



BreezeACCESS® VL

System Manual

**SW Version 4.0.27
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Document History

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

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

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

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

Topic	Description	Version/Date Issued
AP Client IP Address Sections 4.2.6.3.8, Table 4-3, MIB (Appendix E), Parameters Summary (Appendix F)	New feature	SW Version 4.0.27 February 2007
Noise Immunity Control Sections 4.2.6.2.18, Table 4-3, Parameters Summary (Appendix F)	New feature	SW Version 4.0.27 February 2007

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

The Base Station equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules and to EN 301 489-1 rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in commercial, business

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FCC Radiation Hazard Warning

To comply with FCC RF exposure requirement, the antenna used for this transmitter must be fixed-mounted on outdoor permanent structures with a separation distance of at least 2 meter from all persons for antennas with a gain up to 28 dBi and 2.6 meter for a 31.2 dBi dish antenna, 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

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

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About This Manual

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

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

This manual contains the following chapters and appendices:

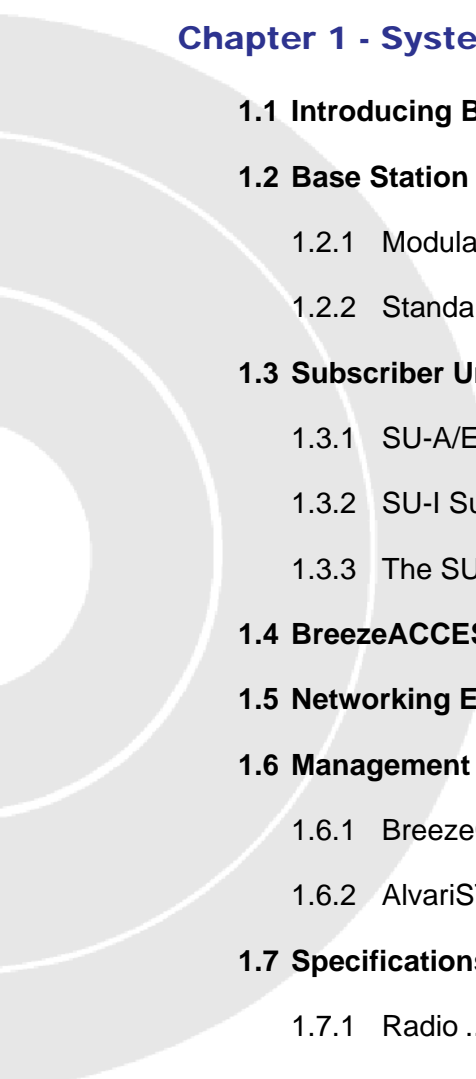
- **Chapter 1** – System description: Describes the BreezeAccess VL system and its components.
- **Chapter 2** – Installation: Describes how to install the system components.
- **Chapter 3** – Commissioning: Describes how to configure basic parameters, align the Subscriber Unit antenna and validate unit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

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

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



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Chapter 1 - System Description

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1.1 Introducing BreezeACCESS VL

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

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

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

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

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

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

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

A BreezeACCESS VL system comprises the following:

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

1.2 Base Station Equipment

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

There are 2 lines of Access Units with different architectures:

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

1.2.1 Modular Base Station Equipment

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



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

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

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

**NOTE**

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

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

E model units are supplied without an antenna.

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

**Table 1-2: AU Detached Antennas**

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

The BS-AU indoor module connects to the network through a standard IEEE 802.3 Ethernet 10/100BaseT (RJ 45) interface. The indoor module is connected to the outdoor unit via a Category 5E Ethernet cable. This cable carries Ethernet traffic between the indoor module and the outdoor unit, and also transfers power (54 VDC) and control from the indoor module to the outdoor unit.

1.2.2 Standalone “Micro-cell” Access Unit

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



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

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



NOTE

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

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



NOTE

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

1.3 Subscriber Unit

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

There are two types of Subscriber Units:

- The SU-A/E series, where each unit comprises an Indoor Unit and an Outdoor Unit (with or without an integrated antenna). These products are intended for installation by a professional installer, enabling long-range connectivity.
- The SU-I series of all-indoor Subscriber Unit, intended for installation by non-professional end users in locations that are close to the Base Station.

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

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

1.3.1 SU-A/E Subscriber Units

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

Table 1-3: Subscriber Unit ODU Types	
SU Type	Antenna Description
SU-A-ODU	Vertically polarized high-gain flat antenna integrated on the front panel
New SU-A-ODU	Vertically/horizontally polarized high-gain flat antenna integrated on the front panel. The smaller size new SU-A-ODU is available in the 5.4 GHz and 5.8 GHz bands.
SU-E-ODU	A connection to an external antenna (not included)

**SU-A-ODU and IDU****New SU-A-ODU**

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

Table 1-4: SU-A/E Subscriber Unit Types	
SU Type	Description
SU-54-BD	A high-rate CPE that supports a full LAN
SU-6-1D	A medium rate CPE that supports a single Ethernet device (one MAC address)
SU-6-BD	A medium rate CPE that supports a full LAN
SU-3-1D	An entry level CPE that supports a single Ethernet device (one MAC address)

**NOTE**

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

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

1.3.2 SU-I Subscriber Units

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



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

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



NOTE

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

1.3.3 The SU-E-BS

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

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

1.4 BreezeACCESS VL B&B (4.9 GHz only)

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

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

1.5 Networking Equipment

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

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

1.6 Management Systems

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

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

1.6.1 BreezeCONFIG™

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

1.6.2 AlvariSTAR™

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

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

AlvariSTAR provides the following BWA network management functionality:

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

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

1.7 Specifications

1.7.1 Radio

Table 1-6: Radio Specifications	
Item	Description
Frequency ¹	<ul style="list-style-type: none"> ■ 4.9 GHz Family: 4.900 – 5.100 GHz ■ 5.2 GHz Family: 5.150 – 5.350 GHz ■ 5.3 GHz Family: 5.250 – 5.350 GHz ■ 5.4 GHz Family: 5.470 – 5.725 GHz ■ 5.8 GHz Family: 5.725 – 5.850 GHz
Operation Mode	Time Division Duplex (TDD)
Channel Bandwidth ¹	<ul style="list-style-type: none"> ■ 20 MHz ■ 10 MHz (HW Revision C and higher)
Central Frequency Resolution	<ul style="list-style-type: none"> ■ 10 MHz for HW Revision A and B ■ 5 MHz for HW Revision C and higher
Antenna Port	<ul style="list-style-type: none"> ■ AU-D-BS/SA-ODU, SU-E-ODU: N-Type jack, 50 ohm ■ SU-I: SMA jack, 50 ohm
Max. Input Power (at antenna port)	<ul style="list-style-type: none"> ■ HW Revision A: -48 dBm typical ■ HW Revision B and higher: -30 dBm typical
Maximum Output Power ²	21 dBm
SU-A-ODU Integral Antenna	21 dBi typical in the 5.150-5.875 GHz band, 20 dBi in the 4.9-5.1 GHz band. 10.5° horizontal x 10.5° vertical, vertical polarization, compliant with EN 302 085 V1.1.1 Range 1, Class TS 1, 2, 3, 4, 5
New SU-A-ODU Integral Antenna (5.4/5.8 GHz)	20 +/- 1 dBi typical in the 5.250-5.875 GHz band, 14° horizontal x 14° vertical, vertical/horizontal polarization, compliant with EN 302 085 V1.2.2 (2003-08) Range 1, RoHS
SU-I-D Detached Antenna	15 dBi typical net (excluding cable loss) in the 5.150-5.875 GHz band, 45°~55° horizontal x 10°~12° vertical, vertical polarization, RoHS compliant

Table 1-6: Radio Specifications

Item	Description			
AU-D Detached Antennas	<ul style="list-style-type: none"> ■ AU-Ant-5G-16-60: 16 dBi typical, 5.150-5.875 GHz, 60° horizontal x 10° vertical sector antenna, vertical polarization, compliant with EN 302 085 V1.1.2 CS3 ■ AU-Ant-5G-17-90: 17 dBi typical, 5.150-5.875 GHz, 90° horizontal x 6° vertical sector antenna, vertical polarization, compliant with EN 302 085 V1.1.2 CS3 ■ AU-Ant-5G-15-120: 15 dBi typical, 5.150-5.875 GHz, 120° horizontal x 6° vertical sector antenna, vertical polarization, compliant with EN 302 085 V1.1.2 CS3. ■ AU-Ant-4.9G-15-120: 15 dBi typical, 4.900-5.100 GHz, 124° horizontal x 6.5° vertical sector antenna, vertical polarization, compliant with EN 302 085 V1.1.2 CS3. ■ AU-Ant-4.9G-9-Omni: 9 dB typical i, 4.900-5.100 GHz, 360° horizontal x 8° vertical, vertical polarization. ■ AU-Ant-5.4G-8-Omni: 8 dBi typical, 5.150-5.725 GHz, 360° horizontal x 4.5° vertical, vertical polarization. ■ AU-Ant-5.8G-8-Omni: 8 dBi typical, 5.725-5.875 GHz, 360° horizontal x 9° vertical, vertical polarization. ■ AU-Ant-5.8G-14-120-UK: 14dBi typical, 5.725-5.850 GHz, 120° horizontal x 6.5° vertical sector antenna, vertical polarization. The antenna pattern complies with Ofcom's IR 2007 EIRP profiles. 			
Sensitivity, Minimum (dBm at antenna port, PER<10%, 20 MHz bandwidth ³)	Modulation Level ⁴	Sensitivity (HW Rev. A)	Sensitivity (HW Rev. B and higher)	Minimum SNR
	1	-87 dBm	-89 dBm	6 dB
	2	-86 dBm	-88 dBm	7 dB
	3	-85 dBm	-86 dBm	9 dB
	4	-83 dBm	-84 dBm	11 dB
	5	-80 dBm	-81 dBm	14 dB
	6	-76 dBm	-77 dBm	18 dB
	7	-71 dBm	-73 dBm	22 dB
	8 ⁵	-69 dBm	-71 dBm	23 dB
Modulation	OFDM modulation, 64 FFT points; BPSK, QPSK, QAM16, QAM64			

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

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

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

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

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

1.7.2 Data Communication

Table 1-7: Data Communication	
Item	Description
Standard compliance	IEEE 802.3 CSMA/CD
VLAN Support	Based on IEEE 802.1Q
Layer-2 Traffic Prioritization	Based on IEEE 802.1p
Layer-3 Traffic Prioritization	<ul style="list-style-type: none">■ IP Precedence ToS (RFC791)■ DSCP (RFC2474)
Layer 4 Traffic Prioritization	UDP/TCP destination ports

1.7.3 Configuration and Management

Table 1-8: Configuration and Management	
Item	Description
Management	<ul style="list-style-type: none"> ■ Monitor program via Telnet ■ SNMP ■ Configuration upload/download
Management Access	From Wired LAN, Wireless Link
Management access protection	<ul style="list-style-type: none"> ■ Multilevel password ■ Configuration of remote access direction (from Ethernet only, from wireless link only or from both) ■ Configuration of IP addresses of authorized stations
Security	<ul style="list-style-type: none"> ■ Authentication messages encryption option ■ Data encryption option ■ WEP and AES OCB 128-bit encryption algorithms ■ FIPS 197 certified encryption (optional for Access Units with HW revision C or higher (excluding AUS units), under license) ■ ESSID
SNMP Agents	SNMP ver 1 client MIB II, Bridge MIB, Private BreezeACCESS VL MIB
Allocation of IP parameters	Configurable or automatic (DHCP client)
Software upgrade	<ul style="list-style-type: none"> ■ FTP ■ TFTP
Configuration upload/download	<ul style="list-style-type: none"> ■ FTP ■ TFTP

1.7.4 Standards Compliance, General

Table 1-9: Standards Compliance, General		
Type	Standard	
EMC	<ul style="list-style-type: none"> ■ FCC Part 15 class B ■ ETSI EN 300 489-1 	
Safety	<ul style="list-style-type: none"> ■ UL 1950 ■ EN 60950 	
Environmental	Operation	<ul style="list-style-type: none"> ■ ETS 300 019 part 2-3 class 3.2E for indoor ■ ETS 300 019 part 2-4 class 4.1E for outdoor
	Storage	ETS 300 019-2-1 class 1.2E
	Transportation	ETS 300 019-2-2 class 2.3
Lightning protection (AU-ODU Antenna connection)	EN 61000-4-5, Class 3 (2kV)	
Radio	<ul style="list-style-type: none"> ■ FCC Part 15.247 ■ ETSI EN 300 328 ■ ETSI EN 301 893 (2003-04) 	

1.7.5 Physical and Electrical

1.7.5.1 SU-A/E Subscriber Unit



NOTE

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

1.7.5.1.1 Mechanical

Table 1-10: Mechanical Specifications, SU-A/E Subscriber Unit			
Unit	Structure	Dimensions (cm)	Weight (kg)
General	An IDU indoor unit and an ODU outdoor unit with an integral antenna or a connection to an external antenna		
IDU PS1073	Plastic box (black), desktop or wall mountable	14 x 6.6 x 3.5	0.3
SU-A-ODU	Metal box plus an integral cut diamond shaped antenna in a plastic enclosure, pole or wall mountable	41.5 x 36.9 x 6.3	2.3
New SU-A-ODU (5.4/5.8 GHz)	Metal box plus an integral diamond shaped antenna in a plastic enclosure, pole or wall mountable	22 x 22 x 7	1.3
SU-E-ODU	Metal box, pole or wall mountable	30.5 x 11.7 x 5.7	1.8

1.7.5.1.2 Connectors

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

1.7.5.1.3 Electrical

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

1.7.5.2 SU-I Subscriber Unit

1.7.5.2.1 Mechanical and Electrical

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

1.7.5.2.2 Connectors

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

1.7.5.3 Modular Base Station Equipment

1.7.5.3.1 Mechanical

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

1.7.5.3.2 Connectors

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

1.7.5.3.3 Electrical

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

1.7.5.4 Standalone Access Unit

1.7.5.4.1 Mechanical

Table 1-18: Mechanical Specifications, Stand Alone Access Unit

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

1.7.5.4.2 Connectors

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

1.7.5.4.3 Electrical

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

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

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

1.7.5.6 SU-I-D Wall/Window Detached Antenna

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

1.7.6 Environmental

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

Chapter 2 - Installation

In This Chapter:

- [Installation Requirements](#), page 30
- [Equipment Positioning Guidelines](#), page 34
- [Installing the Outdoor Unit](#), page 36
- [Installing the Universal IDU Indoor Unit](#), page 46
- [Installing the SU-I](#), page 48

2.1 Installation Requirements

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



NOTE

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

2.1.1 Packing List

2.1.1.1 SU-A/E Subscriber Unit

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

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

Table 2-1: Subscriber Unit ODU Types	
SU Type	Antenna Description
SU-A-ODU	Vertically polarized high-gain flat antenna integrated on the front panel
New SU-A-ODU	Vertically/horizontally polarized high-gain flat antenna integrated on the front panel. The smaller size new SU-A-ODU is available in the 5.4 GHz and 5.8 GHz bands.
SU-E-ODU	A connection to an external antenna (not included)



NOTE

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

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

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

2.1.1.2 Modular Base Station Equipment

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

2.1.1.2.1 BS-SH Base Station Chassis

The BS-SH installation kit includes the following components:

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

2.1.1.2.2 AU-D/E-BS Access Unit

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

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

2.1.1.2.3 BS-PS-AC Power Supply

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

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

2.1.1.2.4 BS-PS-DC Power Supply

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

- BS-PS-DC power supply module

- DC power cable

2.1.1.3 AU-D/E-SA Standalone Access Unit

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

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

2.1.1.4 Optional Items Available from Alvarion

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

2.1.1.5 Additional Installation Requirements

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

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

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

2.1.2 Indoor-to-Outdoor Cables



NOTE

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

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

Table 2-2: Approved Category 5E Ethernet Cables	
Manufacturer	Part Number
Superior Cables Ltd. www.superior-cables.com	612098
HES Cabling Systems www.hescs.com	H5E-00481
Teldor www.teldor.com	8393204101
Southbay Holdings Limited 11th Fl., 15, Lane 347, Jong Jeng Rd. Shin Juang City, Taipei County Taiwan, R.O.C Attn: Eva Lin Tel. 886-2-2832 3339 Fax. 886-2-2206 0081 E-mail: eva@south-bay.com.tw	TSM2404A0D



NOTE

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

2.2 Equipment Positioning Guidelines

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



CAUTION

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

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

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

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



NOTE

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

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

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

2.3 Installing the Outdoor Unit

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



NOTE

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

2.3.1 Pole Mounting the Outdoor Unit



NOTE

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

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

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



NOTE

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

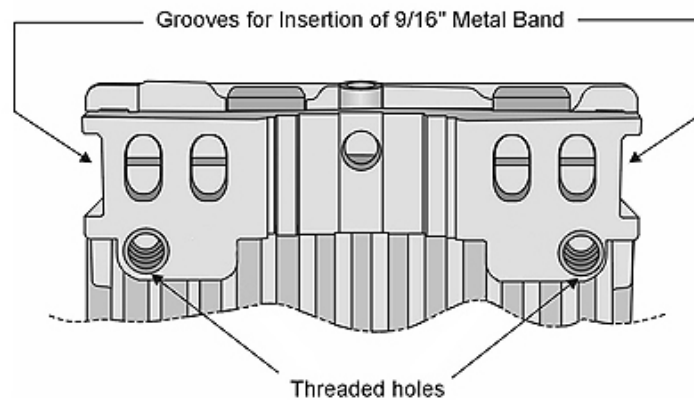


Figure 2-1: Threaded Holes/Grooves

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

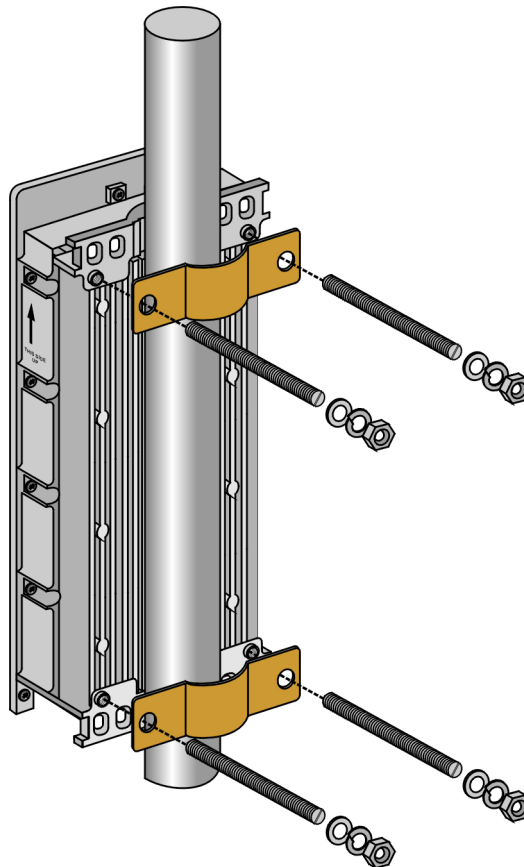


Figure 2-2: 3" Pole Installation Using Special Clamps

NOTE



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

2.3.2 Pole Mounting the New SU-A-ODU

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

- A pole mounting kit is supplied with each unit. The kit includes a special clamp and a pair of threaded rods, flat washers, spring washers and nuts. There are two pairs of threaded holes on the back of the unit, enabling to use the mounting kit for installing the unit using either vertical or horizontal polarization. The clamp enables installing the unit on diverse pole diameters from 1" to 4".
- A Tilt Pole Mounting kit, providing a tilt range of $\pm 15^\circ$ is available from Alvarion. The Tilt kit can be attached to the ODU and be mounted on a 1" to 4" pole using two 9/16" wide metal bands.

2.3.2.1 Polarization

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

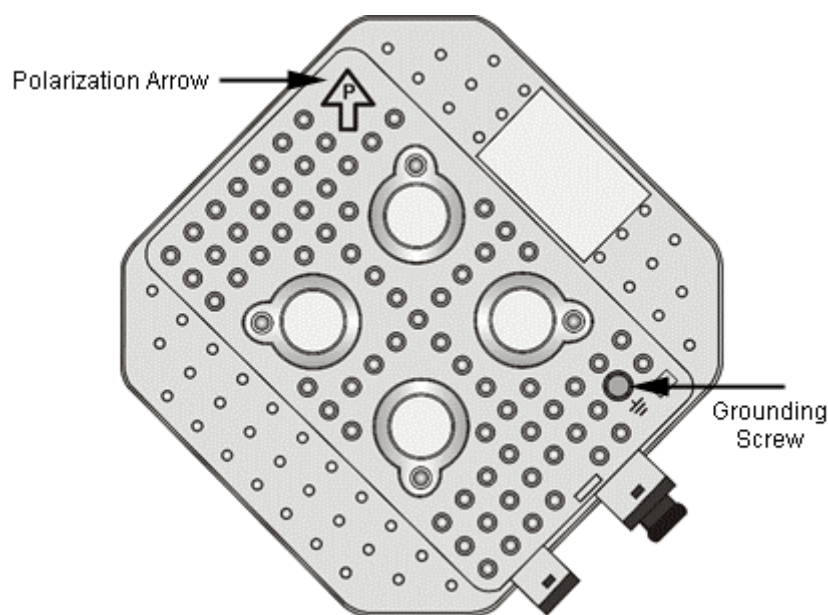


Figure 2-3: Back View of the new SU-A-ODU

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

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

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

2.3.2.2 Pole Mounting the ODU Using the Clamp

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

NOTE



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

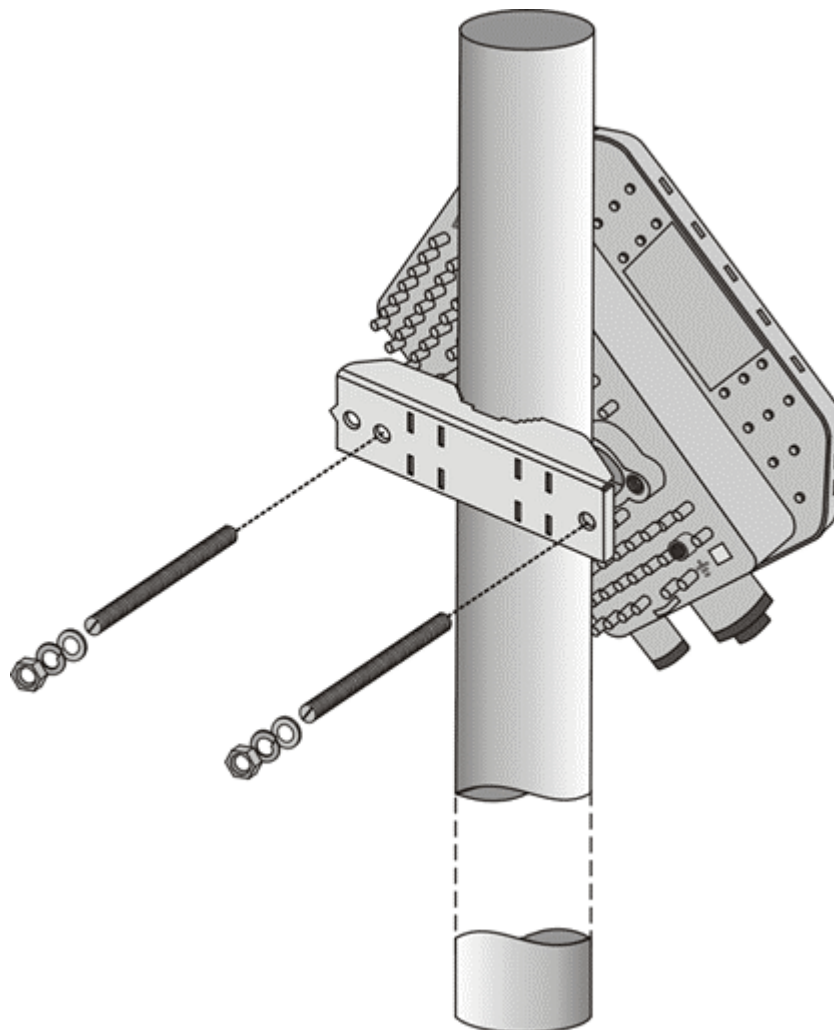


Figure 2-4: New SU-A-ODU Pole Installation Using the Special Clamp, Vertical Polarization

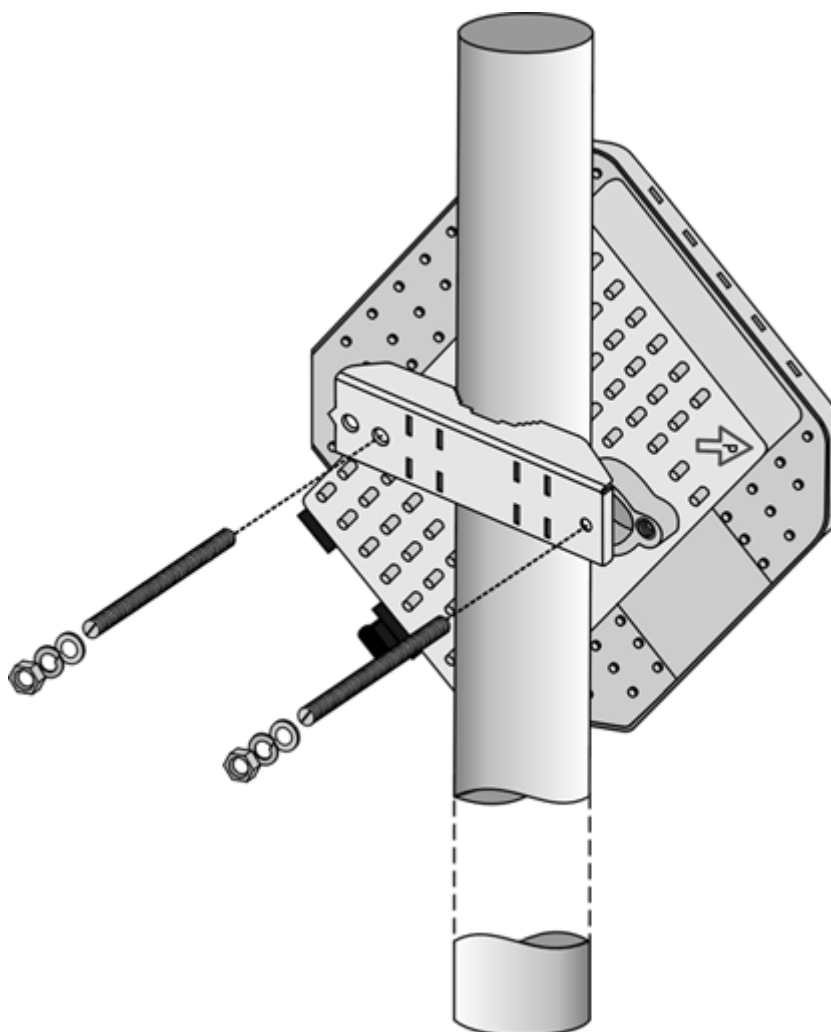


Figure 2-5: New SU-A-ODU Pole Installation Using the Special Clamp, Horizontal Polarization

2.3.2.3 Pole Mounting the ODU with the Tilt Accessory

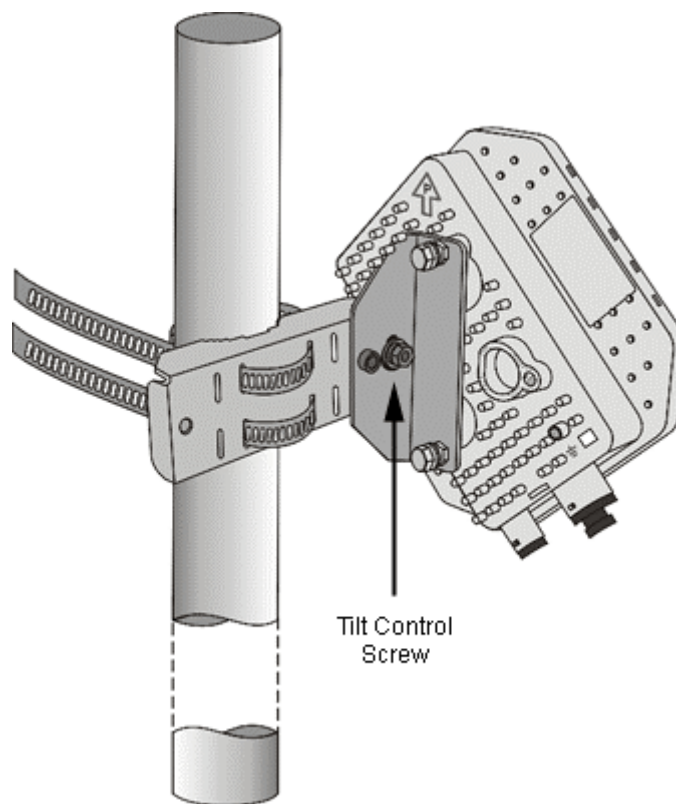


Figure 2-6: New SU-A-ODU Pole Installation Using the Tilt Accessory, Vertical Polarization



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

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

2.3.3 Connecting the Grounding and Antenna Cables

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



To connect the grounding cable:

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



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

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

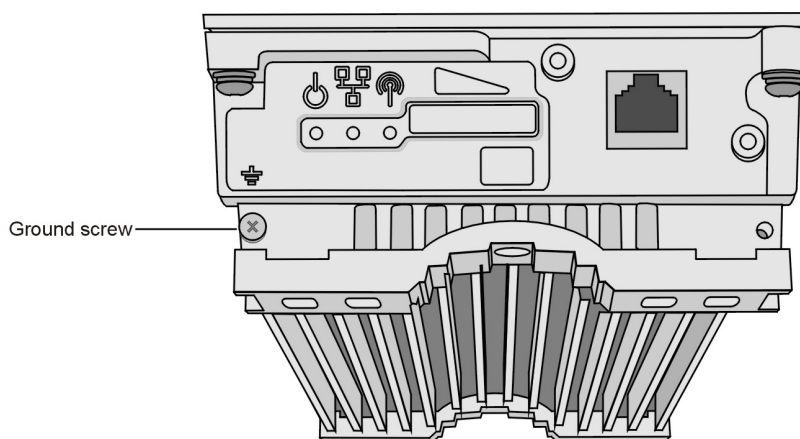


Figure 2-7: Bottom Panel of the ODU
(all ODUs except to new SU-A-ODU, shown without the sealing assembly)

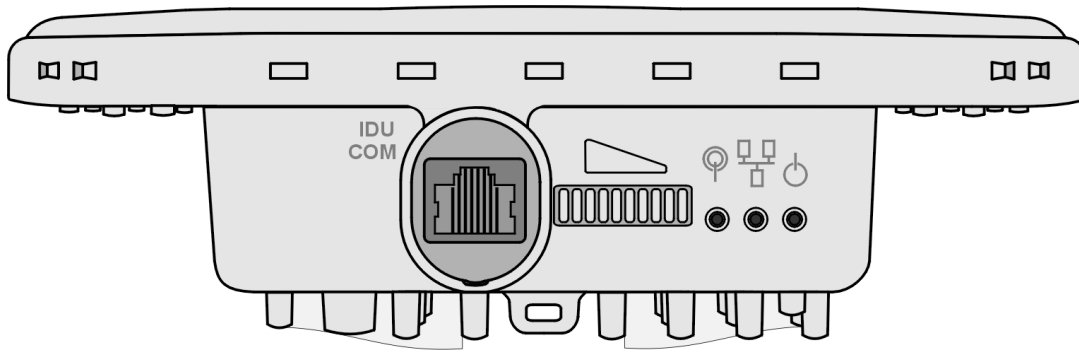


Figure 2-8: Bottom Panel of the New SU-A-ODU (without IDU COM Sealing Cap)



NOTE

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

2.3.4 Connecting the Indoor-to-Outdoor Cable

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



To connect the indoor-to-outdoor cable:

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

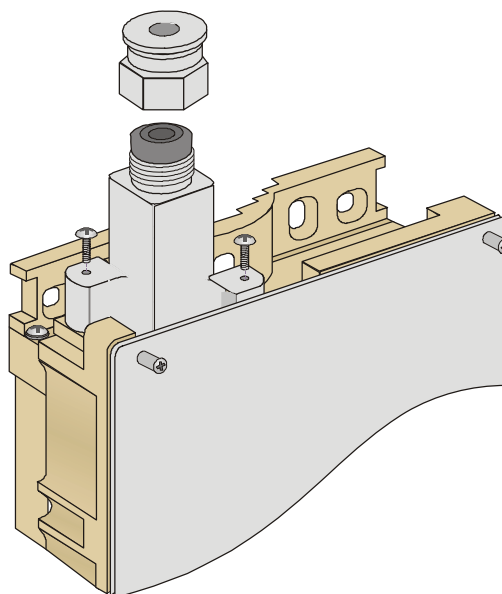


Figure 2-9: The Waterproof Seal

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

**NOTE**

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

- 4 Insert and crimp the RJ-45 connector. Refer to Appendix D for instructions on preparing the cable.
- 5 Connect the Ethernet cable to the outdoor unit RJ-45 connector.
- 6 Replace the waterproof seal and then the top nut. Make sure that the external jack of the cable is well inside the waterproof seal to guarantee a good seal.
- 7 Route the cable to the location selected for the indoor equipment.
- 8 Assemble an RJ-45 connector with a protective cover on the indoor end of the indoor-to-outdoor cable.

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

**To connect the indoor-to-outdoor cable:**

- 1 Verify that the o-ring supplied with the cable kit is in place.
- 2 Connect the RJ-45 connector of the Ethernet cable to the outdoor unit.
- 3 Attach the waterproof seal to the unit. Tighten the top nut.
- 4 Route the cable to the location selected for the indoor equipment.
- 5 Assemble an RJ-45 connector with a protective cover on the indoor end of the indoor-to-outdoor cable.
See Appendix D for instructions on preparing the cable.

2.3.4.3 New SU-A-ODU

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

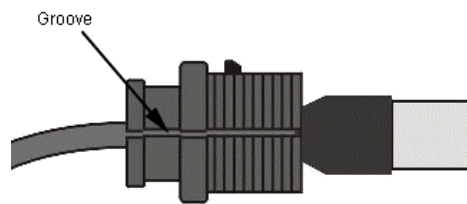


Figure 2-10: Inserting the IDU COM Cable into the Sealing Cap

- 2 Connect the Ethernet cable to the IDU COM RJ-45 connector.
- 3 Put the sealing cap back in its place. Make sure that the small protrusion on the side of the cap fits inside the hole on the connector's protective body.

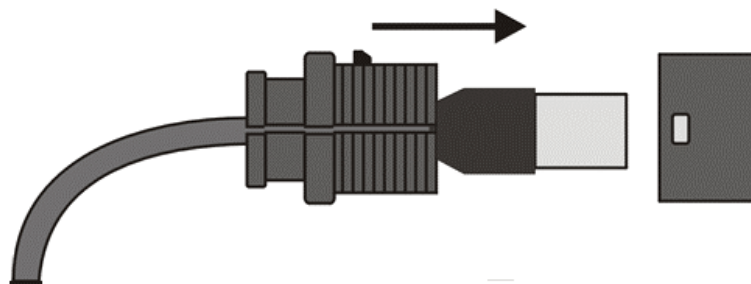


Figure 2-11: Connecting the IDU COM connector and inserting the Sealing Cap

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



NOTE

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

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

2.4 Installing the Universal IDU Indoor Unit

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

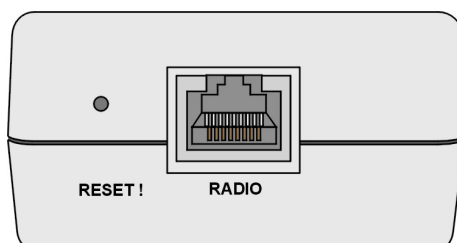


Figure 2-12: IDU PS 1073 Front Panel

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



CAUTION

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



To install the IDU:

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



NOTE

The color codes of the power cable are as follows:

Brown	Phase	~
Blue	Neutral	0
Yellow/Green	Ground	⏏

- 3 Verify that the POWER LED is lit, indicating that power is supplied to the unit.
- 4 Configure the basic parameters as described in section [3.1](#).
- 5 Connect the 10/100 BaseT ETHERNET connector to the network. The cable connection should be a straight Ethernet if connecting the indoor unit to a hub/switch and a crossed cable if connecting it directly to a PC Network Interface Card (NIC).

**NOTE**

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

2.4.1 RESET Button Functionality

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

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

**NOTE**

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

2.5 Installing the SU-I

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

2.5.1 Installation Requirements

2.5.1.1 Packing List

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

2.5.1.2 Additional/Optional Items

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

NOTE

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



2.5.2 SU-I Connectors and LEDs

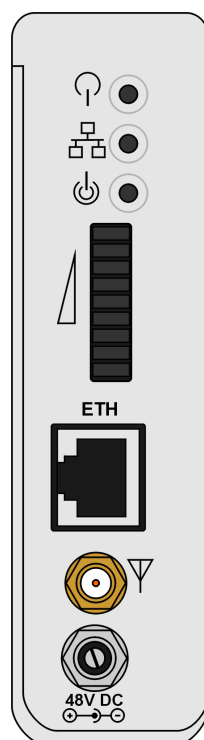






Figure 2-13: SU-I Panel

Table 2-3: SU-I Panel Components

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

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

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

2.5.3 Installation Guidelines

The unit can be placed on a desktop or a shelf. It can also be wall mounted using the optional bracket available from Alvarion. It uses a detached antenna.

Instructions for the available installation options of the detached antenna (included in the SU-I-D package) are provided in the antenna package and in Section [2.5.5](#).

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

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

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

2.5.4 Installing the SU-I

2.5.4.1 Connecting the SU-I



To install the SU-I:

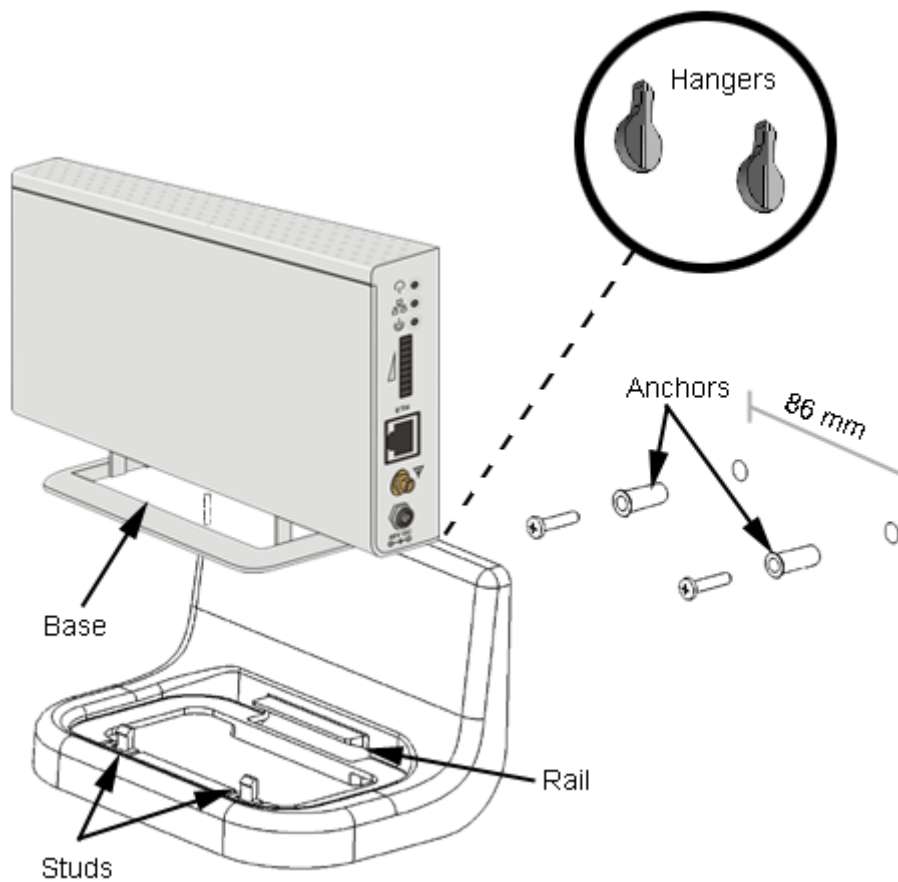
- 1 Connect the Power Adapter DC cable to the POWER jack. Connect the Power Adapter to the AC mains.

- 2 Verify that the green Status LED located on the unit's front panel illuminates, indicating that the power supply to the unit is OK and self test passed successfully.
- 3 Connect the RF cable supplied with the antenna to the SMA jack located on the unit's front panel. Install the antenna using the instructions provided in Section [2.5.5](#) on page 52, and connect to it the other end of the RF cable. Do not over-tighten the SMA connectors.
- 4 If parameters are not pre-configured, configure the basic parameters as described in Section 3.1.
- 5 Align the antenna as described in Section 3.3.
- 6 Connect the 10/100 Base-T Ethernet connector to the data equipment. The cable connection should be a crossed Ethernet if connecting to a hub/switch and a straight cable if connecting directly to a PC Network Interface Card (NIC).
- 7 Verify proper operation of the Ethernet link (see Table 2-3 for the Ethernet activity LED indication). To verify data connectivity from the end-user's PC or from a portable PC connected to the unit, ping a known device in the network, or try connecting to the Internet.

2.5.4.2 Wall Mounting the SU-I

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

- 1 If anchors are needed (wall-board, plaster board, etc.), drill two holes for the anchors using a 6 mm drill bit and insert anchors. The distance between the two holes should be 86 mm. Use the drilling template supplied with the SU-I.
- 2 Fasten the two screws provided with the kit directly to the anchors.
- 3 Use the two hangers on the rear to hang the mounting bracket on the two screws. Make sure the bracket is stable.
- 4 Insert one side of the SU-I's base diagonally under the designated rail.
- 5 Gently apply pressure on the opposite side of the SU-I, until a clicking sound is heard and the two bracket studs are locked onto the SU-I's base.
- 6 To dismount the SU-I, gently push the two bracket studs in the direction of the wall and lift the CPE diagonally. Pull the CPE until free from the rail.

**Figure 2-14: SU-I Wall Mount**

2.5.5 Installing the Detached Antenna

The detached antenna kit includes the following components:

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

- Simple window mounting accessories, enabling installation on a glass window (without any capability for adjusting the direction). For installation instructions see Section [2.5.5.3](#).
- Window mounting kit with rotation capability, enabling installation on a glass window (with rotation capability for adjusting the direction). For installation instructions see Section [2.5.5.4](#).

**NOTE**

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

2.5.5.1 Wall Mount

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

- 1 If anchors are needed (wall-board, plaster board, etc.), drill two holes for the anchors using a 5 mm drill bit and insert anchors. Use a 9/64" drill bit for screwing directly into a solid surface (stud).
- 2 Fasten the antenna to the wall. Refer to Figure 2-15 for directions. Use the two #8 screws provided with the kit. Do not over tighten.
- 3 Connect the antenna cable to the connector located on the bottom side of the antenna. Hand tighten, do not use a wrench or a similar tightening tool. Do not over tighten.

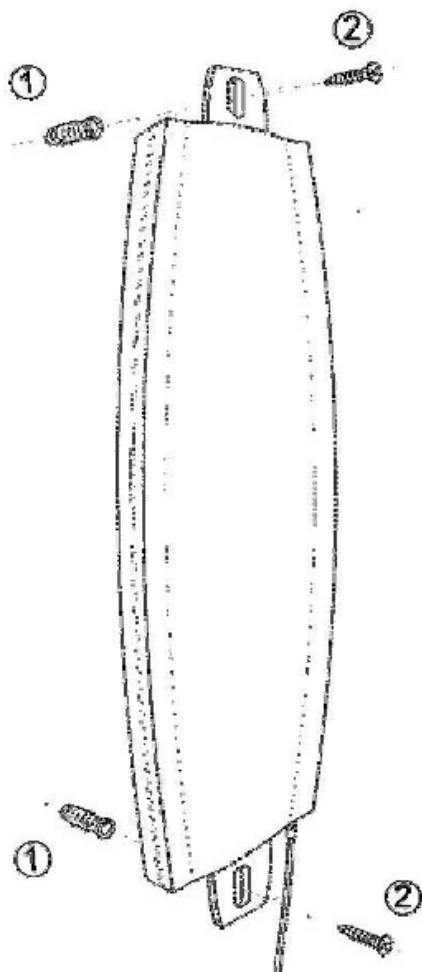


Figure 2-15: Wall Mounting the Antenna

2.5.5.2 Wall Mount with Rotation Capability

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

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

- 4 Attach the assembled plates to the flat rear-side of the antenna. Use the two remaining M5 screws to fasten them.
- 5 Fasten the antenna to the wall. Use the two #8 screws provided with the kit. Do not over tighten.
- 6 Connect the antenna cable to the connector located on the bottom side of the antenna. Use only the torque key supplied with the antenna. Do not over tighten. Do not use a wrench or a similar tightening tool.
- 7 Rotate the antenna left or right so the domed surface of the antenna is facing the direction of the Base Station. Check the received Signal LEDs to ensure the antenna is aimed correctly.

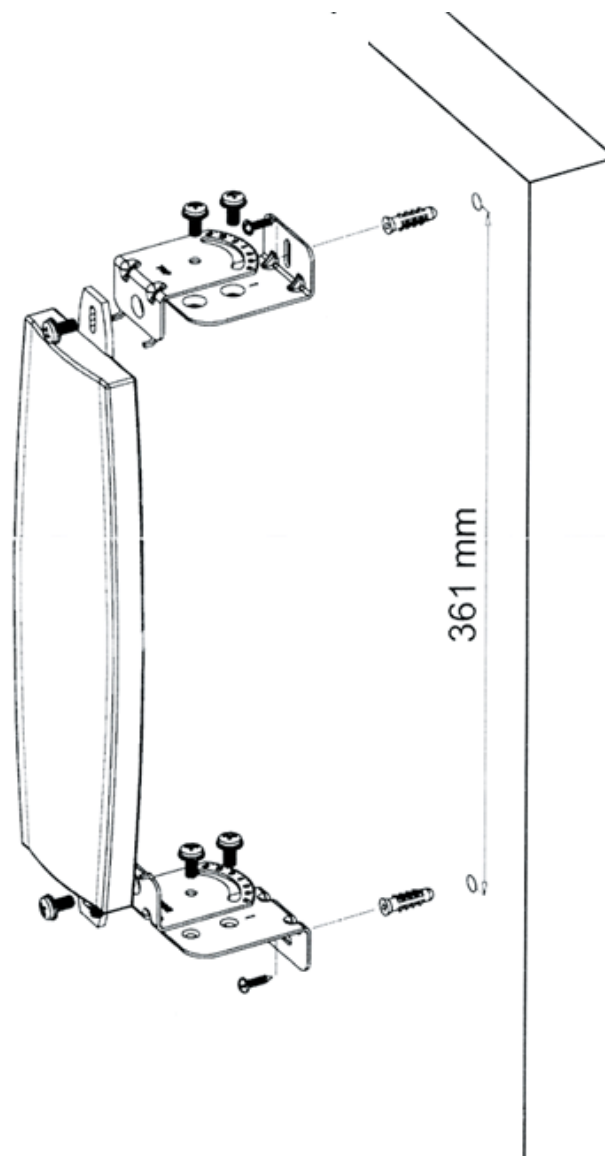


Figure 2-16: Wall Mount with Rotation Capability

2.5.5.3 Window Mount

The installation kit includes 2 suction cups.

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

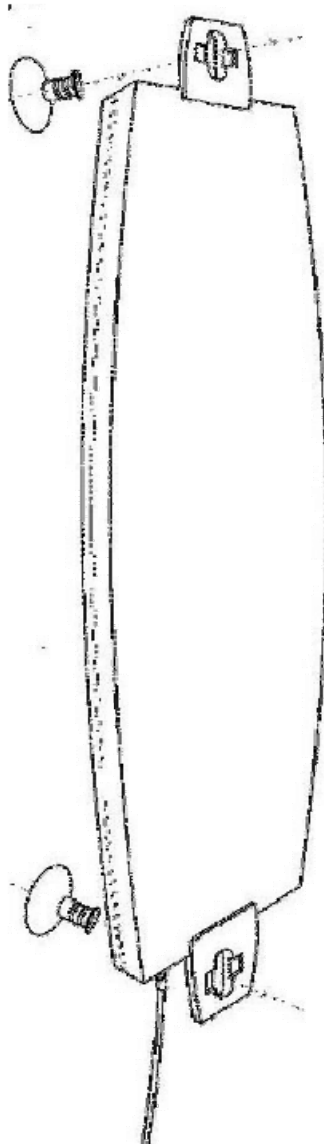


Figure 2-17: Window Mounting the Antenna

2.5.5.4 Window Mount with Rotation Capability

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

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

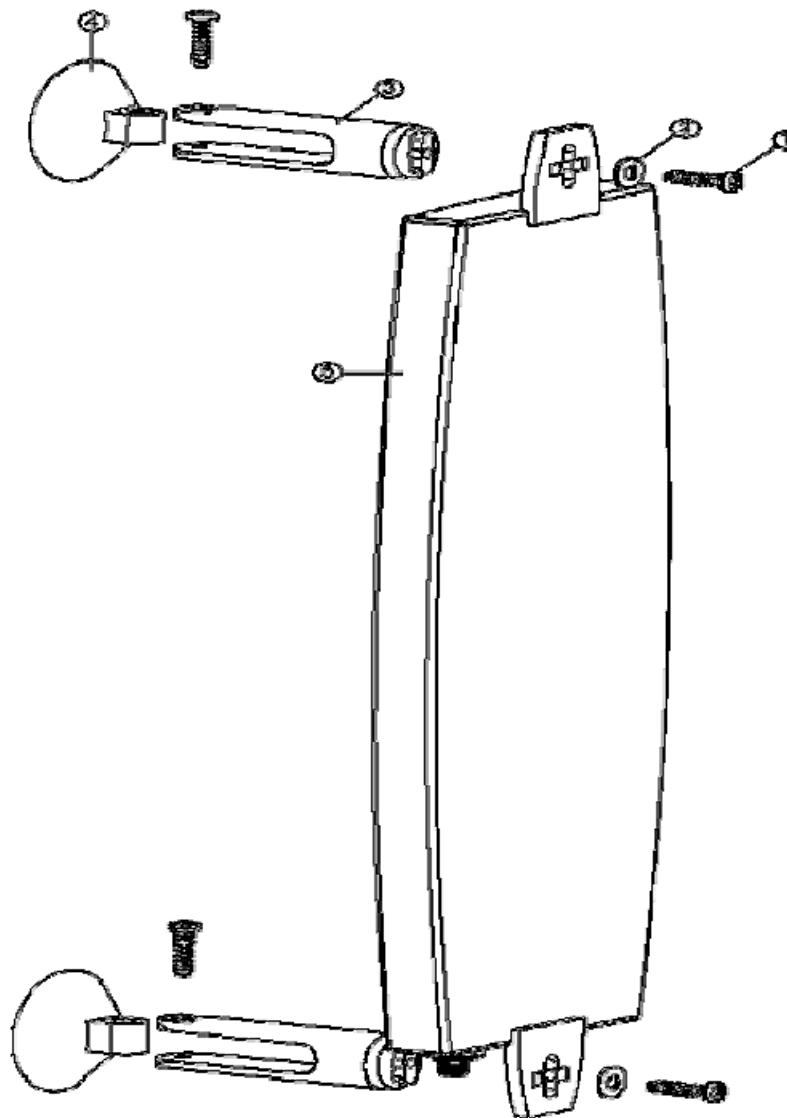


Figure 2-18: Window Mounting with Rotation Capability

2.6 Installing the Modular Base Station Equipment

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

2.6.1 BS-SH Slot Assignment

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

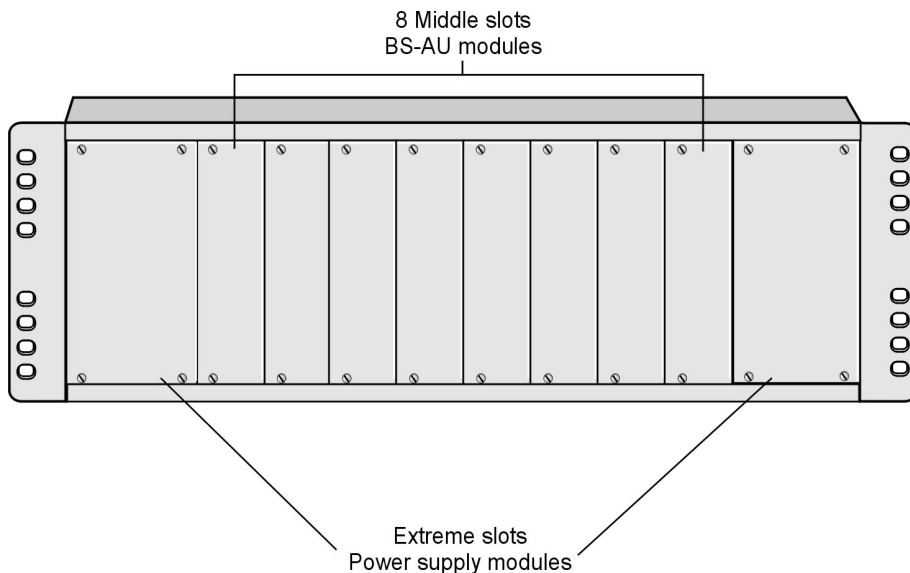


Figure 2-19: BS-SH Chassis Slot Assignment

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

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

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

2.6.2 BS-PS-AC Power Supply Module

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

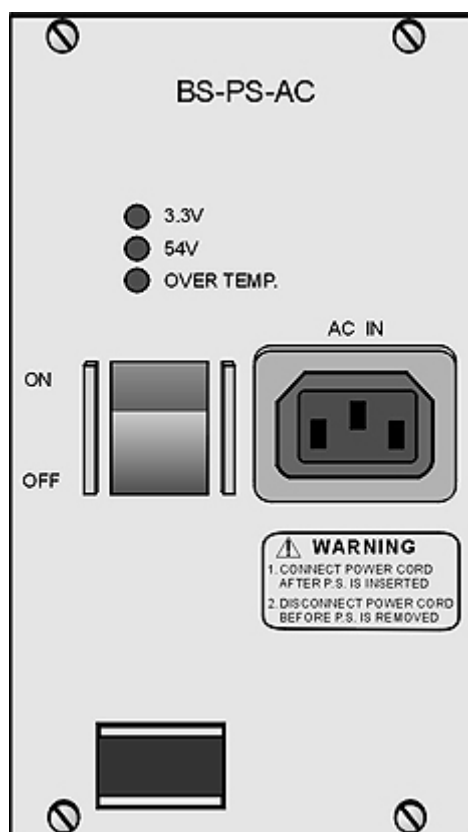


Figure 2-20: BS-PS-AC Front Panel

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

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

Table 2-4: BS-PS LED Functionality	
Name	Description
54V	Green LED. Indicates that the 54V power supply module is OK
3.3V	Green LED. Indicates that the 3.3V power supply module is OK
OVER TEMP	Red LED. Indicates an over temperature condition in the power supply module

2.6.3 BS-PS-DC Power Supply Module

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

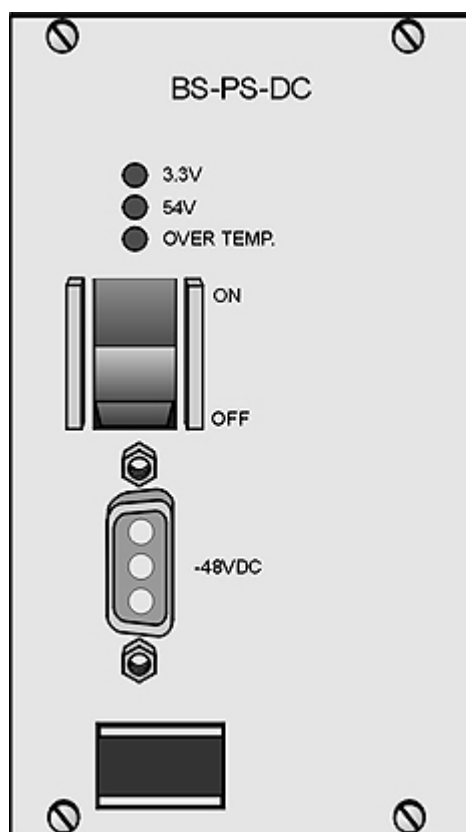


Figure 2-21: BS-PS-DC Front Panel

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

The color codes of the cable wires are as follows:

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

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

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

2.6.4 BS-AU Network Interface Module

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

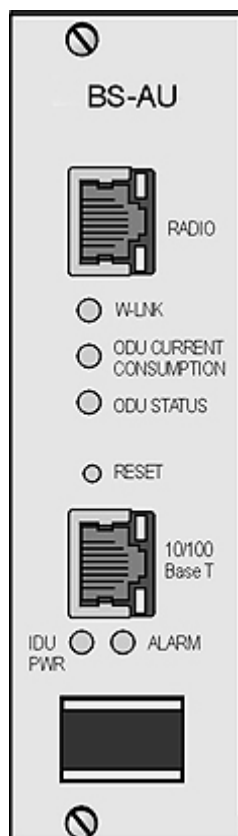


Figure 2-22: BS-AU Front Panel

The BS-AU provides the following interfaces:

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



CAUTION

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

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

2.6.5 Installing the BS-SH Chassis and Modules

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



To install the BS SH chassis and modules:

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

OR

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

- 2 Connect one end of a grounding cable to the ground terminal located on the rear panel of the BS-SH chassis and firmly tighten the grounding screw.
- 3 Connect the opposite end of the grounding cable to a ground connection or to the cabinet, if applicable.
- 4 Carefully insert the BS-PS power supply and the BS-AU modules into the relevant slots and push firmly until they are securely locked. Before insertion, verify that the switches of all BS-PS modules are in the OFF position. Refer to section [2.6.1](#) for a description of the slot assignment.
- 5 Close the captive screws attached to each module.
- 6 Place blank covers over all of the unused slots.
- 7 Connect the indoor-to outdoor cable(s) to the RADIO connector(s) of the BS-AU module(s).
- 8 If a BS-PS-DC power supply is used, connect the DC power cord to the -48 VDC IN jack of the BS-PS-DC power supply. If a redundant power supply module is installed, connect a DC power cord also to the second DC power module. Connect the power cord(s) to the -48 VDC power source, as follows:
 - a Connect the black wire to the -48 VDC contact of the power source.
 - b Connect the white wire to the + (Return) contact.
 - c Connect the shield to the ground.
- 9 If a BS-PS-AC power supply is used, connect the AC power cord to the AC IN jack of the BS-PS-AC power supply. If a redundant power supply module is installed, connect an AC power cord also to the second AC power module. Connect the power cord(s) to the mains outlet.
- 10 Switch the BS-PS-AC/DC power supplies to ON. Verify that all power indicator LEDs on the BS-PS-AC/DC front panel are ON and that the

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

- 11 Configure the basic parameters in all BS-AU modules as described in section [3.1](#).
- 12 Connect the 10/100 BaseT LAN connector(s) to the network. The cable connection should be straight Ethernet if connecting the indoor unit to a hub/switch and a crossed cable if connecting it directly to a PC Network Interface Card (NIC).



NOTE

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

Chapter 3 - Commissioning

About This Chapter:

- [Configuring Basic Parameters](#), page 66
- [Using the Optional Y-cable \(New SU-A-ODU\)](#), page 69
- [Aligning the Subscriber Unit Antenna](#), page 70
- [Configuring the Subscriber Unit's Maximum Modulation Level](#), page 72
- [Operation Verification](#), page 74

3.1 Configuring Basic Parameters

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

Refer to section [4.1](#) for information on how to access the Monitor program using Telnet and how to use it.

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

Refer to [Chapter 4](#) for detailed information on the applicable parameters.

Table 3-1: Basic Parameters		
Parameter	Default Value	Comment
Ethernet Port Negotiation Mode (in Unit Control Parameters)	Auto Negotiation	
IP Address	10.0.0.1	
Subnet Mask	255.0.0.0	
Default Gateway Address	0.0.0.0	
DHCP Options	Disable	
Access to DHCP	AU: From Ethernet Only SU: From Wireless Only	
ESSID	ESSID1	
Sub-Band Select (AU)	1	Applicable only if more than one Sub-Band is available
Frequency (AU)	The lowest frequency in the selected Sub-Band	
User Defined Frequency Subsets (SU)	All frequencies	

Table 3-1: Basic Parameters

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

Table 3-1: Basic Parameters		
Parameter	Default Value	Comment
Authentication Algorithm	Open System	Availability of security parameters depends on support according to the country code.
Data Encryption Option	Disable	
Security Mode	WEP	
Default Multicast Key (AU)	Key 1	
Promiscuous Authentication (AU)	Disable	
Default Key (SU)	Key 1	
Key 1 to Key 4	00.....0 (32 zeros, meaning no key)	

NOTE

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

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

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

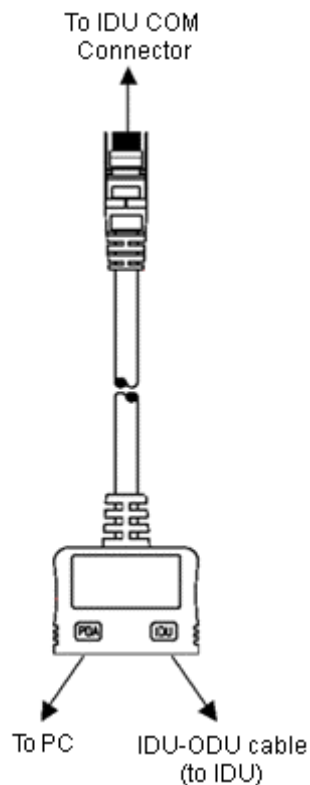


Figure 3-1: Connecting the Y-cable

3.3 Aligning the Subscriber Unit Antenna



NOTE

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

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



NOTE

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



To align the Subscriber Unit antenna:

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

**NOTE**

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

3.4 Configuring the Subscriber Unit's Maximum Modulation Level

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



NOTE

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

To configure the Maximum Modulation Level:

- 1 If the SNR of the SU at the AU is too low, it is recommended that you configure the *Maximum Modulation Level* parameter to a value that is lower than the maximum supported by the unit. This can decrease the number of retransmissions due to attempts to transmit at modulation levels that are too high for the actual quality of the link.
- 2 Check the SNR of the SU at the AU. You can use Telnet to view the SNR values in the *MAC Address Database*, which can be accessed from the *Site Survey* menu. If the ATPC algorithm is not enabled in both AU and SU, the test should be done with the *Initial Power Level* at the SU configured to its maximum value. If the SNR is lower than the values required for the maximum modulation level according to Table 3-2, it is recommended that you decrease the value of the Maximum Modulation Level.



NOTE

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

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

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

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

3.5 Operation Verification

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

3.5.1 Outdoor Unit Verification

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

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



NOTE

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




Table 3-3: AU-ODU LEDs			
Name		Description	Functionality
W-LINK		Wireless Link Indicator	<ul style="list-style-type: none"> ■ Green – Unit is associated with one or more SUs ■ Blinking red – No associations ■ Off – Wireless link is disabled
Status		Self-test and power indication	<ul style="list-style-type: none"> ■ Green – Power is available and self-test passed. ■ Blinking Amber – Testing (not ready for operation) ■ Red – Self-test failed – fatal error
ETH		Ethernet activity/ connectivity indication	<ul style="list-style-type: none"> ■ Green – Ethernet link detected. ■ Amber – No Ethernet connectivity between the indoor and outdoor units.




Table 3-4: SU-ODU LEDs			
Name		Description	Functionality
W-LINK		Wireless Link Indicator	<ul style="list-style-type: none"> ■ Green – Unit is associated with an AU, no wireless link activity ■ Blinking Green – Data received or transmitted on the wireless link. Blinking rate is proportional to wireless traffic rate ■ Off – Wireless link is disabled
Status		Self-test and power indication	<ul style="list-style-type: none"> ■ Green – Power is available and self-test passed. ■ Blinking Amber – Testing (not ready for operation) ■ Red – Self-test failed – fatal error
ETH		Ethernet activity/ connectivity indication	<ul style="list-style-type: none"> ■ Green – Ethernet link between the indoor and outdoor units is detected, no activity ■ Blinking Green – Ethernet connectivity is OK, with traffic on the port. Blinking rate proportional to traffic rate. ■ Red – No Ethernet connectivity between the indoor and outdoor units.
SNR BAR (SU-RA)		Received signal strength Indication	<ul style="list-style-type: none"> ■ Red LED: Signal is too low (SNR < 4 dB) ■ 8 green LEDs: Quality of the received signal ■ Orange LED: Signal is too high (SNR > 50 dB)

Table 3-5: SU-ODU SNR Bar LED Functionality	
SNR Bar LEDs	SNR (typical)
LED 1 (red) is On	Signal is too low (SNR < 4 dB)
LED 2 (green) is On	SNR > 4 dB
LEDs 2 to 3 (green) are On	SNR > 8 dB
LEDs 2 to 4 (green) are On	SNR > 13 dB
LEDs 2 to 5 (green) are On	SNR > 19 dB
LEDs 2 to 6 (green) are On	SNR > 26 dB
LEDs 2 to 7 (green) are On	SNR > 31 dB
LEDs 2 to 8 (green) are On	SNR > 38 dB
LEDs 2 to 9 (green) are On	SNR > 44 dB
LEDs 2 to 9 (green) and 10 (orange) are On	Signal is too high (SNR > 50 dB)

3.5.2 Indoor Unit Verification

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

Table 3-6 provides information for the BS-AU IDU LEDs. Table 3-7 lists the LEDs of the PS1073 IDU.

Table 3-6: BS-AU LEDs		
Name	Description	Functionality
W-LINK	Wireless link activity	<ul style="list-style-type: none"> ■ Green - At least one SU is associated. ■ Blinking Red - No SU is associated. ■ Off - Wireless link is disabled.
ODU CURRENT CONSUMPTION	Current Consumption of the Outdoor Unit	<ul style="list-style-type: none"> ■ Red - over current. ■ Blinking Red - open circuit or below anticipated current consumption. ■ Green - within tolerance.
ODU STATUS	Outdoor Unit Self-test	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ Green - IDU power is OK. ■ Off - no power is supplied to the IDU.
ALARM	Indoor Unit Alarm Indication	<ul style="list-style-type: none"> ■ Red - a fatal failure indication. ■ Off - IDU is functioning properly.

Table 3-7: PS1073 SU IDU / AU-SA IDU LEDs		
Name	Description	Functionality
POWER	Power Indication	<ul style="list-style-type: none">■ Green – IDU power is OK■ Off – No power or power failure
ETH	Self test and end-to-end Ethernet connectivity	<ul style="list-style-type: none">■ Off – No Ethernet connectivity has been detected between the outdoor unit and the device connected to the indoor unit.■ Green – Self-test passed and Ethernet connection confirmed by the outdoor unit (Ethernet integrity check passed).

3.5.3 SU-I Unit Verification

To verify the correct operation of the SU-I unit, examine the LED indicators located on the front panel of the SU-I unit.

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




Table 3-8: SU-I LEDs			
Name		Description	Functionality
	Status	Self-test and power indication	<p>Green: Power is available and self-test passed.</p> <p>Blinking Amber: Testing (not ready for operation)</p> <p>Red: Self-test failed. Fatal error</p>
	Ethernet	Ethernet activity/ connectivity indication	<p>Green: Ethernet link between the SU-I and the data equipment is detected, no activity</p> <p>Blinking Green: Ethernet connectivity is OK, with traffic on the port. Blinking rate proportional to traffic rate.</p> <p>Red: No Ethernet connectivity between the SU-I and the data equipment.</p>
	W-Link	Wireless Link traffic Indication	<p>Green: Unit is associated with an AU, no wireless link activity</p> <p>Blinking Green: Data received or transmitted on the wireless link. Blinking rate is proportional to traffic rate.</p> <p>Off: Wireless link disabled</p>

Table 3-9: SU-I SNR Bar LED Functionality	
SNR Bar LEDs	SNR (typical)
LED 1 (red) is On	Signal is too low (SNR < 4 dB)
LED 2 (green) is On	SNR > 4 dB
LEDs 2 to 3 (green) are On	SNR > 8 dB
LEDs 2 to 4 (green) are On	SNR > 13 dB
LEDs 2 to 5 (green) are On	SNR > 19 dB
LEDs 2 to 6 (green) are On	SNR > 26 dB
LEDs 2 to 7 (green) are On	SNR > 31 dB
LEDs 2 to 8 (green) are On	SNR > 38 dB
LEDs 2 to 9 (green) are On	SNR > 44 dB
LEDs 2 to 9 (green) and 10 (orange) are On	Signal is too high (SNR > 50 dB)

3.5.4 Verifying the Ethernet Connection (Modular Base station)

After connecting 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.

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

After connecting 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.

3.5.6 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 4 - Operation and Administration

In This Chapter:

- [Working with the Monitor Program](#), page 82
- [Menus and Parameters](#), page 85

4.1 Working with the Monitor Program

4.1.1 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.
- 4 Select the required access level, depending on your specific access rights. A password entry request is displayed. Table 4-1 lists the default passwords for each of the access levels.

Table 4-1: 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.

If you forgot the password, type "h" at the Access Level selection prompt. Type "Recover" at the prompt to get a challenge string consisting of 8 characters. Contact Alvarion's Customer Service and give them the challenge string (after user identification) to receive a one-time password. After entering this password at the prompt, the unit will reboot with the default Administrator password (private). Three consecutive errors in entering the one-time password will invalidate it and block the monitor program. A new challenge string should be used to receive a new one-time password.

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

```

BreezeACCESS VL/AU
Official Release Version - 4.0.27
Release Date: Feb 13 2007, 12:59:23
Main Menu
=====
1 - Info Screens
2 - Unit Control
3 - Basic Configuration
4 - Site Survey
5 - Advanced Configuration
x - Exit
>>>

```

Figure 4-1: Main Menu (Administrator Level)

**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.

The display 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 menu items.

4.1.2 Common Operations

The following describes the standard operations 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 some cases, to activate any configuration changes, you must reset the unit. Certain settings are automatically activated without having to reset the unit. Refer to Appendix F 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.

4.2 Menus and Parameters

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

4.2.1 Main Menu

The *Main Menu* enables to access the following menus, depending on your access level, as described in section [4.1](#).

- **Info Screens:** Provides a read only display of current parameter values. Available at all access levels.
- **Unit Control:** Enables 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 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 to activate certain tests and view various system counters. Available at the Installer and Administrator access levels.
- **Advanced Configuration:** Enables to access all system parameters, including the *Basic Configuration* parameters. Available only at the Administrator access level.

4.2.2 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, some security related parameters including the encryption Keys, ESSID and Operator ESSID are only displayed to users with Administrator access rights.

The Info Screens menu includes the following options:

- Show Unit Status
- Show Basic Configuration

- Show Advanced Configuration
- Show Country Dependent Parameters
- Show All Parameters

4.2.2.1 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 the Unit Control menu.
- **Unit Type:** Identifies the unit's function: AU-BS, AU-SA, AUS-BS, AUS-SA, SU-3-1D, SU-6-1D, SU-6-BD, SU-54-BD, SU-I.
- **Unit MAC Address:** The unit's unique IEEE MAC address.
- **Current Number of Associations (AU only):** The total number of SUs associated with this AU. This number may include units that are not currently active as 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 SNAP frame is received from another AU indicating that the SU is now associated with the other AU.
- The SU failed to respond to a certain number of consecutive frames transmitted by the AU and is considered to have "aged out".

- **Number of Associations Since Last Reset:** For SUs - displays the total number of associations with any AU since the last reset, including duplicate associations with the same AU. For AUs - displays the number of SUs that have associated with the AU since the last reset, including duplicate associations with the same SU.
- **Unit Status (SU only):** The current status of the SU. There are two status options:
 - ◇ **SCANNING:** The SU is searching for an AU with which to associate. If the DFS Option is enabled and the SU is currently looking for its previous AU, the AU's MAC Address will be displayed.
 - ◇ **ASSOCIATED:** The SU is associated with an AU.

- **AU MAC Address (SU only):** 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.
- **Unit Hardware Version:** The version of the outdoor unit hardware.
- **Unit BOOT Version:** The version of the BOOT SW.
- **Time Since Last Reset**
- **Flash Versions:**
 - ◇ **Running from:** Shows whether the unit is running from the Main or from the Shadow Version.
 - ◇ **Main Version File Name:** The name of the compressed file (with a “.bz” extension) of the version currently defined as the main version.
 - ◇ **Main Version Number:** The software version currently defined as the main version.
 - ◇ **Shadow Version File Name:** The name of the compressed file (with a “.bz” extension) of the version currently defined as the shadow (backup) version.
 - ◇ **Shadow Version Number:** The software version currently defined as the shadow (backup) version.
- **Radio Band:** The radio band of the unit.
- **Log Out Timer:** The value of the Log Out Timer as defined in the Unit Control menu.
- **Ethernet Port Negotiation Mode:** The Ethernet port negotiation mode as defined in the Unit Control menu.
- **Ethernet Port State:** The actual state of the Ethernet port.

- **FTP Parameters:** General FTP parameters (common to SW Version Download, Configuration File Upload/Download and Event File Upload using FTP):

- ◇ FTP Server IP Address
- ◇ FTP Gateway IP Address
- ◇ FTP User Name
- ◇ FTP Password

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

- ◇ FTP Source Directory
- ◇ FTP SW Version File Name

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

- ◇ Configuration File Name
- ◇ Configuration File Source Directory
- ◇ Operator Defaults File Name

- **FTP Log File Upload Parameters:** The parameters for Event Log file upload using FTP, as defined in the Unit Control menu.

- ◇ FTP Log File Name
- ◇ FTP Log File Destination Directory

- **Event Log Policy**

4.2.2.2 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.

4.2.2.3 Show Advanced Configuration

The Show Advanced Configuration menu enables 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.

4.2.2.4 Show Country Dependent Parameters

Each country has its radio regulation regarding transmissions in the applicable bands that affect parameters such as available frequencies, bandwidth, transmit power, etc. Some other parameters and options may also vary among countries. For each country, one or more sets of parameters are pre-configured in the factory. If more than one set is available, the set to be used can be selected. The Show Country Dependent Parameters displays the available set(s) of these parameters, and includes the following:

- **Country Code:** The up to 3 digits country code according to ISO 3166 and the country name. Some regulatory requirements apply to more than one country. In these cases the Country Code includes a 4 digits proprietary group code and the Country Group name (for example FCC).
- **Data Encryption Support:** Indicates whether data encryption is supported for the applicable country.
- **AES Encryption Support:** Indicates whether encryption using AES is supported for the applicable country.
- **Authentication Encryption Support:** Indicates whether authentication encryption is supported for the applicable country.

For each of the available sets (Sub-Bands), the following information is provided:

- **Sub-Band ID and Frequencies**
- **Allowed Bandwidth:** If more than one bandwidth is allowed, then each bandwidth is associated with a different sub-band, as the bandwidth may affect the available frequencies.
- **Regulation Max Tx Power at Antenna Port:** The maximum transmit power allowed at the antenna port of the unit.
- **Regulation Max EIRP:** The maximum allowed EIRP (Effective Isotropic Radiated Power) in dBm, or No Limit.
- **Min Modulation Level:** The lowest allowed modulation level.

- **Max Modulation Level:** The highest allowed modulation level.
- **Burst Mode:** Indicates whether Burst Mode operation is allowed.
- **Maximum Burst Duration:** If Burst Mode is allowed, this parameter displays the upper limit for the Maximum Burst Duration.
- **DFS Option:** Indicates whether the DFS (Dynamic Frequency Selection) mechanism for identification and avoidance of channels with radar activity is supported.
- **Minimum HW Revision Support:** The minimum HW revision required to support the Sub-Band.

New Country Code files can be uploaded remotely using TFTP (see [Appendix B](#)).

4.2.2.5 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 some security related parameters, including the encryption Keys, ESSID and Operator ESSID, are available only with Administrator access rights.

4.2.3 Unit Control Menu

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

- Reset Unit
- Default Settings
- Change Unit Name
- Change Password
- Flash Memory Control
- SW Version Download
- Configuration File Upload/Download
- Log Out Timer

- Ethernet Port Negotiation Mode
- Change System Location
- Event Log Menu
- Feature Upgrade

4.2.3.1 Reset Unit

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

4.2.3.2 Default Settings

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

The Default Setting options are available only to users with Administrator access rights.

The available options are:

- Set Defaults
- Save Current Configuration As Operator Defaults

4.2.3.2.1 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 section [4.2.3.7](#) option. 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

- Set Partial Factory Defaults
- Set Complete Operator Defaults
- Set Partial Operator Defaults
- Cancel Current Pending Request

4.2.3.2.1.1 Set Complete Factory Defaults

Select this option to reset the unit to the standard Factory Defaults configuration, excluding several parameters that are listed in Table 4-2.

Table 4-2: Parameters not reset after Set Complete Factory/Operator Defaults	
Parameters Group	Parameter
Unit Control Parameters	All Passwords
	FTP Server IP address* (see note below)
	FTP Gateway IP address* (see note below)
	FTP User Name* (see note below)
	FTP Password* (see note below)
	Ethernet Port Negotiation Mode
Air Interface Parameters	Selected Sub-Band (AU)
	Frequency (AU)
	DFS Option (AU)
	Frequency Subset (AU)
	Antenna Gain (AU)

NOTE



The FTP parameters are not set to their default values after Set Complete Operator Defaults. However, they are set to their default value after Set Complete Factory Defaults. Note that in this case they are set to the default values immediately upon selecting the Set Complete Factory Default option (even before the next reset).

4.2.3.2.1.2 Set Partial Factory Defaults

Select this option to reset the unit to the standard Factory Default configuration, excluding the parameters that are required to maintain connectivity and management access. The parameters that do not change after Set Partial Factory Defaults are listed in Table 4-3.

Table 4-3: Parameters that are not reset after Set Partial Factory/Operator Defaults	
Parameters Group	Parameter
Unit Control parameters	Passwords
	Ethernet Port Negotiation Mode
	FTP Server IP address
	FTP Gateway IP Address
	FTP User Name
	FTP Password
IP Parameters	IP Address
	Subnet Mask
	Default Gateway Address
	DHCP Option
	Access to DHCP
Security Parameters	Authentication Algorithm
	Default Key (SU)
	Data Encryption Mode
	Default Multicast Key (AU)
	Security Mode
	Key # 1 to Key # 4

Table 4-3: Parameters that are not reset after Set Partial Factory/Operator Defaults

Parameters Group	Parameter
Air Interface Parameters	ESSID
	Operator ESSID Option (AU)
	Operator ESSID (AU)
	Cell Distance Mode (AU)
	Maximum Cell Distance (AU)
	Per SU Distance Learning Option (AU)
	Selected Sub-Band (AU)
	Frequency (AU)
	DFS Option (AU)
	SU Waiting Option (AU)
	Channel Reuse Option (AU)
	Radar Activity Assessment Period (AU)
	Maximum Number of Detections in Assessment Period (AU)
	Frequency Subset (AU)
	ATPC Option (AU)
	Transmit Power
	Maximum Tx Power (SU)
	Tx Control (AU)
	Best AU Support (SU)
	Preferred AU MAC Address (SU)
	All Noise Immunity Control parameters
Network Management Parameters	AP Client IP Address (SU)
Performance Parameters	Adaptive Modulation Decision Thresholds

Table 4-3: Parameters that are not reset after Set Partial Factory/Operator Defaults	
Parameters Group	Parameter
Bridge Parameters	VLAN ID – Management
	Service Provider VLAN ID (SU)
	VLAN QinQ Protocol Ethertype
	MAC Address List (AU)
	MAC Address List Action (AU)
Service Parameters	DRAP Option (AU)
	UDP Port (AU)
	Max Number of Voice Calls (AU)
	DRAP TTL (AU)
	Wireless Link Prioritization Option (AU)
	Low Priority AIFS (AU)
	Number of HW Retries for High Priority Traffic (AU)
	Number of HW Retries for Low Priority Traffic (AU)
	AU Burst Duration for High Priority Traffic (AU)
	AU Burst Duration for Low Priority Traffic (AU)
	SU Burst Duration for High Priority Traffic (AU)
	SU Burst Duration for Low Priority Traffic (AU)
	Low Priority Traffic Minimum Percent

4.2.3.2.1.3 Set Complete Operators Defaults

Select this option to reset the unit to the Operator Defaults configuration, excluding several parameters that are listed in Table 4-2.

4.2.3.2.1.4 Set Partial Operator Defaults

Select this option to reset the unit to the Operator Defaults configuration, excluding the parameters that are required to maintain connectivity and management access. The parameters that do not change after Set Partial Operator Defaults are listed in Table 4-3.

4.2.3.2.1.5 Cancel Current Pending Request

After selecting one of the Set defaults options, it will be executed after the next reset. This option enables to cancel the pending request before execution (provided the unit has not been reset yet).

4.2.3.2.2 Save Current Configuration As Operator Defaults

The Save Current Configuration As Operator Defaults enables defining the current configuration of the unit as the Operator Defaults configuration.

4.2.3.3 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.

4.2.3.4 Change Password

The Change Password submenu enables changing the access password(s). The Change Password submenu is available only to users with Administrator access rights.

Valid values: A string of up to 8 printable ASCII characters.

Refer to section [4.1](#) for a list of the default passwords for each of the access levels.

4.2.3.5 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 Running 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 Running Version After Reset:** Defines the current running version as the new main version. This version will also be used following the next reset.

4.2.3.6 SW Version Download

The SW Version Download submenu enables the optional downloading of 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 SW Source Dir:** The FTP SW Source Dir option enables defining the 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.

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

Valid values: A string of up to 20 printable ASCII characters. An empty string is not allowed.

The default is VxWorks.bz.

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

The default is: 10.0.0.253.

- **FTP Gateway IP Address:** The FTP Gateway IP Address option enables defining the FTP default gateway address.

The default is: 0.0.0.0.

- **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 18 printable ASCII characters.

The default is: vx

- **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 18 printable ASCII characters.

The default is: vx

- **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 Server IP Address, FTP Gateway IP Address, FTP User Name and FTP Password). This set (or relevant parts of the set) serves the SW Download Procedure, the Configuration File Upload/Download procedure and the Event Log File Upload procedure. Changing any of these parameters in the menu for any procedure will automatically change its value in the menu for the other procedures.

4.2.3.7 Configuration File Upload/Download

The Configuration File Upload/Download submenu enables the optional uploading or downloading of 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 Put Operator Defaults File (cmr)
- **FTP Configuration File Source Dir:** The FTP Configuration File 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 20 printable ASCII characters. An empty string is not allowed.

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 20 printable ASCII characters. An empty string is not allowed.

The default is operator.cmr.

- **FTP Server 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: 10.0.0.253

- **FTP Gateway IP Address:** The FTP Gateway IP Address option enables defining the FTP default gateway address.

The default is: 0.0.0.0.

- **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 18 printable ASCII characters.

The default is: vx

- **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 18 printable ASCII characters.

The default is: vx

- **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 Server IP Address, FTP Gateway IP Address, FTP User Name and FTP Password). This set (or relevant parts of the set) serves the SW Download procedure, the Configuration File Upload/Download procedure and the Event Log File Upload procedure. Changing any of these parameters in the menu for either procedure will automatically change its value in the menu for the other procedures.

4.2.3.8 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.

4.2.3.9 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 and Half-Duplex
- Force 10 Mbps and Full-Duplex
- Force 100 Mbps and Half-Duplex
- Force 100 Mbps and Full-Duplex
- Auto Negotiation (10/100 Mbps and Half/Full Duplex)

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

4.2.3.10 Change System Location

The Change System Location option enables changing the system location of the unit, which is also the sys location in MIB2. The System Location is also displayed as a part of the Monitor menu's header.

Valid values: A string of up to 35 printable ASCII characters.

The default system location is an empty string.

4.2.3.11 Event Log Menu

The Event Log Menu enables controlling the event log feature. The event log is an important debugging tool and a flash memory sector is dedicated for storing it. Events are classified according to their severity level: Message (lowest severity), Warning, Error or Fatal (highest severity).

The severity level of events that should be saved in the Event Log is configurable. Events from the configured severity and higher are saved and may be displayed upon request. Log history can be displayed up to the full number of current active events. In the log, an event is defined as active as long as it has not been erased (a maximum of 1000 events may be stored). The Event Log may be read using TFTP, with remote file name <SNMP Read Community>.log (the default SNMP Read Community is “public”). The Event Log may also be uploaded to a remote FTP server.

The Event Log Menu includes the following options:

- Event Log Policy
- Display Event Log
- Erase Event Log
- Event Load Upload

4.2.3.11.1 Event Log Policy

The Event Log Policy determines the minimal severity level. All events whose severity is equal to or higher than the defined severity are logged.

Valid values are: Message (MSG) Level, Warning (WRN) Level, Error (ERR) Level, Fatal (FTL) Level, Log None.

The default selection is Warning Level severity.

4.2.3.11.2 Display Event Log

The Display Event Log option enables viewing how many events are logged and selecting the number of events to be displayed (up to 1000). The display of each event includes the event time (elapsed time since last reset), the severity level and a message string. The events are displayed according to the time at which they were generated, with the most recent event displayed last (first in – first out).

4.2.3.11.3 Erase Event Log

The Erase Event Log option enables clearing the event log.

4.2.3.11.4 Event Log Upload

The Event Log Upload submenu enables the optional uploading of the event log file to a remote FTP server. The Event Log Upload submenu includes the following options:

- **FTP Event Log Upload Execute:** The FTP event Log Upload Execute executes the upload of the Event Log file according to the parameters defined below.

- **Event Log Destination Directory:** The Event Log Destination Directory enables defining the destination directory for the Event Log File.

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

The default is an empty string.

- **Event Log File Name:** The Event Log File Name option enables defining the name of the event log file to be uploaded.

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

The default is logfile.log.

- **FTP Server 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: 10.0.0.253

- **FTP Gateway IP Address:** The FTP Gateway IP Address option enables defining the FTP default gateway address.

The default is: 0.0.0.0.

- **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 18 printable ASCII characters.

The default is: vx

- **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 18 printable ASCII characters.

The default is: vx

- **Show FTP Event Log File Upload Parameters:** Displays the current values of the Event Log Upload parameters.

**NOTE**

There is one set of general FTP parameters (FTP Server IP Address, FTP Gateway IP Address, FTP User Name and FTP Password). This set (or relevant parts of the set) serves the SW Download procedure, the Configuration File Upload/Download procedure and the Event Log File Upload procedure. Changing any of these parameters in the menu for either procedure will automatically change its value in the menu for the other procedures.

4.2.3.12 Feature Upgrade

The Feature Upgrade option enables to enter a license string for upgrading the unit to support new features and/or options. Upon selecting the Manual Feature Upgrade option the user will be requested to enter the license string. Each license string is associated with a unique MAC Address and one feature/option. If the encrypted MAC Address in the license string does not match the unit's MAC Address, the string will be rejected. If there is a match, a message notifying of the new feature/option will be displayed. The unit must be reset for the change to take effect.

The license string should comprise 32 to 64 hexadecimal digits.

New Feature License files can be uploaded remotely using TFTP (see [Appendix B](#)).

4.2.4 Basic Configuration Menu

The Basic Configuration menu includes all parameters required for the initial installation and operation of the unit. After 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:

4.2.4.1.1 IP Parameters

- IP Address
- Subnet Mask
- Default Gateway Address
- DHCP Client

- ◇ DHCP Option
- ◇ Access to DHCP

Refer to section [4.2.6.1](#) for a description of these parameters.

4.2.4.1.2 Air Interface Parameters

- ESSID
 - ◇ Operator ESSID Option
 - ◇ Operator ESSID
- Frequency Definition
 - ◇ Select Sub-Band (AU, if more than one is available)
 - ◇ Frequency (AU)
 - ◇ User Defined Frequency Subsets (SU)
- Best AU Parameters (SU)
 - ◇ Best AU Support
 - ◇ Preferred AU MAC Address
- Cell Distance Parameters (AU)
 - ◇ Cell Distance Mode
 - ◇ Maximum Cell Distance
 - ◇ Fairness Factor
 - ◇ Per SU Distance Learning
- ATPC Parameters
 - ◇ ATPC Option
- Transmit Power

- Maximum Tx Power (SU)

- Tx Control (AU)

- Antenna Gain

Refer to section [4.2.6.2](#) for a description of these parameters.

4.2.4.1.3 Performance Parameters

- Maximum Modulation Level (SU)

Refer to section [4.2.6.5](#) for a description of these parameters.

4.2.4.1.4 Bridge Parameters

- VLAN Support

- ◇ VLAN ID – Management

Refer to section [4.2.6.4](#) for a description of these parameters.

4.2.4.1.5 Security Parameters

- Authentication Algorithm

- Data Encryption Option

- Security Mode

- Default Multicast Key (AU)

- Default Key (SU)

- Key 1 to Key 4

- Promiscuous Authentication (AU)

Some or all of the security parameters may not be available in units that do not support the applicable features. Refer to section [4.2.6.7](#) for a description of these parameters.

4.2.5 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 identifying potential problems. In the AU, there is also an extensive database for all SUs served by it.

The Site Survey menu includes the following options:

- Traffic Statistics
- Ping Test
- Continuous Link Quality display (SU only)
- MAC Address Database
- Per Modulation Level Counters
- Link Capability

4.2.5.1 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 (WLAN) counters.
- **Reset Counters:** Select this option to reset the counters.

4.2.5.1.1 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 medium. Frames discarded by the unit's hardware filter are not counted by the Ethernet counters. For units with HW revision B and lower, the maximum length of a regular IEEE 802.1 Ethernet packet that can be accepted from or transmitted to the Ethernet port is 1514 bytes, excluding CRC and VLAN(s). For units with HW revision C and higher, the maximum length of an Ethernet packet that can be accepted from or transmitted to the Ethernet port (excluding CRC) is 1600 bytes, including VLAN(s) for single or double-tagged packets.

The unit transmits valid data frames received from the wireless medium to the Ethernet port, as well as 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.

4.2.5.1.2 WLAN 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 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 **Maximum Cell distance** 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 HW Retries** parameter, the frame is dropped.

Each packet to be transmitted to the wireless link is transferred to one of three queues: Low, Medium and High. Packets in the High queue have the highest priority for transmission, and those in the Low queue have the lowest priority. The packets in the High queue will be transmitted first. When this queue is emptied, the packets in the Medium queue will be sent. Finally, when both the High and Medium queues are empty, the packets in the Low queue will be sent.

Data packets are routed to either the High or Low queue, according to the queue selected for them before the MIR/CIR mechanism (for more information see section [4.2.6.6.3](#)).

Broadcasts/multicasts are routed to the Medium queue (applicable only for AU).

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 VL unit via the wireless port (as opposed to messages intended for stations behind other BreezeACCESS VL units), is sent to the High queue, regardless of the priority configuration.

The Wireless Link Counters include the following statistics:

- **Total transmitted frames to wireless:** The number of frames transmitted to the wireless medium. 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. In the AU, there are also separate counters for the following:
 - ◇ Beacons (AU only)
 - ◇ Management and Other Data frames, including successfully transmitted unicast frames and multicast/broadcast data frames (excluding retransmissions, excluding Beacons in AU)
- **Total Transmitted Unicasts (AU only):** The number of unicast frames successfully transmitted to the wireless medium, excluding retransmissions. This count is useful for calculating the rates of retransmissions or dropped frames, as 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 medium. The count does not include control and wireless management frames, or retransmissions. There are also separate counts for each priority queue through which the frames were routed (High, Mid and Low).
- **Frames dropped (too many retries):** The number of dropped frames, which are unsuccessfully retransmitted without being acknowledged until the maximum permitted number of retransmissions. 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 transmitted concatenated frames:** The total number of concatenated frames transmitted successfully to the wireless medium, excluding retransmissions. There are also separate counts for concatenated frames that include one frame (Single), two frames (Double) or more than two frames (More). For more details refer to section [4.2.6.5.10](#).
- **Total Tx events:** The total number of transmit events. Typically, transmission events include cases where transmission of a frame was delayed or was aborted before completion. The following additional counters are displayed to indicate the reason for and the nature of the event:

- ◇ Dropped: The number of dropped frames, which are unsuccessfully retransmitted without being acknowledged until the maximum permitted number of retransmissions.
- ◇ Underrun: The number of times that transmission of a frame was aborted because the rate of submitting frames for transmission exceeds the available transmission capability.
- ◇ Others: The number of frames whose transmission was not completed or delayed 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 medium. 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 frames received from the wireless medium, including duplicate frames. Refer to Duplicate frames discarded below.
- **Total Rx events:** 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 Phy errors (unidentified signals).
 - ◇ CRC: The number of frames received from the wireless medium 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.
 - ◇ Decrypt: The number of frames that were not received properly due to a problem in the data decryption mechanism.
- **Total received concatenated frames:** The total number of concatenated frames received from the wireless medium, including duplicate frames. There are also separate counts for concatenated frames that include one frame (Single), two frames (Double) or more than two frames (More). For more details refer to section [4.2.6.5.10](#).

- **Bad fragments received:** The number of fragments received from the wireless medium 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.
- **Internally discarded MIR\CIR:** The number of data frames received from the Ethernet port that were discarded by the MIR/CIR mechanism to avoid exceeding the maximum permitted information rate.

4.2.5.2 Ping Test

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

- **Destination IP Address:** The destination IP address of the device being pinged. The default IP address is 192.0.0.1.
- **Number of Pings to Send:** 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:** The ping packet size. The available range is from 60 to 1472 bytes. The default value is 64 bytes.
- **Ping Frame Timeout:** The ping frame timeout, which is the amount of time (in ms) between ping attempts. The available range is from 100 to 60,000 ms. 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 when 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.

4.2.5.3 Link Quality (SU only)

The Link Quality submenu enables viewing continuously updated information on the quality of the wireless link. The Link quality submenu includes the following options:

4.2.5.3.1 Continuous Average SNR Display

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

Click the **Esc** key to abort the test.

4.2.5.3.2 Continuous UpLink Quality Indicator Display

The **Continuous UpLink Quality Indicator Display** option displays continuously updated information regarding the average quality of the wireless link to the AU, using the dynamically updated average modulation level measurements. The Link Quality Indicator (LQI) calculation is performed using the formula:

$$\text{LQI} = (0.9 \times \text{"Previous LQI"}) + (0.1 \times \text{"Last Successful Modulation Level"})$$

Each successful transmit will be included in this average, by using the modulation level in which the frame was successfully transmitted as the "Last Successful Modulation Level".

In order to receive quick and reliable LQI measurements, there should be sufficient traffic between the SU and the AU. It is recommended to have traffic of at least 100 packets per second. The traffic can be generated either by an external utility (FTP session, ping generator, etc.) or by the Ping Test option in the Site Survey menu with the appropriate settings (see section [4.2.5.2](#)).



NOTE

If Limited Test is indicated next to the LQI results, it means that the results may not indicate the true quality, as not all modulation levels from 1 to 8 are available. The limitation may be due to the HW of the unit (HW Revision A), or the applicable parameters in the country code, or the configurable Maximum Modulation Level parameter.

Click the **Esc** key to abort the test.

4.2.5.4 MAC Address Database

4.2.5.4.1 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. When DRAP is supported, it enables viewing details on the active Gateways in the sector. 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 following details are also displayed: SU Unit Name, SU SW version, SU Unit Type and SU's Distance from the AU.
- ◇ **X:** An SU that is included in the Deny List.
- ◇ **Sp (Special):** 7 addresses that are always present, including:
 - The MAC address of the AU, which appears twice as it is learned from both the Ethernet and wireless ports.
 - The MAC address of the internal Operating System stack, which also appears twice.
 - 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 the 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 SNAP frame is received from another AU indicating that the SU is now associated with the other AU.
 - The SU failed to respond to 50 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 1017 (1024 minus the number of special Sp addresses as defined above) 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.

**NOTE**

When Data Encryption is enabled, the actual maximum number of associations is limited to 124. The displayed number is the value configured for the Maximum Number of Associations parameter, which might be higher than the actual limit.

- **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
 - ◇ Age in seconds, indicating the elapsed time since receiving the last packet from the Subscriber Unit.
 - ◇ The value configured for the Maximum Modulation Level parameter of the Subscriber Unit
 - ◇ The Status of the Subscriber Unit. There are three options:
 - 1 Associated
 - 2 Authenticated
 - 3 Not Authenticated (a temporary status)

The various status states are described below (this is a simplified description of the association process without the effects of the Best AU algorithm).

Table 4-4: Authentication and Association Process		
Message	Direction	Status in AU
SU Status: Scanning		
A Beacon with correct ESSID	AU → SU	-
SU Status: Synchronized		
Authentication Request	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 Unit Name of the SU.
- ◇ The SW version of the SU.
- ◇ The Unit Type of the SU.
- ◇ Distance.

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 SNAP frame is received from another AU indicating that the SU is now associated with the other AU.
- The SU failed to respond to 50 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.

- **Show MIR/CIR Database:** Displays information on the MIR/CIR support for associated Subscriber Units.

Each entry includes the following information:

- ◇ The MAC address of the associated Subscriber Unit
- ◇ The values of the MIR and CIR parameters configured in the applicable SU for the downlink (AU to SU) and for the uplink (SU to AU).
- ◇ The value configured in the applicable SU for the Maximum Delay parameter.
- ◇ The maximum data rate of the Subscriber Unit
- **Display MAC Pinpoint Table:** The MAC Pinpoint table provides for each of the Ethernet stations (identified by the MAC Address) connected to either the AU or to any of the SUs served by it, the identity (MAC Address) of the wireless device to which they are connected.
- **Gateways Table:** When the DRAP option is supported, the Gateways Table provides details on the active Gateways connected to any of the SUs served by the AU. For each Gateway, the displayed information includes:
 - ◇ Gateway Type (VG-1D1V, VG-1D2V, NG-4D1W)
 - ◇ IP Address
 - ◇ Number of Voice Calls (applicable only to Voice Gateways)

4.2.5.4.2 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):** 8 addresses that are always present, including:
 - The MAC address of the SU, which appears twice as it is learned from both the Ethernet and wireless ports.
 - The MAC address of the internal Operating System's stack, which also appears twice.
 - Alvarion's Multicast address (01-20-D6-00-00-01), which also appears twice. The system treats this address as a Broadcast address.
 - Alvarion's special Multicast address (01-20-D6-00-00-05), reserved for future use.
 - 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 1016.

4.2.5.5 Per Modulation Level Counters

The Per Modulation Level Counters display statistics relating to wireless link performance at different radio modulation levels. The Per Modulation Level Counters menu includes the following options:

- **Display Counters:** Select this option to display the current values of the Per Modulation Level Counters.

- **Reset Counters:** Select this option to reset the Per Modulation Level Counters.

The statistics show the number of frames accumulated in different categories since the last reset.

For SUs, the Per Modulation Level Counters display the following information for each modulation level supported by the unit:

- **SUCCESS:** The total number of successfully transmitted unicasts at the applicable modulation level.
- **FAILED:** The total number of failures to successfully transmit unicast frame during a HW Retry cycle at the applicable modulation level.

In addition, the **Average Modulation Level (AML)** is also displayed. This is the average modulation level (rounded to the nearest integer) since the last time the Per Modulation Level counters were reset. The average is calculated using the **SUCCESS** count at each modulation level as weights.

For AUs, the **SUCCESS** and **FAILED** counts are provided for each of the associated SUs, which are identified by their MAC address.

4.2.5.6 Link Capability

The Link Capability option provides information on HW and SW capabilities of relevant units. In an AU, the information provided in the Link Capability reports is for all associated SUs. In an SU, the Link Capability reports include information on all AUs in the neighboring AUs table (all AUs with whom the SU can communicate).

The Link Capability feature enables to adapt the configuration of the unit according to the capabilities of other relevant unit(s) to ensure optimal operation.

The Link Capability submenu includes the following options:

4.2.5.6.1 Show Link Capability-General

Select this option to view information on general parameters of relevant units. For each relevant unit, identified by its MAC address, the following details are displayed:

- **HwVer:** the hardware version of the unit.
- **CpldVer:** The version of the Complex Programmable Logic Device (CPLD) used in the unit. This parameter is available only in AUs, displaying the CPLD version in the relevant SU.
- **Country:** The 3 or 4 digits country code supported by the unit.
- **SwVer:** The SW version used by the unit. This parameter is available only in SUs, displaying the SW version in the relevant AU.
- **BootVer:** The Boot Version of the unit. This parameter is available only in AUs, displaying the Boot version in the relevant SU.

4.2.5.6.2 Show Link Capability-Wireless Link Configuration

Select this option to view information on current wireless link parameters of relevant units. For each relevant unit, identified by its MAC address, the following details are displayed:

- **ATPC Option:** Enable or Disable.
- **Adaptive Modulation Option:** Enable or Disable.
- **Burst Mode Option:** Enable or Disable.
- **DFS Option:** Enable or Disable. This parameter is available only in SUs, displaying the current option in the relevant AU.
- **Concatenation Option:** Enable or Disable.
- **Country Code Learning by SU:** Enable or Disable. This parameter is available only in SUs, displaying the current option in the relevant AU.
- **Per SU Distance Learning:** Enable or Disable. This parameter is available only in SUs, displaying the current option in the relevant AU.

4.2.5.6.3 Show Link Capability-Security Configuration

Select this option to view information on current security related parameters of relevant units. For each relevant unit, identified by its MAC address, the following details are displayed:

- **Security Mode:** WEP, AES OCB or FIPS 197.

■ **Authentication Algorithm:** Shared Key or Open System.

■ **Data Encryption Option:** Enable or Disable.

4.2.5.6.4 Show Link Capability by AU (SU only)

Select this option to view all capabilities information (General, wireless Link Configuration, Security Configuration) of a selected AU (by its MAC address).

4.2.5.6.5 Show Link Capability by SU (AU only)

Select this option to view all capabilities information (General, Wireless Link Configuration, Security Configuration) of a selected SU (by its MAC address).

4.2.6 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
- Security Parameters

4.2.6.1 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 includes the following options:

- IP Address
- Subnet Mask
- Default Gateway Address
- DHCP Client

4.2.6.1.1 IP Address

The IP Address parameter defines the IP address of the unit.

The default IP address is 10.0.0.1.

4.2.6.1.2 Subnet Mask

The Subnet Mask parameter defines the subnet mask for the IP address of the unit.

The default mask is 255.0.0.0.

4.2.6.1.3 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.

4.2.6.1.4 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
- Access to DHCP

4.2.6.1.4.1 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 above.
- 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 section [4.2.6.1.4.2](#). 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 DHCP 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 above. In addition, you must select the port(s) through which the unit searches for and communicates with the DHCP server, as described in section [4.2.6.1.4.2](#).

The default is Disable.

4.2.6.1.4.2 Access to DHCP

The Access to DHCP option enables defining the port through which the unit searches for and communicates 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.

4.2.6.1.5 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**.

4.2.6.2 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.

4.2.6.2.1 Country Code and Sub-Bands

Each country has its own regulations regarding operation modes and parameters such as allowable frequencies and bandwidth, the need to employ an automatic mechanism for detection and avoidance of frequencies used by radar systems, maximum transmit power at each of the supported modulation levels and the ability to use burst transmissions. To efficiently manage these country dependent parameters, each unit has a 'Country Code' parameter and a set of accompanying parameters, which depend on this country code. Where more than one set of parameters can be used, the available sets are defined as Sub-Bands, selectable through the Frequency configuration menu.

4.2.6.2.2 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 networks 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, the Beacon frames transmitted by it will include both the ESSID and Operator ESSID. The SU shall

regard such frames if either the ESSID or the Operator ESSID matches its 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. When the SU has become associated with a specific AU, its ESSID can be reconfigured to the value of the ESSID of the AU.

4.2.6.2.2.1 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.

4.2.6.2.2.2 Operator ESSID Parameters (AU only)

The Operator ESSID Parameters submenu includes the following parameters:

4.2.6.2.2.2.1 Operator ESSID Option

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

The default is Enable.

4.2.6.2.2.2.2 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.

4.2.6.2.3 Frequency Definition Parameters

4.2.6.2.3.1 Sub-Bands and Frequency Selection

Each unit is delivered with one or more pre-configured Sub-Bands, according to the country code. These sets of parameters include also the frequencies that can be used and the bandwidth.

The parameters that determine the frequency to be used are set in the AU. If more than one Sub-Band is available, the sub-band to be used can be selected. If only one Sub-Band is supported, then the sub-band selection option is not

available. The SU should be configured with a minimal set of parameters to ensure that it will be able to automatically detect and use the frequency/bandwidth used by the AU, including possible changes in this frequency (Automatic Sub Band Select feature).

To simplify the installation process the SU scans a definable frequencies subset after power-up. The defined frequencies subsets may include frequencies from more than one Sub-Band, enabling automatic detection of both frequency and bandwidth. If the Best AU feature is enabled, the SU will scan the defined subset and the operating frequency/bandwidth 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. If no AU is found, the SU will start another scanning cycle.

4.2.6.2.3.2 Avoiding Frequencies with Radar Activity

In some regions, it is important to ensure that wireless access equipment does not interfere with certain radar systems in the 5 GHz band. If radar is being detected, the wireless access network should move automatically to a frequency that does not interfere with the radar system.

The country dependent set of parameters includes also an indication whether DFS (Dynamic Frequency Selection) should be used. The DFS algorithm is designed to detect and avoid operation in channels with radar activity. If the current sub-band does not support DFS, then the DFS parameters configuration submenu is not available.

When the DFS Option is enabled, the AU monitors the spectrum continuously, searching for signals with a specific pattern indication radar activity. Upon detecting radar activity, the AU immediately stops transmitting on this frequency and starts looking for another radar-free frequency. The subset of viable frequencies is configurable.

The AU maintains a continuously updated database of all applicable frequencies, where each frequency is marked as Radar Free, Radar Detected or Adjacent to Radar. The AU attempts to check a new frequency only if it is marked as Radar Free. If a radar activity was detected on a certain frequency, it will be marked in the database as a Radar Detected frequency. The AU will not attempt to check for radar activity in frequencies marked as Radar Detected. A certain time after detecting radar activity on a frequency, it will be removed from the list of Radar Detected frequencies and will be marked as Radar Free. If radar activity was detected on a certain frequency, adjacent channels should not be used as well, according to the bandwidth. For instance, if the bandwidth is 20 MHz, then if radar activity was detected in 5800 MHz, frequencies 5790 MHz and 5810 MHz should not be used as well. These frequencies are marked in the database as Adjacent to Radar, and will be treated the same as Radar Detected frequencies.

Before ceasing transmission on the frequency where radar signals had been detected, the AU sends a special disassociation message to its associated SUs. This message includes an indication whether the SUs should wait for this AU. If the SUs should wait, the message includes also the waiting time. During this time each SU searches for the AU in the defined frequencies subset. If the AU was not found within the waiting time, or if a waiting request was not included in the message, the SU starts searching for any AU, using the Best AU mechanism if applicable.

Typically, operators prefer to preserve the original frequency planning and to avoid moving to a new channel unless they are sure that there is a continuous radar activity in the original channel. It should be noted that detection of radar activity does not necessarily indicate a continuous radar activity in the channel. A channel reuse algorithm enables returning to the original channel under certain conditions that indicates low radar activity on the channel.

4.2.6.2.4 Frequency Definition Submenu in AU

The Frequency Definition submenu in AU includes the following parameters:

4.2.6.2.4.1 Sub-Band Select

This parameter is available only if the country code supports two or more Sub-Bands. For information on how to view the Sub-Bands supported by the unit and the supported parameters' values and options, refer to section [4.2.2.4](#).

The range depends on the number of Sub-Bands supported by the country code.

The default selection is Sub-Band 1.

4.2.6.2.4.2 Frequency

The Frequency parameter defines the transmit/receive frequency when the DFS Option is not enabled. If the DFS Option is enabled, it sets the initial operational frequency upon starting the DFS mechanism for the first time.

The range depends on the selected Sub-Band.

The default is the lowest frequency in the Sub-Band.

**CAUTION**

- a. In units using Country Code 1023 (FCC 5.3 GHz), for full compliance with FCC regulations the Transmit Power parameter in the AU when operating at 5270 MHz with a 20 MHz bandwidth, and the Maximum Tx Power parameter in the SUs connected to this AU, should not be set to a value above “17-Antenna Gain” (The maximum allowed EIRP for 5270 MHz is 17 dBm).
- b. In units using Country Code 392 (4.9 GHz Japan, regular - not B&B point-to-point) with a 10 MHz bandwidth, the following rules must be met for full compliance with regulations:
- When operating at 4945 MHz, the Transmit Power parameter in the AU should not be set to a value above 11 dBm. The Maximum Transmit Power of the SU should not be set to a value above 10 dBm.
 - When operating at 5055 MHz, the Transmit Power parameter in the AU should not be set to a value above 13 dBm. The Maximum Transmit power of the SU should not be set to a value above 10 dBm.

This requirement, although not indicated in the certification document, is needed following the tests performed in the certification lab.

4.2.6.2.4.3 DFS Parameters

The DFS Parameters submenu is available only if DFS is supported by the current Sub-Band. The DFS Parameters submenu includes the following parameters:

4.2.6.2.4.3.1 DFS Option

The DFS Option enables or disables the radar detection and dynamic frequency selection mechanism.

The default is Enable.

4.2.6.2.4.3.2 Frequency Subset Definition

The Frequency Subset Definition parameter defines the frequencies that will be used in the DFS mechanism. The available frequencies according to the Sub-Band are displayed, and each of the frequencies in the list is associated with an index. The frequencies subset can be defined by entering the indexes of the required frequencies, or “A” to select all available frequencies.

The default is the complete list of frequencies available in the Sub-Band.

4.2.6.2.4.3.3 Channel Check Time

The Channel Check Time defines the time allocated for checking whether there is a radar activity on a new frequency after power up or after attempting to move to a new frequency upon detecting radar activity on the previously used frequency. During this time the AU does not transmit.

The range is 1 to 3600 seconds.

The default is 60 seconds.

4.2.6.2.4.3.4 Channel Avoidance Period

The Channel Avoidance Period defines the time that the frequency will remain marked in the database as Radar Detected or Adjacent to Radar after detecting radar activity. These frequencies will not be used when searching for a new frequency. When this time has elapsed, the unit frequency's marking will change to Radar Free.

The range is 1 to 60 minutes.

The default is 30 minutes.

4.2.6.2.4.3.5 SU Waiting Option

The SU Waiting Option defines whether the disassociation message sent by the AU, after detecting radar activity on the current frequency, will include a message instructing the SU to search only for the AU before attempting to search for another AU. The message includes also the time period during which the SU should not search for any other AU. The waiting time is the Channel Check Time plus 5 seconds.

The default is Enable.

4.2.6.2.4.3.6 Minimum Pulses to Detect

The Minimum Pulses to Detect parameter defines the minimum number of radar pulses that should be detected before reaching a decision that radar is active on the channel.

The range is from 1 to 100 pulses.

The default is 6 pulses.

4.2.6.2.4.3.7 Clear Radar Detected Channels After Reset

When the Clear Radar Detected Channels After Reset is enabled, after the next reset all viable frequencies will be marked in the database as Radar Free, including frequencies previously marked as either Radar Detected or Adjacent to Radar. In addition, the AU will start operation using its default frequency.

The default is Disable.

4.2.6.2.4.4 Channel Reuse Parameters (DFS+)

The Channel Reuse algorithm enables returning to the original channel under certain conditions that indicate low radar activity on the original channel. The conditions are that radar was detected in this channel not more than N times (Maximum Number of Detections in Assessment Period) during the last T hours (Radar Activity Assessment Period). When the Channel Reuse Option is enabled, then by the end of the Channel Avoidance Period the unit will attempt returning to the original frequency, provided these conditions are met.

The Channel Reuse Parameters submenu includes the following options:

- **Channel Reuse Option:** Enabling/disabling the Channel Reuse algorithm.

The default is Disable.

- **Radar Activity Assessment Period:** The period in hours used for assessment of radar activity in the original channel.

The range is 1 to 12 hours.

The default is 5 hours.

- **Maximum Number of Detections in Assessment Period:** The maximum number of radar detections in the original channel during the Radar Activity Assessment Period that is required for reaching a decision to try again the original channel.

The range is 1 to 10 radar detections.

The default is 5 radar detections.

4.2.6.2.4.4.1 Show DFS Settings And Data

Upon selecting the Show DFS Settings and Data, the values of all DFS parameters and the current operating frequency will be displayed. The current defined frequency subset as well as the defined subset (to be used after the next reset) are also displayed. In addition, all the applicable frequencies will be displayed together with their status in the database (Radar Free, Radar Detected or Adjacent to Radar).

4.2.6.2.4.5 Country Code Learning by SU

This feature support simplified installation and updates processes by enabling the SU to adapt the Country Code used by the AU.

The AU advertises its country code in every beacon and association response message. Upon synchronization the SU will check if its country code and the country code received from the AU are the same. If they are not the same and the Country Code Learning by SU is enabled, the SU will use the AU's country code: the country code derived limitations will be forced and the following parameters will be set according to new country definitions:

- Maximum TX Power will be set to the maximum defined by the country code.
- TX Power will be set to the maximum defined by the country code.

- The Modulation Level will be set to the maximum modulation level defined by the country code.
- The Multicast Modulation Level will be set to the minimum modulation level defined by the country code.
- The Burst Mode will be set to enable if the country code supports burst mode, and the burst duration will be set to default.

After country code learning (adaptation) the unit is automatically reset. Before this automatic reset, if the unit is running from the shadow version, the versions must be swapped and the running version must be set as main. This is done to avoid returning to the previous version, which occurs automatically after the reset.

The default is Enable.



NOTE

The Country Code Learning by SU feature does not function with the default ESSID (ESSID1).

4.2.6.2.4.6 Show Frequency definitions

Upon selecting Show Frequency Definitions, the selected Sub-Band and Frequency are displayed. In addition, all the parameters displayed upon selecting Show DFS Settings and Data are also displayed.

4.2.6.2.5 Frequency Definition Submenu in SU

4.2.6.2.5.1 User Defined Frequency Subsets

The User Defined Frequency Subsets menu enables defining for each of the available Sub-Bands the frequencies that will be used by the SU when scanning for an AU. For each available Sub-Band, the available frequencies are displayed, and an index is associated with each frequency. Enter either the desired frequency indexes, 'A' (All) for using all frequencies in the subset or 'N' (None) for not scanning that sub-band.

The default is all frequencies in all available sub-bands.

4.2.6.2.5.2 Show Frequency Definitions

Upon selecting the Show Frequency Definitions, the selected frequencies in the available Sub-Bands and the current operating frequency are displayed.

4.2.6.2.6 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. The same limitation also exists if only one AU

in the neighborhood has an ESSID identical to the one used by the SU, as 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 an SU to connect to the best AU in its neighborhood.

When the Best AU feature is used, each of the AUs is 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 with which it can communicate. At the end of the scanning period, the SU reaches 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 made 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:

4.2.6.2.6.1 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.

4.2.6.2.6.2 Number Of Scanning Attempts

When the Best AU option is enabled, the SU gathers information on neighboring AUs for approximately 2 seconds 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: 4.

4.2.6.2.6.3 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 which 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.

4.2.6.2.6.4 Show Best AU Parameters and Data

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

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

- **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)

4.2.6.2.7 Scanning Mode (SU only)

The Scanning Mode parameter defines whether the SU will use Passive or Active scanning when searching for an AU.

In passive scanning, the SU “listens” to the wireless medium for approximately two seconds at each frequency, searching for beacons. The disassociation period, which is the time from the moment the link was lost until the SU decides that it should start searching for another AU, is approximately seven seconds.

In some situations when there is a high probability that SUs might need to roam among different AUs, the use of active scanning enables to significantly reduce the link establishment time. This is achieved by using shorter dwell periods, transmitting a Probe Request at each frequency. This reduces the time spent at each frequency as well as the disassociation period.

When DFS Option is enabled, Scanning Mode is forced to Passive.

The default selection is Passive.

4.2.6.2.8 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 the last calculation, the lower 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 its **Transmit Power** parameters. If after a certain time the SU does not succeed to synchronize with the AU, it will start increasing the transmit power level.

In an AU the maximum supported transmit power is typically used to provide 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, or for compliance with local regulatory requirements.

In some cases the maximum transmit power of the SU should be limited to ensure compliance with applicable regulations or for other reasons.

Different power levels may be used for different modulation levels by taking into account possible HW limitations or regulatory restrictions.

4.2.6.2.8.1 Transmit Power

The Transmit Power submenu includes the following options:

- Transmit Power
- Show Transmit Power Parameters

4.2.6.2.8.1.1 Transmit Power

In the AU, the Transmit Power parameter defines the fixed transmit power level and is not part of the ATPC algorithm.

In the SU, the Transmit Power parameter defines the fixed transmit power level when the ATPC algorithm is disabled. If the ATPC Option is enabled, the value configured for this parameter serves for setting the initial value to be used by the ATPC algorithm after either power up or losing synchronization with the AU.

The minimum value for the Transmit Power Parameter is -10 dBm (the ATPC may reduce the actual transmit power of the SU to lower values). The maximum value of the Transmit Power Parameter depends on several unit properties and parameters:

- The HW revision of the unit

- The Maximum Allowed Tx Power as defined for the applicable Sub-Band.
- The Maximum EIRP as defined for the applicable Sub-Band, together with the value of the Antenna Gain. In certain countries the Maximum EIRP of some equipment types cannot exceed a certain value. In these cases the Transmit Power cannot exceed the value of (Maximum EIRP – Antenna Gain).
- Maximum Tx Power parameter (in SU only)

For information on how to view the Sub-Bands supported by the unit and the supported parameters' values and options, refer to section [4.2.2.4](#).

The unit calculates the maximum allowed Transmit Power according to the unit properties and parameters listed above, and displays the allowed range when a Transmit Power parameter is selected.

For each modulation level, the unit will use as transmit power the minimum between this parameter and the maximum Tx power allowed by the HW and the Country Code for the specific modulation level.

The default Transmit Power is the highest allowed value.

4.2.6.2.8.1.2 Show Transmit Power Parameters

This option displays the Transmit Power parameter and the current transmit power for the different modulation levels.

4.2.6.2.8.2 Maximum Transmit Power (SU only)

The Maximum Transmit Power submenu includes the following options:

- Maximum Tx Power
- Show Maximum Tx Power Parameters

4.2.6.2.8.2.1 Maximum Tx Power

The Maximum Tx Power parameter limits the maximum transmit power that can be reached by the ATPC algorithm. It also sets the upper limits for the Transmit Power parameters.

The minimum value for the Maximum Tx Power is -10 dBm. The maximum value depends on several unit properties and parameters:

- The HW revision of the unit
- The Maximum Allowed Tx Power as defined for the applicable Sub-Band.

- The Maximum EIRP as defined for the applicable Sub-Band, together with the value of the Antenna Gain. In certain countries the Maximum EIRP of some equipment types cannot exceed a certain value. In these cases the Transmit Power cannot exceed the value of (Maximum EIRP – Antenna Gain).

For information on how to view the Sub-Bands supported by the unit and the supported parameters' values and options, refer to section [4.2.2.4](#).

The unit calculates the maximum allowed Maximum Tx Power according to the unit properties and parameters listed above, and displays the allowed range when the Maximum Tx Power parameter is selected.

For each modulation level, the unit will use as maximum transmit power the minimum between this parameter and the maximum Tx power allowed by the HW and the Country Code for the specific modulation level.

The default Maximum Tx Power is the highest allowed value.

4.2.6.2.8.2.2 Show Maximum Tx Power Parameters

This option displays the Maximum Tx Power parameter and the current maximum Tx power for the different modulation levels.

4.2.6.2.8.3 ATPC Parameters in AU

4.2.6.2.8.3.1 ATPC Option

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

The default is Enable.

4.2.6.2.8.3.2 ATPC 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: 4 to 60 (dB).

Default value: 28 (dB).

4.2.6.2.8.3.3 ATPC Delta from Minimum SNR Level

The Delta from Minimum SNR Level is used to define the highest SNR at which you want each SU to be received at the AU (the higher limit of the optimal reception level range):

Max. Level = Minimum SNR Level + Delta from Minimum SNR Level.

Available values: 4 to 20 (dB).

Default value: 5 (dB) for units operating in the 5.4 and 5.8 GHz bands. 8 (dB) for units operating in the 4.9, 5.2 and 5.3 GHz bands.

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

Available values: 1 to 3600 seconds.

Default value: 30 seconds.

4.2.6.2.8.3.5 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: 1-20 (dB)

Default value: 5 (dB)

4.2.6.2.8.4 ATPC Parameters in SU

4.2.6.2.8.4.1 ATPC Option

The ATPC Option enables or disables the Automatic Transmit Power Control (ATPC) algorithm. The parameter takes effect immediately. However, when changed from Enable to Disable, the transmit power level will 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 or following loss of synchronization.

The default is Enable.

NOTE



The accuracy of the Transmit Power level is typically +/- 1 dB. However, at levels that are 15 dB or more below the maximum supported by the hardware, the accuracy is +/- 3 dB (for information on hardware limitations refer to the Country Codes document). At these levels the use of ATPC may cause significant fluctuations in the power level of the transmitted signal. When operating at such low levels, it is recommended to disable the ATPC Option and to set the Transmit Power parameter to the average Tx Power level before the ATPC was disabled.

4.2.6.2.8.5 Tx Control (AU only)

The Tx Control option enables turning Off/On the AU's transmitter, or having the AU Tx status controlled by the status of the Ethernet port/link.

If the selected option is Ethernet Status Control, then:

- If the Ethernet link is down, the AU transmitter will be switched to Off
- If the Ethernet link is up, the AU transmitter will be switched to On.

This feature can be used during maintenance or testing to avoid transmissions using undesired parameters.

The parameter is available only when managing the unit from its Ethernet port.

The default is On.

4.2.6.2.9 Antenna Gain

The Antenna Gain parameter enables to define the net gain of a detached antenna. The configured gain should take into account the attenuation of the cable connecting the antenna to the unit. The Antenna Gain is important especially in countries where there is a limit on the EIRP allowed for the unit; the maximum allowed value for the Transmit Power parameters cannot exceed the value of (EIRP - Antenna Gain), where the EIRP is defined in the selected Sub-Band.

In certain units with an integral antenna the Antenna Gain is not available as a configurable parameter. However, it is available as a read-only parameter in the applicable “Show” menus.

The range is 0 – 50 (dB). A value of “Don’t Care” means that the actual value is not important. A value of “Not Set Yet” means that the unit will not transmit until the actual value (in the range 0 to 50) is configured. The unit can be configured to “Don’t Care” or “Not Set Yet” only in factory (when upgraded to SW version 2.0 from a lower version it will be set automatically to one of these options). Once a value is configured, it is not possible to reconfigure the unit to either “Don’t Care” or “Not Set Yet”.

The default value depends on unit type. In SUs with integral antenna it is set to 21 (read only). The default value for AUs that are supplied with a detached antenna is in accordance with the antenna’s gain. In units supplied without an antenna the default is typically “Not Set Yet”.

4.2.6.2.10 Cell Distance Parameters (AU only)

The higher the distance of an SU from the AU that is serving it, the higher the time it takes for messages sent by one of them to reach the other. To ensure appropriate services to all SUs regardless of their distance from the AU while maintaining a high overall performance level, two parameters should be adapted to the distances of SUs from the serving AU:

- The time that a unit waits for a response message before retransmission (ACK timeout) should take into account the round trip propagation delay between the AU and the SU (The one-way propagation delay at 5 GHz is 3.3

microseconds per km/5 microseconds per mile.). The higher the distance from the AU of the SU served by it, the higher the ACK timeout should be.

The ACK timeout in microseconds is: $20 + \text{Distance (km)}^2 \times 3.3$ or $20 + \text{Distance (miles)}^2 \times 5$.

- To ensure fairness in the contention back-off algorithm between SUs located at different distances from the AU, the size of the time slot should also take into account the one-way propagation delay. The size of the time slot of all units in the cell should be proportional to the distance from the AU of the farthest SU served by it.

The Cell Distance Mode parameter in the AU defines the method of computing distances. When set to Manual, the Maximum Cell Distance parameter should be configured with the estimated distance of the farthest SU served by the AU. When set to Automatic, the AU uses a special algorithm to estimate its distance from each of the SUs it serves, determine which SU is located the farthest and use the estimated distance of the farthest SU as the maximum cell distance. The value of the maximum cell distance parameter (either computed or configured manually) is transmitted in the beacon messages to all SUs served by the AU, and is used by all units to calculate the size of the time slot, that must be the same for all units in the same sector. When the Per SU Distance Learning option is enabled, the AU uses the re-association message to send to each SU its estimated distance from the AU. The per-SU distance is used to calculate the ACK timeout to be used by the SU. When the Per SU Distance Learning option is disabled (or if it cannot be used because the SU uses a previous SW version that does not support this feature), the SU will use the maximum cell distance to calculate the ACK timeout. The AU always uses the maximum cell distance to calculate the ACK timeout.

It should be noted that if the size of the time slot used by all units is adapted to the distance of the farthest unit, then no unit will have an advantage when competing for services. However, this reduces the overall achievable throughput of the cell. In certain situations, the operator may decide to improve the overall throughput by reducing the slot size below the value required for full fairness. This means that when there is competition for bandwidth, the back-off algorithm will give an advantage to SUs that are located closer to the AU.

The Cell Distance Parameters menu includes the following parameters:

4.2.6.2.10.1 Cell Distance Mode

The Cell Distance Mode option defines whether the maximum distance of the AU from any of the SUs it serves will be determined manually (using the Maximum Cell Distance parameter) or automatically. In addition, the Per SU Distance Learning feature is supported only when the Cell Distance Mode is set to Automatic.

The Options are Automatic or Manual.

The default is Automatic.

4.2.6.2.10.2 Maximum Cell Distance

The Maximum Cell Distance parameter allows configuring the maximum distance when the Cell Distance Mode option is Manual.

The range is 0 to 54 (Km). The value of 0 has a special meaning for No Compensation: Acknowledge Time Out is set to a value representing the maximum distance of 54 km. The time slot size is set to its minimal value of 9 microseconds.

The default is 0 (No Compensation).

4.2.6.2.10.3 Fairness Factor

The Fairness Factor enables to define the level of fairness in providing services to different SUs. When set to 100%, all SUs have the same probability of getting services when competing for bandwidth. If set to X%, then SUs located up to X% of the maximum distance from the AU will have an advantage in getting services over SUs located farther than this distance.

The range is 0 to 100 (%)

The default is 100 (%).

4.2.6.2.10.4 Per SU Distance Learning

The Per SU Distance Learning option defines the mode in which SUs calculate the ACK timeout: based on the maximum cell distance or on the actual distance from the AU.

When this feature is disabled, all SUs in the cell use for the calculation of the ACK timeout the maximum cell distance; when enabled, each SU uses instead its actual distance from the AU.

The options are Disable or Enable.

The default is Disable.

4.2.6.2.10.5 Show Cell Distance Parameters

Select Show Cell Distance Parameters to view the Cell Distance parameters. In addition, the Measured Maximum Cell Distance and the MAC address of the unit that the mechanism found to be the farthest from the AU are displayed. A distance of 1 km means any distance below 2 km.

4.2.6.2.11 Arbitration Inter-Frame Spacing (AIFS)

The time interval between two consecutive transmissions of frames is called Inter-Frame Spacing (IFS). This is the time during which the unit determines whether the medium is idle using the carrier sense mechanism. The IFS depends on the type of the next frame to be transmitted, as follows:

- SIFS (Short Inter-Frame Spacing) is used for certain frames that should be transmitted immediately, such as ACK and CTS frames. The value of SIFS is 16 microseconds.
- DIFS (Distributed coordination function Inter-Frame Spacing) is typically used for other frame types when the medium is free. If the unit decides that the medium is not free, it will defer transmission by DIFS plus a number of time slots as determined by the Contention Window back-off algorithm (see section [4.2.6.5.2](#)) after reaching a decision that the medium has become free.

DIFS equal SIFS plus AIFS, where AIFS can be configured to one or two time slots. Typically, AIFS should be configured to two time slots. A value of 1 should only be used in one of the two units in a point-to-point link, where in the other unit the AIFS remains configured to two time slots. This ensures that the unit with AIFS configured to one has an advantage over the other unit, provided that the [Minimum Contention Window](#) (section [4.2.6.5.2](#)) parameter in both units is configured to 0 to disable the contention window back-off algorithm.

**NOTE**

The AIFS parameter is not applicable when the Wireless Link Prioritization Option is enabled.

The available options are 1 or 2 (time slots).

The default is 2 time slots.

**CAUTION**

An AIFS value of 1 should only be used in point-to-point applications (when the Wireless Link Prioritization Option is enabled). Otherwise the default value of 2 must always be used. In a point-to-point link, only one unit should be configured to an AIFS value of 1. When both units need to transmit, the unit with an AIFS value of 1 will have an advantage over the unit with AIFS of 2. In this case, the Minimum Contention Window parameter in both units must be configured to 0 to disable the contention window back-off algorithm.

4.2.6.2.12 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 for AU-BS and AU-SA range from 0 to 512. For AUS-BS and AUS-SA the range is from 0 to 8.

Default value for AU-BS and AU-SA is 512. For AUS-BS and AUS-SA the default is 8.



NOTE

When the Data Encryption Option is enabled, the actual maximum number of SUs that can associate with the AU-BS or AU-SA is limited to 124. The number displayed for the Maximum Number of Associations is the value configured for this parameter, which might be higher than the actual limit. The Maximum Number of Associations Limit (512 when Data Encryption is disabled, 124 when Data Encryption is enabled) is indicated in the Show Air Interface Parameters display.



NOTE

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

- A SNAP frame is received from another AU indicating that the SU is now associated with the other AU.
- 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. To delete inactive SUs from the database you must reset the AU.

4.2.6.2.13 Wireless Link Trap Threshold (AU only)

The Wireless Link Trap Threshold parameter defines the threshold for the wireless quality trap, indicating that the quality of the wireless link has dropped below (on trap) or has increased above (off trap) the specified threshold.

The Wireless Link Trap Threshold is in percentage of retransmissions, and the allowed range is from 1 to 100 (%).

The default is 30 (%).

4.2.6.2.14 Country Code Learning by SU (AU only)

This feature supports simplified installation and updates processes by enabling the SU to adapt the Country Code used by the AU.

The AU advertises its country code in every beacon and association response message. Upon synchronization the SU shall check if its country code and the country code received from the AU are the same. If they are not the same and the

Country Code Learning by the SU is enabled, the SU will use the AU's country code: the country code derived limitations will be forced and the following parameters will be set according to the new country definitions:

- Maximum TX Power (per modulation level) will be set to the maximum defined by the country code.
- TX Power (per modulation level) will be set to the maximum defined by the country code.
- The Modulation Level will be set to the maximum modulation level defined by the country code.
- The Multicast Modulation Level will be set to the minimum modulation level defined by the country code.
- The Burst Mode will be set to enable if the country code supports burst mode, and the burst duration will be set to default.

After country code learning (adaptation) the unit is automatically reset. Before this automatic reset, if the unit is running from the shadow version, the versions must be swapped and the running version must be set as main. This is done to avoid returning to the previous version, which occurs automatically after the reset.

The default is Enable.

4.2.6.2.15 Spectrum Analysis

Gaining knowledge of the noise characteristics per channel enables construction of a relatively noise free working environment. In order to gain information regarding noise characteristics in the location of the unit, the unit will enter passive scanning mode for a definite period, during which information will be gathered. The scanned channels will be the channels comprising the selected sub set.

Upon activating the spectrum analysis the unit will automatically reset. During the information-gathering period the unit will not receive nor transmit data. It also will not be able to synchronize/associate, meaning that it cannot be managed via the wireless link. During the spectrum analysis period the unit security mode is changed to promiscuous to enable gathering information regarding all legal frames received by the unit. At the end of the period the unit will reset automatically regaining normal operability upon start up.

The Spectrum Analysis submenu includes the following options:

4.2.6.2.15.1 Spectrum Analysis Channel Scan Period

The Spectrum Analysis Channel Scan Period is the period of staying on each channel during each cycle for information gathering when performing spectrum analysis.

Range: 2-30 seconds.

Default value: 5 seconds.

4.2.6.2.15.2 Spectrum Analysis Scan Cycles

The Spectrum Analysis Scan Cycle is the number of scanning cycles when performing Spectrum Analysis.

Range: 1-100 cycles.

Default value: 2 cycles.

4.2.6.2.15.3 Automatic Channel Selection (AU only)

The Automatic Channel selection option defines whether the AU will choose the best noise free channel upon startup after completion of the spectrum analysis process. The selection is per analysis: when the analysis is completed it will be disabled automatically.

The default is Disable.

4.2.6.2.15.4 Spectrum Analysis Activation

The Spectrum analysis Activation option enables activation of the spectrum analysis process. Upon activation, the unit will reset automatically and start-up in spectrum analysis mode.

4.2.6.2.15.5 Reset Spectrum Analysis Information

The Reset Spectrum Analysis Information option enables resetting the spectrum analysis counters.

4.2.6.2.15.6 Spectrum Analysis Information Display

The Spectrum Analysis Information Display option enables viewing the results of the last analysis process. The displayed information includes the following details for each channel:

- **Frequency in MHz**

- **Signal Count:** The number of signals (excluding OFDM frames with the correct bandwidth) in the channel.

- **Signal SNR:** The approximate SNR of signals (excluding OFDM frames with the correct bandwidth) in the channel.

- **Signal Width:** The average width in microseconds of signals (excluding OFDM frames with the correct bandwidth) in the channel.
- **OFDM Frames:** The number of OFDM frames with the correct bandwidth detected in the channel.

4.2.6.2.15.7 Spectrum Analysis Information Display - Continuous

The Spectrum Analysis Information Display - Continuous option is available only when the analysis process is active. It enables viewing the continuously updated results of the current analysis process. The displayed information includes the same details available for a regular Spectrum Analysis Information Display option.

4.2.6.2.16 Lost Beacons Transmission Watchdog Threshold

When it is unable to send beacon frames for a predetermined period of time, such as in the case of interferences, the AU resets itself. The Lost Beacons Transmission Threshold parameter represents the number of consecutive lost beacons after which the unit will reset itself.

The range for this parameter is 100 – 1000 or 0. When the parameter is set to 0, this feature is disabled, i.e. internal refresh will never be performed.

The default value is 218.

4.2.6.2.17 Disassociate (AU only)

The Disassociate feature enables disassociating all SUs associated with the AU or a selected SU. This feature is useful during configuration changes, enabling to force the SU(s) to re-initiate the association process, including the search for the best AU (or a preferred AU) using the Best AU process, without performing a full reset.

The Disassociate submenu includes two options:

- **Disassociate All SUs**
- **Disassociate SU By MAC Address:** to disassociate a selected SU

4.2.6.2.18 Noise Immunity Control

The Adaptive Noise Immunity (ANI) mechanism is designed to reduce the wireless physical layer errors and by that enhance the AU processing power of the unit, delivering higher packet processing efficiency.

This ANI mechanism is triggered by the rate of detected Physical Errors and it is modifying different thresholds affecting the immunity to specific interference types.

This feature, active by default, exists in all units with HW revision C and higher running SW version 3.0 and higher. Starting in SW version 4.0, the processing power of the system has been increased dramatically. When using version 4.0 the units are capable to process more packets per seconds, including physical error packets. As a result, the ANI mechanism (triggered by the number of received error packets) may not function properly in certain scenarios, resulting in link performances that are far below the expectations. The option of manually controlling the various parameters used by the ANI mechanism enables to achieve optimal performance in certain deployments where the automatic ANI mechanism may not function properly.

It is strongly recommended to consult with Alvarion experts before switching to manual mode and modifying any of the parameters.

The general rules for using the Noise Immunity Control parameters are:

In the SU, if performance (Modulation Level) is lower than expected based on the SNR, try switching to Manual mode without changing any of the parameters.



CAUTION

Do not change any of the SU's Noise Immunity Control parameters (except the Noise Immunity State Control) from remote, as it may result in loss of connectivity to the unit.

In the AU, try switching to Manual mode if overall throughput is too low or if SUs are lost although communication conditions are sufficient for good connectivity.

In many deployments the transition to Manual mode is sufficient. If not, you may try changing the Noise Immunity Level and/or Spur Immunity Level parameters. The target is to reduce the amount of Phy Error rate reported by the unit (see **Total Rx events** on page 109). To ensure that sensitivity is not reduced too much and SUs are not lost, verify that the Age (see **Display Association Info** on page 113) of all SUs is below 20 seconds.

Do not activate the OFDM Weak Signal parameter if the SNR is below 36 dBm. Under normal conditions, the OFDM Weak Signal should never be activated in the AU, since the SNR of all SUs will be below 36 dBm when ATPC is enabled.

The Noise Immunity Control submenu includes the following options:

4.2.6.2.18.1 Noise Immunity State Control

The Noise Immunity State Control defines the activation mode of the Adaptive Noise Immunity mechanism: Automatic or Manual. The following parameters of the Noise Immunity Control mechanism are applicable only for Manual mode.

The default is Automatic.

4.2.6.2.18.2 Noise Immunity Level

The Noise Immunity Level parameter sets the threshold for immunity against broadband interfering signals. A higher value may reduce the number of errors at the expense of reduced sensitivity.

The range is from 0 to 4. In the current version only 0 and 4 should be used.

The default is 0.

4.2.6.2.18.3 Spur Immunity Level

The Spur Immunity Level parameter sets the threshold for immunity against narrow band interfering signals such as spurious from signals at other frequencies. A higher value may reduce the number of errors at the expense of reduced sensitivity.

The range is from 0 to 7.

The default is 0.

4.2.6.2.18.4 OFDM Weak Signal

The OFDM Weak Signal parameter sets the threshold for immunity against interfering OFDM signals.

The available options are 0 or 1. A value of 1 means that the unit will immediately reject OFDM packets with a relatively SNR.

The default is 0.

4.2.6.2.18.5 Pulse Detection Sensitivity

The Pulse Detection Sensitivity parameter affects the Phy error count: If it is set to Low, then all Phy errors will be reported as regular Phy errors, regardless of the signal level. If it is set to High, all Phy errors with levels below a certain threshold (not accessible to the user) will be reported as regular Phy errors, while those with levels higher than the threshold will be reported as detected radar pulses.

When DFS (radar detection) is used, the Pulse Detection Sensitivity cannot be set to Low (forced to high). When Spectrum Analyzer is running, the Pulse Detection Sensitivity is automatically forced to high for the duration of the test.

The default is High.

4.2.6.2.18.6 Show Noise Immunity

Select this option to view the current values of the Noise Immunity Control parameters, and some additional parameters of the ANI mechanism.

4.2.6.3 Network Management Parameters

The Network Management Parameters menu enables protecting the Unit from unauthorized access by defining a set of discrete IP addresses as well as IP address ranges from which the unit can be managed using protocols such as Telnet, FTP, TFTP, SNMP, DHCP and ICMP. This excludes management messages generated in the unit, such as Traps or Ping Test frames, which are not filtered. The direction from which management access is permitted can also be configured, which means that management access may be permitted from the wireless medium only, from the wired Ethernet only, or from both.

The Network Management Menu also enables managing transmission of traps, including definition of up to 10 traps destination IP addresses and the associated community strings. In addition, the menu enables specifying the IP address of a connected AP client device to facilitate remote management of a BreezeACCESS WI² system.

The Network Management Parameters menu includes the following options:

- Access to Network Management
- Network Management Filtering
- Set Network Management IP address
- Delete a Network Management IP Address
- Delete All Network Management IP Addresses
- Set/Change Network Management IP Address Ranges
- SNMP Traps
- AP Client IP Address (SU only)

4.2.6.3.1 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 and Wireless Link

The default selection is From Both Ethernet and Wireless Link.

**CAUTION**

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.

4.2.6.3.2 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 either the Network Management IP Addresses list or in the Network Management IP Address Ranges list, 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.
- **Activate IP Filter on Ethernet Port:** Applicable only if the Access to Network Management parameter is configured to either From Ethernet Only or From Both Ethernet and 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 and Wireless Link then no IP address based filtering is configured for the wireless port.
- **Activate IP Filter 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 and 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 and Wireless Link then no IP address based filtering is configured for the Ethernet port.
- **Activate IP filter on Both Ethernet and Wireless Link Ports:** 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.

4.2.6.3.3 Set Network Management IP Address

The Set Network Management IP Address option enables defining up to 10 IP addresses of devices that can manage the unit if the Network Management Filtering option is enabled.

The default Network Management IP Address is 0.0.0.0 (all 10 addresses).

4.2.6.3.4 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.

4.2.6.3.5 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.

4.2.6.3.6 Set/Change Network Management IP Address Ranges

The Set/Change Network Management IP address Ranges menu enables defining, updating or deleting IP address ranges from which the unit can be managed if the Network Management Filtering option is enabled. This is in addition to the previous options in the Network Management menu that enable defining, updating and deleting discrete IP addresses.

The menu includes the following options:

4.2.6.3.6.1 Set/Change Network Management IP Address Ranges

The Set/Change Network Management IP Address Ranges option enables defining/updating up to 10 IP address ranges from which the unit can be managed if the Network Management Filtering option is enabled.

The default Network Management IP Address Range is 0.0.0.0 TO 0.0.0.0 (all 10 ranges).

A range can be defined using a string that includes either a start and end address, in the format “<start address> to <end address>” (example: 192.168.1.1 to 192.168.1.255), or a base address and a mask, in the format “<base address> mask <mask>” (example: 192.168.1.1 mask 255.255.255.0).

4.2.6.3.6.2 Delete Network Management IP Address Range

The Delete Network Management IP Address Range option enables deleting IP address range entries from the Network Management IP Address Ranges list.

4.2.6.3.6.3 Delete All Network Management IP Address Ranges

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

4.2.6.3.7 SNMP Traps

The SNMP submenu enables or disables the transmission of SNMP Traps. If this option is enabled, up to 10 IP addresses of stations to which SNMP traps are sent can be defined.

4.2.6.3.7.1 Send SNMP Traps

The Send SNMP Traps option enables or disables the sending of SNMP traps.

The default selection is Disable.

4.2.6.3.7.2 SNMP Traps Destination IP Addresses

The SNMP Traps Destination IP Addresses submenu enables defining up to 10 IP addresses of devices to which the SNMP Traps are to be sent.

The default of all 10 SNMP Traps IP destinations is 0.0.0.0.

4.2.6.3.7.3 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 10 addresses is “public”, which is the default Read community.

4.2.6.3.7.4 Delete One Trap Address

The Delete One Trap Address option enables deleting Trap address entries from the SNMP Traps Addresses list.

4.2.6.3.7.5 Delete All Trap Addresses

The Delete All Trap Addresses option enables deleting all entries from the SNMP Traps Addresses list.

4.2.6.3.8 AP Client IP Address (SU Only)

The BreezeACCESS WI² system comprises a self-contained combination of an advanced WiFi Access Point and a BreezeACCESS SU-ODU that provides backhaul connectivity. The AP Client IP Address parameter enables the installer to configure in the SU the IP address of the WiFi AP connected to it, providing availability of the IP address information for remote management of the AP.

The default AP Client IP Address is 0.0.0.0 (meaning none).

4.2.6.4 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.

The Bridge Parameters menu includes the following options:

- VLAN Support
- Ethernet Broadcast Filtering (SU only)
- Ethernet Broadcast/Multicast Limiter
- Bridge Aging Time
- Roaming Option (SU only)
- Broadcast Relaying (AU only)
- Unicast Relaying (AU only)
- MAC Address List (AU only)

4.2.6.4.1 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 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 system also supports the 802.1 QinQ standard, which defines the way to have 2 VLAN tags (double-tagged frames). This procedure allows an additional VLAN tag, called Service Provider VLAN tag, to be inserted into an existing IEEE 802.1Q tagged Ethernet frame. This is a solution to transport multiple customers' VLANs across the service provider's network without interfering with each other.

The VLAN Support menu includes the following parameters:

- VLAN Link Type

- VLAN ID – Data (SU only)
- VLAN ID – Management
- Service Provider VLAN ID (SU only)
- VLAN Forwarding
- VLAN Relaying (AU only)
- VLAN Traffic Priority
- VLAN QinQ Protocol Ethertype

4.2.6.4.1.1 VLAN ID-Data (SU only)

The VLAN ID-Data is applicable only when the VLAN Link Type parameter is set to Access Link. 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 purposes only.

4.2.6.4.1.2 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), DHCP 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 single-tagged management frames with a matching VLAN ID, or double-tagged management frames with a matching Service Provider 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):

- For Access, Trunk and Hybrid links: Only untagged management frames received on either the Ethernet or wireless link ports are forwarded to the unit.
- An AU operating in Service Provider link mode with VLAN ID – Management = 65535 cannot be managed from either the Ethernet or wireless ports.
- An SU operating in Service Provider link mode with VLAN ID – Management = 65535 will accept untagged management frames from the Ethernet port. From the wireless port it will accept only tagged frames with a VLAN ID tag that matches the defined Service Provider VLAN ID.
- 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, Trunk Link and Service Provider Link options for some restrictions when configuring this parameter.

Table 4-5: VLAN Management Port Functionality	
Action	Management Port - Internal
Receive from Ethernet when Link Type is Access, Trunk or Hybrid	Tagged frames, matching VID-M Untagged frames when VID-M=65535
Receive from Ethernet when Link Type is Service Provider	Tagged frames, matching VID-M
Receive from Wireless when Link Type is Access, Trunk or Hybrid	Tagged frames, matching VID-M Untagged frames when VID-M=65535
Receive from wireless when Link Type is Service Provider	Tagged frames, matching VID-M
Transmit	Insert VID-M, PID-M

Table Legend:

- **VID-M:** VLAN ID-Management
- **PID-M:** VLAN Priority-Management

4.2.6.4.1.3 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, Access Link and Service Provider Link (Access Link option is available only in SUs).

The default selection is Hybrid Link.

4.2.6.4.1.3.1 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 4-6 summarizes the functionality of the data port for an Access link.

Table 4-6: VLAN Data Port Functionality - Access Link	
Action	Data Port - SU
Receive 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

4.2.6.4.1.3.2 Trunk Link

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

**CAUTION**

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 4-7 summarizes the functionality of the data port for a Trunk link.

Table 4-7: VLAN Data Port Functionality - Trunk Link	
Action	Data Port – AU and SU
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

4.2.6.4.1.3.3 Hybrid Link

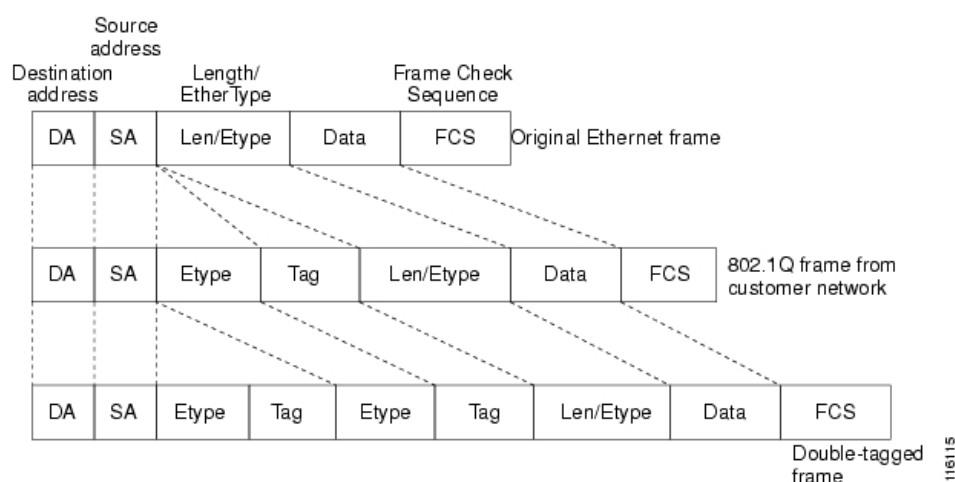
Hybrid Link transfers both tagged and untagged frames, as the devices connected to the unit can be either VLAN aware or VLAN unaware. This is equivalent to defining no VLAN support, as the unit is transparent to VLAN.

Table 4-8 summarizes the functionality of the data port for a Hybrid link.

Table 4-8: VLAN Data Port Functionality - Hybrid Link	
Action	Data Port – AU and SU
Accept from Ethernet	All
Accept from Wireless	All
Tag Insert	No
Tag Remove	No

4.2.6.4.1.3.4 Service Provider Link

A Service Provider Link transfers both single tagged frames (Service Provider tag) and double-tagged frames (Service Provider tag + Customer tag). The Service Provider tag includes the Service Provider VLAN ID and the VLAN QinQ Ethertype.



The following tables summarize the functionality of the SU/AU data port for a Service Provider Link.

Table 4-9: VLAN Data Port Functionality for SU - Service Provider Link	
Action	Data Port –SU
Accept from Ethernet	Untagged frames Single tagged frames: <ul style="list-style-type: none"> ■ If Forwarding is disabled ■ If Forwarding is enabled, only frames with VLAN ID values which are included in the Forwarding List
Accept from Wireless	Single tagged frames: only frames with a Service Provider tag whose parameters match the Service Provider parameters defined in the unit (Service Provider VLAN ID and VLAN QinQ Ethertype) Double tagged frames: only frames with a Service Provider tag whose parameters match the Service Provider parameters defined in the unit (Service Provider VLAN ID and VLAN QinQ Ethertype). If Forwarding is enabled, only frames with Customer VLAN ID values that are included in the Forwarding List
Tag Insert	Service Provider (SP) tag (to wireless)
Tag Remove	Yes (to Ethernet)

Table 4-10: VLAN Data Port Functionality for AU - Service Provider Link

Action	Data Port –AU
Accept from Ethernet	Single tagged frames: <ul style="list-style-type: none"> ■ If Forwarding is disabled ■ If Forwarding is enabled, only frames with VLAN ID values which are included in the Forwarding List Double tagged frames: <ul style="list-style-type: none"> ■ If Forwarding is disabled ■ If Forwarding is enabled, only frames with Service Provider VLAN ID values which are included in the Forwarding List
Accept from Wireless	Single tagged frames: <ul style="list-style-type: none"> ■ If Forwarding is disabled ■ If Forwarding is enabled, only frames with VLAN ID values which are included in the Forwarding List Double tagged frames: <ul style="list-style-type: none"> ■ If Forwarding is disabled ■ If Forwarding is enabled, only frames with Service Provider VLAN ID values which are included in the Forwarding List
Tag Insert	No
Tag Remove	No

NOTE

The following units management limitations apply when using a Service Provider Link:

- The unit can be managed only with tagged frames: VLAN ID – Management must be other than 65535.
- To enable proper management, all units in a cell (the AU and all SUs served by it) must use the VLAN ID - Management.
- The VLAN ID – Management must differ from the Customer's VLAN ID - Data.

4.2.6.4.1.4 VLAN Forwarding (AU and SU)

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

The VLAN Forwarding submenu provides the following options:

4.2.6.4.1.4.1 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.

4.2.6.4.1.4.2 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.

4.2.6.4.1.4.3 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.

4.2.6.4.1.4.4 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.

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.

4.2.6.4.1.5 VLAN Relaying (AU only)

The VLAN Relaying feature is applicable only for Trunk Links and Service Provider Links. It enables defining the VLAN ID values to be included in the VLAN Relaying List.

If the Link Type is defined as either a Trunk Link or a Service Provider 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 (or a Service Provider 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:

4.2.6.4.1.5.1 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.

4.2.6.4.1.5.2 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.

4.2.6.4.1.5.3 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.

4.2.6.4.1.5.4 Show VLAN ID Relaying List

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



NOTE

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.

4.2.6.4.1.6 Service Provider VLAN ID (SU only)

The Service Provider VLAN ID is applicable only when the VLAN Link Type parameter is set to Service Provider Link. It enables defining the Service Provider VLAN ID for data frames, which identifies the Service Provider VLAN to which the unit belongs.

The range is 1 to 4094.

The default value is 1.

The Service provider VLAN ID affects frames received from the wireless link port, as follows:

- Both single-tagged frames (having Service Provider VLAN ID tag) and double-tagged frames (having Service Provider VLAN ID and customer VLAN ID tags) with matching VLAN ID are forwarded to the Ethernet Port (provided the Ethertype of the tag matches the configured VLAN QinQ Ethertype).

- Before transmitting the frames to the Ethernet port, the Service Provider VLAN ID tag is removed.

The Service Provider VLAN ID affects frames received from the Ethernet link port, as follows: A Service Provider tag, that includes the configured Service Provider VLAN ID (and the VLAN QinQ Ethertype) is inserted in all frames, both tagged and untagged, before transmission to the wireless link.

4.2.6.4.1.7 VLAN Traffic Priority

The VLAN Traffic Priority menu enables configuring the VLAN Priority field in applicable frames. These parameters only impact the way in which other VLAN aware devices in the network will handle the packet. All parameters that affect prioritization within the BreezeACCES VL system, including VLAN-based prioritization, are located in the Traffic Prioritization menu.

The VLAN Traffic Priority menu includes the following parameters:

- VLAN Priority – Data (SU only)
- VLAN Priority – Management

4.2.6.4.1.7.1 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 other VLAN aware devices handle the packet.

Valid values range from 0 to 7.

The default value is 0.

4.2.6.4.1.7.2 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.

4.2.6.4.1.8 VLAN QinQ Protocol Ethertype

The VLAN QinQ Protocol Ethertype parameter sets the Ethertype of the Service Provider tag, and is applicable only for Service Provider Links.

The valid values are from 8100 to 9000, 9100 and 9200 (Hex).

The default value is 8100 (Hex).

4.2.6.4.1.9 Show VLAN Parameters

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

4.2.6.4.2 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 medium 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 Broadcast Filtering menu includes the following parameters:

- Filter Options
- DHCP Broadcast Override Filter
- PPPoE Broadcast Override Filter
- ARP Broadcast Override Filter

4.2.6.4.2.1 Filter Options

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

- **Disable** - no Ethernet Broadcast Filtering.
- **On Ethernet Port Only** - filters broadcast messages received from the Ethernet port.
- **On Wireless Port Only** - filters broadcast messages received from the wireless link port.
- **On Both Ethernet and Wireless Ports** - filters broadcast messages received from both the Ethernet and wireless link ports.

The default selection is Disable.

4.2.6.4.2.2 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** - DHCP Broadcast messages are filtered or transmitted according to the general filtering criteria in the Filter Options parameter.
- **Enable** - DHCP Broadcast messages are transmitted regardless of the selected value of the Filter Options parameter.

The default selection is Disable.

4.2.6.4.2.3 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** - PPPoE Broadcast messages are filtered or transmitted according to the general filtering criteria in the Filter Options parameter.
- **Enable** - PPPoE Broadcast messages are transmitted regardless of the selected value of the Filter Options parameter.

The default selection is Disable.

4.2.6.4.2.4 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** - ARP messages are filtered or transmitted according to the general filtering criteria in the Filter Options parameter.
- **Enable** - ARP messages are transmitted regardless of the selected value of the Filter Options parameter.

The default selection is Enable.

4.2.6.4.3 Ethernet Broadcast/Multicast Limiter

The Ethernet Broadcast/Multicast Limiter parameters, available in both AU and SU, enable to limit the number of broadcast and/or multicast packets that can be transmitted per second, in order to prevent the potential flooding of the wireless medium by certain ARP attacks.

In SUs, the limiter is placed after the Ethernet Broadcast Filters. For this reason, the limiter will receive only the packets that pass through these filters. If the Ethernet filters of the SU are disabled, the limiter will be applied to all relevant packets received.

When the Ethernet Broadcast/Multicast Limiter is enabled and the specified limit is reached, the unit will send a trap. The trap will be sent periodically till the number of broadcast/multicast packets will be less than the maximum. The trap will inform the user how many packets were discarded in the last period.

The Ethernet Broadcast/Multicast Limiter menu allows viewing and setting the following parameters:

4.2.6.4.3.1 Ethernet Broadcast/Multicast Limiter Option

The Ethernet Broadcast/Multicast Limiter Option defines the limiter's functionality. The available options are:

- Disable: No limiter
- Limit only Broadcast Packets
- Limit Multicast Packets that are not Broadcasts
- Limit All Multicast Packets (including broadcast)

The default selection is Disable.

4.2.6.4.3.2 Ethernet Broadcast/Multicast Limiter Threshold

The Ethernet Broadcast/Multicast Limiter Threshold defines the maximum number of packets per second that will pass the limiter when it is enabled.

The range is from 0 to 204800 (packets/second).

The default is 50 packets.

4.2.6.4.3.3 Ethernet Broadcast/Multicast Limiter Send Trap Interval

The Ethernet Broadcast/Multicast Limiter Send Trap Interval defines the minimum time in minutes between two consecutive transmissions of the trap indicating the number of packets that were dropped by the limiter since the previous trap (or since the time that the limit has been exceeded).

The range is from 1 to 60 minutes.

The default is 5 minutes.

4.2.6.4.4 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 20 to 2000 seconds.

The default value is 300 seconds.

4.2.6.4.5 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.

4.2.6.4.6 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.

4.2.6.4.7 MAC Address List (AU only)

The MAC Address List submenu enables to define a list of up to 100 MAC addresses as belonging to devices that are either granted or denied service. When the list is defined as a Deny List, the AU will not provide services to a unit whose MAC address is included in the list, enabling to disconnect units in cases such as when the user had fraudulently succeeded to configure the unit to values different from the subscription plan. When the list is defined as an Allow List, the AU will provide services only to units with a MAC address that is included in the list.

The MAC Address List submenu includes the following:

4.2.6.4.7.1 Add MAC Address to List

Select Add MAC Address to List to add a MAC Address to the List.

4.2.6.4.7.2 Remove MAC Address from List

Select Remove MAC Address from List to remove a MAC Address from the List.

4.2.6.4.7.3 MAC Address List Action

This parameter defines the working mode of the MAC list:

- In the case of an Allowed list, if the MAC address is included in the list, the SU will be able to associate itself with the AU and receive permission for generating traffic; if it is not found in the list, it will still be associated but without the permission to generate traffic.
- In the case of a Deny list, if the MAC address is included in the list, the SU will be able to associate itself with the AU but will not be able to generate traffic; otherwise (if the address is not found in the list) the SU will be associated and will be able to generate traffic.

Possible options for this parameter are Deny and Allow.

The default is Deny.

4.2.6.4.7.4 Show MAC Address List

Select Show MAC Address List to display the current list of MAC Addresses included in the List and the selected List Action.

4.2.6.4.8 Roaming Option (SU only)

The Roaming Option defines the roaming support of the unit. When roaming is not expected, it is preferable to set this parameter to Disable. This will cause the unit to start scanning for another AU after losing connectivity with the current AU only after 7 seconds during which no beacons were received from the current AU. This will prevent scanning for another AU in cases where no beacons were received due to a short temporary problem.

When set to Enable, the SU will wait only one second before it starts scanning for another AU. In addition, when the Roaming Option is enabled, the SU will send Roaming SNAP messages upon associating with a new AU. This enables fast distribution of the new location for all clients that are behind the SU. In this case, the SU will send multicast SNAP messages via the wireless link each time it associates with a new AU, except for the first association after reset. The SU will send one SNAP message for each client learned on its Ethernet port, based on its bridging table. In the SNAP message the clients' MAC address is used as the source address. The AU that receives this SNAP message learns from it the new location of the clients. It forwards the SNAP to other AUs and Layer-2 networking equipment via its Ethernet port, to facilitate uninterrupted connectivity and

correct routing of transmissions to these clients. The new AU as well as the previous AU with which the SU was associated, will forward the SNAP messages to all other SUs associated with them.

The default is Disable.

4.2.6.4.9 Ports Control (SU only)

The Ports Control sub-menu includes the Ethernet Port Control option:

4.2.6.4.9.1 Ethernet Port Control

The Ethernet Port Control option allows enabling or disabling non-management traffic to/from the Ethernet port. When changed to Disable, all current data sessions will be terminated. The unit is still manageable via the Ethernet port even if it is disabled for data traffic.

The default selection is Enable.

4.2.6.4.10 Show Bridge Parameters

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

4.2.6.5 Performance Parameters

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

The Performance Parameters menu includes the following parameters:

- RTS Threshold
- Minimum Contention Window
- Maximum Contention Window
- Multicast Modulation Level (AU only)
- Maximum Modulation Level
- Average SNR Memory Factor
- Number of HW Retries
- Burst Mode
- Adaptive Modulation Algorithm
- Concatenation Parameters

4.2.6.5.1 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 4032 bytes for units with HW revision C, and 20 to 2200 for units with HW revision A or B.

The default value is 60 bytes for SUs. For AUs with HW revision C the default is 4032, and for AUs with HW revision A or B the default is 2200. It is recommended that these values be used to ensure that RTS/CTS is never used in the AU.

4.2.6.5.2 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 medium 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 medium. The method requires each station to choose a random number N between 0 and a given number C each time it wants to access the medium. The unit will attempt to access the medium only after a time equal to DIFS (for more details refer to section [4.2.6.2.11](#)) plus N time slots, always checking if a different unit has accessed the medium before. Each time the unit tries to transmit and a collision occurs; 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. In addition, when the Wireless Link Prioritization Option is enabled, the Minimum and Maximum Contention Window parameters can be configured to provide certain units with an advantage over other units.

The available values are 0, 7, 15, 31, 63, 127, 255, 511 and 1023. A value of 0 means that the contention window algorithm is not used and that the unit will attempt to access the medium immediately after a time equal to DIFS.

The default value is 15.



CAUTION

A value of 0 disables the contention window back-off algorithm. It should only be used in point-to-point applications. For more details on configuring units in a point-to-point link refer to section [4.2.6.2.11](#).

4.2.6.5.3 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.

4.2.6.5.4 Multicast Modulation Level (AU only)

The Multicast Modulation Level parameter defines the modulation level used for transmitting multicast and broadcast data frames. 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 modulation level for broadcast and multicast frame transmissions to increase the probability that they are received without errors.

The Multicast Modulation Level parameter is applicable only to data frames. Beacons and other wireless management and control frames are always transmitted at the lowest modulation level according to the Sub-Band.

The minimum value for the Multicast Modulation Level is defined by the Sub-Band in use.

The maximum value for the Multicast Modulation Level is defined by the Sub-Band in use and the HW revision of the unit. Units with HW revision A support a maximum value of 7, while units with HW revision B and higher support a maximum value of 8.

For information on how to view the Sub-Bands supported by the unit and the supported parameters' values and options, refer to section [4.2.2.4](#).

The default value is the lowest supported modulation level.

4.2.6.5.5 Maximum Modulation Level

When the Adaptive Modulation Algorithm (see section [4.2.6.5.9](#)) is enabled, it changes the modulation level dynamically according to link conditions. The purpose is to increase the probability of using the maximum possible modulation level at any given moment. Although the algorithm will avoid using modulation levels that are too high for the prevailing link conditions, it might be better under certain conditions to limit the use of higher modulation levels. If the link quality is not sufficient, it is recommended that the maximum modulation level be decreased, as higher modulation levels increase the error rate. In such conditions, a higher Maximum Modulation Level increases the number or retransmissions before the modulation level is being reduced by the Adaptive Modulation Algorithm. A high number of retransmissions reduces 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 modulation level of the SU be decreased in accordance with Table 4-11, 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 Adaptive Modulation Algorithm is disabled, this parameter will serve to determine Fixed Modulation Level used for transmissions.

The minimum value for the Maximum Modulation Level is defined by the Sub-Band in use.

The maximum value for the Maximum Modulation Level is defined by the Sub-Band in use and the HW revision of the unit. Units with HW revision A support a maximum value of 7, while units with HW revision B and higher support a maximum value of 8.

For information on how to view the Sub-Bands supported by the unit and the supported parameters' values and options, refer to section [4.2.2.4](#).

The default is the highest supported Modulation Level.

Table 4-11: Recommended Maximum Modulation Level*	
SNR	Maximum Modulation Level
SNR > 23 dB	8
21 dB < SNR < 23 dB	7
16 dB < SNR < 21 dB	6
13 dB < SNR < 16 dB	5
10 dB < SNR < 13 dB	4
8 dB < SNR < 10 dB	3
7 dB < SNR < 8 dB	2
6 dB < SNR < 7 dB	1

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

4.2.6.5.6 Average SNR Memory Factor

The Average SNR Memory Factor defines the weight of history (value of last calculated average SNR) in the formula used for calculating the current average SNR for received data frames. This average SNR is used by the ATPC algorithm in the AU and is also included in the Adaptive Modulation Algorithm information messages transmitted by the AU and the SU. 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

4.2.6.5.7 Number of HW Retries

The Number of HW Retries parameter defines the maximum number of times that an unacknowledged packet is retransmitted. When the Adaptive Modulation Algorithm 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 the Adaptive Modulation Algorithm is enabled, refer to section [4.2.6.5.9](#).



NOTE

The Number of HW Retries parameter is not applicable when the Wireless Link Prioritization Option is enabled.

The available values range is from 1 to 14.

The default value is 10.

4.2.6.5.8 Burst Mode

Burst mode provides an increased throughput by reducing the overhead associated with transmissions in the wireless medium. In a burst transmission the inter-frame spacing is reduced and unicast data frames are transmitted without any contention period (burst mode is not activated on broadcasts/multicasts).

The Burst Mode is available only if Burst Mode is supported by the Sub-Band in use. For information on how to view the Sub-Bands supported by the unit and the supported parameters' values and options, refer to section [4.2.2.4](#).

In AUs with HW Revision B or lower, Burst Mode cannot be activated when the DFS option is used. In AUs with HW Revision B or lower, the Burst Mode option will be “blocked” upon trying to enable Burst Mode when the DFS Option is enabled. This limitation does not apply to AUs with HW Revision C.

In SUs and AUs with HW Revision B or lower, Burst Mode cannot be activated when using WEP for data encryption. In units with HW Revision B or lower, the Burst Mode option will be “blocked” upon trying to enable it when using WEP for data encryption. This limitation does not apply to units with HW Revision C.



NOTE

The Burst Mode parameters are not applicable when the Wireless Link Prioritization Option is enabled.

4.2.6.5.8.1 Burst Mode Option

The Burst Mode Option enables or disables the Burst Mode operation.

The default is Enable.

4.2.6.5.8.2 Burst Mode Time Interval

The Burst Mode Time Interval defines the burst size, which is the time in which data frames are sent immediately without contending for the wireless medium.

The range is 1 to the value of the Maximum Burst Duration defined for the Sub-Band.

The default is 5 milliseconds or the value of Maximum Burst Duration defined for the Sub-Band (the lower of the two values).

4.2.6.5.9 Adaptive Modulation Algorithm (Multi Rate)

The Adaptive Modulation Algorithm enables adapting the modulation level of transmitted data to the prevailing conditions of the applicable radio link. The algorithm provides Access Units with simultaneous, adaptive support for multiple Subscriber Units at different modulation levels, as transmission's modulation level decisions are made separately for each associated SU.

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

The decisions made by the Adaptive Modulation Algorithm for the modulation level to be used are based on multiple parameters, including information on received signal quality (SNR) that is received periodically from the destination 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:

- 1 Each new frame (first transmission attempt) will be transmitted at a modulation level selected by the Adaptive Modulation algorithm.
- 2 If first transmission trial has failed, the frame will be retransmitted at the same modulation level up to the maximum number of retransmission attempts defined by the Number of HW Retries parameter.

The Adaptive Modulation Parameters menu includes the following parameters:

4.2.6.5.9.1 Adaptive Modulation Option

The Adaptive Modulation Option enables or disables the Adaptive Modulation decision algorithm. When enabled, the algorithm supports decrease/increase of transmission's modulation levels between the lowest possible level to the value configured for the Maximum Modulation Level parameter. If the Maximum Modulation Level is set at the lowest possible level, the Adaptive Modulation algorithm has no effect.

The default selection is Enable.

4.2.6.5.9.2 Minimum Interval Between Adaptive Modulation Messages

The Minimum Interval Between Adaptive Modulation Messages sets the minimum interval between two consecutive adaptive modulation messages, carrying information on the SNR of received signals. The messages in the AU include SNR information on all the SUs associated with it.

The available range is from 1 to 3600 seconds.

The default is 4 seconds.

4.2.6.5.9.3 Adaptive Modulation Decision Thresholds

Enables selection between Normal and High decision thresholds for the Adaptive Modulation algorithm. In links with a low SNR (below 13), the Adaptive Modulation algorithm may not stabilize on the correct modulation level when using the standard decision thresholds. In this case the algorithm may try to use a modulation level that is too high, resulting in a relatively large number of dropped frames. The “High” option solves this limitation and ensures good performance also in links with a low SNR.

The default is Normal.

4.2.6.5.10 Concatenation Parameters

The Concatenation mechanism enables bundling several data frames into a single frame for transmission to the wireless link. This feature improves throughput and reduces the overhead in the wireless medium, by requiring only one CRC for each concatenated frame, one RTS/CTS cycle if applicable, and a single waiting period according to the contention window mechanism before transmission. When concatenation is enabled, data packets in the queue of the internal bridge can be accumulated before the concatenated frame is transmitted to the wireless medium. Data frames can be accumulated up to a maximum frame size of 2200 bytes for units with HW revision A or B, or 4032 bytes for units with HW revision C or higher. In the AU, the concatenation process is performed separately for each destination SU.

NOTE



Using the Link Capability exchange mechanism, each unit learns the HW Revision and the SW Version of the unit(s) associated with it. A concatenated frame with a length exceeding 2200 bytes may be generated and transmitted only if both the source and destination units have HW Revision C or higher. If either the source or destination unit uses SW Version 3.0 or 3.1, then the maximum size of the concatenated frame is 3400 bytes, and the maximum number of data frames that can be bundled into a concatenated frame is 2 for units with SW version 3.0 and 8 for units with SW version 3.1.

A frame is a candidate for bundling into a concatenated frame if all the following conditions are met:

- The frame is a data frame
- The destination is an entity behind the destination AU/SU.
- The destination AU/SU can support the feature (uses SW version 3.0 or higher).

When a frame is identified as an eligible candidate for concatenation, it is marked accordingly and will be processed according to the following:

- If there is no concatenated frame designated to the same destination unit in the queue:
 - ◇ If the hardware queue is empty – the frame is transmitted immediately.
 - ◇ Otherwise (the queue is not empty) – the frame is inserted to the queue as a concatenated frame.
- If a concatenated frame designated to the same destination unit exists in the queue:
 - ◇ If the combined size of both frames is above the maximum allowed concatenated frame size – both frames are transmitted as two separate frames.
 - ◇ Otherwise (the combined frames size is below the maximum size) – the new frame is added to the concatenated frame. If the number of data frames in the concatenated frame has reached the maximum allowed (applicable only if the destination unit uses SW version 3.0 or 3.1) – the concatenated frame will be transmitted to the wireless medium. Otherwise – the concatenated frame remains in the queue (until the hardware queue becomes free).

**NOTE**

When a frame is marked as a candidate for concatenation, it will be transmitted as a concatenated frame. If it is not bundled with another data frame before transmission, it will be a concatenated frame with a single data frame (Concatenated Frame Single). If it is bundled with two or more data frames, it will be a concatenated frame with either double data frames (Concatenated Frame Double) or more data frames (Concatenated Frame More).

The Concatenation Parameters submenu includes:

4.2.6.5.10.1 Concatenation Option

The Concatenation Option enables or disables the concatenation mechanism.

The default is Enable.

4.2.6.5.10.2 Maximum Concatenated Frame Size

The Maximum Concatenated Frame Size parameter defines the maximum size (in bytes) for a concatenated frame.

The range is:

- 1256 to 2200 bytes for units with HW revision A or B
- 256 to 4032 bytes for units with HW revision C or higher

The Default values are:

- 2200 for units with HW revision A or B
- 4032 for units with HW revision C or higher

4.2.6.6 Service Parameters

The Service Parameters menu enables defining user filtering, MIR/CIR parameters, traffic prioritization parameters and DRAP parameters.

The Service Parameters menu includes the following options:

- User Filtering Parameters (SU only)
- MIR and CIR Parameters
- Traffic Prioritization
- DRAP Parameters (AU only)
- Wireless Link Prioritization (only AU with a license for the feature)

4.2.6.6.1 User Filtering Parameters (SU only)

The User Filtering Parameters submenu enables defining the IP addresses of user devices authorized to access the wireless medium 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:

4.2.6.6.1.1 User Filtering Option

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

- **Disable** - no filtering.
- **IP Protocol Only** - only IP Protocol packets pass.
- **User Defined Addresses Only** - only IP frames from/to IP addresses included in the User Filter Addresses list pass.
- **PPPoE Protocol Only** - only PPPoE messages pass (Ethernet type 0x8863 and 0x8864).

The default selection is Disable.

4.2.6.6.1.2 Set/Change Filter IP Address Range

The Set/Change Filter IP Address Ranges option enables defining/updating up to 8 IP address ranges to/from which IP frames are to pass if the User Defined Addresses Only option is selected in the User Filtering Option parameter.

The default Filter IP Address Range is 0.0.0.0 TO 0.0.0.0 (all 8 ranges).

A range can be defined using a string that includes either a start and end address, in the format “<start address> to <end address>” (example: 192.168.1.1 to 192.168.1.255), or a base address and a mask, in the format “<base address> mask <mask>” (example: 192.168.1.1 mask 255.255.255.0).

4.2.6.6.1.3 Delete Filter IP Address Range

The Delete Filter IP Address Range option enables deleting IP address range entries from the Filter IP Address Ranges list.

4.2.6.6.1.4 Delete All User Filtering Entries

The Delete All User Filtering Entries option enables deleting all entries from the Filter IP Address Ranges list.

4.2.6.6.1.5 DHCP Unicast Override Filter

When user filtering is activated, unicast DHCP messages are filtered out; therefore the unit cannot communicate with the DHCP server. The DHCP Unicast Override Filter option enables to overcome this problem. When enabled, unicast DHCP messages pass, overriding the user filtering mechanism.

The default is Disable DHCP Unicast.

4.2.6.6.1.6 Show 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.

4.2.6.6.2 MIR and CIR Parameters

The CIR (Committed Information Rate) specifies the minimum data rate guaranteed to the relevant subscriber. The MIR (Maximum Information Rate) value specifies the maximum data rate available for burst transmissions, provided such bandwidth is available.

Under normal conditions, the actual Information Rate (IR) is between the applicable CIR and MIR values, based on the following formula:

$$IR = CIR + K(MIR - CIR).$$

In this formula K is between 0 and 1 and is determined dynamically by the AU according to overall demand in the cell and the prevailing conditions that influence the performance of the wireless link. In some situations the minimum rate (CIR) cannot be provided. This may result from high demand and poor wireless link conditions and/or high demand in over-subscribed cells. When this occurs, the actual information rate is lower than the CIR.

The simple solution for managing the information rate in such cases can result in an unfair allocation of resources, as subscribers with a higher CIR actually receive an IR lower than the CIR designated for subscribers in a lower CIR bracket.

A special algorithm for graceful degradation is incorporated into the AU, ensuring that the degradation of performance for each individual Subscriber Unit is proportional to its CIR.

The MIR/CIR algorithm uses buffers to control the flow of data. To balance the performance over time, a special Burst Duration algorithm is employed to enable higher transmission rates after a period of inactivity. If no data is received from the Ethernet port during the last N seconds, the unit is allowed to transmit N times its CIR value without any delay. For example, after a period of inactivity of 0.5 seconds, a unit with CIR = 128 Kbps can transmit up to $128 \text{ Kbits} \times 0.5 = 64 \text{ Kbits}$ without any delay.

4.2.6.6.2.1 MIR: Downlink (SU only)

Sets the Maximum Information Rate of the downlink from the AU to the SU. The MIR value cannot be lower than the corresponding CIR value.

Available values range and default value are shown in Table 4-12.

The actual value will be the entered value rounded to the nearest multiple of 128 ($N \times 128$).

4.2.6.6.2.2 MIR: Uplink (SU only)

Sets the Maximum Information Rate of the up-link from the SU to the AU. The MIR value cannot be lower than the corresponding CIR value.

Available values range and default value are shown in Table 4-12.

The actual value will be the entered value rounded to the nearest multiple of 128 (N*128).

4.2.6.6.2.3 CIR: Downlink (SU only)

Sets the Committed Information Rate of the downlink from the AU to the SU. The CIR value cannot be higher than the corresponding MIR value.

Available values range and default value are shown in Table 4-13.

The actual value will be the entered value rounded to the nearest multiple of 128 (N*128).

4.2.6.6.2.4 CIR: Uplink (SU only)

Sets the Committed Information Rate of the uplink from the SU to the AU. The CIR value cannot be higher than the corresponding MIR value.

Available values range and default value are shown in Table 4-13.

The actual value will be the entered value rounded to the nearest multiple of 128 (N*128).

Table 4-12: MIR Ranges and Defaults				
	MIR Uplink		MIR Downlink	
Unit Type	Range (Kbps)	Default (Kbps)	Range (Kbps)	Default (Kbps)
SU-3	128-2,048	2,048	128-3,072	3,072
SU-6	128-4,096	4,096	128-6,016	6,016
SU-54	128-53,888	32,896	128-53,888	32,896
SU-I	128-2,048	2,048	128-6,016	6,016

Table 4-13: CIR Ranges and Defaults				
	CIR Uplink		CIR Downlink	
Unit Type	Range (Kbps)	Default (Kbps)	Range (Kbps)	Default (Kbps)
SU-3	0-2,048	0	0-2,048	0
SU-6	0-4,096	0	0-4,096	0
SU-54	0-45,056	0	0-45,056	0
SU-I	0-2,048	0	0-6,016	0

4.2.6.6.2.5 Maximum Burst Duration (SU and AU)

Sets the maximum time for accumulating burst transmission rights according to the Burst Duration algorithm.

Available values range from 0 to 2000 (milliseconds).

The default value is 5 (milliseconds), enabling a maximum burst of $(0.005 \times \text{CIR})$ Kbps after a period of inactivity of 5 milliseconds or more.

4.2.6.6.2.6 Maximum Delay (SU only)

Sets the maximum permitted delay in the buffers system. As certain applications are very sensitive to delay, if relatively high delays are permitted, these applications may suffer from poor performance due to data accumulation in the buffers from other applications, such as FTP. The Maximum Delay parameter limits the number of available buffers. Data that is delayed more than the permitted maximum delay is discarded. If the SU supports applications that are very sensitive to delay, the value of the Maximum Delay should be decreased.

Valid values range from 300 to 10000 (milliseconds).

The default value is 5000 (milliseconds).

4.2.6.6.2.7 Graceful Degradation Limit (AU only)

Sets the limit on using the graceful degradation algorithm. In cases of over demand, the performance of all SUs is degraded proportionally to their CIR ($\text{IR} = (100\% - k\%) \times \text{CIR}$). The graceful degradation algorithm is used as long as $k \leq K$, where K is the Graceful Degradation Limit. Beyond this point the simple “brute force” algorithm is used. The Graceful Degradation Limit should be raised in proportion to the demand in the cell. The higher the expected demand in a cell, the higher the value of the Graceful Degradation Limit. Higher demand can be expected in cases of significant over-subscription and/or in deployments where a high number of subscribers are in locations without proper communication with the AU at the highest data rate.

The available values range from 0 to 70 (%).

The default value is 70 (%).

4.2.6.6.2.8 MIR Only Option (AU only)

When the MIR Only Option is enabled, it forces the MIR/CIR algorithm to use MIR values only. The MIR/CIR algorithm determines the actual information rate for each of the supported SUs under changing conditions of demand, based on the configured CIR and MIR values. When the MIR Only Option is enabled, the MIR/CIR algorithm is overridden and forced to operate with MIR values only. For example, the AU attempts to enable all SUs to transmit/receive information at the specified MIR value. When enabled, the graceful degradation algorithm, which is a part of the CIR/MIR algorithm, is also disabled.

The default is Enable.

4.2.6.6.2.9 Show MIR/CIR Parameters

Displays the current values of the MIR and CIR parameters.

4.2.6.6.3 Traffic Prioritization

Each packet that is received from the Ethernet port is placed in either the High or Low queue, according to the Traffic Prioritization parameters. When the MIR/CIR mechanism decides that a packet must be sent, the High priority queue will be checked first. If the High priority queue is not empty, the first element in the queue is forwarded to the MIR/CIR mechanism. Packets from the Low priority queue will be forwarded only if the High queue is empty.

The prioritization of the packets is done using different classifiers:

- VLAN Priority
- ToS Priority: IP Precedence or DSCP
- UDP and/or TCP ports

Each one of these classifiers can be activated/deactivated. If more than one classifier is activated, the priority of each packet will be determined by the highest priority given to it by the active classifiers.

The Traffic Prioritization menu enables activating/deactivating each of these classifiers, and configuring the applicable parameters for each classifier.

The Low Priority Traffic Minimum Percent parameter can be used to prevent starvation of low priority traffic by ensuring that a certain number of low priority packets is transmitted even at the expense of high priority traffic.

In addition, the Wireless Link Prioritization, which is a licensable feature, enables to configure parameters that affect the prioritization of traffic in the wireless link for packets with high/low priority from different units.

4.2.6.6.3.1 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. If the VLAN Priority field in a tagged frame is higher than the value of the VLAN Priority Threshold parameter, the packet will be routed to the High queue. If the VLAN Priority field is lower than or equal to this value, the packet will be transferred to the Low queue (unless it is assigned a High priority by another classifier).

Valid values range from 0 to 7.

The default value is 7, which means that all packets get a low priority (equivalent to disabling the VLAN-based classifier).

4.2.6.6.3.2 ToS Prioritization

The ToS Prioritization parameters enable defining prioritization in accordance with either the 3 IP Precedence bits in the IP header in accordance with RFC 791, or the 6 DSCP (Differentiated Services Code Point) bits in accordance with RFC 2474. The ToS Prioritization menu includes the following parameters:

4.2.6.6.3.2.1 ToS Prioritization Option

The ToS Prioritization Option defines whether ToS-based prioritization is enabled or disabled. The following options are available:

- Disable
- Enable IP Precedence (RFC791) Prioritization
- Enable DSCP (RFC2474) Prioritization

The default is Disable.

4.2.6.6.3.2.2 IP Precedence Threshold

The IP Precedence Threshold parameter is applicable when the ToS Prioritization Option is set to Enable IP Precedence (RFC791) Prioritization. If the value of the 3 IP Precedence bits in the IP header is higher than this threshold, the packet is routed to the High queue. If the value is lower than or equal to this threshold, the packet will be transferred to the Low queue (unless it is assigned a High priority by another classifier).

Valid values range from 0 to 7.

The default value is 4.

4.2.6.6.3.2.3 DSCP Threshold

The DSCP Threshold parameter is applicable when the ToS Prioritization Option is set to Enable DSCP (RFC2474) Prioritization. If the value of the 6 DSCP bits in the IP header is higher than this threshold, the packet is routed to the High queue. If the value is lower than or equal to this threshold, the packet will be routed to the Low queue (unless it is assigned a High priority by another classifier).

Valid values range from 0 to 63.

The default value is 32.

4.2.6.6.3.3 UDP/TCP Port Ranges Traffic Prioritization

The UDP/TCP Port Ranges Traffic Prioritization parameters enable defining prioritization in accordance with the UDP and/or TCP destination port ranges. The UDP/TCP Port Ranges Traffic Prioritization menu includes the following parameters:

4.2.6.6.3.3.1 UDP/TCP Port Ranges Prioritization Option

The UDP/TCP Port Ranges Prioritization Option defines whether port ranges based prioritization is enabled or disabled. The following options are available:

- Disable
- Enable Only for UDP
- Enable Only for TCP
- Enable for both UDP and TCP

The default is Disable.

4.2.6.6.3.3.2 UDP Port Ranges

The UDP Port Ranges menu enables defining port ranges to be used as priority classifiers when the UDP/TCP Port Ranges Prioritization Option is set to either Enable Only for UDP or Enable for both UDP and TCP. All packets whose destination is included in the list will be routed to the High queue. All other packets will be routed to the Low queue (unless they were assigned a High priority by another classifier).

The UDP Port Ranges menu includes the following options:

- **UDP RTP/RTCP Prioritization:** Voice over IP is transported using Real Time Protocol (RTP). The Real Time Control Protocol (RTCP) is used to control the RTP. When an application uses RTP/RTCP, it chooses for destination ports

consecutive numbers: RTP port is always an even number, and the port with the odd number following it will be assigned to RTCP.

If the administrator selects to prioritize only the RTP packets, then all the packets with an odd numbered destination port will always have Low priority. The packets with an even number for destination port will receive High priority, if the port number is included in the specified ranges.

If the administrator selects to prioritize both RTP and RTCP packets, then all packets whose destination port number is included is in the specified ranges will receive High priority.

The available options are:

◇ RTP & RTCP

◇ RTP Only

The default is RTP & RTCP

- **Add UDP Port Ranges:** This option enables adding UDP port ranges to the list of priority port numbers. The list can include up to 64 ranges. It is possible to add discrete port numbers and/or ranges. In ranges, a hyphen is used to separate between start and end port numbers. A comma is used to separate between entries.

For example: 8900,9000-9005,9010,9016-9017.

- **Delete UDP Port Ranges:** This option enables deleting UDP port ranges from the list of priority port numbers. It is possible to delete discrete port numbers and/or ranges. In ranges, a hyphen is used to separate between start and end port numbers. A comma is used to separate between entries.

For example: 8900,9000-9005,9010,9016-9017.

- **Delete All UDP Port Ranges:** This option enables deleting all UDP port ranges from the list of priority port numbers.

- **Show UDP Port Ranges:** Select this option to view the current UDP RTP/RTCP Prioritization option and the list of UDP Port Ranges.

4.2.6.6.3.3 TCP Port Ranges

The TCP Port Ranges menu enables defining port ranges to be used as priority classifiers when the UDP/TCP Port Ranges Prioritization Option is set to either Enable Only for TCP or Enable for both UDP and TCP. All packets whose

destination is included in the list will be routed to the High queue. All other packets will be routed to the Low queue (unless they were assigned a High priority by another classifier).

The TCP Port Ranges menu includes the following options:

- **TCP RTP/RTCP Prioritization:** Voice over IP is transported using Real Time Protocol (RTP). The Real Time Control Protocol (RTCP) is used to control the RTP. When an application uses RTP/RTCP, it chooses for destination ports consecutive numbers: RTP port is always an even number, and the port with the odd number following it will be assigned to RTCP.

If the administrator selects to prioritize only the RTP packets, then all the packets with an odd numbered destination port will always have Low priority. The packets with an even number for destination port will receive High priority, if the port number is included in the specified ranges.

If the administrator selects to prioritize both RTP and RTCP packets, then all packets whose destination port number is included in the specified ranges will receive High priority.

The available options are:

- ◇ RTP & RTCP
- ◇ RTP Only

The default is RTP & RTCP

- **Add TCP Port Ranges:** This option enables adding TCP port ranges to the list of priority port numbers. The list can include up to 64 ranges. It is possible to add discrete port numbers and/or ranges. In ranges, a hyphen is used to separate between start and end port numbers. A comma is used to separate between entries. For example: 8900,9000-9005,9010,9016-9017.
- **Delete TCP Port Ranges:** This option enables deleting TCP port ranges from the list of priority port numbers. It is possible to delete discrete port numbers and/or ranges. In ranges, a hyphen is used to separate between start and end port numbers. A comma is used to separate between entries.

For example: 8900,9000-9005,9010,9016-9017.

- **Delete All TCP Port Ranges:** This option enables deleting all TCP port ranges from the list of priority port numbers.

- **Show TCP Port Ranges:** Select this option to view the current TCP RTP/RTCP Prioritization option and the list of TCP Port Ranges.

4.2.6.6.3.4 Low Priority Traffic Minimum Percent

This feature ensures that a certain amount of low priority packets, specified by the Low Priority Traffic Minimum Percent (LPTMP) parameter, is transmitted even at the expense of high priority traffic.

The mechanism guarantees a low priority traffic with a rate of $LPTMP * RT / 100$, where RT symbolizes the allowed traffic rate. The high priority traffic will thus not be able to exceed $(100-LPTMP) * RT / 100$. If the system receives high priority traffic at a rate higher than this figure, some high priority packets will be discarded.

The range is between 0 and 100 (%).

The default value is 0 (%).

4.2.6.6.3.5 Wireless Link Prioritization Parameters (AU)

To better support delay-sensitive and other high-priority traffic, a set of Wireless Link Prioritization parameters enables configuring parameters that affect the processes of gaining access to the wireless media and of transmitting high/low priority packets.

The Wireless Link Prioritization feature is a licensed feature and is available only in units with the suitable Feature License.

The time interval between two consecutive transmissions of frames is called Inter-Frame Spacing (IFS). This is the time during which the unit determines whether the medium is idle using the carrier sense mechanism. The IFS depends on the type of the next frame to be transmitted, as follows:

- SIFS (Short Inter-Frame Spacing) is used for certain frames that should be transmitted immediately, such as ACK and CTS frames. The value of SIFS is 16 microseconds.
- DIFS (Distributed coordination function Inter-Frame Spacing) is typically used for other frame types when the medium is free. If the unit decides that the medium is not free, it will defer transmission by DIFS plus a number of time slots as determined by the Contention Window back-off algorithm after reaching a decision that the medium has become free. DIFS equal SIFS plus AIFS, where AIFS is a configurable number of time slots.

Under regular conditions, AIFS is configured to two time slots. To support prioritization in the wireless link, we can configure a higher AIFS for low priority traffic (AIFS of two time slots will always be used for high priority traffic as well as AU's transmissions of broadcasts/multicasts and beacons). This will give

advantage to units that need to transmit high priority traffic (depending also on the configured values for the Contention Window parameters).

Other parameters related to transmission to the wireless media that can be configured separately for high/low priority packets are the Number of HW Retries and Burst Duration.

Typically, a lower value of Number of HW Retries should be configured for traffic such as VoIP, which on the one hand is sensitive to delays and on the other hand is less sensitive to missing packets than data traffic.

The Burst Duration, which defines the maximum duration of a burst, should be set to a lower value for delay sensitive traffic. Typically the Burst Duration of the AU should be set to higher value than that of the SUs, because of the higher number of packets that should be transmitted by the AU.

When the Wireless Link Prioritization feature is enabled, the following parameters are not applicable:

- Arbitration Inter-Frame Spacing (AIFS)
- Number of HW Retries
- Burst Mode Option
- Burst Mode Time Interval

When an SU with a SW version below 4.0 tries to associate with an AU that has the Wireless Link Prioritization feature enable, the AU will generate a trap that will include information about this SU. In this way the system administrator can be alerted that the SU should be upgraded. This is necessary because otherwise an SU that does not support the Wireless Link Prioritization feature will send all the traffic as high priority.

**CAUTION**

Verify that all SUs served by an AU with the Wireless Link Prioritization Option enabled use a SW version that supports this feature (SW version 4.0 and higher). Otherwise, overall performance and quality of service in the cell may be reduced since all data from an SU with SW version below 4.0 will be sent with high priority.

The Wireless Link Prioritization Parameters menu includes the following:

4.2.6.6.3.5.1 Wireless Link Prioritization Option

The Wireless Link Prioritization Option enables or disables the Wireless Link Prioritization feature.

The default option is Disable.

4.2.6.6.3.5.2 Low Priority AIFS

The Low Priority AIFS defines the AIFS number of time slots that will be used by the AU and the SUs served by it for low priority traffic.

The range is from 3 to 254 (time slots).

The default is 3.

4.2.6.6.3.5.3 Number of HW Retries for High Priority Traffic

The Number of HW Retries for High Priority Traffic defines the maximum number of times that an unacknowledged high priority unicast packet can be retransmitted. This is the value that will be used by the AU and by the SUs served with it.

The range is from 1 to 14 times.

The default is 10 times.

4.2.6.6.3.5.4 Number of HW Retries for Low Priority Traffic

The Number of HW Retries for Low Priority Traffic defines the maximum number of times that an unacknowledged low priority unicast packet can be retransmitted. This is the value that will be used by the AU and by the SUs served with it.

The range is from 1 to 14 times.

The default is 10 times.

4.2.6.6.3.5.5 AU Burst Duration for High Priority Traffic

The AU Burst Duration for High Priority Traffic parameter defines the maximum duration of a burst that can be made by the AU for high priority packets.

The measurement unit is 250 microseconds and the range is from 1 to 40 (0.25 to 10 milliseconds) or 0 to disable bursts for high priority packets.

The default is 16 (4 milliseconds).

4.2.6.6.3.5.6 AU Burst Duration for Low Priority Traffic

The AU Burst Duration for Low Priority Traffic parameter defines the maximum duration of a burst that can be made by the AU for low priority packets.

The measurement unit is 250 microseconds and the range is from 1 to 40 (0.25 to 10 milliseconds) or 0 to disable bursts for low priority packets.

The default is 20 (5 milliseconds).

4.2.6.6.3.5.7 SU Burst Duration for High Priority Traffic

The SU Burst Duration for High Priority Traffic parameter defines the maximum duration of a burst that can be made by the SUs served by the AU for high priority packets.

The measurement unit is 250 microseconds and the range is from 1 to 40 (0.25 to 10 milliseconds) or 0 to disable bursts for high priority packets.

The default is 8 (2 milliseconds).

4.2.6.6.3.5.8 SU Burst Duration for Low Priority Traffic

The SU Burst Duration for Low Priority Traffic parameter defines the maximum duration of a burst that can be made by the SUs served by the AU for low priority packets.

The measurement unit is 250 microseconds and the range is from 1 to 40 (0.25 to 10 milliseconds) or 0 to disable bursts for low priority packets.

The default is 20 (5 milliseconds).

4.2.6.6.4 DRAP Parameters (AU only)

DRAP (Dynamic Resources Allocation Protocol) is a protocol that can be used by the AU to communicate with Voice and Networking Gateways connected to SUs served by it, enabling identification of these Gateways. It also enables managing voice calls made by Voice Gateways (VG).

The AU keeps track of all current voice calls and, upon receiving from a VG a request for a new call, compares the current number of calls to the maximum allowed number. If the maximum allowed number has been reached, the AU will not confirm the request.

The DRAP feature is applicable only for gateways that support DRAP.

The following is a description of DRAP-related parameters:

4.2.6.6.4.1 DRAP Support

The DRAP Support option enables or disables the DRAP feature that offers the possibility of identifying the connected Gateways and limiting the maximum number of voice calls made by Voice Gateways in a cell.

The default option is Enable.

4.2.6.6.4.2 UDP Port

The UDP Port parameter defines the UDP port used by the DRAP protocol.

The range is from 8000 to 8200.

The default value is 8171.

4.2.6.6.4.3 Maximum Number of Voice Calls

The Maximum Number of Voice Calls parameter sets the maximum number of active calls in the cell.

The range is between 0 and 255.

The default value is 40.

4.2.6.6.4.4 DRAP TTL

The DRAP TTL parameter sets the time between two consecutive Allocation Requests from the Gateways. The Allocation requests are used to identify the existence of an active Gateway. In Voice Gateways they also include information about the current number of voice calls and requests for new calls.

The range is between 1 and 255 (seconds).

The default value is 10 (seconds).

4.2.6.6.4.5 Number of Active Voice Calls

This option shows the current number of active voice calls in the cell.

4.2.6.6.5 Show Service Parameters

Displays the current values of the Service Parameters.

4.2.6.7 Security Parameters

BreezeACCESS VL systems can support encryption of authentication messages and/or data frames using one of the following encryption standards:

- **WEP** Wireless Equivalent Privacy algorithm. WEP is defined in the IEEE 802.11 Wireless LAN standard and is based on the RSA's RC4 encryption algorithm.
- **AES OCB** Advanced Encryption Standard. AES is defined by the National Institute of Standards and Technology (NIST) and is based on Rijndael block cipher. AES OCB (Offset Code Book) is a mode that operates by augmenting the normal encryption process by incorporating an offset value.
- **FIPS 197** is certified for compliance with Federal Information Processing Standards. It provides encryption and message integrity in one solution and implements the Advanced Encryption Standard using Rijndael block cipher.

NOTE



The FIPS 197 encryption algorithm is a licensed feature, and is available only in units with the required license. FIPS 197 can be supported only in Access Units with HW revision C or higher. FIPS 197 feature license is not available for AUS unit.

The following parameters are available through the Security Parameters menu (in certain units some or all of the security options may not be available):

- Authentication Algorithm
- Data Encryption Option
- Security Mode
- Default Key (SU only)
- Default Multicast Key (AU only)
- Key # 1 to Key # 4
- Promiscuous Authentication (AU only)

4.2.6.7.1 Authentication Algorithm

The Authentication Algorithm option determines the operation mode of the selected unit. The following two options are available:

- **Open System:** An SU configured to Open System can only associate with an AU also configured to Open System. In this case, the authentication encryption algorithm is not used.
- **Shared Key:** 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 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 Key is defined. In the SU, a Default Key that refers to a valid Key must be selected.

The AU and all the SUs it serves should be configured to the same Authentication Algorithm option. Mixed operation is not supported.

4.2.6.7.2 Data Encryption Option

The Data Encryption Option allows enabling or disabling data encryption. When enabled, all data frames, including frames using management protocols such as Telnet, FTP, TFTP, SNMP, DHCP and ICMP, are encrypted.

The default is Disable.

**NOTE**

- The AU and all the SUs it serves should be configured to the same Data Encryption Option. Mixed operation is not supported.
- An SU with Data Encryption Option enabled can accept non-encrypted data frames.
- When the Data Encryption Option is enabled, the maximum number of SUs that can associate with the AU is limited to 124. The Maximum Number of Associations Limit is indicated in the Show Air Interface Parameters display.

4.2.6.7.3 Security Mode

The Security Mode option enables selecting the algorithm to be used for encrypting the authentication messages and/or data frames.

The available options are WEP, AES OCB and FIPS 197 (if available).

The default is WEP.

4.2.6.7.4 Default Key (SU only)

The Default Key defines the Key to be used for encrypting/decrypting the authentication messages (Shared Key mode) and/or data frames (Data Encryption enabled). The AU learns the Default Key from the SU provided it is one of the Keys defined in the AU. The AU may use different keys when authenticating and/or communicating with different SUs.

Available values range from 1 to 4.

The default is KEY # 1.

4.2.6.7.5 Default Multicast Key (AU only)

The Multicast Default Key defines the Key to be used for encrypting/decrypting multicasts and broadcasts when Data Encryption is enabled.

Available values range from 1 to 4.

The default is KEY # 1.

4.2.6.7.6 Key # 1 to Key # 4

The Key # options enables defining the encryption key to be used for initializing the pseudo-random number generator that forms part of the encryption/decryption process. The Keys must be set before the Shared Key authentication algorithm or Data Encryption can be used. To support proper operation, both the Key # and the content must be identical at both sides of a wireless link.

Each Key is a string of 32 hexadecimal numbers. For security reasons, it is a “write only” parameter, displayed as a string of asterisks (“*”).

The default for all 4 Keys is 000...0 (a string of 32 zeros), which means no key.

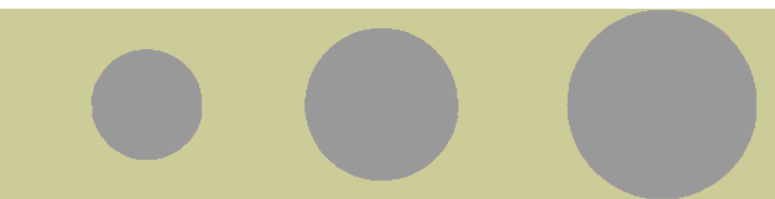
4.2.6.7.7 Promiscuous Authentication (AU only)

The Promiscuous Authentication mode enables new SUs to join an active cell where Shared Key operation and/or Data Encryption are used, even if this SU does not have the correct security parameters. In promiscuous mode, all downlink transmissions (from AU to SUs) are not encrypted, allowing remote configuration of security parameters, regardless of the current settings in the SUs of the parameters related to data encryption. After a new SU joins the cell it should be remotely configured with the proper parameters (or upgraded). When the SU is configured properly, the Promiscuous Mode should be disabled.

The default is Disable.

**NOTE**

Do not leave the AU in the enabled Promiscuous Authentication mode for prolonged periods. Use it only when absolutely necessary, perform the required actions as quickly as possible and disable it. The unit will return automatically to Promiscuous Authentication disabled mode after reset.



A

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, <http://www.alvarion.com/>.

**CAUTION**

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*.

- 7 The original *sourcefile* name of SW files is in the structure uX_Y_Z.bz, where u is the unit type (a for AU, s for SU) and X.Y.Z is the version number.
- 8 *destinationfile* is the name of the file to be loaded. Use the SNMP write community <SnmpWriteCommunity>.bz to define the destination filename. The default SNMP write community is *private*. For example, to load the upgrade file a4_0_13.bz to an AU whose IP address is 206.25.63.65: *tftp -i 206.25.63.65 put a4_0_13.bz private.bz*
- 9 When the loading is complete, the following message is displayed, indicating completion of the TFTP process:

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

- 10 The unit decompresses the loaded file and checks the integrity of the new version. The new version replaces the previous shadow version only after verification. If verification tests fail, the loaded version will be rejected. Among other things that are tested, the unit will reject a file if either the file name or the version number matches the current Main versions. The unit will also reject a file designated for a different unit type, e.g. an AU upgrade file with the prefix a in the original file name will not be accepted by SUs.
- 11 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 and verified, 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 File Name  :3.1.25
Main Version Number     :3.1.25
Shadow Version File Name :4.0.27.bz
Shadow Version Number    :4.0.27
```




B

Appendix B - File Download and Upload Using TFTP



The File 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. The file loading procedure can also be used for uploading a feature license file or an updated country code file to multiple units.

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

In the configuration file, the following three fields represent each parameter:

- 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*). The file should be transferred in ASCII mode.

Use the extension *cfg* for a configuration file.

Use the extension *cmr* for the Operator Defaults file.

Use the extension *fln* for a Feature License file.

Use the extension *ccf* for a Country Code file.

Feature license and country code files include multiple strings, where each string is applicable only for a certain unit identified by its MAC address. When uploading a feature license or a country code file to multiple units, each unit will accept only the parts that are applicable for itself.

Examples:

- 1 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`
- 2 To download the Operator Defaults file from the same unit, enter:
`tftp 206.25.63.65 get private.cmr Suconf`
- 3 To upload the Feature Upgrade file to the same unit, enter:
`tftp 206.25.63.65 put Suconf private.fln`
- 4 To upload the Country Code file from to same unit, enter:
`tftp 206.25.63.65 put Suconf private.ccf`

**NOTE**

The Configuration File mechanism is common to BreezeACCESS VL and BreezeNET B product lines. The Configuration File includes also parameters that are applicable only to BreezeNET B products. Do not attempt to change the default values of these parameters.



C

Appendix C - Using the Set Factory Defaults Utility



The Set Factory Defaults utility is intended to enable management access to a unit in cases where such access is not possible due to wrong or unknown configuration of certain parameters. This includes cases such as unknown Management VLAN ID and wrong management access filtering.

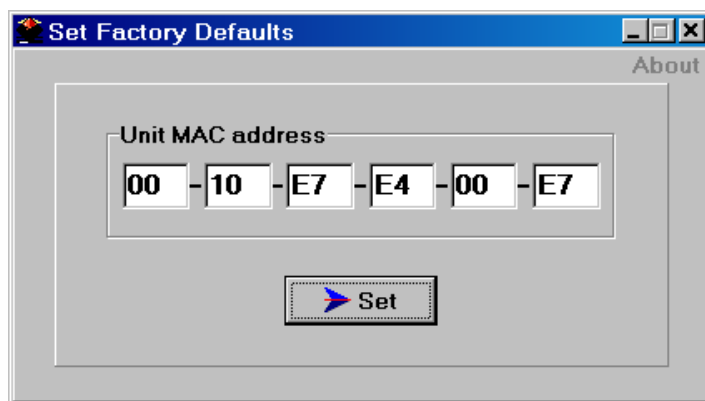
The utility accesses the unit by sending a special packet. Access to the unit is based on its MAC address, which must be entered in the **Unit MAC address** field.

The set unit defaults feature is only available via the Ethernet port.



To set factory defaults:

- 1 Connect the PC with the Set Factory Defaults utility to the Ethernet port of the unit.



- 2 Enter the unit's MAC address.
- 3 Click on the **Set** button.

This utility performs the same operation as Set Complete Factory Defaults, restoring the default factory configuration of all parameters, except to Passwords, general FTP parameters and AU's Frequency.



D

Appendix D - Preparing the Indoor to Outdoor SU Cable



The Indoor-to-Outdoor cable provides pin-to-pin connection on both ends.

Figure 4-2 shows the wire pair connections required for the Indoor-to-Outdoor cable.

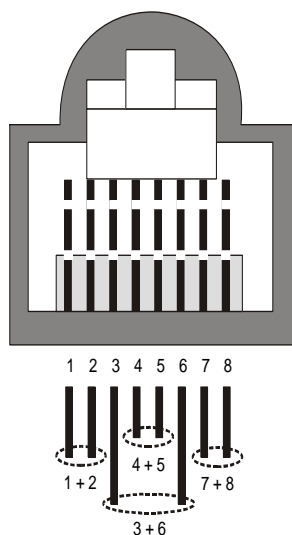


Figure 4-2: Ethernet Connector Pin Assignments

The color codes used in cables that are supplied with crimped connectors are as listed in the following table:

Cable Color Codes	
Wire color	Pin
Blue	1
Blue/white	2
Orange	3
Orange/white	6
Brown	4
Brown/white	5
Green	7
Green/white	8

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 E - BreezeACCESS VL MIB

In This Appendix:

BreezeACCESS VL agents support the following MIBs:

- MIB-II (RFC1213)
- BRIDGE-MIB (RFC1286)
- BreezeACCESS VL Private MIB (breezeAccessVLMib)

The following are described in this Appendix:

- [System Object Identifiers](#), page 210
- [breezeAccessVLMib](#), page 212
- [Supported Traps](#), page 260



NOTE

The BreezeAccessVLMib is used for both BreezeACCESS VL (AU, SU) and BreezeNET B (BU, RB) product lines. Some of the parameters are only applicable to one of the product lines.

E.1 System Object Identifiers

Object	Path
alvarion	OID = 1.3.6.1.4.1.12394 {(iso(1) org(3) dod(6) internet(1) private(4) enterprises(1) alvarion (12394)}
products	OID = 1.3.6.1.4.1.12394.1 {alvarion 1}
breezeAccessVLMib	OID = 1.3.6.1.4.1.12394.1.1 {products 1}
alvarionbwaOID	OID = 1.3.6.1.4.1.12394.4 {alvarion 4}
brzAccessVLOID	OID = 1.3.6.1.4.1.12394.4.1 {alvarionOID 1}
brzAccessVLAU	OID = 1.3.6.1.4.1.12394.4.1.1 {brzAccessVLOID 1}
brzAccessVLSU	OID = 1.3.6.1.4.1.12394.4.1.2 {brzAccessVLOID 2}
brzAccessVLAU-BS	OID = 1.3.6.1.4.1.12394.4.1.4 {brzAccessVLOID 4}
brzAccessVLAU-SA	OID = 1.3.6.1.4.1.12394.4.1.5 {brzAccessVLOID 5}
brzAccessVLAUS-BS	OID = 1.3.6.1.4.1.12394.4.1.6 {brzAccessVLOID 6}
brzAccessVLAUS-SA	OID = 1.3.6.1.4.1.12394.4.1.7 {brzAccessVLOID 7}
brzAccessVLSU-6-1D	OID = 1.3.6.1.4.1.12394.4.1.11 {brzAccessVLOID 11}
brzAccessVLSU-6-BD	OID = 1.3.6.1.4.1.12394.4.1.12 {brzAccessVLOID 12}
brzAccessVLSU-24-BD	OID = 1.3.6.1.4.1.12394.4.1.13 {brzAccessVLOID 13}
brzAccessVLSU-BD	OID = 1.3.6.1.4.1.12394.4.1.14 {brzAccessVLOID 14}
brzAccessVLSU-54-BD	OID = 1.3.6.1.4.1.12394.4.1.15 {brzAccessVLOID 15}
brzAccessVLSU-3-1D	OID = 1.3.6.1.4.1.12394.4.1.16 {brzAccessVLOID 16}
brzAccessVLSU-3-4D	OID = 1.3.6.1.4.1.12394.4.1.17 {brzAccessVLOID 17}
brzAccessVLSU-I	OID = 1.3.6.1.4.1.12394.4.1.17 {brzAccessVLOID 18}
brzNetB-BU-B14	OID = 1.3.6.1.4.1.12394.4.1.21 {brzAccessVLOID 21}
brzNetB-BU-B28	OID = 1.3.6.1.4.1.12394.4.1.22 {brzAccessVLOID 22}
brzNetB-BU-B100	OID = 1.3.6.1.4.1.12394.4.1.23 {brzAccessVLOID 23}
brzNetB-RB-B14	OID = 1.3.6.1.4.1.12394.4.1.31 {brzAccessVLOID 31}
brzNetB-RB-B28	OID = 1.3.6.1.4.1.12394.4.1.32 {brzAccessVLOID 32}
brzNetB-RB-B100	OID = 1.3.6.1.4.1.12394.4.1.33 {brzAccessVLOID 33}
brzAccess4900-AU-BS	OID = 1.3.6.1.4.1.12394.4.1.41 {brzAccessVLOID 41}

Object	Path
brzAccess4900-AU-SA	OID = 1.3.6.1.4.1.12394.4.1.42 {brzAccessVLOID 42}
brzAccess4900-SU-BD	OID = 1.3.6.1.4.1.12394.4.1.51 {brzAccessVLOID 51}
brzAccessVLProducts	OID = 1.3.6.1.4.1.12394.4.1.3 {brzAccessVLOID 3}

E.2 breezeAccessVLMib

OBJECT IDENTIFIER = 1.3.6.1.4.1.12394.1.1

NOTE



An * is used instead of the brzaccVL prefix.

E.2.1 System Information Parameters

MIB Parameter	Description	Value/Range
*SysInfo (breezeAccessVLMib 1)	System Information Parameters	
*UnitHwVersion (*SysInfo 1)	Applicable to all units. Read-only: Hardware platform version.	DisplayString (SIZE(0..32))
*RunningSoftwareVersion (*SysInfo 2)	Applicable to all units. Read-only: Running software version.	DisplayString (SIZE(0..32))
*RunningFrom (*SysInfo 3)	Applicable to all units. Read-only: The memory (main or shadow) from which the current version is running from.	Integer mainVersion (1) shadowVersion (2)
*MainVersionNumber (*SysInfo 4)	Applicable to all units. Read only: Main software version number.	DisplayString (SIZE(0..32))
*MainVersionFileName (*SysInfo 5)	Applicable to all units. Read-only: Main software version file name.	DisplayString (SIZE(0..32))
*ShadowVersionNumber (*SysInfo 6)	Applicable to all units. Read-only: Shadow software version number.	DisplayString (SIZE(0..32))
*ShadowVersionFileName (*SysInfo 7)	Applicable to all units. Read-only: Shadow software version file name.	DisplayString (SIZE(0..32))
*UnitMacAddress (*SysInfo 8)	Applicable to all units. Read-only: Unit hardware MAC address.	MAC address

MIB Parameter	Description	Value/Range
*UnitType (*SysInfo 9)	Applicable to all units. Read-only: Unit type.	Integer auBS (1) auSA (2) su-6-BD (3) su-24-BD (4) su-6-1D (5) bu-B14 (6) bu-B28 (7) rb-B14 (8) rb-B28 (9) su-BD (10) su-54-BD (11) su-3-1D (12) su-3-4D (13) ausBS (14) ausSA (15) auBS4900 (16) auSA4900 (17) suBD4900 (18) bu-B100 (19) rb-B100 (20) su-I (21)
*AssociatedAU (*SysInfo 10)	Applicable to SU/RB. Read-only: Associated AU/BU MAC address.	MAC address
*NumOfAssociationsSinceLastReset (*SysInfo 11)	Applicable to all units. Read-only: The number of associations since last reset, including duplicate associations (re- associations).	Integer
*CurrentNumOfAssociations (*SysInfo 13)	Applicable to AU only. Not applicable to BreezeNET B products. Read-only. The number of subscriber units currently associated with the AU.	Integer na (65535)
*UnitBootVersion (*SysInfo 14)	Applicable to all units. Read-only: The Boot software version.	DisplayString (SIZE(0..32))
*RadioBand (*SysInfo 15)	Applicable to all units. Read-only: The radio band of the unit.	Integer band-5-8GHz (1) band-5-4GHz (2) band-4-9GHz (3) band-5-2GHz (4) band-2-4GHz (5) band-5-3GHz (6) band-4-9GHzJapan (7)
*CurrentEthernetPortState (*SysInfo 16)	Applicable to all units. Read-only. The current state of the Ethernet port.	Integer HalfDuplexAnd10Mbps (1) FullDuplexAnd10Mbps (2) HalfDuplexAnd100Mbps (3) FullDuplexAnd100Mbps (4) linkDown (5)
*TimeSinceLastReset (*SysInfo 17)	Applicable to all units. Read-only. The elapsed time since last reset.	DisplayString (SIZE(0..32))
*CountryDependentParameters (*SysInfo 18)	Country Dependent Parameters	

MIB Parameter	Description	Value/Range
*CountryCode (*CountryDependentParameters 1)	Applicable to all units. Read only. The country code and country or country group name that is supported by the unit	DisplayString (SIZE(0..32))
*CountryDependentParamsTable (*CountryDependentParameters 2)	Applicable to all units. Not accessible. A table of country dependent parameters.	
*CountryDependentParameterEntry (*CountryDependentParamsTable 1)	Applicable to all units. Not accessible. An entry in the country dependent parameters table.	
*CountryDependentParameterTableIdx (*CountryDependentParameterEntry 1)	Applicable to all units. Read only. The sub-band ID of the entry in the Country Dependent Parameters table. Serves also as index for the table entry.	Integer
*CountryDependentParameterFrequencies (*CountryDependentParameterEntry 2)	Applicable to all units. Read only. The frequencies included in the applicable sub-band entry.	DisplayString
*AllowedBandwidth (*CountryDependentParameterEntry 3)	Applicable to all units. Read only. The bandwidth when using the applicable the sub-band.	Integer
*RegulationMaxTxPowerAtAntennaPort (*CountryDependentParameterEntry 4)	Applicable to all units. Read only. The maximum allowed Tx power at the antenna port when using the applicable sub-band.	Integer
*RegulationMaxEIRP (*CountryDependentParameterEntry 5)	Applicable to all units. Read only. The maximum allowed EIRP when using the applicable sub-band.	Integer A Regulation Max EIRP of 100 means no limit.
*MinModulationLevel (*CountryDependentParameterEntry 6)	Applicable to all units. Read only. The minimum supported modulation level.	Integer level1 (1) level2 (2) level3 (3) level4 (4) level5 (5) level6 (6) level7 (7) level8 (8)
*MaxModulationLevel (*CountryDependentParameterEntry 7)	Applicable to all units. Read only. The maximum supported modulation level.	Integer level1 (1) level2 (2) level3 (3) level4 (4) level5 (5) level6 (6) level7 (7) level8 (8)
*BurstModeSupport (*CountryDependentParameterEntry 8)	Applicable to all units. Read only. The supported Burst Mode Option.	Integer supported (1) notSupported (2)

MIB Parameter	Description	Value/Range
*MaximumBurstDuration (*CountryDependentParameterEntry 9)	Applicable to all units. Read only. Applicable only if Burst Mode Option is supported. The maximum supported burst duration.	Integer
*DfsSupport (*CountryDependentParameterEntry 10)	Applicable to AU/BU only. Read only. The supported DFS Option.	Integer supported (1) notSupported (2)
*MinimumHwRevision (*CountryDependentParameterEntry 11)	Applicable to all units. Read only. The Minimum HW Revision needed to support the Sub-Band.	Integer hwRevisionA (1), hwRevisionB (2), hwRevisionC (3), hwRevisionD (4), hwRevisionE (5), na (255)
*AuthenticationEncryptionSupport (CountryDependentParameters 3)	Applicable to all units. Read only. The supported Authentication Encryption Option.	Integer supported (1) notSupported (2)
*DataEncryptionSupport (CountryDependentParameters 4)	Applicable to all units. Read only. The supported Data Encryption Option.	Integer supported (1) notSupported (2)
*AESEncryptionSupport (CountryDependentParameters 5)	Applicable to all units. Read only. The supported AES Encryption Option.	Integer supported (1) notSupported (2)
*AntennaGainChange (*SysInfo 19)	Applicable to all units. Indicates whether the Antenna Gain parameter is changeable or fixed.	Integer supported (1) notSupported (2)

E.2.2 Unit Control Parameters

MIB Parameter	Description	Value/Range
*UnitControl (breezeAccessVLMib 2)		
*ResetUnit (*UnitControl 1)	Applicable to all units. Resets the unit and applies new parameter values.	Integer cancel (1) resetSystemNow (2)
*SetDefaults (*UnitControl 2)	Applicable to all units. 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 NoDefaultSettingRequested (0), completeFactory (1) partialFactory (2) completeOperator (3) partialOperator (4) cancelCurrentPendingRequest (5)

MIB Parameter	Description	Value/Range
*UnitName (*UnitControl 3)	Applicable to all units. The unit name.	DisplayString (SIZE(32)) A string of up to 32 printable ASCII characters.
*FlashMemoryControl (*UnitControl 4)	Applicable to all units. Reset And Boot From Shadow Version: Activates the shadow version. Use Running Version After Reset: The currently active version will become the main version and will be activated after next reset.	Integer resetAndBootFromShadowVersion (1) useRunningVersionAfterReset (2) cancel (3)
*TelnetLogoutTimer (*UnitControl 5)	Applicable to all units. Time-out of management via Telnet. Automatic exit if the program is inactive for the defined time.	Integer 1-999 (minutes)
*SaveCurrentConfigurationAsOperatorDefaults (*UnitControl 6)	Applicable to all units. Saves the current configuration as Operator Defaults.	Integer saveAsDefaults (1) cancel (2)
*ExitTelnet (*UnitControl 7)	Applicable to all units. Exit the Telnet Monitor session.	Integer cancelOperation (1) exit (2)
*UnitPasswords (*UnitControl 8)	Applicable to all units. Unit passwords.	
*ReadOnlyPassword (*UnitPasswords 1)	Applicable to all units. The User (read only) password.	DisplayString (SIZE(8)). Up to 8 printable ASCII characters.
*InstallerPassword (*UnitPasswords 2)	Applicable to all units. The Installer password.	DisplayString (SIZE(8)). Up to 8 printable ASCII characters.
*AdminPassword (*UnitPasswords 3)	Applicable to all units. 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 all units. Ethernet port mode of operation.	Integer force10MbpsAndHalfDuplex (1) force10MbpsAndFullDuplex (2) force100MbpsAndHalfDuplex (3) force100MbpsAndFullDuplex (4) autoNegotiationMode (5)
*FTPParameters (*UnitControl 10)	Applicable to all units. FTP parameters	
*FTPServerParams (*FTPParameters 1)	Applicable to all units. General FTP server parameters.	
*FTPServerUserName (*FTPServerParams 1)	Applicable to all units. The user name to be used for access to the FTP server	DisplayString (SIZE(20)). Up to 18 printable ASCII characters.
*FTPServerPassword (*FTPServerParams 2)	Applicable to all units. The password to be used for access to the FTP server	DisplayString (SIZE(20)). Up to 18 printable ASCII characters.
*FTPClientIpAddress (*FTPParameters 3)	Applicable to all units. The IP address of the FTP stack in the unit. For SW version 4.0 and higher this is read-only, set to the IP Address of the unit.	IP address
*FTPServerIpAddress (*FTPServerParams 4)	Applicable to all units. The IP address of the FTP server	IP address

MIB Parameter	Description	Value/Range
*FTPClientMask (*FTPPParameters 5)	Applicable to all units. The IP MASK of the FTP stack in the unit.	IP address
*FTPGatewayIPAddress (*FTPPParameters 6)	Applicable to all units. The FTP Default Gateway IP address.	IP address
*FTPSwDownload (*FTPPParameters 2)	Applicable to all units. SW download parameters.	
*FTPSwFileName (*FTPSwDownload 1)	Applicable to all units. The name of the SW file to be downloaded.	DisplayString (SIZE(80)). Up to 20 printable ASCII characters. An empty string is not allowed.
*FtpSwDownloadSourceDir (*FTPSwDownload 2)	Applicable to all units. The source directory of the required file in the FTP server	DisplayString (SIZE(80)). Up to 80 printable ASCII characters. Use "." To clear field.
*DownloadSwFile (*FTPSwDownload 3)	Applicable to all units. Execution of the SW download operation.	Integer downloadFile (1) cancel (2)
*ConfigurationFileLoading (*FTPPParameters 3)	Applicable to all units. Configuration file and Operator Defaults file download/upload parameters.	
*ConfigurationFileName (*ConfigurationFileLoading 1)	Applicable to all units. The name of the configuration file to be downloaded/uploaded.	DisplayString (SIZE(80)). Up to 20 printable ASCII characters. An empty string is not allowed.
*OperatorDefaultsFileName (*ConfigurationFileLoading 2)	Applicable to all units. The name of the Operator Defaults file to be downloaded/uploaded.	DisplayString (SIZE(80)). Up to 20 printable ASCII characters. An empty string is not allowed.
*FTPConfigurationFileSourceDir (*ConfigurationFileLoading 3)	Applicable to all units. The source directory of the required file in the FTP server	DisplayString (SIZE(80)). Up to 80 printable ASCII characters. Use "." To clear field.
*ExecuteFTPConfigurationFileLoading (*ConfigurationFileLoading 4)	Applicable to all units. Execution of the file download/upload operation.	Integer executeFTPGetConfiguration File (1) executeFTPPutConfiguration File (2) executeFTPGetOperator Defaults (3) executeFTPPutOperator Defaults (4) cancel (5)
*EventLogFileUploading (*FTPPParameters 4)	Applicable to all units. Event Log file upload parameters.	
*EventLogFileName (*EventLogFileUploading 1)	Applicable to all units. The name of the event log file to be uploaded.	DisplayString (SIZE(80)). Up to 20 printable ASCII characters.
*EventLogDestinationDir (*EventLogFileUploading 2)	Applicable to all units. The destination directory for the event log file in the FTP server	DisplayString (SIZE(80)). Up to 80 printable ASCII characters. Use "." To clear field.
*UploadEventLogFile (*EventLogFileUploading 3)	Applicable to all units. Execution of the event log upload operation	Integer uploadFile (1) cancel (2)
*LoadingStatus (*UnitControl 11)	Applicable to all units. The status of an FTP or TFTP loading process.	Integer inProcess (1) successful (2) failed (3)
*EventLogFileParams (*UnitControl 12)	Event Log parameters	

MIB Parameter	Description	Value/Range
*EventLogPolicy (*EventLogFileParams 1)	Applicable to all units. The lowest severity of events to be logged.	Integer message (1) warning (2) error (3) fatal(4) logNone(5)
*EraseEventLog (*EventLogFileParams 2)	Applicable to all units. Erase the log file.	Integer eraseEventLog (1) cancel(2)
*SysLocation (*UnitControl 13)	Applicable to all units. The unit location.	DisplayString (SIZE(0..34))
*FeatureUpgrade (*UnitControl 14)	Feature Upgrade parameters	
*FeatureUpgradeManually (*FeatureUpgrade 1)	Applicable to all units. Upgrade unit to support new feature.	DisplayString (SIZE(32..64)) License string: 32 to 64 hexadecimal digits.
*ChangeUnitType (*UnitControl 15)	Applicable RB/BU only. Change the unit type between BU and RB.	Integer bu (1), rb (2), cancel (3)

E.2.3 Network Management Parameters

MIB Parameter	Description	Value/Range
*NwMngParameters (breezeAccessVLMib 3)	Network management parameters.	
*AccessToNwMng (*NwMngParameters 1)	Applicable to all units. The port to be used for remote management.	Integer fromwirelessOnly (1) fromEthernetOnly (2) fromBothWirelessAndEthernet (3) na (255)
*NwMngFilter (*NwMngParameters 2)	Applicable to all units. 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)
mnglpFilterTable (*NwMngParameters 3)	Applicable to all units. A table of up to 10 IP addresses of stations that are authorized to access the unit for management purposes. Not accessible.	
mnglpFilterEntry (mnglpFilterTable 1)	Applicable to all units. A Management IP Addresses Table entry. Not accessible.	
*NwMngIpAddress (mnglpFilterEntry 1)	Applicable to all units. An IP address in the Management IP Addresses Table entry.	IP address
*NwMngIpTableIdx (mnglpFilterEntry 2)	Applicable to all units. Read-only. A table index for an entry in the Management IP Addresses Table.	Integer 1-10

MIB Parameter	Description	Value/Range
*DeleteOneNwIpAddr (*NwMngParameters 4)	Applicable to all units. Deletes a single selected entry from the Management IP Addresses Table.	Integer cancelOperation (0) deleteEntry (1...10) na (255)
*DeleteAllNwIpAddrs (*NwMngParameters 5)	Applicable to all units. Deletes all entries from the Management IP Addresses Table.	Integer deleteAll (1) cancelOperation (2) na (255)
*AccessToNwTrap (*NwMngParameters 6)	Applicable to all units. Enables or disables the sending of SNMP traps.	Integer disable (1) enable (2)
mngTrapTable (*NwMngParameters 7)	Applicable to all units. A table of up to 10 IP addresses of stations to which to send SNMP traps. Not accessible.	
mngTrapEntry (mngTrapTable 1)	Applicable to all units. A Management Trap Table entry. Not accessible.	
*NwMngTrapCommunity (mngTrapEntry 1)	Applicable to all units. 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 all units. An IP address in the Management Trap Table.	IP address
*NwMngTrapTableIdx (mngTrapEntry 3)	Applicable to all units. Read only. Index for an entry in the Management Trap Table.	Integer 1-10
*DeleteOneTrapAddr (*NwMngParameters 8)	Applicable to all units. Deletes a single selected entry from the Management Trap Table.	Integer cancelOperation (0) deleteEntry (1...10) na (255)
*DeleteAllTrapAddrs (*NwMngParameters 9)	Applicable to all units. Deletes all entries from the Management Trap Table.	Integer deleteAll (1) cancelOperation (2) na (255)
*MngIpRangesTable (*NwMngParameters 10)	Applicable to all units. A table of Management IP Address Ranges. Not accessible.	
*MngIpRangesEntry (*MngIpRangesTable 1)	Applicable to all units. An entry in the table of Management IP Address Ranges. Not accessible.	
*MngIpRangeIdx (*MngIpRangesEntry 1)	Applicable to all units. Index of an entry in the IP Address Ranges Table.	Integer 1-10
*MngIpRangeFlag (*MngIpRangesEntry 2)	Applicable to all units. Defines the method of defining the range: Using Start & End Addresses (rangeDefinedByStartEndAddr), or using Start Address and Mask (rangeDefinedByStartAddrMask)	Integer rangeDefinedByStartEndAddr(1), rangeDefinedByStartAddrMask(2)
*MngIpRangeStart (*MngIpRangesEntry 3)	Applicable to all units. Start Address of the range.	IP address
*MngIpRangeEnd (*MngIpRangesEntry 4)	Applicable to all units. End Address of the range. Used only if brzaccVLMngIpRangeFlag is rangeDefinedByStartEndAddr	IP address

MIB Parameter	Description	Value/Range
*MngIpRangeMask (*MngIpRangesEntry 5)	Applicable to all units. The subnet mask of the range. Used only if brzaccVLMngIPRangeFlag is rangeDefinedByStartAddrMask.	IP address
*DeleteOneNwIpRange (*NwMngParameters 11)	Applicable to all units. Deletes a single selected entry from the Management IP Ranges Table.	Integer cancelOperation (0) deleteEntry (1...10) na (255)
*DeleteAllNwIpRanges (*NwMngParameters 12)	Applicable to all units. Deletes all entries from the Management IP Ranges Table.	Integer deleteAll (1) cancelOperation (2) na (255)
*ApClientIpAddress (*NwMngParameters 13)	Applicable to SU/RB only. The IP address of a WiFi AP connected to the unit.	IP address

E.2.4 IP Parameters

MIB Parameter	Description	Value/Range
*IpParams (breezeAccessVLMib 4)		
*UnitIpAddress (*IpParams 1)	Applicable to all units. IP address of the unit.	IP address
*SubNetMask (*IpParams 2)	Applicable to all units. Subnet mask of the unit.	IP address
*DefaultGWAddress (*IpParams 3)	Applicable to all units. Default gateway IP address of the unit.	IP address
*UseDhcp (*IpParams 4)	Applicable to all units. 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 *UnitIpAddress, *SubnetMask and *DefaultGWAddress.	Integer disable (1) dHCPOnly (2) automatic (3)
*AccessToDHCP (*IpParams 5)	Applicable to all units. The port to be used for communicating with a DHCP server.	Integer fromWirelessOnly (1) fromEthernetOnly (2) fromBothWirelessAndEthernet (3)
*RunTimeIPAddr (*IpParams 6)	Applicable to all units. 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

MIB Parameter	Description	Value/Range
*RunTimeSubNetMask (*IpParams 7)	Applicable to all units. 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 all units. 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

E.2.5 Bridge Parameters

MIB Parameter	Description	Value/Range
*BridgeParameters (breezeAccessVLMib 5)	Bridge parameters.	
*VLANSupport (*BridgeParameters 1)	Applicable to all units. VLAN support parameters. Applicable to Access Link only.	
*VlanID (*VLANSupport 1)	Applicable to SU/RB only. VLAN ID for data frame tagging.	Integer 1-4094. 0 –na (no VLAN ID)
*EthernetLinkType (*VLANSupport 2)	Applicable to all units. VLAN support mode (Link Type). The accessLink option is not available for AU/BU. serviceProviderLink is not applicable for BU/RB.	Integer accessLink (1) trunkLink (2) hybridLink (3) serviceProviderLink (4)
*ManagementVID (*VLANSupport 3)	Applicable to all units. 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 all units. Enables or disables the VLAN forwarding feature. Applicable to Trunk and Service Provider links only.	Integer disable (1) enable (2) na (255)
*VlanForwardingTable (*VLANForwarding 2)	Applicable to all units. 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 and Service Provider links only. Not accessible.	
*VlanForwardingEntry (*VlanForwardingTable 1)	Applicable to all units. A VLAN Forwarding Table entry. Applicable to Trunk and Service Provider links only. Not accessible.	
*VlanForwardingTableIdx (*VlanForwardingEntry 1)	Applicable to all units. A read only table index for a VLAN entry in the VLAN Forwarding Table.	Integer 1-20

MIB Parameter	Description	Value/Range
*VlanIdForwarding (*VlanForwardingEntry 2)	Applicable to all units. 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. Not applicable to BreezeNET B products.	
*VlanRelayingSupport (*VLANRelaying 1)	Applicable to AU only. Not applicable to BreezeNET B products. Enables or disables the VLAN Relaying feature. Applicable to Trunk and Service Provider links only.	Integer disable (1) enable (2) na (255)
*VlanRelayingTable (*VLANRelaying 2)	Applicable to AU only. Not applicable to BreezeNET B products. 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 and Service Provider links only. Not accessible.	
*VlanRelayingEntry (*VlanRelayingTable 1)	Applicable to AU only. Not applicable to BreezeNET B products. A VLAN Relaying Table entry. Applicable to Trunk and Service Provider links only. Not accessible.	
*VlanRelayingTableIdx (*VlanRelayingEntry) 1	Applicable to AU only. Not applicable to BreezeNET B products. A read only table index for a VLAN entry in the VLAN Relaying Table.	Integer 1-20
*VlanIdRelaying (*VlanRelayingEntry 2)	Applicable to AU only. Not applicable to BreezeNET B products. 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.	
*VlanDataPriority (*VLANTrafficPriority 1)	Applicable to SU/RB only. Priority tagging for data frames. Applicable to Access Link only.	Integer 0 – 7 255-na
*VlanManagementPriority (*VLANTrafficPriority 3)	Applicable to all units. Priority tagging for management frames. Applicable to Access Link and Trunk Link only.	Integer 0 – 7 255-na
*VlanPriorityThreshold (*VLANTrafficPriority 4)	Applicable to all units. Not applicable to units with SW version 3.1 and higher where this parameter is replaced by Priority threshold for tagged frames received from Ethernet port. Applicable to Hybrid Link and Trunk Link only.	Integer 0 – 7 255-na
*VLANQinQ (*VLANSupport 7)	QinQ (Service Provider Link) parameters. Not applicable to BreezeNET-B units.	
*QinQEthertype (*VLANQinQ 1)	Applicable to AU and SU. The Ethernet type of the Service Provider tag	Integer 33024 (0x8100) – 36864 (0x9000), 37120 (0x9100), 37376 (0x9200)
*QinQProviderVlanID (*VLANQinQ 2)	Applicable to SU only. VLAN ID of the Service Provider tag.	Integer 1-4094
*BridgeAgingTime (*BridgeParameters 2)	Applicable to all units. Bridge aging time for devices learned from both the Ethernet and wireless link ports.	Integer 20 – 2000 (seconds)

MIB Parameter	Description	Value/Range
*BroadcastRelaying (*BridgeParameters 4)	Applicable to AU only. Not applicable to BreezeNET B products. 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. Not applicable to BreezeNET B products. 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/RB only. Enables or disables the filtering of Ethernet (layer2) broadcasts. disable: No filtering. onEthernetOnly: 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/RB 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 (*EthBroadcastingParameters 2)	Applicable to SU/RB 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 (*EthBroadcastingParameters 3)	Applicable to SU/RB only. Enables or disables the broadcasting of ARP messages, overriding the general *EthBroadcastFiltering Ethernet broadcast filtering option.	Integer disable (1) enable (2) na (255)
*EthBroadcastMulticastLimiterOption (*EthBroadcastingParameters 4)	Applicable to all units. Enable/disable the limiter for multicast and broadcast packets.	Integer disable (1) limitOnlyBroadcasts(2) limitMulticastsExceptBroadcasts(3) limitAllMulticasts(4)
*EthBroadcastMulticastLimiterThreshold (*EthBroadcastingParameters 5)	Applicable to all units. The limit for the allowed number of multicast and broadcast packets when the Ethernet Broadcast/Multicast Limiter Option is enabled	Integer 0 - 204800
*EthBroadcastMulticastLimiterSendTrapInterval (*EthBroadcastingParameters 5)	Applicable to all units. The minimum time in minutes between two successive traps that are sent, indicating the number of packets that were dropped by the Ethernet Broadcast/Multicast Limiter since the last trap was sent.	Integer 1-60
*ToSPriorityParameters (*BridgeParameters 8)		
*ToSPrecedenceThreshold (*ToSPriorityParameters 1)	Applicable to all units. Not applicable to units with SW version 3.1 and higher. Priority threshold (based on the ToS) for frames received from Ethernet port.	Integer 0-7

MIB Parameter	Description	Value/Range
*RoamingOption (*BridgeParameters 9)	Applicable to SU/RB only. Disable/enable the roaming feature. When enabled, the SU will start scanning for an AU/RB after one second of not receiving beacons from current AU/BU. Once it found a new AU/BU, it will also send through the wireless network a roaming SNAP on behalf of its clients informing other devices in the network of their new location. When disabled, it will wait for seven seconds before starting scanning, and it will not send roaming SNAPS.	Integer disable (1) enable (2) na (255)
*MacAddressDenyList (*BridgeParameters 10)	MAC Address Deny List parameters	
*MacAddressDenyListTable (*MacAddressDenyList 1)	Applicable to AU only. Not applicable to BreezeNET B units. A list of up to 100 MAC Addresses. If brzaccVLMacAddressDenyListAction is set to denyList, these are SUs that are not allowed to transfer data to the AU. If brzaccVLMacAddressDenyListAction is set to allowList, only these SUs are allowed to transfer data to the AU. Not accessible.	
*MacAddressDenyListEntry (*MacAddressDenyListTable 1)	Applicable to AU only. Not applicable to BreezeNET B units. An entry in the Mac Address Deny List Table. Not accessible.	
*MacAddressDenyListTableIdx (*MacAddressDenyListEntry 1)	Applicable to AU only. Not applicable to BreezeNET B units. A read only table index for a MAC Address entry in the Mac Address Deny List Table.	Integer Range: 1 to 100
*MacAddressDenyListId (*MacAddressDenyListEntry 2)	Applicable to AU only. Not applicable to BreezeNET B units. The list of MAC Addresses in the MAC Address Deny List Table. To Remove a MAC Address - SET the corresponding entry to 0. To Add a new MAC Address - SET an entry which is currently 0.	MAC Address
*MacAddressDenyListAdd (*MacAddressDenyList 2)	Applicable to AU only. Not applicable to BreezeNET B units. Add a MAC address to the MAC Address Deny List Table	MAC Address
*MacAddressDenyListRemove (*MacAddressDenyList 3)	Applicable to AU only. Not applicable to BreezeNET B units. Remove a MAC address from the MAC Address Deny List Table	MAC Address
*NumberOfMacAddressesInDenyList (*MacAddressDenyList 4)	Applicable to AU only. Not applicable to BreezeNET B units. Read only. The number of MAC addresses in the MAC Address Deny List Table.	Integer Range: 0 to 100 Na (255)
*MacAddressDenyListAction (*MacAddressDenyList 5)	Applicable to AU only. Not applicable to BreezeNET B-units. Defines the action to be used by the Mac Address Deny List.	Integer denyList (1), allowedList (2), na (255)
*PortsControl (*BridgeParameters 11)	Ports Control parameters. Applicable to SU/RB only.	
*EthernetPortControl (*PortsControl 1)	Applicable to SU/RB only. Enable/disable the Ethernet port. When disabled, only data frames are blocked. Management frames are accepted.	Integer disable (1), enable (2), na (255)

E.2.6 Air Interface Parameters

MIB Parameter	Description	Value/Range
*AirInterface (breezeAccessVLMib 6)	Applicable to all units. Air Interface parameters.	
*ESSIDParameters (*AirInterface 1)	Applicable to all units. ESSID Parameters.	
*ESSID (*ESSIDParameters 1)	Applicable to all units. The Extended Service Set ID (ESSID) used to prevent the merging of collocated systems. The ESSID is accessible only with the write community string (administrator password).	DisplayString (SIZE(31)) Up to 31 printable case sensitive ASCII characters.
*OperatorESSIDOption (*ESSIDParameters 2)	Applicable to AU/BU only. Enabling/disabling the use of the Operator ESSID	Integer disable (1) enable (2) na (255)
*OperatorESSID (*ESSIDParameters 3)	Applicable to AU/BU only. A secondary ESSID to support easy installation of SUs as well as the use of the Best AU/BU feature. Accessible only with SNMP Write Community string (administrator password).	DisplayString (SIZE(31)) Up to 31 printable case sensitive ASCII characters.
*RunTimeESSID (*ESSIDParameters 1)	Applicable to SU/RB only. The ESSID of the associated AU/BU. Accessible only with SNMP Write Community string (administrator password).	DisplayString (SIZE(31)) Up to 31 printable case sensitive ASCII characters.
*MaximumCellDistance (*AirInterface 2)	Applicable to all units. For AU/BU: read-write. For SU/RB: read-only. The distance is learned from the AU/BU. In units with SW version 2.0 and up - applicable only when the Cell Distance Mode is set to Manual. The highest distance from the AU/BU of any SU/RB served by it. Affects the maximum time the units wait for a response message and the slot size by taking into account the round trip propagation delay.	Integer Range: For units with SW version bellow version 2.0 the range is 0 - 50000 Meters. For units with SW version 2.0 and up the range is 0 to 54 Kilometers. 0 means no compensation (minimum slot size, maximal delay timeout).
*AIFS (*AirInterface 3)	Applicable to AU and SU. Not applicable to BreezeNET B products. Arbitration Inter-Frame Spacing (AIFS). This is the number of time slots that define the DIFS. (DIFS=SIFS+AIFS). A value of 1 should be used only in point-to-point applications to allow one unit to have advantage over the other unit.	Integer oneSlot (1) twoSlots (2) na (255)
*WirelessTrapThreshold (*AirInterface 4)	Applicable to AU/BU only. A wireless link quality threshold, expressed in % of retransmissions, for sending the brzaccVLAUWirelessQualityTRAP. This trap indicate whether the quality has gone below or above the specified threshold	Integer 1-100 (%)

MIB Parameter	Description	Value/Range
*TransmitPowerTable (*AirInterface 5)	Applicable to all units. Not accessible. Transmit Power parameters table.	
*TransmitPowerEntry (*TransmitPowerTable 1)	Applicable to all units. Not accessible. An entry in the Transmit Power parameters table.	
*TransmitPowerIdx (*TransmitPowerEntry 1)	Applicable to all units. Read-only. An index of an entry in the Transmit Power parameters table.	Integer 1-4
*ApplicableModulationLevel (*TransmitPowerEntry 2)	Applicable to all units. Read-only. The applicable modulation level for an entry in the Transmit Power parameters table. Level 8 is not applicable to units with HW revision A.	Level1to5 (1) Level6 (2) Level7 (3) Level8 (4)
*MaximumTxPowerRange (*TransmitPowerEntry 3)	Applicable to all units. Read-only. The allowed range for the *TxPower parameter at the applicable modulation level.	DisplayString Range: -10 to the maximum allowed for the applicable modulation level.
*TxPower (*TransmitPowerEntry 4)	Applicable to all units. Read-only for units with SW version 4.0 and higher. AU/BU: The transmit power defined for the applicable modulation level. SU/RB: If ATPC is disabled, this is The transmit power defined for the applicable modulation level. If ATPC is enabled, it serves as the initial transmit power for the ATPC algorithm.	DisplayString Range: In SU/RB: The range is -10 dBm to the power value defined by *MaximumTxPower for the applicable modulation level. In AU/BU: The range is -10 dBm to the power value defined by *MaximumTxPowerRange for the applicable modulation level
*CurrentTxPower (*TransmitPowerEntry 5)	Applicable to SU/RB. Read-only. The actual transmit power in dBm at the applicable modulation level.	DisplayString Range: -17 to the maximum value defined by *MaximumTxPowerRange for the applicable modulation level.
*MaximumTransmitPowerTable (*AirInterface 6)	Applicable to SU /RB. Not accessible. Maximum Transmit Power parameters table.	
*MaximumTransmitPowerEntry (*TransmitPowerTable 1)	Applicable to SU/RB. Not accessible. An entry in the Maximum Transmit Power parameters table.	
*MaximumTransmitPowerIdx (*MaximumTransmitPowerEntry 1)	Applicable to SU/RB. Read-only. An index of an entry in the Maximum Transmit Power parameters table.	Integer 1-4
*MaxTxApplicableModulationLevel (*MaximumTransmitPowerEntry 2)	Applicable to SU/RB. Read-only. The applicable modulation level for an entry in the Maximum Transmit Power parameters table. Level 8 is not applicable to units with HW revision A.	Level1to5 (1) Level6 (2) Level7 (3) Level8 (4)
*DefinedMaximumTxPowerRange (*MaximumTransmitPowerEntry 3)	Applicable to SU/RB. Read-only. The allowed range for the *MaxTxPower parameter at the applicable modulation level.	DisplayString Range: -10 to the maximum allowed for the applicable modulation level.

MIB Parameter	Description	Value/Range
*MaxTxPower (*MaximumTransmitPowerEntry 4)	Applicable to SU/RB. Read-only for units with SW version 4.0 and higher. The maximum transmit power level that can be either configured for the *TxPower parameter or reached by the ATPC algorithm.	DisplayString Range: -10 to the maximum defined by the *DefinedMaximumTxPowerRange for the applicable modulation level.
*MaxNumOfAssociations (*AirInterface 10)	Applicable to AU. Not applicable to BreezeNET B products. The upper limit for the number of Subscriber Units that can be associated with the AU.	Integer AU-BS, AU-SA: 0-512 (0-124 if Data Encryption Option is enabled). AUS-BS, AUS-SA with SW version 4.0 and higher: 0-8. AUS-BS, AUS-SA with SW version below 4.0: 0-5. na (65535)
*BestAu (*AirInterface 11)	Best AU/BU parameters. Applicable to SU/RB.	
*BestAuSupport (*BestAu 1)	Applicable to SU/RB. Disable/enable the Best AU/BU selection mechanism	Integer disable (1) enable (2) na (255)
*BestAuNoOfScanningAttempts (*BestAu 2)	Applicable to SU/RB. The number of scanning attempts to collect information for the Best AU/BU decision	Integer 1-255
*PreferredAuMacAddress (*BestAu 3)	Applicable to SU only. The MAC address of the preferred AU/BU (overriding the Best AU/BU selection process).	Mac Address 000000000000 means no preferred AU
*NeighborAuTable (*BestAu 4)	Applicable to SU/RB. Not accessible. Neighboring AUs/BUs table.	
*NeighborAuEntry (*NeighborAuTable 1)	Applicable to SU only. Not accessible. An entry in the Neighboring AUs table.	
*NeighborAuldx (*NeighborAuEntry 1)	Applicable to SU/RB. Read-only. An Index of an entry in the Neighboring AU/BU Table	Integer Range: 1...20
*NeighborAuMacAdd (*NeighborAuEntry 2)	Applicable to SU/RB. Read-only. The MAC Address of the AU/BU associated with the entry in the Neighboring AU/BU Table	MAC Address
*NeighborAuESSID (*NeighborAuEntry 3)	Applicable to SU/RB. Read-only. The ESSID of the AU/BU associated with the entry in the Neighboring AU/BU Table. Accessible only with the SNMP Write community string (Administrator Password).	DisplayString
*NeighborAuSNR (*NeighborAuEntry 4)	Applicable to SU/RB. Read-only. The average SNR at which the SU/RB receives the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer Na (255)

MIB Parameter	Description	Value/Range
*NeighborAuAssocLoadStatus (*NeighborAuEntry 5)	Applicable to SU/RB. Read-only. The load status of the AU/BU associated with the entry in the Neighboring AU/BU Table. Full means that it has reached its maximum permitted load, meaning in AU that the number of associated SUs is the Maximum Number Of Associations (for AU) or in BU that it is already associated with an RB.	Integer full (1) notFull (2) na (255)
*NeighborAuMark (*NeighborAuEntry 6)	Applicable to SU/RB. Read-only. The overall mark given by the Best AU/BU algorithm to the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer
*NeighborAuHwRevision (*NeighborAuEntry 7)	Applicable to SU/RB. Read-only. The HW revision of the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer HwRevisionA (1), HwRevisionB (2), HwRevisionC (3), na (255)
*NeighborAuCountryCode (*NeighborAuEntry 8)	Applicable to SU/RB. Read-only. The Country Code of the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer
*NeighborAuSwVer (*NeighborAuEntry 9)	Applicable to SU/RB. Read-only. The SW Version of the AU/BU associated with the entry in the Neighboring AU/BU Table.	DisplayString
*NeighborAuAtpcOption (*NeighborAuEntry 10)	Applicable to SU/RB. Read-only. The current ATPC Option of the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer disable (1), enable (2), na (255)
*NeighborAuAdapModOption (*NeighborAuEntry 11)	Applicable to SU/RB. Read-only. The current Adaptive Modulation Option of the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer disable (1), enable (2), na (255)
*NeighborAuBurstModeOption (*NeighborAuEntry 12)	Applicable to SU/RB. Read-only. The current Burst Mode Option of the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer disable (1), enable (2), na (255)
*NeighborAuDfsOption (*NeighborAuEntry 14)	Applicable to SU/RB. Read-only. The current DFS Option of the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer disable (1), enable (2), na (255)
*NeighborAuConcatenationOption (*NeighborAuEntry 15)	Applicable to SU/RB. Read-only. The current Concatenation Option of the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer disable (1), enable (2), na (255)
*NeighborAuLearnCountryCodeBySU (*NeighborAuEntry 17)	Applicable to SU. Not applicable for BreezeNET B-and BreezeACCESS products. Read-only. The current Country Code Learning by SU option of the AU associated with the entry in the Neighboring AU Table.	Integer disable (1), enable (2), na (255)
*NeighborAuSecurityMode (*NeighborAuEntry 18)	Applicable to SU/RB. Read-only. The current Security Mode of the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer wep (1), aesOCB (2), fips197 (3), na (255)

MIB Parameter	Description	Value/Range
*NeighborAuAuthOption (*NeighborAuEntry 19)	Applicable to SU/RB. Read-only. The current Authentication algorithm of the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer openSysteme (1), sharedKey (2), na (255)
*NeighborAuDataEncryptOption (*NeighborAuEntry 20)	Applicable to SU/RB. Read-only. The current Data Encryption option of the AU/BU associated with the entry in the Neighboring AU/BU Table.	Integer disable (1), enable (2), na (255)
*NeighborAuPerSuDistanceLearning (*NeighborAuEntry 21)	Applicable to SU. Read-only. The current Per SU Distance Learning option of the AU associated with the entry in the Neighboring AU Table.	Integer disable (1), enable (2), na (255)
*FrequencyDefinition (*AirInterface 12)	Frequency Definition parameters	
*SubBandLowerFrequency (*FrequencyDefinition 1)	Applicable to SU/RB. Not applicable to units with SW version 2.0 or higher. The lowest frequency in the subset to be used for scanning. For 5.8 GHz products the range is 5740 to 5830 MHz using a 10 MHz resolution. For 4.9GHz products the range is 4920 to 5080 MHz using a 10 MHz resolution. For HW Revision C and above this leaf is not relevant - shall return 0.	Integer
*SubBandUpperFrequency (*FrequencyDefinition 2)	Applicable to SU/RB. Not applicable to units with SW version 2.0 or higher. The lowest frequency in the subset to be used for scanning. For 5.8 GHz products the range is 5740 to 5830 MHz using a 10 MHz resolution. For 4.9G Hz products the range is 4920 to 5080 MHz using a 10 MHz resolution. For HW Revision C and above this leaf is not relevant - shall return 0.	Integer
*ScanningStep (*FrequencyDefinition 3)	Applicable to all units - For flexible Sub-Bands only. For units with version 2.0 and above this is a read-only parameter. The scanning step to be used for generating the frequency subset.	Integer mhz-5 (1), mhz-10 (2), mhz-20 (3) na (255)
*FrequencySubsetTable (*FrequencyDefinition 4)	Applicable to all units. Not applicable to SU/RB with SW version 4.0 and higher. Not accessible. The Frequency Subset table that includes all frequencies from the selected Sub-band.	
*FrequencySubsetEntry (FrequencySubsetTable 1)	Applicable to all units. Not applicable to SU/RB with SW version 4.0 and higher. Not accessible. An entry in the Frequency Subset table.	
*FrequencySubsetTableIdx (*FrequencySubsetEntry 1)	Applicable to all units. Not applicable to SU/RB with SW version 4.0 and higher. Read-only. The index of an entry in the Frequency Subset table.	Integer

MIB Parameter	Description	Value/Range
*FrequencySubsetFrequency (*FrequencySubsetEntry 2)	Applicable to all units with HW revision B and lower (for units with HW revision C and higher replaced by *FrequencySubsetFrequencyNew to support a resolution of 0.5 MHz). Not applicable to SU/RB with SW version 4.0 and higher. Read-only. The frequency in MHz of an entry in the Frequency Subset table.	Integer
*FrequencySubsetActive (*FrequencySubsetEntry 3)	Applicable to all units. Not applicable to SU/RB with SW version 4.0 and higher. The status of an entry in the Frequency subset Table. Only frequencies of active entries will be included in the final list of frequencies to be used for scanning.	Integer active (1) notActive (2)
*FrequencySubsetFrequencyNew (*FrequencySubsetEntry 4)	Applicable to all units. Not applicable to SU/RB with SW version 4.0 and higher. Read-only. The frequency in MHz of an entry in the Frequency Subset table. (Replaces *FrequencySubsetFrequency to support a resolution of 0.5 MHz for units with HW revision C and higher).	DisplayString
*SetSelectedFreqsSubset (*FrequencyDefinition 5)	Applicable to all units. Not applicable to SU/RB with SW version 4.0 and higher. Apply the selected subset. After the next reset the new subset will be used for scanning.	Integer SetSelectedFreqsSubset (1) cancel (2)
*CurrentFrequencySubsetTable (*FrequencyDefinition 6)	Applicable to all units. Not applicable to SU/RB with SW version 4.0 and higher. Not accessible. The Current Frequency Subset table that for SU/RB includes all frequencies that are currently used for scanning. In AU/BU it includes all frequencies that can be used by the DFS mechanism (if applicable).	
*CurrentFrequencySubsetEntry (CurrentFrequencySubsetTable 1)	Applicable to all units. Not applicable to SU/RB with SW version 4.0 and higher. Not accessible. An entry in the Current Frequency Subset table.	
*CurrentFrequencySubsetTableIdx (*CurrentFrequencySubsetEntry 1)	Applicable to all units. Not applicable to SU/RB with SW version 4.0 and higher. Read-only. The index of an entry in the Current Frequency Subset table.	Integer
*CurrentFrequencySubset Frequency (*FrequencySubsetEntry 2)	Applicable to all units with HW revision B and lower (for units with HW revision C and higher replaced by *CurrentFrequencySubsetFrequency New to support a resolution of 0.5 MHz). Not applicable to SU/RB with SW version 4.0 and higher. Read-only. The frequency in MHz of an entry in the Current Frequency Subset table.	Integer

MIB Parameter	Description	Value/Range
*CurrentFrequencySubset FrequencyNew (*FrequencySubsetEntry 3)	Applicable to all units. Not applicable to SU/RB with SW version 4.0 and higher. Read-only. The frequency in MHz of an entry in the Current Frequency Subset table. (Replaces *CurrentFrequencySubsetFrequency to support a resolution of 0.5 MHz for units with HW revision C and higher).	DisplayString
*CurrentAUOperatingFrequency (*FrequencyDefinition 7)	Applicable to AU/BU with HW revision B and lower (for units with HW revision C and higher replaced by *CurrentUOperatingFrequencyNew to support a resolution of 0.5 MHz). Read-only. The operating frequency in MHz.	Integer For 5.8 GHz products with SW version below 2.0 the range is 5740 to 5830 MHz using a 10 MHz resolution. For units with SW version 2.0 and up the range is as defined in the selected Sub-Band.
*AUDefinedFrequency (*FrequencyDefinition 8)	Applicable to AU/BU with HW revision B and lower (for units with HW revision C and higher replaced by *DefinedAUOperatingFrequencyNew to support a resolution of 0.5 MHz). Read-only. For 5.8 GHz products with SW version below 2.0 this is the frequency in MHz of the AU/BU after the next reset. For units with SW version 2.0 and up this is the frequency in MHz to use when the DFS Option is disabled.	Integer For 5.8 GHz products with SW version below 2.0 the range is 5740 to 5830 MHz using a 10M Hz resolution. For units with SW version 2.0 and up the range is as defined in the selected Sub-Band.
*CurrentSUOperatingFrequency (*FrequencyDefinition 9)	Applicable to SU/RB. Read only. The current operating frequency in MHz.	DisplayString For 5.8 GHz products with SW version below 2.0 the range is 5740 to 5830 MHz using a 10 MHz resolution. For units with SW version 2.0 and up the range is as defined in the selected Sub-Band.
*SubBandSelect (*FrequencyDefinition 10)	Sub-Band Selection parameters	
*SelectSubBandIndex (*SubBandSelect 1)	Applicable to all units. Read only for SU/RB with SW version 4.0 and higher. The ID of the sub-band used by the unit.	Integer
*DFSPParameters (*FrequencyDefinition 11)	DFS Parameters. Applicable to AU/BU.	
*DFSOption (*DFSPParameters 1)	Applicable to AU/BU. Enabling/disabling the DFS Algorithm. Not applicable if DFS Option is not supported by the current Sub-Band.	Integer disable (1) enable (2) na (255)

MIB Parameter	Description	Value/Range
*DFSCheckTime (*DFSPParameters 3)	Applicable to AU/BU. Defines the time the unit checks the channel for presence of radar signals and does not transmit after power up or association or after moving to a new channel due to detecting radar in the previously used channel.	Integer Range: 1 to 3600 (seconds).
*DFSChannelAvoidancePeriod (*DFSPParameters 4)	Applicable to AU/BU. Defines the time after detecting radar signals in a channel of avoiding using the channel or adjacent channels in accordance with the bandwidth.	Integer Range: 1 to 60 (minutes).
*DFSWaitingOption (*DFSPParameters 5)	Applicable to AU/BU. Defines whether the associated SUs may should wait for this AU/BU after it stopped transmitting due to radar detection, before they starts scanning for other AUs/BUs.	Integer disable (1) enable (2) na (255)
*DFSClearRadarChannels (*DFSPParameters 6)	Applicable to AU/BU. Clear Radar Detected and Adjacent to Radar channels after unit reset. Returns the unit to operate in default frequency	Integer cancel (1) clearRadarChannels (2) na (255)
*DFS Radar Detection Channels Table (*DFSParameters 7)	Applicable to AU/BU. Applicable only when DFS option is on. Displays the current channels defined in the sub-band and their radar detection status.	
*DFS Radar Detection Channels Entry (*DFS Radar Detection Channels Table 1)	Applicable to AU/BU. An entry in the DFS Radar Detection Channels Table.	
*DFSChannelIdx (*DFS Radar Detection Channels Entry 1)	Applicable to AU/BU. Read-only. The index of the entry in the DFS Radar Detection Channels Table.	Integer
*DFSChannelFrequency (*DFS Radar Detection Channels Entry 2)	Applicable to AU/BU with HW revision B and lower (for units with HW revision C and higher replaced by * DFSChannelFrequency New to support a resolution of 0.5 MHz). Read-only. The frequency in MHz of a channel in the DFS Radar Detection Channels Table.	Integer
*DFSChannelRadarStatus (*DFS Radar Detection Channels Entry 3)	Applicable to AU/BU. The radar detection status of a channel in the DFS Radar Detection Channels Table.	Integer radarFree (1) adjacentToRadar (2) radarDetected (3)
*DFSChannelFrequencyNew (*DFS Radar Detection Channels Entry 4)	Applicable to AU/BU. Read-only. The frequency of a channel in the DFS Radar Detection Channels Table. (Replaces *DFSChannelFrequency to support a resolution of 0.5 MHz for units with HW revision C and higher).	DisplayString
*DFSMinimumPulsesToDetect (*DFSPParameters 8)	Applicable to AU/BU. Defines the minimum number of pulses to detect radar.	Integer 1 - 100
*DFSChannelReuseParameters (*DFSPParameters 9)	Channel Reuse Parameters	

MIB Parameter	Description	Value/Range
*DFSCChannelReuseOption (*DFSCChannelReuseParameters 1)	Applicable to AU/BU. Enabling/disabling the DFS Channel Reuse Algorithm.	Integer disable (1) enable (2) na (255)
*DFSRadarResultAssessmentPeriod (*DFSCChannelReuseParameters 2)	Applicable to AU/BU. The period in hours for assessment of radar activity when the Channel reuse algorithm is enabled.	Integer 1 – 12 hours.
*DFSMaximumNumberOfDetectionsInAssessmentPeriod (*DFSCChannelReuseParameters 3)	Applicable to AU/BU. The maximum number of radar detection in the original channel during the Radar Activity Assessment Period that is required for reaching a decision to try again the original channel.	Integer 1 – 10 detections.
*CountryCodeLearningBySU (*FrequencyDefinition 12)	Applicable to AU only. Starting with 4.0 it is not applicable for BreezeACCESS and BreezeNET B. Defines whether the SU should learn the country code of the AU.	Integer disable (1) enable (2) na (255)
*CurrentAUOperatingFrequencyNew (*FrequencyDefinition 13)	Applicable to AU/BU. Read-only. The operating frequency in MHz. (Replaces *CurrentAUOperatingFrequency to support a resolution of 0.5 MHz for units with HW revision C and higher).	DisplayString For 5.8 GHz products with SW version below 2.0 the range is 5740 to 5830 MHz using a 10 MHz resolution. For units with SW version 2.0 and up the range is as defined in the selected Sub-Band.
*AUDefinedFrequencyNew (*FrequencyDefinition 14)	Applicable to AU/BU. Read-only. For 5.8 GHz products with SW version below 2.0 this is the frequency in MHz of the AU/BU after the next reset. For units with SW version 2.0 and up this is the frequency in MHz to use when the DFS Option is disabled. (Replaces *AUDefinedFrequency to support a resolution of 0.5 MHz for units with HW revision C and higher).	DisplayString For 5.8 GHz products with SW version below 2.0 the range is 5740 to 5830 MHz using a 10 MHz resolution. For units with SW version 2.0 and up the range is as defined in the selected Sub-Band.
*AutoSubBandSelect (*FrequencyDefinition 15)	Auto Sub Band Select parameters. Applicable to SU/RB with SW version 4.0 and higher.	
*AutoSubBandSelectedFreqSubset (*AutoSubBandSelect 1)	Applicable to SU/RB with SW version 4.0 and higher. Apply the selected subset. After the next reset the new subset will be used for scanning.	Integer setAllSelectedFreqsSubset (1), cancel (2)
*AutoSubBandFrequencySubsetTable (*AutoSubBandSelect 2)	Applicable to SU/RB with SW version 4.0 and higher. Not accessible. The Frequency Subset Table that includes all available sub-bands and all the frequencies in these sub-bands.	
*AutoSubBandFrequencySubsetEntry (*AutoSubBandFrequencySubsetTable 1)	Applicable to SU/RB with SW version 4.0 and higher. Not accessible. An entry in the Auto SubBand Frequency Subset Table.	

MIB Parameter	Description	Value/Range
*AutoSubBandFrequencySubsetBandIdx (*AutoSubBandFrequencySubsetEntry 1)	Applicable to SU/RB with SW version 4.0 and higher. Read-only. The index of the applicable Sub Band. This is the Sub Band ID of the relevant entry in the Country Dependent Parameters table. Serves also as an index of the entry in the Auto Sub Band Frequency Subset Table.	Integer 1-5
*AutoSubBandFrequencySubsetFrequencyIdx (*AutoSubBandFrequencySubsetEntry 2)	Applicable to SU/RB with SW version 4.0 and higher. Read-only. The index of the applicable frequency in the applicable Sub Band. Serves also as an index of the entry in the Auto Sub Band Frequency Subset Table.	Integer 1-40
*AutoSubBandFrequencySubsetActive (*AutoSubBandFrequencySubsetEntry 3)	Applicable to SU/RB with SW version 4.0 and higher. The status of an entry in the Auto Sub Band Frequency Subset Table. The frequency of an active entry will be included in the final list of frequencies to be used for scanning.	Integer active (1) , notActive (2)
*AutoSubBandFrequencySubsetFrequency (*AutoSubBandFrequencySubsetEntry 4)	Applicable to SU/RB with SW version 4.0 and higher. Read-only. The frequency in MHz of the entry in the Auto Sub Band Frequency Subset table.	DisplayString
*ATPC (*AirInterface 13)	ATPC parameters	
*AtpcOption (*ATPC 1)	Applicable to all units. Enabling/disabling the ATPC Algorithm	Integer disable (1) enable (2) na (255)
*DeltaFromMinSNRLevel (*ATPC 2)	Applicable to AU/BU. The Minimum SNR Level plus the value of this parameter define the maximum desired level of the average SNR at the AU/BU. If the ATPC Option is enabled, then if the received SNR is above the maximum desired level, the AU/BU will transmit Power-Down messages to the applicable SU/RB.	Integer 4-20 (dB)
*MinimumSNRLevel (*ATPC 3)	Applicable to AU/BU. Defines the minimum desired level in dB of the average SNR at the AU/BU. Below this level, if ATPC Option is enabled, the AU/BU will transmit ATPC Power-Up messages to the applicable SU/RB.	Integer 4-60 (dB)
*MinimumIntervalBetweenATPC Messages (*ATPC 4)	Applicable to AU/BU. The minimal time between consecutive power-up/power-down messages.	Integer Range: 1 to 3600 (seconds)
*PowerLevelSteps (*ATPC 6)	Applicable to AU/BU. The step in dB that the SU/RB will use when receiving an ATPC Power-Up/Power-Down message	Integer 1-20 (dB)
*CellDistanceParameters (*AirInterface 15)	Cell distance Parameters	

MIB Parameter	Description	Value/Range
*CellDistanceMode (*CellDistanceParameters 1)	Applicable AU/BU. The selected mode of deciding on Cell Distance.	Integer automatic (1) manual (2) na (255)
*FairnessFactor (*CellDistanceParameters 2)	Applicable AU/BU. Not applicable to BreezeNET B products with SW version below 4.0. The percentage of the maximum distance that is taken into account in the time slot calculation.	Integer Range: 0 to 100 (Percent). A value of 0 means the minimal slot size (9 microseconds). Na (255)
*MeasuredMaxCellDistance (*CellDistanceParameters 3)	Applicable AU/BU. The Maximum Cell Distance as calculated by the AU/BU.	Integer Range: 0 to 54 (Kilometers). 1 means "below 2 km".
*UnitWithMaxDistance (*CellDistanceParameters 4)	Applicable AU only. Not applicable to BreezeNET B units. The MAC address of the unit with the maximum distance from the AU.	MAC Address
*PerSuDistanceLearning (*CellDistanceParameters 5)	Applicable only to AU with SW version 4.0 and higher. Applicable only if Cell Distance Mode is set to Automatic. When disabled, all SUs in the cell will use for the ACK Timeout the computed distance of the farthest SU. When enabled, each SU will use its own computed distance.	Integer disable (1) enable (2)
*ScanningMode (*AirInterface 16)	Applicable to SU/RB. The scanning mode. In cells where the DFS Option is enabled Scanning Mode is forced to Passive.	Integer passive (1) active (2)
*Antenna Gain (*AirInterface 17)	Applicable to all units. Read-write in units where *AntennaGainChange is supported. Read-only in units where *AntennaGainChange is not supported. The net gain (including cable attenuation for detached antennas) of the antenna.	Integer 0-50 (dB) -1 (not configurable) means "Not Set Yet". -2 (not configurable) means "Don't Care".
*SpectrumAnalysisParameters (*AirInterface 18)	Spectrum Analysis Parameters.	
*SpectrumAnalysisChannelScanPeriod (*SpectrumAnalysisParameters 1)	Applicable to all units. The period in seconds of staying on each channel for information gathering during each cycle when performing Spectrum analysis.	Integer Range: 2-30 seconds.
*SpectrumAnalysisChannelScanCycles (*SpectrumAnalysisParameters 2)	Applicable to all units. The number of scanning cycles when performing Spectrum Analysis.	Integer Range: 1-100 seconds.
*AutomaticChannelSelection (*SpectrumAnalysisParameters 3)	Applicable to AU/BU. Defines whether the AU/BU shall choose the most noise free channel upon startup after spectrum analysis.	Integer disable (1), enable (2), na (255)
*SpectrumAnalysisActivation (*SpectrumAnalysisParameters 4)	Applicable to all units. Activates the spectrum analysis. The unit is automatically reset upon activation.	Integer cancelOperation (1), activateNow (2)
*SpectrumAnalysisStatus (*SpectrumAnalysisParameters 5)	Applicable to all units. Read-only. Indicates whether the unit is currently performing a spectrum analysis process.	Integer inactive (1), currentlyActive (2)

MIB Parameter	Description	Value/Range
*ResetSpectrumCounters (*SpectrumAnalysisParameters 6)	Applicable to all units. Resets the spectrum analysis counters.	Integer cancelOperation (1), resetCounters (2)
*SpectrumAnalysisInformationTable (*SpectrumAnalysisParameters 7)	Applicable to all units. Not accessible. The spectrum analysis information table.	
*SpectrumAnalysisInformationEntry (*SpectrumAnalysisInformationTable 1)	Applicable to all units. Not accessible. An entry in the spectrum analysis information table.	
*SpectrumAnalysisInformationTableIdx (*SpectrumAnalysisInformationEntry 1)	Applicable to all units. Read-only. A table index for a Spectrum Analysis Information Entry in the Spectrum Analysis Information Table.	
*SpectrumAnalysisInformationChannel (*SpectrumAnalysisInformationEntry 2)	Applicable to all units. Read-only. The channel's frequency of the relevant entry in the Spectrum Analysis Information Table.	DisplayString
*SpectrumAnalysisInformationSignalCount (*SpectrumAnalysisInformationEntry 3)	Applicable to all units. Read-only. The number of signals (excluding OFDM frames) detected in the channel.	Integer
*SpectrumAnalysisInformationSignalSNR (*SpectrumAnalysisInformationEntry 4)	Applicable to all units. Read-only. The approximate SNR of the signals (excluding OFDM frames) detected in the relevant channel.	Integer
*SpectrumAnalysisInformationSignalWidth (*SpectrumAnalysisInformationEntry 5)	Applicable to all units. Read-only. The average width in microseconds of the signals (excluding OFDM frames) detected in the relevant channel.	Integer
*SpectrumAnalysisInformationOFDMFrames (*SpectrumAnalysisInformationEntry 6)	Applicable to all units. Read-only. The number of OFDM frames received in the relevant channel.	Integer
*MaxNumOfAssociationsLimit (*AirInterface 19)	Applicable to AU only. Not applicable to BreezeNET B products. Shows the limit for the number of SUs that can be associated with the AU.	Integer AU-BS, AU-SA: If Data Encryption is enabled, the upper limit is 124. Otherwise it is 512. AUS-BS, AUS-SA with SW version below 4.0: 5. AUS-BS, AUS-SA with SW version 4.0 and higher: 8 BreezeNET B products return 65535.
*Disassociate (*AirInterface 20)	Disassociation parameters.	
*DisassociateAllSUs (*Disassociate 1)	Applicable to AU. Disassociate all SUs.	Integer cancelOperation (1), disassociateAllSUs (2)
*DisassociateSuByMacAddress (*Disassociate 2)	Applicable to AU. Disassociate specified SU.	MacAddress

MIB Parameter	Description	Value/Range
*TxControl (*AirInterface 21)	Applicable to AU/BU. Enables to turn the transmitter Off and On. If set to ethernetStatusControl, the unit will not transmit if the Ethernet link is down. This parameter can be configured only via the ethernet port. In units with SW version below 4.0, the unit is reset automatically upon configuration. For unit with SW version 4.0 and higher this parameter is applied in run-time.	Integer on(1) off (2) ethernetStatusControl 3)
*LostBeaconsWatchdogThreshold (*AirInterface 22)	Applicable to AU/BU only. The number of unsuccessful consecutive transmissions of beacons before Internal refresh is performed. 0 means that the lost beacons watchdog is not used and internal refresh is not performed.	Integer 0, 100-1000
*TransmitPower (*AirInterface 23)	Applicable to all units with SW version 4.0 and higher. The uniform transmit power for all modulation levels. For a specific modulation level the effective transmit power (brzaccVLTxPower) is the minimum between the uniform transmit power and the maximum transmit power for that modulation level.	Integer
*MaximumTxPower (*AirInterface 24)	Applicable to only SU/RB with SW version 4.0 and higher. The Maximum Transmit Power for all modulation levels. The Maximum Transmit Power for a specific modulation level is the minimum between this parameter and the hardware limitation for that modulation level.	Integer

E.2.7 Service Parameters

MIB Parameter	Description	Value/Range
*ServiceParameters (breezeAccessVLMib 7)	Applicable to all units. Service parameters.	
*MirDownlink (*ServiceParameters 2)	Applicable to SU/RB. The Maximum Information Rate (MIR) from AU/BU to SU/RB. MIR must be above brzaccVLCirDownlink value.	Integer Range for Set: SU-3 with SW version below 4.0: 128 – 2,048 (Kbps) SU-3 with SW version 4.0 or higher: 128 – 3,072 (Kbps) SU-6 with SW version below 4.0: 128 – 3,968 (Kbps) SU-6 with SW version 4.0 or higher: 128 – 6,016 (Kbps) SU-54: 128 – 53,888 (Kbps) SU-I: 128 – 6,016 (Kbps) RB-14: 128 – 6,912 (Kbps) RB-28: 128 – 22,016 (Kbps) RB-100: 128-107,904 (Kbps) The actual value (Get) will be the entered value rounded to the nearest multiple of 128 (N*128)
*MirUplink (*ServiceParameters 3)	Applicable to SU/RB. The Maximum Information Rate (MIR) from SU/RB to AU/BU. MIR must be above brzaccVLCirUplink value.	Integer Range for Set: SU-3 with SW version below 4.0: 128 – 2,048 (Kbps) SU-3 with SW version 4.0 or higher: 128 – 3,072 (Kbps) SU-6 with SW version below 4.0: 128 – 3,968 (Kbps) SU-6 with SW version 4.0 or higher: 128 – 6,016 (Kbps) SU-54: 128 – 53,888 (Kbps) SU-I: 128 – 2,048 (Kbps) RB-14: 128 – 6,912 (Kbps) RB-28: 128 – 22,016 (Kbps) RB-100: 128-107,904 (Kbps) The actual value (Get) will be the entered value rounded to the nearest multiple of 128 (N*128)

MIB Parameter	Description	Value/Range
*CirDownlink (*ServiceParameters 4)	Applicable to SU only. Not applicable to BreezeNET B products. The Committed Information Rate (CIR) from AU to SU. CIR must be below brzaccVLMirDownlink value.	Integer Range for Set: SU-3 with SW version below 4.0: 0 – 2,048 (Kbps) SU-3 with SW version 4.0 or higher: 0 – 3,072 (Kbps) SU-6 with SW version below 4.0: 0 – 3,968 (Kbps) SU-6 with SW version 4.0 or higher: 0 – 6,016 (Kbps) SU-54: 0 – 45,056 (Kbps) SU-I: 0 – 6,016 (Kbps) The actual value (Get) will be the entered value rounded to the nearest multiple of 128 (N*128). BreezeNET B products will return 65535 for na.
*CirUplink (*ServiceParameters 5)	Applicable to SU only. Not applicable to BreezeNET B products. The Committed Information Rate (CIR) from SU to AU. CIR must be below brzaccVLMirUplink value.	Integer Integer Range for Set: SU-3 with SW version below 4.0: 0 – 2,048 (Kbps) SU-3 with SW version 4.0 or higher: 0 – 3,072 (Kbps) SU-6 with SW version below 4.0: 0 – 3,968 (Kbps) SU-6 with SW version 4.0 or higher: 0 – 6,016 (Kbps) SU-54: 0 – 45,056 (Kbps) SU-I: 0 – 2,048 (Kbps) The actual value (Get) will be the entered value rounded to the nearest multiple of 128 (N*128). BreezeNET B products will return 65535 for na.
*MaxDelay (*ServiceParameters 6)	Applicable to SU only. Not applicable to BreezeNET B products. The maximal time packets may be delayed by the CIR\MIR mechanism. Above the configured maximal period the packets are discarded.	Integer Range: 300 - 10000 (milliseconds) BreezeNET B products will return 65535 for na.
*MaxBurstDuration (*ServiceParameters 7)	Applicable to AU and SU. Not applicable to BreezeNET B products. The maximum time during which inactivity bonus time can be accumulated for future burst transmissions.	Integer Range: 0 – 2000 (milliseconds) BreezeNET B products will return 65535 for na.
*GracefulDegradationLimit (*ServiceParameters 8)	Applicable to AU only. Not applicable to BreezeNET B products. The maximum limit for activating the graceful degradation algorithm.	Integer Range: 0 – 70 (%) na (255)

MIB Parameter	Description	Value/Range
*MirOnlyOption (*ServiceParameters 9)	Applicable only to AU. Not applicable to BreezeNET B products. When enabled, it overrides the CIR/MIR algorithm for determining actual information rate and forces the algorithm to operate with MIR parameters' settings only. When enabled, the Graceful Degradation algorithm is disabled.	Integer disable (1) enable (2) na (255)
*TrafficPrioritization (*ServiceParameters 10)	Traffic Prioritization parameters. Applicable to all units.	
*VLTrafficPriVLAN (*TrafficPrioritization 1)	VLAN Prioritization parameters. Applicable to all units.	
*LANPriorityThreshold (*VLTrafficPriVLAN 1)	Applicable to all units. If the VLAN Priority's value of the frame is less than or equal to this threshold, the frame will get Low priority, otherwise the frame will get High priority. Untagged frames will get Low priority.	Integer 0-7
*TrafficPriIPToS (*TrafficPrioritization 2)	ToS Prioritization parameters. Applicable to all units.	
*ToSPrioritizationOption (*TrafficPriIPToS 1)	Applicable to all units. Disable/Enable IP ToS prioritization and chooses the interpretation of the IP ToS field from IP header: ipPrecedence(2): The IP ToS field is defined by RFC791. In this case the prioritization will be done using the Precedence sub-field of IP ToS. This sub-field has 3 bits, so it can be between 0 and 7. dSCP(3): The IP ToS field is defined by RFC2474. In this case the prioritization will be done using the DSCP sub-field. The size of the sub-field is 6 bits, so the range is 0 to 63.	Integer disable(1), ipPrecedence(2), dSCP(3)

MIB Parameter	Description	Value/Range
*IPPrecedenceThreshold (*TrafficPriIPToS 2)	Applicable to all units. The threshold of Precedence sub-field of IP ToS field from IP Header (RFC791) to be used when the ToS Prioritization Option is set to IP Precedence. If the Precedence sub-field of a frame is less than or equal to this threshold the frame will have Low priority, otherwise it will get High priority.	Integer 0-7
*IPDSCPThreshold (*TrafficPriIPToS 3)	Applicable to all units. The threshold of DSCP sub-field of IP ToS field from IP Header (RFC2474) to be used when ToS Prioritization Option is set to DSCP. If the DSCP sub-field of a frame is less than or equal to this threshold the frame will have Low priority, otherwise it will get High priority.	Integer 0-63
*TrafficPriUdpTcpPortRange (*TrafficPrioritization 3)	UDP/TCP Port Ranges Prioritization parameters. Applicable to all units.	
*UdpTcpPortRangePrioritizationOption (*TrafficPriUdpTcpPortRange 1)	Applicable to all units. Disable/Enable Prioritization using UDP and/or TCP Port Ranges. udpOnly(2): prioritization will be done only for UDP packets tcpOnly(3): prioritization will be done only for TCP packets udpANDtcp(4): prioritization will be done for UDP and TCP packets	Integer disable(1), udpOnly(2), tcpOnly(3), udpANDtcp(4)
*UdpPortRangeConfig (*TrafficPriUdpTcpPortRange 2)	UDP Port Range parameters. Applicable to all units.	
*UdpPortPriRTPRTCP (*UdpPortRangeConfig 1)	Applicable to all units. RTP/RTCP ports prioritization option for UDP packet. rtpANDrtcp(1): the possible RTP and RTCP packet with destination port in the defined port ranges will get High priority. rtpOnly(2): only possible RTP packet (packet with even destination port) with destination port in the defined port ranges will get High priority.	Integer rtpANDrtcp(1), rtpOnly(2)

MIB Parameter	Description	Value/Range
*UdpPortRangeNum (*UdpPortRangeConfig 2)	Applicable to all units. Read-only. The number of entries in the UDP Port Range Table.	Integer
*UdpPortRangeTable (*UdpPortRangeConfig 3)	Applicable to all units. Not accessible. A table of UDP port ranges used for prioritization. The user can define up to 64 ranges. An entry is empty if start is 65535 and end is 0.	
*UdpPortRangeEntry (*UdpPortRangeTable 1)	Applicable to all units. Not accessible. A UDP Port Ranges Table entry.	
*UdpPortRangeStart (*UdpPortRangeEntry 1)	Applicable to all units. Read-only. Start port of an UDP Port Range	Integer 0-65535
*UdpPortRangeEnd (*UdpPortRangeEntry 2)	Applicable to all units. Read-only. End port of an UDP Port Range	Integer 0-65535
*UdpPortRangeIdx (*UdpPortRangeEntry 3)	Applicable to all units. Read-only. Index of an UDP Port Range entry	Integer 1-64
*UdpPortRangeAdd (*UdpPortRangeConfig 4)	Applicable to all units. Add port range(s) to UDP Port Ranges Table. Get operation will return an empty string.	DisplayString A range is defined by <start>-<end> or <start>, where <start> is the Start Port of the range and <end> is the End Port. If only <start> is specified the range is <start>-<start>. The value of <start> and <end> are between 0 and 65535. The user can add several ranges using a comma to separate between ranges. Example: 10-26,99,987-900.
*UdpPortRangeDelete (*UdpPortRangeConfig 5)	Applicable to all units. Delete port range(s) from UDP Port Ranges Table. Get operation will return an empty string.	DisplayString A range is defined by <start>-<end> or <start>, where <start> is the Start Port of the range and <end> is the End Port. If only <start> is specified the range is <start>-<start>. The value of <start> and <end> are between 0 and 65535. The user can delete several ranges using a comma to separate between ranges. Example: 10-26,99,987-900.
*UdpPortRangeDeleteAll (*UdpPortRangeConfig 6)	Applicable to all units. Delete all entries form UDP Port Ranges Table. Get operation will return 1	Integer deleteAll(1), cancelOperation (2)
*TcpPortRangeConfig (*TrafficPriUdpTcpPortRange 3)	UDP Port Range parameters. Applicable to all units.	

MIB Parameter	Description	Value/Range
*TcpPortPriRTPRTCP (*TcpPortRangeConfig 1)	Applicable to all units. RTP/RTCP ports prioritization option for TCP packets. rtpANDrtcp(1): the possible RTP and RTCP packet with destination port in the defined port ranges will get High priority. rtpOnly(2): only possible RTP packet (packet with even destination port) with destination port in the defined port ranges will get High priority.	Integer rtpANDrtcp(1), rtpOnly(2)
*TcpPortRangeNum (*TcpPortRangeConfig 2)	Applicable to all units. Read-only. The number of entries in the TCP Port Range Table.	Integer
*TcpPortRangeTable (*TcpPortRangeConfig 3)	Applicable to all units. Not accessible. A table of TCP port ranges used for prioritization. The user can define up to 64 ranges. An entry is empty if start is 65535 and end is 0.	
*TcpPortRangeEntry (*TcpPortRangeTable 1)	Applicable to all units. Not accessible. A TCP Port Ranges Table entry.	
*TcpPortRangeStart (*TcpPortRangeEntry 1)	Applicable to all units. Read-only. Start port of an TCP Port Range	Integer 0-65535
*TcpPortRangeEnd (*TcpPortRangeEntry 2)	Applicable to all units. Read-only. End port of an TCP Port Range	Integer 0-65535
*TcpPortRangeIdx (*TcpPortRangeEntry 3)	Applicable to all units. Read-only. Index of an TCP Port Range entry	Integer 1-64
*TcpPortRangeAdd (*TcpPortRangeConfig 4)	Applicable to all units. Add port range(s) to TCP Port Ranges Table. Get operation will return an empty string.	DisplayString A range is defined by <start>-<end> or <start>, where <start> is the Start Port of the range and <end> is the End Port. If only <start> is specified the range is <start>-<start>. The value of <start> and <end> are between 0 and 65535. The user can add several ranges using a comma to separate between ranges. Example: 10-26,99,987-900.

MIB Parameter	Description	Value/Range
*TcpPortRangeDelete (*TcpPortRangeConfig 5)	Applicable to all units. Delete port range(s) from TCP Port Ranges Table. Get operation will return an empty string.	DisplayString A range is defined by <start>-<end> or <start>, where <start> is the Start Port of the range and <end> is the End Port. If only <start> is specified the range is <start>-<start>. The value of <start> and <end> are between 0 and 65535. The user can delete several ranges using a comma to separate between ranges. Example: 10-26,99,987-900.
*TcpPortRangeDeleteAll (*TcpPortRangeConfig 6)	Applicable to all units. Delete all entries form TCP Port Ranges Table. Get operation will return 1	Integer deleteAll(1), cancelOperation (2)
*WirelessLinkPrioritization (*TrafficPrioritization 4)	Wireless Link Prioritization parameters.	
*WirelessLinkPrioritizationOption (*WirelessLinkPrioritization 1)	Applicable only to AU with a license for the Wireless Link Prioritization feature and to BU-100. Enable/disable the traffic prioritization over the Wireless Link.	Integer disable (1) enable (2) na (255)
*lowPriorityAIFS (*WirelessLinkPrioritization 2)	Applicable only to AU with a license for the Wireless Link Prioritization feature and to BU-100. Applicable only if the Wireless Link Prioritization Option is enabled. Define the AIFS (Arbitration Inter-frame Space) that will be used for transmitting Low Priority Traffic	Integer 3-254
*HWRetriesHighPriority (*WirelessLinkPrioritization 3)	Applicable only to AU with a license for the Wireless Link Prioritization feature and to BU-100. Applicable only if the Wireless Link Prioritization Option is enabled. Defines the Maximum number of HW Retries for a unicast data packet that has High Priority.	Integer 1-14
*HWRetriesLowPriority (*WirelessLinkPrioritization 4)	Applicable only to AU with a license for the Wireless Link Prioritization feature and to BU-100. Applicable only if the Wireless Link Prioritization Option is enabled. Defines the Maximum number of HW Retries for a unicast data packet that has Low Priority.	Integer 1-14

MIB Parameter	Description	Value/Range
*AUBurstDurationHighPriority (*WirelessLinkPrioritization 5)	Applicable only to AU with a license for the Wireless Link Prioritization feature and to BU-100. Applicable only if the Wireless Link Prioritization Option is enabled. Defines the Maximum duration of burst that can be done by AU/BU with High Priority packets. The time is given in 250 microseconds units.	Integer 0-40
*AUBurstDurationLowPriority (*WirelessLinkPrioritization 6)	Applicable only to AU with a license for the Wireless Link Prioritization feature and to BU-100. Applicable only if the Wireless Link Prioritization Option is enabled. Defines the Maximum duration of burst that can be done by AU/BU with Low Priority packets. The time is given in 250 microseconds units.	Integer 0-40
*SUBurstDurationHighPriority (*WirelessLinkPrioritization 7)	Applicable only to AU with a license for the Wireless Link Prioritization feature and to BU-100. Applicable only if the Wireless Link Prioritization Option is enabled. Defines the Maximum duration of burst that can be done by SU/RB with High Priority packets. The time is given in 250 microseconds units.	Integer 0-40
*SUBurstDurationLowPriority (*WirelessLinkPrioritization 8)	Applicable only to AU with a license for the Wireless Link Prioritization feature and to BU-100. Applicable only if the Wireless Link Prioritization Option is enabled. Defines the Maximum duration of burst that can be done by SU/RB with Low Priority packets. The time is given in 250 microseconds units.	Integer 0-40
*Drap (*ServiceParameters 11)	DRAP Parameters. Applicable only to AU with SW version 4.0 and higher. Not applicable to BreezeNET B-products.	
*DrapSupport (*Drap 1)	Disable/Enable the DRAP feature.	Integer disable (1) enable (2) na (255)
*DrapUdpPort (*Drap 2)	The UDP port used for the DRAP server.	Integer 8000-8200

MIB Parameter	Description	Value/Range
*DrapMaxNumberOfVoiceCalls (*Drap 3)	The maximum number of voice calls that can be supported by the AU when DRAP is enabled.	Integer 0-255
*DrapTTL (*Drap 4)	The maximum time in seconds between two allocation requests.	Integer 1-255
*DrapNoOfActiveVoiceCalls (*Drap 5)	Read-only. The current total number of active voice calls.	Integer
*LowPriorityTrafficMinimumPercent (*ServiceParameters 12)	The minimum percent of the traffic rate that is allocated to the low priority traffic.	Integer 0-100

E.2.8 User Filtering Parameters

MIB Parameter	Description	Value/Range
*UserFilterParams (breezeAccessVLMib 8)	Applicable to SU/RB. User filtering parameters.	
*UserFilterOption (*UserFilterParams 1)	Applicable to SU/RB. 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/RB. 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/RB. An IP Filter table entry. Not accessible.	
*IpID (*IpFilterEntry 1)	Applicable to SU/RB. An IP address in the IP Filter table.	IP Address
*MaskID (*IpFilterEntry 2)	Applicable to SU/RB. 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, then the mask is ignored and only the range value is used to define the address group.	IP Address

MIB Parameter	Description	Value/Range
*IpFilterRange (*IpFilterEntry 3)	Applicable to SU/RB. An address range for the IP Filter entry. The first address in the range is the IP address (*iPID). 0 means that the range is not used. Either a mask or a range, but not both can be used to define an address group. If the range is other than 0, then 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/RB. Read-only. A table index for the IP Filter entry.	Integer 1-8
*DeleteOneUserFilter (*UserFilterParams 3)	Applicable to SU/RB. 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)
*DeleteAllUserFilters (*UserFilterParams 4)	Applicable to SU/RB. Deletes all entries from the IP Filter table.	Integer deleteAll (1) cancelOperation (2) na (255)
*DHCPUnicastOverrideFilter (*UserFilterParams 5)	Applicable to SU/RB. Enables or disables the unicast DHCP messages, overriding the IP Filtering option.	Integer disable (1) enable(2) na (255)

E.2.9 Security Parameters

MIB Parameter	Description	Value/Range
*SecurityParams (breezeAccessVLMib 9)		
*AuthenticationAlgorithm (*SecurityParameters 1)	Applicable to all units. Enables/disables the authentication encryption option. openSystem: Authentication messages are not encrypted. sharedKey : Authentication messages are encrypted.	Integer openSystem (1) sharedKey (2)
*DefaultKey (*SecurityParameters 2)	Applicable to SU/RB. The ID of the key to be used for encrypting/decrypting the authentication messages.	Integer Range: 1 to 4.

MIB Parameter	Description	Value/Range
*DataEncryptionOption (*SecurityParameters 3)	Applicable to all units. Enables/disables the data encryption option.	Integer disable (1) enable (2)
*DefaultMulticastKey (*SecurityParameters 4)	Applicable to AU/RB. The ID of the key to be used for encrypting/decrypting multicasts.	Integer Range: 1 to 4.
*SecurityMode (*SecurityParameters 5)	Applicable to all units. The encryption algorithm to be used for authentication messages and/or data encryption. The fips197 option is applicable only to units with HW revision C or higher, provided they have a license to use FIPS 197 algorithm.	Integer wep (1) aesOCB (2) fips197 (3)
*PromiscuousAuthenticationMode (*SecurityParameters 6)	Applicable to AU/RB. Enabling/disabling the promiscuous mode, where any SU can be authenticated by and communicate with the AU.	Integer disable (1) enable (2)
*Key1 (*SecurityParameters 7)	Applicable to all units. Key number 1. Accessible only with SNMP Write Community String (administrator password).	DisplayString 32 hexadecimal digits
*Key2 (*SecurityParameters 8)	Applicable to all units. Key number 2. Accessible only with SNMP Write Community String (administrator password).	DisplayString 32 hexadecimal digits
*Key3 (*SecurityParameters 9)	Applicable to all units. Key number 3. Accessible only with SNMP Write Community String (administrator password).	DisplayString 32 hexadecimal digits
*Key4 (*SecurityParameters 10)	Applicable to all units. Key number 4. Accessible only with SNMP Write Community String (administrator password).	DisplayString 32 hexadecimal digits
*SecurityModeSupport (SecurityParameters 12)	Applicable to all units. Returns types of encryption that are supported.	Integer (0..7) No encryption (0) WEP (1) AES/OCB (2) WEP + AES/OCB (3) FIPS-197 (4) WEP + FIPS-197 (5) AES/OCB + FIPS-197 (6) WEP + AES/OCB + FIPS-197 (7)

E.2.10 Performance Parameters

MIB Parameter	Description	Value/Range
*PerformanceParams (breezeAccessVLMib 10)		
*RTSThreshold (*PerformanceParams 1)	Applicable to SU and AU. Not applicable to BreezeNET B products. The minimum frame size that requires an RTS/CTS handshake.	Integer 20-4032 (bytes) (20-1600 for units running SW version below 3.0, 20-3400 for units with SW version 3.0) na (65535)
*MinContentionWindow (*PerformanceParams 3)	Applicable to SU, AU, BU-100 and RB-100. The initial value to be used by the contention window calculation algorithm. A value of 0 disables the back-off algorithm.	Integer 0, 7, 15, 31, 63, 127, 255, 511, 1023. na (65535) BU/RB-14/28 will return 65535
*MaxContentionWindow (*PerformanceParams 4)	Applicable to SU, AU, BU-100 and RB-100. The maximum value to be used by the contention window calculation algorithm.	Integer 7, 15, 31, 63, 127, 255, 511, 1023 na (65535) BU/RB-14/28 will return 65535
*MaximumModulationLevel (*PerformanceParams 5)	Applicable to all units. If the Adaptive Modulation algorithm is enabled, it sets the maximum modulation level to be used. If The Adaptive Modulation algorithm is disabled, it set the fixed modulation level to be used.	Integer Range: 1 to 8* *Range depends on HW version and Min/Max Modulation Levels as defined by Sub-Band.
*MulticastModulationLevel (*PerformanceParams 6)	Applicable to AU/BU. The modulation level for multicast and broadcast data frames.	Integer Range: 1 to 8* *Range depends on HW version and Min/Max Modulation Levels as defined by Sub-Band.
*AvgSNRMemoryFactor (*PerformanceParams 7)	Applicable to all units. The weight of history in average RSSI calculation for the ATPC (AU only) and Adaptive Modulation algorithm. The higher is the value, the higher is the weight of history	DisplayString -1 (Disregard History) to 32
*HardwareRetries (*PerformanceParams 8)	Applicable to all units. Not applicable if Wireless Link Prioritization is enabled. The maximum number of trials to transmit an unacknowledged frame in each Hardware Retrials phase.	Integer 1-14 for units with SW version 4.0 and higher. 1-15 for units with SW version below 4.0.
*AdaptiveModulationParams (*PerformanceParams 9)	Adaptive Modulation Parameters	
*AdaptiveModulationAlgorithmOption (*AdaptiveModulationParams 1)	Applicable to all units. Enabling/disabling the Adaptive Modulation algorithm.	Integer disable (1) enable (2)

MIB Parameter	Description	Value/Range
*SoftwareRetrySupport (*AdaptiveModulationParams 2)	Applicable to all units. Read-only for units with version 2.0. Not applicable for units with SW version 3.0 and higher. The status of the Software Retry mechanism. Enabled when the Adaptive Modulation algorithm is enabled and the Burst Mode Option is disabled. Otherwise it is disabled.	Integer disable (1) enable (2) na (255)
*NumberOfSoftwareRetries (*AdaptiveModulationParams 3)	Applicable to all units. Read-only for units with version 2.0. Not applicable for units with SW version 3.0 and higher. The maximum number of times to use the Software Retry mechanism when it is enabled.	Integer 0-14
*MinimumIntervalBetweenAdaptiveModulationAlgorithmMessages (*AdaptiveModulationParams 4)	Applicable to all units. The minimum interval between two consecutive adaptive modulation algorithm messages carrying information on the SNR of received signals.	Integer 1-3600 (seconds)
*AdaptiveModulationDecisionThresholds (*AdaptiveModulationParams 5)	Applicable to all units. Defines the setting of thresholds for the rate decision algorithm. high (2) should typically be used when the SNR is lower than 13 dB.	Integer normal (1) high (2) na (255)
*BurstMode (*PerformanceParams 10)	Burst Mode Parameters. Applicable to all units. Not applicable if Wireless Link Prioritization is enabled.	
*BurstModeOption (*BurstMode 1)	Applicable to all units. Applicable only if Burst Mode Option is supported by the Sub-Band. Not applicable if Wireless Link Prioritization is enabled. Enabling/disabling burst mode operation. In SU/RB with HW Revision B or lower blocked (3) value is returned when Security Mode is Wep, Data Encryption Option is Enabled and Burst option is Enabled. In AU/BU with HW Revision B or lower blocked (3) value is returned when Dfs Option is Enabled and Burst mode is enabled.	Integer disable (1) enable (2) blocked (3) na (255)
*BurstInterval (*BurstMode 2)	Applicable to all units. Not applicable if Wireless Link Prioritization is enabled. The burst interval in milliseconds.	Integer 1-the maximum value as defined in the Sub-Band. (milliseconds) na (255)
*ConcatenationParameters (*PerformanceParams 11)	Concatenation Parameters. Applicable to all units.	
*ConcatenationOption (*ConcatenationParameters 1)	Applicable to all units. Enabling/disabling the concatenation mechanism.	Integer disable (1) enable (2) na (255)

MIB Parameter	Description	Value/Range
*ConcatenationMaximumNumberOfFrames (*ConcatenationParameters 2)	Applicable to all units. Not applicable to units with SW version 4.0 and higher. Defines the maximum number of data frames that can be concatenated.	Integer 2 – 8
*ConcatenationMaxFrameSize (*ConcatenationParameters 3)	Applicable to all units with SW version 4.0 and higher. Defines the maximum size of a concatenated frame.	Integer Range: 256 to 2200 (bytes) for BU/RB-14 BU/RB-28, or for AU/SU with HW revision A or B. 256 to 4032 (bytes) for AU/SU with HW Revision C or higher and BU/RB-100.

E.2.11 Site Survey Parameters

MIB Parameter	Description	Value/Range
*SiteSurvey (breezeAccessVLMib 11)		
*AverageReceiveSNR (*SiteSurvey 1)	Applicable to SU/RB. Read-only. The average Signal to Noise Ratio of received frames.	Integer
*TrafficStatistics (*SiteSurvey 2)	Applicable to all units. Traffic statistics parameters.	
*ResetTrafficCounters (*TrafficStatistics 1)	Applicable to all units. Resets the traffic counters.	Integer reset (1) cancel (2)
*EthCounters (*TrafficStatistics 2)	Applicable to all units. Ethernet counters.	
*TotalRxFramesViaEthernet (*EthCounters 1)	Applicable to all units. Read-only. Total number of frames received via the Ethernet port.	Counter 32
*TxWirelessToEthernet (*EthCounters 2)	Applicable to all units. Read-only. Total number of frames transmitted to the Ethernet port.	Counter 32
*WirelessLinkCounters (*TrafficStatistics 3)	Applicable to all units. Wireless link counters.	
*TxFramesToWireless (*WirelessLinkCounters 1)	Transmitted frames counters	
*AUBeaconsToWireless (*TxFramesToWireless 1)	Applicable to AU/BU. Read-only. The number of Beacon frames transmitted to the wireless medium.	Counter 32
*DataAndOtherMngFramesToWireless (*TxFramesToWireless 3)	Applicable to AU/BU. Read-only. The number of data and other management frames (excluding beacons) transmitted to the wireless medium. The count includes multicasts/broadcasts and one count for each unicast frame transmitted successfully (excluding retransmissions).	Counter 32

MIB Parameter	Description	Value/Range
*TotalTxFramesToWireless (*TxFramesToWireless 4)	Applicable to all units. Read-only. The number of frames transmitted to the wireless medium. 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 AU. Not applicable to BreezeNET B products. Read-only. The total number of unicast frames successfully transmitted to the wireless medium, excluding retransmissions.	Counter 32
*TotalTransmittedConcatenatedFramesDouble (*TxFramesToWireless 6)	Applicable to all units Read-only. The total number of double concatenated frames that were successfully transmitted to the wireless medium, excluding retransmissions.	Counter 32
*TotalTransmittedConcatenatedFramesSingle (*TxFramesToWireless 7)	Applicable to all units Read-only. The total number of single concatenated frames that were successfully transmitted to the wireless medium, excluding retransmissions.	Counter 32
*TotalTransmittedConcatenatedFramesMore (*TxFramesToWireless 8)	Applicable to all units Read-only. The total number of concatenated frames with more than two data frames that were successfully transmitted to the wireless medium, excluding retransmissions.	Counter 32
*TotalRxFramesFromWireless (*WirelessLinkCounters 2)	Applicable to all units. Read-only. The total number of frames received from the wireless medium. 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 all units. Read-only. The total number of retransmissions of data frames (counts all unsuccessful transmissions/retransmissions).	Counter 32
*FramesDropped (*WirelessLinkCounters 4)	Applicable to all units. 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 all units. Read-only. The number of data frames submitted to the internal bridge via the high priority queue for transmission to the wireless medium.	Counter 32
*DataFramesSubmittedViaMidQueue (*DataFramesSubmittedToBridge 2)	Applicable to all units. Read-only. The number of data frames submitted to the internal bridge via the mid priority queue for transmission to the wireless medium.	Counter 32

MIB Parameter	Description	Value/Range
*DataFramesSubmittedViaLowQueue (*DataFramesSubmittedToBridge 3)	Applicable to all units. Read-only. The number of data frames submitted to the internal bridge via the low priority queue for transmission to the wireless medium.	Counter 32
*TotalNoOfDataFramesSubmitted (*DataFramesSubmittedToBridge 4)	Applicable to all units. Read-only. The total number of data frames submitted to the internal bridge for transmission to the wireless medium.	Counter 32
*TotalRecievedDataFrames (*WirelessLinkCounters 6)	Applicable to all units. Read-only. The total number of data frames received from the wireless medium, including duplicate frames.	Counter 32
*RecievedBadFrames (*WirelessLinkCounters 7)	Applicable to all units. Read-only. The number of frames received from the wireless medium with errors (CRC errors).	Counter 32
*NoOfDuplicateFramesDiscarded (*WirelessLinkCounters 8)	Applicable to all units. Read-only. The number of frames discarded due to receiving multiple copies.	Counter 32
*InternallyDiscardedMirCir (*WirelessLinkCounters 9)	Applicable to all units. Read-only. The number of data frames received from the Ethernet port that were discarded by the MIR/CIR mechanism to avoid exceeding the maximum allowed information rate	Counter 32
*TotalRxConcatenatedFramesDouble (*WirelessLinkCounters 10)	Applicable to all units Read-only. The total number of double concatenated frames that were received from the wireless medium, including duplicate frames.	Counter 32
*TotalRxConcatenatedFramesSingle (*WirelessLinkCounters 11)	Applicable to all units Read-only. The total number of single concatenated frames that were received from the wireless medium, including duplicate frames.	Counter 32
*TotalRxConcatenatedFramesMore (*WirelessLinkCounters 12)	Applicable to all units Read-only. The total number of concatenated frames with more than two data frames that were received from the wireless medium, including duplicate frames.	Counter 32
*WirelessLinkEvents (*TrafficStatistics 4)	Applicable to all units. Wireless link event counters.	
*TxEvents (*WirelessLinkEvents 1)	Applicable to all units. Read-only. Tx event counters.	
*DroppedFrameEvents (*TxEvents 1)	Applicable to all units. The number frames that were dropped because they were retransmitted to the maximum allowed number of retransmissions without being acknowledged.	Counter 32
*FramesDelayedDueToSwRetry (*TxEvents 2)	Applicable to all units. Not applicable for units running SW version 3.0 and higher. The number of frames that were delayed because the SW retry algorithm was activated on a previous frame designated for the same recipient.	Counter 32
*Underrun Events (*TxEvents 3)	Applicable to all units. The number of frames whose transmission was aborted because the rate of submitting frames for transmission exceeds the available transmission capability.	Counter 32

MIB Parameter	Description	Value/Range
*OtherTxEvents (*TxEvents 4)	Applicable to all units. The number of Tx events due to problems other than those represented by the other Tx Events counters.	Counter 32
*TotalTxEvents (*TxEvents 5)	Applicable to all units. The total number of Tx events.	Counter 32
*RxEvents (*WirelessLinkEvents 2)	Applicable to all units. Read-only. Rx errors counters.	
*PhyErrors (*RxErrors 1)	Applicable to all units. Read-only. The number of unidentified signals.	Counter 32
*CRCEvents (*RxEvents 2)	Applicable to all units. Read-only. The number of frames received from the wireless medium containing CRC errors.	Counter 32
*OverrunEvents (*RxEvents 3)	Applicable to all units. 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
*RxDecryptEvents (*RxEvents 4)	Applicable to all units. Read-only. The number of frames that were not received properly due to a problem in the data decryption mechanism.	Counter 32
*TotalRxEvents (*RxEvents 5)	Applicable to all units. Read-only. The total number of Rx events.	Counter 32
*PerModulationLevelCounters (*TrafficStatistics 5)	Per Modulation Level Counters.	
*ResetPerModulationLevelCounters (*PerModulationLevelCounters 1)	Applicable to all units. Resets the Per Modulation Level Counters	Integer resetCounters (1) cancel (2)
*SUPerModulationLevelCountersTable (*PerModulationLevelCounters 2)	Applicable to SU/RB. Not accessible. The Per Modulation Level Counters Table.	
*SUPerModulationLevelCountersEntry (*PerModulationLevelCountersTable 1)	Applicable to SU/RB. Not accessible. An entry in the Per Modulation Level Counters Table.	
*SUPerModulationLevelCountersTableIdx (*PerModulationLevelCountersEntry 1)	Applicable to SU/RB. Read-only. The index of an entry in the Per Modulation Level Counters Table.	
*SUPerModulationLevelCountersApplicable ModulationLeve (*PerModulationLevelCountersEntry 2)	Applicable to SU/RB. Read-only. The modulation level applicable for the entry in the Per Modulation Level Counters Table.	Integer Range: 1 to 8* *Level 8 is not applicable to devices with HW revision A
*SUPerModulationLevelCountersTxSuccess (*PerModulationLevelCountersEntry 3)	Applicable to SU/RB. Read-only. The total number of successfully transmitted unicasts at the applicable modulation level.	Counter 32
*SUPerModulationLevelCountersTxFailed (*PerModulationLevelCountersEntry 4)	Applicable to SU/RB. Read-only. The total number of failures to successfully transmit a unicast frame during a HW Retry cycle at the applicable modulation level.	Counter 32
*AverageModulationLevel (*PerModulationLevelCounters 3)	Applicable to SU/RB. Read-only. The average modulation level for successful transmission (rounded to nearest integer) since last reset of the Per Modulation Level counters.	Integer 1-8.
*MacAddressDatabase (*SiteSurvey 5)	MAC Address Database	

MIB Parameter	Description	Value/Range
*AUMacAddressDatabase (*MacAddressDatabase 1)	AU MAC Address Database	
*AdbResetAllCounters (*AUMacAddressDatabase 1)	Applicable to AU/BU. Resets all the counters for all SUs in the MAC Address Database.	Integer reset (1) noReset (2)
*AUAdbTable (*AUMacAddressDatabase 2)	Applicable to AU/BU. Not accessible. The AU MAC Address Database Table.	
*AUAdbEntry (*AUAdbTable 1)	Applicable to AU/BU. Not accessible. An entry in the AU MAC Address Database Table.	
*AdbIndex (*AUAdbEntry 1)	Applicable to AU/BU. Read-only. The Index of an entry in the AU MAC Address Database Table.	Integer
*AdbMacAddress (*AUAdbEntry 2)	Applicable to AU/BU. Read-only. The MAC Address of an SU entry in the AU MAC Address Database Table.	MAC Address
*AdbStatus (*AUAdbEntry 3)	Applicable to AU/BU. Read-only. The wireless status of the relevant SU.	Integer associated (1) authenticated (2) notAuthenticated (3)
*AdbSwVersion (*AUAdbEntry 4)	Applicable to AU/BU. Read-only. The SW Version of the relevant SU.	Display String
*AdbSNR (*AUAdbEntry 5)	Applicable to AU/BU. Read-only. The average Signal to Noise Ratio in dB of frames received by the AU from the relevant SU.	Integer 0-60
*AdbMaxModulationLevel (*AUAdbEntry 6)	Applicable to AU/BU. Read-only. The value configured in the relevant SU for the Maximum Modulation Level parameter.	Integer Range: 1 to 8* *Level 8 is not applicable to devices with HW revision A.
*AdbTxFramesTotal (*AUAdbEntry 7)	Applicable to AU/BU. Read-only. Counts the total number of frames (excluding retransmissions) that were transmitted by the AU to the relevant SU.	Counter 32
*AdbDroppedFramesTotal (*AUAdbEntry 8)	Applicable to AU/BU. 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
*AdbTxSuccessModLevel1 (*AUAdbEntry 9)	Applicable to AU/BU. Read-only. Counts the total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 1.	Counter 32
*AdbTxSuccess ModLevel2 (*AUAdbEntry 10)	Applicable to AU/BU. Read-only. Counts the total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 2.	Counter 32

MIB Parameter	Description	Value/Range
*AdbTxSuccess ModLevel3 (*AUAdbEntry 11)	Applicable to AU/BU. Read-only. Counts the total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 3.	Counter 32
*AdbTxSuccess ModLevel4 (*AUAdbEntry 12)	Applicable to AU/BU. Read-only. Counts the total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 4.	Counter 32
*AdbTxSuccess ModLevel5 (*AUAdbEntry 13)	Applicable to AU/BU. Read-only. Counts the total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 5.	Counter 32
*AdbTxSuccess ModLevel6 (*AUAdbEntry 14)	Applicable to AU/BU. Read-only. Counts the total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 6.	Counter 32
*AdbTxSuccess ModLevel7 (*AUAdbEntry 15)	Applicable to AU/BU. Read-only. Counts the total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 7.	Counter 32
*AdbTxSuccess ModLevel8 (*AUAdbEntry 16)	Applicable to AU/BU. Not applicable to units with HW revision A. Read-only. Counts the total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 8.	Counter 32
*AdbTxFailed ModLevel1 (*AUAdbEntry 17)	Applicable to AU/BU. Read-only. Counts the total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 1.	Counter 32
*AdbTxFailed ModLevel2 (*AUAdbEntry 18)	Applicable to AU/BU. Read-only. Counts the total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 2.	Counter 32
*AdbTxFailed ModLevel3 (*AUAdbEntry 19)	Applicable to AU/BU. Read-only. Counts the total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 3.	Counter 32
*AdbTxFailed ModLevel4 (*AUAdbEntry 20)	Applicable to AU/BU. Read-only. Counts the total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 4.	Counter 32

MIB Parameter	Description	Value/Range
*AdbTxFailed ModLevel5 (*AUadbEntry 21)	Applicable to AU/BU. Read-only. Counts the total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 5.	Counter 32
*AdbTxFailed ModLevel6 (*AUadbEntry 22)	Applicable to AU/BU. Read-only. Counts the total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 6.	Counter 32
*AdbTxFailed ModLevel7 (*AUadbEntry 23)	Applicable to AU/BU. Read-only. Counts the total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 7.	Counter 32
*AdbTxFailed ModLevel8 (*AUadbEntry 24)	Applicable to AU/BU. Not applicable to units with HW revision A. Read-only. Counts the total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 8.	Counter 32
*AdbCirTx (*AUadbEntry 25)	Applicable to AU Only. Not applicable to BreezeNET B products. Read-only. The value configured in the relevant SU for the CIR: Uplink parameter.	Integer
*AdbMirTx (*AUadbEntry 26)	Applicable to AU/BU. Read-only. The value configured in the relevant SU for the MIR: Uplink parameter.	Integer
*AdbCirRx (*AUadbEntry 27)	Applicable to AU. Not applicable to BreezeNET B products. Read-only. The value configured in the relevant SU for the CIR: Downlink parameter.	Integer
*AdbMirRx (*AUadbEntry 28)	Applicable to AU/BU. Read-only. The value configured in the relevant SU for the MIR: Downlink parameter.	Integer
*AdbCirMaxDelay (*AUadbEntry 29)	Applicable to AU. Not applicable to BreezeNET B products. Read-only. The value configured in the relevant SU for the Maximum Delay parameter.	Integer
*AdbDistance (*AUadbEntry 30)	Applicable to AU/BU. Read-only. The measured distance between the relevant SU/RB and the AU/BU (In Kilometers).	Integer 1 means any distance below 2 km
*AdbHwRevision (*AUadbEntry 31)	Applicable to AU/BU. Read-only. The HW Revision of the relevant SU/RB.	Integer hwRevisionA (1), hwRevisionB (2), hwRevisionC (3), hwRevisionD (4), hwRevisionE (5), na(255)
*AdbCpldVer (*AUadbEntry 32)	Applicable to AU/BU. Read-only. The CPLD Version of the relevant SU/RB.	DisplayString
*AdbCountryCode (*AUadbEntry 33)	Applicable to AU/BU. Read-only. The Country Code of the relevant SU/RB.	Integer
*AdbBootVer (*AUadbEntry 34)	Applicable to AU/BU. Read-only. The Boot Version of the relevant SU/RB.	DisplayString
*AdbAtpcOption (*AUadbEntry 35)	Applicable to AU/BU. Read-only. The current ATPC Option of the relevant SU/RB.	Integer disable (1), enable (2), na(255)

MIB Parameter	Description	Value/Range
*AdbAdapModOption (*AUadbEntry 36)	Applicable to AU/BU. Read-only. The current Adaptive Modulation Option of the relevant SU/RB.	Integer disable (1), enable (2), na(255)
*AdbBurstModeOption (*AUadbEntry 37)	Applicable to AU/BU. Read-only. The current Burst Mode Option of the relevant SU/RB.	Integer disable (1), enable (2), na(255)
*AdbConcatenationOption (*AUadbEntry 39)	Applicable to AU/BU. Read-only. The current Concatenation Option of the relevant SU/RB.	Integer disable (1), enable (2), na(255)
*AdbSecurityMode (*AUadbEntry 41)	Applicable to AU/BU. Read-only. The current Security Mode of the relevant SU/RB.	Integer wep (1), aesOCB (2), fips197 (3) na(255)
*AdbAuthOption (*AUadbEntry 42)	Applicable to AU/BU. Read-only. The current Authentication Algorithm Option of the relevant SU/RB.	Integer openSystem(1), sharedKey (2), na(255)
*AdbDataEncryptOption (*AUadbEntry 43)	Applicable to AU/BU. Read-only. The current Data Encryption Option of the relevant SU/RB.	Integer disable (1), enable (2), na(255)
*AdbAge (*AUadbEntry 44)	Applicable to AU/BU. Read-only. The time in seconds elapsed since receiving the last packet from the relevant SU/RB.	Integer
*AdbUnitName (*AUadbEntry 45)	Applicable to AU/BU. Read-only. The Unit Name of the relevant SU/RB.	DisplayString
*UpLinkQualityIndicator (*SiteSurvey 6)	UpLink quality Indicator (LQI) parameters. Applicable only to SU/RB.	
*MeasureUpLinkQualityIndicator (*UpLinkQualityIndicator 1)	Applicable to SU/RB. Starts calculation of LQI. The calculation will be for a period of 10 seconds.	Integer start (1), cancel (2)
*ReadUpLinkQualityIndicator (*UpLinkQualityIndicator 2)	Applicable to SU/RB. Read-only. The results of the last LQI calculation.	Integer 1-8.
*UpLinkQualityIndicatorStatus (*UpLinkQualityIndicator 3)	Applicable to SU/RB Only. Indicates the test conditions. fullTest means that there are no limitations on the range of available modulation levels, and that all modulation levels from 1 to 8 can be used. limitedTest indicates that the results may not indicate the true quality since the available range is limited - by HW (HW Revision A), or by the applicable parameters in the country code, or by the configurable Maximum Modulation Level parameter.	Integer fullTest (1), limitedTest (2)
*MacPinpoint (*SiteSurvey 7)	Applicable to AU/BU. MAC Pinpoint parameters.	
*MacPinpointTable (*MacPinpoint 1)	Applicable to AU/BU. MAC Pinpoint table. Not accessible.	
*MacPinpointEntry (MacPinpointTable 1)	Applicable to AU/BU. An entry in the MAC Pinpoint table. Not accessible. Each entry contains an Ethernet station MAC address and the MAC address of the wireless device used to connect it to the wireless network	

MIB Parameter	Description	Value/Range
MptEthernetStationMACAddress (*MacPinpointEntry 1)	Applicable to AU/BU only. Read only. The MAC address of the Ethernet station. It is used as an index in the MAC Pinpoint Table.	MAC address
MptUnitMACAddress (*MacPinpointEntry 2)	Applicable to AU/BU only. Read only. The MAC address of the wireless device used by the station with the MAC Address from the index in order to access the wireless network	MAC address
*DrapGatewaysTable (*SiteSurvey 8)	DRAP Gateways table. Not accessible. Applicable only to AU with DRAP Support enabled. A table holding information on DRAP enabled gateways connected to SUs that are served by the AU.	
*DrapGatewayEntry (*DrapGatewaysTable 1)	Not accessible. An entry in the DRAP Gateways Table.	
*DrapGatewayIndex (*DrapGatewaysEntry 1)	Read-only. Gateway Entry's Index	Integer
*DrapGatewayIP (*DrapGatewaysEntry 2)	Read-only. The Gateway's IP address.	IP address
*DrapGatewayType (*DrapGatewaysEntry 3)	Read-only. The Gateway's type.	Integer vgDataVoice (4), vgData1Voice1 (5), vgData4Voice2 (6), vgDataVoice2 (7), ngData4Wireless (11), unknown (255)
*DrapGatewayNoOfActiveVoiceCalls (*DrapGatewaysEntry 4)	Read-only. The current number of active voice calls handled by the Gateway. Applicable only to Voice Gateways.	Integer

E.3 Supported Traps

NOTE



An * is used instead of the brzaccVL prefix.

E.3.1 Trap Variables

MIB Parameter	Description	Value/Range
*Traps (breezeAccessVLMib 14)		
*TrapSUMacAddr (*Traps 1)	Applicable to AU/BU. An SU/RB MAC address.	MAC address
*TrapText (*Traps 3)	Applicable to all units. Textual string for future use.	DisplayString
*TrapToggle (*Traps 4)	Applicable to all units. An On/Off toggle status.	Integer on (1) off (2)
*TrapParameterChanged (*Traps 5)	Applicable to all units. A modification to one of the parameters related to IP Filtering, MIR/CIR or VLAN.	Integer cirOrMir (1) ipFilter (2) vlan (3)
*TrapAccessRights (*Traps 6)	Applicable to all units. The access rights used for login.	Integer notLoggedIn (1) readOnly (2) installer (3) administrator (4) factory (5)
*TrapLog (*Traps 7)	Applicable to all units. Login or logout to the Monitor program Telnet.	Integer telnetLogin (1) telnetLogout (2)
*TrapTelnetUserIpAddress (*Traps 8)	Applicable to all units. The IP address of a Telnet user.	IP address
*TrapRTx (*Traps 9)	Applicable to AU/BU. Retransmissions rate.	
*TrapFtpOrTftpStatus (*Traps 10)	Applicable to all units. The status of the last FTP/TFTP loading process.	successful (1) failed (2)
*TrapDFSMoveFreq (*Traps 11)	Applicable to AU/BU with HW revision B and lower (for units with HW revision C and higher replaced by *TrapDFSMoveFreqNew to support a resolution of 0.5 MHz). The new frequency in MHz after detecting radar on a previous channel.	Integer
*TrapDFSMoveFreqNew (*Traps 12)	Applicable to AU/BU. The new frequency in MHz after detecting radar on a previous channel. (Replaces *TrapDFSMoveFreq to support a resolution of 0.5 MHz for units with HW revision C and higher).	DisplayString
*EthBroadcastThresholdExceeded (*Traps 13)	Applicable to all units. The number of packets that were dropped by the Ethernet broadcast/multicast limiter.	Integer

MIB Parameter	Description	Value/Range
*TrapSubscriberType (*Traps 14)	Applicable to AUS only. The type of subscriber that was rejected by the AUS (AUS can serve up to 8 SUs. Only SU-3, SU-6 and SU-I are supported).	Integer unknownSubscriberType(0), su-3(3) su-6(6), rb-14(14), su-24(24), rb-28(28), su-54(54), rb-100 (100)
*TrapMACAddress (*Traps 15)	Applicable to BU/RB only. The MAC address of the BU/RB unit whose type has been changed.	MAC Address
*NewUnitType (*Traps 16)	Applicable to BU/RB only. The new type of the unit.	Integer bu (1), rb (2)
*TrapSWVersion (Traps 17)	The SW version of the SU/RB-B100 with a SW version below 4.0 that tries to associate with a station that has Wireless Link Prioritization Enabled	DisplayString

E.3.2 Private Traps

Trap (Number)	Description	Variables
*SUassociatedAUTRAP (2)	An AU/BU trap indicating a new association with an SU/RB.	*TrapSUMacAddr
*AUdisassociatedTRAP (3)	An AU/BU trap indicating that an SU/RB has been disassociated from the AU/BU. The AU/BU decides that an SU/RB has been disassociated from it and remove it from the ADB after receiving from another AU/BU a SNAP frame with the SU/RB MAC address. The SNAP frame indicating a network topology change where the SU/RB has associated with another AU/BU will be received if both AUs/BUs are connected to the same Ethernet backbone.	*TrapSUMacAddr
*AUagingTRAP (4)	An AU/BU trap indicating that an SU/RB aged out and was removed from the Associations database following its failure to acknowledge a specified number of consecutive frames.	*TrapSUMacAddr
*SUassociatedTRAP (6)	An SU/RB trap indicating association with an AU/BU. In addition to the MAC address information of the AU/BU, the trap also includes information on the average SNR of frames received from the AU/BU.	*AssociatedAU

Trap (Number)	Description	Variables
*AUwirelessQualityTRAP (20)	An AU/BU 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/BU trap indicating power up after reset.	*UnitMacAddress
*MonitorStatusTRAP (102)	Applicable to all units. A 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)	Applicable to all units. A trap indicating a change in CIR/MIR, IP Filter or VLAN parameter.	*TrapParameterChanged
*LoadingStatusTRAP(104)	Applicable to all units. A trap indicating the results (successful or failed) of the last FTP/TFTP loading process.	*TrapFtpOrTftpStatus *UnitMacAddress
*PromiscuousModeTRAP (105)	An AU/BU trap indicating that promiscuous mode was enabled (on) or disabled (off)	*TrapToggle *UnitMacAddress
*DFSRadarDetectedTRAP (106)	An AU/BU trap indicating that radar was detected	*UnitMacAddress
*DFSFrequencyTRAP (107)	An AU/BU trap indicating the new frequency after radar was detected.	*TrapDFSMoveFreq (HW Revision B and lower). *TrapDFSMoveFreqNew (HW Revision C and higher).
*DFSNoFreeChannelsExistTRAP (108)	An AU/BU trap indicating that radar was detected and there is no free channel.	*UnitMacAddress
*EthBroadcastMulticastLimiterTRAP (109)	Applicable for all units. The trap is send if the Ethernet broadcast filter threshold is exceeded and it contains the number of packets that were dropped since the last trap.	*UnitMacAddress *EthBroadcastThresholdExceeded
*UnsupportedSubscriberTypeTRAP (110)	Applicable to AUS only. This trap is generated when a subscriber unit that is not supported tries to associate with the AUS. The AUS supports only up to 8 SU-3 and/or SU-6 and/or SU-I units.	*TrapSUMacAddr *TrapSubscriberType
*UnitTypeChangedTRAP (111)	Applicable to BU/RB only. This trap is generated when the user changes the type of the unit. The RB can be converted to BU or vice versa.	*TrapMACAddress *NewUnitType

Trap (Number)	Description	Variables
*PrioritizationNotSupportedBySUTRAP (112)	Applicable to AU only. This trap is generated when an SU with a SW version below 4.0 that does not support Wireless Link Prioritization is associated with an AU with the Wireless Link Prioritization Option enabled.	*TrapSUMACAddress *TrapSWVersion

Appendix F - Parameters Summary

In This Appendix:

- The tables provide 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 updated in run-time or whether the unit must be reset before the modification takes effect.

F.1 Parameters Summary

F.1.1 Unit Control Parameters

Parameter	Unit	Range	Default	Run-Time
Change Unit Name	AU, SU	Up to 32 printable ASCII characters	None	Yes
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
FTP SW Version File Name	AU, SU	Up to 20 printable ASCII characters. An empty string is not allowed.	VxWorks.bz	Yes
Configuration File Name	AU, SU	Up to 20 printable ASCII characters. An empty string is not allowed.	config.cfg	Yes
Operator Defaults File Name	AU, SU	Up to 20 printable ASCII characters. An empty string is not allowed.	operator.cmr	Yes
FTP Source Dir	AU, SU	Up to 80 printable ASCII characters. Use "." to clear.	None (empty)	Yes
FTP Server IP Address	AU, SU	IP address	10.0.0.253	No
FTP Gateway IP Address	AU, SU	IP address	0.0.0.0	No
FTP User Name	AU, SU	Up to 18 printable ASCII characters	vx	No
FTP Password	AU, SU	Up to 18 printable ASCII characters	Vx	No
FTP Log File Name	AU, SU	Up to 20 printable ASCII characters	logfile.log	Yes
FTP Log File Destination Directory	AU, SU	Up to 80 printable ASCII characters. Use "." to clear.	None (empty)	Yes
Event Log Policy	AU, SU	<ul style="list-style-type: none"> ■ Message ■ Warning ■ Error ■ Fatal ■ Log None 	Warning	Yes
Log Out Timer	AU, SU	1-999 minutes	5	Yes
Ethernet Port Negotiation Mode	AU, SU	<ul style="list-style-type: none"> ■ Force 10 Mbps and Half-Duplex ■ Force 10 Mbps and Full-Duplex ■ Force 100 Mbps and Half-Duplex ■ Force 100 Mbps and Full-Duplex ■ Auto Negotiation 	Auto Negotiation	No
Change System Location	AU, SU	Up to 34 printable ASCII characters	None	Yes
Manual Feature Upgrade	AU, SU	License string: 32 to 64 hexadecimal digits	None	No

F.1.2 IP Parameters

Parameter	Unit	Range	Default	Run-Time
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	<ul style="list-style-type: none"> ■ Disable ■ DHCP Only ■ Automatic 	Disable	No
Access to DHCP	AU, SU	<ul style="list-style-type: none"> ■ From Wireless Only ■ From Ethernet Only ■ From Both Wireless and Ethernet 	AU: From Ethernet Only SU: From Wireless Only	No

F.1.3 Air Interface Parameters

Parameter	Unit	Range	Default	Run-Time
ESSID	AU, SU	Up to 31 printable ASCII characters	ESSID1	No
Operator ESSID Option	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Enable	No
Operator ESSID	AU	Up to 31 printable ASCII characters	ESSID1	No
Best AU Support	SU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Disable	No
Number of Scanning Attempts	SU	1 – 255	4	No
Preferred AU MAC Address	SU	MAC Address	00-00-00-00-00-00 (no preferred AU)	Yes
Scanning Mode	SU	Passive, Active	Passive	No
Cell Distance Mode	AU	Automatic, Manual	Automatic	No
Maximum Cell Distance	AU	0-54 (Km) 0 means no compensation	0 (no compensation)	Yes
Fairness Factor	AU	0 – 100 (%)	100 (%)	No
Arbitration Inter-Frame Spacing	AU, SU	<ul style="list-style-type: none"> ■ 1 time slot ■ 2 time slots 	2 time slots	Yes
Per SU Distance Learning	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Disable	Yes
Wireless Trap Threshold	AU	1-100 (%)	30 (%)	Yes
Maximum Number of Associations	AU	AU-BS, AU-SA: 1-512 (1-124 if Data Encryption Option is enabled). AUS-BS, AUS-SA: 1-8	AU-BS, AU-SA: 512 AUS-BS, AUS-SA: 8	Yes
Sub-Band Select*	AU	According to the Country Code	1	No
Frequency	AU	According to the Sub-Band	The lowest frequency in the Sub-Band	No
User Defined Frequency Subsets	SU	All frequencies in the available Sub Bands	All available frequencies in all available Sub Bands	Yes

Parameter	Unit	Range	Default	Run-Time
DFS Option**	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Dependent on Country DFS Support: If DFS is supported by the country code then the default will be Enable, else it will be Disable.	No
Frequency Subset Definition (in AU)**	AU	According to the Sub-Band. A list of frequency indexes or A for all frequencies supported by the Sub-Band	A	No
Channel Check Time**	AU	1 – 3600 (seconds)	60 (seconds)	No
Channel Avoidance Period**	AU	1 – 60 (minutes)	30 (minutes)	No
SU Waiting Option**	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Enable	No
Minimum Pulses to Detect**	AU	1-100	6	No
Clear radar Detected Channels After Reset**	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Disable	Yes
Channel Reuse Option**	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Disable	No
Radar Activity Assessment Period**	AU	1 – 12 hours	5 hours	No
Maximum Number of Detections in Assessment Period**	AU	1 – 10 detections	5 detections	No
Country Code Learning by SU	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Enable	Yes
Transmit Power	AU, SU	-10 dBm to a value that depends on HW revision , Country Code / Antenna Gain and (in SU) the Max Tx Power parameter	The highest allowed value	Yes
Maximum Tx Power	SU	-10 dBm to a value that depends on HW revision and Country Code / Antenna Gain	The highest allowed value	Yes
ATPC Option	AU, SU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Enable	Yes
Delta from Minimum SNR Level	AU	4-20 (dB)	<ul style="list-style-type: none"> ■ Units in 5.4, 5.8 GHz bands: 5 (dB) ■ Units in the 4.9, 5.2 and 5.3 GHz bands: 8 (dB) 	Yes
Minimum SNR Level	AU	4-60 (dB)	28 (dB)	Yes
Minimum Interval Between ATPC Messages	AU	1-3600 (seconds)	30 (seconds)	Yes
ATPC Power Level Steps	AU	1-20 (dB)	4	Yes
Tx Control	AU	<ul style="list-style-type: none"> ■ Off ■ On ■ Ethernet Status Control 	On	Yes

Parameter	Unit	Range	Default	Run-Time
Antenna Gain	AU, SU***	0 – 50 (dB)	According to the antenna supplied with the unit.	No
Spectrum Analysis Channel Scan Period	AU, SU	2 – 30 seconds	5 seconds	No
Spectrum Analysis Scan Cycles	AU, SU	1 – 100 cycles	2 cycles	No
Automatic Channel Selection	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Disable	No (Configured per analysis)
Lost Beacons Watchdog Threshold	AU	100 – 1000, 0 means Not Used	218	Yes
Noise Immunity State Control	AU, SU	<ul style="list-style-type: none"> ■ Automatic ■ Manual 	Automatic	Yes
Noise Immunity Level	AU, SU	0 – 4 Use only 0 or 4	0	Yes
Spur Immunity Level	AU, SU	0 – 7	0	Yes
OFDM Weak Signal	AU, SU	0 (not active) or 1 (active)	0	Yes
Pulse Detection Sensitivity	AU, SU	<ul style="list-style-type: none"> ■ Low ■ High 	High	Yes

* Not applicable if only one Sub-Band is available for the applicable Country Code

** Applicable only if DFS is supported by the Sub-Band

*** Configurable only in units without an integral antenna.

F.1.4 Network Management Parameters

Parameter	Unit	Range	Default	Run-Time
Access to Network Management	AU, SU	<ul style="list-style-type: none"> ■ From Wireless Link Only ■ From Ethernet Only ■ From Both Ethernet and Wireless Link 	From Both Ethernet and Wireless Link	No
Network Management Filtering	AU, SU	<ul style="list-style-type: none"> ■ Disable ■ Activate Management IP Filter On Ethernet Port ■ Activate Management IP Filter On Wireless Port ■ Activate Management IP Filter On Both Ethernet and Wireless Ports 	Disable	No
Set Network Management IP Address	AU, SU	IP address	0.0.0.0 (all 10 entries)	No
Set/Change Network Management IP Address Ranges	AU, SU	<start address> to <end address> or, <base address> mask <mask>	0.0.0.0 TO 0.0.0.0 (all 10 entries)	No
Send SNMP Traps	AU, SU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Disable	Yes

Parameter	Unit	Range	Default	Run-Time
SNMP Traps IP Destination	AU, SU	IP address	0.0.0.0 (all 10 entries)	No
SNMP Traps Community	AU, SU	Up to 14 printable ASCII characters	public (all 10 entries)	No
AP Client IP Address	SU	IP address	0.0.0.0 (none)	Yes

F.1.5 Bridge Parameters

Parameter	Unit	Range	Default	Run-Time
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	<ul style="list-style-type: none"> ■ Hybrid Link ■ Trunk Link ■ Access Link (only in SU) ■ Service Provider Link 	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 QinQ Protocol Ethertype	AU, SU	8100 – 9000, 9100, 9200 (hex)	8100 (hex)	No
Service Provider VLAN ID	SU	1 – 4094	1	No
Ethernet Broadcast Filtering Options	SU	<ul style="list-style-type: none"> ■ Disable, ■ On Ethernet Port Only ■ On Wireless Port Only ■ On Both Wireless and Ethernet Ports 	Disable	Yes
DHCP Broadcast Override Filter	SU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Disable	Yes
PPPoE Broadcast Override Filter	SU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Disable	Yes
ARP Broadcast Override Filter	SU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Enable	Yes
Ethernet Broadcast/Multicast Limiter Option	AU, SU	<ul style="list-style-type: none"> ■ Disable ■ Limit only Broadcast Packets ■ Limit Multicast Packets that are not Broadcasts ■ Limit All Multicast Packets (including broadcast) 	Disable	Yes
Ethernet Broadcast/Multicast Limiter Threshold	AU, SU	0 – 204800 (packets/second)	50	Yes
Ethernet Broadcast/Multicast Limiter Send Trap Interval	AU, SU	1 – 60 (minutes)	5 (minutes)	Yes
Bridge Aging Time	AU, SU	20 – 2000 seconds	300	No

Parameter	Unit	Range	Default	Run-Time
Broadcast Relaying	AU	Disable, Enable	Enable	No
Unicast Relaying	AU	<input type="checkbox"/> Disable <input type="checkbox"/> Enable	Enable	No
MAC Address List	AU	Up to 100 MAC addresses	None (empty)	Yes
MAC Address List Action	AU	<input type="checkbox"/> Deny <input type="checkbox"/> Allow	Deny	Yes
Roaming Option	SU	<input type="checkbox"/> Disable <input type="checkbox"/> Enable	Disable	No
Ethernet Port Control	SU	<input type="checkbox"/> Disable <input type="checkbox"/> Enable	Enable	Yes

F.1.6 Performance Parameters

Parameter	Unit	Range	Default	Run-Time
RTS Threshold	AU, SU	20 – 4032 (bytes)	AU: 4032 SU: 60	Yes
Minimum Contention Window	AU, SU	0, 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 Modulation Level	AU, SU	According to the Min/Max Modulation Level defined for the Sub-Band	The highest available value	Yes
Multicast Modulation Level	AU	According to the Min/Max Modulation Level defined for the Sub-Band	The lowest available value	Yes
Number of HW Retries	AU, SU	1 - 14	10	Yes
Average SNR Memory Factor	AU, SU	-1 to 32	5	Yes
Burst Mode Option*	AU, SU	<input type="checkbox"/> Disable <input type="checkbox"/> Enable	Enable	No
Burst Mode Time Interval*	AU, SU	1 to the value defined in the Sub-Band for Maximum Burst Duration (milliseconds)	5 milliseconds or the value of Maximum Burst Duration defined for the Sub-Band (the lower of the two values).	Yes
Adaptive Modulation Option	AU, SU	<input type="checkbox"/> Disable <input type="checkbox"/> Enable	Enable	No
Minimum Interval Between Adaptive Modulation Messages	AU, SU	1-3600 (seconds)	4 (seconds)	Yes
Adaptive Modulation Decision Threshold	AU, SU	<input type="checkbox"/> Normal <input type="checkbox"/> High	Normal	No
Concatenation Option	AU, SU	<input type="checkbox"/> Disable <input type="checkbox"/> Enable	Enable	No

Parameter	Unit	Range	Default	Run-Time
Maximum Concatenated Frame Size	AU, SU	<ul style="list-style-type: none"> ■ 256 to 2200 bytes for units with HW revision A or B ■ 256 to 4032 bytes for units with HW revision C or higher 	<ul style="list-style-type: none"> ■ 2200 for units with rev A or B ■ 4032 for units with rev C or higher 	Yes

* Applicable only if Burst Mode is supported by the Sub-Band.

F.1.7 Service Parameters

Parameter	Unit	Range	Default	Run-Time
User Filtering Option	SU	<ul style="list-style-type: none"> ■ Disable ■ IP Protocol Only ■ User Defined Addresses Only ■ PPPoE Protocol Only 	Disable	Yes
Set/Change Filter IP Address Ranges	SU	<start address> to <end address> or, <base address> mask <mask>	0.0.0.0 TO 0.0.0.0 (all 8 entries)	No
DHCP Unicast Override Filter	SU	<ul style="list-style-type: none"> ■ Disable DHCP Unicast ■ Enable DHCP Unicast 	Disable DHCP Unicast	Yes
MIR: Downlink	SU	SU-3: 128-3072 (Kbps) SU-6: 128-6016 (Kbps) SU-54: 128-53888 (Kbps) SU-I: 128-6016 (Kbps)	SU-3: 3072 SU-6: 6016 SU-54: 32896 SU-I: 6016	No
MIR: Uplink	SU	SU-3: 128-2048 (Kbps) SU-6: 128-4096 (Kbps) SU-54: 128-53888 (Kbps) SU-I: 128-2048 (Kbps)	SU-3: 2048 SU-6: 4096 SU-54: 32896 SU-I: 2048	No
CIR: Downlink	SU	SU-3: 0-2048 (Kbps) SU-6: 0-4096 (Kbps) SU-54: 0-45056 (Kbps) SU-I: 0-6016 (Kbps)	0 (Kbps)	No
CIR: Uplink	SU	SU-3: 0-2048 (Kbps) SU-6: 0-4096 (Kbps) SU-54: 0-45056 (Kbps) SU-I: 0-2048 (Kbps)	0 (Kbps)	No
Maximum Delay	SU	300 – 10,000 (ms)	5,000 (ms)	No
Maximum Burst Duration	AU, SU	0 – 2,000 (ms)	5 (ms)	No
Graceful Degradation Limit	AU	0 – 70 (%)	70 (%)	No
MIR Only Option	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Enable	No
VLAN Priority Threshold	AU, SU	0 – 7	7	No
ToS Prioritization Option	AU, SU	<ul style="list-style-type: none"> ■ Disable ■ Enable IP Precedence (RFC791) Prioritization ■ Enable DSCP (RFC2474) Prioritization 	Disable	No
IP Precedence Threshold	AU, SU	0 – 7	4	No
DSCP Threshold	AU, SU	0 – 63	32	No

Parameter	Unit	Range	Default	Run-Time
UDP/TCP Port Ranges Prioritization Option	AU, SU	<ul style="list-style-type: none"> ■ Disable ■ Enable Only for UDP ■ Enable Only for TCP ■ Enable for both UDP and TCP 	Disable	No
UDP RTP/RTCP Prioritization	AU, SU	<ul style="list-style-type: none"> ■ RTP & RTCP ■ RTP Only 	RTP & RTCP	No
TCP RTP/RTCP Prioritization	AU, SU	<ul style="list-style-type: none"> ■ RTP & RTCP ■ RTP Only 	RTP & RTCP	No
Low Priority Traffic Minimum Percent	AU, SU	0 – 100 (%)	0 (%)	Yes
Wireless Link Prioritization Option*	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Disable	Yes
Low Priority AIFS*	AU	3-254	3	Yes
Number of HW Retries for High Priority Traffic*	AU	1-14	10	Yes
Number of HW Retries for Low Priority Traffic*	AU	1-14	10	Yes
AU Burst Duration for High Priority Traffic*	AU	0-40 (in 0.25 milliseconds units)	16 (4 milliseconds)	Yes
AU Burst Duration for Low Priority Traffic*	AU	0-40 (in 0.25 milliseconds units)	20 (5 milliseconds)	Yes
SU Burst Duration for High Priority Traffic*	AU	0-40 (in 0.25 milliseconds units)	8 (2 milliseconds)	Yes
SU Burst Duration for Low Priority Traffic*	AU	0-40 (in 0.25 milliseconds units)	20 (5 milliseconds)	Yes
DRAP Support	AU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Enable	No
UDP Port	AU	8000–8200	8171	No
Maximum Number Of Voice Calls	AU	1–255	40	No
DRAP TTL	AU	1–255 (seconds)	10 (seconds)	No

* Wireless Link Prioritization parameters are applicable only for units with a license for this feature

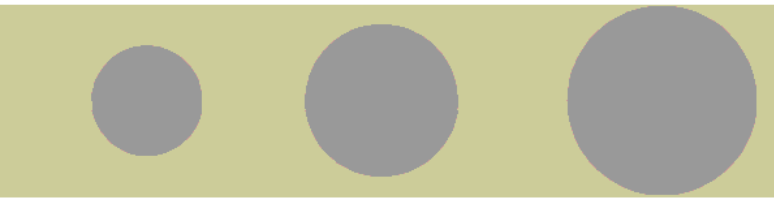
F.1.8 Security Parameters

Parameter	Unit	Range	Default	Run-Time
Authentication Algorithm*	AU, SU	<ul style="list-style-type: none"> ■ Open system ■ Shared Key 	Open system	No
Data Encryption Option*	AU, SU	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Disable	No
Security Mode*	AU, SU	<ul style="list-style-type: none"> ■ WEP ■ AES OCB ■ FIPS-197** 	WEP	No
Default Key	SU	1-4	1	No
Default Multicast Key	AU	1-4	1	No
Key # 1 to Key # 4	AU, SU	32 hexadecimal digits	0...0 (all 0=no key)	No

Parameter	Unit	Range	Default	Run-Time
Promiscuous Authentication	AU	<input type="checkbox"/> Disable <input type="checkbox"/> Enable	Disable	Yes (Disable after reset)

* Applicable only if supported by the Sub-Band.

** The FIPS-197 option is available only in units with HW revision C or higher that have the applicable license.



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Appendix G - Troubleshooting



G.1 Ethernet Port Connection Problems

Problem and Indication	Possible Cause	Corrective Action
The Ethernet Integrity Indicator (the yellow LED embedded in the Ethernet connector) is off, and/or the Ethernet Activity Indicator (the green embedded LED) does not blink when there should be traffic on the Ethernet port.	Wrong type of Ethernet cable	If connected directly to PC-use a crossed cable. Otherwise-use a straight cable
	Faulty Ethernet cable	Replace cable
The unit does not respond to ping.	Wrong IP configuration	Make sure that the PC is on the same subnet as the unit*.
	Wrong Ethernet port operation mode	Make sure that the speed and duplex settings in the PC match the configuration in the unit (the default is Auto Negotiation)

* If the IP parameters of the unit are unknown, use the Set Factory Defaults utility to restore the default factory configuration of all parameters (except to Passwords, general FTP parameters and AU's Frequency). The IP address of the unit after setting to factory defaults is 10.0.0.1.

G.2 SU Association Problems

Problem and Indication	Possible Cause	Corrective Action
SU does not associate with AU	Wrong configuration	Check proper configuration of basic parameters: <ul style="list-style-type: none"> ■ ESSID ■ Sub-band and frequencies subset ■ Best AU parameters ■ ATPC Option ■ Transmit Power ■ Maximum Transmit Power ■ Antenna Gain ■ Security parameters: Authentication Algorithm, and Default Key. If necessary-use Promiscuous Mode in AU.
	Access is denied by AU	Verify that the SU is not included in MAC Address Deny List of the AU.
	Link quality is too low	<ul style="list-style-type: none"> ■ Verify that unit is in coverage area of AU according to radio planning. ■ Verify that antenna is directed toward the AU ■ Try to improve location/height of antenna.

G.3 Low Throughput Problems

Problem and Indication	Possible Cause	Corrective Action
Low throughput is suspected (Check the dominant Modulation Level in Per rate Counters and see expected throughput in the "Expected Throughput" table below)	Ethernet link problems	<ul style="list-style-type: none"> ■ Verify proper settings of Ethernet operation mode (actual Ethernet speed of 100 Mbps). ■ Check Ethernet counters
	Wrong configuration of Maximum Modulation level	Verify that Maximum Modulation level is not set to a value that is not too low according to the "Recommended Maximum Modulation Level" table below.
Low throughput of multicast/broadcast traffic	Non-optimal configuration of Multicast Modulation level	A value that is too low (see the "Recommended Maximum Modulation Level" table below) may degrade throughput of broadcast and multicast traffic.
High retransmissions rate	Interference problems (retransmissions rate in excess of 15%)	Check for interference using the Spectrum Analysis Mode. If necessary, change the operating frequency of the AU.

Expected Throughput in Mbps, TCP Traffic @ 20 MHz Bandwidth, Burst Mode Enabled, Concatenation Enabled									
Unit	TCP Traffic	Modulation Level							
		1	2	3	4	5	6	7	8
SU-3	Uplink	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
	Downlink	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
	Aggregate (Bi-directional)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
SU-6	Uplink	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
	Downlink	4.8	5.6	5.6	5.6	5.6	5.6	5.6	5.6
	Aggregate (Bi-directional)	5	6.7	7	7.1	7.1	7.2	7.2	7.2
SU-54	Uplink	4.7	6.7	8.9	12.4	15.8	21	25.1	26.4
	Downlink	4.8	7.1	9.4	13.7	17.7	24.7	28.9	30.1
	Aggregate (Bi-directional)	4.8	7	9.3	13.1	16.9	22.8	29.4	32

* The throughput results are for net TCP traffic (excluding protocols overheads)

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

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