database Table.	
*AdbEntry (*AdbTable 1)	Applicable to AU only. Not accessible. An entry in the AU MAC Address Database Table.	
*AdbIndex (*AdbEntry 1)	Applicable to AU only. Read-only. The Index of an entry in the AU MAC Address Database Table.	Integer

MIB Parameter	Description	Values/Range
*AdbMacAddress (*AdbEntry 2)	Applicable to AU only. Read-only. The MAC Address of an SU entry in the AU MAC Address Database Table.	MAC Address
*AdbStatus (*AdbEntry 3)	Applicable to AU only. Read-only. The wireless status of the relevant SU.	Integer associated (1) authenticated (2) notAuthenticated (3)
*AdbSwVersion (*AdbEntry 4)	Applicable to AU only. Read-only. The SW Version of the relevant SU.	Display String
*AdbSNR (*AdbEntry 5)	Applicable to AU only. Read-only. The average Signal to Noise Ratio in dB of frames received by the AU from the relevant SU.	Integer 0-60
*AdbMaxDataRate (*AdbEntry 6)	Applicable to AU only. Read-only. The value configured in the relevant SU for the Maximum Data Rate parameter.	Integer max6Mbps (6) max9Mbps (9) max12Mbps (12) max18Mbps (18) max24Mbps (24) max36Mbps (36) max48Mbps (48) max54Mbps (54)
*AdbTxFramesTotal (*AdbEntry 7)	Applicable to AU only. Read-only. Counts the total number of frames (excluding retransmissions) that were transmitted by the AU to the relevant SU.	Counter 32
*AdbDroppedFrames (*AdbEntry 8)	Applicable to AU only. Read-only. Counts the total number of intended to the relevant SU that were dropped because they were retransmitted by the AU to the extent of the maximum allowed number of retransmissions without being acknowledged.	Counter 32
*SUMacAddressDatabase (*Mac AddressDatabase 2)	AU MAC Address Database	
*SUBridgingTable (*SUMacAddressDatabase 1)	Applicable to AU only. Not accessible. The AU MAC Address Database Table.	
*SUBridgingEntry (*SUBridgingTable 1)	Applicable to AU only. Not accessible. An entry in the AU MAC Address Database Table.	
*SUBridgingIndex (*SUBridgingEntry 1)	Applicable to AU only. Read-only. The Index of an entry in the AU MAC Address Database Table.	Integer
*SUBridgingMacAddress (*SUBridgingEntry 2)	Applicable to AU only. Read-only. The MAC Address of an SU entry in the AU MAC Address Database Table.	MAC Address
*SUBridgingLearnedFrom (*SUBridgingEntry 3)	Applicable to AU only. Read-only. The port from which the relevant address was learned.	Integer wireless (1) ethernet (2)

Supported Traps

> **NOTE:**
> An * is used instead of the ofdm prefix.

Trap Variables

MIB Parameter	Description	Values
*Traps (breezeAccessVLMib 14)		
*TrapSUMacAddr (*Traps 1)	Applicable to AU only. An SU MAC address.	MAC address
*TrapSNRQuality (*Traps 2)	Applicable to SU only. Average Signal to Noise Ratio of received frames.	
*TrapText (*Traps 3)	Applicable to SU and AU. Textual string for future use.	DisplayString
*TrapToggle (*Traps 4)	Applicable to SU and AU. An On/Off toggle status.	Integer on (1) off (2)
*TrapParameterChanged (*Traps 5)	Applicable to SU and AU. A modification to one of the parameters related to IP Filtering, or VLAN.	Integer ipFilter (2) vlan (3)
*TrapAccessRights (*Traps 6)	Applicable to SU and AU. The access rights used for login.	Integer notLoggedIn (1) readOnly (2) installer (3) administrator (4) factory (5)
*TrapLog (*Traps 7)	Applicable to SU and AU. Login or logout to the Monitor program Telnet.	Integer telnetLogin (1) telnetLogout (2)
*TrapTelnetUserIpAddress (*Traps 8)	Applicable to SU and AU. The IP address of a Telnet user.	IP address
*TrapRTx (*Traps 9)	Applicable to AU only. Retransmissions rate.	
*TrapFtpStatus (*Traps 10)	Applicable to AU and SU. The status of the last FTP loading process.	successful (1) failed (2)

Private BreezeACCESS VL Traps

Trap (Number)	Description	Variables
*SUassociatedAUTRAP (2)	An AU trap indicating a new association with an SU.	*TrapSUMacAddr
*AUdisassociatedTRAP (3)	An AU trap indicating that an SU has been disassociated from the AU. The AU decides that an SU has been disassociated from it and remove it from the ADB after receiving from another AU a SNAP frame with the SU MAC address. The SNAP frame indicating a network topology change where the SU has associated with another AU will be received if both AUs are connected to the same Ethernet backbone.	*TrapSUMacAddr
*AUagingTRAP (4)	An AU trap indicating that an SU aged out and was removed from the Associates SUs database following its failure to acknowledge a specified number of consecutive frames.	*TrapSUMacAddr
*SUassociatedTRAP (6)	An SU trap indicating association with an AU. In addition to the MAC address, information of the AU, the trap also includes information on the average SNR of frames received from the AU.	*AssociatedAU *TrapSNRQuality
*SUwirelessQualityTRAP (7)	An SU trap, indicating that the quality of the wireless link has changed and dropped below (On) or increased above (Off) a threshold defined by the *WirelessTrapThreshold.	*TrapToggle *UnitMacAddress *TrapSNRQuality
*AUwirelessQualityTRAP (20)	An AU trap, indicating that the quality of the wireless link has changed and dropped below (Off) or increased above (On) a threshold defined by the *WirelessTrapThreshold.	*TrapToggle *TrapRTx
*PowerUpFromReset (101)	An AU or SU trap indicating power up after reset.	*UnitMacAddr
*MonitorStatusTRAP (102)	An AU or SU trap indicating that a log-in or log-out has been performed via Telnet. Includes the login access right and the IP address of the PC performing Telnet.	*TrapLog *TrapAccessRights *TrapTelnetUserIpAddress
*ParameterChangedTRAP(103)	An AU or SU trap indicating a change in a IP Filter, or VLAN parameter.	*TrapParameterChanged
*FtpLoadingStatusTRAP(104)	An AU or SU trap indicating the results (successful or failed) of the last FTP loading process.	*TrapFtpStatus *UnitMacAddr

Appendix E
Parameters Summary
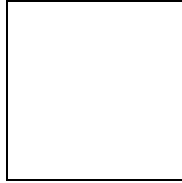
The following table provides an at-a-glance summary of the configurable parameters, value ranges, and default values. In addition, each parameter entry also includes an indication as to whether the parameter is run-time configurable or whether the unit must be reset before the modification takes effect.

Unit Control Parameters

Parameter	Unit	Range	Default	Run-Time Updated
Change Unit Name	AU, SU	Up to 32 printable ASCII characters	BreezeACCESS-OFDM	No
Change Read Only Password	AU, SU	Up to 8 printable ASCII characters	public	No
Change Installer Password	AU, SU	Up to 8 printable ASCII characters	user	No
Change Administrator Password	AU, SU	Up to 8 printable ASCII characters	private	No
SW Version FTP File Name	AU, SU	Up to 80 printable ASCII characters		
Configuration File Name	AU, SU	Up to 80 printable ASCII characters	config.cfg	
Operator Defaults File Name	AU, SU	Up to 80 printable ASCII characters	operator.cmr	
FTP Source Dir	AU, SU	Up to 80 printable ASCII characters. Use "." To clear.		
FTP Client IP Address	AU, SU	IP address		
FTP Host IP Address	AU, SU	IP address		
FTP User Name	AU, SU	Up to 20 printable ASCII characters		
FTP Password	AU, SU	Up to 20 printable ASCII characters		
Log Out Timer	AU, SU	1-999 minutes	5	No

Parameter	Unit	Range	Default	Run-Time Updated
Ethernet Port Negotiation Mode	AU, SU	Force 10 Mbps & Half-Duplex, Force 10 Mbps & Full-Duplex, Force 100 Mbps & Half-Duplex, Force 100 Mbps & Full-Duplex, Auto Negotiation	Auto Negotiation	

IP Parameters

Parameter	Unit	Range	Default	Run-Time Updated
IP Address	AU, SU	IP address	10.0.0.1	No
Subnet Mask	AU, SU	IP address	255.0.0.0	No
Default Gateway Address	AU, SU	IP address	0.0.0.0	No
DHCP Option	AU, SU	Disable, DHCP Only, Automatic	Disable	No
Access to DHCP	AU, SU	From Wireless Only, From Ethernet Only, From Both Wireless and Ethernet	AU: From Ethernet Only. SU: From Wireless Only	No

Air Interface Parameters

Parameter	Unit	Range	Default	Run-Time Updated
ESSID	AU, SU	Up to 31 printable ASCII characters	ESSID1	No
Operator ESSID Option	AU	Disable, Enable	Enable	No
Operator ESSID	AU	Up to 31 printable ASCII characters	ESSID1	No
Best AU Support	SU	Disable, Enable	Disable	No
Number of Scanning Attempts	SU	1 – 255	10	Yes
Preferred AU MAC Address	SU	MAC Address	00-00-00-00-00-00 (no preferred AU)	Yes
Acknowledge Time Out	AU, SU	256 to 8191		No
Maximum Number of Associations	AU	1 – 512	512	No

Parameter	Unit	Range	Default	Run-Time Updated
Frequency	AU	5.7 GHz: 5740 – 5835 MHz	5780 MHz	No
		5.4 GHz: 5485 – 5710 MHz	5600 MHz	
Sub Band Lower Frequency	SU	5.7 GHz: 5740 – 5835 MHz	5740 MHz	No
		5.4 GHz: 5485 – 5710 MHz	5485 MHz	
Sub Band Upper Frequency	SU	5.7 GHz: 5740 – 5835 MHz	5835 MHz	No
		5.4 GHz: 5485 – 5710 MHz	5710 MHz	
Scanning Step	SU	5, 10, 20 MHz	5 MHz	No
Frequency Subset Definition	SU	Depends on selected Sub Band Lower and Upper Frequency and Scanning Step	A (All)	No
Transmit Power	AU	2-28 (dB)	11 (dB)	Yes
Initial Transmit Power	SU	-11 to 29 (dB)	4 (dB)	Yes
ATPC Option	AU, SU	Disable, Enable	AU: Disable SU: Enable	Yes
Maximum SNR Level	AU	0-60 (dB)	30 (dB)	Yes
Minimum SNR Level	AU	0-60 (dB)	25 (dB)	Yes
Minimum Interval Between ATPC Messages	AU	0-3600 (seconds)	120 (seconds)	Yes
SNR Memory Factor	AU	-1 to 32	5	Yes
ATPC Power Level Steps	AU	1-100 (%)	1	Yes

Network Management Parameters

Parameter	Unit	Range	Default	Run-Time Updated
Network Management Filtering	AU, SU	Disable, Activate Management IP Filter On Ethernet Port, Activate Management IP Filter On Wireless Port, Activate Management IP Filter On Both Ethernet & Wireless Ports	Disable	No
Set Network Management IP Address	AU, SU	IP address	0.0.0.0 (all 3 entries)	Yes
Send SNMP Traps	AU, SU	Disable Traps Sending, Enable Traps Sending	Disable Traps Sending	Yes
SNPM Traps IP Destination	AU, SU	IP address	0.0.0.0 (all 3 entries)	Yes
SNMP Traps Community	AU, SU	Up to 14 printable ASCII characters	public (all 3 entries)	No

Bridge Parameters

Parameter	Unit	Range	Default	Run-Time Updated
VLAN ID-Data	SU	1 – 4094	1	No
VLAN ID – Management	AU, SU	1 – 4094, 65535	65535 (no VLAN)	No
VLAN Link Type	AU, SU	Hybrid Link, Trunk Link, Access Link (only in SU)	Hybrid Link	No
VLAN Forwarding Support	AU, SU	Disable, Enable	Disable	No
VLAN Forwarding ID	AU, SU	1 – 4094 (up to 20 entries)	Empty list	No
VLAN Relaying Support	AU	Disable, Enable	Disable	No
VLAN Relaying ID	AU	1 – 4094 (up to 20 entries)	Empty list	No
VLAN Priority – Data	SU	0 – 7	0	No
VLAN Priority – Management	AU, SU	0 – 7	0	No
VLAN Priority Threshold	AU, SU	0 – 7	3	No

Parameter	Unit	Range	Default	Run-Time Updated
ToS Precedence Threshold	AU, SU	0 – 7	3	No
Ethernet Broadcast Filtering Options	SU	Disable, From Ethernet Only, From Wireless Only, Both From Wireless and Ethernet	Disable	No
DHCP Broadcast Override Filter	SU	Disable, Enable	Disable	No
PPPoE Broadcast Override Filter	SU	Disable, Enable	Disable	No
ARP Broadcast Override Filter	SU	Disable, Enable	Enable	No
Bridge Aging Time	AU, SU	100 – 2000 seconds	300	No
Broadcast Relaying	AU	Disable, Enable	Enable	No
Unicast Relaying	AU	Disable, Enable	Enable	No

Performance Parameters

Parameter	Unit	Range	Default	Run-Time Updated
RTS Threshold	AU, SU	20 – 1600 (bytes)	AU: 1600 SU: 60	Yes
Minimum Contention Window	AU, SU	7, 15, 31, 63, 127, 255, 511, 1023	15	Yes
Maximum Contention Window	AU, SU	7, 15, 31, 63, 127, 255, 511, 1023	1023	Yes
Maximum Data Rate	AU, SU	For SU-A-54-VL: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps. For SU-A-24-VL: 6, 9, 12, 18 and 24 Mbps.	SU-A-54-VL: 54 Mbps SU-A-24 VL: 24 Mbps	
Short Frame Multicast Rate	AU	For SU-A-54-VL: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps. For SU-A-24-VL: 6, 9, 12, 18 and 24 Mbps.	6	
Long Frame Multicast Rate	AU	For SU-A-54-VL: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps. For SU-A-24-VL: 6, 9, 12, 18 and 24 Mbps.	6	
Number of HW Retries	AU, SU	0 - 10	4	
Multi-Rate Support	AU, SU	Disable, Enable	Enable	

Parameter	Unit	Range	Default	Run-Time Updated
Software Retry Support	AU, SU	Disable, Enable	Enable	
Number of SW retries	AU, SU	1 - 100	3	

Service Parameters

Parameter	Unit	Range	Default	Run-Time Updated
User Filtering Option	SU	Disable, IP Only, User Defined Addresses Only, PPPoE Protocol Only	Disable	No
Set User Filter Address	SU	IP address (8 entries)	0.0.0.0 (all 8 entries)	Yes
Set User Filter Mask	SU	IP address (8 entries)	255.255.255.255 (all 8 entries)	Yes
Set User Filter Range	SU	0 - 255	0 (all 8 entries)	Yes

Security Parameters

Parameter	Unit	Range	Default	Run-Time Updated
Authentication Algorithm	AU, SU	Open System, Shared Key	Open System	No
Default Key ID	SU	1 – 4	1	No
WEP Key # 1-4	AU, SU	10 Hexadecimal Digits	0000000000 (no key)	No

Appendix F
Menu and
Parameter Index