

BreezeACCESS 3.5

Administration Manual

Software Release 2.6
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About this Manual

This manual contains the following sections:

- 1. CONFIGURATION OF BREEZEACCESS UNITS**
- 2. USING TELNET FOR REMOTE ACCESS**
- 3. SOFTWARE VERSION DOWNLOAD**
- 4. CONFIGURATION DOWNLOAD/UPLOAD**
- 5. SNMP MANAGEMENT**

Note: *Information provided in this manual is applicable to BreezeACCESS 3.5 units with software release 2.6.*

1. CONFIGURATION OF BREEZEACCESS UNITS

This chapter explains how to access the local terminal program. It also describes how to use the terminal program to setup, configure, and manage BreezeACCESS IP Broadband Wireless Local Loop (WLL) system units (Subscriber Units and Access Units, also referred to as SUs and BS-AUs respectively).

Note: *Reset the unit after making configuration changes for the changes to take effect.*

1.1 Accessing and Using Local Terminal Management

⇒ **To access Local Terminal Management:**

1. Use the Monitor cable to connect the MON connector of the unit to the COM port of your ASCII ANSI terminal or PC. The COM port connector on the Monitor cable is a 9-pin D-type plug.
2. Run a terminal emulation program (such as HyperTerminal™).
3. Set the communication parameters to the following:

Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	Xon/Xoff
Connector	Connected COM port

4. Press **Enter**. The *Select Access Level* menu appears. Select the access level according to your authorized access level. You will be requested to enter your password. After entering the correct password press **Enter**.

Table 1-1 lists the default passwords for each of the access levels.

Table 1-1. Default Passwords

Access Rights	Password
Read Only	public
Installer	user
Administrator	private

Note: *Following three unsuccessful login attempts (using incorrect passwords), the monitor port will be blocked. To reactivate the monitor port, the unit must be reset either remotely via an SNMP manager or locally by disconnecting/reconnecting power.*

The *Main Menu* is displayed as shown in Figure 1-1.

```

BreezeACCESS/BST-AU
Official Release Version - 2.6.3
Release Date:  Thu Aug 31 17:24:47 2000
Main Menu
=====
1 - Info Screens
2 - Unit Control
3 - Basic Configuration
4 - Site Survey
5 - Advanced Configuration
BreezeACCESS >>>

```

Figure 1-1. Main Menu

BreezeACCESS is the default name of the unit. You can change this name to a name of your choice (as described in the *Unit Control* menu on page 19), after which the prompt at the bottom of each menu screen will be **NEWNAME>>>**.

The appearance of the *Main Menu* varies in accordance with the set access level.

- For users with read only access rights, only the *Info Screens* option is displayed. Users with this access level cannot 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 cannot access the *Advanced Configuration* menu.
- For users with Administrator access rights, the full *Main Menu* will be displayed. These users can access all the menu items.

1.1.1 Operating the Local Terminal Management

1. Type an option number to open/activate the option. You may need to press **Enter** in some cases.
2. Press **Esc** to exit a menu or option.
3. You can log-out and exit the monitor program at any time by simultaneously pressing the **Ctrl** and **X** keys.

Note: *The program will terminate automatically after a given time of inactivity specified by the Log-Out Timer parameter (described in the Unit Control menu on page 19),*

4. Reset the unit after making configuration changes for the new values to take effect.

1.2 Monitor Menus and Parameters

Table 1-2 lists the menus, sub-menus, and parameters/options in the monitor program. Default values are listed where applicable.

The numbers next to the parameter/option indicate the numbers you need to type in order to access that parameter/option.

For example, if you have Installer access rights, you can access the *IP Address* option (3.1) by starting at the *Main Menu* and typing **3**, followed by **1**.

Note: *Due to differences in the Monitor menus between Subscriber Units and Access Units, some of the menu tree branches are listed separately for each.*

Table 1-2. Monitor Menus and Parameters

Menu	Sub-menu	Parameter/Option
1. Info Screens	1.1 Show Unit Status	Displays the Unit Status parameters
	1.2 Show Basic Configuration	Displays the Basic Configuration parameters
	1.3 Show Advanced Configuration	
	1.3.1 Show IP parameters	Displays the IP parameters
	1.3.2 Show Air Interface parameters	Displays the Air Interface parameters
	1.3.3 Show Network Management parameters	Displays the Network Management parameters
	1.3.4 Show Bridge parameters	Displays the Bridge parameters
	1.3.5 Show Performance parameters	Displays the Performance parameters
	1.3.6 Show Service parameters	Displays the Service parameters (SU Only)
	1.3.7 Show Accounting parameters	Displays the Accounting parameters (SU Only)
	1.3.8 Show Voice parameters	Displays the Voice parameters (SU with voice support only)
	1.3.9 Show Dialing parameters	Displays the Dialing parameters (SU with voice support only)
	1.S Show all parameters	Displays All the parameters

Menu	Sub-menu	Parameter/Option	Default Value
2. Unit Control	2.1 Reset Unit		BreezeACCESS
	2.2 Set Defaults		
	2.3 Change Unit Name		
	2.4 Change Password	2.4.1 Change Read Only Password 2.4.2 Change Installer Password 2.4.3 Change Administrator Password	
	2.5 Flash Memory Control		9600 baud 5 min.
	2.6 Console Speed		
	2.7 Log Out Timer		

Menu	Sub-menu	Parameter/Option	Default Value
3. Basic Parameters / Access Units	3.1 IP Address		010.000.000.001
	3.2 Subnet Mask		255.000.000.000
	3.3 Default Gateway Address		000.000.000.000
	3.4 ESSID		ESSID1
	3.5 Maximum Data Rate		3 Mbps
	3.6 Frequency Offset		0
	3.7 Decrement Hopping Frequencies		Disable
	3.8 Hopping Shift		0
	3.9 Hopping Sync		Idle
	3.H Hopping Band		10 MHz
	3.X Transmit Power Control		15
	3.S Show Basic Configuration		
3. Basic Parameters / Subscriber Units	3.1 IP Address		010.000.000.001
	3.2 Subnet Mask		255.000.000.000
	3.3 Default Gateway Address		000.000.000.000
	3.4 ESSID		ESSID1
	3.5 Maximum Data Rate		3 Mbps (1 Mbps in BreezeACCESS 3.8 products)
	3.6 Frequency Offset		0
	3.7 Decrement Hopping Frequencies		Disable
	3.H Hopping Band		10 MHz
	3.X Transmit Power Control		15
	3.Y Receive Attenuation Control		0dB
	3.S Show Basic Configuration		

Menu	Sub-menu	Parameter/Option	Default Value
4. Site Survey / Access Units	4.1 Traffic Statistics		
	4.2 Print Per-Hop Statistics		
	4.3 Ping Test	4.3.1 Destination IP Address	192.000.000.001
		4.3.2 No. of Pings	1
		4.3.3 Ping Frame Length	64 Bytes
		4.3.4 Ping Frame Timeout	200 milliseconds
		4.3.5 Start Sending	
		4.3.6 Stop Sending	
		4.3.S Show Ping Test Values	
	4.4 MAC Address Database		
4. Site Survey / Subscriber Units	4.1 Traffic Statistics		
	4.2 Print Per-Hop Statistics		
	4.3 Ping Test	4.3.1 Destination IP Address	192.000.000.001
		4.3.2 No. of Pings	1
		4.3.3 Ping Frame Length	64 Bytes
		4.3.4 Ping Frame Timeout	200 milliseconds
		4.3.5 Start Sending	
		4.3.6 Stop Sending	
		4.3.S Show Ping Test Values	
	4.4 Continuous Link Quality Display		
	4.5 Frame Error Rate		
	4.7 Rate Statistics		

Menu	Sub-menu	Parameter/Option	Default Value
5. Advanced Configuration	5.1 IP Parameters	5.1.1 IP Address	010.000.000.001
		5.1.2 Subnet Mask	255.000.000.000
		5.1.3 Default Gateway Address	000.000.000.000
		5.1.S Show IP Parameters	
	5.2 Air Interface Parameters / Access Units	5.2.1 ESSID	ESSID1
		5.2.2 Maximum Data Rate	3 Mbps
		5.2.3 Acknowledge Delay Limit	Low
		5.2.4 Frequency Offset	0
		5.2.5 Decrement Hopping Frequencies	Disable
		5.2.6 Hopping Shift	0
		5.2.7 Hopping Sync	Idle
		5.2.8 Association Aging Time	1 (No Aging)
		5.2.H Hopping Band	10 MHz
		5.2.V Maximum Voice Sessions	12
		5.2.X Transmit Power Control	15
		5.2.W Security Parameter	Disable
		5.2.W.1 Authentication Algorithm	Open System
		5.2.W.2 Default Key ID	WEP Key 1
		5.2.W.A WEP Key #1	0000000000
		5.2.W.B WEP Key #2	0000000000
		5.2.W.C WEP Key #3	0000000000
		5.2.W.D WEP Key #4	0000000000
		5.2.S Show Air Interface Parameters	

Menu	Sub-menu	Parameter/Option	Default Value
	5.2 Air Interface Parameters / Subscriber Units	5.2.1 ESSID	ESSID1
		5.2.2 Maximum Data Rate	3 Mbps
		5.2.3 Acknowledge Delay Limit	Disabled
		5.2.4 Frequency Offset	0
		5.2.5 Decrement Hopping Frequencies	Disable
		5.2.H Hopping Band	10 MHz
		5.2.X Transmit Power Control	15
		5.2.Y Receive Attenuation Control	0dB
		5.2.W Security Parameters	Disable
		5.2.W.1 Authentication Algorithm	Open System
		5.2.W.2 Default Key ID	WEP Key 1
		5.2.W.A WEP Key #1	0000000000
		5.2.W.B WEP Key #2	0000000000
		5.2.W.C WEP Key #3	0000000000
		5.2.W.D WEP Key #4	0000000000
		5.2.S Show Air Interface Parameters	
	5.3 Network Management Parameters	5.3.1 Access to Network Management	From Both Ethernet & Wireless Link
		5.3.2 Network Management Filtering	Disabled
		5.3.3 Set Network Management IP Addresses	000.000.000.000 (all three addresses)
		5.3.4 Delete a Network Management IP Address	
		5.3.5 Delete All Network Management IP Addresses	
		5.3.6 Send SNMP Traps	Disabled
		5.3.S Show Network Management Parameters	

Menu	Sub-menu	Parameter/Option	Default Value
	5.4 Bridge Parameters/ Access Units	5.4.1 VLAN Support 5.4.1.1 VLAN ID 5.4.1.2 Management VLAN ID 5.4.1.3 Ethernet Link Type 5.4.1.4 Priority Queue Threshold 5.4.1.5 POTS Port Priority Tag 5.4.2 Bridging Aging Time 5.4.3 Ethernet Broadcast Filtering 5.4.4 LAN to WLAN Bridging Mode 5.4.5 Broadcast Relaying 5.4.6 Unicast Relaying 5.4.S Show Bridge Parameters	FFFF (No VLAN) FFFF (No VLAN) Hybrid 3 FF (Disabled) 300 seconds Disabled Forward Unknown Enabled Enabled
	5.4 Bridge Parameters/ Subscriber Units	5.4.1 VLAN Support 5.4.1.1 VLAN ID 5.4.1.2 Management VLAN ID 5.4.1.3 Ethernet Link Type 5.4.1.4 Priority Queue Threshold 5.4.1.5 POTS Port Priority Tag 5.4.2 Bridging Aging Time 5.4.3 Ethernet Broadcast Filtering 5.4.S Show Bridge Parameters	FFFF (No VLAN) FFFF (No VLAN) Hybrid 3 FF (Disabled) 300 seconds (SU-BD/BD1V). 1800 seconds (SU-1D/1D1V/ 8D/8D1V) Disabled

Menu	Sub-menu	Parameter/Option	Default Value
	5.5 Performance Parameters / Access Units	5.5.1 RTS Threshold	1600
		5.5.2 Number of Retransmissions	1
		5.5.3 Number of Dwells to Retransmit	2
		5.5.4 Number of Retransmissions to Decrease Rate	0
		5.5.5 Minimum Contention Window	31
		5.5.6 Carrier Sense Level	-90
		5.5.9 Maximum Multicast Rate	1 Mbps
		5.5.T Rate	
		5.5.T.1 Multi-Rate Support	Disabled
		5.5.T.2 Multi-Rate Decision Window Size	3
		5.5.D Dwell Time	128 K-microseconds
		5.5.S Show Performance Parameters	
	5.5 Performance Parameters / Subscriber Units	5.5.1 RTS Threshold	60
		5.5.2 Number of Retransmissions	1
		5.5.3 Number of Dwells to Retransmit	2
		5.5.4 Number of Retransmissions to Decrease Rate	0
		5.5.5 Minimum Contention Window	31
		5.5.6 Carrier Sense Level	-90
		5.5.9 Maximum Multicast Rate	1 Mbps
		5.5.T Rate	
		5.5.T.1 Multi-Rate Support	Disabled
		5.5.T.2 Multi-Rate Decision Window Size	3
		5.5.T.3 Show Rate Counters	
		5.5.S Show Performance Parameters	

Menu	Sub-menu	Parameter/Option	Default Value
	5.6 Service Parameters (Subscriber Units only)	5.6.1 User Filtering Parameters 5.6.1.1 User Filtering Option 5.6.1.2 Set User Filter Address 5.6.1.3 Set User Filter Mask 5.6.1.4 Set User Filter Range 5.6.1.5 Delete a User Filtering Entry 5.6.1.6 Delete All User Filtering Entries 5.6.1.S Show User Filtering Parameters 5.6.2 MIR and CIR Parameters 5.6.2.1 MIR/CIR Option 5.6.2.2 MIR: AU to SU 5.6.2.3 MIR: SU to AU 5.6.2.4 CIR: AU to SU 5.6.2.5 CIR: SU to AU 5.6.2.S Show MIR/CIR Parameters 5.6.S Show Service Parameters	Disabled 000.000.000.000 (all 8 addresses) 255.255.255.255 (all 8 masks) 0 (all 8 addresses) Disabled 128 Kbps 128 Kbps 64 Kbps 64 Kbps Disabled
	5.7 Accounting Parameters (Subscriber Units only)	5.7.1 Accounting Option 5.7.2 RADIUS Server IP Address 5.7.3 RADIUS Server Accounting Port 5.7.4 Maximum Accounting interval 5.7.S Show Accounting Parameters	Disabled 000.000.000.000 1813 60 seconds

Menu	Sub-menu	Parameter/Option	Default Value
	5.8 Voice Parameters (Subscriber Units with voice support only)	5.8.1 Volume	−3dB
		5.8.2 Buffer Delay	0 milliseconds
		5.8.3 Echo Cancellation	Enabled
		5.8.4 Voice Codec	g7231 g729 g711µlaw64k g711Alaw64k
		5.8.6 Voice Activity Detection	Voice Activity Detection OFF
		5.8.S Show Voice Parameters	
	5.9 Dialing Parameters (Subscriber Units with voice support only)	5.9.1 Pulse Dialing	Enabled
		5.9.2 Gatekeeper Option	Disabled
		5.9.3 Gatekeeper/Gateway IP Address	000.000.000.000
		5.9.4 Telephone Number	0000000000 (No Number)
		5.9.5 H323 Terminal ID	X (No H323 Terminal ID)
		5.9.6 IP Dialing Option	Enabled
		5.9.7 IP Dialing Indicator	*
		5.9.8 Automatic Prefix	X (No Gateway Prefix)
		5.9.9 Voice Packets ToS	0
		5.9.S Show Dialing Parameters	

1.3 Main Menu

From the *Main Menu* you can access the following menus, depending on your access level:

- **Info Screens** – Read-only display of current parameter values. Available at all access levels.
- **Unit Control** – Enables access to general operations such as unit reset, loading the factory default parameters, changing passwords and switching between software versions. Available at the Installer and Administrator access levels.
- **Basic Configuration** – Enables access to the set of parameters that are configured as part of the installation process. These parameters are also accessible from the *Advanced Configuration* menu. Available at the Installer and Administrator access levels.
- **Site Survey** – Enables activation of certain tests and viewing of various system counters. Available at the Installer and Administrator access levels.
- **Advanced Configuration** – Enable access to all system parameters, including the parameters that are included in the *Basic Configuration* menu. Only available at the Administrator access level.

1.4 Info Screens Menu

```
BreezeACCESS/BST-AU
Official Release Version - 2.6.3
Release Date:  Thu Aug 31 17:24:47 2000
Info Screens
=====
1 - Show Unit Status
2 - Show Basic Parameters
3 - Show Advanced Parameters
S - Show All Parameters
BreezeACCESS >>>
```

Figure 1-2. Info Screens Menu

The *Info Screens* menu allows viewing the current values of various parameter sets. The parameter sets are identical to the main parameter groups in the configuration menus. The user can view a specific parameter set or can elect to view all parameters (S). This menu is available at all access levels.

1.4.1 Show Unit Status

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

- **Unit Type** – Identifies the unit’s function as one of the following: *Access Unit* or *Subscriber Unit*.
- **Unit MAC Address** – Displays the unit’s unique IEEE MAC address.
- **HW Version** – The hardware version of the unit (the indoor module).

The following parameters appear for SUs only:

- **Unit Status** – The current status of the SU. There are two options:
 - * **SCANNING** – The SU is searching for an AU with which to associate.
 - * **ASSOCIATED** – The SU is associated with an AU.
- **AU MAC Address** – The MAC address of the AU with which the unit is currently associated. If the unit is not associated with any AU, the address will be that of the IEEE broadcast address: FF-FF-FF-FF-FF-FF.
- **Total Number of Associations Since Last Reset** – This indicates the total number of associations with any AU since last reset.
- **Number of MAC Addresses Learned** (all SUs, except BD units with bridging support) – N is the number of LAN MAC addresses recognized by the unit. Maximal number depends on the unit's type – e.g. **1** for 1D units that support a single address and **8** for 8D units that support up to 8 addresses.

The following parameters appear for the AU only:

- **Current Number of Associations** – The total number of SUs currently associated with this AU.
- **Maximum number of Associations Since Last Reset** – The maximum number of SUs that were associated with the AU since the last reset, including duplicate associations with the same SU.

In addition, the following parameters that are related to the *Unit Control* menu also appear for both AU and SU:

- **Unit Hardware Version** – The hardware version at the unit (the indoor unit).
- **Voice Hardware Version** (only in SU with voice support) – The hardware version of the voice module.
- **Flash Type** – The type and size of the Flash memory.

- **Flash Versions:**
 - ⇒ **Current Version** – The software version that is currently active.
 - ⇒ **Shadow Version** – The software version currently defined as the shadow (backup) version.
 - ⇒ **Version After Reset** – The software version that will be used after the next reset.
- **Console Speed** – The speed defined in the unit for the connected terminal used for running the terminal emulation program.

1.4.2 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.

1.4.3 Show Advanced Configuration

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

1.4.4 Show All Parameters

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

1.5 Unit Control Menu

```

BreezeACCESS/BST-AU
Official Release Version - 2.6.3
Release Date:  Thu Aug 31 17:24:47 2000
Unit Control
=====
1 - Reset Unit
2 - Set Defaults
3 - Change Station Name
4 - Change Password
5 - Flash Memory Control
6 - Console Speed
7 - Log Out Timer
BreezeACCESS >>>

```

Figure 1-3. Unit Control Menu

The *Unit Control* menu includes the following options:

- **Reset Unit** – Resets the BreezeACCESS unit and applies any changes made to the system parameters.
- **Set Defaults** – When this option is implemented, system parameters' settings revert to the original factory default settings.

If the *Set Factory Defaults - Complete* option (option 1) is selected, all parameters will revert to the selected set of factory default values.

If the *Set Factory Defaults -Partial* option (option 2) is selected, all parameters will revert to the default values of the current set, except for the parameters that are necessary to ensure connectivity to the unit. The parameters that will not be changed to the factory default values include: IP parameters, ESSID and Frequency Settings parameters.

- **Change Unit Name** – To change the name of the unit, which is also the system's name in MIB2. The unit's name is displayed as the prompt at the bottom of each menu screen (the default name is BreezeACCESS).

- **Change Password** – To change the password(s). A user with Installer access rights can change the passwords for Read Only and Installer. A user with Administrator access rights can change passwords of all levels.

The following table lists the default passwords for each of the access levels.

Access Rights	Password
Read Only	public
Installer	user
Administrator	private

- **Flash Memory Control** –To select the active software version.
The following options are available:
 - * **Reset and Boot from Shadow Version** – To activate the shadow (backup) software version.
 - * **Use Current Version After Reset** – To define the current version as the one that will be activated and used after the next reset.

The FLASH memory can store two software versions. One version is called *Current* and the other is called *Shadow*. New software versions are loaded to the shadow memory version. You can select it as the new active version by selecting *Reset and Boot from Shadow Version*. However, after the next reset, the current version will be activated again. If the active version is the shadow version and you wish to continue using it after the next reset, select *Use Current Version After Reset*.

The parameters configured in the unit are not changed as a result of downloading new software versions (unless the new version includes additional parameters or other changes in the list of parameters).

- **Console Speed** – Allows defining the speed at which the unit communicates with the terminal running the terminal emulation program. Console Speed must be changed prior to changing the speed of the terminal connected to it. The default value is 9600 baud. The allowed range of speeds is: 9600, 19200, 38400, 57600 and 115200 baud.

- **Log Out Timer** – Allows entry of a new Log Out Timer value. If the monitor program will not be used for the specified time, the unit will automatically exit the monitor program. The default value is 5 minutes. The allowed range is 1 to 999 minutes.

1.6 Basic Configuration Menu

The *Basic Configuration* menus for Access Unit and Subscriber Unit are different, and are shown separately in Figure 1-4 and Figure 1-5.

```
BreezeACCESS/BST-AU
Official Release Version - 2.6.3
Release Date:  Thu Aug 31 17:24:47 2000
Basic Configuration
=====
1 - IP Address
2 - Subnet Mask
3 - Default Gateway Address
4 - ESSID
5 - Maximum Data Rate
6 - Frequency Offset
7 - Decrement Hopping Frequencies
8 - Hopping Shift
9 - Hopping Sync
H - Hopping Band
X - Transmit Power Control
S - Show Basic Configuration
BreezeACCESS >>>
```

Figure 1-4. Basic Configuration Menu for AU

```
BreezeACCESS/SU-1D
Official Release Version - 2.6.3
Release Date:  Thu Aug 31 17:24:47 2000
Basic Configuration
=====
1 - IP Address
2 - Subnet Mask
3 - Default Gateway Address
4 - ESSID
5 - Maximum Data Rate
6 - Frequency Offset
7 - Decrement Hopping Frequencies
H - Hopping Band
X - Transmit Power Control
Y - Receive Attenuation Control
S - Show Basic Configuration
BreezeACCESS >>>
```

Figure 1-5. Basic Configuration Menu for SU

The *Basic Parameters* menu includes all the parameters that are necessary for the initial installation and operation of the unit. Once the unit is properly installed and operational, other parameters can be configured either locally using the monitor program or remotely using Telnet or SNMP management.

Note: *All parameters in the Basic Configuration menu are also available in the appropriate submenus of the Advanced Configuration menu.*

- **IP Address** – Displays the current IP address of the unit and allows entry of a new IP address (4 x 3 digit octets, separated by dots). The default IP Address is 010.000.000.001.

- **Subnet Mask** – Displays the current subnet mask of the unit and allows entry of a new subnet mask (4 x 3 digit octets, separated by dots). The default mask is 255.000.000.000.
- **Default Gateway Address** – Displays the current address of the default gateway of the unit and allows entry of a new default gateway address (4 x 3 digit octets, separated by dots). The default gateway address is 000.000.000.000.
- **ESS ID** – The ESSID (Extended Service Set ID) of the unit (up to 32 printable ASCII characters). The ESSID is a string used to identify a wireless network. It prevents the unintentional merging of two co-located wireless networks. An SU can only associate with an AU that has an identical ESSID. Use different ESSIDs to segment the wireless access network and add security to your network. The default value is *ESSID1*.

Note: *The ESSID string is case-sensitive.*

- **Maximum Data Rate** – Displays the current maximum data rate and allows entry of a new value for the maximum data rate.

BreezeACCESS units operate at 1 Mbps, 2 Mbps or 3 Mbps. Under certain conditions (compatibility reasons or range/speed trade-off), you may decide to limit the use of higher rates. If the quality of the link is not good enough, it is recommended to decrease the value of this parameters (the higher the data rate, the higher the error rate). The link quality can be estimated based on the RSSI measurement at the SU, assuming that the propagation conditions are the same for both directions. Otherwise, there is a high probability that the unit will have to retransmit many frames several times before temporarily reducing the data rate (see Number of Retransmissions to Decrease Rate on page 45).

A high number of retransmissions reduces the overall throughput for the selected SU as well as for all the other SUs served by the same AU. If the measured RSSI is from 93 (-78 dBm) to 84 (-86 dBm), it is recommended to decrease the Maximum Data Rate of the SU to 2 Mbps. If the RSSI is less than 84 (-86 dBm), it is recommended to decrease it to 1 Mbps. The default value is 3 Mbps (except for the 3.8 series subscriber units in which the default is 1 Mbps). Allowed values are 1, 2 or 3 Mbps.

- **Hopping Band** – Displays the current bandwidth and allows entry of a new bandwidth. The bandwidth is determined according to specific conditions related to the license to use a given frequency band, and according to other considerations. The available selections are 10, 12, 14, 24, 28, 36, 42 and 50 MHz (some selections are not available in models with a total available bandwidth lower than 50 MHz). In addition, a Single Channel (2 MHz) selection is also available.
- **Frequency Offset** – Displays the current offset of the Hopping Band from the beginning of the available frequency range, and allows entry of a new offset. The offset is measured in channels, where each channel is 2 MHz. For example, in the BreezeACCESS 3.5a series, a Frequency Offset of 5 (10 MHz) will cause the hopping band to start at 3.420 GHz for the uplink and at 3.520 GHz for the downlink. The maximum value of the Frequency Offset is determined by the overall available bandwidth and the selected Hopping Band (Hopping Band should be selected before selecting the Frequency Offset).

When setting this parameter, consider the following relationship.

Max. Frequency Offset (channels) = (Overall Bandwidth-Hopping Band)/2.

For example, in the BreezeACCESS 3.5a series operating at an overall bandwidth of 42 MHz, if the selected Hopping Band is 12 MHz then the allowed range for Frequency Offset is from 0 to 15 channels.

The default Frequency Offset is 0.

- **Hopping Shift** – Displays the current Hopping Shift parameter and allows entry of a new value. Available only in AUs. All the associated SUs learn the value of the Hopping Shift parameter from the AU during the association process. The Hopping Shift parameter is used to provide different operational hopping sequences when several co-located Access Units use the same band (and hence the same basic hopping sequence). This will minimize the cross interference among these AUs and will allow for better spectrum utilization. Each unit represents a shift of one channel (2 MHz) between hopping sequences. The allowed range depends on the defined band.

When setting this parameter, consider the following relationship.

Max. Hopping Shift (channels) = (Hopping Band-2)/2.

For example, if the Hopping Band is 12 MHz, then the allowed range for Hopping Shift is from 0 to 5 channels. The default Hopping Shift is 0. The minimum recommended shift between two adjacent AUs is 2 (4 MHz).

- **Decrement Hopping Frequencies** – This parameter should not be changed from its default configuration of Disabled. It is reserved for special applications where it allows reducing all the operating frequencies by 1 MHz.
- **Hopping Sync** (Access Unit only) – Displays the current Hopping Sync status of the unit and allows defining a new status. When several AUs that use the same band and different Hopping Shifts are co-located, their operation should be synchronized in terms of hopping sequence initialization and timing. One unit must be specified as a Master Unit and all other units must be specified as Slave units. Available options are:
 - ⇒ **Idle** – no synchronization (stand-alone operation)
 - ⇒ **Master** – The AU that serves as a Master unit providing synchronization signals to the Slave units
 - ⇒ **Slave** – An AU that operates as a Slave
- **Transmit Power Control** – Displays the current relative gain of the Tx power circuits. A value of 15 represents the highest transmit power level. A lower value represents a lower transmit power level. The allowed range is from 0 to 15. The default value is 15 (maximum power).

The effect of this parameter on the transmitted power is not linear. In addition, it is affected by the length (attenuation) of the IF cable. Table 1-3 , page 26, displays transmit power control parameters values required to decrease the transmitted power by approximately 5 dB, 10 dB, etc. up to a maximum attenuation of approximately 25 dB as a function of cable length (refers to RG-58). Note that at short cable lengths the transmitted power level cannot be decreased by more than 15 dB.

Attenuation should be introduced to decrease the transmitted power in the following areas:

1. In a Subscriber Unit that is relatively close to the Access Unit, in order to minimize the interference to signals received by the AU from other subscriber units.
2. In an Access Unit, if there is a need to decrease the transmitted power level in order to achieve relatively small cells and to minimize the interference with the operation of neighboring cells.

Cable Length (m) (RG-58)	Achievable Attenuation from Maximum Power				
	5 dB	10 dB	15 dB	20 dB	25 dB
0 - 6	5	2	0	Not Achievable	Not Achievable
12	6	3	0	Not Achievable	Not Achievable
18	7	5	2	0	Not Achievable
24	8	6	3	0	Not Achievable
30	8	7	4	2	0

Table 1-3. Transmit Power Control Values to Achieve Attenuation from Max.

- **Receive Attenuation Control** – (Applicable for SU only). Displays the current attenuation introduced into the receiver circuits and allows entry of a different attenuation value. If the received signal level is too high, it is recommended to introduce such attenuation to prevent overloading of the receiver circuits. The default Receive Attenuation is 0dB. Other available Receive Attenuation values are 10dB and 25dB.

1.7 Site Survey Menu

The *Site Survey* menus for Access Unit and Subscriber Unit are different, and are shown separately in Figure 1-6 and Figure 1-7.

```
BreezeACCESS/BST-AU
Official Release Version - 2.6.3
Release Date:  Thu Aug 31 17:24:47 2000
Site Survey
=====
1 - Traffic Statistics
2 - Print Per-Hop Statistics
3 - Ping Test
4 - MAC Address Database
BreezeACCESS >>>
```

Figure 1-6. Site Survey Menu for AU

```
BreezeACCESS/SU-1D
Official Release Version - 2.6.3
Release Date:  Thu Aug 31 17:24:47 2000
Site Survey
=====
1 - Traffic Statistics
2 - Print Per-Hop Statistics
3 - Ping Test
4 - Continuous Link Quality Display
5 - Frame Error Rate
7 - Rate Statistics
BreezeACCESS >>>
```

Figure 1-7. Site Survey Menu for SU

The *Site Survey* menu provides various tests and counters for verifying the quality of the wireless link. These tests can be used to help you to decide where to position your units for optimal coverage, to align antennas; and to assist in troubleshooting.

1.7.1 Traffic Statistics

The traffic statistics counters can be used to monitor, interpret and analyze the wired and wireless links performance. The counters display statistics concerning wireless link and Ethernet frames. The menu includes the following options:

- **Display Counters** – Choose this option to display the current value of the Ethernet and Wireless Link Counters.
- **Reset Counters** – Choose this option to reset all the counters.

```
Ethernet Counters
=====
Total received frames via Ethernet :
Transmitted Wireless to Ethernet  :

Wireless Link Counters
=====
Total transmitted frames to wireless:
Total received frames from wireless:
Total retransmitted fragments      :
Frames Dropped (too many retries) :
Hit any key to return
BreezeACCESS >>>
```

Figure 1-8. Traffic Counters

The following is a list of the available counters:

1.7.1.1 Ethernet Counters

- **Total received frames via Ethernet** – The total number of frames received from the Ethernet port. This counter includes both bad (i.e., with errors) and good frames (i.e., frames with no errors).
- **Transmitted wireless to Ethernet** – The number of frames transmitted by the unit to the Ethernet port. These are usually frames that have been received from the wireless side, but also frames generated by the unit itself.

1.7.1.2 Wireless Link Counters

- **Total transmitted frames to wireless** – The number of frames transmitted to the wireless media. The count includes the first transmission of data frames (without retransmissions), and also the number of control and management frames.
- **Total received frames from wireless** – The total number of frames received from the wireless media. The count includes data and management frames.
- **Total retransmitted fragments** – The total number of retransmissions of data frames (not including the first transmission).
- **Frames dropped (too many retries)** – The number of dropped frames. The frames were retransmitted to the extent of the maximum allowed number of retransmissions.

1.7.2 Print Per Hop Statistics

This option prints various per hop statistics as shown in Figure 1-9.

Num	The number of the information row, assigned automatically and sequentially by the program.
Freq	An operational frequency number according to the hopping sequence.
Rx	The number of frames received at the specified frequency.
Tx	The number of frames transmitted successfully at the specified frequency.
RTx	The number of frames re-transmitted at the specified frequency.
avrRssi	The average RSSI (Received Signal Strength Indication) of all the frames received at the specified frequency. If no frames have been received, the avrRSSI is 0.

All other parameters (SlvT, MstT, RecShft, SeqOn) have no operational meaning and are intended for the use of authorized BreezeCOM technicians only.

Num	Freq	Rx	Tx	RTx	avrRssi	SlvT	MstT	RecShft	SeqOn
1	2	10	13	1	100	0	0	0	0
2	25	11	12	2	98	0	0	0	0

Figure 1-9. Per Hop Statistics

A short summary is produced, after the table is printed:

```

Received Frames per second      :   10.48000
Transmitted Frames per second   :   12.51000
Retransmitted Frames per second:    1.456000
The current frequency index     :    28

```

The frequency index is the channel number (each channel is 2MHz).

1.7.3 Ping Test

The *Ping Test* menu includes the following options:

- **Destination IP Address** – Displays the IP address of the destination unit for pinging. Allows entering an IP address (4 x 3 digit octets, separated by dots). The default IP address is 192.000.000.001.
- **No. of Pings** – Enter the number of ping attempts per session. The default value is 1. The allowed range is from 0 to 9999. Select 0 for continuous pinging.
- **Ping Frame Length** – Enter the ping packet size. The default value is 64 bytes. The allowed range is from 60 to 1472 bytes.
- **Ping Frame Timeout** – Enter the ping frame timeout, which is the amount of time (in ms) to wait between ping attempts. The default value is 200 ms. The allowed range is from 200 to 2000 ms, in increments of 200 milliseconds (200, 400, 600,.....2000).
- **Start Sending** – To start transmission of ping frames.
- **Stop Sending** – To stop the transmission of ping frames.
- **Show Ping Test Values** – To display the current values of the ping test parameters, the transmission status (sending or not), the number of pings sent, and the number of pings received (acknowledged frames).

1.7.4 Continuous Link Quality Display (Available in SU only)

This option displays a continuously updated table that includes information on the quality of the received signal (Received Signal Strength Indication).

Each line includes the number of frames that were received since last measurement (total Rx), the average RSSI for these frames (avrRSSI), and the error rate (percentage of retransmission).

Press any key to abort the test.

Table 1-4 displays the measured RSSI vs. the received signal level in dBm.

Table 1-4. RSSI Values vs. dBm Levels

RFLevel in dBm	RSSI Values: SU-A/E-3.5
-35	130
-40	129
-45	127
-50	120
-55	115
-60	111
-65	106
-70	103
-75	98
-80	91
-85	85
-90	78
-94	70

1.7.5 Frame Error Rate (Available in SU only)

The Frame Error Rate option activates a test between two units (AU and SU), in which each unit also transmits information regarding its calculated error rate. The display includes:

- SU Frame Error Rate
- AU Frame Error Rate

The Frame Error Rate is calculated as:
$$(\text{Retransmitted Frames}) / (\text{Transmitted Frames} + \text{Retransmitted Frames}).$$

1.7.6 Rate Statistics (Available in SU only)

Displays the number of packets that were transmitted since the last reset at various rates (1Mbps, 2Mbps, 3Mbps), and the total number of retransmissions.

1.7.7 MAC Address Database (Available in AU only)

The MAC Address Database option displays the Bridging (Forwarding) database and the Association database. The following options are available:

- Display Association Info
- Display Bridging & Association Info

1.8 Advanced Configuration Menu

```
BreezeACCESS/SU-1D1V
Official Release Version - 2.6.3
Release Date:  Thu Aug 31 17:24:47 2000
Advanced Configuration
=====
1 - IP Parameters
2 - Air Interface Parameters
3 - Network Management Parameters
4 - Bridge Parameters
5 - Performance Parameters
6 - Service Parameters
7 - Accounting Parameters
8 - Voice Parameters
9 - Dialing Parameters
BreezeACCESS >>>
```

Figure 1-10. Advanced Configuration Menu for SU

Note: *Figure 1-10 shows the Advanced Configuration menu of a Subscriber Unit with voice support. The Advanced Configuration menu of a Subscriber Unit without voice support (SU-1D/8D/BD) includes items 1 through 7. The Advanced Configuration menu of an Access Units includes items 1 through 5.*

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

1.8.1 IP Parameters

The IP Parameters sub-menu allows configuration of the following parameters:

- **IP Address** – Displays the current IP address of the unit and allows entry of a new IP address (4 x 3 digit octets, separated by dots). The default IP Address is 010.000.000.001.
- **Subnet Mask** – Displays the current subnet mask of the unit and allows entry of a new subnet mask (4 x 3 digit octets, separated by dots). The default mask is 255.000.000.000.
- **Default Gateway Address** – Displays the current address of the default gateway of the unit and allows entry of a new default gateway address (4 x 3 digit octets, separated by dots). The default gateway address is 000.000.000.000.
- **Show IP Parameters** – Displays the current values of the IP Parameters.

1.8.2 Air Interface Parameters

The *Air Interface Parameters* sub-menu allows configuration of the following parameters:

- **ESS ID** – The ESSID (Extended Service Set ID) of the unit (up to 32 printable ASCII characters). The ESSID is a string used to identify a wireless network. It prevents the unintentional merging of two co-located wireless networks. An SU can only associate with an AU that has an identical ESSID. Use different ESSIDs to segment the wireless access network and add security to your network. The default value is *ESSID1*.

Note: *The ESSID string is case-sensitive.*

- **Maximum Data Rate** – Displays the current maximum data rate, and allows entry of a new value for the maximum data rate.

BreezeACCESS units operate at 1 Mbps, 2 Mbps or 3 Mbps. Under certain conditions (compatibility reasons or range/speed trade-off), you may decide to limit the use of higher rates. If the quality of the link is not good enough, it is recommended to decrease the value of this parameters (the higher the data rate, the higher the error rate). The link quality can be estimated based on the RSSI measurement at the SU, assuming that the propagation conditions are the same for both directions. Otherwise, there is a high probability that the unit will have to retransmit many frames several times before temporarily reducing the data rate (see Number of Retransmissions to Decrease Rate on page 45).

A high number of retransmissions reduces the overall throughput for the selected SU as well as for all the other SUs served by the same AU. If the measured RSSI is from 93 (-78 dBm) to 84 (-86 dBm), it is recommended to decrease the Maximum Data Rate of the SU to 2 Mbps. If the RSSI is less than 84 (-86 dBm), it is recommended to decrease it to 1 Mbps. The default value is 3 Mbps. Allowed values are 1, 2 or 3 Mbps.

- **Acknowledge Delay Limit** – Use this parameter to increase the range of the system through increasing the time that the unit can wait for acknowledgements. Increasing the range, however, may decrease the overall performance and achievable network throughput. It should be increased only to support ranges of over 10Km. Use the feature on both sides of the link (i.e., if the range was increased for one SU, it must be increased to the same value for the AU and all the other SUs associated with the same AU). The default setting is *Low* (up to 10Km). Allowed values are: Low (up to 10 Km), Medium (up to 20Km) and High (up to 100Km).
- **Hopping Band** – Displays the current bandwidth and allows entry of a new bandwidth. The bandwidth is determined according to specific conditions related to the license to use a given frequency band, and according to other considerations. In the standard versions the available selections are 10, 12, 14, 24, 28, 36, 42 and 50 MHz (some selections are not available in models with a total available bandwidth lower than 50MHz). In addition, a Single Channel (2 MHz) selection is also available.

- **Frequency Offset** – Displays the current offset of the Hopping Band from the beginning of the available frequency range, and allows entry of a new offset. The offset is measured in channels, where each channel is 2 MHz. For example, in the BreezeACCESS 3.5a series, a Frequency Offset of 5 (10 MHz) will cause the hopping band to start at 3.420 GHz for the up-link and at 3.520 GHz for the down-link. The maximum value of the Frequency Offset is determined by the overall available bandwidth and the selected Hopping Band (Hopping Band should be selected before selecting the Frequency Offset).

When setting this parameter, consider the following relationship.

Max. Frequency Offset (channels) = (Overall Bandwidth-Hopping Band)/2.

For example, in the BreezeACCESS 3.5a series operating at an overall bandwidth of 42 MHz, if the selected Hopping Band is 12 MHz then the allowed range for Frequency Offset is from 0 to 15 channels. The default Frequency Offset is 0.

- **Hopping Shift** – Displays the current Hopping Shift parameter and allows entry of a new value. Available only in AUs. All the associated SUs learn the value of the Hopping Shift parameter from the AU during the association process. The Hopping Shift parameter is used to provide different operational hopping sequences when several co-located Access Units use the same band (and hence the same basic hopping sequence). This will minimize the cross interference among these AUs and will allow for better spectrum utilization. Each unit represents a shift of one channel (2 MHz) between hopping sequences. The allowed range depends on the defined band.

When setting this parameter, consider the following relationship.

Max. Hopping Shift (channels) = (Hopping Band-2)/2.

For example, if the Hopping Band is 12 MHz, then the allowed range for Hopping Shift is from 0 to 5 channels. The default Hopping Shift is 0. The minimum recommended shift between two adjacent AUs is 2 (4 MHz).

- **Hopping Sync** (Access Unit only) – Displays the current Hopping Sync status of the unit and allows defining a new status. When several AUs that use the same sub-bands and different Hopping Shifts are co-located, their operation should be synchronized in terms of hopping sequence initialization and timing. One unit must be specified as a Master Unit and all other units must be specified as Slave units. Available options are:
 - ⇒ **Idle** – no synchronization (stand-alone operation)
 - ⇒ **Master** – The AU that serves as a Master unit providing synchronization signals to the Slave units
 - ⇒ **Slave** – An AU that operates as a Slave
- **Decrement Hopping Frequencies** – This parameter should not be changed from its default configuration of Disabled. It is reserved for special applications where it allows reducing all the operating frequencies by 1 MHz.
- **Transmit Power Control** – Displays the current relative gain of the Tx power circuits. A value of 15 represents the highest transmit power level. A lower value represents a lower transmit power level. The allowed range is from 0 to 15. The default value is 15 (maximum power).

The effect of this parameter on the transmitted power is not linear. In addition, it is affected by the length (attenuation) of the IF cable. Table 1-5 displays transmit power control parameters values required to decrease the transmitted power by approximately 5 dB, 10 dB, etc., up to a maximum attenuation of approximately 25 dB as a function of cable length (refers to RG-58). Note that at short cable lengths the transmitted power level cannot be decreased by more than 15 dB.

Table 1-5. Transmit Power Control Parameters Values

Cable Length (m) (RG-58)	Achievable Attenuation from Maximum Power				
	5 dB	10 dB	15 dB	20 dB	25 dB
0 - 6	5	2	0	Not Achievable	Not Achievable
12	6	3	0	Not Achievable	Not Achievable
18	7	5	2	0	Not Achievable
24	8	6	3	0	Not Achievable
30	8	7	4	2	0

Attenuation should be introduced to decrease the transmitted power in the following areas:

1. In a Subscriber Unit that is relatively close to the Access Unit, in order to minimize the interference to signals received by the AU from other subscriber units.
 2. In an Access Unit, if there is a need to decrease the transmitted power level in order to achieve relatively small cells and to minimize the interference with the operation of neighboring cells.
- **Receive Attenuation Control** – (Applicable for SU only). Displays the current attenuation introduced into the receiver circuits and allows entry of a different attenuation value. If the received signal level is too high, it is recommended to introduce such attenuation to prevent overloading of the receiver circuits. The default Receive Attenuation is 0dB. Other available Receive Attenuation values are 10dB and 25dB.
 - **WLAN Aging Time** (AU only)– Displays the current WLAN Aging Time and allows entry of a new value. The AU maintains a database of associated Subscriber Units. If an SU was not active for a long time, it will be deleted from the database. The time the AU will wait prior to deleting an inactive SU entry from the database is the WLAN Aging Time. The available range is 1 (no aging) or 2 to 50,000 seconds. The default value is 1 (no aging). Under normal conditions this parameters should not be changed.
 - **Maximum Voice Sessions** – Applicable only for an AU that supports Subscriber Units with voice capability. The value of the Maximum Voice Sessions parameter specifies the maximum number of simultaneous voice sessions that can be conducted by the SUs associated with this AU. If the number of active voice sessions reaches this number, any additional SU trying to initiate a voice session does not get a dial tone. The selection range is from 0 to 50. The default value is 12. As this value increases, voice quality may deteriorate as more users share the same bandwidth for voice sessions.

- **Security Parameters** - Eavesdropping is prevented by using the Wired Equivalent Privacy (WEP) algorithm defined in the IEEE 802.11 Wireless LAN standard. The WEP is based on RSA's RC4 and must be ordered specifically. The privacy option is available only if specified as such in the factory setting. The following parameters are available in the Security Parameters menu:
 - ⇒ **Authentication Algorithm** – Determines the operation mode of the unit. The available options are:
 - * Open System: No Authentication
 - * Shared Key: Authentication enabled (for units that have the privacy option enabled)
 - ⇒ **Default Key ID** – Defines the ID of the key to be used for encryption of transmitted messages and decryption of received messages. The default selection is WEP KEY # 1.
 - ⇒ **WEP KEY # 1** through **WEP KEY # 4** – Allows entry of the encryption key to be used for initialization of the pseudo-random number generator. The WEP Key is a string of 10 hexadecimal numbers. The default for all 4 keys is a string of 10 zeros (no key). The WEP Keys must be set before the Shared Key authentication mode can be used. The Subscriber Units must use the same WEP Key that is used by the Access Unit.

Note: *It is recommended to change the WEP Keys periodically, to enhance system security.*

1.8.3 Network Management Parameters

This feature allows protecting the unit from trials of unauthorized access by defining a set of IP addresses from which management of the unit (Telnet, TFTP, SNMP) is allowed. This feature also supports the possibility of defining the direction (from the wireless media or from the wired Ethernet or from both) from which such access is allowed. The *Network Management Parameters* menu includes the following options:

- **Access to Network Management** – To define the unit's management option, which are the following:

- * From Wireless Link Only
- * From Ethernet Only
- * From Both Ethernet & Wireless Link

The default selection is *From Both Ethernet & Wireless Link*.

- **Network Management Filtering** – To enable/disable management filtering. Available options are:

- * Disabled
- * Enable Management IP Filtering on Ethernet Port
- * Enable Management IP Filtering on Wireless Link Port
- * Enable Management IP filtering on Both Ethernet & Wireless Link Port

The default selection is *Disabled*.

- **Set Network Management IP Addresses** – Displays the current addresses (up to 3) and allows you to enter new addresses. The default value is 000.000.000.000 for all 3 addresses.
- **Delete a Network Management IP Address** – To delete one entry.
- **Delete All Network Management IP Addresses** – To delete all entries.
- **Send SNMP Traps** – Determines whether this unit sends SNMP traps when an event occurs. If enabled, a trap is sent to the defined host address. The default is *Disabled*.

Note: *SNMP traps are not supported in this version. This parameter is included for the future support of SNMP traps.*

- **Show Network Management Parameters** – Displays the current values of the Network Management parameters.

1.8.4 Bridge Parameters

The *Bridge Parameters* menu includes the following parameters:

- **VLAN Support** – Choose this option to define the following VLAN (Virtual LAN) parameters (for more information, read the IEEE 802.1q specification).
 - ⇒ **VLAN ID** – Sets the VLAN ID that identifies the VLAN to which the unit is related. Valid values are hexadecimal numbers in the range 2 to FFE and FFFF (No VLAN). All other values (0, 1, FFF, 1000 to FFFE) are reserved for special use or forbidden. The default value is FFFF (no VLAN). This parameter has no effect in AUs.
 - ⇒ **Management VLAN ID** – Sets a management VLAN ID to enable remote management of Subscriber Units that support VLAN. Valid values are hexadecimal numbers in the range 2 to FFE and FFFF (No VLAN). All other values (0, 1, FFF, 1000 to FFFE) are reserved for special use or forbidden. The default value is FFFF (no VLAN). This parameter has no effect in AUs.
 - ⇒ **Ethernet Link Type** – Sets the link type. Available options are:
 - * Access Link: Transfers frames while tagging/un-tagging them because all devices connected to it are VLAN-unaware.
 - * Trunk Link: Transfers only tagged frames because all devices connected to it are VLAN-aware.
 - * Hybrid Link (capable of transferring frames with or without VLAN)
For an AU, this parameter is set to Hybrid Link and cannot be changed.
For SUs, the default selection is Hybrid Link.

⇒ **Priority Queue Threshold** – Each packet to be transmitted to the wireless link is transferred to one of three queues: Low, Mid and High, in accordance with the principles laid out in IEEE 802.1p standard.

Packets in the High queue have the highest priority for transmission, while those in the Low queue have the lowest priority. Packets with a tag according to IEEE802.q include a *User Priority* field that can have a value in the range 0-7. This value determines the relative priority of the packet. Packets with a User Priority higher than the value of the Priority Queue Threshold will be routed to the Mid queue. Packets with a User Priority equal to or lower than the value of the Priority Queue Threshold will be routed to the Low queue. Untagged data packets will be routed to the Low queue. Voice packets are routed to the High queue. Available values are 0-7. The default value is 3.

⇒ **POTS Port Priority Tag** – This parameters is to be used with VLAN-aware switches, adding a priority tag to voice packets to ensure that they will be given the required priority. The value in the priority tag will be equal to the value of the POTS Port Priority Tag. Available values are 0-7 and FF (disable-no priority tag). The default value is FF.

- **Ethernet Broadcast Filtering (SU only)** – To define the layer 2 (Ethernet) broadcast filtering capability. This option is only available in SUs and is not applicable for AUs. The Ethernet Broadcast Filtering allows saving bandwidth on the wireless media through blocking protocols that are typically used in the customer's LAN but are not relevant for other customers (e.g. NetBios that is used by Microsoft Network Neighborhood). Enabling this feature blocks Ethernet broadcasts (destination address FFFFFFFF). This feature will not affect the ARP protocol, which also uses Ethernet broadcasts. This feature should not be enabled when there is a router behind the SU. Available options are:

- * Disabled (no broadcast filtering)
 - * From Ethernet Only
 - * From Wireless Link Only
 - * From Both Ethernet & Wireless Link
- The default selection is *Disabled*.

- **LAN to Wireless Link Bridging Mode** (AU only) – This parameter allows controlling the flow of information from the Ethernet backbone to the wireless media. The options are:
 - * **Reject Unknown** – Allows transmission of packets only to addresses that the AU knows to exist in the wireless link.
 - * **Forward Unknown** – Allows transmission of all packets, except those sent to addresses that the AU recognizes as being on its wired Ethernet side (this is the default value).

The default selection is Forward Unknown. When connecting very large broadcast domains, it is recommended to set this parameter to Forward Unknown.
- **Bridge Aging Time** – Displays the current value for bridge aging time for addresses on the wired side, and allows entry of a new value. The available range is 100 to 2000 seconds. The default value for AUs, and for SU-BD units (SUs with bridge functionality) is 300 seconds. For all other SUs, the default value is 1800 seconds.
- **Broadcast Relaying** (AU only) – Determines whether the unit performs broadcast relaying. When Broadcast Relaying is enabled, broadcast packets originating in 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 Broadcast Relaying if you are sure that all broadcast messages from the wireless link will be destined to the wired LAN. The default selection is *Enable*.
- **Unicast Relaying** (AU only) – Determines whether the unit performs Unicast relaying. When Unicast Relaying is enabled, Unicast packets originating in devices on the wireless link can be transmitted back to the wireless link devices. If this parameter is disabled, these packets are not sent to the wireless link even if they are intended for devices on the wireless link. Disable Unicast Relaying only if you know that all Unicast messages from the wireless link will be destined to the local wired LAN. The default selection is *Enable*.
- **Show Bridge Parameter** – Displays the current values of the Bridge parameters.

1.8.5 Performance Parameters

The *Performance Parameters* menu includes the following parameters:

- **RTS Threshold** – Defines the minimal frame size to require RTS/CTS (Request To Send/Clear To Send) handshake. Frames with a size below the RTS Threshold value are transmitted directly to the wireless link without any delay. Setting this parameter to a value larger than the maximum frame size will prevent the RTS/CTS handshake for frames transmitted by this unit. The default value is 60 bytes for SUs and 1600 for AUs. The allowed range is from 20 to 1600.
- **Number of Retransmissions** – The maximum number of times that a packet that was not acknowledged will be retransmitted. The default value is 1. The allowed range is from 0 (no retransmissions) to 100.
- **Number of Dwells to Retransmit** – The minimum number of Dwell periods (see Dwell Time parameter below) during which packets will be retransmitted. Used together with Number of Retransmissions (see above) to provide retransmissions in both the time and frequency domains. The default value is 2. The allowed range is from 0 to 9.
- **Number of Retransmissions to Decrease Rate** – The number of unsuccessful retransmissions that will cause an automatic decrease in the data rate before the next retransmission (the lower the data rate, the higher the probability that the packet will be properly received and acknowledged). The default value is 0, meaning that the rate will be decreased prior to the first retransmission. The allowed range is from 0 to 10.
- **Minimum Contention Window** – The BreezeACCESS system uses Carrier Detect Multiple Access (CDMA) mechanism to minimize collisions in the wireless media resulting from trials of more than one unit to transmit at the same time. The contention window is the time that a unit will wait from the time it has decided that there are no detectable transmissions by other units until it will attempt to transmit. The contention window is a random number whose maximum value is determined by the value of the Minimum Contention Window parameter and the number of previous trials to transmit the frame. The higher the number of SUs served by the same AU, the higher the Minimum Contention Window for each SU should be. The default value is 31. The allowed range is from 1 to 255.

- **Carrier Sense Level** – This is the threshold level for decision on the existence of transmission from another unit on the wireless media. As long as the level is above this threshold, the unit will assume that another unit is transmitting and will refrain from trying to transmit in order to prevent collisions. The default value is –90. The allowed range is from –255 to 255.
- **Maximum Multicast Rate** – Determines the maximum data rate for multicast and broadcast transmissions. Multicast and broadcast transmissions are not acknowledged. Consequently, and without the possibility of using the acknowledgement mechanism for retransmission, there is a chance that such transmissions will not be properly received. Therefore, it is recommended to use a lower rate for transmission of broadcast, multicast and control frames, to increase the probability that they will be received without errors. The available selections are *1Mbps*, *2Mbps* and *3Mbps*. The default Maximum Multicast Rate is the minimum possible rate, 1Mbps.
- **Rate** –Link quality dynamically changes, due to various environmental conditions. Dynamically switching between the possible transmission rates increases the probability of using the maximum rate for the current radio link quality at any given moment. Decreasing the rate one step improves the receiver sensitivity by 6-8dB. When enabled, the transmission rate decisions are made separately for each unit.

The transmission rate decision algorithm is completely separated from the retransmission mechanism defined by *Number of Retransmission* and *Number of Dwells to Retransmit* parameters. The transmission rate decision algorithm provides Access Units with simultaneous, adaptive support for multiple Subscriber Units at different rates. The decision on the rate of each transmission (first attempt) is based on counting transmissions, retransmissions and *successful windows*. A *window* is defined as *n* consecutive transmission or retransmission attempts. A successful window is one contains at least one successful transmission attempt (i.e. sending a frame and receiving an ACK on the first transmission attempt).

The Rate menu includes the following parameters:

- ⇒ **Multi-Rate Support** – Allows enabling or disabling the Multi-Rate decision algorithm. When enabled, the algorithm supports degrade/upgrade of transmission rates from 1Mbps to the current value of the Maximum Data Rate parameter. Enabling the algorithm has no effect if the Maximum Data Rate is 1Mbps. The default selection is *Disabled*.
- ⇒ **Multi-Rate Decision Window Size** – Allows setting the size of the decision window. Increasing the size of the window will increase the probability that it will be a successful window, thus slowing down the decision to degrade to a lower rate and accelerating the decision to upgrade to a higher rate. The allowed range is 1 to 50. The default value is 3.
- ⇒ **Show Rate Counters** (SU only) – Displays the number of packets that were transmitted since the last reset at each of the rates (1Mbps, 2 Mbps, 3 Mbps) and the total number of retransmissions.
- **Dwell Time** (AU only) – The time spent on a radio channel before hopping to the next channel according to the operational hopping sequence. The default value is 128 Kilo-microseconds. The allowed selections are 32, 64 and 128 Kilo-microseconds.

1.8.6 Service Parameters (Subscriber Units only)

The *Service Parameters* menu includes the following parameters:

- **User Filtering Parameters** – This menu item is only available in SUs. This feature allows you to define IP addresses of devices that are authorized to access the wireless media, serving for security and/or control purposes. Choose this option to define the following IP parameters:
 - * **User Filtering Option** – To disable or enable the User Filtering feature. The available options are:
 - Disable (No filtering)
 - IP only (only IP Protocol Frame Passes)
 - Enable (only User Filtering defined Addresses Pass)The default selection is *Disabled*.
 - * **Set User Filter Address** – Displays the current IP addresses. Allows you to enter up to 8 IP addresses. The default for all addresses is 000.000.000.000.
 - * **Set User Filter Mask** – Displays the current masks. Allows you to enter up to 8 subnet masks. The default for all subnet masks is 255.255.255.255.
 - * **Set User Filter Range** – To define a range of addresses (the range includes the base address). The default value is 0 (not used).

Note: You may use either *Mask* or *Range* (but not both) to define a group of addresses.

- * **Delete a User Filtering Entry** – Displays the current list of IP addresses, subnet masks and ranges. Enter the list number (from 0 to 7) to delete the entry from the list (the list number will be replaced by the default values).
- * **Delete All User Filtering Entries** – To delete all User Filtering entries (and replace them with the default values).

- * **Show All User Filtering Parameters** – Displays the current User Filtering Option and the list of User Filtering addresses, subnet masks and ranges.
- **MIR and CIR Parameters** – The CIR (Committed Information Rate) value specifies the minimum data rate guaranteed to the applicable subscriber. The MIR (Maximum Information Rate) value specifies the maximum data rate available for burst transmissions, provided such bandwidth is available. Select this option to define the following parameters:
 - * **MIR/CIR Option** – Enables or disables the CIR\MIR support feature.
 - * **MIR: AU to SU** – Sets the Maximum Information Rate of the down-link from the AU to the SU. Available range is 32 to 2048Kbps. The MIR value cannot be lower than the corresponding CIR value. The default value is 128Kbps.
 - * **MIR: SU to AU** – Sets the Maximum Information Rate of the up-link from the SU to the AU. Available range is 32 to 2048Kbps. The MIR value cannot be lower than the corresponding CIR value. The default value is 128Kbps.
 - * **CIR: AU to SU** – Sets the Committed Information Rate of the down-link from the AU to the SU. Available range is 0 to 1024Kbps. The CIR value cannot be higher than the corresponding MIR value. The default value is 64Kbps.
 - * **CIR: SU to AU** – Sets the Committed Information Rate of the up-link from the SU to the AU. Available range is 0 to 1024Kbps. The CIR value cannot be higher than the corresponding MIR value. The default value is 64Kbps.
 - * **Show MIR/CIR Parameters** – Displays the current values of the MIR and CIR parameters.
- **Show Service Parameters** – Displays the current values of the *Service Parameters (User Filtering Parameters and MIR and CIR parameters)*.

1.8.7 Accounting Parameters (Subscriber Units only)

The RADIUS (Remote Authentication Dial In User Service) accounting interface, developed for service providers that serve dial-in users, allows service providers to bill their clients according to actual usage of the services. The Radius Accounting standard (rfc no. 2139) defines the interface between NAS (Network Access Server) and the Accounting Server.

The handshake process between the NAS and the Accounting Server includes authentication field based on shared secret key. The NAS and the Accounting Server operates in a client-server model, where the NAS is the client.

In the BreezeACCESS system there is a NAS implemented in each Subscriber Unit. Every period defined by the service provider (Accounting Interval) the NAS (SU) will update the Radius Accounting Server with the traffic passed through it during the period. From the Radius Server point of view this period is a session in accordance with the rfc 2139 definitions. The information is sent to the Radius Server using the standard Radius attributes. The record structure is described in Section 1.8.7.1 on the next page.

The *Accounting Parameters* menu allows enabling the RADIUS client embedded in the subscriber units and configuring the parameters that control the transmission of accounting records to a RADIUS billing server. The *Accounting Parameters* menu includes the following parameters:

- **Accounting Option** - To enable or disable the accounting records transmission feature. When this option is enabled, the SU enables the RADIUS client. The default is *Disabled*.
- **RADIUS Server IP Address** – Specifies the IP address of the RADIUS server to be used. This is the destination address for the accounting records. The default address is *000.000.000.000*.
- **Radius Server Accounting Port** – Specifies the port number of the Radius Accounting port according to RFC 2139. This port is used for the handshake between the Radius Server and the Radius Client. Allowed range is 1000 to 9999. The default value is 1813.
- **Maximum Accounting Interval** – Specifies the interval in seconds between two consecutive transmissions of accounting records. The allowed range is from 60 to 1800 seconds (1 to 30 minutes). The default value is *60* seconds.
- **Show Accounting Parameters** – Displays the current values of the Accounting parameters.

1.8.7.1 RADIUS Record Structure

Session Id Parameters

Field	Size (bytes)	Description
RU HW ID	6	Remote Unit (SU) MAC Address
RU Address	4	Remote Unit (SU) IP Address
RU ID	16	Remote Unit (SU) Identifier String (defined by Service Provider)
MIR_to_RU	2	Maximum Information Rate to Remote Unit (SU)
CIR_to_RU	2	Committed Information Rate to Remote Unit (SU)
MIR_from_RU	2	Maximum Information Rate Remote Unit (SU)
CIR_from_RU	2	Committed Information Rate from Remote Unit (SU)
Reset Counter	1	Number of reset counter
Session_ID_Cnt	2	Session ID counter-incremented by one each record

Ethernet Vendor Specific Parameters

Field	Size (bytes)	Description
Record Type	1	Ethernet/Management/Telephony.
End User Address	4	IP source address of all frames for this record.
End User HW Address	6	MAC source address of all frames for this record.
Destination Address HW Address	6	MAC destination address of all frames for this record.
Broadcast/Unicast	1	MAC level which identifies broadcast or unicast.
IP Service Type	1	Precedence / D (delay) / T (throughput) / R (reliability)
Destination Address	4	IP destination address of all frames for this record.
Layer 3 Protocol	1	Layer 3 Protocol type
<i>Tx Bytes</i>	<i>4</i>	<i>Number of bytes transmitted</i>
<i>Rx Bytes</i>	<i>4</i>	<i>Number of bytes received</i>
<i>Tx Packets</i>	<i>4</i>	<i>Number of packets transmitted</i>
<i>Rx Packets</i>	<i>4</i>	<i>Number of packets received</i>

SP Management Vendor Specific Parameters

Field	Size (bytes)	Description
Destination Address HW Address	6	MAC destination address of all frames for this record.
Broadcast/Unicast	1	MAC level broadcast or unicast.
IP Service Type	1	Precedence / D (delay) / T (throughput) /R (reliability)
Destination Address	4	IP destination address of all frames for this record.
Tx Bytes	4	Number of bytes transmitted
Rx Bytes	4	Number of bytes received
Tx Packets	4	Number of packets transmitted
Rx Packets	4	Number of packets received

1.8.8 Voice Parameters (Subscriber Units with voice support only)

The parameters in the *Voice Parameters* menu include the following options:

- **Volume** – Allows setting of the gain of the voice signal to the earphone. Available range is 0dB to -20dB in 1dB steps. The default value is -3dB.
- **Buffer Delay** – Allows specifying the delay in milliseconds that may be introduced by additional Quality of Service processing. Available range is 0 to 300 (in mS). The default value is 0.

***Note:** When using a Fax/Modem (only supported with G.711 codecs), it is recommended to set the delay value within the range of 100 - 150.*

- **Echo Cancellation** – Allows enabling or disabling the built-in echo cancellation feature. The default value is *Enable*.

***Note:** When using a Fax/Modem this parameter should be set to Disable.*

- **Voice Codec** – Allows specifying the relative priority of the codecs. The units support the following codecs:

1. G.723.1 (6.4Kbps rate, 1:10 compression ratio)
2. G.729 (8Kbps rate, 1:8 compression ratio)
3. G.711 Ulaw (64Kbps, no compression, US standard)
4. G.711 Alaw (64Kbps, no compression, European Standard)

You can enter a list of one to four codecs, specifying the relative priorities to be offered during capabilities' exchange according to the H.323 standard. For example, enter 2 to always use the G.729 codec. Enter 2, 1, 3, 4 to set the highest priority for G.729 and the lowest priority for G.711 Alaw. The default setting is all four codecs, in the priority listed above.

- **Voice Activity Detection** – Choose this option to enable the Voice Activity Detection, and suppression of silence periods to decrease the transmitted traffic volume. This will improve overall system performance by allowing the AU to support more voice channels. Available options are:

Voice Activity Detection OFF.

Voice Activity Detection G7231 (enable when using G7231 compression).

Voice Activity Detection G729 (enable when using G729 compression).

Voice Activity Detection Both (enable when using either G7231 or G729 compression).

Voice Activity Detection is not applicable when using G711 codec. The default selection is 0 (Voice Activity Detection OFF).

1.8.9 Dialing Parameters (Subscriber Units with voice support only)

The parameters in the *Dialing Parameters* menu include the following options:

- **Pulse Dialing** – Allows enabling or disabling the automatic pulse dialing detection feature to support telephones with pulse dialing. The default selection is *Enabled*.
- **Gatekeeper Option** – If set to Enable, the unit will communicate with the Gatekeeper to resolve the destination telephone number into the IP address and to register its own phone number and IP address with the Gatekeeper. The default selection is *Disabled*.
- **Gatekeeper/GateWay IP Address** – Allows specifying the IP address of the Gateway/Gatekeeper. If the Gatekeeper Option parameter (see above) is set to Enabled, an IP address must be specified. The default value is 000.000.000.000.
- **Telephone Number** – The telephone number as specified in the Gateway (if it is required by the specific type of Gateway used). The default number is 0000....0 (10 zeros).

Note: When using a Gateway without a Gatekeeper, this number must be predefined in the Gateway.

- **H323 Terminal ID** – The H323 Terminal ID (Name) to be used for calling the terminal when the caller uses this feature (e.g. NetMeeting). Applicable only when a Gatekeeper is used and the *Gatekeeper Option* parameter is set to *Enabled*. The default selection is X (No H323 Terminal ID)
- **IP Dialing Option** – Allows enabling or disabling dialing using IP addresses. The default selection is *Enabled*.
- **IP Dialing Indicator** – Allows specifying the prefix used to identify an IP Dialing string. Applicable only if the *IP Dialing Option* parameter (see above) is set to *Enabled*. The default value is *.
- **Automatic Prefix** – Allows specifying a default prefix (number of the Gateway trunk port) to be automatically inserted and transmitted to the gateway before the dialed number. The default is X (no Gateway Prefix).
- **Voice Packets ToS** – Allows setting the value of the Type of Service (ToS) field in the IP header of voice packets (RTP). If the router/gateway in the Base Station supports Quality of Service based on ToS, the value of this parameters should be configured according to the definitions of the router/gateway in order to take advantage of the QoS feature and to ensure that voice packets will be handled accordingly. Available values are 0-255. The default value is 0.

2. USING TELNET FOR REMOTE ACCESS

Use the following procedure to connect to BreezeACCESS 3.5 units via a Telnet session.

1. Connect the PC to the Ethernet port of the unit (or the hub to which the unit is connected) using a straight Ethernet cable. If you connect the PC directly to a unit that is normally connected to a hub, use a crossed Ethernet cable. You may also connect the PC to any Ethernet port on the network and communicate with the unit to be managed via the wired or wireless media.
2. Make sure that the IP parameters of the PC are configured to enable connectivity with the unit.
3. Run a Telnet application and use the IP address of the unit to be managed as the Host Name.
4. Set Port to *Telnet* (this is the default).
5. Set Terminal Type to *VT100* (this is the default).
6. Enter the Service Provider password.
7. When the password is recognized, the following message is displayed:

You have entered.

8. Press **Enter**, the Breeze ACCESS Monitor is displayed on the screen.
9. To exit the Telnet session, choose *Disconnect* from the *Connect* menu. (The session is terminated automatically, after a specific time of inactivity determined by the Log-out Timer).

3. SOFTWARE VERSION DOWNLOAD PROCEDURE

3.1 General

Firmware upgrades to the unit's FLASH memory are performed by a simple download procedure using a TFTP application. Before performing an upgrade procedure, be sure you have the correct files and latest instructions.

Upgrade packages can be obtained from BreezeCOM's web site, **www.breezecom.com**.

Note: *Shutting down power to the unit or terminating the download procedure before completion may cause the unit to be inoperable.*

1. Verify that you have the IP Address of the unit to be loaded. Verify that the IP address of the PC from which you intend to perform the upgrade belongs to the same subnet as the unit to be upgraded. If the unit is behind a router, verify that the unit is configured with the correct *Default Gateway Address*.

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. From the Main Menu select *1 – Info Screens*. From the Info Screen menu select *2 – Show Basic Configuration*. You will receive a display of the current configuration of the basic parameters, including the *IP Address*, *Subnet Mask* and *Default Gateway Address*.

To configure any of the IP parameters, go to the Main Menu and select *3 – Basic Configuration*. From the Basic Configuration Menu, select: *1 – IP Address*. To configure the Subnet Mask, select *2 – Subnet Mask*. To configure the Default Gateway Address select *3 – Default Gateway Address*.

2. To verify the connection, PING the unit's IP address. Verify that PING replies are being received.
3. The procedure to be used depends on the unit's FLASH memory type. Identify the FLASH memory type by using the Monitor program, connecting the PC to the unit either directly or via Telnet.

From the Main Menu, select *1 – Info Screens*. From the Info Screen menu select *1 – Show Unit Status*. The last line of the Unit Status display will indicate the FLASH type and size, e.g.: FLASH Type: FLASH FILE 4M or FLASH type: STRATA 4M.

4. Use the TFTP utility, using 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` defines that the PC (client) will send a file to the `hostaddress`. `destinationfile` is the name of the file to be downloaded.

3.2 To Download an Upgrade to a Unit with FLASH Type: FLASH FILE

Use the following table to determine which source file name to use, according to the unit's type.

Unit Type	Source File Name
AU	eanafb
SU-D (data only)	eansfb

Use the SNMP write community `<SnmpWriteCommunity>.dwn` (the default write community is `private`) to define the remote filename.

For example: to download the upgrade file BA_265 to an AU whose IP address is 206.25.63.65: `C:\BA_265\Firmware\Firmware>tftp -i 206.25.63.65 put eanafb private.dwn`

Note: *If you are upgrading a Subscriber Unit (SU) which is not associated with an AU, the unit will reset every one minute (approximately) and the following message will be displayed:*

```
FTL: file src\wpscan.c line 262 Too large number of  
scanning attempts
```

The unit will reset and it will take a few seconds before you can re-establish the connection to it. You should either have the SU associated with an AU before starting the download process or succeed to complete the download before the unit resets. Otherwise you will have to try again until you succeed to complete the download.

When download is completed the following message will be displayed:

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

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

From the Monitor Main Menu, select 2 – *Unit Control*. From the Unit Control menu, select 5 – *Flash Memory Control*. From the Flash Memory Control menu, select S – *Show Flash Versions*. The display will be as follows:

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

Current Version:	2.2.6
Shadow Version:	2.6.5
Version After Reset:	2.2.6

Use the *Flash Memory Control* menu select the active software version, as follows:

To activate the backup (shadow) version: from the Flash Memory Control menu select *1 - Reset and Boot from Shadow Version*. Select *1 – Reset Now* and press ENTER. The unit will reset and the Shadow version will be used as the active version. Note that after the next Reset, the Current version will be activated again.

If the active version is the Shadow version and you wish to continue using it after the next Reset, select *2 - Use Current Version After Reset* from the Flash Memory Control menu. Select *1 – Set As Default Now* and press ENTER. This will actually cause switching between the names of the two versions: The previously Shadow version will be called Current and vice versa. The following message will be displayed: UP Image FLASH will be operational.

For BreezeACCESS units running software version 2.2 and up, the download procedure is protected. A trial to download a wrong version (e.g. using <SnmpWriteCommunity>.fmr when trying to download a new version to units with a FLASH Type: FLASH FILE) will be rejected.

3.3 To Download an Upgrade to a Unit with FLASH Type: STRATA

Use the following table to determine which source file name to use, according to the unit's type.

Unit Type	File Name
AU	BA_X.AU
SU-D (data only)	BA_X.SU
SU-DV (Data & Voice)	BA_X.SUV

X refers to the software version number, up to 5 decimal digits (e.g. for software release 2.6.5, X=265).

Use the SNMP write community <SnmpWriteCommunity>.fmr (default write community is `private`) to define the remote filename. For example: to download the upgrade file BA_265 to an SU whose IP address is 206.25.63.55:

```
C:\BA_265\Firmware\Firmware>tftp -i 206.25.63.55 put BA_265.su
private.fmr
```

Note: If you are upgrading a Subscriber Unit (SU) which is not associated with an AU, the unit will reset every minute or so and the next message will be displayed:

```
FTL: file src\wpSCAN.c line 262 Too large number of
scanning attempts.
```

The unit will reset and it will take a few seconds before you can re-establish the connection to it. You should either have the SU associated with an AU before starting the download process or succeed to complete the download before the unit resets. Otherwise you will have to try again until you succeed to complete the download.

When download is completed the following message will be displayed:
Download operation has been completed successfully.

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

From the Monitor Main Menu, select 2 – *Unit Control*. From the Unit Control menu, select 5 – *Flash Memory Control*. From the Flash Memory Control menu, select S – *Show Flash Versions*. The display will be as follows:

```
Flash Versions
=====
Current Version      : 2.2.6
Shadow Version       : 2.6.5
Version After Reset  : 2.2.6
```

Use the *Flash Memory Control* menu select the active software version, as follows:

To activate the backup (shadow) version: from the Flash Memory Control menu select 1 - *Reset and Boot From Shadow Version*. Select 1 – *Reset Now* and press ENTER. The unit will reset and the Shadow version will be used as the active version. Note that after the next Reset, the Current version will be activated again.

If the active version is the Shadow version and you wish to continue using it after the next Reset: from the Flash Memory Control menu, select 2 - *Use Current Version After Reset*. Select 1 – *Set As Default Now* and press ENTER. This will actually switch between the names of the two versions; the Shadow version will be called Current and vice versa. The following message will be displayed: UP Image FLASH will be operational...

For BreezeACCESS units running software version 2.2 and up, the download procedure is protected. A trial to download a wrong version (e.g. using <SnmpWriteCommunity.dwn> when trying to download a new version to units with a FLASH Type: STRATA will be rejected).

4. CONFIGURATION DOWNLOAD/UPLOAD

The Configuration Download/Upload utility simplifies the task of remotely configuring a large number of units using TFTP. The Download file and Upload file are identical in content, allowing the use of an uploaded file to perform download to other units. Each parameter is represented in the file by three fields:

- a. A symbolic string similar to the name of the parameter in the monitor program, followed by “=”.
- b. The value of the parameters (using the same values that are used in the monitor program).
- c. A comment (optional). If used, it should start with a “;” character.

An unknown parameter or a known parameter with an out of range value will be ignored by the unit.

Use the SNMP write community (the default is “private”) to define the download file (set):

`SnmpWriteCommunity.cfg`

Use the SNMP read community (the default is “public”) to define the upload file (get):

`SnmpReadCommunity.cfg`

5. SNMP MANAGEMENT

5.1 Supported MIBs

All products in the BreezeACCESS family include an embedded SNMP (Simple Network Management Protocol) agent. All functions can be accessed from the Management Information Base (MIB) using an SNMP application.

BreezeACCESS agents support the following MIBs:

- MIB-II (RFC1213)
- BRIDGE-MIB (RFC1286)
- BreezeCOM Private MIB
- BreezeACCESS Private MIB

The BreezeCOM and BreezeACCESS Private MIBs can be viewed by opening the MIB file on the provided diskette. The following tables provide details on the BreezeACCESS private MIBs: brzaccess.mib and brzphone.mib.

BreezeACCESS Object Identifiers

Object IDs	Description	Comment
breezecomSU1D	BreezecomOID.7	SU-1D, 3.5 Series
breezecomSU8D	BreezecomOID.8	SU-8D, 3.5 Series
breezecomSUBD	BreezecomOID.9	SU-BD, 3.5 Series
breezecomSU1D1V	BreezecomOID.10	SU-1D1V, 3.5 Series
breezecomSU8D1V	BreezecomOID.11	SU-8D1V, 3.5 Series
breezecomSUBD1V	BreezecomOID.12	SU-BD1V, 3.5 Series
breezecomAU	BreezecomOID.13	AU, 3.5 Series
breezecomSU1D-24	BreezecomOID.14	SU-1D, 2.4 Series
breezecomSU8D-24	BreezecomOID.15	SU-8D, 2.4 Series
breezecomSUBD-24	BreezecomOID.16	SU-BD, 2.4 Series
breezecomSU1D1V-24	BreezecomOID.17	SU-1D1V, 2.4 Series
breezecomSU8D1V-24	BreezecomOID.18	SU-8D1V, 2.4 Series
breezecomSUBD1V-24	BreezecomOID.19	SU-BD1V, 2.4 Series
breezecomAU-24	BreezecomOID.20	AU-NI, 2.4 Series
breezecomAUbst-24	BreezecomOID.21	AU-BS, 2.4 Series
breezecomSU1D-MMDS	BreezecomOID.22	SU-1D, MMDS Series
breezecomSU8D-MMDS	BreezecomOID.23	SU-8D, MMDS Series
breezecomSUBD-MMDS	BreezecomOID.24	SU-BD, MMDS Series
breezecomSU1D1V-MMDS	BreezecomOID.25	SU-1D1V, MMDS Series
breezecomSU8D1V-MMDS	BreezecomOID.26	SU-8D1V, MMDS Series
breezecomSUBD1V-MMDS	BreezecomOID.27	SU-BD1V, MMDS Series
breezecomAU-MMDS	BreezecomOID.28	AU-NI, MMDS Series
breezecomAUbst-MMDS	BreezecomOID.29	AU-BS, MMDS Series

Contents: brzaccess.mib:

MIB Parameter	Description	Range/Comment
<u>brzaccServiceParameters</u>	BrzAccessMib.1	
brzaccMirCirOption	BrzAccessMib.1.1	Disable (0), EnabledWithoutProtocol(1), EnabledWithProtocol (2) NA (255)
brzaccMirAUtoSU	BrzAccessMib.1.2	32-2048
brzaccMirSUtoAU	BrzAccessMib.1.3	32-2048
brzaccCirAUtoSU	BrzAccessMib.1.4	0-1024
brzaccCirSUtoAU	BrzAccessMib.1.5	0-1024
<u>brzaccUserFilterParams</u>	BrzAccessMib.2	
brzaccUserFilterOption	BrzAccessMib.2.1	Disable (0), IpOnly (1), Enable (2), NA (255)
<u>brzaccIpFilterTable</u> brzaccIpFilterEntry brzaccIpID brzaccMaskID brzaccIpFilterRange brzaccIpFilterIdx	BrzAccessMib.2.2 BrzAccessMib.2.2.1 BrzAccessMib.2.2.1.1 BrzAccessMib.2.2.1.2 BrzAccessMib.2.2.1.4 BrzAccessMib.2.2.1.4	IP Address IP Address Integer Table Index
brzaccDeleteOneUserFilter	BrzAccessMib.2.3	Off (0), FirstEntry (1), SecondEntry (2), ThirdEntry (3), FourthEntry (4), FifthEntry (5), SixthEntry (6), SeventhEntry(7), EighthEntry (8), NA (255)
brzaccDeleteAllUserFilters	BrzAccessMib.2.4	DeleteAll (1), Off (2), NA (255)

MIB Parameter	Description	Range/Comment
<u>brzaccAccountingParameters</u>	BrzAccessMib.3	
brzaccAccountingOption	BrzAccessMib.3.1	Disable (0), Enable (1), NA (255)
brzaccRadiusServerIpAddress	BrzAccessMib.3.2	IP Address
brzaccMaxAccountingInterval	BrzAccessMib.3.3	60 to 1800
brzaccRadiusServerAccountingPort	BrzAccessMib.3.4	Range 1000 to 9999
<u>brzaccNwMngParameters</u>	BrzAccessMib.4	
brzaccAccessToNwMng	BrzAccessMib.4.1	WlanOnly (0), EthOnly (1), BothWlanEth (2), NA (255)
brzaccNwMngFilter	BrzAccessMib.4.2	Disable(0), ActivateOnEthPort (1), ActivateOnWlanPort (2), ActivateOnBothWlan&Eth(3), NA (255)
<u>mngIpFilterTable</u> mngIpFilterEntry brzaccNwMngIpAddress brzaccNwMngIpTableIdx	BrzAccessMib.4.3 BrzAccessMib.4.3.1 BrzAccessMib.4.3.1.1 BrzAccessMib.4.3.1.2	IP Address Table Index
brzaccDeleteOneNwIpAddr	BrzAccessMib.4.4	Off (0), FirstEntry (1), SecondEntry (2), ThirdEntry (3), NA (255)
brzaccDeleteAllNwIpAddrs	BrzAccessMib.4.5	on (1), off (2), NA (255)

MIB Parameter	Description	Range/Comment
<u>brzaccBridgeParameters</u>	BrzAccessMib.5	
brzaccEthBroadcastFiltering	BrzAccessMib.5.1	Disable (0), EthOnly (1), WlanOnly (2), BothWlan&Eth (3), NA (255)
<u>brzaccVLANSupport</u>	BrzAccessMib.5.2	
brzaccVlanID	BrzAccessMib.5.2.1	IP address
brzaccEthernetLinkType	BrzAccessMib.5.2.2	AccessLink (1), TrunkLink (2), HybridLink (3)
brzaccPriorityQueThreshold	BrzAccessMib.5.2.3	Range: 0-7 or 255 is disable
brzaccPOTSPortPriorityTag	BrzAccessMib.5.2.4	Range: 0-7 or 255 is disable
brzaccManagementVlanID	BrzAccessMib.5.2.5	IP Address
brzaccBridgeAgingTime	BrzAccessMib.5.3	(in seconds): 100 to 2000.
BrzaccLanToWirelessLink BridgeMode	BrzAccessMib.5.4	RejectUnknown (0), ForwardUnknown(1), NA (255)
brzaccBroadcastRelaying	BrzAccessMib.5.5	Disable(0), Enable(1), NA (255)
brzaccUnicastRelaying	BrzAccessMib.5.6	Disable(0), Enable(1), NA (255)

MIB Parameter	Description	Range/Comment
<u>brzaccAirInterface</u>	BrzAccessMib.6	
brzaccESSID	BrzAccessMib.6.1	Up to 31 chars
brzaccAckDelayLimit	BrzAccessMib.6.2	Low (0), Medium (1), High (2)
brzaccFreqOffset	BrzAccessMib.6.3	<u>MMDS series</u> : Range depends on Hopping Band <u>2.4 series</u> : Not Applicable (reserved for special applications) <u>3.5 series</u> : Depends on specific model and selected Hopping Band
brzaccTransmitDiversity	BrzAccessMib.6.4	Use2Antenas (0), Antena1 (1), Antena2 (2)
brzaccHoppingSequence	BrzAccessMib.6.5	2.4 series only Range: 1 to 26 depends on Hopping Standard
brzaccHoppingSet	BrzAccessMib.6.6	2.4 series only, Range: 1 to 3
brzaccHoppingSync	BrzAccessMib.6.7	Idle (0), Master (1), Slave (2), NA (255)
brzaccHoppingShift	BrzAccessMib.6.8	<u>MMDS series</u> : Range depends on Hopping Band <u>2.4 series</u> : Not Applicable <u>3.5 series</u> : Range depends on Hopping Band

MIB Parameter	Description	Range/Comment
brzaccHoppingBands	BrzAccessMib.6.9	<p><u>MMDS series:</u> FrqMMDS_HoppingSequence6MHz(34), frqMDS_HoppingSequence12MHz (35), frqFlexibleHopping(37), frqSingleChannelMMDS(38), <u>2.4 series:</u> = Hopping Standard. Factory defined, cannot be changed. <u>3.5 series, 3.8 GHz products:</u> frq3.8GHzBand1(0), frq3.8GHzSelectable(1), frq3.8GhzApprovalSpectrumMask(2), frqSingleChannel3.8GHz(42), <u>3.5 series, 3.5a and 3.5b products:</u> frq3.5aGHzHoppingSequence10MHz (15), frq3.5aGHzHoppingSequence12MHz (16), frq3.5aGHzHoppingSequence14MHz (17), frq3.5aGHzHoppingSequence24MHz (18), frq3.5aGHzHoppingSequence28MHz (19), frq3.5aGHzHoppingSequence36MHz(20), frq3.5aGHzHoppingSequence42MHz(21), frq3.5aGHzHoppingSequence50MHz(32), frqSingleChannel3.5GHz (40), <u>3.5 series, 3.5a1 products:</u> frq3.5a1GhzHoppingSequence10MHz(23), frq3.5a1GhzHoppingSequence12MHz(24), frq3.5a1GhzHoppingSequence14MHz(25), frq3.5a1GhzHoppingSequence24MHz(26), frq3.5a1GhzHoppingSequence28MHz(27), frq3.5a1GhzHoppingSequence36MHz(28), frq3.5a1GhzHoppingSequence42MHz(29), frq3.5a1GhzHoppingSequence50MHz(33), frqSingleChannel3.5a1GHz (39), <u>3.5e series:</u> frq3.5eGHzHoppingSequence10MHz(52), frq3.5eGHzHoppingSequence12MHz(53), frq3.5eGHzHoppingSequence14MHz(54), frq3.5eGHzHoppingSequence24MHz(55), frqSingleChannel3.5eGHz (43),</p>

MIB Parameter	Description	Range/Comment
		2.6 series: frq2.6GHzHoppingSequence10MHz(44), frq2.6GHzHoppingSequence12MHz(45), frq2.6GHzHoppingSequence14MHz(46), frq2.6GHzHoppingSequence24MHz(47), frq2.6GHzHoppingSequence28MHz(48), frq2.6GHzHoppingSequence36MHz(49), frq2.6GHzHoppingSequence42MHz(50), frqSingleChannel2.6GHz (51), NA (155)
brzaccMaxDataRate	BrzAccessMib.6.10	1Mbps (1), 2Mbps (2), 3Mbps (3)
brzaccTransmitPower Control	BrzAccessMib.6.11	0 to 15
brzaccRxAttenuation Control	BrzAccessMib.6.12	0dB (0), 10dB (1), 25dB (2), NA (255)
brzaccAssociationAging Time	BrzAccessMib.6.13	In sec. or No Aging. Range: 1 to 50000, 0 means No Aging.
BrzaccMaximumVoice Sessions	BrzAccessMib.6.14	0 to 50, only in AU. NA (255)
<u>brzaccFlexSubBandDef</u>	BrzAccessMib.6.15	
brzaccAddSubBand	BrzAccessMib.6.15.1	Up to 9 decimal number in one of the following formats: a. XXXX b. XXXX,YYYY (no spaces) c. XXXX-YYYY (no spaces)
brzaccDelSubBand	BrzAccessMib.6.15.2	Up to 9 decimal number in one of the following formats: a. XXXX b. XXXX,YYYY (no spaces) c. XXXX-YYYY (no spaces)
brzaccEraseAllSubBands	BrzAccessMib.6.15.3	EraseAll (0), Cancel (1)
brzaccSubBandTable	BrzAccessMib.6.15.4	Displays sub bands supported after next reset.
brzaccSubBandEntry	BrzAccessMib.6.15.4.1	
brzaccSubBand	BrzAccessMib.6.15.4.1.1	Displays sub bands

MIB Parameter	Description	Range/Comment
brzaccSubBands TableIdx	BrzAccessMib.6.15.4.1.2	Index to table
brzaccCurrentHopping SeqTable	BrzAccessMib.6.15.5	Displays currently used frequencies.
BrzaccCurrentHopping SeqEntry	BrzAccessMib.6.15.5.1	
brzaccHopSeqSubBand	BrzAccessMib.6.15.5.1. 1	Displays frequencies
brzaccCurrHopSeq TableIdx	BrzAccessMib.6.15.5.1. 2	Index to table
brzaccRate	BrzAccessMib.6.16	
brzaccNumOf Retransmissions	BrzAccessMib.6.16.1	Enable/disable (only SU)
brzaccNumOf Retransmissions	BrzAccessMib.6.16.2	1 to 50 (only SU)
brzaccSecurityParameters	BrzAccessMib.6.17	
brzaccAuthentication Algorithm	BrzAccessMib.6.17.2	OpenSys (0), ShareKey (1)
brzaccDefaultKeyID	BrzAccessMib.6.17.3	Range: 1 to 4
brzaccWEPKey1	BrzAccessMib.6.17.4	10 hexadecimal digits
brzaccWEPKey2	BrzAccessMib.6.17.5	10 hexadecimal digits
brzaccWEPKey3	BrzAccessMib.6.17.6	10 hexadecimal digits
brzaccWEPKey4	BrzAccessMib.6.17.7	10 hexadecimal digits
brzaccCurrentTxPwrLvl	BrzAccessMib.6.18	BreezeACCESS 2.4 MMDS Indoor units only: Low (0), High (1)

MIB Parameter	Description	Range/Comment
<u>brzaccPerformanceParams</u>	BrzAccessMib.7	
brzaccNumOfRetransmissions	BrzAccessMib.7.1	0 to 100
brzaccNumOfDwellToRetransmit	BrzAccessMib.7.2	0 to 9
brzaccNumOfRetransToDecRate	BrzAccessMib.7.3	0 to 10
brzaccMinContentionWin	BrzAccessMib.7.5	0 to 10000
brzaccMaxMulticastRate	BrzAccessMib.7.6	1Mbps (1), 2Mbps (2), 3Mbps (3)
brzaccCarrierSenseLevel	BrzAccessMib.7.7	-255 to 255
brzaccDwellTime	BrzAccessMib.7.9	T32KiloMicrosecods (32), T64KiloMicrosecods (64), T128KiloMicrosecods (128), NA(255)
brzaccRTSThreshold	BrzAccessMib.7.10	20 to 1600 Only AU
brzaccRate	BrzAccessMib.7.11	
brzaccMultiRateSupport	BrzAccessMib.7.11.1	disable (0), enable (1), NA (255)
brzaccMultiRateDecisionWinSize	BrzAccessMib.7.11.2	Range: 1 to 50

MIB Parameter	Description	Range/Comment
<u>brzaccSiteSurvey</u>	BrzAccessMib.8	
perHopStatisticsTable	BrzAccessMib.8.1	
hopSeqEntry	BrzAccessMib.8.1.1	
wPperHopStatisticsTable	BrzAccessMib.8.1.1.1	
hopTracerRx	BrzAccessMib.8.1.1.2	
hopTracerTx	BrzAccessMib.8.1.1.3	
hopTracerRetries	BrzAccessMib.8.1.1.4	
hopTracerRSSI	BrzAccessMib.8.1.1.5	
<u>brzaccTrafficStatistics</u>	BrzAccessMib.8.2	
brzaccResetTrafficCounters	BrzAccessMib.8.2.1	NoResest (0), Reset (1)
<u>brzaccEthCounters</u>	BrzAccessMib.8.2.2	
brzaccTotalRxFramesViaEthernet	BrzAccessMib.8.2.2.1	Counter (Read-only)
brzaccTxWirelessToEthernet	BrzAccessMib.8.2.2.2	Counter (Read-only)
<u>brzaccWlanCounters</u>	BrzAccessMib.8.2.3	
brzaccTotalTxFramesToWireless	BrzAccessMib.8.2.3.1	Counter (Read-only)
brzaccTotalRxFramesFromWireless	BrzAccessMib.8.2.3.2	Counter (Read-only)
brzaccTotalRetransmittedFragments	BrzAccessMib.8.2.3.3	Counter (Read-only)
brzaccWlanFramesDropped	BrzAccessMib.8.2.3.4	Counter (Read-only)
brzaccRecivingUnits	BrzAccessMib.8.3	
BrzaccAveragePower	BrzAccessMib.8.3.1	A value representing the average Signal Strength
brzaccRssiOrDbm	BrzAccessMib.8.3.2	RSSI (0), DBM (1)

MIB Parameter	Description	Range/Comment
brzzaccSoecialOp	BrzAccessMib.9	Factory use only
brzaccUnitControl	BrzAccessMib.10	
brzaccResetUnit	BrzAccessMib.10.1	Cancel (0), ResetSystemNow (1)
brzaccSetDefaults	BrzAccessMib.10.2	Cancel (0), Complete (1), Partial (2)
brzaccUnitName	BrzAccessMib.10.3	SIZE(32)
brzaccFlashMemoryControl	BrzAccessMib.10.4	Reset And Boot From Shadow Version (1), Use Current Version After Reset (2)
brzaccConsoleSpeed	BrzAccessMib.10.5	s9600bps (1), s19200bps (2), s38400bps (3), s57600bps(4), s115200bps (5)
brzaccMonitorLogoutTimer	BrzAccessMib.10.6	1 to 999 minutes
brzaccUnitPasswords	BrzAccessMib.10.7	
brzaccReadOnlyPassword	BrzAccessMib.10.7.1	SIZE(32)
brzaccInstallerPassword	BrzAccessMib.10.7.2	SIZE(32)
brzaccAdminPassword	BrzAccessMib.10.7.3	SIZE(32)
brzaccIpParams	BrzAccessMib.11	
brzaccUnitIpAddress	BrzAccessMib.11.1	IP Address
brzaccSubNetMask	BrzAccessMib.11.2	IP Mask
brzaccDefaultGWAddress	BrzAccessMib.11.3	IP Address
brzaccSysInfo	BrzAccessMib.13	
brzaccUnitHwVersion	BrzAccessMib.13.1	Read-only, Hardware Platform Version
brzaccVoiceHwVersion	BrzAccessMib.13.2	Read-only, Voice Hardware Platform Version
brzaccSoftwareVersion	BrzAccessMib.13.3	Read-only, Running Software Version
brzaccShadowVersion	BrzAccessMib.13.4	Read-only, Shadow Software Version

MIB Parameter	Description	Range/Comment
brzaccSupportedMibVersion	BrzAccessMib.13.5	Read-only, The Supported Private MIB Versions
brzaccUnitMacAddress	BrzAccessMib.13.6	Read-only, Hardware MAC address of the Unit
brzaccUnitType	BrzAccessMib.13.7	Read-only, The Unit Type
brzaccAssociatedAU	BrzAccessMib.13.8	Read-only (only SU), Associated AU Mac Address
brzaccNumOfAssociated	BrzAccessMib.13.9	Read-only (only AU), Number of Associations Since Last reset
brzaccFlashType	BrzAccessMib.13.10	Read-only (string), STRATA FLASH = New Flash, FLASH FILE = Old Flash
brzaccFlashSize	BrzAccessMib.13.11	Read-only (integer), Flash Size In Mb

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MIB Parameter	Description	Range/Comment
<u>phonDialingParams</u>	BrzPhonMib.1	
phonPulseDialing	BrzPhonMib.1.1	Off (0), On (1), NA (255)
phonGateKeeperOption	BrzPhonMib.1.2	No (0), Yes (1), NA (255)
phonGkGwIpAddress	BrzPhonMib.1.3	IP Address
phonMyTelephoneNumber	BrzPhonMib.1.4	String up to 15 chars
phonH323TerminalID	BrzPhonMib.1.5	String up to 25 chars
phoneIpDialingOption	brzPhonMib.1.8	disable (0), enable (1), NA (255)
phoneIpDialingIndicator	brzPhonMib.1.9	Up to three ASSCI printable chars. if nothing is Indicated - no dialing indicator will be added
phoneAutomaticPrefix	brzPhonMib.1.10	Up to eight ASSCI printable chars, if nothing is Indicated - no prefix will be added
phoneVoicePacketsToS	brzPhonMib.1.11	0-255
<u>phonVoiceParams</u>	BrzPhonMib.2	
phonVoiceVolume	BrzPhonMib.2.1	0 to 20 (in dB), NA (255)
phonBufferDelay	brzPhonMib.2.2	0 to 300
phonEchoCancellation	brzPhonMib.2.3	disable (0), enable (1), NA (255)
phonVoiceCodec	brzPhonMib.2.4	1 - G7231, 2 - G729, 3 - G711u-law, 4 - G711A-law. New priority vector (i.e: 4213)
phonVoiceActivityDetection	brzPhonMib.2.5	OFF (0), G7231 (1), G729 (2), Both (3), NA (255)